



S92 Frequently Asked Questions

Recently, Sikorsky, the manufacturer of the S-92 helicopter, issued a letter to all operators concerning some occurrences of cracking which had been detected in one of the four feet which mount the S-92 Main Gearbox to the aircraft.

Bristow has now understandably received a number of questions from passengers concerning this matter.

Bristow is very understanding of our passengers concerns and will provide as much information as possible. Please do be assured that Bristow takes your safety and that of our crews extremely seriously and that ensuring the safe conduct of our flights is **always** our primary concern.

1. Are these cracks in the same area of the Gearbox as was modified earlier in 2009?

No. The earlier modification replaced titanium studs on the Oil Filter Housing with steel items; that modification is not connected to this issue.

2. Will the winter weather have any impact on the reliability of the S-92 and is any additional maintenance required?

No. The aircraft's flight manual sets out the conditions in which the S-92 can fly. Bristow always operates within these criteria. The manufacturer's maintenance procedures are already designed to cater for differences in the climate that the helicopter may encounter in a particular role.

3. Is vibration causing the issue with the MGB feet and do other helicopter types have the same problem?

Sikorsky does not believe that vibration felt in the cabin is a contributor in any way to the loads on the transmission feet. They have conducted actual flight tests with instrumentation (strain gauges) on the feet and know that the loads in the foot are primarily the result of the lifting and torque loads of the main rotor. Vibration is a condition inherent to helicopter design and all manufacturers face the same challenges in mitigating its effects.

4. How did Sikorsky & Bristow decide upon a 10 hour inspection regime?

Sikorsky develops inspections of this type by testing and analyzing the structure and determining the amount of time it would take for a crack to occur and grow. They then apply very conservative reductions to set the inspection interval so that it is effective at finding a problem with plenty of margin and would even account should it be missed during any particular inspection. This process was used by Sikorsky to determine the 10-hour interval specified in the Service Bulletin. In addition, Sikorsky showed during certification that the attachment of the gearbox to the airframe is secure for a period of time even if one of the 4 feet is completely severed from the gearbox.

5. If a bolt fails, could it collide with the main or tail rotor?

A small number of bolts have been found broken over the last few years and this is the reason that they are now replaced every 500 hours for good measure. To Sikorsky's knowledge in all of these cases the bolt head stayed in place in its hole. One reason is that the bolt is caulked after installation to prevent water ingress, and this caulking would hold any broken piece in place. An important point to note is that there have been no bolt failures reported since the 500 hour replacement requirement was introduced.

6. How are the cracks detected?

The gearbox feet are inspected every 10 flight hours in accordance with ASB92-63-020. Cracks are first identified visually and then confirmed with an NDT test.

7. Does the 10 hour inspection include an NDT check?

ASB92-63-020 requires a visual inspection. Bristow is carrying out an Eddy Current NDT test as additional verification if a crack is suspected.

8. Would reducing the number of take offs and landings help to prevent the cracking?

Sikorsky are conducting a thorough technical investigation now and as soon as they have reached conclusions that information will be made available; at this time there is no Sikorsky-recommended restriction on the number of take off's or landing's that can be conducted on a particular flight. This is based on their analysis and testing.

9. Would reducing the payload help to prevent the cracking?

Sikorsky are conducting a thorough technical investigation now and as soon as they have reached conclusions that information will be made available; at this time there is no payload restriction in place.

10. The S-92 door vibrates in flight. Could this be contributing to the cracks?

Sikorsky are conducting a thorough technical investigation now and as soon as they have reached conclusions that information will be made available; it is very unlikely that any vibration in the door assembly is a contributory factor to this phenomena. See also the response to question 3.

11. Could the relative inexperience of the flight crews with the S-92 be a contributory factor?

No. The crews are all fully qualified to operate the aircraft and their continuous training regime ensures that standards are monitored at very regular intervals. In addition, the aircraft has a system called HUMS (Health Utilization & Monitoring System) which monitors a wide range of aircraft parameters and warns if the aircraft is operated outside of design limitations.

12. Are other operators experiencing the same problem?

Yes, and the update letter recently issued by Sikorsky went to all operators world-wide.

13. Are the S92s in Norway and other regions experiencing similar problems and do they fly similar flight patterns?

Refer the answer to Q12.

14. Can safety reps be invited to see the actual failed equipment/components and can we have pictures or presentation of what the failure looks like?

Photographs illustrating the abnormality are provided for interest at the foot of this document.

15. Can we have a pilot and engineer come offshore to reassure the population?

Bristow will work closely with our Clients aviation departments and directly with Clients to ensure that the fullest information is available for briefing passengers travelling offshore in whatever form that has to take.

16. Sikorsky stated that during certification, the attachment of the gearbox to the airframe was secure for a period of time even if one of the 4 feet was completely severed from the gearbox. How long is this period of time?

The period, along with the required inspection procedure, includes a very conservative factor of safety such that flight worthiness is not compromised at any time, even if a crack were not detected at an early inspection.

17. Do the pilots have a cockpit indication that something is wrong with the gearbox feet / bolts during the flight?

No. The inspection process is robust and assures early detection of any potential defect.

18. If the bolt is caulked after installation to prevent water ingress and this caulking will hold any broken piece in place, are you removing this caulking to complete the 10 hour inspection of the bolt?

The defect is not with the bolt and the caulking does not preclude or hinder any of the inspection requirements.

19. What would lead an operator to suspect that an NDT Eddy Current test is needed?

The maintenance technician must comply exactly with the specific instructions issued by the manufacturer – this is a legal requirement. If a technician cannot fully assure himself that the intent of the visual inspection has been satisfied and that no defects exist, then the NDT test is used as an additional method of analysis to confirm inspection findings.

20. What effect would it have on a helicopter if the main transmission was misaligned and what might cause such a misalignment?

Like all aircraft, helicopters are constructed to rigorous build standards with very tightly controlled manufacturing tolerances. As such, variances between aircraft are very small and are predicted and catered for in the design and manufacture of the aircraft. This ensures that such matters do not affect the operation or performance of the aircraft at all.

21. If this defect has been occurring for a period of time, why has there been no communication before now and has Bristow been operating unsafe aircraft?

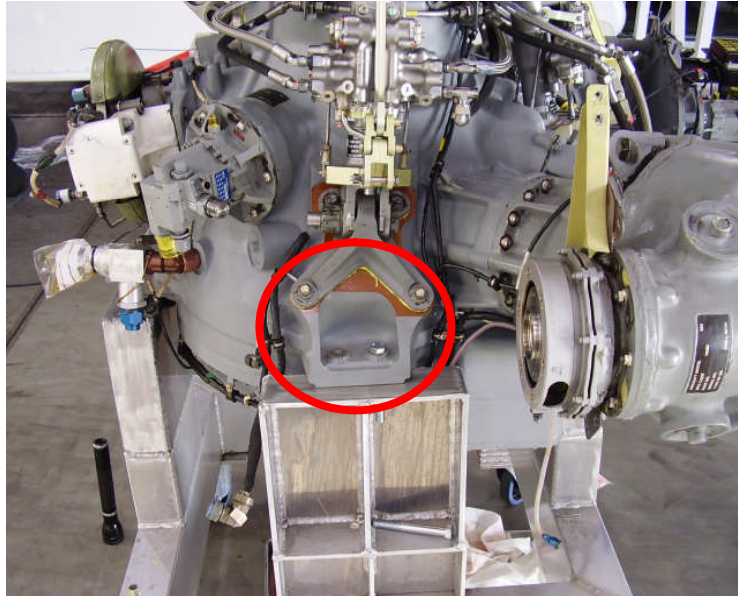
The flight worthiness of the S-92 is not in question. Bristow would never allow an aircraft to fly that was not safe.

Appropriate communication was provided as soon as it became apparent that this particular abnormality could give rise to passenger concern.

S92 Main Transmission Photographs

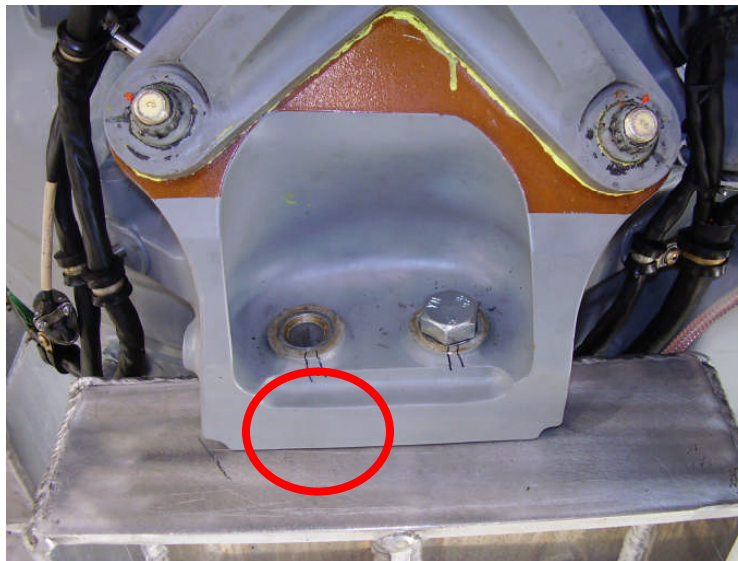
The following photographs are all taken with the gearbox on a maintenance stand.

Picture 1 – S92 Main Transmission (entire foot circled)



Forward

Picture 2 – Close up of Main Transmission Foot (area of defect circled)



Picture 3 – Hairline crack just visible, length circa one inch



Picture 4 – High magnification shot of defect

