Review of the Final Report

that was written by

J.-L. Françon, L. Bloncourt, D. Kügler

Dated 18 April 2017

The HAGUE DISTRICT COURT (Chamber of Commercial Affairs)

Case Number C/09/434236/ HA ZA 13-17, and
case number C/09/441930 / HA ZA 13-476

Limited review

by

Experts of Claimants

A. Cats
H. Horlings

1 December 2017

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References

A – Interim Report V17, L. Bloncourt, J-L Françon and D. Kügler, 15 June 2016.
B – Review, Remarks and Questions (RRQ), W. Benschop, E. Boucher, A. Cats, H. Horlings, 27 Sept. 2016.
C – Portuguese Accident Investigation Report (RoA), DGAC, November 1994.
D – The Last 80 Seconds of Flight MP495, Avio*Consult*, 2017**,** in both English and Dutch languages; https://www.avioconsult.com/downloads-nl.htm
E – Information meeting DASB 1 Dec 1994, Congresgebouw The Hague. Lijst 2 nr. 5, production 5.
F – TV Documentary EénVandaag, 16-01-2016, https://npo.nl/AT_2047441, at 00:24 and from 11:05.

1. Introduction

1.1. The Case

1.1.1. On 21 Dec. 1992, a Martinair DC-10 crashed during landing at Faro airport; 56 people died and many more were severely injured. The accident investigation was carried out by an International Civil Aviation Organization (ICAO) "Annex 13" compliant Portuguese Commission of Investigation, led by the Portuguese Civil Aviation Authority, with support of the Dutch Aviation Safety Board (DASB), the US National Transportation Safety Board (NTSB) and others. A few years after the accident, a number of victims started collecting documents on the accident because they had no faith in the formal investigation and had serious doubts about the answers given to their questions by the DASB and about the information presented to the press by both Martinair and DASB. They subsequently contacted a personal injury lawyer.

1.1.2. Following an independent analysis by expert Harry Horlings of Avio*Consult*, a USAF Test Pilot School graduate, the lawyer subpoenaed the DASB, and therefore the State for:

1. Inappropriate, careless investigation of the cause of the accident, and
2. Misinforming the survivors and the next of kin of the deceased.

1.1.3. In the view of claimants, the Portuguese report contained many errors; the DASB should have noticed these, but they ignored them. Still, they tried to emphasize the weather conditions and constructed their own truth (different from the Portuguese).

1.1.4. During information meetings, DASB misinformed the survivors by answering 31 of the 143 asked questions inappropriately with their own opinion of the cause of the accident, which was not in agreement with the formal Portuguese Report. Based on the DASB 'truth', claimants have made important decisions in settling their personal injury cases. They trusted and relied on the supposed independence of the DASB.

1.1.5. The court in The Hague appointed three experts, J.-L. Françon, L. Bloncourt and D. Kügler, to provide independent expertise on the functioning of the DASB following the issue of the final accident investigation report by the Portuguese Commission. The experts published their findings in Interim Report V17, dated 15 June 2016 (ref. A), after which experts of claimants issued their Review, Remarks and Questions (RRQ, ref. B) on 27 September 2016, in accordance with the Guidelines for Experts. The Final Report by the experts was dated 18 April 2017.

1.1.6. This review of the Final Report is only limited, meaning that not the whole Final Report was reviewed. Experts of claimants considered it a waste of time to again spend many hours reviewing a report written by people who might be experts in conducting transport flights with large airplanes as pilots, but who already proved in their interim report to be ignorant on and not adequately familiar with the operation, the working of airplane systems and with flying qualities and performance of airplanes at a high engineering knowledge level, that definitely is required to read and evaluate objective DFDR data and hence to reconstruct the flight to a level required to answer the questions of the court. The final report again contains too many irrelevant paragraphs. The RRQ (ref. B) is to be considered part of this review of the Final report.

1.1.7. Most errors found in interim version V17 were not corrected by the experts and questions were not answered, despite many suggestions and remarks in the Review of Interim Report Version V17 (ref. B) by the experts of claimants.
This review is incomplete without Claimant's Review, Remarks and Questions (RRQ), dated 27 Sept. 2016 and all of its appendices (ref. B).

1.1.8. Below, reference is made to the Final Report (FR) with page or paragraph numbers (quotes in *italics* print between quotation marks), to the Portuguese Report of Accident (RoA, ref. C), to claimants' Review with Remarks and Questions (RRQ, ref. B) and to the applicable Aircraft Operations Manual (AOM) and Basic Instructions Martinair (BIM), of which the relevant pages are included as appendices in RRQ (ref. B).
Since experts included a paragraph with Experts' competencies in the final report on page 6, experts of claimants will therefore begin with a more comprehensive description of their competencies and expertise as well, preceded by some common information on the customary levels of expertise in the world of aviation.

1.2. Levels of Expertise in Aviation

For readers who are not familiar with the levels of expertise that can be achieved in aviation, some insight is given on the required training for airline pilots and for both experimental test pilots and flight test engineers in the paragraphs below.

1.2.1. **Commercial Pilots and Airline Transport Pilots**. Entry requirements for pilot training vary according to training location and local regulatory requirements, however generally, candidates should meet the following minimum entry criteria: Completed Secondary School education (in the Netherlands: HAVO or VWO) achieving national qualifications in English Language, Mathematics and Science subjects, and a class 1 pilot medical certificate.
For example, the large international aviation training company CAE Brussels offers an integrated Airline Transport Pilot Course (ATP), which takes approximately 20 months to complete. Ground training is conducted at Brussels Airport, Belgium for approximately 9 months, followed by flight training at CAE Phoenix in Mesa, Arizona, USA for approximately 9 months. The last part is performed at CAE in Oxford (or another suitable European training location) for a period of 2 months.
Hence, it takes only 20 months to obtain an airline pilot rating.

1.2.2. During the 9 months theoretical training, the following subjects are instructed: Air Law and Regulations, Human Performance and Limitations, Basic principles of flight, Aircraft general knowledge, Meteorology and Climatology, General VFR-IFR navigation & Radio navigation, Communication, Operational procedures and Aircraft performance, Weight and balance and Flight planning.
In 9 months' time, the achieved level of knowledge cannot be very high, is at a basic, general level which is considered to be just sufficient to operate the airplanes and its systems as a pilot.

1.2.3. During employment as airline pilot, type rating courses have to be attended, including frequent simulator training to qualify and remain qualified on the airplane types the pilot is engaged for by the airline companies. Additional training for captains exist too, but the subjects mentioned above on principles of flight, knowledge of aircraft and its systems at a higher BSc or MSc level is not required and is not presented to airline pilots. Ten thousand or more flight hours do not provide this level either, but only lots of experience, during which the knowledge of flight and operating procedures, as defined in airplane manuals and airline procedures, should become the highest attainable level.

1.2.4. **Experimental Test Pilots and Flight Test Engineers.** During and after World War II, Test Pilot Schools (TPS) were founded by the lead aviation nations (USA, UK, FR, Russia and recently also India and Brazil) because so many expensive prototype airplanes and flight crew were lost in catastrophic accidents during flight test operations because of the lack of adequate engineering and flight-test knowledge gained by (airline) pilots prior to, during and following regular pilot training. TPSs educate both test pilots and flight test engineers in the same class to be able to have the knowledge, experience and confidence to

act as a well-educated team in the cockpits of sometimes unknown airplanes-under-test. Pilots and flight test engineers who graduated from one of the Test Pilot Schools, for which the entry level is usually an MSc degree in engineering or a BSc and an entry exam, know there definitely is a difference in knowledge and experience level to be able to talk knowledgeable about performance and flying qualities of aircraft and conduct flight tests and aircraft evaluations in a safe, responsible and knowledgeable way. They also learned in greater detail about on-board systems, such as flight-control, engine and navigation, radar and other avionics systems to be able to test the systems in-flight.

1.2.5. In 1985, the year that Horlings attended the USAF TPS, half of the time of the TPS course was spent on theory at academic MSc level, with 32 subjects, including: subsonic and supersonic aerodynamics, pitot-statics, engines, airplane performance, flying qualities such as roll coupling, linear control theory, equations of motion, longitudinal and lateral-directional static and dynamic stability, maneuvering flight, test maneuvers for approach and landing, and on-board systems such as flight control computers, radars, electro-optical and (inertial) navigation systems and also instrumentation & data acquisition using flight data recorders, and finally Human Factors, all to a high academic level required to flight-test and evaluate all types of fixed-wing airplanes including the on-board systems and to be well-educated to discuss flight-test results with airplane design engineers and other (system and human factors) specialists. The TPS students had to pass 32 graded exams throughout the year. A grade below 70% was reason to be put on probation.

1.2.6. During the one-year long course, flight and flight-test experience were gained in 23 different types of airplanes, in size varying from gliders and small single-engine airplanes and helicopters to a big DC-10, and in subsonic and supersonic fighter jets; approximately 130 hours total flight time. Objectives during the test- and flying hours were, amongst others, the determination of longitudinal, directional and lateral stability flying qualities, climb, descent, approach, turn and cruise performance, stall and spin susceptibility and recovery (following loss of control), and the functioning and measuring of the accuracy of on-board radars and navigation systems such as radio navigation and inertial navigation systems (INS), as used also in the DC-10.

1.2.7. During the performance phase of the course, a data acquisition system, comparable to a Flight Data Recorder, was used on all flights to record the data that were required to produce data plots for the reports, which are comparable to the data plots out of the 'black boxes' DFDR, CVR and AIDS that were included in MP495 RoA, Annexes 15 and 9 (ref. C). Interpretation of and comprehending the relation between the data streams were required to be able to write the reports. During the course, approximately 32 graded reports had to be written to be able to graduate.

1.2.8. Because of the high entry level and high cost of training, only a small number of Dutch and European citizens attended and graduated from anyone of the Test Pilot Schools, including L'EPNER (école du personnel navigant d'essais et de reception) in Istres, France.

1.2.9. On the Home page of the USAF Test Pilot School (http://www.edwards.af.mil/Units/USAFTPS/), a reader will find:

"The United States Air Force Test Pilot School (USAF TPS) is where the Air Force's top pilots, navigators and engineers learn how to conduct flight test and generate the data needed to carry out test missions. Human lives and millions of dollars depend upon how carefully a test mission is planned and flown.

The comprehensive curriculum of Test Pilot School is fundamental to the success of flight test and evaluation. Upon graduating from TPS, graduates will have earned a Master of

Science Degree in Flight Test Engineering. Explore the tabs and links below to find out more".

1.2.10. The European Aviation Safety Agency (EASA), who took over the aircrew licensing regulations of the national authorities, awards the graduates of the Test Pilot Schools of USA, UK and FR with the highest category 1 flight test rating for conducting the following flight-tests:

- *Initial flight(s) of a new type of aircraft or of an aircraft of which flight and/or handling characteristics may have been significantly modified,*
- *Flights during which it can be envisaged to potentially encounter flight characteristics significantly different from those already known;*
- *Flights to investigate novel or unusual aircraft design features or techniques;*
- *Flights to determine or expand the flight envelope;*
- *Flights to determine the regulatory performances, flight characteristics and handling qualities when flight envelope limits are approached.*

Source: Conversion flight test rating and flight test instructor certificate, Min I&M, ILT; Commission Regulations (EU) No 1178/2011 and 290/2012.

1.2.11. An airline pilot, whatever his or her number of flight hours or flight experience, does not qualify for such a category because of the lack of adequate high-level knowledge on aeronautical engineering, aircraft performance, flying qualities, aircraft systems and flight test methods and techniques. An airline pilot might not even be aware of the existence of test pilot schools and of their level of training.
TPS graduates are the highest-level aircraft flight experts in the world. In the aviation industry, TPS graduates are respected for their unmatched knowledge and experience. For all other aviators applies: "*YOU DON'T KNOW what you don't know*" (source: FAA).

1.2.12. Test Pilots and flight test engineers are trained to conduct experimental flight-tests but might not always have the knowledge and experience required to conduct tests related to typical commercial airline revenue flights and operating procedures of a specific type of airplane. Therefore, in such cases, experienced airline pilots and other specialists are asked to participate in such flight-test programs.

1.2.13. During the investigation of accidents, when a higher-level knowledge of flying qualities and performance aspects is required, a TPS graduate will be assigned to participate, as was required in the accident investigations of the Royal Netherlands Air Force.

1.3. Expertise of Claimants' Expert H. Horlings of Avio*Consult*

1.3.1. Lieutenant-Colonel ret'd Ing. H. Horlings, founder of Avio*Consult*, graduated in Dec. 1985 as flight test engineer after completing the one-year long course at the USAF Test Pilot School at Edwards Air Force Base, CA, USA. During the year 1984, he prepared himself for the MSc level entry exam using applicable college books of both TU Delft and Kansas University.

During the course, besides on 22 other types of airplanes, Horlings also gained experience during two times five flight hours in a USAF KC-10 to evaluate the operation and Human Factors aspects of the cockpit systems, including the radar system, the INS and the systems for aerial refueling.

1.3.2. Following graduation from the Test Pilot School, Horlings was assigned a flight-test job at the Royal Netherlands Air Force Headquarters, Operational Research and Evaluation (ORE) Branch. This office scheduled, prepared, conducted and managed flight-tests and

aircraft evaluations with all Air Force aircraft types. Horlings was also involved in the evaluation, including in-flight testing, of new-to-buy airplanes, such as C-130 Hercules, Fokker 50 and 60, Pilatus PC-7, Gulfstream IV, F-16, DC-10 and helicopters Apache AH-64, AB-412, AS-532 Cougar, CH-47 Chinook, BO-105 and the unmanned Sperwer, and in modifications of F-16, F-27M NF- 5, Fokker 60 and AB-412 rescue helicopter. He was invited by EADS in Spain for design meetings of the A330 Multi-Role Tanker Transport aircraft. He was also responsible, and wrote content, for all aircraft and operating manuals for Air Force flight-crews, including the KDC-10.

1.3.3. From 1992 to 1996 he was assigned to work with DC-10 manufacturer McDonnell Douglas and the USAF to design and evaluate the modifications required to turn two DC-10 airplanes, bought from Martinair, into tanker/transport airplanes. He was also responsible for the flight-test program following the modifications that were accomplished by KLM engineering, and took part in the certification of the airworthiness of the aircraft at the FAA facilities in Long Beach, CA. During these years, Horlings gained much knowledge of the DC-10, its cockpit, control, navigation and refueling systems. The 10-hour flight experience with the KC-10 during the Test Pilot School course proved beneficial. Prior to the modifications, he evaluated the Area Inertial Navigation Systems (AINS) of the Martinair DC-10 thoroughly for suitability during world-wide aerial refueling operations, including during simulator sessions at the KLM flight training center.

1.3.4. During the last five years of his flight-test career, Horlings became head of the ORE Branch as Lieutenant-Colonel and was the functional chief of all Air Force experimental test pilots and flight test engineers. He also became a member of a scientific committee of the National Aerospace Laboratories (NLR) to review reports written by NLR-engineers prior to their release. Following his retirement, he was urgently asked by the Director of the NLR, Prof. Dr. Ir. F.J. Abbink, to stay a member of the Committee because of his education, knowledge, experience and, last but not least, his critical view.

1.3.5. Horlings started his Air Force career as radio/radar specialist and graduated in 1976 as electronics engineer at the HTS in Haarlem. In 1979, he attended a 4-month Avionics ('airborne electronics') Course at General Dynamics, Fort Worth, TX, and Hill Air Force Base, UT, USA to become Avionics Maintenance Officer. The objective of this course was to be able to teach the design and operation of electronic flight control systems, inertial navigation systems, radar and other electronic aircraft systems. From 1979 to 1984 he was teacher avionics systems and head master of the RNLAF Field Training Detachment at Airbases Leeuwarden and Volkel during the introduction of the F-16.

1.3.6. In 1977, Horlings received his private pilot license, including instrument training, and in 1979 also the corresponding American FAA license. During the flight training and thereafter, he gained experience and proficiency in operating the same radio navigation systems in the EU and USA that MP495 used during the approach to Faro Airport.

1.3.7. Horlings published articles on airplane control in Dutch and foreign aviation magazines, and was invited to present papers in the USA, Germany, Greece and the Netherlands by aviation authorities, accident investigators, the European Air Forces Flight Safety Committee and the Flight Safety Foundation. He also conducted supplemental airplane accident analyses and wrote supplemental reports. The transport safety board of Canada let him know to have used his work; South-Africa asked him to take part in the investigation of a fatal accident with a Jetstream 3100. Some of the papers and reports are downloadable from his AvioConsult.com website, on pages Downloads and Accidents. Horlings provided aircraft expertise as expert witness for General Electric in a law suit in Florida, USA.

1.3.8. Horlings, like almost nobody else in The Netherlands, is capable by training and experience of evaluating the DFDR and AIDS data of flight MP495, using his technical, operational and flying experience and knowledge of aircraft performance, flying qualities and the on-board navigation, engine and other aircraft systems, and the applicable airplane flight and operating manuals. For these reasons he was asked by Dr. Ir. C. Spaans, Qualimax BV, on behalf of mr. J.W. Koeleman and the victims, and as recommended by a professor of TU Delft, to review the available data of the MP495 accident, resulting in a written analysis in 2012 and supplementing documents and reviews, such as ref. B and ref. D, and presentations for the courts of Amsterdam and The Hague.

1.3.9. The weighing factor of Horlings' contributions to this case should be rated much higher than that of the experts because the two pilot-experts are not qualified test pilots, not accident investigators, and proved not have DC-10 aircraft systems knowledge at a level required to conduct satisfactory investigations, as will become very clear after reading ref. B and this review.

1.4. Expertise of Claimants' Expert A. Cats

1.4.1. Mr. A. Cats joint the Royal Netherlands Navy in 1967 as an officer and became Navigator on the Grumman Tracker S2A (1968-1969). Following the military pilot training course (1969-1971) on aircraft Fokker S-11 / Fouga Magister/ Grumman Tracker S2A, he was assigned Pilot / Operations Officer in the Royal Netherlands Navy (1971-1977) on aircraft: Grumman Tracker S-2A, Beechcraft TC45J and Breguet Atlantic SP13A.

1.4.2. In 1977 he joined the Dutch CAA (Rijks Luchtvaart Dienst):

- Senior Pilot-inspector Flight Operations,
- Examiner Instrument Rating/Private Pilot License/ Commercial Pilot License/ Air Transport Pilot License/ Type-Ratings all types,
- FAA Oklahoma: Flight Simulator Evaluator Course,
- Flight Simulator Evaluator, initial and (annual) renewal checks all simulators used by Dutch airlines,
- Member ETOPS Working Group, drawing up JAA rules and regulations for extended twin-engined operations,
- Supervisor introduction of Martinair Boeing B-767-300ER (1989),
- Supervisor introduction of KLM McDonnell Douglas MD-11 (1993),
- Supervisor introduction of KLM Boeing B-767-300ER (1995),
- Supervisor introduction Zero Flight Time (ZFT) Type-Rating Exams KLM,
- First Officer NLM (Fokker F-27) /Transavia (Boeing B-737)/KLM (McDonnell Douglas DC-10-30),
- Captain /Type-rating instructor (TRI) Air Holland (Boeing B-757/767).

1.4.3. From 1998-2003 he was Captain/ TRI/ Air Europe Italy /Blue Panorama (B-767-300ER)

1.4.4. His flying experience: Total 12900 hrs:

Military: 2560 hrs (Breguet Atlantic 1800 hrs)

Civil: Fokker F-27: 250 hrs (F/O NLM),

Boeing B-737: 1500 hrs (F/O Transavia),

DC-10: 1050 hrs (F/O KLM),

B-757/B767-200: 3950 hrs (Capt. Air Holland),

B-767-300ER: 3590 hrs (Capt. Air Europe /Blue Panorama).

1.4.5. Mr. Cats, with his experience in the Dutch Civil Aviation Authority as a senior pilot-inspector flight operations and examiner on behalf of the Dutch government, his experience in the DC-10 and other airplane types, has the knowledge and experience to evaluate the Final report on all aspects of flight operations, the correct application of the prescribed airplane flight and operations manuals and the flight procedures contained therein. His knowledge and experience also exceed those of experts.

1.5. Expertise of the Experts Appointed by the Court: L. Bloncourt, J-L Françon and D. Kügler

Judgement of 8 July 2015, § 2.8 – § 2.11 state:
"The questions for the experts are (also) of a highly technical nature, in the sense that they require knowledge of aviation technology and familiarity with DC-10s", and:
"*The three persons who in this judgment are appointed as experts have each indicated in writing, after taking note of the interlocutory decision of 26 February 2014 through a sworn translation into French or English provided to them by the court, that they consider themselves competent – as far as they can currently gauge – to jointly answer the court's questions.*

With due observance of that which is stated here, the court appoints the following experts (in alphabetical order)".

1.5.1. **Mr Laurent Bloncourt**, aviation expert. An airline pilot, with 15000 hours of flight as captain, instructor and examiner, in charge during years to provide advices to their own national civil authority about flight safety.

1.5.2. **Mr Jean-Louis Françon**, aviation expert. First officer, captain, instructor and examiner on DC10-30 KSSU during more than 4500 of total of 6000 hours of flight. Is Enquéteur accident (Université de Stockholm).

1.5.3. *"Both pilots have taught instructors and pilots on the "Human Factors" concepts since the beginning of their implementation in the captains' and first officers' training then for all personnel involved in airlines operations"* (FR page 7).

1.5.4. **Dr. Ing. Dirk Kügler**, Director of the German Aerospace Center (*Deutsches Zentrum für Luft- und Raumfahrt e.V., DLR*). An engineer and professor, internationally well-known in the field of Air Traffic Management (ATM), with a strong industry background, educating at leading universities including Human Factor concepts.

1.5.5. On the Internet is found that Dr. Kügler "*received a doctorate degree (Dr.-Ing.) in 1995 and a degree as Diplom-Ingenieur (Dipl.-Ing.) in Electrical Engineering from Technische Universität Carolo-Wilhelmina zu Braunschweig, Germany, in 1990*".

His professional background is: "*Director of the Institute of Flight Guidance at DLR German Aerospace Center in Braunschweig since 2008 as well as a Full Professor (W3) for Air Traffic Management (ATM) at Technische Universität Carolo-Wilhelmina zu Braunschweig in Germany. He is involved in research in Air Traffic Management (ATM) both for on-ground and on-board applications.*

Prior to joining DLR and Technische Universität Carolo-Wilhelmina zu Braunschweig, he has been 10 years with DFS Deutsche Flugsicherung GmbH (German Air Navigation Service Provider), Langen, Germany, where he held various management positions at Director Level.

Dirk Kuegler is Deputy Director of the German Institute of Navigation (DGON) as well as head of the Air Navigation Commission of DGON.

He is a Fellow (FRIN) to the Royal Institute of Navigation (RIN)".

1.5.6. **Comments**. Although both pilots Bloncourt and Françon have an impressive number of flight hours and will be skilled pilots, they obviously do not have a high-level education and knowledge of (systems) engineering, performance and flying qualities knowledge as required by the court and as becomes clear in § 3.1 below, and have no experience in accident investigations for which reading and understanding DFDR and AIDS data was required, either. They do not possess the expertise at scientific level to qualify for training at a Test Pilot School. The two 'expert' pilots were obviously not supported by Dr. Kügler with engineering knowledge.

1.5.7. Most experienced airline pilots are convinced they are the real experts. Airline pilots however, are only taught to a level required to control airplanes and operate the on-board systems, which is their skill, but they are not experts at academic engineering level on these subjects. Test Pilot Schools were founded to educate high level experts, refer to § 1.2.4 above.

1.5.8. Dr. Kügler is an electrical engineer, director of the Institute of Flight Guidance. He should have knowledge on ground radar systems and of electronic airplane flight control systems, but experts of claimants did not notice this expertise in the Final report at all.

1.5.9. Dr. Kügler did not sign the report with DLR, but with "c/o WiTech Engineering GmbH" (cover sheet Final Report), which might mean that he outsourced his contribution to someone at WiTech who was not appointed by the court. If c/o indeed means 'care of', WiTech might have taken over. However, WiTech Engineering GmbH has no competency in aeronautical engineering; on website http://www.witech-engineering.de/team.htm, Dr. Kügler is not listed as team member. The invoices were also sent by WiTech.
From the Final Report, it is definitely obvious that high level engineering knowledge, that could be expected from an electrical engineer at PhD level, was not applied in answering the questions, which is the reason for doubts on his contribution or, if he did not participate himself, of the expertise of the person he was replaced with.

1.5.10. **Conclusion**. The expertise of the three experts on aircraft systems, airplane performance and flying qualities, which is required for evaluating objective DFDR and AIDS data and for answering the questions of the court, is seriously doubted by experts of claimants. The lack of expertise will be proven by discussing a few statements of the experts on 16 subjects, including DC-10 systems and flying qualities, in § 3.1 to § 3.1.18 below.

2. A Few Summarizing Remarks on The Final Report by Experts

2.1. The Interim report V17 (ref. A) and the Final report by experts are very unprofessional, chaotic and sub-standard, written by incapable, incompetent airline pilots on the subject of accident investigation and evaluation of aircraft, who only flew their many hours, after which they considered themselves expert. But in what? It looks like their report is the first report that they ever wrote. They filled too many pages with irrelevant descriptions and data.
Experts of claimants have serious doubts whether the experts are educated well enough and qualified to conduct accident investigations. There is absolutely neither a trace of any higher-level expertise on the subjects of airplane flying qualities and performance, nor on the design and operation of aircraft systems, other than required for pilots to be able to control the airplane and operate the on-board systems from the cockpit; really embarrassing. Having to waste time reading and commenting this sub-standard report was the worst experience ever for claimants' ex-

perts. Many words, no content. Their many inappropriate and wrong comments lead to the conclusion that the experts obviously do not realize that "*You only see what you look for, and you only look for what you know*", or as the FAASafety.gov organization advocates: "*YOU DO NOT KNOW What You Do Not Know*". Experts should have refrained from writing on subjects they have no sure knowledge of and are not thoroughly familiar with.

2.2. Experts did not or did not want to understand the intention of the letter of the court and considered their involvement like an ICAO Annex 13 type analysis, which was not the intention of the court, FR pages 8, 177, 178, 195, and § 3.2.4 below.

2.3. The experts did not answer the questions of the court (§ 5 below). The experts included statements like: "*The maintenance of the system conformed with the constructor's instruction* " (FR page 43 and § 5.7.1.5 below), while it is absolutely sure that they can never have seen maintenance data themselves. On more occasions, they copy wrong conclusions from other sources without proper verification by themselves. They obviously do not have the required knowledge to do so and did not adequately include that this was the case, and that they were quoting from another source, if any.

2.4. Experts did not conduct an in-depth analysis to confirm the RoA, the NLR report, as well as the DASB performance. They seem to only have looked for arguments to protect the DC-10 pilots, Martinair and DASB from being blamed in this court case. Experts did not use the facts, the objective data of DFDR and AIDS, but frequently only referred to statements by the crew and passengers, and considered these reliable, which a real and competent accident investigator would never do. Following reading both the Interim and the Final Report, experts of claimants are convinced that the experts avoided objective DFDR and AIDS data because they do not have the expertise to accurately assess such data. Instead, they dumped inappropriate data graphs out of a preliminary NLR report, that was never approved or accepted by the Commission, or from another, may be even self-made source. The legends of these graphs are incomplete, not professional, and not all of the data in these graphs or charts are in agreement with the formal DFDR data. The experts did not analyze the data, but just included the often-illegible data plots without adding any explaining and substantiating comments, for instance on FR pages 37, 38, 107, 133, 148, 149, 152 and in FR § 8.6.5.3 page 147, or included drawings and sketches from other sources than the RoA or police statements (FR page 33) and included data that are absolutely irrelevant (FR pages 89, 90). The presented "*Position of the command*" data in the graph *"Computes position of the control wheel"* on page 152 is calculated data, according to the legend, but it is not made clear whether this is roll wheel position or roll control force. Both of these are also recorded as measured, hence presented as objective data in the AIDS data charts. The calculated data does not agree with measured data in AIDS plot in RoA Annex 9/ page 14. The AIDS plot shows a peak to the right at 6 sec. prior to touchdown. So, where is the data from? How did experts calculate? A credible analysis should include this. Experts must have thought that the readers of their report are ignorant people (refer to § 4.12 and § 4.13 below).

2.5. Experts do obviously not have adequate (engineering) knowledge of the design and operation of aircraft systems, more specifically the autothrottle system (answer § 6.6, FR page 43), the landing gear system including the brakes, the Inertial Navigation System, the yaw damper and the radio altimeters which caused them to make the wrong conclusions. Some of the errors on system operation by the experts are presented in 16 subparagraphs of § 3.1 below.

2.6. Experts are hesitating in concluding pilot errors throughout their report. They rather use "*Human Factors*" and "*workload*" as cause and excuse. The crew consisted of three members, who should have been well trained and should be able to handle all possible situations. In the CVR transcript, nothing is recorded that might proves stress or high workload; the conversations were easy, calm. What was lacking is guidance of the captain to his less-experienced copilot to follow procedures and to talk him through the approach and landing in the bad weather and high crosswinds at the time, in which he had no experience. Refer to § 3.2.1.3, § 3.3 and § 5.8.1.

2.7. Experts included their analysis of the CVR transcript from FR page 134 but left out nearly all lines of text that could point to or contained pilot errors (§ 3.11).

2.8. Experts used the DASB comments that are included as attachment to the RoA, not the Comments of the Kingdom of the Netherlands (Lijst 4 tab 23 dl 1, 2, also called 'Blue Report') on the draft report, that was handed over to the Portuguese Commission in Sept. 1994 in which DASB wanted to blame the weather etc., so experts did not answer the questions of the court appropriately, using the correct and important source (the 'Blue Report'). The DASB-required deletions were not commented on; the DASB-required text replacements were not commented on either. Refer to § 3.6 , § 4.1 and § 5.10.3.2.

2.9. Experts did not answer most of the questions in our RRQ document, ref. B, that was written following review of Interim Report Version V17 (ref. A), or just wrote "*no comment*", and did not use our remarks that were well supported with references to formal KLM DC-10 Aircraft and Operating Manuals that were also in use by, and applicable to Martinair (FR page 7, 178). The reason must be that these experts wrote about subjects that are not in their field of expertise. They should have mentioned that, rather than answering questions with inappropriate answers. Refer to ref. B for the comments of the experts and our remarks and questions.

2.10. Martinair did not publish AOM's for their DC-10 crews themselves. In order for KLM to facilitate the training of Martinair flight crews, the operation of the Martinair DC-10 airplanes were conducted using KLM AOM's. The lack of adequate performance of the MP495 flight crew and, above all, the non-adherence to the published KLM/Martinair AOM flight techniques/procedures during the approach to Faro played a vital role. Did both DASB and the experts ever study these AOM procedures thoroughly and used them in their analyses? It should have been easy, because all of the relevant pages are included as appendices to the claimants' RRQ of Sept. 2016 (ref. B). Based on this knowledge, it is indeed quite astonishing to read the following Experts' statement: "*the Experts believe that providing answers to questions of claimant's advisors' team, referring to the part of the flight above 500 ft is not directly relevant*" (FR page 8, and § 3.2.2.8 below).

2.11. Experts added many pages with text and data that are completely irrelevant, for instance ground idle trim data of the engines on FR page 89 and flight idle data on FR page 90, and like FR § 8.2.5 on an ICAO document (FR page 55). It seems that experts wanted to confuse because they cannot convince, or they just did not understand the data.

2.12. Another example is explaining the autoland mode of the DC-10 (FR page 150); totally irrelevant, because Faro airport was not equipped to facilitate the autoland capability of any airplane.

2.13. Experts wrote "*The rudder movements are quite important but it is not possible to qualify them as abnormal according the weather conditions (thunderstorm, wind rotation and rain*)" (FR page 150). Abnormal is the inappropriate application of rudder already from 42 seconds before touchdown. Experts will not have reviewed AIDS data, RoA Annex 9 chart 6. An expert will be able to "*qualify*" rudder movements, because these data are in the DFDR and AIDS reports. See also ref. D and § 5.1.7 below.

2.14. Experts only discussed the Summary of the Analysis by Avio*Consult* dated 17 Dec. 2012, and obviously did not read the analysis itself (FR § 8.5, page 56). Neither did OvV.

2.15. Experts did not note an error in Martinair FCOM (03-50-04) on approach speed calculation, which was addressed by Avio*Consult* in report Dec. 2012, summary § 6 (item 13). They left out this item in their report (FR page 78) and did not comment. This error does not exist in AOM 3.3.5 – 03 that was made available to the experts. Besides the pilots of MP495, experts made an error as well in concluding the approach speed to be inserted in the ATS speed window (139 kt, FR page 29), because they either did not read the Martinair AOM themselves, or did not understand the operation, the functioning of the ATS and the reason for the speed additives (§ 3.10.3 below).

2.16. Experts just accepted that the DASB/OvV answers are right, without verifying these by using objective DFDR data (FR page 79). Again, experts might not be able to read and comprehend DFDR data.

2.17. Experts do not understand landing loads on a landing gear, resulting in an inappropriate cause of the collapse of the landing gear (FR pages 22, 33, 35, 41). They continue to refer to certification requirements, without reviewing the provided NTSB data on the real capabilities of the landing gear (RRQ, ref. B, appendix 35). They did not consider that a manufacturer designs a landing gear stronger than minimum required. This also shows incompetence: referring to regulations while not understanding them. It is this subject what makes experts of claimants believe that Dr. Kügler did not apply his engineering knowledge, otherwise he would have prevented this inappropriate use of regulations and the rate of descent as cause of the collapse of the right main landing gear to have been published in the Final Report (§ 5.3.2 below).

2.18. Experts mention that a wind of *"220°/ 35 kt is at the crosswind limit of the DC-10"*, and that "*a go-around decision would have been a highly probable consequence"* (FR page 60), but nothing about the wet and flooded runway crosswind limits of the airplane (5 resp. 15 kt) and the 11° wind correction (crab) angle that was required during the landing. On FR page 68: "*220°/ 35 knots; tail wind and an exceedance of the crosswind limit of the aircraft*". Different statements about the crosswind limit are included in the final report; none of these were the case. The decision to go-around should have been made.
In addition, experts did not analyze the reason why the heading during the last 80 seconds of the approach had to be 125°. If the airplane had flown on the 111° radial, the wind correction angle would have been 14° which, at an airspeed of 139 kt, can only be caused by a crosswind of 34 kt (ref. D). If during the last 1 nm on the extended runway centerline (106°), the crosswind component would have been 45 kt. This wind was not reported and did not exist; impossible, hence, the airplane did not approach on the 111° but on a 117° approach radial, and not on the extended runway centerline either (§ 3.10.5 below).

2.19. The experts did not review, analyze and comment the transcript of the meeting of 1 Dec. 1994 in the Congresgebouw (§ 5.10.3 below) and the experts did not conclude whether the DASB answered 31 of 143 questions appropriately or wrong. Of the 31 of 143 questions answered wrongly by DASB, experts only changed one remark in the Final Report: Experts no longer considered it responsible to land, only to continue the approach, refer to § 3.2.6 below.

2.20. The NLR report with comments of Frans Erhart was not used (Lijst 4 tab 24) by experts. Erhart wanted to emphasize the existence of windshear and insisted NLR on implementing 12 changes to make the DASB-suggested occurrence of windshear more obvious, which the (non-pilot) scientists of NLR regrettably did. Experts should have noticed this as well. Refer also to § 3.2.7.

2.21. Experts included a new radar data analysis for which they seem to have used ATC radar data and statements by the captain, rather than objective DFDR and AIDS data (FR page 121). They fabricated their own approach path, that does not agree with DFDR data, and shifted the data until the flight path ends in the center of the runway, as the captain stated a few months after the accident. Low altitude lateral flight path data was not available from recordings on the DFDR. The provided ATC radar data however, cannot be considered very accurate because the airplane was below the horizon of the Lisbon ATC radar, which was 7700 ft at Faro. Experts further used data out of a preliminary NLR report (CR 93080 C) which were not used anymore in the final NLR report (CR 94238 C, Annex 4 in RoA), and which were not correct either. The preliminary report was made with DC-8 data that were corrected a bit to match a DC-10 but were amended after receiving DC-10 data from McDonnell Douglas, as was noted in the final NLR report. The preliminary report used by the experts was obviously not good. Experts should have noticed and asked themselves whether the NLR data would be correct, but they didn't. They obviously didn't have the engineering knowledge to do so. For details, refer to § 3.4 below.
This inferior and deficient *"lateral analysis of the radar data"*, prompted experts of claimants to

write a more detailed lateral analysis than provided in the Avio*Consult* report of Dec. 2012: The Last 80 Seconds of Flight MP495 in understandable and engineering-correct language using only objective data of the DFDR and AIDS (ref. D).

2.22. In FR § 5.2.1.2 titled "*A problem of wording*" (page 20) the experts wrote their causes and contributing factors of the accident. Apart from these conclusions not being asked for by the court, they are also incorrect, not in accordance with the facts. Experts should realize that they are not accident investigators, not highly educated and qualified aircraft experts, but only airline pilots licensed to operate aircraft. Not very wise of the experts to consider themselves experts; § 1.2 above was included for this purpose.

2.23. Experts often use "*estimate*", "*consider*", "*seems*" and "*should be*". If not sure, they should say so, or not say anything.

2.24. Experts are spreading their opinions, assumptions, and did not conclude using objective data; their findings are sometimes misleading.

3. Proficiency of and Comments on the Final Report of the Experts

3.1. Lack of Expertise of Experts on Airplane Systems, Flying Qualities and Radar

In the paragraphs to follow, a limited number of subjects are discussed that prove that experts do not possess the required high-level engineering proficiency and knowledge of airplane systems and flight characteristics to draw the correct conclusions, and to answer and substantiate their answers to the questions of the court and of the experts of the claimants.

3.1.1. Lack of expertise of the experts on Human Factors

Experts seem to elaborate more on Human Factors (from FR page 82) in the Final report than in the Interim Report V17 (ref. A), which still is not convincing, given the large amount of remarks and questions of claimants in ref. B. Experts might believe they are experts in the field of Human Factors, but their ideas of Human Factors do not correspond with scientific and ICAO publications on the subject, that is commented on in § 3.3 below.

3.1.2. Lack of expertise of the experts on autopilot / CWS mode

3.1.2.1. Experts wrote on FR page 84:
"The DC10 was equipped with an autopilot system:

- *under certain conditions, the system could land by itself and perform the taxing phase immediately after landing;*

- *the system could also fly "in transparency" through the option called "control wheel steering";*

3.1.2.2. The DC-10 was equipped with two redundant autopilot systems.

3.1.2.3. It is irrelevant for this case to mention the autoland feature because Faro airport was not equipped with the appropriate landing systems to facilitate autoland.

3.1.2.4. "*Control wheel steering"* or CWS does not "*fly in transparency"*; it needs inputs from either pilot via the control wheels and columns and maintains the set pitch and roll attitude.

3.1.2.5. Experts wrote on FR page 85:
"It allowed great accuracy but also provided great flight stability by watering-down excessive orders given to the flight control systems".

3.1.2.6. The accuracy is the same as achieved with the CWS mode off, but CWS eases the piloting job of maintaining roll and pitch attitude by using the autopilot stabilization systems. The pilot sets the roll and pitch attitude, after which the CWS maintains this, whatever the outside disturbances, providing stabilized manual flight. "*Excessive orders*" though, are not somehow reduced by the system, on the contrary, these are indeed passed on to the control surfaces, as can be proven with AIDS and DFDR data during the time the CWS was engaged and was inappropriately used by the copilot during the last seconds of flight. Refer to § 3.1.11.2 and § 5.1.1.1 for additional comments on this subject.

3.1.2.7. Experts wrote on FR page 86:
"On DC10, there was no comparison on the forces applied by one pilot by reference to the other what is called a double-input.

On the DC10, it is not the case because the control columns are mechanically linked to each other, and all actions that a pilot might take on his own column is felt by the other pilot in his own column. There is no double-input on DC10".

3.1.2.8. Both the left and right control wheels and columns were equipped with individual force transducers. The left and right control forces are not linked to each other but are continuously compared within the autopilot system when CWS is engaged. When, at 6 seconds before touchdown the captain grabbed the controls and steered the roll control wheel to the right, while the copilot steered to the left, the CWS system switched itself off because of these conflicting inputs. Small force inputs that do not (yet) result in a control motion, are not felt by the other crewmember. Only resulting control surface motions are fed back to the pilot controls.

3.1.2.9. Experts wrote on FR page 85:
"The activation was done by moving the autopilot control lever from the MAN position to the CWS position; this was done by the pilot himself of course. "

3.1.2.10. The activation of CWS was done by the pilot flying at a radio altitude of 570 ft (AIDS data), in accordance with the procedures, by moving the control lever from CMD to CWS. Until then, the approach was flown in the command mode of the autopilot.

3.1.2.11. On page 87 experts wrote:
"The conclusion is that the use of the CWS, the day of the accident, was strictly in accordance with the Martinair and KLM standard operational procedures."

3.1.2.12. No, it was not. The copilot did not attain an attitude under CWS and let the CWS make the corrections for external disturbances but continued to enter steering inputs therewith overruling the CWS mode which in turn acted against the inappropriate inputs with as a result an unstable final approach, as also mentioned above. The copilot did not use CWS as he should have. The NTSB also concluded this.

3.1.2.13. On page 64, experts wrote:
"The Experts cannot validate this wording because there is no lowest altitude limitation to disengage the CWS mode. It is only an advice to let the pilot "feel the plane" before touchdown."

3.1.2.14. AOM 3.3.5 - 08: "*The minimum height to change from CMD to OFF is 150 ft HAT*". Does this not sound as a limitation? It is not an advice either to let the pilot feel the airplane. Martinair recommends landing with CWS engaged. The CWS disengaged because captain and copilot entered opposite roll control commands at 6 seconds before landing.

3.1.3. Lack of expertise of the experts on AINS wind data

3.1.3.1. Experts wrote on FR page 94:
"Among these tips given to the pilots is the constant display of instantaneous 'actual' winds.

It is calculated:

• from aerodynamic data measured by "pitot tubes" type of sensors as well as Angle of Attack sensors (AOA sensors);

• and from data coming from the accelerometers, which compute the movements of the aircraft center of gravity."

and

"In case of slide slip approach configuration, the aerodynamic data measured are wrong, and so is the result.

As soon as such maneuvers are being performed, the indications given on the wind measures become false; and these maneuvers started rather soon, at 400 feet, if we refer to the flight recordings."

3.1.3.2. The navigation computers of MP495 were investigated by manufacturer Collins in the USA. The preliminary draft report was sent to the NTSB on 5 March 1993, who sent it by fax to DGAC (the Commission) in Portugal. Mr. Biemond, chairman DASB, received a copy (Lijst 2 tab 3F page 6). On page 6 of this report Collins wrote: "*The system calculates wind as the vector difference between the ground velocity and the air velocity*".

3.1.3.3. Angle of Attack data are definitely not used by the Area Inertial Navigation System (AINS) to calculate winds. The AINS continuously calculates positioning data as the aircraft moves across the earth using inertial and acceleration sensors. The subsequent inertial positions over the ground are used to calculate the ground velocity (being a vector quantity), which includes the magnitude of the ground speed and the direction of the center of gravity of the airplane. True airspeed and altitude data from the central air data computers are used by the AINS to calculate the air velocity (airspeed and direction), the wind and other data for display on the AINS control/ display unit, and to output the drift angle, the track error + drift angle and the true heading to the HSI, if selected.

3.1.3.4. The magnitude of the ground velocity is smaller in case of head wind; the direction different from the magnetic heading in case of crosswind.
The captain read the wind 2.5 seconds after the heading had slowly changed to the left with 6° from 125° (DFDR heading data) due to the rudder input by the copilot. A sideslip that small had not changed the ground velocity, the path of the center of gravity of the aircraft over the ground; the airspeed measurements via the pitot tubes were not affected by the small sideslip angle (≈ 6°, DFDR data) at the moment that the captain read the displayed wind. The vectors ground velocity and air velocity do not change with sideslip, neither did the displayed wind, because the center of gravity of the airplane maintains it path during a sideslip. The wind data calculated by the AINS (190°/ 20 kt) should therefore have been considered valid. The airspeed and altitude data on the DFDR do not show any effects from sideslip either.
Experts obviously do not have INS system knowledge to a level required to accurately describe the operation of an INS, its inputs and its calculated outputs.

3.1.3.5. The *"indications given on the wind"* did definitely not become false. The system operates correctly up to the maximum sideslip angle in a 30 kt crosswind, which is

more than 13°. This is subject of flight-testing for certification. The experts must have conducted crosswind landings during all of their flight-hours and will confirm not to have lost a reliable airspeed indication during the sideslip just prior to landing.
The experts did not analyze the reason of the sideslip at 400 ft, because that would require them to say it was a pilot error. There are more wrong statements in this paragraph because of the lack of systems knowledge.

3.1.3.6. Experts wrote on FR page 26:
"The assertion made by the Dutch Aviation Safety Board is true: the computed value of the wind (direction and intensity) should be wrong as soon as the aircraft does not fly symmetrically.
Moreover, only the official indication provided by the ATC is considered as valid".

3.1.3.7. The Chairman of the DASB, Mr. Biemond, obviously did not forward the Collins fax to the NLR and the Dutch accident investigators (refer to § 3.1.3.2 above). The computed value was not wrong, as was explained above; there were more indicators of a strong crosswind, as will be discussed next.

3.1.3.8. Just prior to the final turn, on outbound radial 269°, the heading was 252° and the airspeed 170 kt, as recorded by the DFDR. The large drift angle of 17°, caused by a crosswind component of 50 kt, must have been noticed by the pilots on the HSI.
At the end of the final turn, at 6 nm, the captain read the wind from the AINS display and said: "*wind is coming from the right, 30 kt, drift 12 degrees*".
A near constant and large required heading of 125° during the approach to a runway bearing of 106°, as shown by DFDR data in RoA Annex 15, cannot be but caused by a very strong crosswind. DASB (and experts) must have noticed this as well. The wind provided by ATC was obviously not actual. This ATC wind must be used for landing planning, but if the conditions change, then actual data or observations should of course be used as valid data, rather than the planning data, for maintaining safety.

3.1.3.9. At the instant the captain read the wind at 10 sec. prior to landing, the sideslip angle was approx. 6°, while increasing from zero at 12 sec. before landing; not very asymmetrically (DFDR data). As explained in § 3.1.3.4 above, this had no influence on the calculation of the displayed wind.

3.1.3.10. The Airplane Manuals do not contain a warning that the airspeed indication is not correct when a sideslip is being maintained. The actual wind data read by the Captain from the AINS were also valid; this wind was already present during the last 80 seconds of flight, as proven by DFDR heading data (refer to ref. D).
If the visibility below 500 ft suddenly reduces because of precipitation while ATC reported good visibility, would experts consider this good visibility report still valid and continue the approach? We do not believe so; the manuals are clear: abort the approach, go-around, which the pilots did not do.

3.1.4. Lack of expertise of the experts on UTC

3.1.4.1. Experts wrote on FR page 51:

"According to the transcription of the CVR, the touchdown occurred at 07:32:50 UTC, which seems to correspond to the DFDR recorded data as provided by the NTSB."

and:

"The Experts consider that the use of multiple time references used in the report had no consequences on the work of analysis done by the Commission of Investigation."

3.1.4.2. A DFDR does not record time of day data, but only elapsed time, the time since start-up or some other starting point. The title of the timescale of the DFDR data in

RoA Annex 15, is "ELAPSED TIME" in hh:mm:ss. Experts obviously did not take a close look and did not analyze DFDR data, the most important source of objective data for an accident investigator.

3.1.4.3. The experts were obviously aware of "*multiple time references used in the report*", but did not use the one and only UTC, formerly called Greenwich Mean Time (GMT). The consequence of not using a single time scale is that occurrences, like heading changes, accelerations and meteo data, that are important for accident analyses cannot be correlated easily. Then, for instance, the question remains whether the strong wind of 220°/ 35 kt, that was reported and was emphasized by DASB, occurred between "*07:32:40 and 07:33:20 UTC*" (DASB, FR page 60), or in other words before or after landing (at the real 07:33:20 UTC). Experts of claimants determined, by analyzing the used clock times and DFDR data, that this wind did not occur before the landing.

3.1.4.4. In the Portuguese RoA, regrettably several (5) timescales were used. The touchdown occurred at 07:33:20 UTC (RoA pages 5, 55, 57). The time mentioned by experts is the so-called radar time, not UTC. The Avio*Consult* report (§ 2.2) presents all about the used times in the Portuguese report. The use of "*multiple time references*" did have consequences.

3.1.5. Lack of expertise of the experts on the brake system/ procedure of the DC-10

3.1.5.1. Experts wrote on FR page 92:

"Clearly said, the pilot could land while applying maximum pressure on the pedals because the breaks would not have started functioning."

And on FR page 93:

"Assuming that the wheels of the main landing gears were being blocked by the pilots, who pressed the breaking pedals while flying, is therefore impossible because of the way the anti-skid and free-wheel system was designed."

And on FR page 81:

"The example of the « landing with the wheels braked » should be emphasized to sustain the Experts' opinion as the system itself is designed to precisely avoid this occurrence."

3.1.5.2. Experts did obviously not analyze the braking system of this airplane. After the wheels start spinning-up after landing, the anti-skid system allows brake pressure to be released to the brakes. If the brake pedals are pushed during the landing, then brake pressure is released to the brakes immediately at spin-up of the aft wheels. Pushing the brake pedals before the nose gear is firmly on the runway however, is in violation with AOM 3.3.5 – 13 procedures (ref. B, appendices 2 and 30); experts obviously ignored the AOM and our comments in ref. B. The anti-skid system will enable maximum braking effort on the given runway surface from the instant the aft wheels spin-up and the respective brake pedal is pushed, which happened during the landing of MP495. The right main landing gear did not fail immediately at touchdown but, following the wheel spin-up, 93 m further than the touchdown spot (RoA Annex 11 and ref. B, § 5.11.2). Neither the RoA nor the experts discuss a probable fuse pin failure in the main landing gear, refer to § 5.7.1.6 below.

3.1.6. Lack of expertise of the experts on Yaw damper operation

3.1.6.1. The experts wrote on FR page 149:

"When the autopilot is engaged, the rudder actuators are enslaved to the yaw damper computer", and:

"That means that until 07:31:56 UTC, the recorded rudder movements are only the consequence of yaw damper orders".

3.1.6.2. This is not in accordance with the system description in AOM Volume I, § 1.3/2 page 1. Yaw dampers can be switched on and off independent of the autopilot but need to be on when an autopilot is engaged in CMD or CWS mode. AOM § 1.3/2 page 1 explains that the yaw damper operates in series with the pedals, and also that: *"If pedals are operated beyond the ±5 degrees yaw damper authority, the rudder will respond to the additional amount of rudder input".*

3.1.6.3. This in fact means that the statements by the experts are wrong; the rudder actuators are not enslaved to the yaw damper computer but operate in series with the rudder pedal inputs.
By the way, prior to the mentioned time, being the switchover time to CWS, no rudder pedal forces are recorded by the AIDS, only brake pedal movements (RoA Annex 9); the DFDR until then recorded only rudder activity less than 5 degrees, caused by the yaw damper (RoA Annex 15).

3.1.6.4. On page 150, the experts wrote:
"On all operating modes, except AUTOLAND, the pilot does not feel the rudder movements".

3.1.6.5. This is not right. The yaw damper inputs are indeed not fed back, except during autoland. However, load feel devices of the rudder control system "*provide artificially induced feedback force"* from both upper and lower rudders to the pilot pedals (AOM § 1.9/4 and Schematic Diagram 27-21-0).

3.1.7. Lack of expertise of the experts on Autothrottle system operation

Experts are not familiar with the operation of the autothrottle systems of the DC-10, as explained in § 3.8 below, and hence, cannot appropriately analyze the (stability of the) flight at a high level of expertise.

3.1.8. Lack of expertise of the experts on Engine thrust increase for go-around

3.1.8.1. Experts wrote on FR page 80:

"it is at all time possible to initiate a « missed approach procedure » or what is called an « aborted landing procedure » (until reversers be extended)".

3.1.8.2. Experts do obviously not consider the increased spool-up time of big turbofans when the thrust is reduced to idle by a pilot, rather than maintaining an RPM from which an immediate spool-up is possible, as the autothrottle system does. Experts obviously did not review DFDR data or could not read these. They might not even have seen the NTSB letter in the attachment of the RoA that told the same. The formal procedure-call in DC-10 manuals is, by the way: 'go-around'. Experts did not discuss that the procedural go-around button was not pushed by the captain, as he should have.

3.1.8.3. The experts did obviously not notice in the DFDR data that the ground spoilers extended one second after touchdown, before the thrust reversers were deployed, while the throttles were increased to maximum for a go-around. With extended spoilers, it is impossible for the wings to generate adequate lift for a go-around. This must have been a deficiency in the spoiler system, or a (delayed) maintenance item. This deficiency was also a contributing factor to the accident.

3.1.9. Lack of expertise of the experts on Cockpit clocks

3.1.9.1. Experts wrote on FR page 11:

"For information, all along their report, the Experts will use the DFDR time as the main time reference because it is the cockpit reference time and also because it is the end of DFDR". Footnote: "The DFDR time reference is the time provided by the Captain's clock in the cockpit".

3.1.9.2. DFDR time is not connected to the Captain's clock, and not to the copilots' and flight engineers' (F/E) clocks either. The electronic clocks in the cockpit were connected to a pulse generator behind the F/E's panel providing independent time signals to each clock (AOM 1.13/5). The Captains clock is not connected to the DFDR clock, refer to § 3.7.2.

3.1.10. Lack of expertise of the experts on Radio Altitude

3.1.10.1. Experts wrote on FR page 194:

"The Claimants advisors' team uses inappropriately the term "radar altitude"".

3.1.10.2. Experts obviously do not know what the acronym 'radar' means. RADAR is the acronym of Radio Detection and Ranging. A radio-altimeter system, installed on transport airplanes, determines the tapeline altitude, that is the altitude of the airplane above the ground by using a small radar system. Hence, both the terms radar altitude and radio altitude are appropriate terms, sometimes abbreviated as 'radalt'. Radar altitude is a better, more complete and appropriate description of this function than radio altitude.

3.1.10.3. On FR page 194, as comment to § 5.3.2.3 of our RRQ (ref. B):

"The Experts want to clarify a point. The radio-altimeter indication is not so accurate: the measurement is performed perpendicularly to the plane and not vertically. That means a rapid variation of the bank angle induces an error of indication well known by the pilot performing a visual pattern at a low altitude. During the last turn, rapid changes of bank angles can occur, enough to trigger false GPWS warning. The radio-altimeter indication is then really accurate when the approach is smooth or rather smooth with small bank angle correction".

3.1.10.4. As briefly explained above, a radio altimeter is a small radar system (in twofold mounted in a DC-10) of which the antennae are mounted on the underside of the fuselage (AOM 1.15/7). The antennae do not have a sharp-edged pencil beam but transmit RF energy in a beam that is wide enough to continue to accurately measure the altitude between the antennae and the ground underneath the aircraft while banking during turns (with at least ± 25°). The radalt data of the DFDR (RoA Annex 15 page 2) show no sudden increase of the altitude during banking during the last 20 seconds of flight, as the experts suggest. Before that time, the radalt fine data show a constant 230 ft. The maximum measured bank angle during the final approach at 7 seconds before landing was only 14°; at this time, the radalt indicator was not observed anymore.
The experts obviously do not know how a radio-altimeter functions and did not verify radalt DFDR data to support their deceptive statement.
In addition, mentioning GPWS (Ground Proximity Warning System) has nothing to do with a functioning radalt; is not of relevance to the Faro accident. The use of this abbreviation makes no sense, is misleading.
Experts should refrain from clarifying systems that they do not understand.

3.1.10.5. Again, it becomes clear that the basic systems knowledge of experts is inappropriate for accident investigations, not as might be expected from experts.

3.1.11. Lack of expertise of the experts on airplane performance and flying qualities

3.1.11.1. Experts use "*loss of control*" (page 7, 30, 41, 62), or "*not under control*" (page 146), but that was not the case. The definition of Loss of Control as used by NASA, and as the Commercial Aviation Safety Team/ Joint Safety Analysis Team published in their report is: "*Loss of control includes significant, unintended departure of the aircraft from controlled flight, the operational flight envelope, or usual flight attitudes, including ground events*".
None of these, and certainly not an unintended departure, occurred to flight MP495 prior to touchdown because the aircraft responded appropriately to all control inputs, as DFDR and AIDS data prove. The captain stated in his second statement that he "*believed that the right gear had collapsed*" and that "*the DC-10 was then beyond control until it came to rest".* But this was after the landing, when parts separated from the airplane.

3.1.11.2. Experts wrote on FR page 194:

"It is undeniable that the aircraft has encountered destabilizing meteorological conditions during the last phase of its final approach"

There were variations, undeniable, but these were not destabilizing, and not caused by meteorological conditions. Experts should have reviewed AIDS data that show that the copilot caused the variations himself by pulling and pushing the elevator (pitch) control inappropriately while the autopilot was in CWS mode and the autothrottle engaged. The NTSB also noted that the CWS function of the autopilot was "*inappropriately used by the flight crew"* (in the letter of 26 Oct. 1994, attached to the RoA). Refer to § 3.8 below on the effects of the inappropriate use of CWS.
Experts obviously do not have knowledge of flying qualities at a higher level and made the wrong conclusions. If they indeed noticed the inappropriate copilot's actions, they might want to protect him by not mentioning his improper piloting techniques.

3.1.11.3. On FR page 148 experts wrote:

"…we must take into account the instantaneous bank angle because this angle creates a centrifugal force."

During a crosswind landing, the longitudinal axis of the airplane needs to be aligned with the runway to avoid a traversing landing (with a crab angle). The pilot pushes the rudder pedal to align the fuselage with the runway. In order to prevent the airplane from being blown away from the (extended) centerline, a small bank angle is required into the crosswind which prevents the displacement. This bank angle causes a side force component of the weight ($W \cdot \sin \varphi$) of the airplane to act in the lateral Y-body axis against the side forces generated by the crosswind. This small bank angle does not *"create a centrifugal force"*, because the airplane flies straight ahead, while side slipping; it does not turn. Experts should have used centripetal force, rather than "*centrifugal force "* for the force in the direction of the turn if this would apply.
Maintaining the required approach path requires a balance of forces and moments. How would experts explain the forces and moments during a knife edge maneuver (flying straight ahead while banking 90° as fighter aircraft do during air shows)?
A bank angle in itself does not create centrifugal or centripetal forces, only when in a coordinated turn when the control column is pulled to increase the pitch angle to provide for the increased requirement of lift. Attaining a bank angle for aligning with the runway is not resulting in a coordinated turn because of the opposite rudder input; the airplane is in a steady straight flight.
With this remark, the three experts show not to possess aeronautical engineering and flying qualities knowledge at expert level.

3.1.12. Lack of expertise of the experts on the calculation of the Wind Correction Factor

3.1.12.1. Experts made the same mistake as the MP495 pilots, while the AOM is very clear on this subject. Experts seem not to understand that the approach speeds of all types of airplanes always needs to be higher than the threshold speed, for increased controllability and safety reasons. The minimum increase for a DC-10 is 5 kt; the increase is higher when larger gusts are reported by ATC.
In case the ATS is engaged and gusts (turbulence) are measured and increase above a certain threshold, the ATS automatically adds an additional 5 kt to the approach speed entered on the ATS control panel, as long as the measured gusts (turbulence) last. Hence, when gusts vary in intensity above and below the built-in threshold, the approach speed will vary between 0 and 5 kt above the approach speed set in the ATS speed window. These speed variations also cause variations in lift ($\equiv V^2$), and hence in changes of the pitch angle (if the autopilot is in vertical speed mode). DFDR speed data show that airspeed and pitch angle actually changed during the approach – is normal.

3.1.12.2. Experts did not calculate the correct approach speed and used the term reference speed (V_{REF}) for threshold speed that did not exist in Martinair manuals in 1992. Please refer to § 3.10.3 for more details.

3.1.13. Lack of expertise of the experts on the use of Martinair Manuals

3.1.13.1. Experts refer to the Flight Crew Operating Manual (FCOM, FR page 102), which is a generic operating manual that is provided by the airplane manufacturer with the purchase of an airplane. Most airlines write their own Airplane Operating Manuals (AOM), which Martinair and KLM also did. In 2012, Avio*Consult* did not yet have access to the AOM and had to use the available Martinair FCOM. The three volumes of the Martinair/ KLM AOM were made available later and were also sent to the experts by the court, in pdf format. Experts should have used the Martinair/ KLM AOM rather than the FCOM. It is not made clear from where they received the used FCOM and whether it was applicable to the Martinair DC-10 operations.

3.1.13.2. In the Final Report, there are numerous occasions where experts present their own ideas about terms and definitions used in aviation but did not verify these with and in Martinair manuals. Examples:

3.1.13.3. On FR page 180, experts wrote:

"The right term is not "Approach stability" but "Approach Stabilization"".

3.1.13.4. In BIM 3.4.4- 06, "Approach stability" is defined, not "*stabilization*". This was brought to the attention of experts in Ref. B, Appendix 11, but experts obviously did not verify.

3.1.13.5. On the same page 180, experts wrote:

"As soon as the Captain said that he had the runway in sight, all the considerations presented previously by the Claimants' advisors are no more to be considered because the approach is not any more a non-precision approach but a visual approach, even if the crew continued to help themselves using the information provided by the electronic devices".

3.1.13.6. This statement by the experts is definitely wrong and not in agreement with Martinair and KLM procedures. They obviously have not reviewed the non-precision approach procedure in AOM 3.3.5 – 08 (appendix 14 in ref. B), which applies down to the landing. Again, experts prove not to be mindful pilots and percipient experts.

3.1.13.7. Experts did not use the Martinair manuals that were forwarded to them here either. A skilled pilot knows that manuals are important, are required to be applied for

the airplane to be considered airworthy and knows by experience where to find the required information and data in the manuals. Experts ignored the manuals, more specifically the chapters that were included as appendix to ref. B by the experts of claimants.

3.1.14. Lack of expertise on Ground (ATC) Radar horizon and accuracy

3.1.14.1. In the final report, experts added a new analysis of the final approach of the airplane (FR page 123). They used radar data out of the RoA, annex 5. The Commission stated in the RoA that the ATC radar was located near Lisbon, about 108 nm NNW (330°) of Faro. The horizon of this radar was 7700 ft above Faro airport, if the radar would be at sea level, as calculated in § 3.4.4 below. Such radar data should not be used for analysis, which both the Commission and experts did. Not described in the RoA is what radar data were used to plot the radar trajectory in RoA Annex 12 (used on the cover sheet of this review).

3.1.14.2. Experts plotted the inaccurate radar data on Google Earth images, and inappropriately shifted the plots in such a way that the trace marking the path of the airplane ends in the middle of the runway, in accordance with the statements of the captain, and then conclude:

"From this radar data analysis it can be assumed, that the flight MP495 had been laterally aligned with the extended centre line of runway 11 (quite late) shortly after the intersection of VOR radial 111° and the runway extended centreline of 106° at around 0,8 [nm] (or 1.500 [m]) from touchdown".

3.1.14.3. *"Assumed"*, which means 'not sure'. Experts cannot explain the large lateral deviations in the flight profile. They did not realize that the ATC radar is NNW of Faro, exactly in the line of these deviations. This would mean larger range errors of the radar than before, which is impossible. The range error of a radar is constant and very small, if any, and is only caused by delays in the signal processing within the radar system itself; the propagation speed of RF energy in the air is constant: the speed of light ($3 \cdot 10^8$ m/s). Following the final turn, the airplane seems established on an approximate heading of 080° for 100 seconds, as suggested in Figure 1 on FR page 123 (copied in § 3.4.5 below), while the much more reliable DFDR data show only 34 seconds at heading 080° (as also shown in the figure on the cover sheet). The ATC radar data is too inaccurate to draw precise conclusions on the lateral path of the airplane. Experts obviously have no expertise on radar systems.

3.1.14.4. Experts of claimants did not use the ATC radar data for analyzing the last 80 seconds of flight, but only DFDR and AIDS data (ref. D). Refer to § 3.4 below for additional comments on the radar data analysis by experts or to ref. D.

3.1.15. Lack of expertise on applicability of regulations – JAR-OPS

3.1.15.1. Despite an explanation of the value and applicability of JAR-OPS data in RRQ ref. B, experts did not delete references to and quotes out of these regulations (FR page 111). JAR-OPS was being drafted but did not exist to be included in manuals for pilots in 1992. The term "*flooded*" was defined in ICAO manuals at least 8 years prior to the accident and should already have been incorporated in KLM and Martinair manuals, as KLM admitted to the DASB.

3.1.16. Lack of expertise on the use of FAR Certification requirements

3.1.16.1. Despite remarks in our review (RRQ, ref. B), experts maintained quotes out of Federal Aviation Regulations in the Final report, on pages 57 and 87. They maintained their position on landing loads and did obviously not review the NTSB report on the actual strength of a DC-10 landing gear that was included as Appendix 35 in RRQ, ref. B. FAR's are not for (airline) pilots who have no background in engineering, but for airplane

design engineers and for certification staff, test pilots and flight test engineers and present minimum requirements. A landing gear will mostly be designed stronger than minimum required, refer to § 4.8.
Experts also inappropriately used FAR-required thrust response requirements as briefly discussed in § 3.8.6 below.

3.1.17. Lack of expertise for use/analysis of DFDR and AIDS data

3.1.17.1. Experts preferred the use of the interviews of the three flight crew members, air traffic controllers and visual witnesses for their analysis, rather than the formal and objective DFDR and AIDS data. They specifically asked the court by letter of 3 Sept. 2015 for the interviews. Experts of claimants do not consider interviews to be fully objective, although these would be easier to use than analyzing DFDR data if you are not a real expert.

3.1.17.2. DFDR data show that immediately after touchdown the ground spoilers extended, while the captain had increased the throttles for a go-around, 3 seconds before touchdown. Despite this throttle increase, the airplane continued its descent and touched down; the engine spool-up was not fast enough (§ 3.1.8 above). Without the spoilers being extended, the go-around could have been successful. Experts should have noticed this failure in the spoiler knockdown system of the DC-10.

3.1.17.3. Rather than DFDR data, experts used data out of a preliminary NLR report that were not included in the RoA by the Commission (FR pages 107, 128).
Experts also made their own plots that are too dense to be useable for data analysis (FR pages 127, 133, 148, 149, 152). Some of the data does not agree with AIDS data in RoA Annex 9. Experts just presented (dumped) these data but did not analyze, explain and substantiate, as is done in ref. D, and is required by the court. They obviously did not use the letters written by the NTSB to the Commission, either.

3.1.18. Conclusions on the proficiency and expertise of experts

3.1.18.1. Experts stated to the court being experts in aviation. Experts might be skilled in the operation of aircraft, in conducting transport flights with large airplanes as pilots, but already proved in their Interim Report V17 (ref. A) to be ignorant on and not adequately familiar with the operation, the functioning of airplane systems, flying qualities and performance of airplanes at a high technical and engineering knowledge level that is required to read, evaluate and analyze objective DFDR data and accidents, and hence, reconstruct the flight to a level required to answer the questions of the court, i.e. a level that is required to be considered an expert.

3.1.18.2. Experts confirm and prove that airline pilots are not necessarily also experts on the subject of aircraft accident investigation. The lack of aircraft systems knowledge and the inappropriate use of regulations led to incorrect analyses and conclusions. Experts did not respond adequately to the Review, Remarks and Questions of Claimants (ref. B) either, most probably also because of the lack of expertise.
The experts misled the court and the experts of claimants as well prior to their assignment with their statement that they are aviation experts. Two of the experts have no more expertise than required for airline pilots and the third seems a reluctant engineer, but not in airplane engineering. The following paragraphs will augment this conclusion.

3.2. General remarks on the Final Report

3.2.1. Experts added § 0.1.1. Experts competencies (FR page 6).

"No expert can claim that he has universal knowledge on all topics. Should it be necessary, he will refer to the best available competency provided by the appropriate specialist. Moreover, this behavior is the foundation of a proper and well-conducted expertise".

3.2.1.1. An individual expert will not have all of the expertise required to analyze an accident. The experts show this is true, but they did not refer to other specialists, as became clear in this report. Experts did not carefully review Martinair Operating Manuals, did not read the whole Avio*Consult* report and its appendices with formal data, and obviously did not have design and engineering level expertise on the aircraft systems, such as autopilot, and autothrottle and Inertial Navigation System. They obviously did not understand the NTSB accident investigation report that was included with the remarks and questions of claimants on the design loads of the DC-10 landing gear (ref. B, appendix 35) and did not refer to other specialists. Any aeronautical engineer would have understood that report, but it appears that the Expert's did not want to rewrite their cause of the accident, as presented in Interim Version V17 (ref. A).

3.2.1.2. The experts continue with:

"The Experts want to underline that the Claimants advisors' team uses, exclusively and obviously without any contextual dimension, only the available textual information. These textual information do only provide factual results of the crew's action or effects due to the corresponding environment".

The experts of the claimants did not use statements by the crew and passengers because these cannot be considered objective. Have experts not compared the statements by the cockpit crew taken at 29 Dec. 1992 and a few months later? Which ones of the statements provide "*factual results"*? DFDR, AIDS and CVR data do not lie. In the report, experts just "*estimate that the Captains's statements are globally coherent with the objectives information including the DFDR and the CVR*" (FR page 45).
It requires expertise to evaluate objective data. Experts did not mention possessing any expertise required to analyze objective flight data to the level required for the accident with MP495, but only presented their mental ideas or beliefs, their "*estimates*". Experts used the verb 'estimate' at least 10 times in their report; it seems that they are not always very sure on their statements. Objective DFDR data, that the "*claimants advisory team"* used, provides factual and solid evidence.

3.2.1.3. Also, on FR page 6:

"To be able to consider the importance of the Human Factors in a cockpit, it is necessary to have demonstrable operational experience and competencies in this field".

Because experts must have realized that the expertise of claimants' expert team exceeds their own expertise, they placed even more emphasis on Human Factors in the Final report. However, they did not refer to formal academic definitions as taught at Universities, Test Pilot Schools and as used in ICAO accident investigation manuals. For this reason, a paragraph on the subject is added in this review (§ 3.3).

3.2.1.4. "*Human factors*" should not be used to explain away the errors made by the pilots.

3.2.2. § 0.1.2. ANSWERS TO "REVIEW AND REMARKS AND QUESTIONS" (FR page 7)

"The large amount of non-relevant remarks within this report has lead to a huge confusion.

Consequently and in accordance with the court's requirements, "Review and Remarks and Questions" (as provided by the Claimants advisors' team) will only be considered if they concern the actual content of the Experts' interim report V17; they should not be

considered when the "Remarks and Questions" have already received an answer in that report. The Experts want to underline that their mission is not to issue an opinion on the work of the Commission of Investigation."

3.2.2.1. There were no non-relevant remarks in the Review, Remarks and Questions (ref. B). Experts of claimants just repeated comments by the DASB and by the experts made in interim report V17 (ref. A), and added remarks and questions using facts, applicable rules and regulations and the comments by DASB. If experts consider this "*non-relevant*", then they might not have the expertise to understand the remarks and answer the questions.

3.2.2.2. Following all of the questions and remarks, the experts might not have understood and realized that they did not conduct their work in accordance with the court's requirement. Claimants have the right to ask questions and receive answers. If experts mention that *"they already received an answer in V17"*, then it is not clear to them that their report is not based on objective flight data and Airplane Manuals that the flight-crew had to use. If experts do not know the answer to a question, then they should say so, but not provide answers that are incorrect, that are neither in agreement with the design of systems, nor with recorded flight data of DFDR, AIDS and CVR.

3.2.2.3. The claimants went to court because they were convinced that the investigation of the cause of the accident was inappropriate and careless, and that DASB and therewith the State misinformed the survivors and the next of kin of the deceased in writing and during meetings.

3.2.2.4. The mission of the experts was indeed to issue an expert-opinion on the work of the DASB. The general question was whether *"the then Civil Aviation Board handle the information available at the time regarding the aforementioned themes with due care"*. (FR § 0.1.4, page 9). Since the DASB was involved in the investigation as accredited representative, the mission of experts was indeed also to issue an opinion on the work of the whole Commission.

3.2.2.5. On FR page 7:

"To simplify and clarify, the debatable flight can be divided the in two parts:

- The first one above 500 [ft] elevation, which was handled by the crew with a correct airmanship, aside from an inappropriate correction of the wind during the interception and the final phase, flying so laterally displaced at the left of the radial 111°. During this phase, the immediate safety of the aircraft was never affected by the captain's decisions.

- and the one below 500 [ft] where the loss of control happened. The non-decision of go around under 500 [ft] is one of the major cause of the accident. Many points and questions raised by the Claimant advisors' team, are related with facts without any relation with the loss of control under 500 [ft].

So, the Experts believe that providing answers to the questions of the Claimants advisors' team, referring to the part of the flight above 500 [ft] is not directly relevant".

3.2.2.6. Claimants experts, following a thorough review of the Martinair procedures, do not agree with "*correct airmanship"*, but agree to the "*inappropriate correction"* to the actual wind, although inappropriate is not the correct adjective; there was no adequate correction, no attempt to return to the 111° radial at all, as heading data of DFDR prove.

3.2.2.7. An Approach and Landing Accident Reduction (ALAR) working group was founded by the Flight Safety Foundation (FSF) because so many accidents happened during these flight phases. In every ALAR document is emphasized that pilots should adhere

to procedures, and follow the prescribed flight path to avoid stress, errors and accidents. The "*immediate safety of the aircraft"* was *"not affected by the captain's decisions"*, but the ultimate, the final safety was because procedures, that would have guaranteed the safety, were neglected by the flight crew, over and over again.

3.2.2.8. Providing answers to questions that refer to the part of the flight above 500 ft is indeed relevant, because errors were also made above 500 ft. The questions also take the reader by the hand in showing the poor performance of the pilots, which started already before departure and continued down to the landing. The most critical errors were made during the approach procedure from the initiation of the final turn at 8 nm outbound. The performance of the crew, and of the DASB in their contribution to the investigation and in answering questions of the victims and relatives are the subject of the court case and hence, are highly relevant. Experts did not read the court's letter very well, and/or did not want to accuse the pilots.

3.2.2.9. A loss of control never happened. Experts have heard about this phenomenon but do obviously not know what to make of it (refer to § 3.1.11 above). DFDR and AIDS data (RoA Annexes 15 and 9) do not at all prove the loss of control; the aircraft responded to control inputs down to the landing. When control is lost, an airplane does not respond to either of the (pilot) control inputs. Experts did obviously neither read nor understand DFDR and AIDS data.

3.2.3. In FR § 0.1.3.1 on page 8:

"The Experts must recall that the DASB was acting as a member of the Commission of Investigation and had consequently to respect the recommendations of the ICAO Annex 13 ("Aircraft Accident and Incident Investigation"). It is clearly indicated that the work of a Commission of Investigation is not to define liability but only to determine causes and/or contributing factors to avoid other accidents due to similar causes in the future.

Consequently, the Experts' understanding of "the work in due care" of the DASB excludes all what concerns the determination of liability".

3.2.3.1. During the investigation, DASB was accredited to the Commission, but not anymore during the meetings with victims and relatives, when the incorrect answers were given. DASB even tried to convince the Commission to change the Final Report to include several arguments that would lead to the conclusion that weather phenomena were the cause of the accident. This case is all about liability which is the reason that the court asked the questions. Experts should not have excluded liability matters.
Why did experts not just answer the questions of the court? Now claimants cannot but conclude that experts refrain from answering the questions because they might not be qualified enough to conduct an objective, independent investigation and to answer questions objectively and truthfully using adequate knowledge.

3.2.4. On FR page 195:

"It is a constant among the Claimants advisors' team to consider the DASB as separate from the Commission of Investigation: This is a major mistake; the DASB is a part of the Commission of Investigation and must act in accordance with this role clearly defined by ICAO Annex 13".

Experts still do not understand that this court case is about the behavior of the DASB towards the victims during the 1 Dec. 1994 meeting and their contributions to the Commission during the investigation. The experts have a mistaken view of the case, not the experts of claimants. Our review, remarks and questions obviously did not ring a bell.

3.2.5. On FR page 9:

"The assessment of the DASB's work and/or behavior during the Investigation and after, during the meetings with the victims and families, will consequently follow strictly these considerations".

This was not asked by the court. The court asked how the DASB performed. It is not the Experts' responsibility to determine whether the questions of the court and the proper answers should be and are in agreement with the restrictions of ICAO Annex 13.

3.2.6. In FR § 8.8 from page 156, Experts only changed one of their remarks to the 143 questions following the RRQ by claimant's experts (ref. B). Of the 31 out of 143 questions that DASB answered wrongly, only one remark was amended by experts in the Final Report. This question (17, FR page 159) was: " *Was it responsible to land in the weather conditions at Faro"*? DASB answered: "*It was responsible to land under the weather conditions which the crew were informed of*". The remark of the experts in Interim report V17 (ref. A) was "*Yes*", and in the Final report this was changed to: "*Yes it was responsible continue the approach*" (FR page 159). Experts therewith even emphasized the wrong statement by DASB, but now express doubts whether it was "*responsible to land*" because they changed it to "*it was responsible to continue the approach*" only. Fact is that the airplane crashed because of not handling the large crosswind appropriately; the pilots needed a too large wind correction angle, too large for the maximum available rudder deflection to align the airplane before touchdown, because they did not approach on the (extended) runway centerline, see also § 5.2.1.2 below. In addition, the runway was reported flooded, which the DASB was aware of.
Experts, rather than stating whether the answers by Martinair and DASB were correct or not, answered many questions themselves and presented their own, often irrelevant interpretations, therewith taking the place of DASB and Martinair, which was of course not the intention. Some answers were incorrect, some answers of experts to the 143 questions are not even relevant.

3.2.7. Comments on the inappropriate answers by the DASB on many of the 143 questions asked by the victims were already presented in the RRQ (ref. B) and will not be repeated here. The cross-reference list in the table in § 5.10.1.4 below presents the paragraph number in the RRQ for each of the questions.

3.2.8. Experts wrote on FR page 196:

"DASB is not responsible for the NLR report neither the Commission of Investigation. NLR is responsible for its report. DASB is neither responsible for the decision of the Commission of Investigation to appoint the NLR for this study. DASB proposed this laboratory and the Commission appointed it".

The title pages of the NLR reports state: "*This investigation has been carried out under a contract awarded by the Accident Investigation Bureau of the Netherlands Aviation Safety Board, contract number OV/634''* (for CR 93080 C). The contract number of NLR CR 94238 C (RoA Annex 4) is OV/441.
The NLR draft report CR 94XXX with comments of Frans Erhart (Lijst 4 tab 24) was not used by experts. Erhart wanted to emphasize the existence of windshear and required NLR to implement 12 changes to the draft report that was going to be included as Annex 4 to the RoA, which the (non-pilot) scientists of NLR regrettably did. Experts should have noticed this as well.
The contract statement on the title pages and the required changes in fact mean that DASB was responsible for the NLR reports, not the Commission.

3.3. Comments on The Use Of "Human Factors" by Experts

3.3.1. Experts might be experts in conducting transport flights with large airplanes as a pilot, but already proved in their interim report V17 (ref. A) not to be adequately familiar with the operation, the working of airplane systems and with flying qualities and performance of airplanes at a high knowledge level, which definitely is required to read and evaluate objective DFDR and AIDS data and hence reconstruct the flight to a level required to answer the questions of the court (see also § 3.1 above). They paid no attention to the many Remarks and Questions raised by the experts of claimants (ref. B).

3.3.2. Experts must have realized this, because in the final report all of a sudden, they reproach experts of claimants for only using available textual information and mention that "*it is obvious that they do not consider the Human Factors dimension of the events*" (FR page 6). The experts "*took this dimension into account and considered that the DASB (RVDL at the time of accident) (being part of the Commission of Investigation) did the same when it sent its comments to this Commission*".
Experts further suggest quite arrogantly that only they have "*operational experience and competencies in this field*"…

3.3.3. **Human Factors**. Experts mention the term "*Human Factor*" many times, in fact precisely 30 times, as excuse for the crew's behavior and, to claimants' experts' opinion, not always appropriate. Experts seem to have their own interpretation and incorrect understanding of the science of Human Factors, which is confirmed on FR page 82 where experts wrote:
"Generally speaking, a pilot who spends more than 600 hours flying a specific aircraft is subsequently considered as an expert, in regard to the "Human Factor" principles".

A pilot without any academic level of training on any subject cannot be called an expert. In the following paragraphs, Human Factors is briefly explained, as is defined in academic level, ICAO, Test Pilot School course books, in the Accident Investigation Manual (§ 3.3.7 below) and in other publications on the subject.

3.3.4. In our environment of high technology, airplanes are designed to have exceptional performance, agility and complexity, such that the operator, the human, has become the weak leak, the limiting factor in the airplane. Human Factors (plural, capital initials) is the science of ergonomic design of – in our case – flight crew stations (cockpits) to improve the interaction between the (automated) on-board systems and the users (pilots), which is especially important for ensuring adequate human performance during high-workload flight phases. In designing and developing complex man-machine systems, system design engineers and specifically educated evaluators [Experimental Test Pilots and Flight Test Engineers – like Horlings of Avio*Consult*] determine if trained pilots can adequately perform the required tasks to achieve successful performance; pilot workload is just one aspect of this determination. The design features and the environments directly influence the success of a flight; this often results in the ultimate bottom line, mission success or failure, life or death [ref.: USAF Test Pilot School (TPS) Chapter 3 – Human Factors; downloadable via this link: http://handle.dtic.mil/ 100.2/ADA320038].

3.3.5. The human factor (singular, lower case initials) – in this case – is the pilot in the cockpit. Pilots, though, are selected and trained to be high level professionals in operating complex airplanes and their onboard systems. Both airplane manufacturers and operators (in this case Martinair/KLM) publish procedures in formal and legally binding Airplane Flight and Operating Manuals for all phases of flight, including the handling of the airplane during adverse weather conditions and in case the airplane has deficiencies. It is mandatory for airline pilots to use and follow these procedures in-flight. Airline pilots are not authorized to deviate from the published procedures in Airplane Flight and and

Operating Manuals, because these are to be considered part of the airplane's certificate of airworthiness. Not adhering to the procedures renders the airplane not-airworthy and results, in this case regrettably resulted, in an accident.

3.3.6. *"Human Factor(s)"* and *"high workload"* can and may not be used as an excuse for not adhering to established, thoroughly evaluated and published procedures, as the experts do; this should be called human failure or human error instead. Airline pilots are well trained using the formal procedures during classroom lessons and simulator training sessions and are not authorized to deviate from them, because they are not educated at a sufficiently high engineering level to overview the consequences thereof. Still, there seem to be experienced airline pilots who do not comprehend this and 'bend' the rules as they like; they can and should be held responsible for the consequences.
Airline pilots without proper additional education (besides high school and a pilot rating course) are definitely not authorized to change procedures, although many of them think they are, including the experts. Good knowledge of, and experience with flight-testing aircraft performance, flying qualities and on-board systems is required to do that. This was one of the reasons that Test Pilot Schools were founded in the USA, UK and France, of which the entry level usually is an MSc degree in engineering.

3.3.7. Two quotes out of ICAO Doc 6920, ed. 1970, Manual of Aircraft Accident Investigation, support the above:

1. Page III - 9 – 3:

   "the prime object of the Human Factors investigation is to obtain evidence as to the cause, sequence and effect of the accident through an examination of the operating crew, the cabin attendants and the passengers. Co-incidentally with the investigation, evidence as to identification will automatically emerge particularly if each examination is enhanced by the coordinated efforts of the Human Factors Group pathologist, police, odonatologists, radiologists, etc."

2. Page III - 9 -19:

   "§ 9.9. Other aspects HF investigation.

   § 9.9.2 e) Assessment of the workload of the crew at the time of the accident.

   The Human Factors Group must distinguish carefully between hypothesis and genuine evidence; whenever possible, factual evidence must be adduced before an accident can be ascribed to a psycho-physiological factor. For example, it may be suggested that the pilot was particularly irritable at the time of the flight; but a replay of the recordings of his in-flight transmissions may give far better evidence as to whether or not this effect was operative at the time of the accident" (page III-9-21).

Experts should have adduced the "*factual evidence"* as recorded by DFDR, AIDS and CVR, but they did not. The CVR did record calm conversations, no stress indications. The captain however did not provide adequate guidance to the less experienced copilot during the approach.

3.3.8. **Crew Resource Management** (CRM) is a set of training procedures for use in environments where human error can have devastating effects. Used primarily for improving air safety, CRM focuses on interpersonal communication, leadership, and decision making in the cockpit.
Crew resource management formally began with a National Transportation Safety Board (NTSB) recommendation made during their investigation of the 1978 United Airlines Flight 173 crash. There, a DC-8 crew ran out of fuel over Portland, Oregon while troubleshooting a landing gear problem.

The term "*cockpit resource management*" (later generalized to "*crew resource management*") was coined in 1979 by NASA psychologist John Lauber who had studied communication processes in cockpits for several years. While retaining a command hierarchy, the concept was intended to foster a less authoritarian cockpit culture, where copilots were encouraged to question captains if they observed them making mistakes.
Crew resource management grew out of the 1977 Tenerife airport disaster (KLM) where two Boeing 747 aircraft collided on the runway killing 583 people. A few weeks later, NASA held a workshop on the topic, endorsing this innovative training. United Airlines was the first airline to provide CRM training for its cockpit crews in 1981. By the 1990s, it had become a global standard [Wikipedia].
Experts should have elaborated on CRM, rather than on "*Human Factors*" because the captain proved not to communicate in the cockpit, showed no leadership, did not apply the prescribed procedures himself and allowed the copilot (the pilot-flying) to deviate from well established procedures, as the CVR transcript proves.

3.3.9. **Workload and stress**. The terms *"workload"* and *"stress"* are also favorites of the experts; they used both 14 resp. 12 times. The CVR did not record stressed voices or sounds due to high workload during the approach. There were no defects or deficiencies that required more attention and caused higher workload than normal. The workload on flight MP495 never exceeded the workload or stress that the pilots experienced during simulator training sessions. Pilots are selected, trained and tested to handle stressful situations with ease. A crew of three reduces the workload of the individual crew members.

3.3.10. **Conclusions on "*Human Factors*" use by experts**

3.3.10.1. The fatal accident happened because the pilots did not apply well developed flight procedures. They were or should have been trained to use these procedures to the letter. A crew of three in the cockpit is an adequate amount of human presence to avoid stress and high workload under all circumstances. If they cannot handle the aircraft in whatever circumstances, something went wrong in their training, with obtaining their licenses and ratings and in their CRM. The NTSB also mentioned this in their October 1994 letter to the Commission (attachment to RoA).

3.3.10.2. Conclusion on the use of the term 'Human Factor(s)' by experts is that it seems that experts used it to cover-up errors by the crew. The level of expertise of the experts and their intentions are again seriously doubted.

3.3.10.3. The Captain of Martinair MP495 showed no leadership. On 21 Dec. 1992, there was no Crew Resource Management in the DC-10 cockpit during the approach to Faro airport. The flight crew is responsible for the fatal accident.

3.4. Comments on A New Analysis of ATC Radar Data Presented by Experts

3.4.1. In § 8.6.4.1.2 (FR page 121), experts present a new analysis using the radar data that is included in RoA Annex 5. In § 3.1.14 above, a few statements were already presented out of the comments below.

3.4.2. On FR page 121, experts wrote:

"The documentation provided to the experts by the court does not include any details on the radar sources itself (like geographic position, type of radar primary and/or secondary surveillance, update rate, position errors etc.)".
Despite these uncertainties, experts present their analysis. They do not clarify how these data were reduced and plotted, either.
In the RoA § 1.17.5 Radar register, page 105, the Commission wrote: *"The MP 495 radar*

position registrations were received from the Lisbon radar recording. It was possible to determine the aircraft trajectory inside the Lisbon FIR up to the point of impact on the runway".

3.4.3. Radar properties other than this approximate position were not provided in the RoA. Yet sure is that the ATC radar was located near Lisbon, approximately 200 km NNW of Faro airport (§ 3.1.14 above). This direction is important to know for comments on the lateral analysis, that follows below.

3.4.4. Due to the curvature of the earth, the horizon of a ground-based radar (in nm) = $1.23 \times \sqrt{altitude\ (ft)}$. In Portugal, the ATC radar was located ≈ 200 km, is 108 nm from Faro. Hence, the horizon of that radar above Faro was $(108/1.23)^2$ = 7700 ft, meaning that data of that ATC radar is not accurate and reliable below 7700 ft above Faro airport. If the ATC radar would be positioned on a mountain, this horizon may be lower. Mountains however, also cause radar shadow zones in which the radar horizon might be higher.
Experts did not mention the ATC radar horizon. At Faro, the long-distance radar data should not be used to analyze flight MP495 at altitudes below 7700 ft (§ 3.1.14 above). Experts of claimants did not use the radar data to analyze the flight, because of the radar horizon and the lack of reliable information on the accuracy of the radar data. The meaning of so-called 'adjusted positions' in RoA Annex 5 is not made clear.

3.4.5. On FR page 122, experts wrote:

"The error associated of the range measurement of the radar stays more less the same over the maximum coverage area of the radar. In other words, the further away the target (here: aircraft) is from the radar origin, the larger the bearing error appears in absolute terms. This is why we have a changing lateral position quality of the radar plots during the course of the flight".

This is confusing; range and bearing errors used together in this paragraph; a "*range measurement error*" results in a *"bearing error"*, which in turn leads to a "*changing lateral position*" according to the experts. This indeed requires some comment.

An ATC radar is designed to 'paint' a distant airplane with several (at least 3) consecutive pulses of RF energy at the maximum range of the radar during every antenna revolution. The Pulse Repetition Frequency (PRF), the RF transmitter power and the RPM of the radar antenna are selected to achieve this. Since the width of the RF antenna beam increases a little at longer ranges, the radar echo's might appear wider than at close distance if no signal processing is done. But this is not very important to value the expert's analysis.

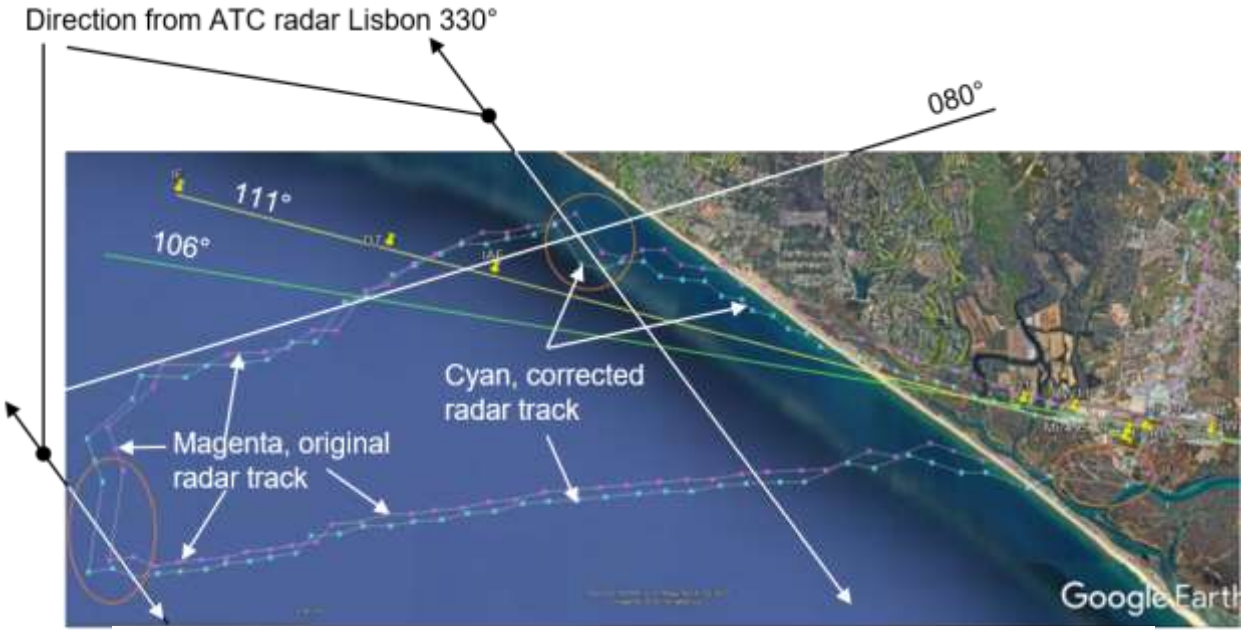
Experts state that the *"error of the range measurement"* of radar data *"stays more or less the same"*, which is not correct, because the propagation speed of RF energy (being the speed of light) does not change with the distance traveled. The range error of a radar, if any, does not at all rely on the distance from the radar to the airplane but is constant, is the same for any distance; the RF energy of a radar does not slow down at greater distances from the radar, but is only attenuated in and by the atmosphere. The possible error, if any, resides in the signal processing inside the radar system (see also § 3.1.14). This processing error is constant, though.

Because we know that the ATC radar is situated NNW of Faro, and nearly perpendicular to both the outbound and the inbound track during the VOR approach to Faro airport as shown with auxiliary lines in the figure below, the *"error of the range measurement"* indeed stays the same, not *"stays more or less the same"*. If both the magenta and cyan tracks are from the same radar, they should however, be on top of each other. Since this

is not the case, the source of these data is questionable. Obviously, a not-explained difference error exists between both data sources.

Angular accuracy of a radar, inappropriately called *"bearing error"* or "*lateral error"* by the experts, might play a role in plotting the track of the airplane. However, when looking at the figure below, the data points along the flight path are equidistant from each other during both the outbound and inbound tracks of the approach; there is no sign of "*bearing errors"* of the ATC radar near Lisbon at all, not even on the North bound part of the track, far left in the figure below (Figure 1 on FR page 123), except for two missing data points.

Experts use the "*bearing error"* to explain *"a changing lateral position quality of the radar plots",* meaning position data north or south of the 111° radial. However, with range measurements from the ATC radar that is located perpendicular to the airplane track, this so-called 'lateral' error is a range error and should be zero.
Since normal range measurements of a radar are quite accurate and hence, the range



Lateral flight profile based on radar data (Figure 1 out of the Final report page 123). Added are auxiliary lines showing ATC radar direction, and legends of the original (magenta) and corrected (cyan) radar tracks.

errors are near zero, the distance of the airplane track data points to the ATC radar should be very accurate. Yet, the experts emphasize *"In figure 1, the areas with orange circles mark areas with large lateral deviations within the radar track (orange circles). These effects cannot be fully explained at this point"*. Experts of claimants can explain: the line connecting the data points within these orange circles point in the approximate NNW direction of the ATC radar near Lisbon; for these points the range errors would apply, not the lateral deviations (if seen from the airport). As explained, range data is very accurate, hence the data plots might not be as accurate as experts think they are. The cause of the data jumps could be errors in the acquired data; these data points should not be used. The radar horizon may play a role here as well.

On FR page 122, the experts wrote:
"The measured relative difference between both radar tracks is in the range between 150 [m] and 300 [m].

No quantitative statement on the absolute lateral position accuracy of the radar data can be made".

What is meant by "*relative difference"*? The range measured by a radar that is near perpendicular to the airplane track should have no or only very small, yet constant errors that can only be caused by (digital) signal processing within the radar. A range error between 150 and 300 m should ring a bell, because that is impossible; a radar would be useless. If *"No quantitative statement on the absolute lateral position accuracy of the radar data can be made",* as experts state on the bottom of FR page 122, then why use these data, why present this analysis? Real experts would not do this, knowing also about the radar horizon.
Experts obviously consider the lateral position data as seen from the airport, but the radar was not at Faro airport, it was to the NNW. This 'lateral error' was near zero, as explained above.
Errors were made by the experts plotting the cyan and magenta tracks. They did not investigate the source, i.e. the real value of the data presented in Annex 5, and the limitations that come with the data.
Experts lack radar engineering and radar data analyzing knowledge, for sure. Their analysis in the newly added paragraphs should not be considered.

3.4.6. The "*Lateral flight profile*" (should of course just be called the flight track) in the title of Figure 1 on page 123 of the Final Report (is the figure above) shows that, from the orange circle in the bottom left, the airplane flew at a heading of approximately 080° for 20 consecutive radar position points. One data point per 5 sec. (as the experts specified) results in 100 seconds of flight at heading ≈ 080°. The DFDR data dump provided by the NTSB however, shows only 34 seconds of flight at 080° heading. Experts of claimants rather believe the objective DFDR data to be correct and the analysis by the experts incorrect.
The presented cyan and magenta flight profiles show lateral 'jumps' of approximately 1° – 4° during the final approach (orange circles), when measured from Faro. Above, the experts wrote also about differences between 150 and 300 m. These jumps cannot be caused by range measurements of a radar NNW of Faro. Experts should question themselves whether their analysis of radar data is reliable. It is definitely not; data from below the radar horizon are not very accurate, are unreliable.

3.4.7. On FR page 124, experts state *"the "cyan" track has been shifted to the North to match the runway 11 centre line as best as possible"*.
On page 126 they state *"From this radar data analysis it can be assumed that the flight MP495 had been laterally aligned with the extended centre line of runway 11 (quite late) …"*

In this radar data paragraph, experts do a lot of assuming, interpolating data, and shifting of data around to match their desired outcome with the statement of the Captain, data of which *"No quantitative statement on the absolute lateral position accuracy of the radar data can be made"* (as Experts wrote on FR page 122), and expect the readers to accept their analysis, which real experts will never do.
Shifting data and then *"assuming"* that the aircraft was laterally aligned *("quite late"*) is definitely not an objective analysis. It is 'fixing' data to match a desired outcome.

3.4.8. The experts conclude on FR page 127:

"This analysis of the available radar data supports the assumption, that flight MP495 was laterally aligned with the extended centre line of runway 11 (quite late) shortly after the intersection of VOR radial 111° and the runway extended centreline of 106° at around 0,8 [nm] (or 1.500 [m]) from touchdown and was established on the extended

centre line of runway 11 at around 250 [ft], which is in accordance with Captain's statement (Lijst 4 map 1 van 4 pdf page 19) indicating that the flight was on the centre line of the runway at 200 [ft]".

Experts herewith in fact also confirm that MP495 was not stabilized on the approach when passing 500 ft altitude, ≈ 45 seconds before landing, as required by the approach procedures in the AOM. The pilots made an unforgiveable navigational error but experts did not use these words, they protect the pilots.

3.4.9. In the conclusion of the radar data analysis on FR page 127, experts repeat their assumptions to be "in accordance with Captains statement":

"*The Experts are also confident regarding the conclusions of the NLR report about the position of the aircraft which was aligned, on very short final, on the center line of the runway below more or less 200 [ft]*" and that
"*this conclusion matches with the Captain's statement indicating that the flight was on the center line of the runway at 200 [ft] and the radar data analysis conducted by the experts*".
Experts finally include a "*chart provided by the NLR (see final report CR93080C)*", which also "*confirms the Captain's statement and the radar data analysis of the experts about the position of the aircraft on short final*".

In his first statement the captain said: *"We were in the correct position for landing, the crab angle was approximately 7° to the right."* In his second statement, a few months later, he stated: *"At 200 feet we were on the centerline and in the slot for landing"* and *"we had 7° drift"*. If the airplane was indeed on the extended centerline with a true course (path over the ground) of 106°, a 7° drift angle would mean a heading of 113°, and a wind of 150°/20 kt. The heading however, was much larger, 125° as DFDR data prove. Therefore, the airplane cannot have flown on the extended runway centerline; the approach true (ground) course was approx. 117° and the wind 190°/20kt, as is also briefly explained in § 3.10.5 below, and as proven in ref. D.

The conclusions of the experts prove that the Experts' only objective was to find arguments to confirm the not-objective Captain's statement that "*the flight was on the centerline of the runway*", by shifting radar data in a way that real experts would not dare to do and by using an NLR report that was not a *"final report"*, but a first version that was not accepted and used by the Commission. This version was not included in Annex 4 of the RoA. The used NLR chart was not included in the final NLR report either (because it was not made with objective data). NLR might also inappropriately have used ATC radar data of below its horizon and might not have made a heading and wind analysis, either.

3.4.10. This unprofessional and even misleading "*radar data analysis*" by experts was the trigger for experts of claimants to write a more detailed analysis of the approach path of the airplane during the last 80 seconds of flight than included in the Avio*Consult* report of Dec. '12, using objective DFDR and AIDS data only: 'The last 80 seconds of flight MP495' (ref. D). DFDR- and AIDS-recorded heading data, control inputs by the pilots and airplane motions are more reliable for analyzing than the position data of a distant radar while the airplane is below its horizon.

3.4.11. *Experts* wrote a misleading, unprofessional, even amateurish radar data analysis, which should be discarded by the court.

3.5. Comments on The Thrust Reverser Analysis by Experts

3.5.1. Experts wrote as comment to the DASB comments on FR page 58 – second sentence:

"Even if the landing distance is not a contributing factor to the accident, the Experts evaluation is that the stowage of the reverser N° 2 is a concern that the crew should have considered, according to the weather conditions".

On page 179, item 2.2 experts remark:

"As soon as the MEL is respected, it is not necessary to organize any contact with the Authority. At the opposite, a contact will be mandatory to obtain a dispatch clearance out of the MEL (technical flight, …)".

The MEL (Minimum Equipment List), called Dispatch Deficiency Guide (DDG) in the AOM, did not allow the MP495 crew to depart a repair station, hence the MEL/ DDG was not "*respected"* by the captain. The remark to the DASB answer on question 4 of 143 questions was *"As indicated, the aircraft was "good for fly" except for the reverser n°2 (approved technical deviation)"*.
Here experts seem to agree that the deviation was approved, which it was not. Schiphol was a repair station and the DDG prescribes that a repair had to be made prior to departure.

3.5.2. This is not an answer to the question. A departure with an inoperative thrust reverser was not approved by Martinair procedures and by AOM 3.1.17, as was well explained in the FAA MEL preamble: *"The MEL is intended to permit operation with inoperative items of equipment for a period of time until repairs can be accomplished. It is important that repairs be accomplished at the earliest opportunity"*. This in fact means repair as soon as possible, and certainly when the airplane is at a repair station, as correctly interpreted in the Martinair manuals. Still, experts maintain their incorrect conclusion that *"All the procedures were fully respected before the dispatch"* (FR § 2.2, page 179). Martinair and DASB did not answer questions 102 and 107 of 143 correctly; Experts did not answer claimants' questions in RRQ, ref. B, § 2.2. Experts are biased, are protecting the crew.

3.5.3. Experts expressed doubts about departing with reverser 2 stowed. The landing distance was indeed a factor because the required landing distance exceeded the runway length under the given (flooded) runway condition.

3.6. Comments Regarding the Proposal of Changes by DASB ('Blue Report'), Sept. 1994

3.6.1. In § 8.4, experts present their *"comments regarding the proposition of changes sent by DASB to the Commission"*. However, the presented comments are not comments on the *"proposition of changes"*, but comments on the 'reduced' version, the 'weakened' version that is included as Appendix in the Portuguese Final Report of Accident (RoA). The original proposed/ required changes by DASB to the draft of the RoA were presented to the Commission during a meeting of DASB and Commission from 8 – 12 Sept 1994 ('Blue Report', Lijst 2 tab 23 dl 1, from pdf page 15). The Appendix of the RoA that the experts commented on was made when it became clear that the Commission did not want to accept all of the change proposals in the 'Blue Report' of the DASB.
The lines/words that DASB wanted the Portuguese commission to delete (because they could be used to blame the crew) are not included in the comments of the experts, which is unfair and doesn't contribute to answering the question asked by the court whether the DASB did handle the information it had at the time with due care. During meetings with victims and relatives, DASB continued to use their own conclusions and causes as stated in the 'Blue Report', rather than those out of the Final Portuguese Report.
The experts used the wrong document for answering the questions of the court.

3.6.1.1. In the RoA, the Commission wrote: *"the crew was not aware of the turbulence intensity due to the influence of the automatic flight control systems operating correctly, degrading the crew's perception of the seriousness of the situation"*.
DASB wanted this line to be deleted with the 'Blue Report' but changed it in the final version to "*the crew was less aware…*". By the way, "*automatic systems"* do not "*degrade the crew's perception"*, on the contrary, these systems are faster and better in the response to disturbances than a human pilot. The pitch control columns and roll control wheels move with the control inputs generated by the autopilot and hence, providing the pilots with tactile feedback to enable "*perception of the seriousness of the situation"*. Nevertheless, there was no serious situation at all. Experts exaggerate the intensity of the turbulence, because DFDR data prove this was only light. Experts did obviously not analyze DFDR and AIDS data to conclude that the copilot continuously interfered with the autopilot, as not only experts of claimants, but also the NTSB concluded (letter 26 Oct. 1994), see also § 3.1.11.2.

3.7. Comments on The Use of Clock Times by Experts

3.7.1. On FR page 10, experts wrote about time references: *"This question seems to be considered as an important issue in order to understand the last part of the flight MP495. But the real question is, whatever the used time reference, whether this reference should be considered as a contributing factor to this accident. The answer is obviously clear and negative; this is the reason why the Experts decided to close this question at the early beginning of their report"*.

Time references in a report are indeed not contributing factors to an accident, but it is definitely not a good engineering and accident investigation practice to report events in reports using so-called UTC times, while the times in the Final Report of the experts are not to the UTC standard, but to some other standard, called Padrão in the Portuguese report. Times were also used improperly by the Portuguese Commission. As discussed in § 3.1.4.3 above and § 3.7.3 below, certain events cannot be analyzed accurately if these are to different time standards. Experts did obviously not read § 2.2 of the Avio*Consult* report and hence, continued to use the wrong time reference throughout their report.

3.7.2. In FR § 8.1, page 51, experts wrote:

"*According to the transcription of the CVR, the touchdown occurred at 07:32:50 UTC, which seems to correspond to the DFDR recorded data as provided by the NTSB.*

According to the official report, touchdown occurred at 07:33:20 UTC, which shows a difference of 30 seconds.

In Annex #5 of the official report, named "TIME UTC", we note three references: Radar, Padrao (standard), and CVR.

The accident occurred at 07:32:49 on both "RADAR" and "CVR", but at 07:33:20 on "STANDARD".

"Moreover, even though the gap between "RADAR" and "STANDARD" is constant, the gap between "RADAR" and "CVR" is not".

3.7.2.1. Several errors exist in this text. Experts, as world-wide operating and experienced airline pilots, should know that there is only one UTC. Errors were made in the Portuguese and NLR reports (and by the experts as well). The touchdown occurred at 07:33:20 UTC as presented in the RoA § 1.1 on page 22: "*The accident occurred at 07:33:20 UTC, in dusk light conditions*".
The DFDR does not record UTC, but Elapsed Time, and the NTSB did not provide UTC

data as experts state (§ 3.1.4.23.1.4 above). NTSB reported "*data consistent with touch-down were observed at 0007:02 DFDR elapsed time*". Refer to RoA Annex 15 and § 3.7.4 below.
Experts could have concluded that the time labelled 'padrão' was the one and only real UTC.

3.7.2.2. Experts do obviously not understand why the gap between the Radar and CVR times is not constant. The CVR of MP495 recorded all sounds in the cockpit on a vinyl tape that stretches under use, and/or of which the tape speed is not constant. Therefore, the difference of CVR time with padrão time at the beginning of the recording was 2 min, 4 sec. and at the end 31 seconds. Data of older CVRs always needs to be correlated to UTC, using tones, ATC conversations and sounds of the operating switches and buttons in the cockpit that can be linked/correlated to DFDR recorded data or recordings of ATC. Real experts and accident investigators are aware of this.

3.7.3. Experts continue to use the wrong UTC time not only in FR § 8.4, but throughout their report, which prevents them from correctly correlating between recorded events (FR pages 150, 153, etc.). On FR page 51: *"The Experts consider that the use of multiple time references used in the report had no consequences on the work of analysis done by the Commission of Investigation.* Is this so? When did the supposed wind 220°/35 kt occur, in-flight or after landing? Experts did not list the proper time reference in the legends of the graphs that they made up either (FR pages 133, 148, 149, 152).

3.7.4. On FR page 11: *"For information, all along their report, the Experts will use the DFDR time as the main time reference because it is the cockpit reference time (The DFDR time reference is the time provided by the Captain's clock in the cockpit) and also because it is the end of DFDR*".
DFDR time is not connected to the Captain's clock, and not to the copilots' and F/E's either. The electronic clocks in the cockpit were connected to a pulse generator behind the F/E's panel providing independent time signals to each clock (AOM 1.13/5). The clocks were each provided with buttons to set the GMT hours and minutes, which would not be necessary if connected to the DFDR as main time reference. DFDR time is not set by and synchronized to the cockpit clocks either. DFDR time only exists within the DFDR and is an Elapsed Time expressed in hh:mm:ss, as was discussed in § 3.1.4.2 above. This is mentioned in the legend of DFDR data in RoA Annex 15, that was an attachment to the NTSB letter dated Feb. 12, 1993.

3.7.5. Again, experts prove that they are not experts and have no experience in accident investigation.

3.8. Comments on Throttles & Autothrottle Analysis by Experts

3.8.1. On FR page 31: *"Moreover, the Dutch Aviation Safety Board indicates that the thrust increase at around 102% at 07:32:40 UTC — 10 seconds before impact — is the result of the ATS's actions.*
The Experts disagree with this assertion.
It seems that the specialists originally designated to lead this investigation preferred to remain cautious by avoiding declaring which one, between the ATS and the pilot, caused this thrust variation. The thrust increase could also have be initiated by the pilots: this is at least the content of the statements made by the Captain and the F/E.

A lack of certainty about the thrust variation is the reason for the Experts to be cautious".

3.8.1.1. *"The experts disagree with the assertion"* that the thrust increase to around 102%, "*10 seconds before impact"*, is the result of ATS's action, and they have *"a lack of*

certainty", because they don't have expertise on the operation of autothrottle systems. Claimants' experts knew that the ATS responds to an elevator control input, and could also show DC-10 Schematic Diagram 22-31 that presents all of the inputs to the autothrottle systems, which are: Radio altitude, bank angle, pitch angle, angle of attack, airspeed, Mach No., altitude rate, normal acceleration, longitudinal acceleration, engine rpm and engine over limit, horizontal stabilator position, elevator position, left inboard flap and, of course, the on/off switch, the takeoff go-around (TOGA) switch and the speed selector input (that was set to 139 kt). The elevator is, via an actuator, directly connected to the control column in the cockpit by steel cables. If a pilot pulls on the control column, the position of the elevators changes after which the ATS immediately responds with increasing the throttle position, which is required because the thrust increase, the spooling-up of the big turbofan engines takes time. A higher nose attitude would quickly decrease the airspeed below the set value; the ATS is designed to avoid this. Most pilots know this. The ATS is a well-developed feedback and control system.

3.8.1.2. Twenty seconds before touchdown, the copilot pulled the control column (AIDS data page 9) which increased the pitch attitude to 8°, after which the elevator feedback to the ATS caused the engines RPM to increase and reach 102% at 10 seconds before impact (DFDR data). Hence, the ATS and not the copilot increased the engine RPM to 102%. Thereafter copilot pulled the throttles back to flight idle. One reason for closing the throttles could be that the increased RPM would accelerate the airplane after which the touchdown spot would be further down the (short) contaminated runway, which the copilot did not want to occur; not a professional decision. Procedures require the ATS to be engaged until touchdown.
The thrust increase at 4 seconds before touchdown was indeed initiated by the captain, as both their statements and objective DFDR data confirm.
Experts wrote about the wrong RPM increase because they obviously used statements made by the captain and the F/E and not objective DFDR and AIDS data in their analysis and were not aware of the elevator position and other feedback to the ATS.

3.8.2. On the bottom of FR page 74:
"*The Experts do not validate the official statement as the thrust reduction, whatever the reason, has begun earlier*" (than at 50 ft).
Experts should have reviewed DFDR data that confirm that the thrust was reduced to flight idle already at 150 ft. Refer to the DFDR data in § 5.6.1.1.

3.8.3. On the top of page 69 experts wrote:
"As already said, the Experts do not validate the official assertion related to the reduction of thrust. The rate of thrust variation is the same as if done by the ATS. It is then impossible to define definitely who initiate the thrust reduction".
No, an ATS is not programmed to reduce the thrust to a level below approximately 60% N1 when the altitude is above 50 ft. This is proven by the DFDR data in § 5.6.1.1 where the rates of thrust decrease by the ATS and manually by the copilot are shown, and also that ATS did not decrease the RPM below 60% on four occasions.

3.8.4. The experts included flight idle trim tables (FR pages 89, 90) but did not explain to the court what the objective is of including the tables. The tables seem to be provided by General Electric, but not via the court, so where is this data from? A proper legend is missing; are the data indeed for the CF6-50C engines of the Martinair DC-10? Ground idle data are irrelevant; the provided flight idle data as well because the incomplete legend says: *"allow to stabilize 3 minutes with no airbleeds or generator loads*". Air bleeds and generator loads were not selected off and not stabilized; hence the table does not apply. They red-lined both the N1 for 14° C of 26.5% and the legend that calls for allowance to stabilize for 3 minutes, which of course did not occur during the approach of

MP495. So, the table is not at all valid for this case. Including these tables is confusing, not convincing.

3.8.5. On FR page 90, "*The Experts' conclusions are:*

• during the approach and even just before the accident itself, the engines were correctly running without any defect or failure;

• At all time, including just before the accident, the engines were able to provide the pilots with all the required thrust even in case of missed approach procedure or aborted landing procedure".

3.8.5.1. The last statement is definitely incorrect; the engines were correctly running but the RPM had decreased to 40.7% (DFDR) because the copilot had closed the throttles with some force against the ATS and kept them closed, against the applicable procedures that require the use of ATS until the landing, and that require to avoid an RPM as low as flight idle when under manual control. The 40.7% RPM (DFDR) is lower than the flight idle RPM of 42.2% that experts provided on FR page 90, hence the experts should have concluded that the engines' RPM decreased below flight idle at 5 sec. before touchdown. Normally, the throttles are retarded from 50 ft by either the ATS or the pilot.

3.8.5.2. After the throttles were increased by the captain to maximum thrust 3.5 sec. before touchdown for a go-around, it took too long for the engines to spool up for developing the required thrust for the go-around (DFDR data, RoA Annex 15). Hence, the engines of MP495, when the go-around was initiated, were not able to provide the required thrust in-time, because of the copilot error (throttles closed to flight idle). Not only the low RPM was a contributing factor to the failure of the go-around (and hence to the accident), also the effect of the inappropriately deploying spoilers within one second after touchdown (§ 3.1.17); the experts did not mention this, while it is obvious from the DFDR data.

3.8.5.3. The pilot should not have interfered with the fully functioning autothrottles before touchdown. Experts are aware of the spool-up delay, given their statement on FR page 87, but the pilot error of pulling the throttles back to the stop and holding them there, preventing the ATS to do its work properly, and therewith reducing the RPM to flight idle, rather than maintaining a higher RPM than flight idle as the ATS is programmed to do and as is taught to pilots to be able to expedite the thrust increase, is regrettably not mentioned by the experts. They do not like to mention pilot errors.

3.8.6. Experts present engine data that are not out of the RoA (FR page 87 - 89) and refer to FAR 33.73 (thrust response) which provides minimum requirements for airplane manufacturers (and experimental test pilots for flight-testing purposes), not for airline pilots. Manufacturers may design equipment that exceeds the minimum requirements. Experts are not aware of the additional time increments in this FAR that the Administrator might have allowed, and do not realize that the requirement calls for "*takeoff power or thrust*" which might not be linearly proportional to engine RPM only. Experts should stick to Airplane Manuals that they understand, not to engineering data and manuals that exceed their level of knowledge.

3.8.7. On the bottom of FR page 196, experts state as comment on RRQ, ref. B, § 5.3.5.7: "*The F/O's action plan was to land! In this case preventing an increase of thrust is a normal behavior because of the risk of increase of landing distance!*"

The copilot was not preventing *"an increase of thrust"* but pulled the throttles back at a too high altitude of 150 ft, for which 50 ft is normal, therewith overruling the ATS, which is against the Martinair procedures that require the ATS to be in control of the engines

until landing. He might have decreased the throttles because of the thrust increase to 102% by ATS a few seconds earlier which might lead to an "*increase of landing distance",* which he wanted to avoid; the runway was not that long. A pilot should never pull the throttles back in an attempt to reduce the landing distance, because the airspeed might decrease below the threshold speed and a go-around at low altitude or from the ground will fail (both of which actually happened). In addition, the rate of descent might increase. "*Preventing an increase of thrust"* is certainly not "*a normal behavior"*. Such a behavior is not professional and might turn out to become catastrophic, which it in fact did. The experts do obviously not want to blame the copilot for his unprofessional behavior and did not review DFDR and AIDS data before making this comment. Stating "*Preventing an increase of thrust*" to prevent an "*increase of landing distance*" also proves that experts are not knowledgeable and safety minded pilots.

3.8.8. Experts did not provide a thorough analysis about the closure of the throttles to flight idle, 14 sec. before touchdown (FR page 90). Closing the throttles at 150 ft is a pilot error that experts again did not discuss. It is obvious that the experts do not have adequate knowledge of the autothrottle (and other) systems and did not review the applicable Martinair procedures, which is the reason that they drew the wrong conclusions.
If the copilot would not have closed the throttles and had left the ATS in control of the throttles, the go-around initiated by the captain would have been successful and the accident would not have happened.

3.9. Comments on Ailerons Analysis by Experts

3.9.1. On the top of FR page 153: "*It is important to note the movements of the control wheel around 7:31:40 UTC and around 7:31:53 UTC because these movements are the result of an action of the autopilot*". Experts refer to 67 and 58 seconds before landing, the time the light turbulence started. The command mode of the autopilot was controlling pitch and roll. The turbulence caused a very small bank angle that was correctly counteracted by the autopilot; the control wheel rotated only 4 degrees in both cases; not at all "*important to note"*.
The experts did not discuss the copilot control force inputs thereafter, which showed that he did not use the CWS mode of the autopilot in the proper way, as was also noticed by the NTSB (letter Oct 26, 1994) saying that the CWS (and ATS functions) *"were inappropriately used by the flight crew"*. The experts obviously have not reviewed AIDS data, RoA Annex 9 graph 14 which shows the wheel control force exerted by the copilot, the bank angle and the control wheel position (with an offset). These are not computed, but objectively measured values. The accompanying graph with computed position of the control wheel on FR page 152 is very bad; its legend as well. The graph cannot be correct; the position of the left aileron is not in agreement with the DFDR data. Position of the command is opposite of the AIDS data. Do experts expect any reader to be able to read and understand the graph? Where are the data from, where is the experts' analysis from second to second? Analyzing does not mean just dumping illegible data on paper in a report as an answer to the questions of a court. Very unprofessional, an expert unworthy. Experts should have substantiated their conclusions, as asked for by the court.

3.10. Comments on More Pilot Errors as Analyzed by Experts

3.10.1. Destabilization.

3.10.1.1. On FR page 153, third bullet:

"• *That the bank angle in very short final seems to be the result of the simultaneous action of the ailerons and the rudder, both due to pilot's inputs.*

According to the third point above one might conclude that the pilot, and only the pilot, is the source of destabilization.
This is not what the Experts say. It is possible that destabilization was felt by the crew and induced the F/O's reaction on the controls"

A contradiction in this paragraph. There was no destabilization, as DFDR data shows; the airplane responded adequately to all control inputs, some of which were inappropriate as the NTSB also reported (§ 3.9.1 above). The copilot was in the loop during the final approach. He pushed the rudder pedal to near full left and did not compensate the roll side effect with aileron to the right; the captain interfered and took control; hence a co-pilot error is obvious, don't experts agree?

3.10.2. **Approach path:**

3.10.2.1. On FR page 102, experts called it "*an excellent decision*" "*to stabilize the flight path for a few seconds to heading 080°* ", but in the next line wrote:

"The only critique we could make towards the crew is not to have sufficiently anticipated the beginning of interception because of an unfavorable wind that pushed the aircraft outside of the planned trajectory.

Moreover, the turn toward the final approach radial was performed with only a 25° bank angle because it was performed through the autopilot, which induced a slight overshoot from the approach axis that should have been adjusted immediately."

"*Should have been adjusted immediately*"? So, the decision is not that "*excellent"*? As the DFDR data show, the turn never exceeded 17.6° angle of bank, but this bank angle decreased because a heading of 080° was set, rather than an updated intercept heading to the 111° radial. The copilot did not use his instruments to roll out on the 111° approach radial with an appropriate wind correction angle. Calling this error an *"excellent decision"* does not show independent expertise. See also § 5.4.2 below.
On FR page 123, experts show that the airplane was on heading 080° not only "*for a few seconds"*, but for about 100 seconds (while DFDR data shows 34 seconds on this heading, refer to § 3.4 above).

3.10.2.2. After passing overhead Faro VOR, the radar plot showed a perfect tracking of the outbound 269° radial; a confirmation that the pilots were fully aware of the existing strong wind and the resulting drift angle (17°, ref. D), parameters that were indicated on the Performance Page of the AINS. Consequently, at the start of and during the inbound turn, the pilots should have been able to anticipate an overshoot of the inbound 111° radial, an occurrence which was clearly presented on the HSI (horizontal situation indicator) and RMI (radio magnetic indicator). These indications should have required an immediate and earlier turn to a new intercept heading (≈ 141°). Letting the autopilot roll-out on the 080° heading, thus further increasing the overshoot, was a wrong action and should have been corrected by the captain. For the Experts to say that this was *"an excellent decision"* is totally ridiculous. Moreover, the aircraft was not configured for the approach and landing in-time, as required by the procedure in AOM 3.3.5 – 08; obviously both pilots did not follow this procedure under the unfavorable weather conditions. The copilot initiated configuring the airplane for approach and landing too late, after being reminded by the captain and did not command "*landing checklist*" after setting the final approach speed. This was only accomplished after being challenged by the F/E when the aircraft was between 5 and 4 nm DME.

3.10.2.3. The statements made by the F/E following the accident (lijst 4 map 1 sur 4) are questionable; there were at least 2 issues that could not be confirmed by the CVR transcript.
Firstly, there was "*the flashing of feed pump lights*" (FR page 24), which he said to have

reported to the pilots but this report was not recorded on the CVR. But if so, why did the F/E not take the required action conform AOM abnormal procedures? This creates a reasonable doubt whether or not there was turbulence stronger than moderate during this turn.
Secondly, he claimed the captain called "*go-around*" prior to impact; again, no evidence in the CVR transcript of RoA Annex 5 either.

The Experts' conclusion that the crew was "*highly busy*" during the inbound turn cannot be substantiated by facts or CVR recording and is exaggerated. Even in these probably bumpy weather conditions, the autopilot executed the level turn with 22° flaps as it was commanded to do, so why qualify this as "*a major flight path correction*" (FR page 24). The autopilot and ATS did their job, maintaining altitude, attitude and speed. The pilots only had to monitor the flight path and the radio. During this turn, there was only the radio transmission by ATC with the 'flooded' runway information. The 9-sec. pause for the captain to reply to this information is totally irrelevant. Probably the *captain was too passive here again.* Experts did not verify the F/E statements with the CVR transcript.

3.10.3. Approach speed

3.10.3.1. Experts state on FR page 102 that *"the landing bug (white bug) should have been set at 139 knots and the approach command speed bug (yellow bug) also at 139 knots*". The speed 139 kt was the calculated threshold speed for this landing.
On page 29, experts also state that putting 139 kt in the ATS window "*is considered by the Experts as appropriate*". However, neither of these statements is in accordance with the AOM. The relevant data table including the relevant notes out of the AOM 3.3.5 – 03 is presented below.

3.10.3.2. The experts obviously used the FCOM, a 'generic' operating manual that is provided by the manufacturer with the purchase of an airplane (§ 3.1.13.1 above). This manual also contains landing data. The first line in the Guidelines for threshold speed (V_{TH}) additives on page 03-50-03 states that "*A minimum additive of 5 knots is to be applied to V_{TH} (1.3 V_S) for all normal configuration approaches*". On the next page however, an error is printed: "*during gust conditions, select a speed 5 knots less than the required speed*". Avio*Consult* reported this error in his report of Dec. 2012 § 3.3.9 and mentioned this also in the summary of the report, § 6 item 13. Experts did not include this item in their comments on the Avio*Consult* report on FR page 78. The error did not exist in the AOM anymore that replaced the FCOM for use by Martinair (and KLM) flight crew.

03 WIND CORRECTION FACTOR (WCF) Source: Martinair AOM 3.3.5 - 03

WIND	AUTOLAND	MANUAL LANDING ATS ON			MANUAL LANDING ATS OFF		
			min	max		min	max
STEADY STATE	5 kt	1/2 of the wind above 20 kt	5 kt	20 kt	1/2 of the wind above 20 kt	5 kt	20 kt
GUST	5 kt	all of the gust above 5 kt	0 kt	15 kt	all of the gust	0 kt	20 kt

NOTE: - If both steady state and gust require a WCF, the greater will prevail.
- During gusty wind conditions, the ATS will add up to a maximum of 5 kt to the ATS reference speed. Without ATS the additive is not available.

3.10.3.3. The approach speed of any airplane is always higher than the threshold speed, for additional safety and in anticipation of gusts or a go-around. According to the table out of the AOM 3.3.5 – 03 inserted above, the approach speed of the Martinair DC-10 is always a minimum of 5 kt (circled number) higher than the threshold speed.

3.10.3.4. The wind reported by ATC was 15 – 20 kt meaning a steady state of 15 kt, and gusts of 20 – 15 = 5 kt.
Hence the table above shows that the steady state wind correction factor had to be 5 kt, being the minimum increase above the threshold speed, the circled number. The gusts were 5 kt, hence the wind correction factor (additive) due to gust was 0 kt.
The FCOM used by the experts prescribes the same as the first note below the table inserted above: "*When both the steady state and gust condition additives are to be considered, add only the greater of the two*". The greater of the two was 5 kt, so the approach speed, called the ATS reference speed in the second note of the AOM table above, had to be 5 kt higher than the 139 kt threshold speed, hence 144 kt.

3.10.3.5. The Auto Throttle System is programmed to add an *additional* 5 kt to the approach speed, to the ATS reference speed that is set in the ATS speed selector window, when gusts (turbulence) above a certain threshold are detected (second note to the table above). Flight MP495 indeed encountered intermittent light turbulence to which the ATS responded by increasing and decreasing the throttles. The resulting 5 kt speed increases and decreases due to the gusts/ turbulence are actually shown in the DFDR airspeed and engine RPM data.
The ATS would have increased the approach speed to 149 kt intermittently during the experienced light turbulence when the approach speed would have been set to 144 kt, for providing additional safety (FR page 182; RRQ, ref. B, App 21).
Although the captain in his statement said that he had inserted 144 kt in ATS speed window, 139 kt was found in this window after the crash (Comments of the Kingdom of the Netherlands (Lijst 4 tab 23 dl 1, 2, page 5).
Hence, the final approach speed should have been set to 144 kt rather than 139 kt; see the note below the AOM table above; end of discussion!! The experts made the same mistake as the pilots did.
The approach speed indeed decreased a few times to the threshold speed of 139 kt, as DFDR data prove, when the gust level decreased below the threshold value within the ATS system for applying the speed additive, which would not have happened if 144 kt was set.
The experts obviously did not use the proper manual or want to hide the error of the pilots.
Hence, the conclusion by the experts that setting 139 kt in the ATS speed window "*is considered appropriate*", is wrong, not in agreement with the AOM that the pilots had to use. They also made errors on this subject on pages 30 and 182 of the Final report.

3.10.4. Landing calls and use of controls

3.10.4.1. The captain as pilot-not-flying missed the '500 ft' call, however more important is the fact that 'approaching minimums' was never called by the captain, either. The 500 ft call is not meant to be a precision call and should be amended if it conflicts with the call approaching minimums as stated in AOM 3.3.5. This was not covered in the crew-briefing. Why the PF did not call 'Landing' or 'Go-around' remains a hot issue. During any approach, the call 'Landing' is compulsory, even during a visual approach, for the pilot-flying to inform the other crew members of his intention to land (or go-around). Subtle pilot's incapacitation is reason for these calls to ensure the pilot flying is well and awake. In any case, the captain should have taken appropriate actions when neither of these calls were given.

3.10.4.2. Errors in the application of the correct approach speed and missing of calls can only lead to the conclusion that these qualified pilots did not perform according AOM procedures as they were supposed to do. Qualification as "*highly professional*" by the experts in their final report on page 62 should be disregarded, neither can be proven

that the crew was "*highly busy*" when the "*flooded*" information was transmitted. For a qualified crew, this procedure did not create a higher than normal workload during a non-precision approach, not even under turbulence conditions. As indicated above the (instructor) captain should have monitored more closely and should have corrected the copilot (not having experience above 15 knots crosswind), when noticing that the correct procedure was not correctly carried out. This escalated to the point where the PF was inadequately controlling the aircraft using CWS and ATS. The letter from the NTSB (Oct. 26, 1994) left no doubt about this either.

3.10.4.3. The question remains: why were all these hard facts not analyzed and not commented on by both DASB and experts?

3.10.4.4. Experts did not mention either that the pilots did not use the go-around button to expedite configuring the aircraft and engines for a safe and immediate go-around (FR pages 91, 92). Another pilot error they do not like to mention.

3.10.4.5. Feet on brake pedals before nose gear is firmly down on the runway (FR page 92), is not approved for a DC-10; refer to § 3.1.5 above. Again, a pilot error that experts do not like to mention.

3.10.4.6. No answer was given to the question whether the crew was too late configuring the airplane for landing (FR page 182). Again, a pilot error they do not like to mention.

3.10.4.7. Experts provide no answer to the question why the correct AOM procedure was not carried out (calls: 500ft/approaching minimums by PNF and landing or go-around by PF). Again, a pilot error they do not like to mention.

3.10.4.8. "*Flooded*" in the statement of the Captain "*complementary"*? (FR page 186). *"It is not a task of the Experts and they are not in position to comment on this kind of potential procedures issues*" (FR page 186). Experts consider the second statement by the captain true, objective (FR page 188). Experts continue to refuse that the Captain knew the meaning of 'flooded' (FR page 190), again, to protect the pilots.

3.10.5. Approach headings

3.10.5.1. The pilots continued the final approach despite a large wind correction angle (heading 125°). Experts did not analyze the reason why the heading during the last 80 seconds of the approach had to be 125°.
If the airplane had flown on the 111° radial, the wind correction angle would have been 14° which, at an airspeed of 139 kt, could only have been caused by a crosswind component of 34 kt; quite unimaginable. Hence, the airplane did not approach on the 111° radial, but on the 117° radial, with a drift angle of 8° that corresponds to the wind correction angle caused by the wind 190°/ 20 kt that was read by the captain from the INS.

3.10.5.2. The 90% rudder input was not adequate to align the airplane with the runway centerline; a crab angle of 6° remained (that increased to 11° at landing following release of the rudder). The rudder of the DC-10 was designed for alignment with at least a 30 kt crosswind component, requiring a drift angle of 12° at an airspeed of 139 kt. If the airplane during the last 1 nm had flown on the extended runway centerline (ground course 106°) as required by the procedure and as stated by the captain, the wind correction angle would have been 125° – 106° = 19°, which was too large to allow alignment with the runway for landing using full rudder. Such a large 19° drift angle could only be caused by a crosswind component of 45 kt, which is unimaginable as well. Hence, the airplane did not approach on the extended runway centerline during the last 1 nm either, but at a larger ground course. See also § 5.2.1.2 below. More details are presented in ref. D.

3.10.6. Experts again and again hesitate to confirm pilot errors in writing. They are not objective and show blamable behavior.

3.11. Comments on The CVR Analysis by Experts

3.11.1. On page 134 experts wrote:

"The reference used by the Experts is extracted from the files sent to the Experts by the Court. The time reference used below is the one indicated by the transcription and described as UTC reference".

3.11.1.1. The experts included a table in their report (from page 136) in which they copied/ typed the transcript they reference to. This transcript however, was a raw transcript, meaning that the recorded events and lines of spoken words were not yet time correlated with the DFDR and ATC-recorded events. The correlated CVR-transcript that the experts should have used was included in Annex 5 of the RoA, that was also made available to the experts.

3.11.1.2. On FR page 51, experts conclude "*Moreover, even though the gap between "RADAR" and "STANDARD" is constant, the gap between "RADAR" and "CVR" is not"* and notice a large difference between RADAR and CVR time. This obviously did not ring a bell to be very cautious when performing the radar data and other time related analyses. Experts should have read Avio*Consult* report § 2.2.

3.11.1.3. "*We have to bear in mind that the equipment used for the CVR was not so reliable as it is now: this type of support was sensitive to heat and can easily become distended"*. The cause of the increasing gap is not the reliability of the equipment, but the stretching of the vinyl tape of the CVR or a varying tape speed, which makes correlation with events recorded on the DFDR, ATC radar recordings and other sources required. All accident investigators are aware of this; this was also the reason that the different times are included in RoA Annex 5 per line of CVR content. The CVR was obviously reliable, because it recorded until after landing. See also § 3.7.2.2 above.

3.11.1.4. *"The Experts consider that the use of multiple time references used in the report had no consequences on the work of analysis done by the Commission of Investigation"*. This indeed did have consequences, because Commission and experts could not determine the exact time of the occurrence of meteorological events, such as the mentioned increase of wind to 220°/ 35 kt which was not recorded before the landing of MP495.

3.11.2. On page 134, experts continue with *"The lessons"*.

3.11.2.1. *"The crew behavior and coordination are good"*. The comments below prove this was not the case. Experts are protecting the crew.

3.11.2.2. *"The management of the cockpit is quite good until 800 ft (radio-altimeter)"*. The crew resource management in the cockpit was not at all good, see also the comments below. "*The flight path follows the Jeppesen chart*", which definitely was not the case. Even experts confirmed on FR page 102 (§ 3.10.2 above) that *"an unfavorable wind that pushed the aircraft outside of the planned trajectory"*. The airplane never returned to the path defined on the Jeppesen chart.

3.11.3. On FR page 136 the experts refer to the source of the used CVR transcript. This transcript does not completely agree with the transcript in RoA annex 5, which the experts must have seen as they used the radar data recorded in the same annex. What experts did not include in the title or legend is that the transcript in the Final Report is incomplete, is limited to content that the experts believe is of importance. Experts left out

many lines of communication inside the cockpit and to and from MP495, ATC and other airplanes on the approach frequency. Some could point to pilot errors, for instance:

3.11.3.1. On 07:00:03 CVR, the Captain called ATC via the radio: "*TAP UH FARO good morning, Martinair 495*". This message was left out by the experts, may be because the captain made a little error saying TAP (an other airplane that was on this frequency) and said "*UH"*.

3.11.3.2. On 07:08:09, :15, :22 CVR time, calls from ATC to descent to FL70 and switch frequency, as well as the inappropriate response by the captain were left out by experts. The captain responded with "*UH left 70",* while 7 seconds later he reported on the new frequency (approach) "*out of 240 for 70*".

3.11.3.3. Following receiving the weather and other arrival information from ATC, the response of the captain came only after 41 seconds, very late. The answer was: "*UH copied number 2, UH, 1013*". Experts left out two *"UH's"* in the answer showing a captain not paying attention, not showing "*a good level of professionalism*".

3.11.3.4. At 07:07:58 CVR time, the copilot said *"Let's set QNH 1013"* already at FL 240, while procedures require this to be done while descending through transition level FL50 which ATC which the captain confirmed by mentioning this in the cockpit 4 minutes earlier. An altitude report at FL60 was therefore not accurate. Procedures were not applied.

3.11.3.5. Experts did not copy the call of MP495 to approach *"Martinair 495 final"*. ATC had asked MP495 to report runway in sight or approaching minimums. The captain did neither of this as requested.

3.11.3.6. In § 3.10.2.3 above, the non-existing calls on flashing fuel pump lights were already mentioned.

3.11.3.7. Experts also left out the call by the captain two seconds before landing (07:32:48 CVR) "*Throttles*" and the "sound of throttles pushed forward", may be because experts considered the thrust increase at 15 seconds before landing as go-around attempt, and not this event.

3.11.4. Experts included content that was from and to flight MP461, not MP495 (07:02:00 CVR). Experts did not notice that the captain repeated ATIS info, rather than repeating the message sent to MP461 (07:03:39 CVR).

3.11.5. On FR page 184:

"The Claimants advisors' team cannot provide any evidence that the crew of MP 495 heard the transmission to the MP461. The Claimants advisors' team can only say that this transmission is recorded on the CVR. The difference is not only semantic. It is well known that a message that is not at the intention of a crew is not necessarily listened or understood by this crew. To hear a message a crewmember must be ready to hear it. This is a constant of the Human Factors principles about the communication.

3.11.5.1. There is a reason and a purpose that airplanes tune their radios to the same frequency on the approach. The full CVR transcript in Annex 5 of the RoA does not show much communication to other stations.

3.11.5.2. May be during cruise en-route, the crew is only paying attention when they hear their call sign, but not during an approach when the frequency of radio calls to and from the airplane increases. The crew, for instance, heard the increased wind of 24 kt being reported to another airplane (07:19:51 UTC), because the response in the cockpit was "*hè what"*?
"*Human factors principles about the communication"*? Nobody has ever heard of this.

3.11.6. The experts included much comments that will not be discussed here, to save time and paper.

3.12. Comments on The DFDR Analysis by Experts

3.12.1. The DFDR analysis by experts (FR page 147) is discussed throughout this review. The experts did not include DFDR data out of RoA Annex 15 in their analysis but made up their own graphs and inappropriately called these DFDR data. In this review, the graphs out of the real DFDR data out of RoA Annex 15 are copied as necessary and discussed. Refer to ref. D for a DFDR analysis as the experts should have conducted.

4. Concluding and Additional Remarks

4.1. Experts considered their assignment as experts by the court as to conduct an Annex 13 investigation, while it was meant to answer post-investigation questions, which might include liability matters (FR pages 12, 195). During the accident investigation, and after the draft was issued by the Commission, the DASB tried to influence the Commission with their own ideas about the accident (Comments of the Kingdom of the Netherlands (Lijst 4 tab 23 dl 1, 2, also called 'Blue Report')). Following the issuance of the final Portuguese report, the DASB answered questions, not the Commission (FR pages 200, 201). Many answers of DASB were deliberately not right. This is what the experts were asked to review and comment on. But they did not.

4.2. Experts wrote as comment on the conclusion of Avio*Consult* (that the pilots made serious, even fatal errors) that "*these expressions do not match with the aim of the ICAO Annex 13*" (FR page 81). But an Annex 13-like conclusion was not the intention of *AvioConsult and* was not the intention of appointing the experts by the court either.

4.3. Experts seemed not willing to write about pilot errors. They did choose the side of the pilots and therewith gave away their independence.

4.4. Experts wrote too many pages for just answering the questions of the court.

4.5. Experts seem to have conducted their own accident investigation, but do not lead the reader through their analyses and conclusions. They use the term analysis, but present statements made by the crew during the second interview with the Commission of Investigation in Feb. 1993 as facts. A statement made two months after an accident can neither be considered factually correct, nor objective. Experts should have used objective DFDR and AIDS data to verify and confirm the statements, but they did not. They obviously also lack adequate engineering knowledge of autopilot, autothrottles and navigation systems, and the knowledge and experience of analyzing such graphically displayed data, which is not surprising because reading and understanding DFDR data is not subject of airline pilot license training and will not be gained during thousands of air transport flight hours. They should either have mentioned this or have kept away from suggesting that they have the expertise to do so.
Claimants' experts cannot but conclude that the experts do not possess the expertise to investigate the accident, and accurately review and analyze the Portuguese report, DFDR and AIDS data and the DASB and NTSB reports. Therefore, much of their so-called 'analysis' should not be used in court.

4.6. Experts again and again wrote that the DASB was doing their job with due care. But claimants' experts believe that it became clear that their role during the investigation was doubtful; they tried to influence the Commission with the Comments of the Kingdom of the Netherlands (Lijst 4 tab 23 dl 1, 2, also called Blue Report), and required the NLR to change their report to hide any statement or conclusion that was not supporting their idea of windshear at low altitude as cause of the accident.

The questions of the court were not only whether the DASB performed well during the investigation, but whether DASB informed the victims and relatives with the truth about the accident and the investigation following the issuance of the final report. Experts did not read the letter of the court with due care.

4.7. Experts maintain their incorrect position on the use of JAR-OPS despite our comments and questions, but deleted JAR-OPS being the reference regarding national regulations (FR page 27). JAR-OPS 1 did not yet exist in 1992; pilots do not use JAR-OPS, but only Airplane Flight and Operating Manuals. Mentioning JAR-OPS is irrelevant to this case (FR page 189). JAR-OPS were intended to be used only by national rule makers and by manual writers of airline companies, to include the relevant aspects of JAR-OPS in Airplane Operating Manuals. Draft JAR-OPS were gradually introduced in the Netherlands after 1992.
The DASB lead investigator Frans Erhart was made aware during the investigation with a memo from 'Rob' that i.a.w. PANS-RAC 3.1.19 the term 'flooded' can be used by ATC without problems and that both ATC personnel and pilots need to be aware of this phraseology. Mr. Guy Oomen of KLM recognized that this term was not yet included in the appropriate aircraft manuals and that they would start implementing as of today. Rob continues: "*According to the attached regulations, "flooded" can be used by an ATS-unit in Radio Telephony (and in ATIS transmissions without problems and need involved personnel (pilots and ATC personnel) be aware of these possibly used phraseology*" (NA-2622 note KLM Rob to Frans). A similar statement was made in the RoA on page 125. This means that KLM confirmed to have been negligent since 1985; DASB was made aware of this, but kept their mouth shut.

4.8. The same applies to (USA) Federal Aviation Regulations (FARs) that the experts referred to and left behind in the Final Report. FARs are not to be applied by airline pilots; they should only use the formal Flight and Operating manuals (FR pages 57 and 87).

4.9. In their analysis of the CVR transcript in § 8.6.5.2 (FR page 136), experts quoted incorrectly, and deliberately left at least 15 lines out of their analysis, which would prove pilot errors or quotes that could be explained as pilot failures. The pilots of MP495 heard about the bad weather at the airport as was reported by other airplanes; they should have taken note of these messages. There were several errors in the Experts' comments as well. It is unclear why experts did not refer to or copy the CVR transcript out of RoA Annex 5 into their report and used a not time-correlated and incomplete version instead.

4.10. The CVR transcript starts when the copilot performed his crew-briefing, in which there is no coverage of the coincidence of the "500ft call" and the call "Approaching Minimums". "*you call approaching minimums*" was the only remark related to it. As it turned out, this aspect had a dramatic impact on the execution of the last part of the approach. The captain, in his monitoring function as pilot-not-flying, should have amended this according to the note in AOM 3.3.5 – 08: "*As the 500 ft call is not meant to be a precision call, amend the above procedure if the 500 ft call conflicts with the call Approaching Minimums".* It should be noted that this captain was a qualified instructor as well. In general, an instructor has a higher than standard level of performance and knowledge of systems and procedures. According to the Experts' report on FR page 62, *"the captains' intervention during the whole approach seems to have been too passive"*, which is an amazing conclusion for a captain with this qualification.

4.11. According to the CVR transcript, other significant items of a crew-briefing, AOM 3.3.5 – 05, were only covered much later (the visual aid PAPI and the 5 degrees off-set and Non-Directional Beacon behind the runway).

4.12. Experts used drawings and data graphs out of an NLR report (CR 93080 C) that was never approved and used by the Portuguese Commission; it was only a first issue and superseded by CR 94238 C which was included as Annex 4 in the RoA. Experts just copied these graphs or charts and did not explain and analyze them (FR pages 37, 38, 107, 128, etc.). See remark in § 2.21.

On FR page 33, experts include a runway drawing that is not legible, and has no legend; it shows that the airplane landed on the left side of the runway, but does not show as much detail as the figure that is included in Annex 11 of the RoA, for instance the wide deep scratch made by the rim of a center gear wheel that runs in the direction of the runway, not sideward as would be the case during a lateral movement towards the left of the runway as experts state in their § 6.2. Why did the experts not use the DFDR and other data and figures out of the RoA? Experts obviously have no experience in data analysis and in writing accurate reports.

4.13. Experts used the term *"analysis"* quite a few times, but they only presented data and did not explain, did not really analyze what happened and why, for instance the DFDR analysis from FR page 147. They too often used 'estimate', 'assume', etc., terms that show their uncertainties. They made their own very unclear and crowded graphs (FR pages 127, 133, 148, 149, 152), rather than using the formal objective and very clear DFDR data graphs made available in the RoA Annex 15, straight from the NTSB. The presented graphs cannot be used for a thorough analysis, which the experts did not present either. Nobody will be able to analyze data with such bad graphs. The graphs look bad, but that is due to using one vertical scale for different types of data. There are errors in the graphs; some are calculated while measured data are available in DFDR and AIDS data in RoA Annexes 15 and 9. These home-made graphs cannot convince but seem included to confuse the readers.
Experts for instance state "*the instability is obvious*" (FR page 147), and list some data, but they did not explain why the "*instability"*, if any, "*is obvious"*; they do not know what they are talking about. The copilot pulled and pushed inappropriately on the controls and therewith induced unnecessary engine RPM changes which are explained by experts as instability. These airline pilots don't know what they are talking about, which is the reason that only experimental test pilots and flight test engineers are engaged to determine the in-flight stability of an airplane. See also § 1.2.6 above and § 5.1.4 below.

4.14. Experts considered themselves experts but, as was shown in § 3.1.1 through 3.1.17, they lack the high-level engineering, flying qualities and aircraft systems knowledge to be one. When an 'expert' doesn't know how a system works, he will make the wrong conclusions. If he has no knowledge of airplane performance and flying qualities at a reasonable level, his conclusions will be wrong. Airline pilots might be experts in operating airplanes, and in finding their way across the globe, but that doesn't make them experts to conduct accident investigations. The participating electrical engineer at PhD level should have prevented the other experts from making errors on electronic and technical systems, which he did not. The three experts made numerous errors and proved not to be high level experts capable of answering the questions of the court.

4.15. **Conclusion**. The Final Report of the experts is not made with a high level of expertise, is misleading. The experts might be experts in operating airplanes, but certainly do not have the expertise to investigate an accident, to read and understand DFDR and AIDS data and to write a good analysis. The experts obviously did not understand that the questions the court asked were questions to determine whether the DASB truthfully answered the questions of the victims of the accident and the relatives. Substantiated and convincing analyses that support the answers of the questions are not provided, as the court asked for. The experts based their answers on verbal statements of a few months after the accident, and not on objective (DFDR and AIDS) data as were included in Annexes of the Portuguese Accident investigation report.

5. Comments on The Answers of The Experts to The Court

In paragraphs below, the quotes out of the Final report of the experts are printed in *italics.* Experts did not answer all questions under the correct paragraph head. Comments of claimants' experts are presented in the same paragraphs, in the 4th level. The comments in the paragraphs below are limited, because most subjects are discussed extensively in the Review of Interim Report Version V17, dated 27 September 2016 (ref. B) in which for most, if not all, subjects the applicable rules & regulations, the

facts, comments of DASB, comments and conclusions of the experts and remarks & questions of the experts of claimants are presented.

5.1. Microburst and Windshear, Cross- and Tailwind Component According to RoA (FR § 6.1)

5.1.1. *"It is undeniable that the aircraft has encountered destabilizing meteorological conditions during the last phase of its final approach*" (FR page 41).

5.1.1.1. At no instant, the aircraft was destabilized by weather conditions; the response to pilot control inputs was not interrupted at any moment during the approach, not even because of the light turbulence, as objective DFDR data prove. Only during the last seconds of flight, the response of the aircraft was slower because of the decreasing control power of the aerodynamic control surfaces, ailerons, rudder and elevator, which is proportional to the square of the airspeed ($\equiv V^2$). During the approach, the copilot caused variations in speed and attitude because he was interfering with the normal operation of the engaged autopilot in both the Command and CWS modes by applying unnecessary control forces to which the autopilot and therewith also the autothrottle system (ATS) responded. The NTSB confirmed this in their letter of 26 Oct. 1994 (appendix of the RoA): "*Once the autopilot was disengaged, CWS with ATS remained; functions which were inappropriately used by the flight crew*".

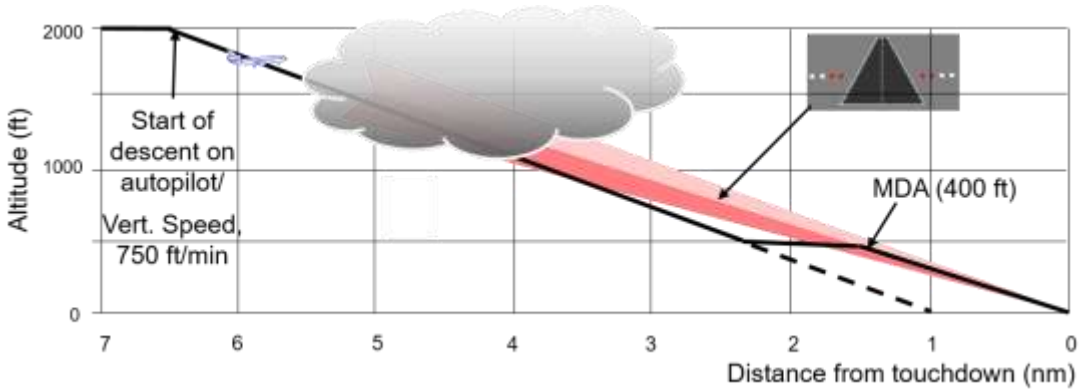
5.1.1.2. The approach was indeed not stabilized, however not due to meteorological conditions, but due to not adhering to the approach requirements in the AOM and BIM. At 500 ft altitude, the aircraft was not within the required 2° of the 111° approach radial and the approach speed was 5 kt lower than the required approach speed.
MP495 experienced light turbulence, but definitely no "*destabilizing meteorological conditions*". There is no objective evidence to support this ignorant statement by experts.

5.1.2. "*The NLR has conducted two studies that both confirmed that the aircraft went through three windshears below 1000 feet/ground, after 07:30:30 UTC*" (FR page 41).

5.1.2.1. Experts refer to and used graphs out of an NLR report (CR 93080 C) that was not included in the RoA (FR page 94). It was a preliminary report made with DC-8 data rather than correct DC-10 data and was, after receiving DC-10 data from McDonnell Douglas, replaced by CR 94328 C which was indeed included in RoA, as Annex 4.
The preliminary report used by the experts was obviously not good for the NLR.

In § 1 Introduction of CR 94328 C, the NLR wrote: "*In summary it was concluded that windshear (a downburst) had been present, however, it was not a hazardous factor in itself during the approach of the aircraft. Furthermore, strong crosswinds were determined to be present at the moment of landing, far in excess of the maximum demonstrated crosswind limits of 30 kts of the aircraft*" [underlined words deleted by DASB].

Experts referred to and used (illegible) plots out of the unpublished NLR report rather than the official combined and legible graphs of the DFDR data as made available in the RoA Annex 15, straight from the NTSB, and of the AIDS data in RoA Annex 9. The used unofficial plots cannot be accurately read and should not have been included by experts. Obviously, experts could not read them either because they did not write a substantiated data analysis, but just dumped these plots in their report. Including illegible, invalid, not-substantiated and un-explained data in a report is confusing, not convincing and proves ignorance.



VOR/DME Approach for 125 kt ground speed. Initially, a vertical speed of ≈750 ft/min set on Autopilot, i.a.w. AOM 3.3.5 – 09). Continued on CWS as soon as PAPI is visible.

5.1.2.2. Experts, in any case the two pilots, should have verified whether the NLR used the correct flight operations assumptions, but they didn't. The NLR research engineer and his superiors, who signed and hence agreed with the report, were obviously not pilots, did not know what the consequence is of the transition from a constant vertical speed in the Command mode of the autopilot to a manually controlled final descent with visual guidance of a PAPI system, which is that the airplane might have to fly level for some time to intercept the PAPI lights if the initial vertical speed, that was set in the autopilot, was a little too high, or the headwind was stronger than anticipated (and the ground speed lower). The PAPI glidepath always has to be intercepted from below, for safety reasons. Refer to the figure above, and to ref. D, § 2.6.1. This short level flight is not evidence of the occurrence of windshear, up- and or downdrafts (and not of tail wind either) but is normal for a non-precision approach.

5.1.2.3. Hence, stating that this means that "*the aircraft went through three windshears*" is not correct; it is a consequence of the non-precision approach procedure of which the engineers of the NLR were obviously not (made) aware.
AOM 3.3.8 – 02 specifies that when windshear is encountered, "*flight path control may be indicated by deviations from target conditions in excess of:*

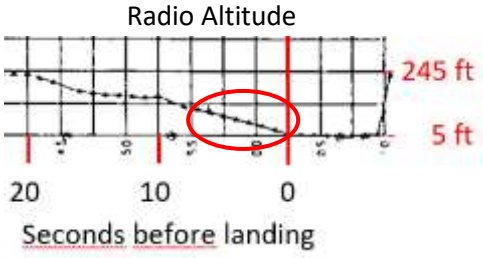
- *± 15 kt;* [15 kt higher or lower than the target value]
- *± 500 ft/min;*
- *± 5° pitch attitude;*
- *± 1 dot displacement from the glideslope;*
- *Unusual throttle position for a significant period of time".*

None of these deviations were mentioned in the cockpit (CVR transcript). In addition, DFDR data do not confirm any of the deviations, either. The data do not prove that the aircraft "*went through three windshears*"; the Portuguese Commission investigated the occurrence of windshear but did not conclude that there was any windshear either.
Again, it became clear that the experts obviously did not have the expertise to read and understand DFDR data plots and did not review the Martinair AOM for non-precision approach procedures and windshear effects, but used the statements by the crew of a few months after the accident and confirmed that the NLR was right, without critically reviewing the NLR data.
Besides commenting on the use of the autopilot by the crew (§ 5.1.1.1 above), the US accredited representative, who was assigned to the Commission on behalf of the NTSB,

also wrote: "*If the commission feels that windshear was present during the approach then consideration should be given to recommending implementation or review of crew training for windshear recovery*"; a diplomatic way of saying that the NTSB did not read any sign of windshear in the DFDR data either.

5.1.3. "*The third windshear — through which the aircraft went at a very low altitude —has caused an important flight path deviation followed by a loss of control; the latter led to a descent rate way above the value that the landing gear could support*" (FR page 41).

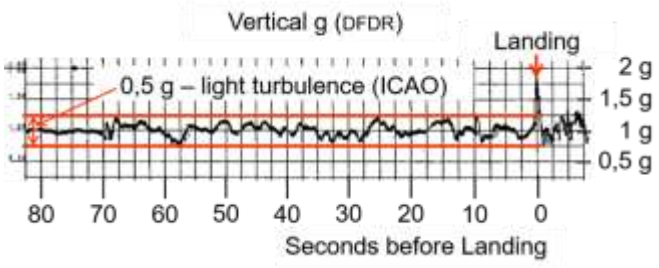
5.1.3.1. Experts wrote "*an important flight path deviation*" but did not include what they exactly are referring to and what they mean. The airspeed of the aircraft was 139 kt plus a frequent and automatic gust additive of 5 kt by the ATS, until 7 seconds before touchdown, as DFDR airspeed data prove. An increased crosswind would initially only result in a small increase of the drift angle, because of the ≥ 139 kt forward airspeed. Experts should have been able to calculate this increase, like experts of claimants did in ref. D. In addition, an increased headwind might have caused a small increase of the glide path angle, but DFDR data do not prove this either: the rate of descent during the last 7 seconds of flight was constant, as shown in the adjacent figure. The DFDR did not record abnormal lateral and longitudinal accelerations either, that would prove an abrupt change and "*an important flight path deviation*". The vertical (normal) acceleration graph in § 5.1.4.1 below proves that the airplane was not pushed down during the last 2.5 seconds of flight but was rather withheld from descending any further because the pitch angle was increased by the captain for a go-around. The NLR noticed this pitch increase in their draft report, but the lead investigator of the DASB required this to be deleted, because it would lead to a different cause/ conclusion of the accident than windshear. Hence, the Portuguese Commission did not get to see this specific NLR conclusion.



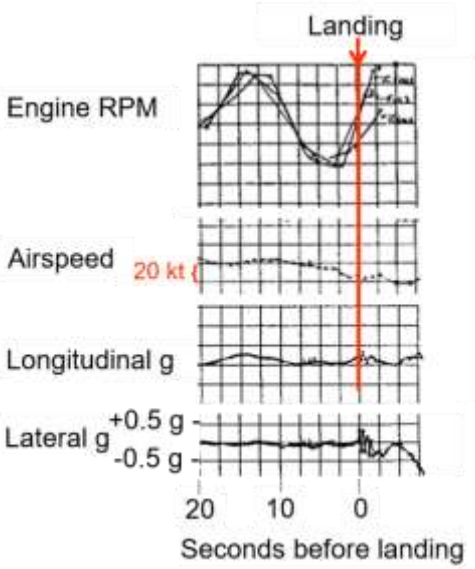
5.1.3.2. Experts also wrote "*loss of control*", but the crew never lost control of their airplane. When controllability is lost, the aircraft does not respond to any or all of the control inputs anymore, mostly because of the too low airspeed. The landing speed was 126 kt (DFDR data). On FR page 32, the experts stated: "*At 126 kt the aircraft is technically still able to fly".* The aircraft responded to all control inputs until touchdown, as DFDR and AIDS data prove; the airspeed was higher than the stall speed during the whole approach. The computed rate of descent was less than 900 ft/min during the last 7 seconds of flight, as proven by DFDR data and confirmed by the experts (850 ft/min, FR pages 33 and 133). In addition, the rate of descent was definitely not exceeding the value that the landing gear could support (which is 1014 ft/min at maximum landing weight with wings level, or 900 ft/min with 8° roll), as became clear from NTSB report DCA97MA055 that was included in appendix 35 of ref. B. The actual landing weight was 84% of the maximum landing weight. The experts either did not read claimant's remarks or did not understand them because of lack of appropriate aircraft engineering and flying qualities knowledge (§ 3.1.11.1 above).

5.1.4. "*The Experts estimate that these variations of speed and direction of the calculated wind must be considered, and as a result, they induced accelerations and turbulences* (*refer to passengers' or crew members' statements)*" (FR page 41).

5.1.4.1. "*Calculated wind must be considered*". Calculated wind? If experts had verified and calculated the wind, then they would have concluded that the constant heading of 125° during the approach could only have been caused by a constant crosswind component of 20 kt, such as caused by the wind that the captain read from his navigation display at 10 sec. before touchdown (190°/ 20 kt, see also § 5.1.7.4 below). Were there "*induced accelerations*"? Experts "*refer to passengers' or crew members' statements"*, but objective DFDR data only show normal (vertical) accelerations less than 0.5 g, as result of light atmospheric turbulence, during the last 70 seconds of flight, as the DFDR data in the figure above proves.



5.1.4.2. There were no (induced) lateral accelerations before landing as the DFDR data proves (adjacent figure). The small recorded lateral accelerations were caused by rudder inputs by the copilot. The only recorded longitudinal accelerations coincide with engine RPM changes that occurred because the pilot pushed and pulled the elevator controls to which the autothrottle respond immediately (refer to § 3.8 above), and in the last seconds, the longitudinal acceleration increased due to the application of thrust for the go-around. The airspeed decreased because the copilot kept the throttles closed from 15 seconds before landing, until the captain increased them for the go-around at 4 seconds before landing. There were no other accelerations, hence the winds did not *"induce accelerations and turbulences",* as objective DFDR data proves. Expertise on the operation of the autothrottle system would not have led to this incorrect *"estimation"* (§ 3.8 above); "*passengers' or crew members' statements"* are not an independent and objective source of data; DFDR data are.



Although the airspeed decreased during the last 10 seconds of flight, this cannot be attributed to the occurrence of a tail wind, but to the pilots increasing the pitch angle during the last 8 seconds of flight while the throttles were kept close (DFDR data).

5.1.5. "*It seems likely that certain actions taken by the pilots had contributed to the increase of the rate of descent, which ultimately was excessive*" (FR page 41).

5.1.5.1. Experts did not explain which "*certain actions*" "*contributed"*. The rate of descent was higher than normal, agreed, but certainly not "*excessive*" as should have become clear after reviewing DFDR data (figures above), our remarks (ref. B) and after reading the provided NTSB report on the strength of a DC-10 landing gear (§ 5.1.3.2 above). The experts obviously did not read (and understand) the DFDR data. See also § 5.3.4 on vertical speed below.

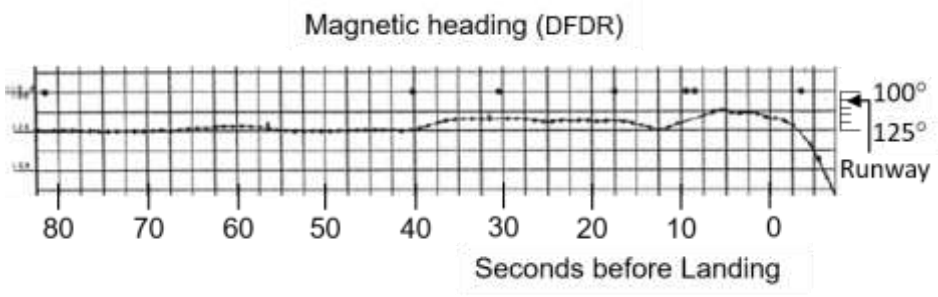
5.1.6. "*All that being said, it is not in the Dutch Aviation Safety Board competencies to requalify the NLR's conclusions. This makes no sense since the Dutch Aviation Safety Board has neither the expertise not the responsibility to do it*" (FR page 41).

5.1.6.1. The lead investigator of the DASB, Frans Erhart, reviewed the final draft of the report (CR 94XXX, ref.: NL-HaNA_2616) and required NLR to make changes to several paragraphs that had to do with crosswinds being far in excess of the maximum demonstrated crosswind limit of 30 kt of the airplane, the too small bank angle to compensate for the drift (page 11), the pitch up at touchdown (page 13; also mentioned in § 5.1.3.1 above) and the rate of descent (760 ft/min, page 16), to which the NLR complied with. Obviously, DASB had both the expertise and the intention to change the NLR conclusions and therewith prevent the pilots and Martinair from being held responsible. See also § 5.3.1 below.

5.1.6.2. The DASB had available both pilots and engineers, hence had the competencies to review the NLR's conclusions. NLR however, obviously had no pilots involved in writing their reports. DASB should have carefully reviewed the NLR report to check whether the NLR used the correct flight operations assumptions, or at least have assisted them with flight operational and procedural knowledge, especially on the subject of non-precision approach that was the only available approach method to Faro airport. DASB obviously did not. DASB should have commented the reports (as accredited member of the investigation commission), but they even tried to persuade the Commission to include windshear as cause of the accident in the Comments of the Kingdom of the Netherlands (the so-called 'Blue Report') on the draft of the Final Report that was taken to Portugal on 8 Sept. 1994 by mr. Biemond and Frans Erhart, and was made available to the experts (Comments of the Kingdom of the Netherlands (the Blue Report, Lijst 4 tab 23 dl 1, 2). These Comments were not comments on the Final Report, as experts assumed, but on the draft of the Final Report, issued 21 July 1994 by the Commission, as the date of the document should have made clear. DASB obviously indeed had the "*expertise"*, the "*responsibility*" and the "*competencies*" to write these comments. Experts used the wrong document, the shortened version of the comments of the DASB that is included as Appendix in the final RoA of the Portuguese Commission, and that was shortened because DASB did not get their own will; see also § 3.6.1 above.

5.1.7. The experts did not answer the cross- and tailwind part of the question in this paragraph, therefore the experts of claimants will.

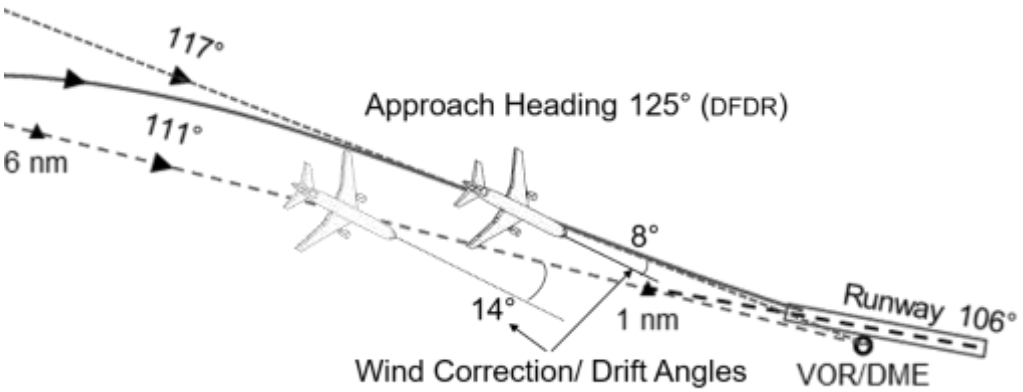
5.1.7.1. The DFDR data (figure below) show that the approach heading of 125° did not change during the last 80 s of flight, with the exception of the small heading changes (yawing) due to (inappropriate) rudder inputs by the copilot between 40 and 13 seconds before landing and during the last 12 seconds of flight. This also means that the wind was constant, otherwise the heading would have been increased to larger than 125°.



5.1.7.2. On FR page 150, Experts wrote: "*The rudder movements are quite important but it is not possible to qualify them as abnormal according the weather conditions (thunderstorm, wind rotation and rain)*". Abnormal is the inappropriate application of

rudder already from 40 seconds before touchdown, even before reaching the 1 nm point in front of the runway threshold, as shown in the figure above. Experts will not have reviewed AIDS data, RoA Annex 9 chart 6. An expert will be able to "*qualify*" rudder movements, because these data are in the DFDR and AIDS reports. See also ref. D. The rudder movements during the last 12 seconds are indeed not abnormal because of the requirement to align the airplane with the runway before landing.

5.1.7.3. At the intended 111° approach radial, with an airspeed of 139 kt and with the ATC-reported wind of 150°/ 20 kt, a Wind Correction Angle (WCA) of 5° would be required to maintain the 111° approach radial (ground course). The magnetic heading would have to be 111° + 5° = 116°.
With a wind of 190°/ 20 kt (as the captain read from his navigation display), the WCA/ drift angle would have been 8° and the heading 111° + 8° = 119°. Neither of these two headings agree with the much larger actual heading of 125° that was objectively recorded by the DFDR, a heading that was obviously required during the last 80 seconds of the approach to get to the runway, see the figure below.
When the airplane would have followed the 111° approach radial with a constant heading of 125° (grey outlined aircraft image in the figure below), meaning a WCA/ drift angle of 14° (!), and at an airspeed of 139 kt, the crosswind component must have been a constant and considerable 34 kt (139·sin 14°), quite unimaginable because an experienced pilot would not have continued the approach; impossible. The drift angle of a DC-10 at this approach speed at the maximum approved crosswind component of 30 kt is only 12° ($\sin^{-1}$ 30/139).
Although the pilot applied rudder input, this did not change the ground course because he kept the wings near level.



Actual approach course (117°), heading (125°) and required approach radial (111°).

5.1.7.4. Following iterating heading and wind calculations, it can be proven that the ground course of the airplane can only have been 117°, as shown in the figure above (and by ATC radar data in the RoA – front cover), and that the wind during the last 80 seconds of the approach was a constant 190°/ 20 kt, as the captain also read at 10 seconds before landing from the display of navigation computer. This resulted in a more practical WCA of 8°, leading to a required approach heading of 117° + 8° = 125° that was objectively recorded on the DFDR. The final approach, within 1 nm of the runway threshold, will be analyzed in § 5.2.1.2 below.
Hence, this heading analysis proves that the airplane was definitely not approaching on the 111° radial, but on the larger 117°. Refer to ref. D for more details.

5.1.8. **Conclusions**

5.1.8.1. The experts did not answer the question of the court on the theme "*Microburst and Windshear, The Cross- and Tailwind Component According to Report of Accident*" but presented their own opinion. Experts of claimants proved with their analysis of heading and wind that experts were wrong.

5.1.8.2. The non-pilot engineers of the NLR were not (made) aware of the non-precision approach procedure that had to be conducted at Faro airport, and inappropriately misinterpreted the interception of the PAPI glide path from below as the occurrence of up- and downdrafts. There were no symptoms of windshear recorded on the DFDR, as confirmed by the NTSB, whose letter was included in the RoA. The probable occurrence of windshear was investigated by the Commission, but not concluded to have occurred before the landing of MP495. The Portuguese Commission did not include windshear in their cause of the accident. The Commission, in RoA § 2.2.3 states: "*The crew did not use operational procedures which took into account the occurrence of windshear*", meaning that they did not experience any windshear, up- or downdrafts. The NLR (in RoA Annex 4) did not include windshear in the summery of their report, only up- and downdrafts, which they included because of not being aware of the non-precision approach procedure. But in the Netherlands, DASB spread their own conclusions: "*The aircraft in the final phase of the approach passed a turbulence area associated with windshear and downburst phenomena, that initiated a longitudinal instability of the aircraft*". The occurrence of windshear in the light turbulence area can however not be proven. DASB intentionally lied to the victims and the public.

5.1.8.3. The deviation (6°) from the 111° approach radial when passing 500 ft altitude at 50 seconds before landing (≈ 2 nm) was too large to comply with the lateral requirement for a stabilized approach, which allows only a maximum of 2° (to avoid approach and landing accidents).

5.1.8.4. The large 125° approach heading was required because the airplane approached the airport on the 117° radial, rather than on the prescribed 111° radial and because of the (too) strong 20 kt crosswind component, that exceeded the limits for a flooded runway (max. 5 kt) and for a wet runway (15 kt).

5.1.8.5. A sudden and unexpected wind variation in direction and speed in the final stage of the approach, as suggested by DASB ('Blue Report' page 13) and/ or a tailwind component could not be proven to have occurred using DFDR data, only the constant too large crosswind component during the last 80 seconds of flight.

5.1.9. **This subject was reviewed** and substantiated in RRQ ref. B § 4.4. Experts answered on FR page 182: "*No comment, No new evidence*". But the questions really were, was there any windshear, downdraft, updraft etc.? Was the NLR right? Do the DFDR data convince you there was? Or don't you have the expertise to read and understand DFDR data. Just say so, tell the court this is not your expertise, no point, but don't give wrong answers. Don't the experts have an opinion on the letter by the NTSB that was included as appendix in the RoA either (§ 5.1.2 above)? When experts say "*No new evidence*", what do they mean? Do they agree with the NLR and the Commission who either denied the existence of windshear, or concluded that the flight was not affected by windshear as DASB wanted the victims to believe?

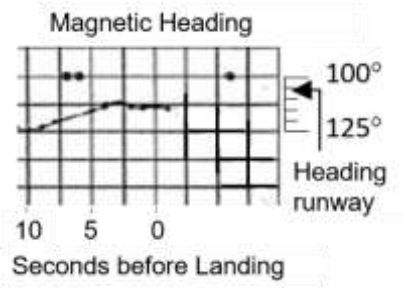
5.1.10. **The correct answer to the court is:** There were no sudden and unexpected wind variations in direction and speed (windshear), no microbursts and no tail wind in the final stage of the approach, but indeed a too high crosswind component of 20 kt during the approach and landing, which exceeded the aircraft limits (5 kt for a flooded runway, 15 kt for a wet runway), as was listed as one of the causes of the accident in the RoA.

The pilots were aware of the strong wind because of the required large 125° approach heading, the ATC provided wind of 150°/ 15 – 20 kt and the on-board measured wind of 190°/ 20 kt but nevertheless continued the approach.

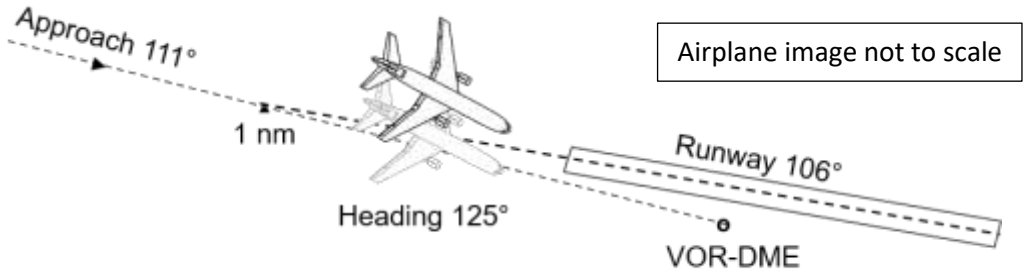
5.2. The (Alleged) Occurrence of A Lateral Movement (FR § 6.2)

5.2.1. *"All the elements analyzed by the Experts (the wind effects or the pilot's actions on the flight controls) lead to the same conclusion that there is a lateral movement towards the left of the runway*" (FR page 41).

5.2.1.1. The final approach path of the airplane was briefly analyzed and described in § 5.1.7 above (and in ref. D), including the winds that the experts did not include in their answer to the court. It was concluded that the airplane cannot have been on the 111° radial but was approaching on the 117° radial.
At 12 seconds before the landing, the copilot applied 90% rudder input to the left in an attempt to align the airplane with the runway for landing, which is the normal procedure. DFDR magnetic heading data in the adjacent figure show that the airplane yawed from the approach heading 125° to 112°, a change of 13° which was, however, not adequate to reach the runway heading of 106°. The yawing angle of 13° however, was approximately equal to the heading change that is required to align the airplane at the maximum approved crosswind component of the DC-10 (30 kt) for which the vertical tail with rudder are designed. The difference between the approach heading to align from (125°) and the runway bearing (106°) to align to, being 19°, obviously exceeded the control power of the rudder at the given approach speed. This knowledge assists in revealing the actual final approach path of the airplane as well.



5.2.1.2. If the airplane would have been flying at the extended runway centerline (106°), with the on-board measured actual crosswind (190°/ 20 kt) that was confirmed to be correct in § 5.1.7.4 above, then the wind correction angle would have to be 8° and the heading within 1 nm from the threshold had to be 106° + 8° = 114°. With the ATC-provided wind (150°/ 20 kt), these data would be 6° and 112°, respectively.
In both of these cases, there would have been ample rudder control power to reach the 106° runway bearing with 90% rudder deflection. Even if the wind would have been 220°/ 35 kt, as was suggested, then still adequate rudder control power would have been available to line up with the runway. The 90% rudder input by the copilot however, was not adequate to align the airplane with the runway from the DFDR recorded approach heading 125°, as shown in the figure with the magnetic heading of the last 5 seconds above. Hence, the airplane was not approaching on the extended runway centerline (106°) but on the 117° radial as analyzed in § 5.1.7.4 above and shown in the figure below. Ref. D presents the detailed analysis on this subject.

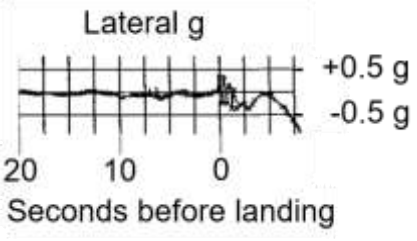


The shaded aircraft image shows the position according to the experts, the solid lined image according to experts of claimants i.a.w. DFDR and AIDS data analysis.

5.2.1.3. During the 90% rudder input, the pilot allowed the bank angle to increase slowly from 8° right to 14° to the left while a bank angle to the right would have been required to avoid drifting away from the extended runway centerline under the influence of a strong crosswind from the right. The pilot did not maintain a roll control force to the right. This bank angle to the wrong side and not maintaining a roll control force to the right are also indications that the airplane was not on the (extended) centerline.

5.2.1.4. The 14° bank angle to the left for a few seconds must have changed the path over the ground a few degrees to the left changing the flight path of the airplane in the direction of the runway. At 5 seconds before landing, the pilot reduced the rudder input to zero. With a 20 kt crosswind component from the right and while on the extended runway centerline, a pilot would never do this; the airplane would drift to the left, away from the runway centerline. DFDR acceleration data do not show a deviation to either side due to increasing or decreasing winds (figure in § 5.1.4.2 above).
The decrease of the rudder and the bank angle that both returned to zero are also indications that the airplane was not approaching on the runway centerline, but from the left and had to be 'moved' to the right to get above the runway centerline.

5.2.1.5. Hence, there was not a lateral movement towards the left side of the runway from the (extended) runway centerline due to a sudden increase of wind, but the aircraft was approaching from the left side (refer to the figure above) and did not make it to the runway centerline at all. The wind did not increase at that time.
Experts wrote "*analyzed*", but they did not present their analysis. The included graphs in their final report cannot be used for analysis; the data density is too large and the resolution too low (§ 2.4 and § 3.1.17 above). They should have used the provided and more accessible and readable DFDR and AIDS data, which are normally always used for analysis, and which were also used by experts of claimants.
The DFDR lateral acceleration (g) data in the adjacent figure only show very small changes that coincide with the changing rudder inputs from 10 seconds before the landing, and a larger value at touchdown, caused by the lateral forces due to the 11° crabbed landing. The objective DFDR data in the figure above shows that there was no lateral acceleration during the last seconds of flight and hence, do not confirm the conclusion by experts that "*there is a lateral movement towards the left of the runway".* Experts did not answer the claimants' questions in RRQ (ref. B) either.



5.2.1.6. The experts did not analyze the objective, measured control inputs by the pilots ("*the pilot's actions on the controls*") as presented in AIDS data in Annex 9 of the

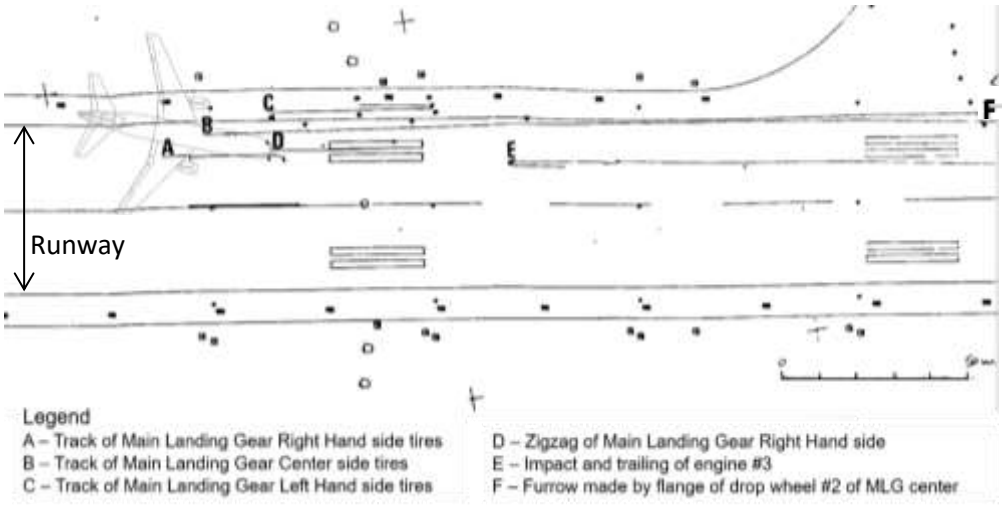
RoA. They included a graph on FR page 152 with the 'computed', not the actual AIDS recorded position of the control wheel. The experts did not analyze and explain what they saw and did not relate the airplane movements with pilot and or autopilot inputs. The last line of the conclusion of the ailerons analysis on FR page 153 is "*This is not what the Experts say*". Then why did experts provide the graphs and the text if experts themselves have doubts.
This supports the conclusion that experts did not use objective DFDR and AIDS data that was made available to them by the court, most probably because they do not have the expertise to read and understand the data. Again, it becomes clear that these self-appointed experts are not experts, but charlatans.

5.2.2. "*It is a coherent conclusion with*:

- *The statement made by the pilots during their interviews, according to which the aircraft was on the runway extended center line at 200 feet height;*
- *The impact that occurred on the left-hand side of the runway as proven by the markings on the ground*" (FR page 41).

5.2.2.1. Crew statements can never be considered true and objective, certainly not statements that were made a few months after the accident, and which might be well 'prepared' or 'fabricated'. Experts should have analyzed objective DFDR, AIDS and other data provided in the RoA, but they didn't. There is no record of the exact lateral position of the aircraft during final approach, apart from the less-precise ATC radar approach path. Only detailed analysis of DFDR and AIDS data can lead to reconstructing the lateral path that the aircraft must have flown. Such an analysis (§ 5.1.7.3 and § 5.2.1.2 above, and ref. D) led to the conclusion that the aircraft was definitely not on the extended runway centerline, because the suggested lateral position on the (extended) runway centerline does not correspond with the control inputs at that time, with the aircraft heading, with the bearing of the centerline (106°) and with the wind correction angle due to the actual crosswind, which all airline pilots could also have calculated and concluded. The figure in § 5.2.1.2 above shows the position of the airplane as analyzed from DFDR and AIDS data, while the grey outlined image shows the position according to the experts. As was explained in § 5.2.1.1 above, the rudder authority did not allow a 19° heading change from 125° to 106° for aligning with the 106° runway. The airplane cannot have flown on the extended centerline.

5.2.2.2. The impact of the aircraft on the left-hand side of the runway could indeed be proven with the drawing in RoA Annex 11, refer to the figure below.
The scratches of the tires (A – C) and of the right engine nacelle (E), and the wide and deep groove (F) caused by a rim of the center main landing gear after the initial touchdown, were all in the direction of the runway, not to the left as would be the case following a lateral movement towards the left of the runway, as experts concluded. It is impossible to change the path of a 161-ton body from the centerline to the left side of the runway in a jiffy; the laws of physics applied to MP495 as well. A rapid increase of the wind would have had little influence on an aircraft of which the forward airspeed was still about 130 knots; only the heading would have increased a bit. The heading did increase a few degrees, but this was due to the pilot releasing the rudder (§ 5.2.1.4 above).
The impact on the left side of the runway (the left main landing gear touched down outside of the runway) and the scratches and groove (furrow) in the direction of the runway, as presented in RoA Annex 11 (refer to B in the figure below), support the claimants' conclusion that the aircraft just made it to the left edge of the runway coming from the left, on approach radial 117° rather than 111°, as the figure in § 5.2.1.2 shows.



Impact area MP495 on runway 11, RoA Annex 11.

5.2.2.3. **Conclusion**. The recorded DFDR and AIDS data of heading, bank angle and aileron and rudder control inputs by the pilot(s), the aircraft motions during the last seconds of flight and the marks on the runway surface prove that the aircraft was never on the (extended) runway centerline and that there was no lateral displacement from the centerline to the left side of the runway. The conclusion of the experts is wrong, not based on objective data but only on 'fabricated' statements by the crew a few months after the accident, and so is the conclusion of the DASB. DASB should have analyzed the approach as the experts of claimants did.

5.2.3. **This subject was reviewed** and substantiated in RRQ ref. B § 5.8. Experts answered on FR page 198 with "*No comment*". They added the following remarks:
"*It is not possible to deny the lateral displacement during the approach: at 200 ft., the aircraft is on the extended center line of the runway, and the touchdown occurred on the left-hand side on the runway 11.*
The reasons for this displacement was investigated by the Commission of Investigation which includes the DASB.
After discussions and expertises, the Commission concluded that the causes were a huge modification of the aerological conditions.
The mission of the Experts is not to evaluate the conclusions of the Commission".

5.2.3.1. Experts maintain their position that the statement by the crew of a few months after the accident is true. Experts however, don't have objective evidence that the airplane was on the extended centerline. A pilot statement of a few months after the accident cannot be called objective. The court can also read statements but wants objective answers from experts. The control inputs by the pilots during the last seconds of flight prove that they were not on the centerline in this approach under strong cross-wind conditions. They approached the runway from the left.

5.2.3.2. Were DASB and Commission right? That is what the court wants to know from the experts, after analyzing objective DFDR data.

5.2.3.3. As for the last remark: yes, it's your mission, the court asked you to.

5.2.4. **The correct answer to the court is:** An extreme lateral displacement from the (extended) runway centerline to the left side of the runway, as DASB and Martinair wanted

the victims to believe, did not at all occur, could not be confirmed after analyzing objective DFDR and AIDS data of the heading of the airplane during the last 80 seconds of flight and of the pilot control inputs. Please refer also to the answer in § 5.4.11.

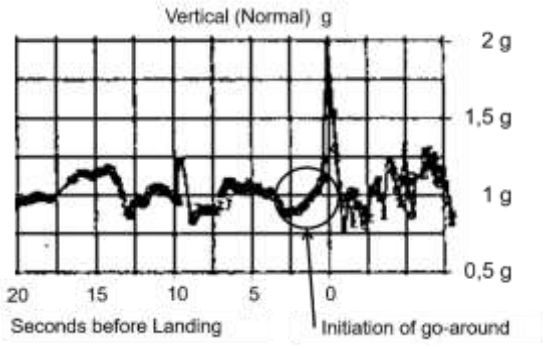
5.3. The Rate of Descent (FR § 6.3)

5.3.1. *"The value of the descent rate was calculated by both the NLR and the NTSB in its analysis of recorded parameters on the DFDR. Both have similar conclusions. The Experts also obtained similar results"* (FR page 42).

5.3.1.1. *"The value of the descent rate*" was indeed calculated by the NLR, but not by the NTSB; the NTSB did not write about the rate of descent (ROD) in their DFDR Factual report (RoA Annex 15). The ROD is not a recorded parameter on the DFDR because its value could only be measured with slowly responding instruments (in 1992). The NTSB did not have a "*similar conclusion*", but only presented vertical (=normal) acceleration (g) data.
The NLR wrote in the Draft of their final report (CR 94XXX (NL-HaNA_2616) on page 16: *"On average the energy rates oscillate around the mean approach value of 760 ft/min"*, meaning that the average rate of descent was 760 ft/min. The NL lead investigator Frans Erhart, as also mentioned in § 5.1.6 above, required the NLR to delete this not too large rate of descent, because it would not support 'his' conclusion of a hard landing; the NLR did indeed not mention the rate of descent as number in their final report (RoA Annex 4, CR 94238C § b on page 17) but wrote, as Erhart required: *"On average the energy rates oscillate around the respective mean approach values given earlier in this section*".
The average value of the ROD presented by the NLR (760 ft/min, in constant wind conditions) was not higher than the rate of descent the landing gear is designed for (which was at least 1014 ft/min, NTSB report DCA97MA055, § 1.16.1, see RRQ, ref. B, Appendix 35).

5.3.1.2. "*The Experts obtained similar results*", but did not present their calculation, only presented the value 850 ft/min (on FR page 133). How did experts obtain the value? When using the DFDR radio-altitude data, the final rate of descent was ≈797 ft/min. The experts like to use statements by pilots and passengers, but obvious not the statement by the captain to the Portuguese Police in which he stated that the *"Rate of descent was approx. 700 ft/min"*. See also the figure in § 5.1.3.1 above.

5.3.1.3. Lead investigator Frans Erhart also required the NLR to delete the line "*pitch-up to about 9 degrees"* on page 13 of the above referenced draft report that the NLR included as explanation of the rather short flare that occurred just before touchdown, because pitching-up for the initiation of a go-around decreases the rate of descent of an airplane, as also shown in the adjacent figure with DFDR data of the normal, vertical acceleration.



The normal g increases in the last 3 seconds of flight proving the decrease of the rate of descend just prior to touchdown rather than "*subsequently a high rate of descent"*, following *"a sudden and unexpected wind variation in direction and speed (windshear) in the final stage of the approach"* as DASB wanted the Commission to include as cause of the accident in the Final Report ('Blue Report' page 13). DFDR data shows that the rate of descent decreased as if an invisible hand started to keep the air-

plane from descending any further. At landing, the ground kept the airplane from descending further; the g-peak is in the same direction.
This is another piece of evidence that DASB tried to persuade the Portuguese Commission (and the victims) that "*a high rate of descent caused a hard landing"*. The ROD was higher than normal but decreased just prior to touchdown and did not exceed the structural limits of the landing gear (as mentioned in § 5.3.1.1 above).

5.3.2. *"Moreover, the analysis of the mechanical collapse of the right main landing gear illustrates the problem generated by an excessive vertical speed".*

5.3.2.1. Despite our Review, remarks and questions (ref. B), the experts continue to use "*excessive vertical speed*" as the only cause of the collapse of the landing gear. Was the Portuguese Instituto Superior Técnico de Lisboa, who conducted the metallurgic analysis, made aware of the large 11° crab angle during the landing, and of the application of brake power already at wheel spin-up, rather than after the nosewheel was firmly on the ground as required by AOM (§ 3.1.5 above)? These also had influence on the forces and moments on the landing gear. No, the Instituto was probably not made aware. That should have been done by the Commission, to which an accredited representative of the DASB was added. Experts of claimants are convinced that neither the Commission, nor the DASB (and now also the experts) had the expertise to place the metallurgic report in the right perspective.
Real experts make such a conclusion only after their own thorough and documented analysis.

5.3.2.2. The Instituto Superior Técnico de Lisboa (RoA § 1.16.1 page 84) presented their report in the Portuguese language. Where did the experts get their *"analysis of the mechanical collapse"* from? Do they master the Portuguese language? Did they analyze and verify this report?

5.3.3. *"The Experts' mission is not to find out the origin of this vertical speed. Moreover, it is a normal job for an expert of a Commission of Investigation from which DASB is a part, to require the answer from the best specialist available for the related topic. It is obviously not possible to deny the existence of a high vertical speed at the time of the accident".*

5.3.3.1. The experts were not asked to find out the origin of the vertical speed, but to answer the question of the court whether the vertical speed was indeed that high that it led to the failure of the landing gear, hence to the accident. If experts use *"a high vertical speed"*, then they should make sure that it is correct. The Commission and the experts should have reviewed DFDR data to determine the vertical speed, the rate of descent. The experts should also have reviewed the above-mentioned NTSB report that was provided to them by the claimants (ref. B, appendix 35), and the DFDR radio altitude data (§ 5.1.3 above) to conclude that the ROD was not excessive for the DC-10 landing gear and that the DASB misinformed the victims.

5.3.3.2. How can experts conclude that the answer is "*from the best specialist available*"? Do they know the specialists? Who are they? Did they review and analyze the report with appropriate expertise? The NLR specialists did not even know the non-precision approach technique that required level flight (§ 5.1.2.2) and explained this as up- and downdrafts. Experts were asked to substantiate their answers, not to copy a possible incorrect source.
Following a thorough analysis of objective DFDR data, well-educated aviation experts would conclude differently. The vertical speed was not that high that it alone led to the failure of the landing gear, as the data in the referred NTSB report confirms.

5.3.3.3. This is a wrong answer by the experts, not showing any expertise. There was not a too large rate of descent. There was a too large crab angle during touchdown, because of the too large crosswind, and because brake pressure was applied before the nosewheel was firmly on the ground.

5.3.4. On FR page 30 and 31 experts wrote: "*The Dutch Aviation Safety Board remains cautious regarding the vertical speed values as it seems that these values are merely computed, and not recorded by sensors. The Experts agree here that such a caution is appropriate*". Still, the experts did not deny the existence of a high vertical speed in this answer to the court. They calculated 850 ft/min, as stated in FR § 8.6.4.2 on page 133. The factual DFDR data do not show a high rate of descent that alone would have led to the failure of the landing gear. These computed *"vertical speed values"* are obviously not factual data.

5.3.5. **Conclusion**. Experts again show the inappropriate use of available documentation, and not having analyzed objective DFDR and AIDS data, but to rely on, and misinterpret statements by others. They wrote more than once "*obtained similar results*", but did not show how they obtained their results, they did not substantiate. Experts accepted reports of the NLR and Instituto Superior Técnico de Lisboa (only available in Portuguese), without critically reviewing the reports. Experts stated that their "*mission is not to find out the origin of this vertical speed*", while they had to substantiate and hence analyze the reports as asked for by the court. Experts did not criticize the DASB for requiring the NLR to delete important findings that could interfere with the cause, being windshear that DASB wanted to be stated in the final RoA, especially the only 65% rate of descent (760 ft/min) at a much lower landing weight than the design limit (1014 ft/min) at maximum landing weight, and the pitch-up just prior to the landing that reduced the rate of descent. The landing was not that hard that the higher-than-normal ROD alone would lead to the failure of the landing gear. More in § 5.7 below.

5.3.6. **This subject was reviewed** and substantiated in RRQ ref. B § 5.3. The answer by the experts on FR page 194 is: "*No comment*". They continue with an incorrect explanation of a radio-altimeter, as already discussed in § 3.1.10, that "*induces error of indication",* and wrote about the last turn, which is not of relevance. Experts have no comment on the rate of descent of the DASB of 1000 ft/min while they themselves calculated 850 ft/min. They have obviously not reviewed and understood the NTSB report in RRQ ref. B Appendix 35.

5.3.6.1. Experts reproach experts of claimants "*to persuade the reader that DASB did a wrong job*". Experts did obviously not use the Blue report, the formal Comments of the Netherlands that DASB sent to Portugal following the issue of the draft RoA. There is a lot of persuasion in that DASB report, of which one item is to convince the commission of windshear as cause of the accident.

5.3.6.2. Experts included this remark: "*It is a constant among the Claimants advisors' team to consider the DASB as separate from the Commission of Investigation: This is a major mistake; the DASB is a part of the Commission of Investigation and must act in accordance with this role clearly defined by ICAO Annex 13*".

5.3.6.3. Hence, experts still consider DASB as "*member of the commission of investigation*". This court case is about the behavior of the DASB towards the victims during meetings, and their contributions to the Commission during the investigation. The experts did obviously not read the letter of the court very well. Experts are mistaken.

5.3.6.4. Experts did not behave as skilled airline pilots when discussing the early closure of the throttles that would also affect the rate of descent (refer to § 3.8.7 above).

5.3.7. **The correct answer to the court is:** The rate of descent was higher than normal, but certainly not excessive and still much lower, approximately only 65% of the design limit

of the landing gears of the DC-10. In addition, the rate of descent decreased during the last 3 seconds of flight because the captain increased both the pitch angle and the throttles for a go-around. The failure of the right main landing gear cannot have been caused by the higher than normal rate of descent alone, but also because of the large crab angle that was a consequence of not approaching on the prescribed approach radial, and not on the extended runway centerline either (§ 5.1.7.4 and § 5.2.1.2 above), at too low an approach speed (§ 3.10.3 above). See also § 5.7 below.

5.4. The (Alleged) Occurrence of An Intentional Navigational Error (FR § 6.4)

5.4.1. *"If this question calls for the Expert to evaluate the decision of the crew to engage the last turn at 8 nautical miles, then the answer resides in the relevant Portuguese procedure published at the time"* (FR page 42).

5.4.1.1. No, it does not, and this is not an adequate answer to the court. The experts were asked to substantiate their answer, not only to refer to procedures. Experts will understand that 8 nm is a procedural distance where the final turn should, and indeed did begin according to both the ground radar, DFDR and CVR data. This question is about not being established on the 111° approach radial at 7 nm, about intentionally extending the turn on the 080° heading, overshooting the 111° approach radial because of the known strong southerly wind, and thereafter not returning to the prescribed 111° approach radial at all. So, what is your answer? The answer does not reside in the Portuguese procedure. The procedure had to be followed, which the crew did not.

5.4.2. *"The Experts' analysis as shown in paragraph 8.6.4.1 of this report, shows that the crew respected the published approach procedure, at least during initial and intermediate approach paths"* (FR § 6.4 page 42).

5.4.2.1. There are two series of paragraphs numbered 8.6.4.1, one beginning on page 95 and one from page 118.
The first § 8.6.4.1 is about the flight preparation, the second on the horizontal flight management, which is a newly added paragraph that was discussed in § 3.4 above and of which the conclusion was that the presented radar data analysis is misleading, unprofessional and even amateurish, and should be discarded by the court. The crew did not respect the published approach procedure, to which the experts agree (§ 5.4.3.6 below).

5.4.3. In the last sentences of § 8.6.4.2.1 (weather situation on arrival) on the top of page 102, experts wrote:

- *"Experts also consider that the choice by the pilot flying to stabilize the flight path for a few seconds to heading 080° was an excellent decision, allowing both a clear final approach path interception without going above the final descent path.*
- *The only critique we could make towards the crew is not to have sufficiently anticipated the beginning of interception because of an unfavorable wind that pushed the aircraft outside of the planned trajectory.*
- *Moreover, the turn toward the final approach radial was performed with only a 25° bank angle because it was performed through the autopilot, which induced a slight overshoot from the approach axis that should have been adjusted immediately".*

5.4.3.1. Heading 080° would indeed be a good intercept heading for the 111° approach radial under 'no wind' conditions, but at that point, there was a considerable crosswind of which the pilots must have been aware, because they needed heading 252° on the 269° outbound radial (§ 3.1.3.8 and § 3.10.2.2 above), meaning a very large drift

angle of 17° at 170 kt.
Normally a radial is intercepted under an angle of 30°, so when the radial becomes alive, as shown by the deviation bar movement on the Horizontal Situation Indicator from full deflection position, the heading has to be adjusted by turning the heading selector of the autopilot to smoothly establish on the required radial and then track it with correction for the wind. The captain said "*I'll give you 111*", meaning that he is selecting the 111° radial in the co-pilot's VOR selector window. This was not a heading advice. The co-pilot, as pilot-flying, then commanded "over right heading 080", however due to the actual strong crosswind, this initial 080° heading should have been increased as soon as the instruments showed that the radial became alive. Under this crosswind condition letting the autopilot momentarily rolling out on 080° heading was a big mistake. The captain, in his monitoring role, did nothing to correct this.

5.4.3.2. During the final turn, the copilot initiated the interception of the 111° approach radial too late, even only after crossing the 111° approach radial at heading 080°. This overshoot was clearly indicated on his instruments: the VOR deviation bar moving from full left to full right (ref. D, § 2.5.2) and the VOR needle moving through the 111° indication.

5.4.3.3. On FR page 119, experts present a similar statement: *"But, with a wind coming from the south/south-east, the path on ground will obviously "overshoot" the approach radial and a correction should be performed to come back as soon as possible on the centerline or on the scheduled radial (here VOR-VFA radial 111°)"*.

5.4.3.4. Despite the "*excellent decision*" mentioned in the first bullet, the experts criticize the crew in the second bullet "*not to have sufficiently anticipated the beginning of interception"*, which was obviously not that "*excellent"* after all. In addition, it was not "*an unfavorable wind that pushed the aircraft outside of the planned trajectory"*, but it was the copilot who could expect an overshoot during the turn due to the strong southerly wind, who did not anticipate this, and who did not respond to the correct approach radial indications on two of his instruments, not during the turn and not following the turn either. The captain in his monitoring role allowed this to happen.

5.4.3.5. As the ground radar plot in RoA Annex 12 shows (figure on the title page), the initial turn radius (i.e. bank angle) was smaller than towards the end of the turn. Mentioning a bank angle of only 25° looks interesting and impressing, but under autopilot control, the bank angle is never larger than 25°; it does not make sense to mention this here. By the way, objective DFDR data show that the bank angle never exceeded 17.6° during the final turn.

5.4.3.6. The "*autopilot*" did not induce a "*slight overshoot"*, but the copilot did. The overshoot was not "*slight"* but was a 6° overshoot, while a deviation of only 2° is allowed. The airplane reached a (cross track) distance of up to 0.6 nm (1 km) too far north of the 111° radial to which the crew did not return at all, as they should have to comply with the stabilized approach requirements in the AOM. The copilot should have entered the wind-corrected approach heading in-time on the autopilot control panel which he did not. A deviation larger than 2° is considered an error that leads to catastrophes, as is warned for by the Flight Safety Foundation (FSF) Approach and Landing Accident Reduction (ALAR) working groups already for a long time. Experts here confirm that the overshoot "*should have been adjusted immediately"* but did regrettably not copy this conclusion to FR § 7.

5.4.3.7. Experts here again agree appropriately that the course correction should have been performed as soon as possible.

5.4.4. In FR § 0.1.2 on page 7, experts wrote that the approach above 500 ft "*was handled by the crew with a correct airmanship, aside from an inappropriate correction of the wind during the interception and the final phase, flying so laterally displaced at the left of the radial 111°. During this phase, the immediate safety of the aircraft was never affected by the captain's decisions".*

5.4.4.1. Here, the experts again agree to "*an inappropriate correction of the wind during the interception and the final phase".* The crew did not respect the published approach procedure and violated the requirements for a stabilized approach by exceeding the ± 2° requirement from the prescribed 111° approach radial (109° – 113°) when passing 500 ft altitude and did not configure (prepare) the airplane for landing in time.
Was this really *"an excellent decision"*, also given the critique by the experts themselves in the second bullet? Experts conclude that the approach path was not correct but did regrettably not include this conclusion in the answer to the court in § 6.4 and in the conclusions in § 7. It looks like the experts did not want to answer this question fairly and that they are protecting the pilots of MP495.

5.4.4.2. Subject of the navigation error is also the failure of the pilots to approach on the prescribed approach radial and the extended runway centerline, as discussed in § 5.1.7.3 and § 5.2.1.2 above.

5.4.5. On FR page 120, experts state: "*the overshoot requiring to turn right towards – at least – a heading of 150° and around 1 nm before the runway to turn left on heading 125° to balance the wind and to establish the mandatory drift angle*".

5.4.5.1. Experts confirm that a "*turn towards– at least – a heading of 150°*" was required, following the "*excellent decision"*. The pilots never attained this heading and continued at a heading of 125° until reaching the runway, as DFDR heading data shows. Experts should have concluded this as well and mention this in FR § 6.4.

5.4.5.2. By writing this, experts did not realize that "*the mandatory drift angle*" during the last 1 nm on a heading of 125° minus runway heading 106° results in a wind correction, i.e. drift angle of 19°, meaning that at 139 kt airspeed, a very large crosswind component of 47 kt would have been present, 42 kt higher than the limit for a flooded runway, 22 kt above the wet runway limit (see figure in § 5.2.2.1). Quite an impossible statement; experts did not realize what they wrote; this sentence is wrong. A heading and wind analysis in § 5.2.1.2 above (and in Ref. D) proves that the airplane did not approach the runway on the extended runway centerline and did not turn 5° left at around 1 nm in front of the runway. The heading was 125° during the last 80 seconds of the approach and not only during the last 1 nm.

5.4.6. "*In addition, this flight path clearly avoided a very active stormy area, west of the airport for more or less 10 nautical miles*" (FR § 6.4 page 42).

5.4.6.1. There was a thunderstorm SW of the airport in the weather forecast, which might have been located at *"more or less 10 nm"*, but MP495 turned at the standard 8 nm and hence, was not avoiding a stormy area. Nothing was recorded on the CVR referring to a stormy area during the turn, not a single word. This did not show up in statements by the captain and copilot either. During the approach, the pilots did not have to avoid *"a very active stormy area"*.

5.4.7. Experts did not mention that the DASB, as accredited member of the Commission, obviously did not discuss this large navigation error and the deviation from the approach procedures with the other members of the Commission. Experts did not confirm the procedure in the AOM that the crew should indeed read and use the on-board available wind data if the weather is bad and windshear might be expected. The captain knew this

procedure and did read the wind at least twice from the display of the AINS system, as the CVR transcript proves.

5.4.8. The captain, at 2.5 minutes before landing read the wind and said "*wind is coming from the right, 30 kt, drift 12° so you make it 123 or so*". At that moment the airplane was close to the maximum 6° deviation from the 111° approach radial (while 2° is maximum allowed). The copilot did not steer the airplane back to the 111° radial as soon as possible following the turn, as experts also mention in § 5.4.3.7 above: "*a correction should be performed to come back as soon as possible on the centerline or on the scheduled radial (here VOR-VFA radial 111°)"*.

5.4.9. **Conclusions**. The newly added analysis of "*the horizontal flight management*" from FR page 118 proves that the experts are not real experts but fall short in (radar) engineering knowledge.
Experts divert the attention to initiating the final turn, while the question is about the error following the turn. Experts state that the crew made "*an excellent decision"*, while they did overshoot the approach radial due to the known strong wind and did not return to the prescribed approach radial at all. This shows ignorance of both the crew and the experts. Experts (often) include unnecessary statements in their report and did not accurately review objective DFDR data, which caused them to make incorrect statements.
Experts confirm though, that the pilots should have turned "*right towards – at least – a heading of 150°"* but did not include this good conclusion in their answer to the court and in the conclusions in FR § 7. They again made an error in the calculation of the wind correction.
Experts also conclude "*an inappropriate correction of the wind*" and "*flying so laterally displaced at the left of the radial"* but add that the immediate safety was never affected. They obviously forgot that this happened at or below 500 ft when procedures require the airplane not to be displaced more than 2° while the data prove a three times larger angle of 6°; the approach was not stabilized, as required. The navigational errors during the approach led to the accident; safety was indeed affected.
Experts continue to explain errors by the pilots away, to varnish their errors over and over again.

5.4.10. This subject was reviewed and substantiated in RRQ ref. B § 4.

5.4.11. **The correct answer to the court is:** The co-pilot, when the captain reported "*approaching 8 miles*" (8 DME on outbound radial) and selected the inbound 111 radial in the course window on the co-pilot's VOR panel ("*I'll give you one one one*"), then commanded "*over right 080"*, however did not follow-up with further heading correction as soon as the overshoot became apparent; the captain let this happen.
At 500 ft altitude, the airplane still was not on the prescribed 111° approach radial and therewith did not comply with the requirements for a stabilized approach in the prescribed DC-10 approach procedures. This should have resulted in a go-around already from that point as experts confirm, see § 5.5.2 below.
A heading of 125° to a runway of 106° was required during the approach until just before landing, as proven by DFDR data. This large heading could not be corrected with near maximum rudder to align the airplane with the runway and therewith to avoid a crabbed landing, because the airplane did not approach on the (extended) runway centerline and 90% rudder was not adequate to yaw from 125° to 106° (= 19°) for alignment, which would have been only 8° when approaching on the extended runway centerline with the same wind and airspeed (§ 5.2.1.2 above). The airplane landed with an 11° crab angle half outside of the left side of the runway and crashed because of this sequence of navigational errors.

5.5. The (Alleged) Missing of Calls by The Crew (FR § 6.5)

5.5.1. *"If this question calls for the Experts to evaluate the fact that the crew forgot the "500 feet" call out, the Experts confirm that the crew forgot it even if it was partially corrected by the F/E' remind"* (FR page 42).

5.5.1.1. Experts only refer to the 500 ft call, but not to the other calls prescribed in AOM 3.3.5 – 08 that the pilots missed, being 'Approaching Minimums', 'Landing' or 'Go-around' and 'Fifty'. The captain, when taking control for the go-around at 3 seconds before touchdown did not call 'my controls' either, which caused the CWS to disengage itself because of conflicting inputs from the copilot, who continued controlling the airplane as well, while he should have released the controls.

5.5.2. *"The instructions published by Martinair in its BIM indicate that, if the aircraft is not stabilized at this altitude, a missed approach procedure must be engaged. This specific instruction is customary in most airlines"* (FR page 42).

5.5.2.1. The airplane was not stabilized in the approach at 500 ft: the airplane was not on the 111° radial ± 2° but on 117°, the approach speed was too low and the engines RPM was not stabilized but varied because of inappropriate elevator control inputs by the copilot. The experts should have concluded here that a missed approach procedure should have been conducted by the crew of MP495, rather than stating "*if not stabilized, a missed approach procedure must be engaged*".

5.5.3. *"The exact altitude of the stabilization floor may vary from one company to another, but it always has the same purpose.*
What matters is not going through this window in a specific configuration, but to do it with respect to the trajectory as defined by the actual procedure. The configuration will then be different whether the pilots carry-out a visual or an instrument approach (FR page 43)".

5.5.3.1. The experts should answer questions of the Martinair DC-10 operation, not what other companies do or have. The 500 ft as well as the Approaching Minimums at 400 + 100 ft calls are prescribed in Martinair non-precision approach procedures; that is what these questions are about.

5.5.3.2. The experts wrote "*to do it with respect to the trajectory as defined by the actual procedure"* but did not conclude that the pilots failed to respect the procedure.

5.5.3.3. "*A specific configuration*" is of no importance at Faro, is the same for every approach, i.e. if the experts mean the aircraft configuration: gear down, flaps and slats set, etc. The only difference is the lateral and altitude 'window' at which the approach should be stabilized at Faro: 111° radial ± 2°, 500 ft altitude, approach speed maintained, engines RPM stabilized. "*An instrument approach*" was not possible at Faro due to the lack of appropriate ground equipment. Why mentioned this? Confusing. Not to the point.

5.5.4. *"Moreover, this stabilization floor means that all destabilization below this level should immediately be followed by a missed approach procedure* (FR page 43).

In our case, the pilots should have initiated a missed approach procedure since the aircraft became destabilized, even at a very low altitude.

So, taking this into consideration, the fact that the pilots forgot to make the announcement verbally could be considered as a contributing factor to the accident: the announcement constitutes a verbal reminder of the procedure to follow, and it was not done".

5.5.4.1. "*Stabilization floor*" sounds interesting but is not defined in DC-10 or other manuals that apply to Martinair operations. Experts should stick to applicable terminology for flight MP495.

5.5.4.2. Finally, experts draw conclusions: "*Destabilization below 500 ft should immediately be followed by a missed approach procedure*" and "*in our case, the pilots should have initiated a missed approach procedure*", a go-around from already an altitude of 500 ft which they didn't do.
The fact that the appropriate calls were not made "*could be considered as a contributing factor to the accident*". Of course, experts mean it was, not *"could be"* a contributing factor.
These good conclusions however do regrettably not show up in the conclusions of the Final Report (§ 7) on page 48. DASB should also have reported this fatal error to the victims.

5.5.5. **Conclusions**. The experts confirm "*that the crew forgot the 500 ft call".* They also conclude that the crew should have initiated the missed approach procedure already at 500 ft and still also at a lower altitude, and also conclude "*the fact that the pilots forgot to make the announcements verbally could be considered as a contributing factor to the accident*. They regrettably did not include this in their conclusions in FR § 7.

5.5.6. This subject was reviewed and substantiated in RRQ ref. B § 5.1.

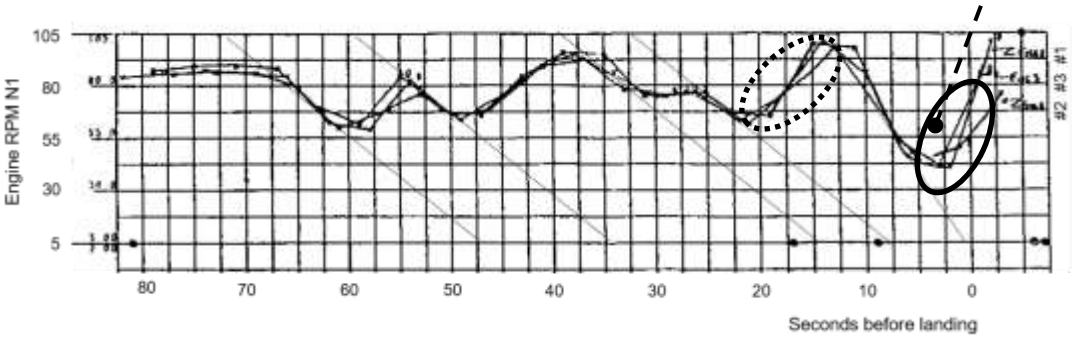
5.5.7. **The correct answer to the court is:** The crew did not state any of the AOM-required procedural approach and landing crew coordination calls which led to not conducting the circumstances-required missed approach procedure (go-around) at 500 ft and not at a lower altitude either, which would have prevented the accident from happening. "*The fact that the pilots forgot to make the announcements verbally could be considered as a contributing factor to the accident"*.

5.6. Keeping the Throttle (Too) Closed (FR § 6.6)

5.6.1. *"There are two points to address regarding this question:*

- *First, the records show a strong thrust increase that reached a value comparable with a missed approach procedure;*
- *Then next, a decrease down to flight idle thrust.*

Several scenarios have been mentioned but, for the Experts, it clearly appears that the increases in thrust were consequential to the destabilization, not a cause of it" (page 43).



Comparison RPM decrease by autothrottle (4x) and manually by the copilot (1x); this last rate of decrease is larger (DFDR-data, RoA Annex 15).

5.6.1.1. The "*strong thrust increase*" mentioned by the experts must be the increase from 20 seconds before the landing (dotted oval in DFDR engine RPM data in the figure above). This increase was not caused by initiating "*a missed approach procedure*" at that time, but by the autothrottle system because the copilot pulled on the control yoke increasing the pitch after the captain said three times "*bit low*" (CVR), and also because the airspeed decreased. The captain said this because AOM 3.3.5 – 14 requires for a PAPI approach below 200 ft that *"the aircraft must be brought gradually above the "on glide slope" indication to provide a 30 to 40 ft wheel clearance at the threshold"*. Otherwise the landing gears of the large DC-10 would touchdown in front of the runway threshold, at Faro's not too long runway.
As explained in § 3.8.1 above, airspeed and elevator position are two of the most important parameters that the autothrottle system responds to. When a pilot increases the pitch angle by pulling the control column, the elevator position changes to which the autothrottle system responds by increasing the thrust of the engines immediately to enable a potential climb and prevent losing any more altitude and airspeed, hence wing lift. The reached thrust level was indeed comparable with the thrust for a missed approach procedure but lasted only three seconds.

5.6.1.2. Then the copilot pushed the nose down again, decreasing the pitch angle to avoid a climb, and a few seconds later closed the throttles against the autothrottle system, as the DFDR pitch angle and engine RPM data prove. The rate of decrease of the RPM was higher than under control of the autothrottle system on four earlier occasions during the last 80 seconds of flight, as shown by the oblique lines in the figure above; this also proves that the autothrottle system did not close the throttles, but the pilot-flying, the copilot did. The RPM decreased to 40.7 %, while the autothrottle system did not decrease the thrust that low on three earlier occasions, as shown in the figure above. A too low RPM increases the engine spool-up time so much, that adequate engine thrust might come too late for a safe go-around, which actually happened following the increase of thrust by the captain at 3 seconds before touchdown (solid oval).
AOM 3.3.5 – 04 states that "*the primary method of executing an approach is by means of the autopilot and autothrottles*". The autothrottle system is to remain engaged until after touchdown to prevent an early throttle closure. Due to the early manual throttle closure by the copilot, the airplane touched down on the runway while this would not have happened with a thrust increase from an RPM level higher than ≈60 %, being the lowest level under autothrottle control at 60 seconds before landing in the figure above. The short, dashed line on the right side shows the rate of increase of the thrust from 60% RPM, rather than from 40.7 %, from the same time the captain slammed the throttles forward for a go-around. The engine RPM would have reached 105% just before touchdown, which would have prevented the accident from happening.
Closing the throttles prematurely is also a contributing factor to the accident.

5.6.1.3. In the second bullet: *"… for the Experts, it clearly appears that the increases in thrust were consequential to the destabilization, not a cause of it ".* The *"increases in thrust"* had nothing to do with "*destabilization*", but with the way the autothrottle system is designed and operated. The *"increases in thrust"* were caused by the copilot who increased (and decreased) the pitch angle of the airplane several times during the last 70 seconds of flight, resulting in engine RPM changes. From 22 seconds before touchdown the copilot increased the pitch angle (captain said 3x *"bit low")*, after which the ATS immediately responded with a thrust increase to 102%; refer to § 3.8.
There was never destabilization; the autothrottle system operated as designed. When a pilot pulls the control column as the copilot did, the autothrottle foresees that a go-

around is going to be executed and increases the thrust of the engines at once to facilitate an immediate go-around. If experts had systems expertise (§ 3.8 above) and would have reviewed DFDR and AIDS data, they would not have concluded as they did.

5.6.1.4. Experts should also have noted in the DFDR data that the spoilers extended within one second after touchdown, which normally should not occur with advanced throttles (§ 3.1.17.2 above), but which, in this case, inhibited a go-around immediately following touchdown, which normally would have been possible. Refer also to § 3.1.8.3.

5.6.2. *"However, even though the thrust increase showed the pilot's intentions to go around, it also showed that he became aware of the situation but the variations of bank angle, whatever their origin, changed his order of priorities"* (FR page 43).

5.6.2.1. The increase of thrust the experts are referring to was not the thrust increase for a go-around; that increase came after the engines were at flight idle, 3 seconds before touchdown. If the thrust increase was for a go-around, then why would the pilot decrease the pitch angle and not keep it at the required angle for the go-around to ensure staying clear of the runway?
The "*variations of bank angle*", the experts are referring to, were initiated by the copilot, as is documented in the DFDR and AIDS data. There was only one peak (14° left), which was the side effect of the yawing, the yaw rate and the rudder deflection due to 90 % rudder pedal to the left. The captain grabbed the controls and quickly rotated the aileron control wheel to the right reducing the bank angle, as proven by DFDR and AIDS data.

5.6.2.2. *"whatever their origin"* is not a conclusion that could be expected from experts. They should have figured out in detail what the cause was, like is done by experts of claimants (ref. D), by just reading and analyzing DFDR and AIDS data that was included in Annexes 15 and 9 in the RoA. Experts obviously did not analyze DFDR data; they made it very clear that they were lacking the expertise to do so (§ 3.1.17 above).

5.6.3. **Conclusions**

5.6.3.1. The experts were mistaken in the moment of the increase of the thrust for the go-around. They obviously did not review the CVR transcript and the DFDR and AIDS data to accurately determine the reason of the thrust increase at 20 seconds before landing, which they inappropriately attributed to the destabilization, which there was none. Being DC-10 pilots, they should have read in the DC-10 manual and been aware that a too low approach would result in touching down before reaching the threshold of the short runway at Faro airport. The captain knew this and told the copilot he was too low, after which the copilot decreased the descent a bit by pulling the control column, which in-turn caused the RPM to increase. This was the one and only scenario; experts did not make clear which scenarios they mentioned, and obviously had no expertise in the operation of the autothrottle system.

5.6.3.2. The experts mention the RPM decrease down to flight idle thrust, but obviously did not see that this was caused by the copilot pushing the nose down a bit to continue the descent. If the thrust increase was for a go-around, then why would the pilot decrease the pitch angle and not increase to and keep it at the required 15° angle for the go-around to ensure staying clear of the runway, as the AOM go-around procedures requires? DFDR data provides answers, if reviewed.

5.6.3.3. The experts did not notice the deployment of the spoilers within one second after touchdown (DFDR data) while all throttles were advanced, which inhibited a go-around from the surface of the runway.

5.6.3.4. The experts did not answer the question of the court. DFDR data shows that the throttle closure started at an altitude of 150 ft above ground level, while this normally should begin at 50 ft, and that the throttles were kept closed because the RPM decreased to a value lower than the autothrottle system would do (§ 3.8.5 and figure in § 5.6.1.1 above). Hence, the copilot closed the throttles too far and kept them closed until the captain took over and increased the thrust 3 seconds before touchdown. Experts did not discuss this; they did not want to blame either of the pilots.

5.6.3.5. Experts of claimants are now convinced that the experts did neither read nor understand the DFDR and AIDS data plots, or did not want to, because these data show catastrophic pilot errors, as the NTSB also confirmed. Experts obviously have no expertise on the operation of the autothrottle system either, as already mentioned in § 3.8, and hence, made the wrong conclusions.

5.6.4. This subject was reviewed and substantiated in RRQ ref. B § 5.4.

5.6.5. **The correct answer to the court is:** The copilot closed the throttles at too high an altitude and kept them closed with some force against the correctly operating autothrottle system. Closing the throttles and keeping them closed was against all operating procedures and pilot training, and prevented the initiated go-around at 3 seconds before touchdown from being successful, which it would normally have been if the copilot would have let the autothrottle system control the engines. Keeping the throttles closed was a catastrophic pilot error.
The spoilers extended immediately after touchdown despite the advanced throttles by the captain, which must have been a system deficiency. Deployed spoilers reduce the lift of the wings and prevented the initiated go-around from continuing safely, which normally is always possible, even after touchdown.
Both the manual closure of the throttles and the deficiency in the spoiler system are contributing factors to the accident.

5.7. The Landing Gear Breaking Off (FR § 6.7)

5.7.1. "*There is no doubt whatsoever regarding this element; the Portuguese experts conducted analyses that are irrefutable:*

- *The material did not have any defect that could have weakened the gear's resistance;*
- *The maintenance of the system conformed with the constructor's instructions;*
- *The fracture occurred after a mechanical pressure on the landing gear that was beyond the metal's resistance capacity*" (FR page 43).

5.7.1.1. The experts have *"no doubt whatsoever"*, but they obviously did not review the Landing Gear Energy and Load Limit Certification data in the NTSB report (DCA97MA055, § 1.16.1) that claimants provided to them as Appendix 35 in their Review, Remarks and Questions (RRQ) document (ref. B). In addition, the experts did not consider the additional effects of other contributing factors such as the large 11° crab angle during touchdown and the early application of the brakes, i.e. before the nose gear was firmly on the ground, as required by AOM 3.3.5 – 13. Landing a DC-10 with an 11° crab angle is not allowed; is not a mistake, but a serious pilot blunder. When the brake pedals are being pushed during touchdown, brake pressure is released to the brakes immediately at spin-up of the aft wheels. Applying brake pedal pressure before the nose gear is firmly on the ground is in violation with AOM procedures and is a pilot error as well (refer to § 3.1.5 above).

5.7.1.2. On FR page 33, experts wrote: "*The Experts' conclusion should be that the crab angle could be a contributing factor to the collapse of the gear*". Why is this conclusion not included in this answer to the court?

5.7.1.3. On FR page 57, Experts include "*FAR 25.473 - Landing load conditions and assumptions*" and "*FAR 25.485 - Side load conditions*", but do not substantiate why these are included. As also mentioned in ref. B, § 5.11.4, Experts not only made a mistake in the title (was in 1992 Ground load conditions and Assumptions), but also did not understand that a manufacturer will design a landing gear stronger than minimum required in applicable FAR's. Experts obviously did not read or understand ref. B.

5.7.1.4. On FR page 150, experts wrote: "*We must take into account the fact that, below 150 ft, the pilot must also « align » the aircraft with the runway and de-crab the flight path in case of drift. This is the case for the MP495*".
Here experts confirm that the DC-10 needed to be de-crabbed before landing. This is not only required "*in case of drift*", but drift needs to be prevented by banking a few degrees into the wind if the airplane is approaching above the runway centerline. During the last seconds of flight of MP495, the bank angle was not to the right to compensate for the drift, with the exception of the very last second, when the bank angle increased to 5.62° at touchdown. The pilots did not attain a constant bank angle to prevent the airplane from drifting away from the runway centerline under the actual crosswind condition, hence, the airplane was not approaching on the centerline.
The pilots did not de-crab the airplane; DFDR data prove a crab angle of 11° at touch down, while it should have been zero, and the bank angle was not to the right against the strong crosswind during the last 10 seconds of flight, except for a few degrees from the very last second, which increased the crab angle.
Experts wrote *"This is the case for the MP495"*, but DFDR data show it was not the case, the airplane was not aligned with the runway, was not de-crabbed. A misleading statement by the experts.

5.7.1.5. Experts wrote that "*The material did not have any defect that could have weakened the gear's resistance*" and that *"the maintenance of the system conformed with the constructor's instructions"*, but did they review maintenance log books, manuals, instructions and procedures? Were these provided to them? By whom? No delayed or postponed maintenance? Not even concerning the broken landing gear? Or are they quoting other documents without verifying and referencing these? Experts of claimants did neither receive maintenance logbooks, nor airplane maintenance manuals with "*the constructor's instructions".*
The maintenance logbooks must have included entries of delaying a required replacement of the right main landing gear three times, as was reported by a maintenance planning technician of KLM. There must have been problems with the landing gear, that were reported in the logbooks. Refer to TV documentary of EénVandaag, Ref. F. The airplane was one of two that was already sold to the Department of Defense for being converted into KDC-10 tanker-transport airplane. Replacement of a landing gear is costly and would mean loss of profit for Martinair.
Experts should not make statements that they cannot substantiate.

5.7.1.6. *"The fracture occurred after a mechanical pressure on the landing gear that was beyond the metal's resistance capacity*". The fracture of the landing gear cannot have been caused by the rate of descent alone that might have been higher than normal, but still was below the maximum design rate of descent presented in the above referenced NTSB report for different touchdown bank angles. The combination of landing with an 11° crab angle, the too early application of the brakes and possibly also the delayed replacement must have caused the fracture of the landing gear.

Another, not investigated possibility is the failure of the fuse pin in the landing gear. The landing gear of a DC-10 is equipped with fuse pins that allow sacrificial shedding in case of an aft (drag) overload condition to prevent parts of the landing gear from puncturing the fuel tanks in the wing above the gear (NTSB report referenced above, page 26). Why did experts not write about this probable fuse pin failure due to both the aft overloads caused by the early brake application and the additional torsion due to the crab angle?

5.7.1.7. The scratches on the runway do not confirm that the right landing gear collapsed immediately at touch down. The first tire marks that could indicate landing gear failure were at 30 m (point D, called 'zigzag' in RoA Annex 11, refer to the figure with § 5.2.2.2 above). The right engine nacelle started sliding on the runway from approximately 90 m from the first rubber marks, not from the touchdown point. All of the scratches were in the direction of the runway, and do not confirm a sideward displacement to the left from the runway centerline, as the DASB told the victims.

5.7.1.8. The Experts' response to this question proves that the experts did not review the data in ref. B, and obviously did not apply the available high-level engineering knowledge to understand the NTSB analysis on Landing Gear Energy and Load Limit Certification data provided by the experts of claimants in ref. B, appendix 35.

5.7.2. **Conclusions**

5.7.2.1. It is a fact that the landing gear failed. The cause was not a higher than normal rate of descent, but the unapproved 11° crabbed landing, the too early application of the brakes, both caused by the pilot, and deficiencies in the landing gear that required replacement of the gear but which was postponed by Martinair three times. Experts seem to continue to have difficulty in concluding pilot errors. It is obvious that the experts did not want to learn from the NTSB report that was made available by experts of claimants with ref. B.

5.7.2.2. Experts obviously do not have the engineering knowledge to answer this question of the court. They should have informed the court of not being capable of answering engineering type questions.
Experts, by answering this and other engineering type questions, claimed to possess knowledge or skill that they obviously do not have, which is the definition of a charlatan.

5.7.3. This subject was reviewed and substantiated in RRQ ref. B § 5.11.

5.7.4. **The correct answer to the court is:**

The landing gear failed due to the following contributing factors:

- the pilot did not align the airplane with the runway before landing. The crab angle was 11°;
- the early application of the brakes by the copilot which increased the torsion moments on the landing gear due to the large 11° crab angle; and
- the possible failure of the built-in fuse pin that sacrifices the landing gear in case of a high aft pointing overload (was not investigated by the commission);
- the possible failure of the landing gear due to its postponed replacement three times.

The rate of descent was larger than normal but less than the limit to which the landing gear was designed, according to the NTSB and McDonnell Douglas (§ 5.3.7 above). Alignment of the airplane with the runway was not possible, because the drift angle was too large for the limited rudder authority (§ 5.2.2.1 above) at the approach speed. The

drift angle was too large because the copilot did not approach the runway on the extended runway centerline (refer to § 5.4.11 above).
The landing gear failed, broke off, due to pilot failures.

5.8. The Crew's Interpretation – Or Lack Thereof – Of the Term "Flooded" (FR § 6.8)

5.8.1. *"As explained before, the Experts estimate that analyzing the understanding of this word can be done using the largest sense of the term and cannot be dissociated from the "Human Factor" principles, which ought to be considered as a cause or a contributing factor of the accident" (FR page 44).*

This type of "Human Factor" analysis was at its early stage at the time of the accident, and no specific publication defined it clearly even though some airlines started to consider it in the flight safety policies".

5.8.2. Experts refer to Human Factors principles, because they don't want to point their finger at either the captain whose *"intervention during the whole approach seems to have been too passive",* as stated in the conclusion of the RoA (page 127), or at Martinair who did not amend their airplane manuals to ICAO norms on runway status reports that already existed for at least 8 years, including the term "*flooded*" (RoA page 107, bottom line). Experts wasted many words that do not make sense at all.

5.8.2.1. It is so obvious that experts are trying to find excuses for the crew not having understood the term flooded, but the captain, a few days after the accident, confirmed that he received the flooded message from ATC and that he understood what flooded exactly meant: "*If the runway is actually flooded that means "standing water" to me, in that case the braking action is "poor" and the crosswind limit is reduced to 5 kt.*" Dutch lead investigator Frans Erhart was made aware during the investigation that the term 'flooded' was allowed to be used by ATC and that pilots should have been aware of the meaning. Despite the fact that KLM and Martinair were at least 8 years too late with incorporating the new runway condition terminology in their manuals, which was confirmed by KLM (see § 4.7 above), the captain was fully and in detail aware the new ICAO terminology.

5.8.2.2. The captain knew that the crosswind limit was 5 kt but did not take action and let the copilot continue the approach in the too strong winds. Following receiving the flooded message, he reported the wind at least twice after reading his navigation display, the first was: "*wind is coming from the right, 30 kt*", and the second: "*wind 190°/ 20 kt"*. Not using these readings that showed a 4 to 6 times too large crosswind component for a safe landing on the flooded runway, and not taking appropriate action, is not a matter of human factors (§ 3.3) but of human error, of negligence, recklessness and irresponsible behavior.

5.8.2.3. The experts are mistaken on the science of "*Human Factors*". There were many publications on the subject, and it was also part of the investigation of accidents at the time of the accident. Refer to § 3.3 above.

5.8.3. *"The "flooded" information was transmitted to the crew around 5 minutes before expected landing. It came at a moment when the pilots' workload was high:*

- *In the middle of the final turn;*
- *Crossing of a storm west of the airport;*
- *With important variations of the flight parameters;*

- *And with important thrust variations and the flickering of fuel tank pumps lights indicating that the aircraft took at this precise moment, a substantial pitch attitude but within the AFM limits"* (FR page 44).

5.8.3.1. The final turn was flown by the autopilot, both pilots could relax and sit back; the workload was not high. It cannot be proven that the aircraft was "*crossing a storm"*; mindful pilots do not cross a thunderstorm at only 2000 ft altitude that would have shown up at the on-board weather radar on the outbound radial, for the pilots to be able to avoid crossing it. The DFDR data provided by the NTSB do neither show data of airplane motions and accelerations that occur during crossing a storm, nor data that prove that there were important variations of the flight parameters. However, the DFDR did record 9 seconds of invalid data following establishing at heading 080°, 45 seconds after receiving the flooded information, the cause of which is unknown, and not discussed by the NTSB either, because it apparently was not very important. On the CVR no verbal reports were made on any "*important variation"*. During the flight at heading 080°, there were no important thrust variations, hence no important pitch control inputs; the RPM of the engines was between 60 and 81%. The aircraft did not take "*a substantial pitch attitude"*, the pitch attitude was between 1 and 5 degrees. Were experts not apt to exaggerate the conditions at that time? From which objective source do experts have these data? Again, these events are not very important.

5.8.3.2. Refer to § 3.10.2.3 for comments on *"the flickering of the fuel lights"* (nothing recorded on the CVR, no appropriate procedures initiated by the flight crew that normally are required following these indications).

5.8.3.3. Why did experts write "*a substantial pitch attitude but within AFM limits*"? Any evidence? What AFM limits do they mean? How do you know *"within AFM limits".* Where do experts have these data from? Are these data objective, or from crew statements of a few months later? Experts have no evidence to support their statements.

5.8.4. *"On this chapter regarding the meaning of "flooded", the Experts remind that the fact that the runway was or was not flooded is neither a direct cause nor a direct contributing factor of this accident"* (FR page 44).

5.8.4.1. Experts of claimants cannot believe that experts wrote this; absurd. ATC reported to MP495 that the runway was flooded, so it was for the pilots to use, to take into account. Pilots cannot see from the cockpit at 8 nm what the runway condition actually is.
"*Flooded*" not only means that the runway may be too short for braking to a full stop, but also that the nose landing gear wheels will have not enough friction on the contaminated runway surface to be able to counteract the weathercock effect of the large vertical tail when the crosswind component is larger than 5 kt and cannot prevent the airplane from a dangerous runway excursion. By the way, the crosswind limit for a wet runway was 15 kt; the actual crosswind component was 20 kt, also too large. If the "*flooded*" report from the ATC controller was used by the crew as it should have been, the airplane would have aborted the approach and delayed its arrival until the water had drained from the runway (as prescribed in AOM 3.3.5 – 15, ref. B, appendix 2) or diverted to another airport; the accident at Faro would not have happened.

5.8.5. DASB wrote in an internal document the items *"to add in analysis"* (Lijst 4 tab 23 dl 1, pdf page 31). A few paragraphs are quoted:

"Remark in statement captain of MP 461 with respect to runway state.: nog te verwerken!" [still to incorporate]

"This runway state information was not correctly interpreted. It could have imposed restrictions on maximum crosswind and an extra penalty on the calculation on actual landing distance".

"During the investigation the use, meaning and understanding of the term "runway flooded" was considered. This revealed that it was standard ICAO-terminology, meaning "extensive standing water is visible". Though the runway state was not mentioned when the landing clearance was issued to MP 495 and might have been understood as if conditions did not exist anymore, there remains the question why the crew did not link this information with the possible consequences thereof for their landing".

"The BIM and the AOM do not use the term flooded in anyway, but only give references to "standing water". There is no direct link in the AOM to the consequences of standing water on the performance for landing and actual landing distance calculation, but under Maximum Wind Components for Runway Conditions for Take-off and Landing in a table format it can be read that for braking action Medium one of the "typical runway conditions" is moderate to heavy rain on a clear runway, and for braking action Poor one condition is standing water".

"The fact that the Captain did make a statement that he had considered the term "flooded" as non-standard gave rise to investigate in the Netherlands how this term was understood and interpreted. It was found that a "pretty wet state" was being connected to this term, but the fact that it was standard terminology and its exact meaning of standing water was not 100% appreciated".

5.8.5.1. Refer to § 4.7 above for the admission of a company error (Martinair) on this subject that was known to DASB.

5.8.6. **Conclusions**

5.8.6.1. The correct answer is that the captain received the "*flooded*" message from ATC, and exactly understood what it meant, because he confirmed its reception to ATC (with the confirming formal term "*Roger*") and stated its meaning and the consequences for the approach in a statement to the Portuguese Police a few days after the accident. The captain did not use this information for aborting and delaying the approach or for diverting to another airport as prescribed in the Martinair procedures in the AOM.

5.8.6.2. The quotes repeated above show that DASB was fully aware of the runway condition and the consequences for flight MP495. Nevertheless, question 17 of 143 questions: "*Was it responsible to land in the weather conditions at Faro",* was answered by DASB: *"It was responsible to land under the weather conditions which the crew were informed of*". Questions 18, 26, 27, 28 and 29 of 143 on the weather conditions were also answered inappropriately.
Given the statements above, DASB knew that is was not justified to land. DASB did not tell the truth about this statement to the victims.
Again, the experts seem to have only one objective with their inappropriate answers, being to protect the pilots.

5.8.7. This subject was reviewed and substantiated in RRQ ref. B, § 4.6 and § 6.3.

5.8.8. **The correct answer to the court is:** The captain interpreted the term "*flooded*" correctly, as it was defined by ICAO, but the copilot did not. The captain was also aware of the consequences, being braking action poor and the crosswind limit that was reduced to 5 kt, while the crosswind read by himself during the approach was 20 – 30 kt, and ATC reported 15 – 20 kt. There was however no coordination within the crew on this issue, according to the CVR transcript.
DASB was made aware by KLM that the DC-10 manuals of KLM and Martinair were not

yet amended to include the new ICAO terminology that was already in use for at least 8 years. The ATC controller who transmitted the flooded massage was indeed aware. The captain, aware of the flooded runway and the limitations on the landing performance under the current winds, should have ordered a missed approach procedure (go-around) and either wait for the runway condition to improve, or divert to another airport as the Martinair procedures prescribe. If the captain had adhered to his procedures, the accident would not have happened.

5.9. The Subsequent Statements of The Captain and His Actions (FR § 6.9)

5.9.1. *"The Experts want to remind, first, that they act at all time without any partiality, fully free from all possible influence or interpretation raised by any reports provided by any claimants or organizations.*
The Experts want to highlight that they have been appointed because they are independent" (FR page 45).

5.9.1.1. After reading the draft and the Final report, the experts of claimants did not get the impression that the experts were acting without any partiality, independently and were unprejudiced. We cannot but conclude that two of the experts, being pilots, try to protect their kind. It could also be that the experts are not knowledgeable enough on the subject of operation of aircraft systems (at a high engineering level) and on analyzing DFDR data to draw the right conclusions but hesitate to confirm their lack of expertise.

5.9.1.2. The captain made more than one statement; a few days after the accident to the Portuguese Police and a few months later to the Commission and the DASB. What are the differences and why? That's the question. Experts should not "*understand*", "*estimate*", "*note*" and "*remind*", but analyze the statements and report their conclusion. Why were there differences in the statements over time? Was the second statement may be influenced or prepared by other people than the captain? Experts of claimants' 'estimate' that the experts did not want to comment because that would lead to the conclusion that the crew made fatal errors.

5.9.2. "*The Experts:*

- *note that the first part of the Captain's statement about the runway flooded begin by an "if" ("if the runway is actually flooded that means "standing water" to me. In that case the breaking action in "poor" and the crosswind limit is reduced to 5 kt. In my mind this condition did not exist during our approach").;*
- *note that the second part of the Captain's statement indicates that "In my mind, this condition did not exist during our approach";*
- *note that the "flooded" information has been sent at a moment when the workload inside the cockpit was high (see also chapter 5.2.2.3 of this report);"* (FR page 45).
- *would like to remind that the aim of the Dutch Aviation Safety Board, as accredited representative inside the Commission of Investigation acting under the ICAO Annex 13, was not to define a responsibility or a liability.*

5.9.2.1. Doesn't this *"If"* mean that the captain processed the info and drew a conclusion from it? This is why the information was withheld. The term flooded was already in use for many years; twice mentioned by ATC and verbally repeated in the cockpit. DASB heard from a KLM employee that they were behind in amending the airplane manuals (§ 5.8.2.1 above). Nevertheless, the Captain understood but did not act.

"*I took it to mean that the runway was wet*". The captain made the interpretation that the runway was wet. In that context see the earlier remark "*flooded means standing water to me*." Relevant for a flooded runway or standing water on a runway are the reduced crosswind limit (5 kt; the ATC reported crosswind was 15 – 20 kt, the captain himself read 20 – 30 kt from his navigation system) to avoid both runway excursion after landing, and the increased required landing length (3055 m; available was 2445 m). Please also refer to § 5.8.4 above. "*I took it to mean*", means that he thought about the meaning of the term flooded at the instant this was told him by ATC. This is important because his first statement to the Portuguese Police included: "*If the runway is actually flooded, that means "standing water" to me*. *In that case the braking action is poor and the crosswind limit is reduced to 5 kt. In my mind, this condition did not exist during our approach*" (Lijst 2 tab 4).

This statement was withheld from the victims and the public for 22 years. The victims were informed by the DASB that the captain was not aware of the meaning of the word flooded, see questions 17 and 18 of 143 questions of the public meeting in 1994. Only in the court hearing in 2014, the representative of the Dutch State admitted that this info was withheld from the public by DASB.

5.9.2.2. Experts refer to the high workload all the time, but the autopilot was flying the airplane until 54 seconds prior to landing (see § 5.8.3.1 above). Both pilots at that time were monitoring; no high workload, nothing was recorded on the CVR to confirm either high workload or stress in the cockpit.

5.9.2.3. Again, the experts refer to ICAO Annex 13, as an excuse, every time they try to escape their responsibility as independent experts.

5.9.3. *"As a conclusion, the Expert estimate that the Captain's statements have been considered "in due care" by the Commission of Investigation and the Dutch Aviation Safety Board"* (FR page 45).

5.9.3.1. It is not the question whether *" the Captain's statements have been considered "in due care" by the Commission of Investigation and the Dutch Aviation Safety Board"*, but what the Experts' conclusion is on the statements of the captain and why the second statement differs from the first. So, what is the Experts' objective, fair, uninfluenced by personal prejudice and independent opinion, and what is the answer?

5.9.4. There are more statements that the experts do not talk about. During the interview by the Portuguese police, the captain made the following statements. Comments are added in the same paragraph.

5.9.4.1. "*Before departure we collected the flightfolder, containing Meteo and Notam information, from the Martinair desk and the copilot visited the Meteo desk while I went to the FIO*". Meteo Schiphol stated to have not seen anybody of the MP495 crew.

5.9.4.2. "*Approaching the VOR from the North we circumnavigated some CB's*" (cumulo nimbus clouds (thunderstorms). This cannot be confirmed by the CVR transcript. MP461 did, which they heard on the radio, not MP495.

5.9.4.3. "*V-threshold was calculated by the flight-engineer to be 143 kt, V-ref was 139 kt, to which the wind correction of minimum 5 kt should be added*". V-threshold was calculated to be 139 kt, which was also entered on the Takeoff & Landing data Card and in the ATS speed window by the crew. Good is the minimum 5 kt wind correction. The approach speed should have been: 139+5 = 144 kt and entered in the ATS (§ 3.10.3 above). The entered value was 139 kt, 5 kt too low, which was bad for safety.

5.9.4.4. "*The airport was clear and we could see the 767 in front of us, so we cancelled IFR*". A flight plan for a flight under IFR (Instrument Flight Rules) is usually not cancelled, not during an approach under visual meteorological conditions either. BIM 2.1.2 – 02 states: *"normal flight execution is conducted under IFR*", and "*the IFR flight plan shall not be cancelled"*. BIM 3.4.4 – 02 allows visual approaches under three conditions, but also states that "*The captain shall not cancel his IFR flight plan to make a visual approach"*. This cancelation would have required a request via a radio call to ATC which was not recorded on the CVR. The statement cannot be right.

5.9.4.5. "*Landing check was carried out when leaving 2000 ft inbound. Rate of descent was approx. 700 ft/min*". A landing check when leaving 2000 ft is too late. The airplane should have been configured for landing prior to leaving 2000 ft. The configuring for landing was too late, refer to § 3.10.2.2 above.

5.9.4.6. "*There was a strong wind from the right, and we were blown away to the left a bit, but came back on the centerline*". Why would the heading have to be 125° as DFDR data proves, if the airplane were on the runway centerline (106°)? The wind correction angle (drift) would be 19°, which is unrealistic and, in fact, cannot be true because the crosswind that would require this 19° wind correction angle would be stronger than the rudder is designed for to line-up the airplane. An unrealistic statement by the captain; cannot be true. Every experienced pilot needing a 19° wind correction angle shortly before landing would doubt the weather circumstances and go-around. The airplane did not approach on the runway centerline. Refer to § 5.4.11 above.

5.9.4.7. "*We were in the correct position for landing, the crab angle was approx. 7' to the right*". See the previous paragraph. DFDR data proves that the 'crab angle', here meaning the difference between the magnetic heading and the ground course of the airplane was much larger, even during the last 80 seconds of flight (§ 5.1.7.3 and § 5.2.1.2 above). The crab angle during landing was 11°.

5.9.4.8. "*At around 150 ft radio altitude I suddenly felt a high sinkrate"*. DFDR data do not confirm this statement.

5.9.5. A note in the archives accompanying the signed statement of the captain reads: "*Deze verklaringen zijn samengesteld uit te PIVO aantekeningen bij de twee verhoren, d.i. te Faro en in A'dam. Er zijn geen markante verschillen met de verklaringen welke wij van M'Air via Frijns kregen.*" [Informal translation: These statements are compiled from the PIVO notes during the two interviews, i.e. at Faro and in Amsterdam. There are no striking differences with the statements that we received from Martinair via mr. Frijns]. This could confirm that somebody else than the captain himself wrote his statement.

5.9.6. **Conclusion**. The experts did not answer this question of the court. Experts of claimant's 'estimate' that the experts did not want to comment because that would lead to the conclusion that the crew did not perform professionally and made fatal errors. Experts behaved biased, not independent, and did definitely not "*act at all time without any partiality".* Experts did obviously not want to answer this and other questions and tried to find a way out by using the term estimating.

5.9.7. This subject was reviewed and substantiated in RRQ ref. B § 5.8.

5.9.8. **The correct answer to the court is:** The statements made by the captain to the Portuguese police after the accident and a few months later to DASB differ which could lead to the supposition that the second statement was well-prepared by advisors. A note in the archives confirmed that the statement was compiled from third party notes. However, these advisors did not review the DFDR and AIDS data that are objective and did not confirm all of the statements to be true.

5.10. (Alleged Incorrect) Statements of Martinair And the Civil Aviation Board (FR § 6.10)

5.10.1. **Meeting of 1993.**
"A first information meeting was organized on 11th of August 1993: the result of this meeting was the submission of 143 questions asked by the Anthony Ruys Foundation to Martinair and the Dutch Aviation Safety Board" (FR page 45).

"The Experts underline that the most part of these questions were not appropriate to the investigation itself but are related to liability and/or responsibility of the different actors, which is not the main purpose of such an investigation" (FR page 46).

5.10.1.1. Whatever the nature of the questions, "*related to liability and/or responsibility*", the DASB (and Martinair) should have answered them correctly and truthfully.

5.10.1.2. **The 143 Questions** asked by the victims and their relatives were answered in writing on 18 Nov. 1994, three days after issuance of the Portuguese Report of Accident. Comments of experts on the 143 questions are in the Final Report from page 156; conclusions were not included in the answer to the court. Comments by the experts of claimants on the inappropriate answers by Martinair and the DASB on 31 of the 143 questions were already presented in the RRQ (ref. B) and will not be repeated here.

5.10.1.3. Following the comments by experts of claimants in ref. B, experts only changed one remark, to question 17, in the Final Report (FR page 159). The question was: "*Was it responsible to land in the weather conditions at Faro?*" The answer was: "*It was responsible to land under the weather conditions which the crew were informed of*". In Interim report V17, experts wrote as remark: "*Yes*". In the FR on page 159 experts wrote: "*Yes it was responsible to continue the approach".* But on FR page 60, experts wrote: "*With a runway wet as indicated by the Captain and flooded as indicated by the ATC controller, a go-around decision would have been a highly probable consequence*" for a crosswind near the maximum approved crosswind limit for a DC-10. In answer § 6.5 on page 43 (§ 5.5.4.2 above), experts wrote: "*Moreover, this stabilization floor* [500 ft] *means that all destabilization below this level should immediately be followed by a missed approach procedure*". And: "*In our case, the pilots should have initiated a missed approach procedure since the aircraft became destabilized, even at a very low altitude*". Experts seem not consistent throughout their report but agree that the approach should not have continued.

5.10.1.4. The cross-reference list in the table below presents the paragraph number in the RRQ ref. B for each of the 31 questions that were answered inappropriately or wrong, in which remarks and questions of the experts of claimants to the experts are included. Question 34 is not included in the list because the answer in itself was not incorrect, although the mentioned turbulence is somewhat exaggerated.

Question	Paragraph in RRQ (ref. B)
4	2.2.2
17	4.6.3.4
18	4.6.3.5
19	4.6.5.4
26	4.6.5.5
27	4.6.5.6
28	4.6.5.7
29	4.6.5.8
31	4.7.3.12
39	4.2.5.15

Question	Paragraph in RRQ (ref. B)
58	5.10.5.3
59	5.10.5.4
88	4.4.5.7
89	4.4.5.8
102	2.2.4.1
107	2.2.4.2
112	2.3.4.3
113	5.9.5.5
114	5.9.5.6
115	5.9.5.7

Question	Paragraph in RRQ (ref. B)
126	5.10.5.5
129	5.11.6.17
130	5.11.6.18
131	5.11.6.19
132	5.11.6.20

Question	Paragraph in RRQ (ref. B)
133	5.11.6.21
137	2.3.4.5
140	5.10.5.6
141	5.10.5.7
142	5.10.5.8

5.10.2. **Information meeting DASB 1 Dec 1994**.
On FR page 46: *"The Experts want to underline that the DASB or its representatives was bound by the conclusions of the Commission of Investigation.*

The most important remarks raised by the families and victims were that the witnesses' statements were not considered by the Commission of Investigation.

The Experts note that in some cases, the answers were not enough substantiated, mainly in the way an accident investigation is organized or conducted according to ICAO Annex 13.

They note the existence of contradictions in between the witnesses' statements but also contradictions between the statements and the objective recorded flight data".

5.10.2.1. The intention of the question of the court was to determine whether the DASB indeed answered 31 of 143 questions inappropriately and presented wrong information during the meeting of 1 Dec. 1994. It seems that the experts did not use the remarks and questions of the experts of claimants concerning these 31 questions (ref. B) and did not discuss the questions asked during the meeting (transcript lijst 2 nr. 5), FR page 154.

5.10.2.2. DASB did inform the victims during the 1 December 1994 meeting that the meeting was not about liability and financial issues. They did not tell the victims that they were not successful in persuading the Commission to include their views in the Final Report as laid down in their 'Blue Report'. DASB issued a less critical report to be included as Appendix in the Final Report but persisted in mentioning windshear as cause of the accident, while they knew that the pilots had made mistakes.

The experts on FR page 46 "*note the existence of contradictions in between the witnesses' statements but also contradictions between the statements and the objective recorded flight data*" but did chose to use the not-objective statements by witnesses who are not aviation experts, rather than the recorded objective DFDR flight data for writing their report. Using unsound, inexpert witnesses' statements is a lot easier than analyzing objective DFDR flight data, if you can't read and understand these flight data, and do not have both engineering and aircraft systems knowledge at MSc level.

5.10.3. **Questions and answers during the 1 Dec. 1994 meeting.** Because the experts did not include the (alleged incorrect) statements of Martinair and the DASB made during the meeting on 1 Dec 1994 (ref. E) in the Final Report, but just made some remarks (a few not correct) from FR page 154, they did not fully answer the question of the court, therefore experts of claimants will, in the paragraphs below.

5.10.3.1. Ref. E, page 4. *"we are here today to explain a report that we didn't write".* This is not quite true, the Dutch accredited representative, being an investigating team member, had influence on the course of the investigation, contracted the NLR for the windshear study and issued the Blue report as response to the draft Portuguese report with many (written) required changes. DASB at least contributed to the report.

5.10.3.2. Ref. E, page 5. Mr. Bodewes: "*You also know that these comments are attached to the report that lies before us in English".*
Following the issue of the draft Portuguese report the DASB was invited to comment on that version of the report. The "*Comments of the Kingdom of the Netherlands, by the Aviation Safety Board, on the Final Report of the Portuguese Government the Blue Report"*, in short called the 'Blue report', was dated 6 Sept. 1994 and was hand-carried to the Portuguese Commission on 8 Sept. 1994, after reaching agreement within DASB. However, the comments that are included as attachment in the final Portuguese Report, and "*that lies before us in English"* were not the comments that DASB wrote on the draft report, but a strongly reduced version that was issued when it became clear that the Commission did not accept all of the required changes of the DASB as 'strongly' asked for in the Blue Report. DASB did not inform the audience about their comments and change proposals in the Blue report, but continued to emphasize the windshear effects, to which the Portuguese Commission did not agree.

5.10.3.3. Ref. E, page 5. *"I must tell you that only a few members of the Civil Aviation Board are here today. They are the same members that helped prepare the Netherlands' response to the draft report that we received from Portugal".*
Mr. Frans Erhart, who is believed to be the Dutch lead investigator, was present but was not allowed to say anything, as victims stated. He contracted the NLR, had the NLR change their report and was one of the people who wrote and hand-carried the Blue report to the Portuguese Commission. The statement is not correct.

5.10.3.4. Ref. E, page 5. Meteorologist Mr. Groen explains the weather conditions at Faro on 21 Dec 1992. He "*only received the report a week ago"*. He also mentions that "*the strongest in a series of thunderstorms was moving across the airfield at the time of the impact"*. The exact time was not included. As known from the Horlings' report, the meteo clock did not show UTC, but some local time. In addition, there is no pilot who continues his approach penetrating a thunderstorm when he is below 500 ft above the ground. The captain had a clear view of the runway and even stated to have cancelled IFR, which was not true, refer to § 5.9.4.4 above. Mr. Groen was not telling the truth.

5.10.3.5. Mr. Groen continued with "*an example of an American storm*" with microburst or downburst. He also stated:
"The horizontal outflow is what we see here at B. In the somewhat more detailed cross-section - and this is very probably what was happening in Faro - there is a cold outflow of air at the surface of the ground. The aircraft approached for landing at the front of the storm in a south-westerly wind and before it reached the runway to land was hit by a turning wind, which is the result of the sinking column of cold air precipitation. It was therefore hit by an increasing south-westerly turning wind just before it reached the runway, with an additional, in all likelihood, portion of sinking air at the time of the impact."

Mr. Groen uses the terms "*very probably"* and "*in all likelihood"*. In the Final Report however, the Commission included as established fact on page 127: "*According to the values registered in the SIO, there has not been a significant variation of wind speed and direction in the last 20 seconds"*. The experts of claimants have concluded that DFDR data do not prove any change of wind, neither in direction nor in strength during the last 80 seconds of flight (ref. D). The wind was not turning as that would have required a heading change during the approach. The meteo registration system (SIO) recorded a change in wind several minutes after the landing of MP495. Mr. Groen presented an irrelevant 'story', was not telling the truth and obviously told the audience what DASB wanted him to tell.

5.10.3.6. The next speaker, Mr. Snoek mentions the "*runway flooded*" report by ATC and also the required positive touchdown that the captain told the copilot to achieve

already 30 minutes before landing following receiving info of the weather that would cause at least a wet runway. Mr. Snoek explained the approach but did neither mention the large deviation of the airplane from the required 111° approach radial nor other pilot errors. Finally, he again mentioned the microburst, the changing winds and the downdraft, of which the occurrence cannot be confirmed with objective DFDR and AIDS data, and which are not mentioned in the Portuguese Report. Obviously, Mr. Snoek, being an accident investigator of DASB, did not review and analyze the DFDR, the NLR report and the meteo data himself, or did not have the expertise to do so.

5.10.3.7. Ref. E, page 11. Mr. Snoek confirms that ICAO added "flooded" to be used for runway condition reporting, and that "*the pilot's manual had not yet been updated",* which was a failure of Martinair (and KLM), as confirmed in National Archive document 2622 in a note from KLM to DASB lead investigator Frans Erhart. Hence, DASB was aware. Mr. Snoek also states that "*the pilots did not associate the word "flooded" with the uh, let's say stopping distance"*. But this is not true, he must have been aware that the captain exactly knew what flooded means (from his 1st statement). In addition, Mr. Snoek, as an accident investigator, should know that not only the stopping distance is affected by the runway condition, but that also the crosswind component is a factor to consider for preventing the airplane from vacating the runway on the side due to the loss of friction (aquaplaning) of the nose gear wheels that would be required to counteract the large weathercock effect of the strong crosswind on the large vertical tail (§ 5.8.4.1 above). The strong actual crosswind, as also indicated by the large crab angle during the landing, exceeded both the wet and flooded limits, which was not mentioned by Mr. Snoek.
He continues on page 12 with: *"If it had been properly processed and had "flooded" been associated with the fact that you have to include a braking action of "poor" in your calculation, yes, then it was a mistake"*. The term flooded was properly processed by the captain, and he did not ask ATC for clarification. Hence, continuing the approach to a flooded runway "*was a mistake"*. In addition, a note in National Archives document 2622 made by Mr. Lou van Munster (Dutch airline pilot association - VNV) during the interview of the captain at Schiphol said: "*Discussion flooded statement at SPL* [Schiphol] *not as explicit as mentioned here* [in the 2nd captains' statement]*, the consequences of the crosswind with standing water was more explicit* ". DASB and its investigators were fully aware of the consequences of landing on a flooded runway, with standing water. They knew that the captain was aware and that the manuals were not updated, for which the airline company is responsible. Their answer to the public was not correct, not truthful, not complete.

5.10.3.8. Ref. E, page 13. "*Mr Snoek only has the material that the Portuguese gave to the Civil Aviation Board, to the Minister, and that's the information he must use: he doesn't have anything else"*. This cannot be true. The DASB and the Dutch investigators visited Portugal several times and were provided with all data that the Portuguese commission had. They also provided the Commission with many data of airplane, crew and procedures, the NLR reports and finally the Blue report with much material. The lead investigator Da Silva even visited The Netherlands for interviews.

5.10.3.9. Ref. E, page 17. Mr. Hofstra explains some of the data that are recorded on the DFDR. He stated: "… *and the whole investigation was based on them, on the position and the space that the aircraft was in at all times"*. This is not true. The position of the airplane and the space that the aircraft was in was not recorded, but only heading, airspeed, control inputs and other relevant data as shown in Ref. B Appendix 7 (or RoA Annex 15). Despite being an accident investigator and a test pilot, Mr. Hofstra seemed not aware of the DC-10 DFDR specification and recorded data. He might not have reviewed and analyzed the data either, otherwise he would know.

5.10.3.10. Ref. E, page 16. Mr. Snoek about the stowed thrust reverser of engine number 2, the middle engine: "*The fact is that the rules say that you need number 2, which is on the aircraft's roll axis, so doesn't cause any problems when, let's say, when the aircraft is doing this, that you don't need it, that you can take off without number 2"*. He is correct on the first sentence; the rules indeed require the thrust reverser to be repaired at a station where repair is possible. The remainder of his answer proves that he is not a cognizant accident investigator. The engine is not on the aircraft's roll axis, but above it. You indeed can takeoff without thrust reverser number 2, but the Martinair rules did not allow this (depart from a repair station with an inoperative thrust reverser). Mr. Snoek did not tell the truth.

5.10.3.11. Ref. E, page 17. Mr. Hofstra: "*Well, maybe I can say something about the instability. Normally speaking, a stable approach is expected to . . . . There are figures for this, such as I read them: the speed which can vary by plus or minus 15 knots with regard to your selected speed, the vertical speed, which can be about 500 feet more or less per minute and the position* [pitch] *of the aircraft which I believe is 5°.*"
The numbers given are the expected deviations from target conditions when windshear is encountered, refer to § 5.1.2.3 above. These numbers are not for defining a stabilized approach, which are at or below 500 ft: lateral within 2° of the prescribed approach radial (which the airplane was definitely not), the approach speed being 5 kt too low and the engine RPM started to vary.
Mr. Hofstra continues: *"The vertical speed in the report, which is also the speed recorded by the flight data recorder, is not usually the actual speed that is displayed on the pilot's instruments, but a speed that is calculated from the altitude and time. And because it's continuously calculated, it can be in the plus range although it's not or it can be extremely low. So there are a number of figures that determine whether an approach is stable, whereby you have to distinguish stability and turbulence"*.
The flight data recorder (DFDR) did not record the vertical speed of the airplane, the AIDS did; Mr. Hofstra was wrong. The vertical speed is calculated, but using so-called discrete data, a few data points per second, not continuous data. Hence, you have to be very cautious reading and using the data, as cognizant engineers are aware of. AIDS graph 17 shows several occurrences of large vertical speeds while the altitude line in the same graph hardly changes and neither does the vertical g. People who are not familiar with flight data reduction and reporting make mistakes and draw the wrong conclusions. Even the NLR did and so did Mr. Hofstra.
In the cockpit, the rate of climb or descent is continuously displayed on an instrument in clear view of the pilots. The CVR did not record any remark in the cockpit on the occurrence of an excessive rate of descent or climb. The large changes in the calculated vertical speed fits the requirement to prove the occurrence of windshear, but windshear is even today not reported to have ever happened at Faro airport. DFDR data of flight MP495 doesn't prove it, and neither the Commission nor the accredited representative of the NTSB reported the occurrence of windshear.
The DASB must intentionally have drawn the attention of the audience towards the occurrence of windshear, which did not occur. They misled the public.

5.10.3.12. Ref. E, page 17. Mr Hofstra: "*I can only repeat what I read and that is that the investigation into the microburst that was conducted by the National Aeronautical Laboratory, that there were fragments and changes in the air, of speed and also vertical speeds and wind direction that they exceeded the aircraft's limitations. That's what the report says"*.
The DASB investigators just quote a report written by an engineer of the NLR and approved by his chiefs who were not pilots, who were obviously not familiar with a non-precision approach that had to be flown on the Vertical Speed and CWS modes of the

autopilot and who concluded updrafts and downdrafts while the motions were normal for the approach procedure. It could be expected from the DASB that they would have carefully reviewed the NLR report, but the report perfectly adhered to the wish of Martinair that a windshear caused the accident. Mr. Hofstra, a test pilot, and the DASB must have been aware but lied to the public.

5.10.3.13. Ref. E, page 18. A question of the audience: "*How can it happen that you as the captain speak to the passengers at some point in time and that what you say isn't recorded on the cockpit voice recorder? That's a big question for us, how can that happen?*"
Mr Barendrecht: *"Shall I try to answer the question? Announcements to passengers that are made by crew members in the cockpit are not recorded on the cockpit voice recorder. They are not recorded and will not be recorded, they don't belong there."*
Mr Bodewes: *"What you do hear often is the crew discussing that an announcement should be made to the passengers, for example, about the arrival time and that kind of stuff. But you don't hear the announcements themselves"*.
This is not correct. All sounds in the cockpit are recorded, including all spoken words, such as announcements to the passengers via the public-address system, which is confirmed with a message in the CVR transcript in RoA Annex 5 page 63 at 07:13:00 UTC, 20 minutes before landing. However, if these announcements are made more than 30 minutes before the CVR is turned off, the announcements will be overwritten by more recent sounds. These investigators were obviously not aware of the operation of a CVR and gave the wrong answer.

5.10.3.14. Ref. E, page 19. One of the passengers asked whether the sound of an engine fire alarm was recorded on the CVR when the wing of the airplane contacted the ground. Mr. Hofstra: "*Well, at that point in time, uh, at that point in time it wasn't working anymore. The recording stopped on impact, so that piece isn't on it*".
The CVR transcript in the RoA Annex 5 proves that the CVR recorded until 9 seconds after touchdown, though no fire bell, but only a landing gear warning horn was recorded. Hence, the given answer was wrong.

5.10.3.15. Then, without recorded question Mr. Hofstra says: "*…you're approaching the airfield and what they practice and are also taught in theory, and practice on the simulator: if you're in a microburst, how do you fly out of it? Because it's entirely counterintuitive: you have a low speed, instead of doing what everyone is used to doing from their first lesson onward, namely pushing the nose, you have to pull it. That's what they're taught to do on the simulator …".*
This answer is definitely not in accordance with the Martinair DC-10 AOM 3.3.8 – 02, Windshear Recovery Technique. Mr. Hofstra earlier mentioned the deviations in airspeed, vertical speed and pitch attitude that may be indicators of an occurring windshear (§ 5.10.3.11 above). AOM 3.3.8 – 02 tells pilots that if flight path control becomes marginal at low altitudes, to initiate the recommended Windshear Recovery Technique without delay. The first two steps that are to be accomplished simultaneously are to "*aggressively apply thrust"* and "*increase or decrease pitch attitude as necessary toward an initial target attitude of 15°*". The captain must certainly have been aware of this. The pilots however, did not (aggressively) increase the thrust and did not increase the pitch attitude to 15° either. Neither of these did happen, hence the pilots did not experience any windshear. Twenty seconds before landing, the autothrottle increased the thrust because the copilot increased the pitch angle to 8° after the captain told him to be too low; he did not want the wheels to touchdown in front of the runway threshold, for which is also warned in the AOM 3.3.5 – 14 (ref. D § 5.10.1). The pitch angle during the approach did not increase above 8°, also an indication that windshear recovery was not necessary.

Again, a member of DASB tried to convince the audience that a microburst or windshear occurred. There is no evidence in the objective data of DFDR, AIDS and CVR, whatsoever. Nothing. DASB was misleading the audience.

5.10.3.16. Mr. Bodewes continues: "*I'll answer that. The question is whether the Civil Aviation Board is independent and whether they would benefit from making a different decision than the one they should be making. I can assure you that this is not the case. When we do an investigation, we do it as thoroughly as possible. There is no reason to believe that the Civil Aviation Board would want to hide something. Especially not in this case because we didn't conduct the investigation*".
This is not true either, is even misleading. DASB was invited to participate in the investigation, as per ICAO Annex 13, did conduct large parts of the investigation, contracted the NLR and made them change their report, attended several meetings in Portugal, etc. DASB did not conduct parts of the investigation "*as thoroughly as possible*", though. DASB wrote the misleading Blue report in which they required the Portuguese Commission to change the cause of the accident into: "*the accident was initiated by a sudden and unexpected wind variation in direction and speed (windshear) in the final stage of the approach*". DASB must have conducted an investigation, must have noticed the errors that the crew made during the approach and must have decided to "*hide*" these and blame the weather instead, as Martinair wanted.

With these comments it is obvious that the microburst/ windshear keeps the Dutch investigators busy. They seem to do anything to persuade the audience to accept its occurrence, but the analysis of DFDR, AIDS and CVR data does not prove microburst, downbursts, updrafts, or whatever windshear might have caused. The DASB and his investigators were not independent, they acted as if they were on the leash of Mr. Martin Schröder who already stated on TV on the day after the accident that windshear caused the accident. There is no evidence that supports this early and inappropriate conclusion. The DASB lied intentionally to the public. The NTSB agrees.

5.10.4. Conclusions

5.10.4.1. The DASB and its representatives, at the time of answering the questions, considered themselves not at all bound by the conclusions in the Portuguese report. They presented their own conclusions, not the conclusions of the report. Their own conclusions and 31 answers to the victims were wrong and/or misleading in such a way that the victims received less compensation than they would have received if the conclusions of the Portuguese report were used. DASB spread the wrong truth in the Netherlands and to the media. The weather was bad, the wind strong, but the pilots decided to press on and land, therewith violating the airplane limits and approach procedure constraints that were published in their airplane manuals. In addition, they made several errors in the communication in the cockpit (crew resource management), with air traffic control and while operating aircraft systems (Autothrottle System and Control Wheel Steering), the latter as confirmed by the NTSB. DASB was aware of many procedural errors that the crew committed, but this is not what DASB told the victims, because these were pilot errors for which Martinair could be held responsible. Objective data do not prove the occurrence of windshear, updrafts or downdrafts. These existed only in the minds of the people of Martinair and the DASB. The DASB behaved not independent. The experts now did choose the side of Martinair and of DASB as well by not concluding that 31 out of 143 answers were incorrect, in addition to not concluding the other errors of the pilots in this Final report. All 31 questions were discussed and substantiated in ref. B (RRQ), a cross-reference list of which is presented in § 5.10.1.4 above.

5.10.4.2. The experts did not review, analyze and comment the transcript of the meeting of 1 Dec. 1994 in the Congresgebouw, and the experts did not conclude whether the

DASB answered 31 of 143 questions appropriately or wrong either.
Hence, experts did not answer this question of the court.

5.10.5. **The correct answer to the court is:** The DASB answered questions during the 1 Dec. 1994 meeting, as well as 31 of the 143 written questions asked by the victims and their relatives, purposely incorrect. Both DASB and Martinair continued to argue that the accident was owing to the weather, which can, however, not be proven by the objective data recorded in the DFDR, AIDS and CVR. The pilots made catastrophic errors during the approach and should have initiated a go-around, as also concluded by the experts, which would have prevented the accident from happening. DASB did everything to hide the truth from being told or written to the victims and their relatives.

5.11. The Location Where the Aircraft Crashed (FR § 6.11)

5.11.1. *"The Experts assume that this question refers to the fact that the region of Faro could have been a cause, or a contributing factor of the accident.*

General instructions regarding Faro airport do not provide any alert on this specific topic. The Faro region was comparable, meteorologically speaking, to Lisbon or to other places on the other side of the Gibraltar strait, which are not well-known for their dangerous conditions.

This affirmation does not include stormy situations in which meteorological phenomenon such as windshear, microburst, or downburst can occur" (FR page 46).

5.11.1.1. Faro airport was indeed not listed as airport where windshear ever occurred or might occur.

5.11.1.2. The intention of this question was not to determine whether "*the region of Faro could have been a cause, or a contributing factor of the accident", but* to determine whether DASB denied the exact touchdown spot of the aircraft, 124 m beyond the touchdown zone (as the NLR wrote) and half outside of the runway.
DASB, in the 'Blue Report' on page 7, stated *"Touchdown was on the far left side of the runway".* DASB wrote in the answers 58 and 59 of 143 questions: *"This was the consequence of the sudden wind change shortly before the landing, which moved the aircraft to the left".* And: *"Yes, the length is more than adequate. During the approach the aircraft was on a correct glide path to touch down at such a distance from the runway threshold that there would be enough distance for a safe stop"*.

The experts conclude (§ 5.2.2 above*)*: *"The impact that occurred on the left-hand side of the runway as proven by the markings on the ground".*

5.11.1.3. Touchdown was not "*on the left-hand side", or* "*far left of the runway",* but half outside of the left side of the runway (RoA annex 11, see the figure in § 5.2.2.2 above). The effect of an increase of the wind on an airplane whose airspeed was ≈ 130 kt will only be a small heading increase because of the weathercock stability of the airplane; there will initially be no displacement but an increase in sideslip. Displacing a 161-ton heavy body takes time (mass inertia).
There was no sudden wind change shortly before landing, the runway length (2445 m) was not adequate for the reported runway condition (3055 m) and the crosswind component (20 kt) was too large for a landing on both a flooded (5 kt) and a wet (15 kt) runway to be able to avoid either or both a runway excursion (§ 5.8.4 above) or an overrun of the runway. Experts of claimants prove in ref. D by DFDR and AIDS analysis that neither of these answers are correct.

5.11.2. Question 140 was answered by DASB: "*The Anthony Ruys touched down in the normal landing area"*, while DASB knew that the airplane touched down half outside the left side of the runway, which definitely is not the normal landing area.

5.11.3. This subject was reviewed and substantiated in RRQ ref. B § 5.2.2.2.

5.11.4. **Conclusion**. The experts did not answer this question.

5.11.5. **The correct answer to the court is:** The airplane crashed on the left side of the runway, with the left main landing gear outside of the runway. The direction of all of the marks, as reported in Annex 11 of the RoA (figure in § 5.2.2.2), was in the direction of the runway, proving that the airplane was not in a motion to the left, away from the runway centerline. The airplane approached from the left and touched down before reaching the runway centerline from the left. Refer to § 5.4 and § 5.2 above, were the approach to the airport and the alleged lateral movement are analyzed, and conclusions presented.

5.12. Conclusion of the Experts (FR § 7)

5.12.1. FR page 48: *"Let's remember that the question asked to the Experts was to define if, whether or not, the action of the Dutch Aviation Safety Board during the investigation that followed the accident of the 21st of December 1992 was in accordance with national and international regulations applicable at the time, and beyond mere regulation, if the investigation was well conducted, "with due care"".*

5.12.1.1. The court did not ask this. As explained in the letter of the court of 8 July 2015, § 2.5:
"*Claimants' main argument concerns that the then Civil Aviation Board arrived at incorrect findings in 1994/95 in many aspects and in this respect misinformed the survivors and relatives of the victims. In the opinion of the claimants, this concerned demonstrable falsehoods and the suppression of relevant factual information. According to claimants, this applied to the following themes stated in section 6.18 of the interlocutory decision of 26 February 2014"*.
The paragraph heads of § 5.1 to 5.11 above are in accordance with the list of themes.

5.12.1.2. The question was not "*if the investigation was well conducted, "with due care""*, but "*to formulating a precise answer to the general question*: *did the then Civil Aviation Board handle the information available at the time regarding the aforementioned themes with due care"* (court letter § 2.6).

5.12.1.3. Experts did obviously not quite understand the questions of the court, not even following the Review of the Interim Report V17 by experts of claimants (ref. B). The experts did not, as the court solicited, "*limit themselves to formulating a precise answer to the aforementioned general question*".

5.12.2. FR page 48: *"The Experts' mission is not to determine what or who was/were responsible or liable for the accident*".

5.12.2.1. Again, this was not subject of the questions by the court.

5.12.3. FR page 48: "*As demonstrated in several documents provided to the Experts, the Dutch Aviation Safety Board's behavior could have been improved, but was in accordance with standard investigation regulations.*

In accordance with ICAO, the Dutch Aviation Safety Board did not lead the investigation but participated in the investigation under the authority of the appointed Portuguese Chief of the Commission of Investigation.

This is a crucial point:

- *Any remark, any request for additional investigation, any analysis had to be approved by the official Commission of Investigation;*
- *Any other conclusion would be illegitimate if we consider the aim of an investigation as defined by international treaties and conventions".*

5.12.3.1. DASB did indeed not lead the investigation, but still wrote, independently and certainly not asked by the Commission, their own conclusions (Comments of the Kingdom of the Netherlands (Lijst 4 tab 23 dl 1, 2, the 'Blue Report')) and tried to convince the Commission to amend their draft report to include the DASB conclusions. According to experts, *"any other conclusion would be illegitimate"*. We agree. But experts do regrettably not firmly conclude in their Final Report that the conclusions of DASB in the answers to the 143 questions, which they used during the meeting with the victims or their relatives, were indeed *illegitimate* because the Commission did neither approve nor include most of the DASB suggestions on their cause of the accident in the official Report of Accident, certainly not the windshear conclusion.

5.12.3.2. Using the above quoted words of the experts in the second bullet, should we then conclude that the windshear conclusion of the DASB in both the Blue report and the appendix in the final Report of Accident is illegitimate?

5.12.4. FR page 49: *"There is no reason to objectively doubt the conclusions of these laboratories or organizations",* and:
"The proposals of modifications of the final official report were evaluated in detail by the Experts.

Some appeared to be adequate, and some other are not.

But only the official Commission of Investigation had the power to accept such proposals of modifications or reject them".

5.12.4.1. It was the intention of the questions of the court to critically review the conclusions of the laboratories or organizations.

5.12.4.2. Experts mention to have evaluated the change proposals of DASB in detail, but they do not present their analysis, there is no substantiation, just these empty phrases. The Commission did indeed reject the windshear to have occurred, but in NL, DASB continued to promote their own opinion, including the windshear, which was not in accordance with the final Portuguese report (RoA).

5.12.4.3. The Commission refused all DASB amendment proposals in the 'Blue Report' that referred to pilot errors.

5.12.4.4. These were not answers to the questions by the court. DASB is not an accredited representative now anymore.

5.12.5. FR page 49: *"To conclude, the Experts consider that the Dutch Aviation Safety Board — through its actions, comments, and involvement into the investigation as an accredited representative of the Commission of Investigation — did not deviate from its responsibilities and fulfilled its obligations in due care as defined at the time of the accident in the ICAO Annex 13".*

5.12.5.1. The questions of the court were not related to the contribution of DASB during the investigation, but to the answering of the questions of the victims and their relatives by the DASB following the issue of the final Portuguese report of the accident investigation.

5.12.5.2. **Conclusion**. The large number of substantiated questions and remarks by the experts of claimants in RRQ of September 2016 (ref. B) did regrettably not ring a bell in the Experts' minds to whether their approach to writing their report and to answering the questions of the court was right. It was not; they did not answer the questions.

6. Conclusions of This Review by Experts of Claimants

6.1. The three persons who were appointed as experts by the court each have indicated in writing that they consider themselves competent – as far as they can currently gauge – to jointly answer the court's questions. The review of the Interim Report V17 (ref. A) and of the Final Report in this analysis by experts of claimants prove that although they consider themselves competent, they are not. These self-appointed experts are not experts; they repeatedly claim to be expert, to possess knowledge, but they don't. Their performance matches that of a charlatan.
Experts did not stick to the questions of the court but conducted their own investigation for which they showed not to be qualified and competent. They should have refrained from making statements that are outside of their level of expertise and competence. The experts might be skilled airline pilots and an excellent electrical engineer, but proved not to be objective, independent and knowledgeable experts for this case, for answering the questions of the court. They did not realize that they only see what they look for, and only look for what they know.

6.2. Several subjects should have been analyzed and described correctly by the experts, but even AOM-related subjects, like non-precision approach procedures and crew coordination aspects, were incorrectly dealt with by the experts; experienced airline pilots unworthy. In their Final Report, experts continue to explain errors by the MP495 pilots away, to varnish their errors over and over again. The experts have not provided an independent report as could be expected from experts près la Cour d'Appel de Paris "Aéronautique et Espace" and a doctor in electrical engineering, who was also familiar with Air Traffic Management.

6.3. The experts did not answer all of the questions of the court in their Final Report, although they drew a few good conclusions which they regrettably did neither use in their answers to the court in § 6, nor in their conclusions in § 7. The many errors made by the pilots of MP495 and the DASB did not pass their lips. The experts were protecting both the Martinair pilots and the DASB.

6.4. The experts asked the court with letter 3 Sept. 2015 for the interviews with both the crewmembers and the visual witnesses and obviously used these for their analysis rather than using the more difficult to assess, though objective and factual DFDR and AIDS data that were provided to them in Annexes 9 and 15 of the formal Portuguese Accident Report and in the Review, Remarks and Questions by experts of claimants (ref. B) as well. Experts prove that airline pilots are not 'equipped' to analyze DFDR data and fall short in airplane systems engineering knowledge, which was the reason for Test Pilot Schools to be founded (§ 1.2.4 above).

6.5. The experts did not review the 143 questions of the victims and their relatives with "*due care*", specifically not the 31 inappropriately answered questions by the DASB during the 1 Dec. 1994 meeting. They would have to blame the pilots, Martinair and DASB, if they did.

6.6. The experts did not use the remarks and did not answer the questions by the experts of claimants in their review of Interim report V17 (RRQ, ref. B), because they obviously do not have the expertise to do so.

6.7. The experts added very many pages with unnecessary, irrelevant, not substantiated and hence unverifiable data that do not apply to the assignment by the court. Many pages contained errors and many comments were not in agreement with the procedures in the (provided) Airplane Operating Manual and Basic Instruction Martinair manual that the pilots of MP495 had to use and that were made available to the experts by the court.

6.8. The experts did not formulate "*a precise answer to the general question: did the then Civil Aviation Board handle the information available at the time regarding the aforementioned themes with due care"*, that was specifically asked for by the court.

6.9. The experts did not answer questions of the experts of claimants in RRQ ref. B, but stated 'no comments' instead many times (FR, from page 177), the reason must be that the experts lack the knowledge and experience at a sufficiently high level. They did not analyze (and substantiate) DFDR data.

7. Recommendation by The Experts of Claimants

7.1. The court is recommended to discard the Final Report by the three experts as prejudiced, not made with adequate expertise but by using assumptions and statements of interviewed people rather than by analyzing objective and factual DFDR and AIDS data with high level accident investigation expertise, and with airplane systems knowledge at a high engineering level. Their report is not sufficiently substantiated; experts used the wrong starting points, did not adequately answer the questions of the court and hence made their report unusable. ■

List of Abbreviations

AFM	Airplane Flight Manual
AIDS	Airborne Integrated Data System
AINS	Area Inertial Navigation System
AOM	Aircraft Operations Manual
ATC	Air Traffic Control(ler)
ATS	Auto Throttle System
BIM	Basic Instructions Martinair
CMD	Command, a mode of the autopilot
CVR	Cockpit Voice Recorder
CWS	Control Wheel Steering (autopilot mode)
DASB	Dutch Aviation Safety Board; NL: Raad voor de Luchtvaart (RVDL), includes BVO
DDG	Dispatch Deficiency Guide (AOM 3.1.17)
DFDR	Digital Flight Data Recorder (black box)
DGAC	Direcção-Geral da Aviação Civil (Portugal)
DME	Distance Measuring Equipment
FAA	Federal Aviation Administration (USA)
FAR	Federal Aviation Regulations (USA)
F/E	Flight Engineer
FR	Final Report of Experts
FCOM	Flight Crew Operating Manual
FSF	Flight Safety Foundation
ft	foot, feet
ft/min	foot per minute (ft/min)
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
KLM	EN: Royal Dutch Airlines
kt	knot or knots (nm/hour)
LDC	Landing Data Card
MDA	Minimum Decision Altitude
MLG	Main Landing Gear
(M)MEL	(Master) Minimum Equipment List
NLR	EN: National Aerospace Laboratories
nm	nautical mile (1852 m)
NTSB	National Transportation Safety Board (USA)
OvV	EN: Dutch Aviation Safety Board ('16); NL: Onderzoeksraad voor Veiligheid
PANS-RAC	Procedures for Air Navigation Services - Rules of the Air and Air Traffic Control
PAPI	Precision Approach Path Indicator
PF	Pilot-flying
PNF	Pilot-not-flying
RF	Radio Frequency
R/T	Radiotelephony
R-Nav	Area Navigation (Inertial, supplemented by radio navigation, whenever available)
RoA	EN: Accident Investigation Report; NL: Rapport van Ongeval (RvO)
ROD	Rate of Descent (vertical speed)
RRQ	Review, Remarks and Questions of Claimants, 27 September 2016
TPS	Test Pilot School
USAF	United States Air Force
UTC	Universal Time Coordinated (Greenwich Mean Time)
V17	Interim Report Experts version V17 (ref. A)
VNV	Vereniging Nederlandse Verkeersvliegers; Dutch Airline Pilot Association
VOR	VHF Omni-directional Ranging (radio navigation ground beacon)