

Scott Arnold

From: Epperson Joe
Sent: Friday, May 26, 2017 2:43 PM
To: McKenny Van; Yakubovich, Tom; Figueroa, Robert; Ledbetter, Timothy; Scott Arnold
Cc: McAtee Nancy; Budinski Michael
Subject: UPDATE PHI BELL 407 N457PH
Attachments: Memo to NTSB on exam of components.pdf

Conference call held Friday may 26 starting 2 pm EDT
attending Joe Epperson, Nancy McAtee NTSB, Robert Figueroa Bell, Tom Yakubovich PHI

Joe and Nancy updated on materials investigation the week.

Measurements of the gap continued with cast replicas of the space between the skins at about 3 inches from the leading edge.

On Replica #2 0.5602, 0.5605, 0.5613 and 0.5611 inch were measured near the inboard edge of the inertia block. Near the middle 0.5573 measured and 0.5583 inch near the tip. Replica #3 will be forwarded to Bell for separate measurements.

The bond line thickness continues to be measured and mapped using Keyence microscope. Considerable variation in chordwise direction some in spanwise. Depending on location the bond thickness measured between the bond line at the block location and the void spaces between ranged from 0.003 inch to 0.016 inch in other locations. Previously found 0.001 to 0.002 inch adhesive thickness wetting the skin surfaces in the voids. Measurements likely to be plus minus 0.001 inch or so. FTIR on the adhesive surfaces continue. Nothing positive as yet. Representative specimens of adhesive, cured and uncured, and liquid mold release received and will be compared to section of flat side of blade.

Gearbox studs were SEM examined finding fatigue initiating at overstress areas at roots of threads. Some areas of the fracture faces were damaged others not. It was noted that the nuts were threaded onto the studs different amounts. One about 2 threads showing the other about 4. Both had torque paint on nut and stud threads

Bell informed us of receiving a blade from PHI for confirmations of tap test located voids. Bell developing x-ray inspection as possible method of detecting waffle pattern in blades found voids and local waffle pattern.

RBI produced a test/demo blade with block replacement using the vacuum method of compaction. The test blade had the waffle pattern and was detected and identified by x-ray. Peel tests and shear strength test in progress.

Bell has requested, see attached memo, certain parts including the inboard end of the separated blade along with pieces of the separation area, the entire other blade and the fractured gearbox studs for additional tests and examinations. I agree with the request and will forward the parts to Bell as I am finished with them and pending IIC approval. The parts will remain in NTSB custody and a non-proprietary report will document the work. We will be informed when destructive tests will occur.

Continuing work.

I will continue to map the bond disbond areas of the joint.

Mapping joint thickness

photographs of the GB studs and Tail boom support casting.

FTIR spectra of known materials and combinations, mold release agent and cured adhesive.

Joe Epperson