

STATUS OF AIRBUS A320 NEO Aircraft FITTED WITH PW 1100 ENGINES

Statement from DGCA, India on 28.08.2019

1. Airbus A320 NEO aircraft, fitted with two PW1100G-JM engines, are operated by M/s Indigo Airlines and M/s Go Air. M/s Indigo Airlines inducted the first A320 NEO aircraft in March 2016 and at present, have **92** such aircraft in its fleet. M/s. Go Air inducted the first A320Neo aircraft in May 2016 and presently have **35** such aircraft in its fleet. At present, there are **127** such aircraft in India and **436** aircraft operating globally.
2. PW 1100G-JM engine is a “Fan Driven-Geared Turbine engine” manufactured by M/s Pratt and Whitney (P&W), USA. The engine has been type certified by the Federal Aviation Administration (FAA) of USA, the regulatory authority of the State of Design and subsequently, by European Aviation Safety Agency (EASA). The engine is more fuel efficient, generates more thrust and produces less noise and is environment friendly.
3. Post induction of A320 NEO aircraft fitted with PW1100G engines into service, following significant technical issues have been experienced on these engines worldwide:
 - a) Combustion Chamber distress-Block B & Block C
 - b) #3 Bearing Pre Mod & Post Mod failures
 - c) N2 transient vibration
 - d) Low Pressure Turbine (LPT) failure.
 - e) HPC (High Pressure Compressor) rear knife edge seal failures
 - f) Gear Box failures.
4. While the issues related to Combustion Chamber Distress, No.3 Bearing Seal failures and High Pressure Compressor (HPC) Rear Knife Edge seal failures have been addressed by taking suitable mitigation measures, the manufacturer is in the process of implementing mitigation actions in respect of the following issues:
 - (i) Gear Box failure.
 - (ii) Low Pressure Turbine (LPT) failure
 - (ii) Engine vibration

5. The issues related to MGB, LPT and vibration are being addressed by the manufacturer by implementing necessary modifications on the related parts. The engines removed due to any defect or because of scheduled removal are sent to the engines shops, where necessary maintenance or modification is done. The details of mitigation action are as follows:-

a) Issues related to Gear Box failure is being addressed as under:

(1) Immediate: Software update (FCS 5.0) minimizes the time spent at excitation speeds, which will significantly reduce the potential for gear fracture. Software update have been completed on all the aircraft operated by Indian operators.

(2) Long term: More robust gear design (being incorporated at MRO from July 2019) to circumvent excitation. 20 engines with modified gear (Indigo-14 and Go Air 6) have been received.

b) Issues related to Low Pressure Turbine (LPT) failure:- Redesigned, more durable new LPT stage 3 blades are being incorporated on new production engines, and at the MRO during shop visit. 47 such engines with new LPT blades (Indigo 40 and Go Air 7) have been received.

c) Issues related to high transient vibration: - Redesigned piston seal in HPC will be implemented. Although transient vibration may result in an unplanned engine removal, there is no In Flight Shutdown (IFSD) risk associated with transient vibration.

6. Proactive measures taken by DGCA for early detection of associated problems and removal of engine to prevent impending engine failure:

(i) Reduced periodicity of boroscopic inspection (BSI) on Combustion chambers from 1500/750 /375/150 Hrs/ 30 Cycles to 1000/500 /375 Hrs and replacement of engine when recommendation of the manufacturer for further operation of the engine below 375 hours.

(ii) Replacing the engine, whenever cases of Metallic chips in Oil due to Wear of No.3 Bearing Seal is detected under Oil Debris Monitoring (ODM) mechanism.

(iii) Logging all the cases detecting odours/ smoke in cabin during operation for necessary investigation and rectification. In all odour / smoke cases, engine inspected in detail and to be used only after rectification of the defect.

(iv) Record, monitor and inspect engines if Vibration > 3CU (manufacturer's guideline of 5CU). Conduct BSI in repeat cases. This may result in removal of engines before vibration level is aggravated.

- (v) Restricting operation of A320 Neo aircraft with P& W engines on Port Blair Sector.
- (vi) Extended Diversion Time Operation (EDTO) for Airbus Neo aircraft has not been allowed by DGCA even though the In- Flight shut down rates of aircraft engine combination is well below acceptable limit.

7. Additionally, following directions have been issued by DGCA to M/s Indigo and M/s Go Air on 22-7-2019 for addressing the MGB and LPT related issues:

- a) All new inductions of A320/321 neo aircraft after August 2019 must be installed with modified MGB and new modified 3rd stage LPT blades.
- b) No engines from MROs shall be accepted unless installed with modified MGBs and new modified 3rd stage LPT blades, except those which are at final stages in shop or in transit.
- c) Restriction on acceptance of lease engines without modified LPT and MGB.

8. Details of engine events (In-flight shut down / air turn back / rejected take off etc due to MGB and LPT failures are as follows:-

Year	MGB		LPT	
	Indian Operator	Global*	Indian Operator	Global*
2017	NIL	NIL	03	04
2018	02	07	05	06
2019 (Till August)	02	11	07	17
Total	04	18	15	27

*Including Indian operators

9. Outcome of above measures

- a) The engine failure related to MGB is expected to be contained after software updates. Engine failures related to LPT blade damage are being addressed by providing new LPT 3rd Stage blade.
- b) The fault being captured at an early and incipient stage before failure of engine. These have resulted in increased number of engine removal.
- c) Restriction on import of engines with un-modified MGB and LPT will result in early replacement of affected engines.

10. DGCA is continuously monitoring the performance of these engines and taking appropriate proactive measures as and when required including grounding of aircraft in the interest of safety and further remedial measure if necessitated, will be taken. The operation of these aircraft/ engines are considered safe globally. Manufacturer has been directed to ensure more availability of spare engines for Indian operators to prevent grounding of aircraft due to removal of engines.
11. About 40 per cent of the domestic seat capacity of India is powered by Neo Engines and therefore, any knee-jerk reaction to completely shut their operations will have serious consequences. As there has not been any reported case of any accident in any part of the world, where these engines are in operation, will it be prudent? It is true that there have been cases of Air Turn Back, In Flight Shut down or Engine vibrations beyond the prescribed limits, but with strong mitigation measures in place and strict adherence to SOPs by the Airlines, the problem is being contained. Whenever, there is a problem with the Engine, the Aircraft is being grounded and the Engine replaced.
12. Finally, DGCA assures all its stakeholders that we are alive to the situation and will take the harshest action, should the need arise.
