

FROM: Steve Gleason, Sikorsky Aircraft Corp.
TO: Thomas M. Little, NTSB Air Safety Investigator
SUBJECT: Reply to Mr. Sanberg's comments
DATE: January 10, 2013

Here are my thoughts on Mr. Sandberg's comments.

I had the engineering department put together several 3D drawings of the components and provide a dimensional study of the proper parts assembled and the improper parts assembly we found on the subject aircraft. I also had them review the maintenance manual to see if the instructions were adequate.

Engineering determined that the review of the instructions show them to be reasonably clear and adequate". The aircraft 0694C was not I/A/W instructions in three areas; the phenolic pinion plug 269A5441 was not properly installed, the split bushing 269A5595-001 was missing and an incorrect longer 269A6030 BSC Spline Adapter was installed on the tail transmission. All of these are correctly detailed in the maintenance manual.

The dimensional 3D drawing indicated that when properly configured, and assuming the fractured pinion moved aft, there was reduced spline engagement but full decouple was unlikely. The drawing assumed the pinion fractured, with the fractured aft pinion fragment, including the nut and threaded portion of the pinion and plug displaced axially and TRDS full aft. The view showed there was reduced engagement of the pinion splines, reduced engagement of TRDS splines and the 269A5430 adapter likely migrated out of bearing approximately 75%.

My opinion, based on the lack of fractures with the split bushing installed, is that if proper parts were installed there would not have been a fracture. Based on the 3D drawings in the case there was a fracture the assembly would not have decoupled.

Additionally improper maintenance appears to be more than just incorrect parts installed. The log books reflect that a 100 hour inspection had been performed just a few hours previous to the event/accident. According to the Schweizer Handbook of Maintenance Instructions the aft pinion nut should have been exposed and a check of the torque (750 to 1000 inch pounds) performed. If the torque check had been performed I believe that the excess wear and discoloration of the grease would have been visibly obvious and more than likely would have found a loose torque.

I agree with Mr. Sandberg that this is a failsafe design. The subject helicopter was not in compliance with design. The tail rotor driveshaft which is made of aluminum would have failed prior to applying enough load to fracture the pinion. It is highly unlikely that there would be 2 complete torsional fractures in the same drive line even with equivalent materials. Practically the first piece to physically fail would unload the system and no load would exist to create the second fracture.

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