

Safety Investigation Report

Ref. AAIU-2012-13

Classification: Serious incident

Level of investigation: Standard

Date and hour: 02 July 2012 at 11:57 UTC

Aircraft: Aquila A210 MSN: 183
The aircraft is registered in France and held a valid Airworthiness Review Certificate (ARC)

Total flight time: 1133,3 FH

Type of engine: One Rotax 912S (BRP-Powertrain) S/N: 4.923.554

Accident location: In a grass field in Waasmunster (N 51° 06.47' - E 004° 07.25')

Aircraft damage: Landing gear cowling ruptured, oil leak and subsequent damage to engine

Type of flight: Cross-country flight

Phase: Cruise

Persons on board: 2 crew, both holders of a Private Pilot License, Single Engine Piston (land)

Injuries: None

Abstract:

The aircraft took off from EBCI for a flight to EHLE, the Netherlands. Above VOR AFI, abeam EBBR, the pilots smelled an odour of burned oil. However they didn't notice any smoke, neither in the cockpit, nor outside, and all engine parameters were normal. They proceeded the flight to VOR NIK. After approx. 5 minutes, the engine started to run rough and a big drop of oil pressure was noticed. The pilot in command putted the propeller in fine pitch to stabilise the engine RPM. All other engine parameters were still in the green. The pilot searched for an adequate terrain to make a forced landing. This was found in Waasmunster. After circling 2 times above the grass field, the landing was successfully performed. The engine was shut down and the occupants evacuated the aircraft uninjured. The belly of the aircraft showed a giant oil trace and the nose landing gear cowling was found ruptured.

Cause(s):

The cause of the incident was a loose washer in the engine causing a hole in the ignition housing and a subsequent oil leak.

Hazard identified during the investigation ¹:

Performing a maintenance task not in accordance with approved data.

Consequence ²:

Powerplant failure (SCF-PP)

¹ Hazard – Condition or object with the potential of causing injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.

² Consequence – Potential outcome(s) of the hazard

Damage

Aircraft

Only the nose landing gear cowling was ruptured due to the landing in the field.

Engine

The engine was sent to Franz Aircraft Engines Vertrieb GmbH, Germany for an investigation. A hole was found in the ignition housing under the water pump. When removing this housing, a damaged thrust washer of the idle/intermediate gear fell out. A tooth of the camshaft gear was missing and the water pump gear was also damaged. A metal part was found in the range of the circlip on the sprag clutch housing. Besides this, there was also damage on the pistons and the inlet valves.



Figure 1: hole in ignition housing



Figure 2: damaged thrust washer showing impact of gear teeth

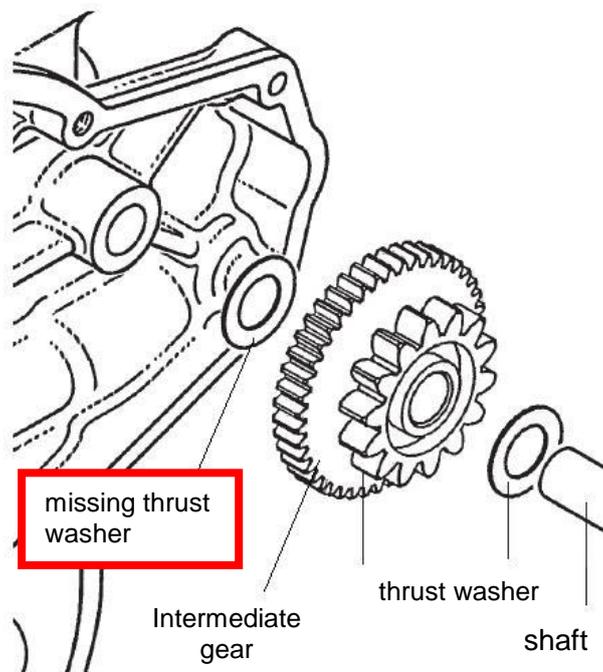
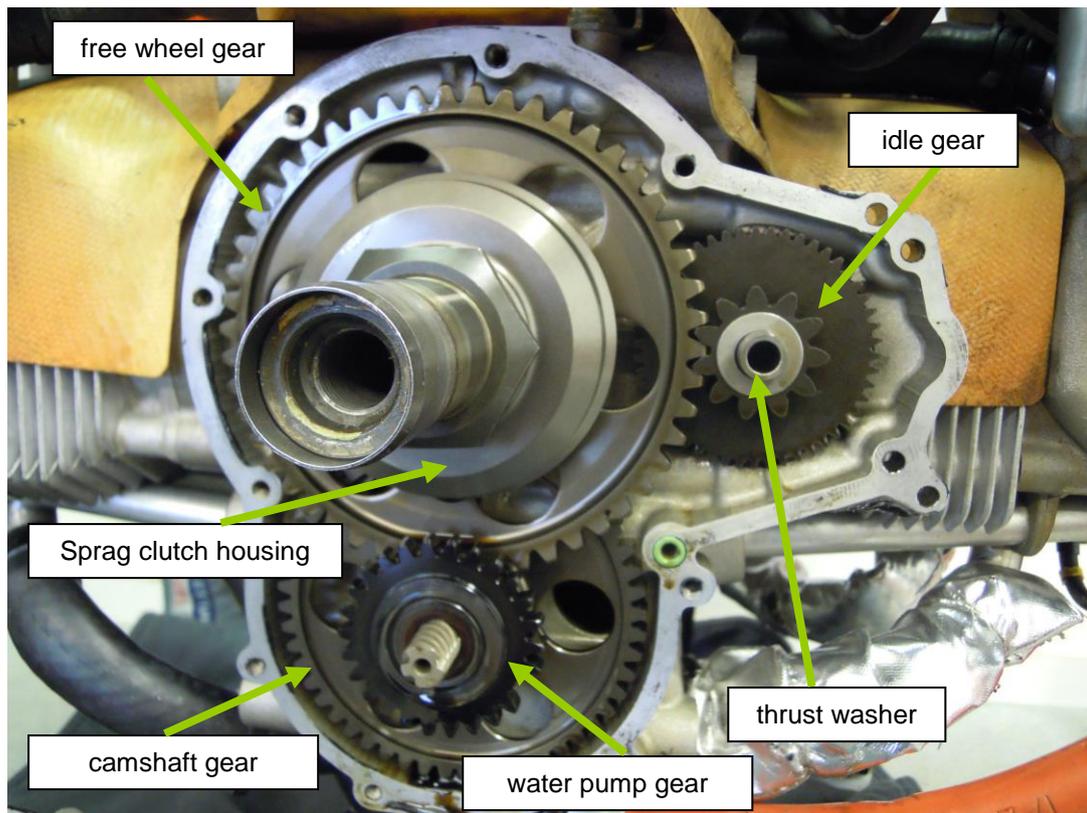


Figure 3: Assembly of the idle/intermediate gear

Engine description



Maintenance history of the engine

During the last maintenance, the sprag clutch assy was replaced because the starter couldn't turn fast enough. 2 rollers of the sprag clutch weren't rolling anymore.

This repair was done on 25 June 2012 at 1119,2 FH by an independent Rotax Maintenance Technician (iRMT) who is certified by BRP-Powertrain to perform heavy maintenance tasks. After a ground run and a test flight, the aircraft was released by a Part 66 B1 licensed engineer.

The technician (iRMT) declared that he didn't remove the intermediate gear for this job.

Maintenance manual

The removal of the sprag clutch is described in the Rotax Maintenance Manual section 72 chapter 3.6.1. There is also the following stated to do this job:

Pull out the intermediate gear shaft and remove the intermediate starter gear with the thrust washers on both sides of the intermediate gear.

BRP-Powertrain stated that this not necessary from a technical point of view, but that this is asked to carry out a visual inspection and to clean the housing.

In chapter 3.4, which describes the removal of the ignition housing there is the following note:

The thrust washer of the intermediate starter gear may be stuck on the rear side if the ignition housing.

Analysis

The sprag clutch assy was replaced 14 flight hours before the incident. The technician doing this job, declared that he did not remove the idle/intermediate gear during the replacement of the sprag clutch assy although this was asked by the Maintenance Manual section 72 chapter 3.6.1.

It is obvious that if the thrust washer would have been on its place during the re-assembly it never could have fallen and been damaged like it was.

The hypothesis is that while removing the ignition housing to perform the repair, the gear shaft (see figure 4 and 5) moved together with the housing, allowing the aft thrust washer to become loose and to shift down. Subsequently, the washer got between the different gears causing amongst others a tooth of the camshaft gear to break. Finally this broken tooth came down below the water pump gear which pushed it through the housing with the oil leak as result.

If the intermediate gear would have been removed and re-installed during the sprag clutch replacement, a missing washer would have been noticed.

Conclusion

The engine failure was due to a loose washer in the engine causing a hole in the ignition housing and a subsequent oil leak. This could happen because a maintenance task was not completely performed in accordance with the Maintenance Manual.

Safety recommendation

Recommendation 2012-P-14

AAIU(Be) recommends that BRP-Powertrain adds a note in the Maintenance Manual that warns the users that a failure to check the presence of both thrust washers of the intermediate gear before re-installation of the ignition housing could led to heavy damage of the engine.

ABOUT THIS REPORT

As per Annex 13 and EU regulation EU 996/2010, it is only obliged to perform a full investigation of accidents and serious incidents involving aircraft other than specified in Annex II to Regulation (EC) No 216/2008. However, the Air Accident Investigation Unit may decide to investigate other incidents when they expect to draw safety lessons from them. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report.

It is not the purpose of the Air Accident Investigation Unit to apportion blame or liability. The sole objective of the investigation and the reports produced is the determination of the causes, and, where appropriate define recommendations in order to prevent future accidents and incidents.