



# National Transportation Safety Board

## Aviation Accident Data Summary

<b>Location:</b>	Battle Creek, MI	<b>Accident Number:</b>	CEN11LA459
<b>Date &amp; Time:</b>	07/02/2011, 2040 EDT	<b>Registration:</b>	N330JK
<b>Aircraft:</b>	WINGTIP TO WINGTIP, LLC PANZL S-330	<b>Injuries:</b>	1 None
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Air Race/Show		

### Analysis

The entire left aileron separated from the airplane as the pilot was performing an aerobatic aileron-roll maneuver during an airshow aerobatic demonstration flight. The pilot was able to recover into level flight and make an uneventful landing. The pilot stated that his preflight inspection before the accident flight did not reveal any mechanical issues with the airplane, including loose jam nuts or any other aileron anomalies. However, the pilot reported that his aviation mechanic had to retighten the jam nut for the center aileron hinge rod-end after it had been found loose on several occasions before the accident flight.

A postaccident examination revealed that the center aileron hinge had failed in the shank region of the rod end due to reverse bending fatigue. No material issues were identified with the center aileron rod end, which met the part specifications. A design analysis confirmed that the aileron rod ends were adequate for the limit loads on the structure but were inadequate for fatigue tolerance. The stress levels in the rod end shank were at or above the endurance limit for the specified rod end material, regardless of a loose or tight jam nut. However, a loose jam nut further increased the stress in the rod end about 28 percent and would have reduced the cycles to a fatigue failure. Following the accident, the airplane manufacturer redesigned the aileron bracket assemblies by increasing the diameter of the rod end shank and reducing the moment arm between the bearing and the aileron bracket. The redesign yielded a total stress reduction of about 83 percent in the rod end, which was significantly below the endurance limit for the specified material.

### Flight Events

Maneuvering-aerobatics - Part(s) separation from AC

### Probable Cause

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The inadequate aileron hinge design, which resulted in the in-flight separation of the left aileron following a fatigue failure of the center hinge rod-end.

### Findings

Aircraft-Aircraft systems-Flight control system-Aileron control system-Design - C

Aircraft-Aircraft systems-Flight control system-Aileron control system-Fatigue/wear/corrosion - C

Aircraft-Aircraft systems-Flight control system-Aileron control system-Failure - C

## Pilot Information

<b>Certificate:</b>	Airline Transport	<b>Age:</b>	44
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Instrument Rating(s):</b>	Airplane
<b>Other Aircraft Rating(s):</b>	None	<b>Instructor Rating(s):</b>	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane
<b>Flight Time:</b>	(Estimated) 13000 hours (Total, all aircraft), 180 hours (Total, this make and model), 10000 hours (Pilot In Command, all aircraft), 100 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Manufacturer:</b>	WINGTIP TO WINGTIP, LLC	<b>Registration:</b>	N330JK
<b>Model/Series:</b>	PANZL S-330	<b>Engines:</b>	1 Reciprocating
<b>Operator:</b>	John Klatt Airshows, Inc.	<b>Engine Manufacturer:</b>	Lycoming
<b>Air Carrier Operating Certificate:</b>	None	<b>Engine Model/Series:</b>	AEIO-540-EXP
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Air Race/Show		

## Meteorological Information and Flight Plan

<b>Observation Facility, Elevation:</b>	BTL, 952 ft msl	<b>Weather Information Source:</b>	Weather Observation Facility
<b>Conditions at Accident Site:</b>	Visual Conditions	<b>Lowest Ceiling:</b>	Overcast / 3500 ft agl
<b>Condition of Light:</b>	Dusk	<b>Wind Speed/Gusts, Direction:</b>	8 knots, 260°
<b>Temperature:</b>	26°C / 21°C	<b>Visibility</b>	8 Miles
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Battle Creek, MI (BTL)	<b>Destination:</b>	Battle Creek, MI (BTL)

## Airport Information

<b>Airport:</b>	W K Kellogg Airport (BTL)	<b>Runway Surface Type:</b>	Asphalt
<b>Runway Used:</b>	23R	<b>Runway Surface Condition:</b>	Dry
<b>Runway Length/Width:</b>	10004 ft / 150 ft		

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	N/A	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Andrew T Fox	<b>Adopted Date:</b>	12/05/2013
<b>Investigation Docket:</b>	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=81032">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=81032</a>		

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