Australian Government
Civil Aviation Safety Authority

Airworthiness Bulletin

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Kamatics Corporation KAflex Drive Shafts – UH-1 and Bell 206/407/412

An Airworthiness Bulletin is an advisory document that alerts, educates, and makes recommendations about airworthiness matters.

Recommendations in this bulletin are not mandatory.

1. Effectivity

All UH-1 and Bell 206/407/412 helicopters with a Kamatics Corporation KAflex drive shaft installed.

2. Purpose

To alert Certificate of Registration holders, operators, and maintainers to an inadequacy in a detail in the pre-flight check requirements of the approved Bell 407 Flight Manual with regard to checking the KAflex drive shaft for serviceability.

To advise that two ATSB investigations (AO-2019-070) and (AO-2022-006) found that fatigue failure of a flex plate at a bolt hole and missing hardware as findings to the two incidents, highlighting the importance of performing a preflight inspection of the engine to transmission drive assembly.

To advise that the recent ATSB investigation (AO-2022-006) has highlighted potential aircraft handling characteristics that might be observed in the event of a failure of the KAflex drive shaft, which operators and pilots should be aware of, and once a KAflex drive shaft has entered fail-safe, complete failure of the drive shaft typically occurs in just a few minutes, leading to an emergency landing and significant damage to the helicopter.

To reiterate that FAA AD 2021-26-16, which imposes a life limit on the Kamatics engine to transmission drive shaft, is applicable to Australian restricted category UH-1H rotorcraft under the auspice of CASR Part 39 and operators must comply with the FAA airworthiness directive.

3. Background

A KAflex drive shaft is installed between the engine and main transmission in the Bell 407 rotorcraft during production.

The Kamatics STC that installs this drive shaft into the Bell 206 series rotorcraft has specific pre-flight inspection requirements, but which are omitted in the current Bell 407 Flight Manual (Rev 5 19 Feb 2007), although the drive shaft for both helicopters is identical in design.

A Kamatics/KAflex shaft assembly is also fitted to the UH series limited/restricted category rotorcraft.

Specifically, CASA considers that the word “Condition” is inadequate to describe a proper check of the drive shaft flexure plates during the pre-flight check in the powerplant area and may result in the person checking the drive shaft missing vital indications that may affect continuing airworthiness of the drive shaft.

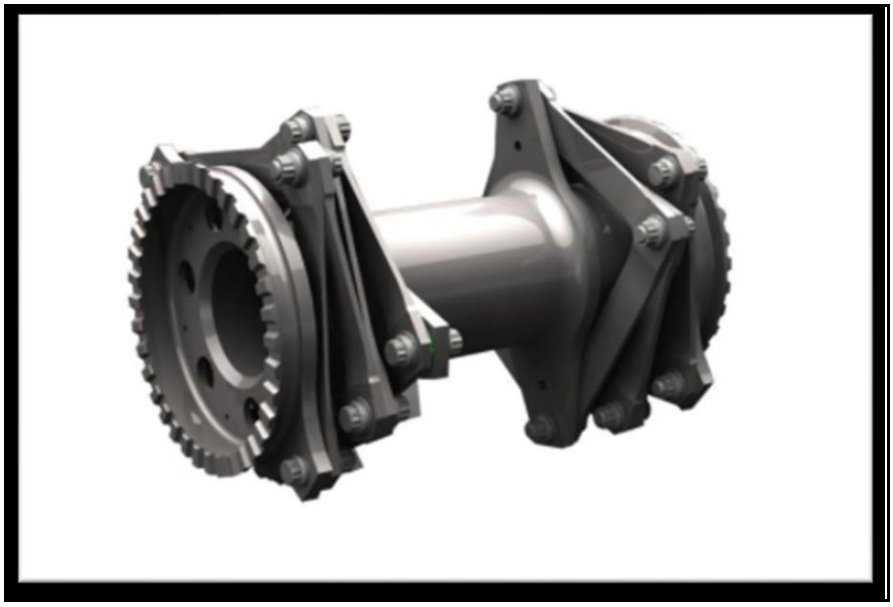
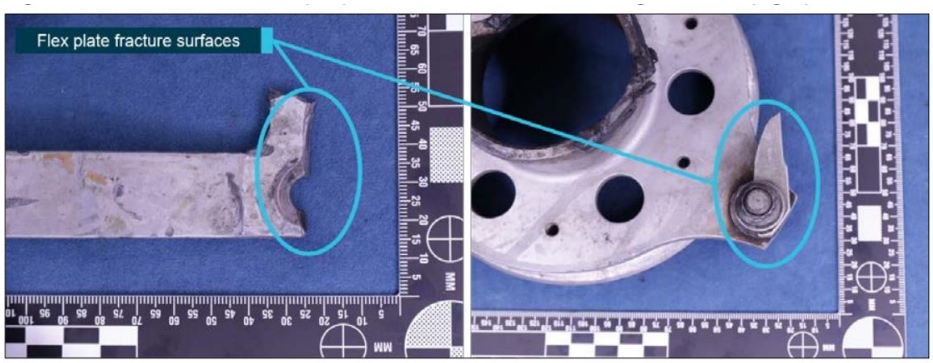
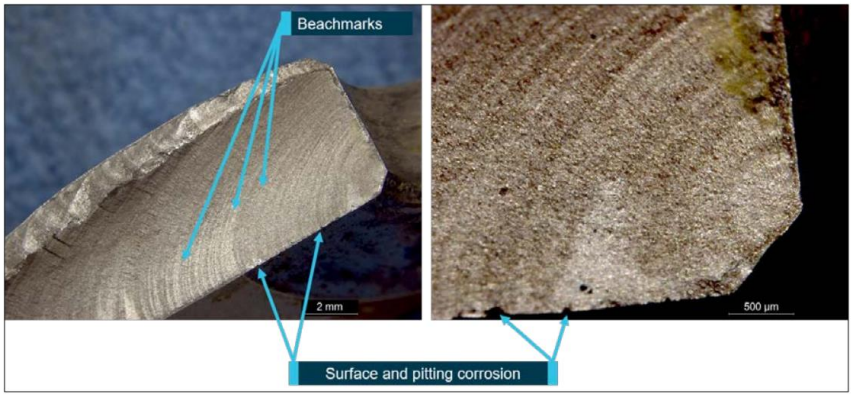


Figure 1 - Kamatics Corporation KAflex drive shaft assembly



Source: ATSB



Source: ATSB

Figure 2 - Images highlighting failed flex plate from KAflex drive shaft.
Source: ATSB report AO-2019-070

In their investigations, the ATSB has noted certain aircraft characteristics that might be observed, as follows:

1. Pilots of UH-1H helicopters should note that if vibrations or noise from the transmission area rapidly increases or becomes severe during flight, it may signify that the KAflex drive shaft has entered fail safe and could imminently fail. A ‘howling’ sound has been reported in at least one instance.

2. Of the UH-1H accidents that have occurred, complete failure of the drive shaft has typically occurred in just a few minutes leading to an emergency landing and significant damage to the helicopter. In addition, pilots should be aware that complete failure of the KAflex drive shaft can unexpectedly lead to right yaw, which is contrary to indications of a loss of drive to the main rotor system detailed in the flight manual.

4. Recommendations

It is recommended that when conducting the pre-flight check to determine the “condition” of the KAflex main drive shaft flexures in the Bell 407 and UH-1 series, that the check includes the following:

Check general condition of the KAflex drive shaft;

a. Visually check for broken, loose and missing flex frame connecting hardware (washers, nuts or bolts).

b. Inspect flex frame and mount bolt torque stripes for evidence of slippage/misalignment that may indicate rotation / movement of the connecting nuts or bolts.

WARNING

DO NOT disturb or tighten flex frame nuts or bolts.

Evidence of turning fasteners by wrench

or other means is cause for rejection.

CASA Note: *Evidence of slippage and Indications of loose hardware may include traces of "brown dust" (fretting particulate) coming from any flex frame fastener area.*

Operators should ensure that the rotorcraft maintenance programme contains a specified life limit for the Kamatics/KAflex drive shaft assembly.

Finally, that FAA AD 2021-26-16 compliance times and actions are adhered to, to ensure safe operation of the rotorcraft.

CASA Note: *Operating with the assembly beyond the recommended life limit may result in the fatigue failure of a flex frame or a flex frame attaching bolt within the drive shaft assembly.*

5. Reporting

Any defects or failures of the Kamatics Corporation KAflex drive shafts must be submitted to CASA via the CASA Defect Reporting System, including details of any flight handling characteristics associated with the failure or operation in the fail-safe mode of the drive shaft assembly.

6. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link email address:

AirworthinessBulletin@casa.gov.au

or in writing, to:

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Civil Aviation Safety Authority
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