



GOVERNMENT OF INDIA  
DIRECTORATE GENERAL OF CIVIL AVIATION  
Opposite Safdarjung Airport, New Delhi -1100 03

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## PUBLIC NOTICE

Subject: **STATUS REPORT ON AIRBUS A320 NEO AIRCRAFT FITTED WITH PW 1100 ENGINES (as on 27-11-2018)**

### 1. **Fleet Size of Airbus A320neo Fitted with PW 1100 Engines**

- Airbus A320Neo aircraft, fitted with two PW1100G-JM engines, are being 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 presently have **59 such aircraft** in its fleet. M/s. Go Air inducted the first A320Neo aircraft in May 2016 and presently have **25 such aircraft** in its fleet.
- At present **three A320Neo aircraft of M/s Go Air** are on ground awaiting engines replacement.

### 2. **In-Service Problems Encountered**

Post induction of the PW 1100G-JM engine into service, following technical issues have been experienced on these engines worldwide:

- a) Distress in Combustion Chamber;
- b) Oil chips Detection Indication due to wear of No.3 bearing seals; and
- c) HPC (High Pressure Compressor) rear knife edge seal fitted on engines with Serial Number 450 and above, which were introduced in service from October 2017 onwards.

### 3. **Action Taken to Address Above Issues**

- a) Distress in Combustion Chamber

#### Actions by the Manufacturer

- (i) At the time of entering into service, the PW 1100G-JM engines were fitted with "Block A" Combustion Chambers, which showed indications of erosion. In order to ensure timely detection, the manufacturer called

for carrying out Boroscopic Inspection (BSI) on these Combustion Chambers (in-depth physical inspection of combustion chamber) at 1500 Flight hours instead of the original 3900 flight hours which was laid down in the Maintenance Planning Document. Depending upon BSI findings the manufacturer calls for repeat inspection at reduced intervals of 750/375/150 flight hours/ 30 flight cycles.

- (ii) Consequently, P&W introduced improved “Block B” Combustion Chambers and further introduced “Block C” Combustion Chamber with further improvements and enhanced life of approximately 4000 flight hours. Currently, the manufacturer is working on development of “Block D” combustion Chambers with further improved life of Combustion Chambers for a life of 8000 flight hours. **Introduction of improved “Block C” Combustion Chambers has resulted in improvement in life of combustion chambers.**
- (iii) **At present 108 (out of 118) engines of Indigo and 44 (out of 50) engines of Go Air are installed with “Block C” combustion chamber. With the introduction of “Block C” combustion Chambers in March 2018, no distress has been observed.**

Additional Actions by DGCA

- (i) Periodicity of Boroscopic Inspection (BSI) on Combustion Chamber which was brought down from 3900 flight hours to 1500 flight hours by the engine manufacturer was further reduced by DGCA to 1000 flight hours with repeat inspection at every 500 flight hours and 375 hours in February 2017. **The restrictions imposed by DGCA have also been adopted by engine manufacturer for “Block B” combustion chambers effective March 2018.**
- (ii) In the event of non-satisfactory BSI result, affected engine is being removed before any impending failure and these restrictions continue to be in force.

b) **Detection of Metallic chips in Oil due to Wear of No.3 Bearing Seals**

Actions by the Manufacturer

- (i) PW1100G-JM Engines are equipped with Oil Debris Monitoring (ODM) System which gives an indication in case of any metallic chip is detected in the oil due to wear of the bearing. In the event of detection of metallic chip, the manufacturer permits release of aircraft for 10 Flight Hours under Master Minimum Equipment List (MMEL), which is approved by the regulatory authority of State of Manufacture. The same has been reduced to 3 flight hours and one cycle.
- (ii) Additionally, after series of Number 3 bearing seal wear cases, the **manufacturer introduced modifications on the seal which has resulted in reduction in the failure of the seals.**

- (iii) **At present Indigo has 107 engines with modified bearing and Go Air has 47 engines with modified bearing. The problem on No. 3 Bearing has been reduced significantly. After the introduction of improved bearing in March 2018, only four cases of failure have been reported till date.**

Additional Actions by DGCA

- (i) Use of aircraft for additional 10 flight hours as given in the Minimum Equipment List (MEL) after the display of ODM light was stopped and DGCA issued directions to the operators to immediately ground the aircraft from commercial operations whenever cases of display of ODM light was experienced and replace the engine. This stipulation by DGCA continues.

c) **Issues related to Engines Serial Number (ESN) P770450 & above**

- (i) PW 1100G-JM engines produced after serial number P770450 (hereafter “post-450”) were equipped with a design change to high pressure compressor (HPC) rear knife edge seals. This change resulted in a negative impact to the durability of the knife edge seal and resulted in 5 failures of the seal worldwide. The failed seal was fully contained within the case of the engine and does not pose any damage the airplane.
- (ii) Due to such failures, FAA along with EASA evaluated the risk associated with both engines failing due to a knife edge seal failure, and issued Emergency Airworthiness Directive (AD) on 9<sup>th</sup> February 2018, which placed flight restrictions on the Airbus A320Neo aircraft fitted with these engines to maintain an acceptable level of safety in the worldwide fleet. These ADs restricted the airplanes from flying with both engines in the post-450 configuration and prevented ETOPS operations with any engine in the post-450 configuration.
- (iii) The EASA Emergency AD 2018-0041 was followed by both Indigo Airlines and Go Air A320Neo fleet. The aircraft fitted with both post-450 serial number engines were immediately grounded.

Additional Actions by DGCA

- (i) Following issuance of Emergency AD in February 2018, DGCA reviewed and decided to prevent operation of aircraft fitted with even one post-450 engine on the Airbus A320Neo aircraft. This action was over and above the recommendations made by the regulatory authority of type certification of the aircraft and engine.
- (ii) DGCA corrected the possibility even single engine failures despite being permitted by EASA, keeping in mind the paramount importance of airworthiness and passenger safety.

4. In addition to above issues, there have been few cases of engine vibrations, Low Pressure Turbine (LPT) blade damage, Airlines have referred the matter to the engine manufacturer. DGCA would consider issuing necessary instructions upon receipt of report from engine manufacturer.
5. FAA has issued two ADs No. 2018-21-10 and 2018-22-02 dated 7 November 2018 which are effective from 12 December 2018.
  - (i) FAA AD No. 2018-21-10 requires replacement of certain parts on PW 1100 engines from S. No. 450 to 614 installed on A 320 Neo aircraft. This is to address failure of knife edge blade seal. All the engines operated by both the Indian operator are compliant with this directive.
  - (ii) FAA AD No. 2018-22-02 requires replacement of High Pressure Compressor (HPC) front hub due to corrosion on PW 1100 engines installed on A 320 Neo aircraft. This AD is required to be complied within 120 days after effective date of the AD on engines which ever have accumulated 6180 cycles since new or within 5 years since the ship date which occurs first. Total 15 engines (Indigo-13 and Go Air-2) installed on aircraft are affected by this AD. This AD has already been declared mandatory by DGCA and both the operators have been directed to comply within the stipulated time period.
6. **With all the above actions, DGCA has ensured that safety of aircraft operations is not compromised at any stage.**

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