Aviation Investigation Final Report

Location:	RIVIERA, Texas	**Accident Number:**	FTW98LA084
Date & Time:	January 2, 1998, 08:30 Local	**Registration:**	N1091Y
Aircraft:	Hughes 269C	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Other work use		

Analysis

Following a total loss of engine power, during a cattle herding flight, the pilot executed an autorotation to an area confined by trees. Engine examination revealed a broken crankshaft & camshaft. The camshaft exhibited deformation consistent with overload. All four cylinder mounting flanges were fretted & all piston rings showed 'excessive' wear. The #1 & #4 cylinder top compression rings were broken. Main bearing saddle faces of the crankcase showed heavy fretting. The engine manufacturer Materials Laboratory reported the mode of fracture of the crankshaft was fatigue. The fatigue originated from the oil hole (between #3 main & #3 crankpin journals) in the cheek and near the rear fillet radius of the #3 main bearing journal. The cause of the fatigue was not determined. During the overhaul, the crankshaft received a magnaflux inspection & re-nitriding by an inspection facility. The engine was reassembled & returned to service by company maintenance personnel. The engine had 1150.6 hours since overhaul.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The total loss of engine power due to a fatigue failure of the crankshaft for undetermined reason. A factor was the lack of suitable terrain for the forced landing.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: MANEUVERING

Findings
1. (C) ENGINE ASSEMBLY,CRANKSHAFT - FATIGUE
2. (C) REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
3. (F) TERRAIN CONDITION - NONE SUITABLE
4. OBJECT - TREE(S)

Factual Information

On January 2, 1998, at 0830 central standard time, a Hughes 269C helicopter, N1091Y, owned and operated by Smith Helicopters, Inc., under Title 14 CFR Part 91, sustained substantial damage during an autorotation following a loss of engine power while maneuvering near Riviera, Texas. The commercial pilot and the passenger were not injured. Visual meteorological conditions prevailed for the local cattle herding flight and a flight plan was not filed. The flight originated from the King Ranch at 0745.

During telephone interviews, conducted by the investigator-in-charge (IIC), and on the Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1/2), the pilot and the operator reported that the pilot was maneuvering the helicopter at 75 feet agl herding cattle on the King Ranch when the engine "started missing briefly then quit." The pilot executed an autorotation to a dirt road confined by mesquite trees 15 to 20 feet in height. During the landing, the main rotor struck the tailboom. The tailboom, vertical and horizontal stabilizer, main rotor blades, and the tail rotor driveshaft received structural damage.

A review of the engine maintenance records, by the FAA inspector and the IIC, revealed that the Lycoming HIO-360-D1A engine, S/N L-25772-51A, was manufactured in 1991. The engine was overhauled in January 1995. During the engine overhaul, the crankshaft received a magnaflux inspection and re-nitriding. The crankshaft was certified and approved for return to service by Aircraft Engine & Accessory Co., Inc., Dallas, Texas. The engine was reassembled by a mechanic and installed in N1091Y. The engine was returned to service by company maintenance personnel on February 21, 1995. At the time of the accident, the engine time since overhaul was 1,150.6 hours. The last 100 hour inspection was performed on October 7, 1997, and the airplane had accumulated 69 hours since the inspection.

On March 10, 1998, at Laredo, Texas, the FAA inspector examined the helicopter and the engine. Structural damage to the airframe was confirmed. The inspector reported that the engine crankshaft would not rotate. When cylinders #1 and #3 were removed from the engine, the FAA inspector found that a portion of the crankshaft appeared to be separated in the area of the #3 main bearing. A piece of metal was found in the oil screen sump. The engine was shipped to Textron Lycoming, Williamsport, Pennsylvania, for further examination.

On September 16, 1998, in Williamsport, Pennsylvania, under the surveillance of an FAA inspector, a teardown of the engine revealed a broken crankshaft and camshaft. The camshaft exhibited deformation consistent with overload. All four cylinder mounting flanges were fretted and all piston rings showed "excessive" wear. The #1 and the #4 cylinder top compression rings were broken. The engine and aircraft logs provided no indications as to what service bulletins or FAA Airworthiness Directives had been complied with from overhaul to the time of the accident. The #1, #2, and the #3 center main bearing saddle faces of the

crankcase showed heavy fretting. Fresh fretting was seen on the #4 main saddle surface. The oil holes and galleys were normal. See the enclosed reports for additional details.

The crankshaft was examined by the Textron Lycoming Materials Laboratory. The mode of fracture of the crankshaft was fatigue. The fatigue originated from the oil hole (between #3 main and #3 crankpin journals) in the cheek and near the rear fillet radius of the #3 main bearing journal. The cause of the fatigue was not determined.

The helicopter was released to the owner's representative.

Pilot Information

Certificate:	Commercial	**Age:**	28,Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	April 15, 1997
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	567 hours (Total, all aircraft), 567 hours (Total, this make and model), 527 hours (Pilot In Command, all aircraft), 254 hours (Last 90 days, all aircraft), 61 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Hughes	**Registration:**	N1091Y
Model/Series:	269C 269C	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	411050
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	October 7, 1997 100 hour	**Certified Max Gross Wt.:**	1700 lbs
Time Since Last Inspection:	69 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	6631 Hrs	**Engine Manufacturer:**	Lycoming
ELT:		**Engine Model/Series:**	HIO-360-D1A
Registered Owner:	SMITH HELICOPTERS, INC.	**Rated Power:**	190 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:		**Distance from Accident Site:**	
Observation Time:		**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	20 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	135°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:		**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	VFR
Departure Time:	07:45 Local	**Type of Airspace:**	

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	27.280019,-97.809707(est)

Administrative Information

Investigator In Charge (IIC):	Roach, Joyce
Additional Participating Persons:	JIM AGUILAR; SAN ANTONIO , TX JOE GREEN; NEW CUMBERLAND , PA BOB OHNMEISS; WILLIAMSPORT , PA
Original Publish Date:	February 16, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=20510