

Date: 09/18/2012

NTSB ID: WPR12LA407

Subject: N21MX MXS Wreckage Inspection and Findings

Location: Aircraft Recovery Services (ARS) , Pearblossom, CA

Report prepared by: Eric Minnis for MX Aircraft

Individuals in attendance: Patrick Jones- NTSB IIC, Matt Nachreiner- FAA IIC, Mark Platt- Lycoming Engines, Jerry Prince- Owner of ARS, Chris Meyer , Owner of MX Aircraft, and Eric Minnis assisting MX Aircraft.

Summary

On 09/18/2012 we (Eric Minnis and Chris Meyer) performed an on-site inspection of the wreckage of N21MX at the ARS facility near Pearblossom, CA. Our involvement was intended to serve as subject matter experts in the construction technique, design, and operation of the MX series of aircraft.

Due to eyewitness accounts and information gained from the accident flight, our focus areas were targeted as follows:

- 1) **Airframe structural integrity**
- 2) **Control system continuity and operation**
- 3) **General observations**

Upon examination of the wreckage the following was determined:

- 1) **Airframe structural integrity:** all flight controls, control surfaces, wings, cowlings, fairings, spades, landing gear etc. were present and attached at impact with the exception on the canopy which was jettisoned by the pilot. No evidence existed of any airframe structural failure. All damage observed was consistent with impact with terrain.
- 2) **Control system continuity and operation:**
 - a. **Control system push rods/ bearings-** All pushrods and rod end bearings/ aileron hinge bearings were identified and accounted for. All damage to pushrods and rod end bearings/ aileron hinge bearings was consistent with impact damage. No evidence of inflight failure existed.
 - b. **Rudder-** both sets of ruder cables were attached at the rudder horn and to the rudder pedal assemblies in the cockpit. The rudder horn and all attaching hardware were present and installed correctly. No pre-impact damage was observed with the rudder control system.

- c. **Elevator**- both the right and left elevator halves were properly attached to the horizontal stabilizer. The elevator horns were attached to the rod end bearing with the proper hardware and no in-flight failure was apparent. The down elevator control stop had been modified to allow more elevator deflection in the nose down direction. Because of this modification, the elevator control horn had made hard contact with the most aft former and worn a relief slot into it. This is not believed to be contributory.
- d. **Ailerons**- both the left and right ailerons were attached to the wing at each hinge location during impact. All rod end bearings, spades, and push rods were accounted for and no evidence of in-flight failure was observed.
- e. **Torque tube assembly**- all major components of the torque tube assembly were present and accounted for. Visual inspection of the torque tube assembly and corresponding witness marks revealed that prior to impact, the torque tube was not engaged in the forward bearing. In addition, the structure that supports the forward bearing had been constructed in an alternate manner using aluminum sheet of approx. .040 thick attached using AN bolts. 2 pieces of aluminum extruded channel had been placed on either side of the forward torque tube bearing.

3) **General observations:**

- a. The correct adhesive to be used in the construction of MX Aircraft goes by a trade name "Hysol". An unknown adhesive was observed to have been used in the construction of this aircraft. Evidence of the use of "Hysol" was also present.
- b. Flaking and peeling of paint revealed that certain parts of the airframe had not been adequately sanded prior to application of adhesive and paint.

Factual Information:

Prior to impact, the torque tube was dislodged from the forward torque tube bearing. The torque tube assembly controls the ailerons and elevator. Failure of this component in this manner would result in the pilot's inability to control the aircraft in pitch and roll.

The forward torque tube bearing had been installed on N21MX in a manner inconsistent with the design of the MXS aircraft. The correct placement of the forward and aft torque tube bearings ensures proper operation and retention of the torque tube assembly.

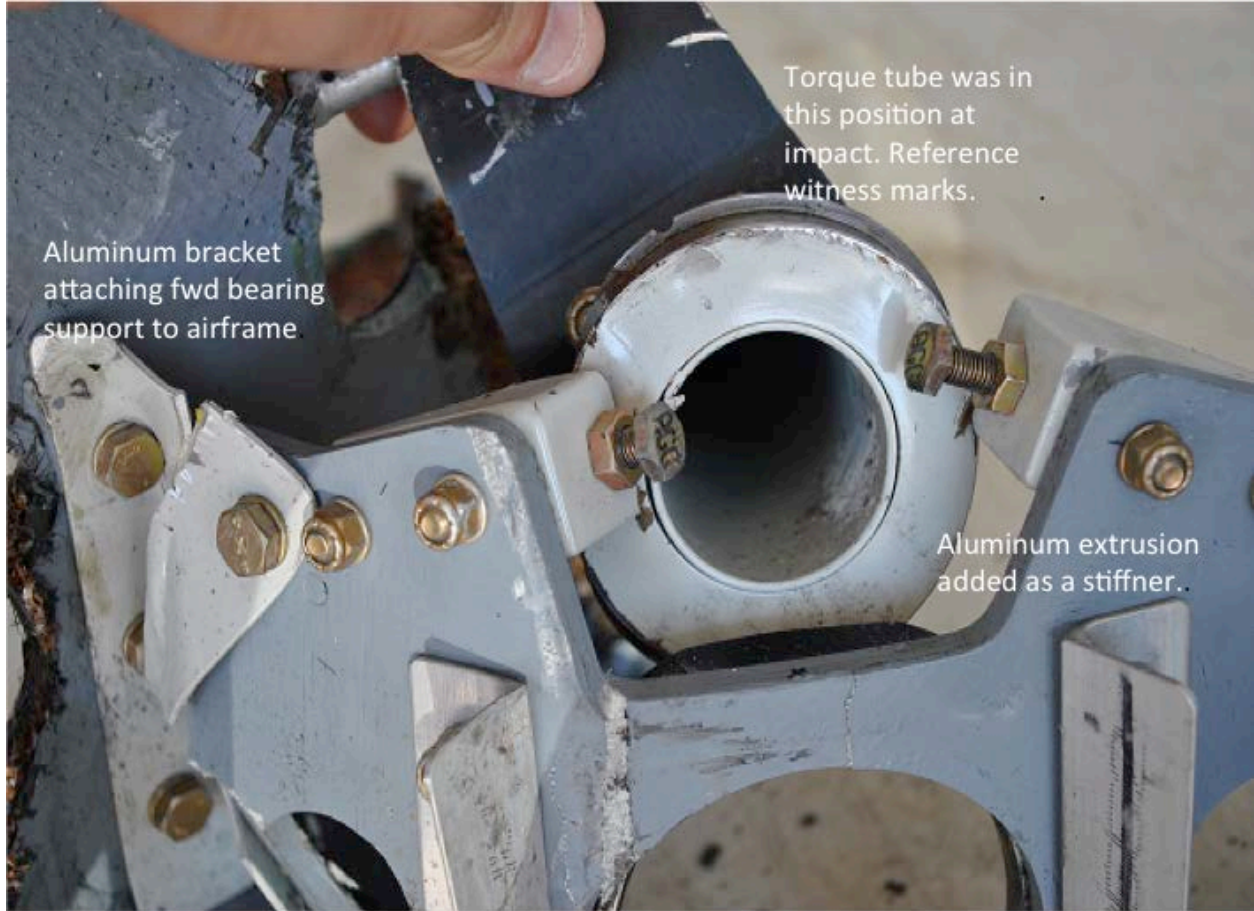


Shown above is the position of torque tube assembly/ front torque tube bearing assembly at impact. Reference witness marks on forward face of torque tube with aileron stop brackets. Reference aluminum used to attach bearing assembly to airframe. Reference aluminum extruded channel added as stiffener to either side of bearing.

Containment Action:

Two aircraft were built by the group that installed the forward torque tube bearing assembly in this manner. N21MX, and another aircraft that was identified and corrected in 2010 by MX Aircraft after arrival at MX Aircraft for inspection. MX Aircraft did notify the owner and builder of N21MX of the findings and recommended he correct this issue immediately. It is our belief that these are the only two aircraft affected.

Furthermore, to ensure no potential for field modifications is present, MX Aircraft will release an inspection procedure for owners of MXS aircraft to perform a visual inspection to verify that the correct installation of the torque tube bearings exists. MX Aircraft will contact each owner and record the results of the inspections for NTSB review.



Torque tube was in this position at impact. Reference witness marks.

Aluminum bracket attaching fwd bearing support to airframe

Aluminum extrusion added as a stiffener.