AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8543		
Aircraft Registration	**ZU-RAT**	**Date of Accident**	30 August 2008		**Time of Accident**	1450Z	
Type of Aircraft	Rotorway Executive 162 F (Helicopter)		**Type of Operation**		Private		
Pilot-in-command Licence Type	Private Pilot		**Age**	58	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		1 500.0		Hours on Type	205.0	
Last point of departure	Aviators' Paradise Aerodrome (FAAP) – North West						
Next point of intended landing	Rustenburg Aerodrome (FARG) – North West						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Rustenburg area (GPS co-ordinates: S25°3959.26 E027°2238.56)							
Meteorological Information	**Wind direction:** Westerly; **Wind speed:** 20 kts; **Temperature:** 20°C; **Visibility:** Good; **Cloud cover:** Clear						
Number of people on board	1 + 0	**No. of people injured**	0	**No. of people killed**	0		

Synopsis

The pilot was on a private flight under Visual Flight Rules in daylight conditions from FAAP to FARG. During the flight the helicopter suddenly yawed to the left, and the pilot therefore applied right rudder to maintain heading with the airspeed unchanged. The aircraft did not respond as required, after a few seconds he reduced engine power. This had the desired effect and the helicopter started flying straight again. He decided to execute a precautionary landing on a narrow dirt road. During the descent and approach, he observed trees and wires in the selected area.

The pilot decided to do a run-on landing and reduced engine power to maintain heading. The aircraft touched down about 3 m short of the landing zone, the left skid struck a mound of soil and the helicopter nosed over, coming to rest on its left side.

The pilot evacuated the aircraft through one of the front windscreens, which was shattered. The helicopter was destroyed by the impact and a post-impact fire.

Probable Cause

The pilot experienced a tail rotor failure during forward flight.

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator : Creative & Industrial Coatings CC
Manufacturer : RotorWay International
Model : Executive 162 F
Nationality : South African
Registration Marks : ZU-RAT
Place : Rustenburg area at GPS co-ordinates S25º3959.26 E027º2238.56
Date : 30 August 2008
Time : 1450Z

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose of the Investigation

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997), this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and ***not to establish legal liability****.*

Disclaimer

This report is given without prejudice to the rights of the CAA, which are reserved.

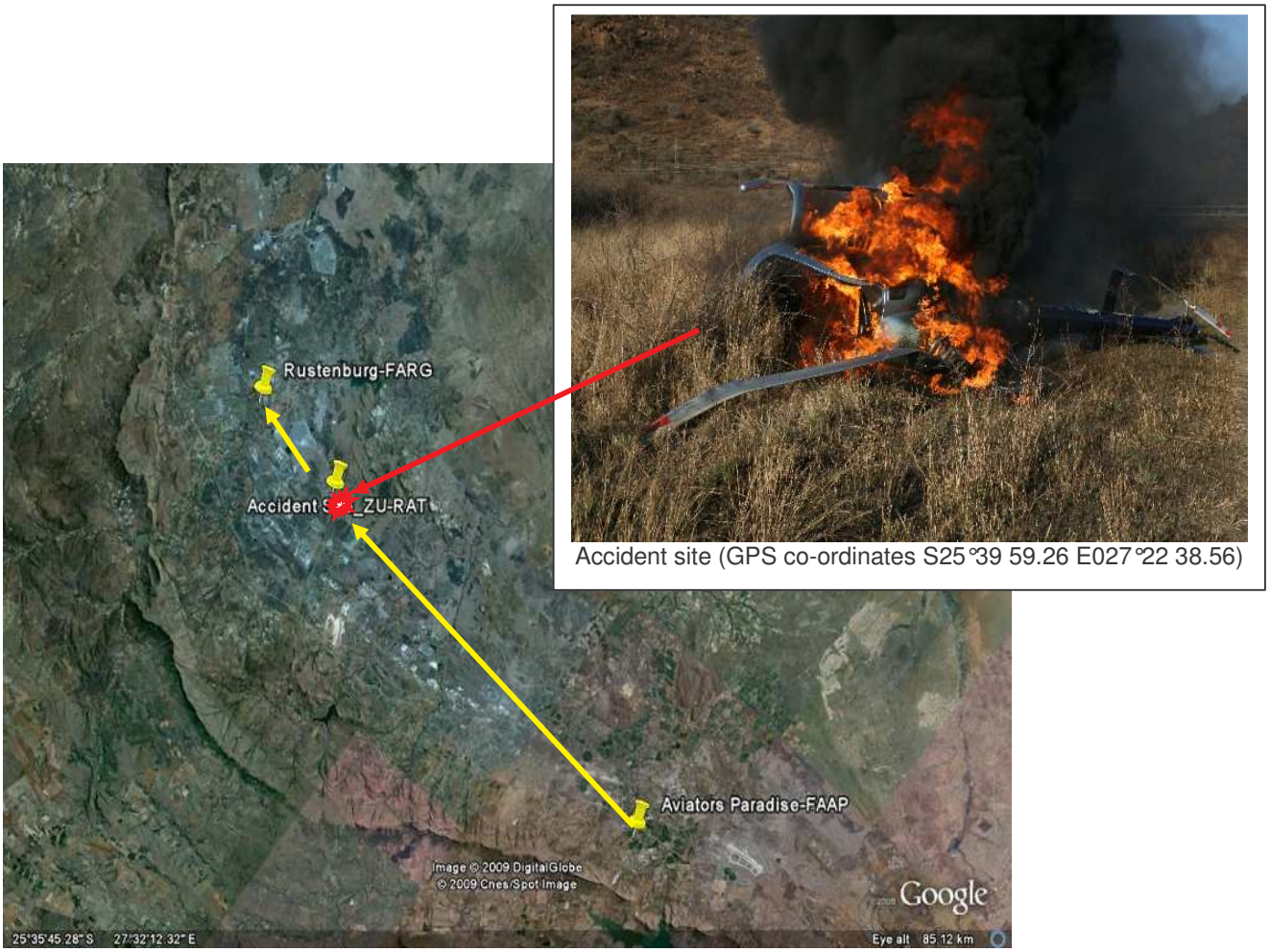
1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 On Saturday, 30 August 2008, the pilot took off in a RotorWay Executive 162F helicopter from Aviators' Paradise aerodrome (FAAP) for Rustenburg aerodrome (FARG). He was the sole occupant and on a private flight under visual flight rules (VFR) in daylight. While the helicopter was about 800 feet AGL and cruising at 90 mph, it suddenly yawed to the left. The pilot immediately responded by applying opposite right rudder pedal. This did not solve the problem, however, so he reduced engine power and the helicopter flew straight and level again.

1.1.2 The pilot monitored the instruments and began descending to prevent a rotor rpm decay problem. He planned to do an autorotation landing because a flare with engine power would have caused the helicopter to yaw too aggressively on landing. He found a suitable open field and commenced with the autorotation landing.

1.1.3 During the descent and approach, he noticed trees and wires in his path, and reduced power as much as possible to ensure a straight flight to the landing area. The helicopter touched down several metres short of the anticipated landing spot and performed a 3 m run-on landing. In the process of landing, the left skid dug into a mount of soil about 350 mm high which caused the helicopter to nose over and come to rest on its left side. The pilot managed to evacuate the helicopter unhurt through one of the broken front windscreens. The helicopter was destroyed in the impact sequence and by a post-impact fire that erupted in the tall dry grass.



Accident site (GPS co-ordinates S25°39 59.26 E027°22 38.56)

Figure 1. The track flown and the location of the accident site.

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	1	-	-	-

1.3 Damage to Aircraft

1.3.1 The helicopter was destroyed in the impact sequence and by post-impact fire.

1.4 Other Damage

1.4.1 Minor fire damage to grass around the wreckage.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	58
Licence Number	xxxxxxxxxxxx	Licence Type	Private Pilot		
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	21 December 2008				
Restrictions	Corrective lenses				
Previous Accidents	None				

Flying Experience

Total Hours	1 500
Total Past 90 Days	Unknown
Total on Type Past 90 Days	Unknown
Total on Type	205.0

1.6 Aircraft Information

Airframe

Type	Executive 162F (Helicopter)	
Serial Number	6936	
Manufacturer	Rotorway	
Date of Manufacture	9 September 2005	
Total Airframe Hours (At time of Accident)	± 183.0	
Last Annual Inspection (Date & Hours)	17 May 2008	175.0
Hours since Last Annual Inspection	± 8.0	
Authority to Fly (Issue Date)	21 May 2008	
C of R (Issue Date) (Present Owner)	18 October 2005 Creative & Industrial Coatings CC	
Operating Categories	Private Operation Authority to Fly	

Engine

Type	Rotorway RI 162 F
Serial Number	7202
Hours since New	183.0
Hours since Overhaul	TBO not reached

Main and Tail Rotors

Main rotor blades – serial number	3912	3913
Tail rotor blades – serial number	6633	6632
Operating hours	183.0	

1.6.1 The helicopter kit was manufactured in USA and imported to South Africa. The owner submitted an application for issuance of the build number on 20 October 2005 to have the helicopter assembled. The aircraft was then assembled by the manufacturer at their South African branch between July and November 2005. A logbook entry of Certificate Relating to Maintenance of an Aircraft (CRMA) dated 25 November 2005 was then issued and attached in the logbook indicating that the aircraft was certified serviceable.

The investigation found that the manufacturer had fitted the tail rotor belt-drive and tail rotor assembly and had carried out the first static balancing of the tail rotor. The manufacturer had also carried out the full rigging procedure of controls as per the aircraft builder's manual.

1.6.2 The helicopter was then issued with a Proving Flight Authority to Fly and required to fly a maximum of 40 hours, before issuance of the Private Authority to Fly. The aircraft was then subjected to various test flights and its performance found to be satisfactory.

Maintenance information

1.6.3 The maintenance history of the helicopter was reviewed in the investigation. The objective was to determine if the owner had maintained the aircraft in compliance with the manufacturer's maintenance requirements and applicable regulations and had ensured that the helicopter was airworthy at the time of the accident flight.

(i) According to the aircraft logbooks, there was no indication of any deferred defects which were not complied with.

(ii) The manufacturer was responsible for the maintenance of the helicopter for the first year of operation (2005).

(iii) The helicopter was flown for 146.3 hours before the next annual inspection was carried out on 17 May 2008 by an Approved Person. The applicable regulations regulation requires that the annual inspections be carried out after every 12 month or 100 hours interval. However, inclusive of the annual maintenance inspections, there are progressive inspections which the manufacturer also requires that operators have to comply with.

1.6.4 According to the pilot, he carried out a pre-flight inspection which included checking of the belt tensioning prior to the accident flight. The tail rotor drive belt was serviceable at the time and pre-flight considered to be satisfactory. The aircraft operated normally until the sudden yaw.

1.6.5 After the accident, the pilot performed a visual inspection of the wreckage and found that the centre tail rotor drive-belt had sustained a catastrophic failure. The belt was twisted and broken and had become entangled in the centre pulley. This section was not damaged by the post-impact fire.

Figure 2. Views of the damaged tail rotor drive-belt.

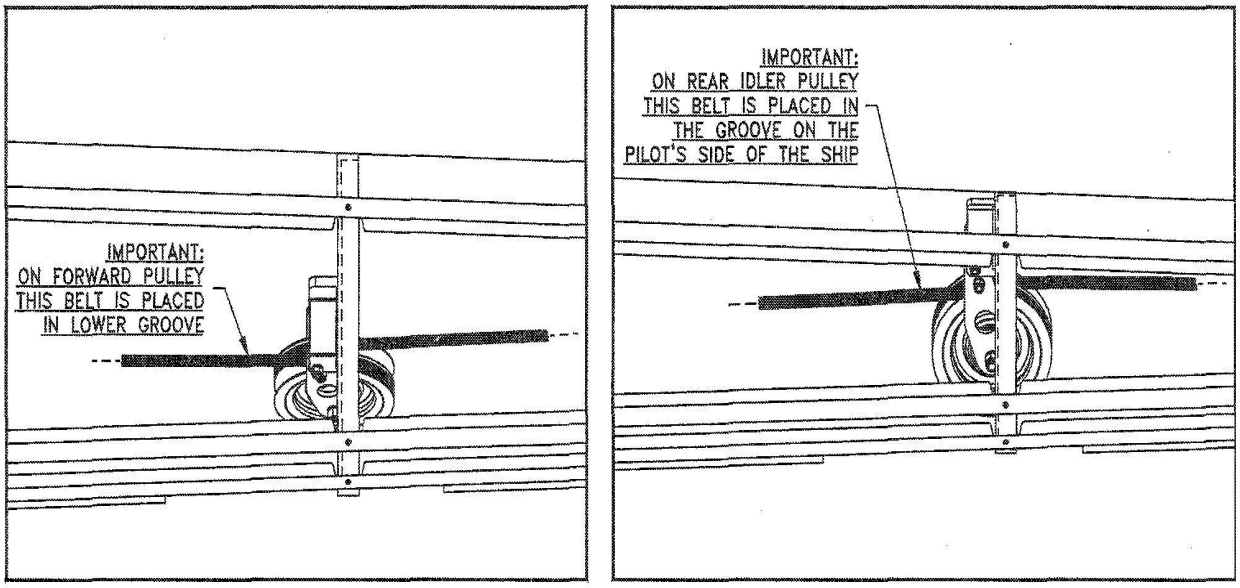


Figure 3. The correct method of installation of the tail rotor drive-belt.

Fuel

1.6.6 According to the pilot, the helicopter was refuelled to capacity with 17 US gallons of avgas at Aviators' Paradise aerodrome (FAAP). There was sufficient fuel for the flight.

1.7 Meteorological Information

The following was supplied by the pilot:

Wind direction	Westerly	Wind speed	20 kts	Visibility	Good
Temperature	± 20°C	Cloud cover	Nil	Cloud base	Nil
Dew point	Unknown				

1.8 Aids to Navigation

1.8.2 The helicopter had standard navigation equipment installed, and this was serviceable.

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1.9 Communications

1.9.1 The aircraft was installed with serviceable VHF radio communication equipment and was operated in uncontrolled airspace.

1.10 Aerodrome Information

1.10.1 The helicopter was being flown from FAAP to FARG when the pilot experienced a sudden yaw. The accident site was in a field away from an aerodrome at co-ordinates S25°39 59.26 E027°22 38.56.

1.11 Flight Recorders

1.11.1 The helicopter did not have a flight data recorder (FDR) or a cockpit voice recorder (CVR) installed. Neither was required by regulations.

1.12 Wreckage and Impact Information

1.12.1 The pilot executed a precautionary landing in a field ± 20 miles east of FARG. During landing the left skid dug into a mound of soil, causing the aircraft to nose over and come to rest on its left side. The main rotor blades were still rotating and sustained major damage. A post-impact fire erupted and contributed to the destruction of the helicopter. The wreckage was intact and contained in one place at co-ordinates S 25º3959.26 E027º2238.56.

1.13 Medical and Pathological Information

1.13.1 The pilot had a valid medical certificate with no waivers.

1.13.2 He was not injured in the accident.

1.14 Fire

1.14.1 According to the pilot, a fire erupted after the accident sequence. The source of ignition could not be determined in the investigation.

1.15 Survival Aspects

1.15.1 The accident was considered survivable. The cabin remained intact and the pilot was properly restrained by the aircraft's safety harness. After the helicopter nosed over and rolled onto its left side, the pilot reacted quickly, unfastening the safety belts and evacuating the helicopter. The pilot was standing a safe distance (± 5 m) from the wreckage when the post-impact fire erupted.

1.16 Tests and Research

1.16.1 None.

1.17 Organisational and Management Information

1.17.1 This was a private flight. The pilot was also the owner of the aircraft.

1.17.2 The last annual inspection was carried out by an Approved Person appropriately rated on the type and authorised to do maintenance on the aircraft.

1.17.3 The Regulator decided not to perform an onsite investigation due to the late reporting of the accident. Instead, a desktop investigation was conducted, relying on information obtained from the owner-pilot and the aircraft manufacturer.

1.18 Additional Information

1.18.1 All the owners of Rotorway Executive 162 helicopters in South Africa, specifically the Executive 162F type, were contacted during the investigation to determine if any had experienced problems with tail rotor drive-belts. None had. Some owners had made use of the manufacturer to carry out maintenance on their helicopters, while others had used the Approved Person responsible for the accident aircraft.

1.18.2 According to the Executive 162F pilot operating handbook (POH), the following items should be checked during the pre-flight inspection:

(i) Travel of idler pulley swing arm (not bottoming out in bulkhead)

(ii) The tail rotor drive should be checked for condition and location of drive belts. The tension of the belts should also be checked (1⅜ inch ± ⅛ inch at

10 lbs using the belt tension tool).

(iii) Condition of the pulleys and bearings

(iv) Temperature strips on the idler pulley and drive pulley:

(a) 170°F (77°C) indicates belt slipping or other problem.

(b) 180°F (82°C) or higher shows that the belt has been damaged by heat and must be replaced.

1.18.3 The emergency procedures in the POH (Section 4, Item K) for tail rotor failure during forward flight are as follows:

(i) Failure is usually indicated by a right or left yaw which cannot be corrected by applying the pedal.

(ii) Immediately enter a shallow descent into the wind.

(iii) Select a landing site and perform a run-on landing, touching down at a speed well above translational lift, and using throttle to maintain heading.

1.18.4 The aircraft manufacturer has published mandatory and advisory service bulletins to inform owners of inspection requirements introduced as a result of failed tail rotor drive-belts. According to the bulletins, the following incidents and factors have been recorded:

(i) An accident occurred due to loss of tail rotor control. During the teardown inspection, the middle or second tail rotor belt was found in several pieces and the belt cords were wrapped in the groove of the rear idler pulley.

(ii) The aramid fibre tail rotor belts become tighter as the temperature increases, and loosen as the temperature decreases.

(iii) Tail rotor drive belts (part numbers E18-1150 and E18-1160) recently failed in two separate instances. Both of these belts were Gates brand and it was recommended that they be replaced immediately with Bando belts.

1.18.5 Based on the above information, the manufacturer was requested to forward the part numbers (P/N) and brand of the tail rotor drive-belts fitted at assembly. The following was supplied:

(i) Tail Rotor Rear Belt – 112”, P/N E18-1160

(ii) Tail Rotor Front Belt – 118”, P/N E18-1150

(iii) The manufacturer did not know the brand of the belts and awaited information from the USA. However, based on the service bulletin, it was evident that the belts were of the Gates type.

1.18.6 The manufacturer published the following recommendations for owners:

(i) There should be immediate inspection on the aircraft to verify proper routing of tail rotor drive belts through the tail boom. The belts should be installed in

specific grooves of the pulleys. If belts are routed properly there is no further action required. Any belt not properly routed into correct idler pulley groove should be replaced immediately.

(ii) The standard tail rotor belt tension is 1 3/8" ± 1/8" deflection at 10 pounds of pull while the belts are at operating temperature. If the belts are adjusted in cold weather, they may become too tight as the aircraft is flown and warms up. On the other hand, if the belts are checked and adjusted warm indoors, and the aircraft is then taken outside and flown in cold weather, the belts may be too loose. Pre- and post-flight inspections are very important. The manufacturer recommends the use of their new belt tension tool, which is faster and easier to use than the spring scale and ruler method. Belt tension should be checked before and after each flight and adjusted when necessary.

1.18.7 The aircraft had a Fully Automated Digital Electronic Control (FADEC) system installed. This is a fully redundant electronic engine control system which automatically activates during failure of the primary system. By using the selector buttons, the pilot can view a number of engine conditions on the digital display monitor. If a problem arises, the pilot can identify it and respond accordingly. The manufacturer was requested to provide information of downloads from the FADEC, but none was received.

1.18.8 The manufacturer stated that they were not responsible for assembling the aircraft and forwarded the details of another SA aviation company who, according to them, were responsible for the assembly process. The manufacturer did not explain why this company was allowed to use Rotorway's authorisation stamp to release the aircraft to service after it was assembled.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1 The pilot had a valid licence and the type rating of the accident aircraft was endorsed on it. He had a valid medical certificate, was in good health and had no medical problem which prevented him from operating the aircraft safely. His training and total hours attest to his flying experience, and he clearly demonstrated his ability by speedily regaining control during the sudden yaw. He also acted in compliance with the aircraft flight manual by deciding not to continue with the flight and performing an autorotation to a field. The pilot experienced no anomaly with the helicopter apart from the yaw.

2.2 The owner-pilot was aware of his responsibility to ensure that the helicopter was appropriately maintained, and had taken the helicopter to an Approved Person for scheduled and unscheduled maintenance.

2.3 The workmanship of the Approved Person was analysed and it was found that he had neglected to appropriately certify the maintenance logbook of the helicopter as required by regulations. Another concern was that airworthiness directives and service bulletins applicable to the type had not been certified in the maintenance logbook. This calls into question the professionalism of the Approved Person.

Aircraft

2.4 The helicopter was considered to be airworthy prior to the flight. The owner/pilot indicated that he had performed a pre-flight inspection. There was no indication of any mechanical systems defect or malfunction prior to the flight. The aircraft started up, lifted off and took off as required. This is normally the time when components are under maximum stress. However, it was during cruise that the helicopter suddenly yawed to the left. The pilot instinctively identified the problem to be the tail rotor and responded by depressing opposite right rudder. This input proved to be ineffective, an indication of possible tail rotor failure.

2.5 The pilot followed appropriate procedure by using engine power to control his heading. The aircraft responded effectively and the pilot once again maintained straight and level flight. After the accident, it was found that the tail rotor drive belt had failed, and it is possible that the loss of tail rotor effectiveness might have been caused by this failure.

2.6 No on-site investigation was performed, and the tail rotor drive belt was not recovered from the wreckage for testing to determine the cause of failure. Instead, research was conducted into the accident and incident history of the aircraft type and it was found that the tail rotor failure was not an isolated occurrence. The aircraft manufacturer had published airworthiness directives and service bulletins to inform operators of potential tail rotor dangers.

2.7 One particular service bulletin referred to the failure of tail rotor drive belts (part numbers E18-1150 and E18-1160) which were Gates brand belts. Apparently, this company changed its facilities and processes, and operators began experiencing premature belt wear and failure. Based on the findings of the manufacturer's investigations, it was recommended that these belts not be used.

2.8 It was found that the accident aircraft still had the Gates belts installed. The service bulletin had therefore not been complied with. The result was exactly as predicted by the manufacturer: "Loss of your tail rotor will most likely result in significant aircraft damage".

2.9 The tail rotor drive belt was found to be within its service lifetime as specified in the maintenance manual. According to the manufacturer, the integrity of the belts also depends on their condition and tension – and these factors have to be checked before every flight. It is recommended that whenever the belts have stretched one inch or more, they should be replaced immediately, regardless of the hours they have been in use. The new belts stretch rapidly and it is important to prevent them from becoming too loose. A belt that is too loose could be damaged by rolling over the edge of the pulleys or by the heat created from excessive slippage. In order to avoid the above failure, the pilot is required to use the belt tensioning tool during pre-flight inspections. No proof could be found indicating that the pilot did not use the belt tensioning tool. None of these anomalies was observed by the pilot during his pre-flight inspection, however, and the aircraft was considered to be serviceable for the flight.

Environment

2.10 The pilot was obligated to execute an emergency landing, ideally in an open, level area to avoid colliding with obstacles. He spotted several hazards such as power

lines and trees, and in trying to avoid them selected an open area covered with long grass. During the run-on landing the left skid dug into a hidden mound of soil, causing the helicopter to become unstable. It nosed over and fell onto its left side.

3. CONCLUSION

3.1 Findings

3.1.1 The owner-pilot had a valid licence and the aircraft type rating was endorsed on it.

3.1.2 He had a valid medical certificate with no waivers.

3.1.3 He was the owner of the aircraft and issued with a valid Private Authority to Fly Certificate.

3.1.4 He was the sole occupant and was flying on a private flight under VFR by day from FAAP to FARG.

3.1.5 The aircraft was registered as a Non-Type Certificated Aircraft (NTCA) and operated in accordance with requirements of CAR, Parts 24 and 94.

3.1.6 It was maintained by a duly authorised Approved Person (AP).

3.1.7 While en route to FARG, the aircraft experienced a suddenly left yaw and the pilot executed an autorotation landing.

3.1.8 The emergency procedure followed by the pilot was in compliance with the requirements of the emergency procedures in the pilot's operating handbook, Section 4, item K.

3.1.9 The pilot could maintain his heading only by means of reducing engine power.

3.1.10 He selected a suitable open field to perform the run on landing.

3.1.11 During landing after touchdown, the left skid dug into a mound of soil which caused the aircraft to nose over and fall onto its left side.

3.1.12 The pilot evacuated the aircraft through the windscreen but did not sustain any injury.

3.1.13 The aircraft was destroyed in the impact sequence and by post-impact fire.

3.1.14 The accident was reported a day after it occurred and it was therefore decided not to conduct an onsite investigation.

3.1.15 The wreckage was inspected by the pilot after the accident and evidence was found that the centre tail rotor drive belt had failed.

3.1.16 The emergency was determined to be the result of tail rotor failure.

3.2 Probable Cause/s

3.2.1 The pilot experienced a centre tail rotor drive belt failure in flight, which resulted in an unsuccessful precautionary landing.

3.2.2 The pilot landed the aircraft short of the selected landing zone.

3.2.3 The helicopter's left skid dug into a mound of soil and the aircraft rolled over.

4. SAFETY RECOMMENDATIONS

4.1 It is recommended that the aircraft manufacturer should provide training to registered owners and operators to appropriately make use of the tail rotor drive-belt tension testing equipment and effective visual inspection techniques so that they are equipped with the necessary skills to identify potential problems with the tail rotor transmission system.

4.2 It is recommended that the Commissioner for Civil Aviation (CCA) in consultation with the aircraft manufacturer investigate the possibility of upgrading the relevant tail rotor drive system service bulletin A - 12 to be a mandatory airworthiness directive.

4.3 It is recommended that the Commissioner for Civil Aviation (CCA) require that the aircraft manufacturer make contact with all the owners and operators who have the Gates brand tail rotor drive belts (part numbers: E18-1150 and E18-1160) fitted on their aircraft, to comply with the applicable service bulletin A-12 (dated 8 September 1992) requirement immediately, i.e. before their next flight.

5. APPENDICES

5.1.1 Appendix A: Copies of Airworthiness Directives and Service Bulletins

Report reviewed and amended by the Advisory Safety Panel on 16 February 2010

-END-

Appendix A

Airworthiness Directives (AD) and Service Bulletins (SB)

(5)

ROTORWAY INTERNATIONAL

4140 W. MERCURY WAY • CHANDLER BOULEVARD
CHANDLER, AZ 85226 • USA
PHONE (480) 961-1001 FAX (480) 961-1514

April 4, 2002

TO ALL EXEC OWNERS

ADVISORY BULLETIN A-36

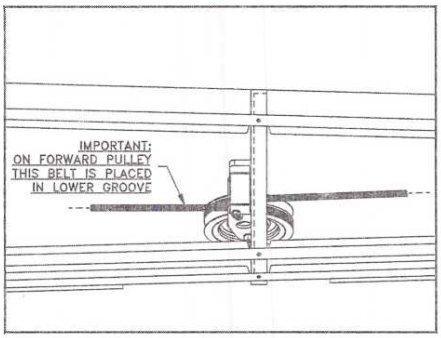
History: Recently an accident occurred due to loss of tail rotor control. During the teardown inspection, the middle or second tail rotor belt was found separated in several pieces and the belt cords were wrapped in the groove of the rear idler pulley. There is a strong opinion that the belts were not routed properly from one pulley to the next pulley, because the cords from the separated belt were wrapped in the pulley groove intended for the rear tail rotor belt.

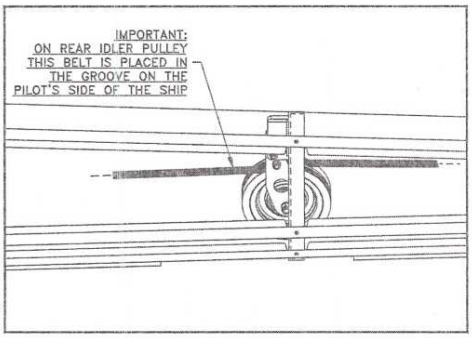
The tail rotor belts transfer power from the main drive to the tail rotor shaft. As indicated in the construction documents, the belts should be installed in specific grooves of the pulleys. (Refer to the drawings below taken from print E09-2000.)

Action: This bulletin strongly recommends immediate inspection to verify proper routing of tail rotor drive belts through the tail boom. Removal of the tail boom inspection panels will allow for visual determination of belt routing. At the forward idler pulley, the belt coming from the secondary drive unit should be in the lowest groove of the idler pulley, and the second or middle belt should be in upper groove routing rearward. At the second idler pulley location, the second belt should route to the groove on pilot side of the aircraft, and the third belt which routes to the tail rotor shaft should be located in the upper or passenger side pulley groove.

If belts are routed properly there is no further action required.

ANY BELT NOT PROPERLY ROUTED INTO CORRECT IDLER PULLEY GROOVE SHOULD BE REPLACED IMMEDIATELY.





RotorWay INTERNATIONAL

300 South 25th Ave. Phoenix, Arizona 85009 / 602-278-8899
FAX 602-278-7657

September 8, 1992

TO ALL EXEC BUILDERS

EXEC ADVISORY SERVICE BULLETIN A-12

History: Tail rotor drive belts (part numbers E18-1150 and E18-1160) have recently failed during use in two separate instances. Both of these belts were Gates brand. Investigation into the belt industry has revealed that Gates has recently changed their manufacturing facilities and processes; and that users of Gates belts in other applications have experienced premature belt wear and failure.

Since we cannot be sure of the location or process by which the belts are manufactured, we recommend no further use of Gates brand belts on the tail rotor drive system. Loss of your tail rotor will most likely result in significant aircraft damage.

Action: RotorWay International has constructed a fixture for testing different brands of belts. Bando belts, which appear to be of superior construction and are currently being used in the drive train, have tested satisfactory and are now available from RotorWay.

We strongly recommend that all Gates brand belts currently being used in the tail rotor drive be replaced immediately with Bando belts.

Note: Proper installation and maintenance of these belts is critical, and the following installation procedures should be adhered to. The nuts on the tail rotor shaft adjustment rods should be fully loosened so the belts can be installed without being under any tension. **NEVER ROLL ANY BELT INTO PLACE** over the edge of a pulley while under tension - this can damage the cords inside the belt. After installation, tighten the nuts on the adjustment rods to tension the belt. Then check belt tension just forward of the first tail boom bulkhead using a spring scale and ruler. Adjust the belt so that it deflects one inch with 10 pounds of pull.

The belts should be kept free from any dirt, oil, grease, etc. Clean as necessary with a clean cloth, dampened with acetone.

ROTORWAY INTERNATIONAL

4141 W. CHANDLER BOULEVARD • CHANDLER, AZ 85226 • USA
PHONE (602) 961-1001 FAX (602) 961-1514

May 12, 1995

TO ALL EXEC, EXEC 90 AND EXEC 162F BUILDERS

TAIL ROTOR BELT ADVISORY BULLETIN A-21

History: As a result of extensive testing of tail rotor belts, RotorWay International has confirmed that when a belt is properly installed and maintained, it will perform as expected for the 250 hour lifetime specified in the Maintenance Manual. In our test fixture, we have been unable to create a deliberate belt failure on properly tensioned belts.

Advisory Bulletin A-20 (dated November 28, 1994) stressed the importance of checking the condition and tension of the belts before every flight. Although this may be time consuming, these pre-flight checks are essential to the continued safe operation of your helicopter.

Action: To simplify the important task of belt inspection, we recommend the use of a "Mandatory Belt Replacement" label to monitor belt stretching, temperature strips to monitor pulley temperatures, and a newly designed tool for checking belt tension. Below are the recommended installation and maintenance procedures to be followed.

1. Belt installation: Fully loosen the nuts on the adjustment rods so that the belts are not under any tension while being installed. NEVER install a belt by rolling it into place over the edge of a pulley while under tension, as this can damage the belt internally.

2. Initial tensioning: Using a spring scale and ruler at the first bulkhead of the tail boom, tension the belts so that a deflection of 1 3/8 inches at 10 pounds of pull is measured. Do not over-tighten the belts. Once the correct initial tension has been attained, apply the belt replacement label to the upper tail rotor slider stringer on the pilot's side. Align the "NEW BELT" mark on the label with the rear edge of the bearing mounting plate. If the bearing mounting plate reaches the "REPLACE" mark during subsequent adjustments, this is an indication that the belt has stretched beyond a safe limit. WHENEVER THE BELTS HAVE STRETCHED ONE INCH OR MORE, THEY MUST BE REPLACED IMMEDIATELY, REGARDLESS OF THE NUMBER OF HOURS THEY HAVE BEEN USED.

(continued)

3. Temperature strips: Install temperature strips on the two tail rotor idler pulleys and the drive pulley on the tail rotor shaft. The heat sensitive "dots" will darken if the indicated temperature is exceeded.

   Examine the temperature strips before and after each flight. If the 170° dot darkens, it is an indication that a belt may be slipping or some other problem may exist. The problem should be identified and corrected before continuing flight. If the 180° (or higher) dot darkens, the belts have been damaged from heat and MUST be replaced.

4. Belt "break-in" period: Upon installing new belts, check and adjust the tension every 15 minutes that the engine is running (idle or operating RPM) until no further adjustment is required. New belts will stretch rapidly during this time, and it is very important to prevent them from becoming too loose. A belt that is too loose could be damaged internally by rolling over the edges of the pulleys; it can also be damaged by the heat created from excessive slipping.

5. Pre- and Post-flight check: RotorWay International recommends the use of our new belt tension tool, which is faster and easier to use than the spring scale and ruler method. Belt tension should be checked before and after each flight and adjusted when necessary.

6. Cleaning: The belts and pulleys should be kept clean and free of any oil, dirt or other contamination. Use acetone and a clean cloth (the rag should be damp but not dripping with acetone).

The belt replacement label (part number E18-1200), temperature strips (part number E08-5200), and belt tension tool (part number E08-5100), along with detailed instructions, are now available from our parts department.

ROTORWAY INTERNATIONAL

4140 W. MERCURY WAY • CHANDLER BOULEVARD
CHANDLER, AZ 85226 • USA
PHONE (602) 961-1001 FAX (602) 961-1514

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TO ALL EXEC, EXEC 90 and EXEC 162F OWNERS

ADVISORY BULLETIN A-25

The following information applies only to aramid fiber tail rotor belts, which have been supplied by RotorWay International since 1/25/94.

History: RotorWay International has observed that the aramid fiber tail rotor belts become tighter as the temperature increases, and loosen as the temperature decreases.

Action: The standard tail rotor belt tension is 1 3/8" ± 1/8" deflection at 10 pounds of pull while the belts are at operating temperature. If the belts are adjusted in cold weather, they may become too tight as the helicopter is flown and warms up. On the other hand, if the belts are checked and adjusted warm indoors, and the helicopter is then taken outside and flown in cold weather, the belts may be too loose.

We recommend that the following procedures be observed during colder weather:

1. The belts should be checked and adjusted in an environment that is approximately the same temperature that the helicopter will be operated in.

2. If the belts are tensioned cold, adjust them to the loose end of the range, so that as they warm up, they will be within limits.

3. Allow the aircraft to run long enough for the coolant and oil temperatures to stabilize, then shut down and immediately check the belt tension again. Adjust as necessary.

4. Remember that if the 170° temperature dot darkens, it indicates that the belts are running hotter than normal. If the 180° (or higher) dot darkens, the belts have been damaged from heat and MUST be replaced.