SYNTHETIC FABRIC DETACHED FROM RIGHT HAND ELEVATOR

The aim in the Netherlands is to reduce the risk of accidents and incidents as much as possible. If accidents or near-accidents nevertheless occur, a thorough investigation into the causes of the problem, irrespective of who is to blame for it, may help to prevent similar problems from occurring in the future. It is important to ensure that the investigation is carried out independently from the parties involved. This is why the Dutch Safety Board itself selects the issues it wishes to investigate, mindful of citizens' position of dependence with respect to public authorities and businesses. In some cases, the Dutch Safety Board is required by law to conduct an investigation.

GENERAL INFORMATION

Identification number:	2011012
Classification:	Accident
Date, time[1] of occurrence:	1 April 2011, 08.05 hours
Location of occurrence:	Amsterdam Schiphol Airport
Aircraft registration:	PH-CGC
Aircraft model:	Dornier 228-212
Aircraft type:	Twin engine turbo propeller aircraft
Type of flight:	Coast Guard operational flight
Phase of flight:	Cruise
Aircraft damage:	Detachment of right hand elevator fabric cover
Total crew:	Four
Total passengers:	One
Injured:	None
Other damage:	None
Lighting conditions:	Daylight

SUMMARY

During flight the crew of a Netherlands Coastguard Do-228 was faced with a sudden nose down movement of the aircraft. The crew executed the applicable emergency procedures and landed uneventfully at Amsterdam Schiphol Airport.
After landing it became clear that the top of the synthetic cover of the right hand elevator was partly detached and was only connected to the trailing edge of the right hand elevator. The elevator had been in a repair facility in 2004. The investigation revealed that the repair was not entirely executed in accordance with the aircraft manufacturer's procedures.

[1] All times in the report are local times unless stated otherwise.

FACTUAL INFORMATION

The flight

On 1 March 2011 at 21.00 hours, the day prior the mishap flight, the maintenance organization JetSupport, an EASA Part 145 approved maintenance organization also the continuing airworthiness management organization (CAMO) of this aircraft, located at Schiphol-East, had carried out the aircraft's daily inspection for the next morning. No discrepancies were observed.

On 1 April 2011 around 07.00 hours and prior to commencing the flight the crew carried out a required visual inspection of the aircraft. No discrepancies were observed. Around 08.00 hours, PH-CGC took off from Amsterdam Schiphol Airport's runway 22. The mission was an operational flight over the North Sea. After take-off the aircraft performed a right climbing turn and rolled out on a westerly course. Cruising at an altitude of 1000 feet and airspeed of 180 knots and south of runway 18C/36C (the centre of three parallel runways at Schiphol) the crew experienced a sound comparable to the snapping of a cable. The sound was followed by a short, powerful downward motion of the nose of the aircraft. Subsequently the pilot stabilized the aircraft in horizontal flight, while the control column vibrated severely. The crew analyzed the situation, suspected damage to the synthetic skin of an elevator and reduced the airspeed to 150 knots. Subsequently the crew consulted a Flight Ops Information bulletin distributed by the aircraft manufacturer. The bulletin was issued by Fairchild Dornier on 28 October 2002. It describes handling characteristics, the indications to the crew, crew procedures and recommendations to optimize handling characteristics in the event the synthetic skin detaches from an elevator control surface.

The aircraft appeared fully controllable. The crew returned to Amsterdam Schiphol Airport and made an uneventful overweight landing on runway 22.

After landing the top part of the synthetic cover was found largely detached from the right hand elevator. The fabric was only attached to the trailing edge on the bottom side of the elevator. The maintenance organization started an internal investigation.

The accident was reported to the Dutch Civil Aviation Authority who in turn informed the Dutch Safety Board.

Cockpit crew

	Captain	*First officer*
Nationality	Dutch	Dutch
License	CPL(A/H), valid till November 2016	CPL(A), valid till 22 February 2016
Type rating	D228, valid till 1 September 2011	D228, valid till 1 May 2011
Instrument rating	IR(A) valid till 1 September 2011	IR(A) valid till 1 May 2011
Hours total	2700	3584
Hours on type	600	2142
Last proficiency check	17 August 2010	29 April 2010
Medical certificate	Class I valid till September 2011	Class I en II valid till 2 July 2011

Table 1: Information cockpit crew

Aircraft information

Figure 1: Netherlands Coastguard Dornier 228-212 aircraft (source: MOD)

PH-CGC is a twin-engine turboprop aircraft of the type Dornier 228-212. The aircraft was built by Dornier Fairchild in 1990. In 2003 RUAG Aerospace Services (RUAG) became the license holder for maintenance and modifications of all Dornier 228 aircraft. Later RUAG started the production of the Dornier 228. To perform its mission for the Netherlands Coastguard, the aircraft is equipped with specific communication equipment and detection sensors. The aircraft is also equipped with a flight data recorder and cockpit voice recorder. A standard crew comprised two pilots and two observers. The data from the PH-CGC flight data recorder was used for the investigation. The cockpit voice recorder data was overwritten.

Damage

The top part of the synthetic cover largely separated from the right hand elevator. The elevator did not show evidence related to contact with a foreign object.

Figure 2: right hand elevator after the flight

Weather conditions

The surface wind came from a south-southwesterly direction with a speed of eleven knots. The visibility was more than ten kilometers with light stratus clouds at nine hundred feet. The temperature at ground level was ten degrees Celsius and the barometric pressure was 1018 hectopascal.

The Netherlands Coastguard

Responsibility for policy on the Netherlands Coastguard
The Netherlands Coastguard was established by decree issued by the Minister of Transport, Public Works and Water Management[2] and the Minister of Defence on 1 January 2007. In addition to these two Ministers, the Ministers of Finance, Security and Justice, the Interior and Kingdom Relations, Economic Affairs, Agriculture and Innovation also have a policy-making role. The Minister of Transport, Public Works and Water Management is responsible for policy on the Netherlands Coastguard.

Management of the Netherlands Coastguard
The Ministry of Defence is responsible for managing The Netherlands Coastguard. This management task has been assigned to the Royal Netherlands Navy Command. The Director of the Coastguard is responsible for the day-to-day management of the Coastguard. The relevant ministries have placed personnel and equipment at the disposal of the Director to enable him to carry out his duties. The Coastguard thus has disposal of several ships and aircraft belonging to the Ministry of Infrastructure and the Environment, the Ministry of Defence and the Ministry of Security and Justice. The Coastguard Centre in Den Helder is responsible for coordinating the Coastguard's enforcement and service duties.

Deployment of resources by the Coastguard
Binding agreements concerning the deployment of personnel and material resources have been set out in operating agreements between the Director of the Coastguard and the relevant ministries or other services.

One of the operating agreements sets out the division of tasks, operating authority and responsibilities between the Director of the Coastguard and the Ministry of Defence. The agreement provides that the Ministry of Defence has responsibility for the continuity and the quality of the Coastguard in two key areas, namely managing the organisation and ensuring the required basic provisions, on the one hand (support), and providing personnel and material resources for the performance of the Coastguard's duties (operations), on the other.

The management tasks supporting the organisation have been assigned to the Royal Netherlands Navy Command. This latter is also the Coastguard Director's designated contact for the quality aspects of the Coastguard organisation and the resources deployed by the Coastguard Centre.

The Coastguard Centre has been operating air patrol flights over the North Sea with aircraft carrying military and civil registration for decades. From 2002 the performance of airborne coastguard operations carried out by one Dornier 228 aircraft holding civil registration was transferred from the National Police Services Agency (KLPD), which had carried out these flights until that year, to the Royal Netherlands Navy. A second Dornier 228 aircraft was subsequently purchased to carry out these operations. Effective 1 January 2008 the Air Force Command (*Commando Luchtstrijdkrachten*, CLSK) was assigned responsibility for managing the Coastguard's two Dornier 228 aircraft.[3] The CLSK therefore is responsible for ensuring the quality and readiness of the crew and the aircraft.

[2] From 14 October 2010: Infrastructure and the Environment.

[3] The CLSK is the 'operator'.

The Schiphol-East Coastguard Unit
The two Dornier 228 aircraft, the crew members and the management and support staff collectively form the Schiphol-East Coastguard unit. The crew members – 14 pilots and 14 observers – fall under Squadron 334 at Eindhoven Air Base for administrative purposes. As the manager accountable for the air transport fleet at Eindhoven Air Base, the Eindhoven Air Base Commander also has responsibility for ensuring safe operating procedures and the air worthiness of the Coastguard aircraft.

The two Dornier 228 aircraft are registered in the Netherlands Civil Aircraft Register held by the Environmental and Transport Inspectorate (*Inspectie Leefomgeving en Transport*, ILT) and therefore have civil registrations. The Commander of the Royal Netherlands Air Force owns both aircraft. The two Dornier 228 aircraft are the only Ministry of Defence aircraft carrying civil registration. The Ministry of Defence has concluded a contract with RUAG Aerospace to perform aircraft maintenance and airworthiness management on the two aircraft. RUAG has, in turn, outsourced aircraft maintenance and airworthiness management to JetSupport. More information on this is provided later on in the report.

The 'Coastguard Manual' for the Coastguard Unit[4] sets out the duties, authority and responsibilities of the relevant parties involved in the Schiphol-East Coastguard Unit.

Supervision of Coastguard aircraft
The supervision of Coastguard aircraft has been set out in an agreement between the Minister of Infrastructure and the Environment and the Minister of Defence. In the agreement it has been agreed that supervision will be shared by the Inspectorates of both Ministries. The Environmental and Transport Inspectorate (ILT) at the Ministry of Infrastructure and the Environment supervises compliance with civil aviation safety and environmental protection rules and legislation. The Ministry of Defence Military Aviation Authority (MLA) supervises military aviation. The ILT supervises the continuing airworthiness of and maintenance programme for the Coastguard aircraft. The MLA supervises the Coastguard Unit's operations.

Reporting accidents and serious incidents

Incident reporting and investigation at the Ministry of Defence
The MLA has published special military aviation requirements (SMLE-1) for reporting incidents involving military aircraft. Among other things these requirements incorporate the definition of an accident[5] and state that the operator is responsible for reporting an aviation incident to the MLA. Accidents and serious incidents must be reported within 24 hours. A maximum period of 72 hours applies to reporting other incidents.[6]

The Ministry of Defence has incorporated incident reporting in its Safety Management System (VMSDEF). The corresponding reporting procedure is set out in the instruction[7] issued by the

[4] Version 1.5 March 2010 of the Manual was valid at the time of the accident.

[5] SMLE-1, version 2.0, Article 1.10, which applies the same definitions for an accident, serious incident and incident as the Dutch Safety Board Regulations.

[6] In all cases, the means of communication to be used, such as telephone, fax or e-mail, are determined on the basis of the severity of the incident. Incidents are ultimately reported by means of an approved form or reporting system.

[7] SG Instruction A/963.

Ministry of Defence Secretary General. A report must be entered in the incident registration system.[8] A commander may institute an investigation after an incident[9] has been reported to him. The VMSDEF states: 'if an incident has occurred and further investigation is required, an investigation committee must be set up as soon as possible'. The person responsible for taking the decision to set up an investigation committee depends on the severity of the incident. In the incident registration system the extent of the injury or damage/loss sustained by personnel (injury), equipment (sum of money) or the environment (release of harmful substances and/or the effects thereof) is linked to four categories of severity: I through IV, with IV being the highest category. The commander of the unit takes the decision to set up an investigation committee for an incident in categories I through III. The Commander of the Armed Forces takes the decision on a category IV incident.

The procedure for reporting incidents and conducting investigations into incidents at CLSK is set out in detail in their Occupational Safety Regulations, which state that reports should only be made to the Dutch Safety Board through the intervention of Ministry of Defence staff.[10] The Regulations do not describe the rules applicable to reports of incidents involving Ministry of Defence aircraft carrying civil registration, the operator of which is the Ministry of Defence. In addition, no information is provided about when the investigation committee and when the Dutch Safety Board should perform an investigation into an incident involving these aircraft.

The 'Coastguard Manual' for the Coastguard Unit does not describe how and to whom an incident involving a Dornier 228 aircraft carrying civil registration should be reported, nor by whom. It was also found that the Manual, like the Occupational Safety Regulations, did not set out the rules applicable to incidents involving Dornier 228 aircraft, and no information is given about when an investigation should be instituted.

Duty to report serious incidents and accidents

In the Netherlands, the Dutch Safety Board is charged with the investigation of accidents and serious incidents involving an aircraft registered in the Netherlands.[11] Pursuant to the Dutch Safety Board Decree, the pilot-in-command and the operator of the aircraft, among others, are required to report accidents to the Safety Board.[12]

The definitions of an accident and a serious incident, the accessibility of the Dutch Safety Board and the information that is required to be reported are incorporated in the Aeronautical Information

---

8 All staff members can report an incident online by means of a software application on the Ministry of Defence intranet.

9 The Instruction distinguishes between the following:

- Unsafe situation: a situation, which if no action is taken, could lead to an incident or accident. These situations are urgent or need to be identifiable in a broader context in addition to the risk inventory and evaluation.
- Incident: an event that may potentially cause the death of or injury to a person or damage an object/item of property or the environment.
- Accident: an event causing the death of or injury to a person, or damage to an object/item of property or the environment.

10 Occupational Safety Regulations, Version 7.0, July 2010, 7.9.10.

11 Dutch Safety Board Decree, Article 3 (1).

12 Article 9 (1a) of the Dutch Safety Board Decree of 10 December 2004.

Circular Series B (AIC-B) 02/10 dated 17 June 2010.[13] The AIC-B also sets out the incident reporting requirements in accordance with the EU Directive[14], not being accidents or serious incidents, near-accidents and other requirements concerning reporting to the Environmental and Transport Inspectorate.

INVESTIGATION AND ANALYSIS

The Dutch Safety Board started an investigation a week after the accident. The investigation comprises two parts. The first part focuses on the causal factors. The second part focuses on the way the parties involved responded to the initial reporting of the accident.

Part I: Detachment of the synthetic cover

Maintenance repair work
Investigation revealed that the synthetic cover of the right hand elevator was detached from the surface of the elevator construction. More than 90% of the bonding surface of the construction was smooth/shiny with tiny to no marks only from the cover fabric. According to the manufacturer this indicates insufficient bonding. Less than 10% of the bonding surface showed the typical granular/fiber surface. On the surface areas not covered with adhesive the plain metal surface was visible, there were no signs of (brown colored) primer. In some areas it was easy to peel off the cover from the surface, whereas in some small areas it was difficult.

The above mentioned results could be an indication that the gluing process was not performed adequately. Therefore the maintenance history of this particular elevator was investigated.

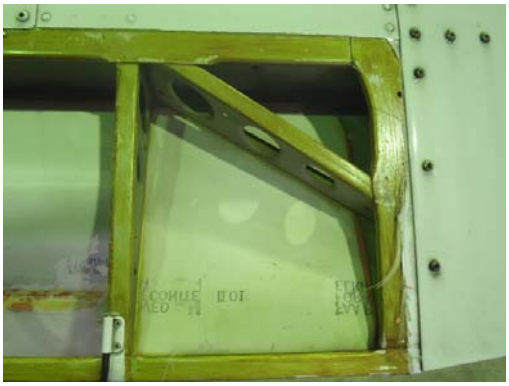

Figure 3: detail of affected surface of the elevator construction

The left and right hand elevator control surfaces and the rudder control surface on each aircraft have the same serial number. The history of the right hand elevator with serial number 1204 is presented in the table below: this elevator had been installed on three aircraft.

---

[13] AIC-B 02/10 refers to the old European Directive 94/56/EC establishing the fundamental principles governing the investigation of civil aviation accidents and incidents and still needs to be amended in line with EU Regulation 996/2010. This AIC-B also requires amendment following the establishment of the Environmental and Transport Inspectorate on 1 January 2012.

[14] Directive 2003/42 EC of the European Parliament and the Council of 13 June 2003 on occurrence reporting in civil aviation.

Aircraft registration	*Aircraft serial number*	*Aircraft part of Do-228-212*	*Operator*
PH-MNZ	8206	Unknown – 17 April 2003	Netherlands Coastguard unit, aircraft sold to RUAG
PH-CGN	8181	June 2010 – 4 November 2010	Netherlands Coastguard unit
PH-CGC	8183	8 March 2011 – 1 April 2011[15]	Netherlands Coastguard unit

Table 2: history of right hand elevator PH-CGC

The left and right hand elevator had been installed on PH-MNZ when the trailing edge of the right hand elevator was damaged during ground operations on 17 April 2003. The following day the right hand elevator was removed from the aircraft and stored for about a year. On 12 May 2004 it was send to a repair facility. The repair work was carried out between 13 and 26 May 2004. When completed, the elevator was stored. During storage the elevator was inspected/certified on 26 November 2008 by JetSupport.
In June 2010 JetSupport installed the elevator on PH-CGN and it remained there for about 550 flight hours and 386 landings. On 4 November 2010 the elevator was removed and stored again after inspection established its serviceability. JetSupport installed the elevator on 8 March 2011 on the aircraft PH-CGC. At the time of the accident it had accumulated about 75 flight hours and 60 landings since installation.

Three organizations are involved in the maintenance and airworthiness management of the aircraft. For the maintenance and the continuing airworthiness management[16] of both Coastguard Dornier aircraft, the Ministry of Defense has a contract with RUAG. RUAG subcontracted these activities to JetSupport. JetSupport in its turn had the repair or replacement of the elevator's cover carried out by a (different) repair facility. This other repair facility is a Part 145 maintenance organization that has experience in repairing synthetic covered elevators, including those of the Dornier 228.[17]

Re-covering repair work
For the re-covering of the synthetic cover pages 201 – 227 of the Dornier 228 Structural Repair Manual (SRM) 51-73-00 (Jun 1/84), and other relevant pages including some of the Dornier 228 Airplane Maintenance Manual (Nov 01/2000), were faxed to the repair facility. The repair work started on 13 May 2004 by a mechanic who was experienced in covering aircraft surfaces.[18] The materials used for the repair were purchased from RUAG and supplied to JetSupport which in turn delivered the materials to the repair facility. Based on previous repairs, performed satisfactorily by the repair facility, JetSupport accepted the repaired elevator without a visual inspection.

On 19 April 2011 the Dutch Safety Board convened with, amongst others, representatives of RUAG, JetSupport, the repair facility, and the mechanic about the procedures contained in the SRM and the work carried out. The mechanic stated that the repair work was carried out in accordance with SRM, section 5 *"Complete Re-covering"* with the remark that he used Methyl-Ethyl-Ketone (MEK) instead of toluene as adhesive diluents and a five millimeter wide steel roller to press the synthetic cover against the surface for bonding. Furthermore he stated that during the covering he also

[15] Date of the occurence.

[16] EASA Part M Subpart G (CAMO)-part.

[17] In order to carry out maintenance on aircraft with a MTOM > 5700 kg (as in this case) a Part 145 maintenance approval is obligatory.

[18] The mechanic had a valid license. There is no separate rating for re-covering aircraft.

made a test panel, using the same materials and procedures. After tearing off the cover on the test panel he was satisfied about the bonding.

According to RUAG toluene should have been used instead of MEK as adhesive diluents as described in the SRM. The use of MEK could have caused the bad bonding of the cover to the surface of the elevator construction. RUAG indicated also that for proper bonding a rigid wooden or metal tool (spatula) should be used in order to be able to press the cover strongly against the surface of the elevator construction. However, the SRM does not specify such a procedure. The instructions in the SRM are general and do not specify the use of a tool, nor do the instructions mention the amount of force that needs to be exerted with the tool.

Previous occurrences and actions from manufacturer
Shortly after the accident, RUAG traced two other aircraft where repairs on control surfaces were carried out by the repair facility concerned. One of the aircraft was PH-MNZ, which was purchased by RUAG. The operator of the other Do-228 aircraft was informed accordingly.[19] The operator was asked to check the maintenance documents and look for elevators or rudders that were repaired or recovered with synthetic fabric at the repair facility concerned. If so, the operator was recommended to exchange these elevators or rudders.
RUAG also issued a Service Information Letter in which all operators and maintenance/repair facilities were informed about the accident and to offer on the job familiarization for organizations that perform fabric repairs and/or complete recovering of rudders and elevators.[20]

RUAG reported three other occurrences of control surface skin loss on Dornier 228 aircraft that occurred in the past. In 2002 two occurrences took place (elevator and rudder skin loss) and in 2011 another occurrence (elevator skin loss). The investigation report on the rudder skin loss in 2002 was published by the Bundesstelle für Flugunfalluntersuchung (BFU).[21] In the three occurrences the elevator or rudder skin loss was caused by incorrect repair of the cover.

In 2007 RUAG found that during repair/overhaul of some rudders and elevators an inadequate paint removing procedure had been used which could lead to partial de-bonding of the cover and corrosion damage of the (inner) surface. RUAG issued a Service Bulletin[22] for all Dornier 228 models. The Service Bulletin was followed by an Airworthiness Directive.[23] The Service Bulletin and the Airworthiness Directive contained instructions for visual inspection, investigation and if necessary repair of the affected parts in accordance with the repair instructions of the manufacturer.

In response to the occurrences with skin loss in 2002, the manufacturer issued an information letter[24] (Flight Ops Information) 'Horizontal Stabilizer-Elevator Skin Detachment' for operators to provide optimum flight crew handling if elevator skin detachment is suspected. The 'Horizontal Stabilizer-Elevator Skin Detachment' procedure was on board PH-CGC. The flight crew of PH-CGC carried out this procedure, which recommends reducing the airspeed to 150 – 130 knots and adding 10 knots to the reference speed for landing.

---

[19] Airworthiness Review Sheet 228-55-051.

[20] SI-228-087, issued 01.07.2011.

[21] Untersuchungsbericht 3X258-0/02, September 2003.

[22] SB-228-270, 30 October 2007.

[23] D-2007-350, 19 December 2007 which was superseded by D-2007-350R1, 30 January 2009.

[24] FOI-228-004, issued 28 October 2002.

The Dutch Safety Board is of the opinion that the multiple skin loss occurrences in the past should have led to a procedure suitable for publication in the abnormal and emergency procedure section of the Dornier 228-212 pilot's operating handbook. The manufacturer inserted such revision as described above in the abnormal and emergency procedures of the pilot's operating handbook on 14 April 2011. The Netherlands Coastguard unit also inserted this procedure in her own procedures.[25]

Part II: Reporting the accident

The supervision of Coastguard aircraft has been set out in an agreement between the Minister of Infrastructure and the Environment and the Minister of Defence. In the agreement it has been agreed that supervision will be shared by the Inspectorates of both Ministries. As a result, military as well as civil regulations are (partially) applicable.

The pilot-in-command entered the occurrence with PH-CGC in the incident registration system, which is part of the safety management system of the Ministry of Defence of The Netherlands (VMSDEF). The Flight Safety Officer at the Schiphol-East Coastguard Unit reported the incident to the Aviation Incidents Analysis Bureau (*Analysebureau Luchtvaartvoorvallen*, ABL) at the former Transport, Public Works and Water Management Inspectorate (IVW), the Military Aviation Authority (*Militaire Luchtvaartautoriteit*, MLA), the Royal Netherlands Air Force Operations Centre[26] and the Commander of Eindhoven Air Base.[27] The Transport, Public Works and Water Management Inspectorate informed the Dutch Safety Board of the incident report.

The Coastguard Unit did not report the accident to the Dutch Safety Board even though this is required under aviation legislation. The Coastguard Unit's reporting procedure was therefore examined.

The damage sustained by the right elevator on PH-CGC falls under the definition of an accident: the damage was serious, had negative consequences for the controllability of the aircraft and required major repairs.[28] On account of the above the Safety Board Investigation Act (*Rijkswet Onderzoeksraad voor Veiligheid*) and the EU Regulation on the investigation and prevention of accidents and incidents in civil aviation therefore apply. The pilot-in-command and the operator should have reported the incident, which was classified as an accident, to the Dutch Safety Board.

According to the special military aviation requirements (SMLE-1) the occurence should have been classified as an accident. This did not take place when the information was entered in the

---

[25] Temporary revision no. 002, Horizontal Stabilizer-Elevator/Rudder Skin Separation, 228-S/N 8181 and S/N 8183, 14 April 2011.

[26] The Operations Centre forms part of the Air Force Commander's headquarters. The Operations Centre acts on behalf of the Air Force Commander and is responsible for the day-to-day management of air force operations.

[27] The Commander of Squadron 334, who reports to the Commander of Eindhoven Air Base, was informed. The Schiphol-East Coastguard Unit falls under Squadron 334. The Head of the Flight Safety Bureau (*Bureau Vliegveiligheid*), a policy staff member who reports to the Eindhoven Air Base Commander, was also informed of the incident.

[28] See Article 1, first paragraph under f, 2°, Decision on the Dutch Safety Board, and Article 2, paragraph 1 under b of EU Regulation 996/2010.

registration system. The investigation shows that the SMLE-1 and the registration system apply different definitions to the terms ‘accident’, ‘serious incident’ and ‘incident’. The registration system uses categories of severity and material damage is only expressed in monetary terms. This is unrelated to classification as an incident or accident. By contrast, the descriptions given to damage in SMLE-1 are in accordance with the Dutch Safety Board Regulations and the EU Regulation. These differences encourage the errors that happened with regard to this particular incident. The report was based on the captain’s judgement and as such was entered in the registration system in accordance with the rules.

The conclusion can be drawn from correspondence that the MLA took note of the report. This is in accordance with the agreements made on the supervision performed by the MLA and the Human Environment and Transport Inspectorate (*Inspectie Leefomgeving en Transport*, ILT) on Dornier 228 Ministry of Defence aircraft because this particular case involved the airworthiness of the aircraft.

As a consequence, the incident was not followed-up as required under civil aviation legislation. The Occupational Safety Regulation shows that in its capacity as operator of Dornier 228 aircraft, the Royal Netherlands Air Force Command (*Commando Luchtstrijdkrachten*, CLSK) itself does not send any reports directly to the Dutch Safety Board. In accordance with the Coordination Protocol between the Dutch Safety Board and the Ministry of Defence dated 14 December 2007, this responsibility rests with the Ministry of Defence/Operational Control and Readiness Department (*Directie Aansturen Operationele Gereedstelling*).

As stated above, the incident was reported to the IVW/ABL. The conclusion can be drawn from interviews and correspondence that the decision to report the incident to IVW/ABL was based purely on the (incorrect) assumption that the IVW as the supervisory authority responsible for the EASA Part 145 organisations - RUAG Aerospace Services and JetSupport - would be in charge of a technical investigation. The assumption may possibly have been prompted by the compulsory technical investigation carried out by JetSupport as an approved company (Part 145). Moreover the reports made to the ABL are intended for incidents in accordance with the European Directive, not being accidents or serious incidents. The above explains why the accident involving the PH-CGC was not reported to the Dutch Safety Board.

The Commander of Eindhoven Air Base, who also is the accountable manager of the Schiphol-East Coastguard Unit, requested the chief pilot of the Coastguard Unit to draw up a detailed air safety report. He also consulted with CLSK Headquarters about the action to be taken. The CLSK itself considered setting up an investigation committee. On the basis of the same assumption referred to above, the CLSK assumed that the IVW would investigate the incident. It was decided not to set up an investigation committee and to await the results of IVW's investigation. In the event of any future investigations into incidents involving the Coastguard, the accountable manager has agreed with the Head of Accidents and Occupational Safety Investigations at CLSK that the latter will coordinate these investigations.

In respect of the above, the Dutch Safety Board would also like to point out the following. The Safety Board investigated the ditching of an SAR helicopter in the North Sea on 21 November 2006. As a result of the investigation the Safety Board recommended that the Coastguard assume its responsibility by setting up a system for assessing the quality of the tasks allocated to the Coastguard and performed by the airborne and naval units.[29] Responses received from the Ministry

[29] *Emergency landing by a Bristow AS332L2 Search and Rescue helicopter*, published on 23 February 2010.

of Defence and the Minister of Infrastructure and the Environment show that consultations have been initiated between the Ministry of Infrastructure and the Environment, the Coastguard and the Ministry of Defence concerning the implementation of a quality system and supervision thereof.[30]

It emerged from the investigation into the incident involving PH-CGC that a backlog had occurred in implementing the recommendation on account of a lack of capacity at the Coastguard. Consequently, at the time of the accident a quality officer whose duties include assessing the quality of the tasks allocated to the Coastguard and performed by airborne and naval units had not yet been employed by the Coastguard. A quality officer has recently been appointed.

In 2009 and 2011 the MLA performed quick scans at the Schiphol-East Coastguard Unit, the purpose of which was to establish whether the unit is operating at an acceptable level of safety and in what manner that level can be achieved and maintained. The quick scan reports show that numerous findings were made at the Coastguard Unit, based on which measures must be taken. The quick scan performed in 2011 was a periodic quick scan that was carried out after the incident. A number of findings resulting from the quick scan relate to the consolidation of combined military and civilian flight operations. One of the findings indicated that the unit's reporting procedures were not set out in accordance with the SMLE-1. Due to the lack of capacity at the Coastguard the quick scan reports were assessed by the Eindhoven Air Base Commander and the CLSK staff[31] involved. This shows that at the time of the accident inadequate account was taken of the consolidation of military and civilian flight operations. The consolidation issues are an area that should be identified by the quality assessment system.

Although the established findings fall outside the scope of this investigation, the Dutch Safety Board is concerned about the slow progress made by the Coastguard in implementing the quality assessment system. The Dutch Safety Board deems it likely that the established shortcomings in the reporting procedure and the way it was carried out in respect of the accident involving the Coastguard's Dornier 228 aircraft is the result of the above backlog. The Safety Board was pleased to learn that an additional officer has been appointed by the Coastguard to further develop and implement the quality system.

CONCLUSIONS

It is concluded that the re-covering of the synthetic fabric was not fully executed in accordance with the procedures stated in the Dornier 228 Structural Repair Manual. Methyl-Ethyl-Ketone was used as adhesive diluents instead of toluene. Furthermore, the instruction for re-covering in the Structural Repair Manual is general and does not specify the use of a tool, such as a spatula, for proper bonding. The manufacturer offers on-the-job training for maintenance organizations that carry out repair and/or replacement of synthetic cover on elevators and rudders. The combination of incorrect adhesive diluents and the use of different tools than meant but not prescribed, could have caused insufficient bonding of the cover to the surface of the elevator frame.

---

[30] Letter from the Minister of Infrastructure and the Environment dated 24 August 2010 and a letter from the Minister of Defence dated 1 September 2010.

[31] The Department of Air Transport and Tanker Operations (*Afdeling Luchttransport en Tankeroperaties*, ALTO) and Group Staff responsible for Flight Safety, Quality, OHS and the Environment (*Stafgroep Vliegveiligheid, Kwaliteit, Arbo en Milieu, Stg VKAM*).

The flight crew carried out the ‘Horizontal Stabilizer-Elevator Skin Detachment’ procedure contained in the information letter issued by the manufacturer. Shortly after the accident the manufacturer inserted this procedure in the abnormal and emergency procedures section of the Dornier 228-212 pilot’s operating handbook.

Other findings
Apart from the main conclusions concerning the actual incident, the investigation has brought to light shortcomings in Ministry of Defence reporting systems.

It is concluded that Ministry of Defence procedures for reporting incidents and performing investigations into incidents involving aircraft carrying a civilian registration, are not described in a sufficiently clear manner in Ministry of Defence procedures.

This report has been published in Dutch and English language. If there are differences in interpretation the Dutch text prevails.