Aviation Investigation Final Report

Location:	Canby, Minnesota	**Accident Number:**	CEN22LA427
Date & Time:	September 11, 2022, 19:00 Local	**Registration:**	N2122U
Aircraft:	Cessna A188A	**Aircraft Damage:**	Substantial
Defining Event:	Sys/Comp malf/fail (non-power)	**Injuries:**	1 None
Flight Conducted Under:	Part 137: Agricultural		

Analysis

The pilot stated that the tailwheel spring cross tube broke when the tailwheel landing gear touched down. After landing, the airplane made an immediate turn and spun around. The left main landing gear collapsed, and the left wing struck the ground. The airplane sustained substantial damage to the wing.

Postaccident examination of the tailwheel spring cross tube revealed that the outside diameter of the tube was about 0.002 inch smaller than the specified nominal outside diameter of 0.875 inch, and the wall thickness was 0.0009 inch thinner than the specified nominal wall thickness of 0.049 inch for the original tube design.

Examination of the tube showed signatures consistent with overstress deformation.

The part dimensions indicated the part could have been from original manufacture and likely had not been replaced since at least 1985, when the drawing for replacement parts was changed to have a thicker wall, 0.120 inch. An uncoated steel part of that age used in an airplane used in aerial application service would be expected to have a more corroded surface than what was observed on the accident part. The surface condition suggests it may have been recently sanded, possibly removing about 0.001 inch of material around the outside diameter.

The recent change in outside diameter likely did not significantly affect the strength of the tube. The bending strength of the tube was reduced by about 2 percent relative to the nominal tube based on a comparison of the bending moments required to reach given stress at the exterior surface. Similarly, the cross-sectional area was also reduced by just 2 percent. While some increase in impact loading on the tube could be expected due to the additional clearance between the tube and the fitting, the failure is more likely attributed to loads that exceeded the

maximum design load for the tailwheel. An additional margin of safety could have been achieved if the tube had been replaced with the thicker-walled replacement part rather than apparently having been cleaned up and reused.

The metallurgical examination of the tailwheel spring cross tube revealed that it failed in overload, which indicates that it was not the initiating event for the loss of control. It is likely that the pilot failed to maintain airplane control during the landing sequence, which resulted in a ground loop and the substantial damage to the left wing and the fractured tailwheel spring cross tube.

Probable Cause and Findings

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

The pilot's failure to maintain airplane control during the landing, which resulted in an overload failure of the tailwheel cross tube and subsequent impact with the runway.

Findings

Aircraft	(general) - Not attained/maintained
Aircraft	Nose/tail landing gear - Capability exceeded

Factual Information

History of Flight

Landing-landing roll	Sys/Comp malf/fail (non-power) (Defining event)

On September 11, 2022, at 1900 central daylight time, a Cessna A188A, N2122U, sustained substantial damage when it was involved in an accident near Canby, Minnesota. The pilot was uninjured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 137 aerial application flight.

The pilot stated that, during the landing, the airplane made an immediate turn when the tailwheel touched down. The airplane spun around, the left main landing gear collapsed, and the left wing struck the ground. The airplane sustained substantial damage to the left wing.

The pilot stated that the tailwheel spring cross tube broke when the tailwheel touched down. He said that the tube had a wall thickness of 0.055 inch, and the superseded tube had a wall thickness of 0.125 inch.

The cross tube was examined by the National Transportation Safety Board Materials Laboratory. The tube wall at the location of the right joint was flattened and substantially deformed consistent with ductile overstress deformation of the tube, and the deformation corresponded to the upward displacement of the attach fitting right end relative to the adjacent fuselage lug. The piece of the tube that had been retained within the lug was ovalized, also consistent with overstress deformation associated with the relative displacement.

The tube material was identified as alloy 4130 steel, consistent with the specified material for the part. The tube had an outside diameter of 0.873 inch and a wall thickness of 0.0481 inch. According to an engineering drawing for the tube at the time of airplane manufacture in 1970, the specified tube had a nominal outside diameter of 0.875 inch and a wall thickness of 0.049 inch. Therefore, the outside diameter of the tube was about 0.002 inch smaller than the specified nominal outside diameter of 0.875 inch, and the wall thickness was 0.0009 inch thinner than the specified nominal wall thickness of 0.049 inch for the original tube design. In 1985, the wall thickness of replacement parts (the airplane model was no longer in manufacture in 1985) was changed to 0.120 inch. The measured hardness was consistent with values for the specified material.

Pilot Information

Certificate:	Commercial; Flight engineer	**Age:**	79,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	May 3, 2022
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	July 2, 2022
Flight Time:	14299 hours (Total, all aircraft), 5266 hours (Total, this make and model), 13700 hours (Pilot In Command, all aircraft), 60 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N2122U
Model/Series:	A188A	**Aircraft Category:**	Airplane
Year of Manufacture:	1970	**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	18800672
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	July 1, 2022 Annual	**Certified Max Gross Wt.:**	4000 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	2548 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	Not installed	**Engine Model/Series:**	IO-520-D
Registered Owner:	Anderson Aerial Spraying Service	**Rated Power:**	
Operator:	Anderson Aerial Spraying Service	**Operating Certificate(s) Held:**	Agricultural aircraft (137)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	CNB,1194 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	19:15 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	20°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Canby, MN	**Type of Flight Plan Filed:**	None
Destination:	Canby, MN	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class G

Airport Information

Airport:	Myers Field Airport CNB	**Runway Surface Type:**	Asphalt
Airport Elevation:	1194 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	12	**IFR Approach:**	None
Runway Length/Width:	4648 ft / 75 ft	**VFR Approach/Landing:**	Full stop

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	44.7295,-96.266028(est)

Administrative Information

Investigator In Charge (IIC):	Gallo, Mitchell
Additional Participating Persons:	Jason Dunn; Federal Aviation Administration, MSP FSDO; Minneapolis, MN
Original Publish Date:	December 20, 2023
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=105980