Aviation Investigation Final Report

Location:	El Centro, California	**Accident Number:**	WPR24LA067
Date & Time:	December 23, 2023, 22:30 Local	**Registration:**	N111PM
Aircraft:	Bell 206B	**Aircraft Damage:**	Substantial
Defining Event:	Sys/Comp malf/fail (non-power)	**Injuries:**	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The pilot was flying in night visual flight rules (VFR) conditions about 100 ft above ground level (agl), toward an intended application site for agricultural pesticides, when the helicopter began to make a loud noise and vibrate. Unsure if the helicopter had lost rotor rpm or not, the pilot lowered the collective and initiated a run-on landing to a field.

Postaccident examination of the helicopter's airframe and engine revealed that the forward-most flex plate of the forward flex coupling on the KAflex driveshaft assembly was fractured. No evidence of additional preaccident mechanical malfunction or failure that would have precluded normal operation was observed.

Fracture analysis revealed that the flex plate failed due to a fatigue fracture resulting from a loose attachment between the flex plate and the forward driveshaft fitting.

Multiple areas of missing or replacement torque paint were observed throughout the KAflex driveshaft assembly's joints. It is likely that the joints had either slipped or been manually disturbed before the non-original torque paint was applied, which would have been cause for the driveshaft assembly to be removed and shipped to the manufacturer. However, no evidence of the driveshaft's removal after visual confirmation of joint slippage or disturbance was recorded in the aircraft maintenance logs.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

An in-flight failure of the engine-to-transmission driveshaft due to a fatigue fracture of the forward-most flex plate in the forward KAflex coupling that resulted from a loose bolt attachment between the flex plate and the forward driveshaft coupling. Contributing to the accident was maintenance personnel's failure to identify the condition and remove the KAflex driveshaft for repair as specified by the manufacturer.

Findings

Aircraft	(general) - Failure
Personnel issues	Scheduled/routine inspection - Maintenance personnel

Factual Information

History of Flight

Enroute	Sys/Comp malf/fail (non-power) (Defining event)
Enroute	Emergency descent initiated
Emergency descent	Off-field or emergency landing

On December 23, 2023, about 2230 Pacific standard time, a Bell 206B, N111PM, was substantially damaged when it was involved in an accident near El Centro, California. The pilot was not injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 137 aerial application flight.

According to the pilot, the helicopter departed from a flatbed truck with about 73 gallons of pesticide and 200 lbs of fuel onboard, and then flew toward the intended application site at about 100 ft agl. Abruptly, the helicopter began to make a loud noise and "vibrate badly." Initially unsure if the engine was losing rotor rpm, the pilot lowered the collective and initiated a run-on landing to a field.

Postaccident examination of the airframe and engine revealed substantial damage to the engine-to-transmission driveshaft, known as a KAflex driveshaft, which exhibited a fractured flex plate and gouging of the isolation mount. No evidence of additional mechanical malfunction or failure was observed that would have precluded normal operation.

Postaccident examination of the KAflex driveshaft was conducted by the National Transportation Safety Board Materials Laboratory. The examination revealed that the flex plate at the forward end of the forward flex coupling was fractured where it had been attached to the forward driveshaft fitting. The fracture surfaces in the forward flex plate revealed flat fracture features with curving crack arrest lines that were consistent with fatigue fracture. Fatigue features emanated across most of the fracture surface on both sides of the hole, consistent with high-cycle fatigue with relatively low nominal stress levels.

The joint between the forward driveshaft fitting and the forward flex plate was loose, and visible gaps opened as the joint was flexed by hand. The bolts attaching the forward flex plate to the adjacent flex plate were removed to separate the forward flex plate from the rest of the assembly.

Examination of the aft face of the forward flex plate at the fracture location and at the hole opposite the fracture location revealed that both holes were elongated, and surfaces around the hole were dished, with thinning through the thickness, consistent with wear contact from relative motion between the flex plate and associated bolts and washers. The bolt shanks at

both locations were also thinned, consistent with contact wear from relative motion between the bolt and the attachment holes.

At the joint associated with the fracture location, remnants of yellowish orange colored torque paint were observed on the head of the bolt and on the side of the forward flex plate. Additionally, green torque paint was observed on the nut and adjacent washer, the side of the forward fitting lug, and the edge of the bolt head. With the green paint on the bolt head aligned with the green paint on the forward fitting lug, the yellowish orange paint remnants on the bolt head and adjacent flex plate would not be aligned if the flex plate was placed in its originally installed position. On the opposite side of the coupling, a remnant of yellowish orange paint was observed on the side of the forward flex plate, and paint was absent from the remainder of the joint.

Most of the attachment hardware associated with the forward and aft flex couplings had evidence of yellowish orange torque paint applied at the head side and the nut side of each joint. On close inspection of the aft flex coupling, torque paint was missing, broken, or incomplete on 3 of the 10 bolt heads and all 10 of the nuts. On the forward coupling, torque paint was missing, broken, or incomplete on half the bolt heads, and 6 of the 10 nuts, including the heads and nuts at the forward flex plate. In 4 of the joints where torque paint was missing from one or both sides of the joint, the outer surface of the flex plate showed evidence of circumferential rubbing contact with another object.

According to Kamatics Service Instruction Number SIN2348 Rev. K, *Installation, Maintenance, and Repair of the KAflex Driveshaft for the Bell 206A and 206B Helicopter,* the driveshaft assembly should be inspected for loose or missing hardware (bolts, nuts, washers) daily, before the first flight of the day. The inspection should include a check of the torque strips for evidence of slippage. If evidence of loose or missing hardware is found, the driveshaft is to be returned to Kamatics Corporation. The procedures include a warning not to disturb or tighten the flex frame nuts or bolts, and that evidence of turning fasteners by wrench or other means is cause for rejection.

According to maintenance records, the most recent routine maintenance was a 100/200/300-hour inspection, completed 3 weeks before the accident. The KAflex driveshaft was installed on 6/23/2016. No evidence of the KAflex driveshaft's removal after the 2016 installation was observed within the provided records.

Pilot Information

Certificate:	Commercial; Private	**Age:**	45,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	May 19, 2023
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 18, 2022
Flight Time:	8119 hours (Total, all aircraft), 616.2 hours (Total, this make and model), 8047 hours (Pilot In Command, all aircraft), 516 hours (Last 90 days, all aircraft), 178.9 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N111PM
Model/Series:	206B	**Aircraft Category:**	Helicopter
Year of Manufacture:	1975	**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	1770
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	December 2, 2023 100 hour	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Turbo shaft
Airframe Total Time:	17072.6 Hrs as of last inspection	**Engine Manufacturer:**	Rolls Royce
ELT:		**Engine Model/Series:**	250-C20J
Registered Owner:	On file	**Rated Power:**	420 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	Agricultural aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	KIPL,0 ft msl	**Distance from Accident Site:**	2 Nautical Miles
Observation Time:	22:53 Local	**Direction from Accident Site:**	225°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots / None	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	230°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.03 inches Hg	**Temperature/Dew Point:**	11°C / 9°C
Precipitation and Obscuration:			
Departure Point:	Brawley, CA (n/a)	**Type of Flight Plan Filed:**	None
Destination:	Brawley, CA (n/a)	**Type of Clearance:**	None
Departure Time:	18:00 Local	**Type of Airspace:**	Military operation area;Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	32.94059,-115.31871(est)

Administrative Information

Investigator In Charge (IIC):	Blocher, Kristyn
Additional Participating Persons:	Todd Crousore ; Federal Aviation Administration; San Diego, CA Jon-Adam Michael; Rolls-Royce; Indianapolis, IN
Original Publish Date:	October 22, 2025
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=193630