

---

# Airbus A320NEO

---

ATA36 System

**LIEBHERR**

Regional Technical Workshop  
2023



# Agenda

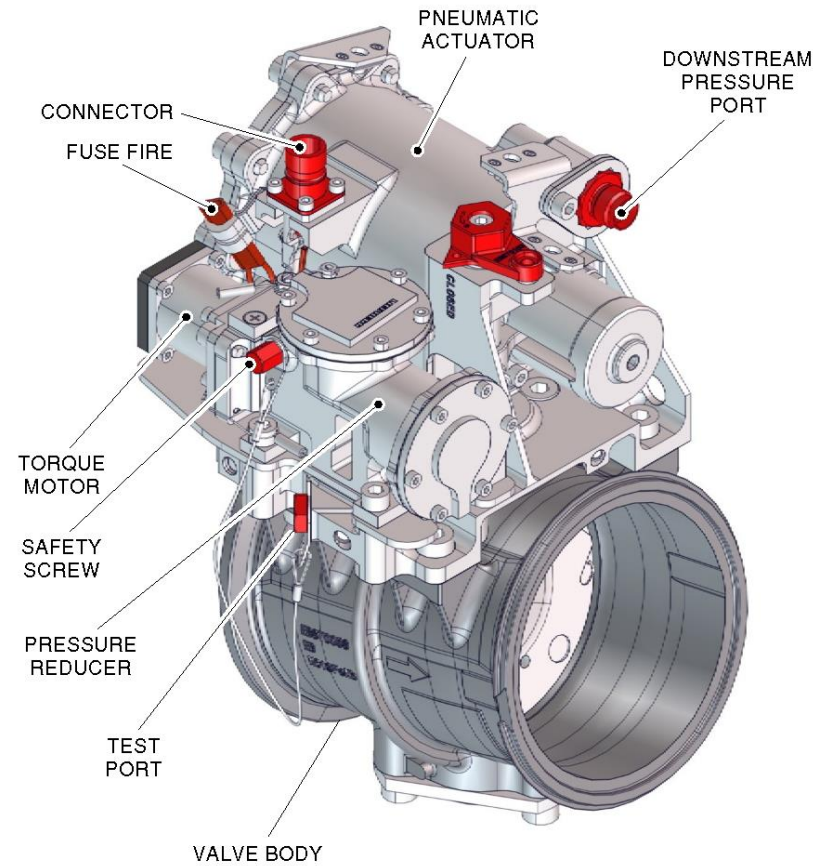
- 1 A320NEO ATA 36 training**
- 2 PRV & HPV status
- 3 A320NEO Fleet Status and Product Support Summary
- 4 BMC software status
- 5 DPS Sensor NFF status
- 6 FAV body status

# Agenda

- 1 A320NEO ATA 36 training
- 2 **PRV & HPV status**
- 3 A320NEO Fleet Status and Product Support Summary
- 4 BMC software status
- 5 DPS Sensor NFF status
- 6 FAV body status

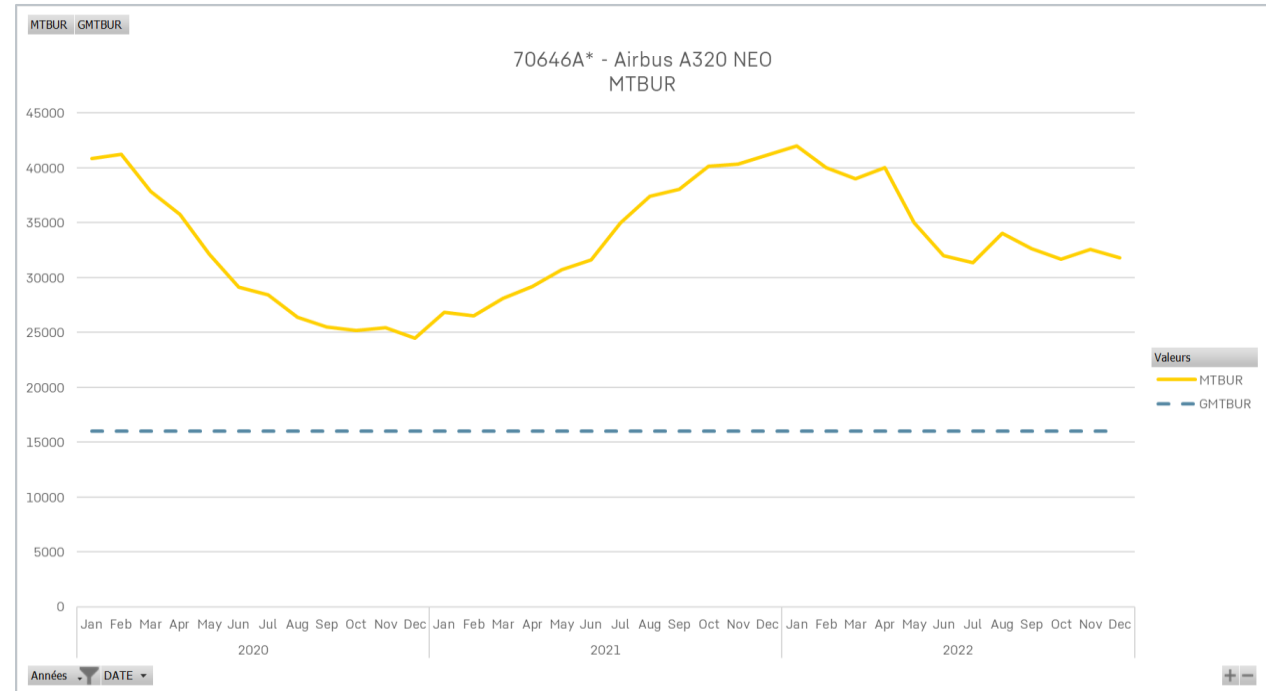
# PRV 70646A02\* status

**Pressure Regulating Valve (PRV)  
70646A020001**



# PRV 70646A02\* status

- The PRV reliability remains high, twice above the guarantee
- To date, no major issue identified
- AIB & LA still monitoring the valve
- The solution deployed on the HPV could be retained for the next PRV improvement opportunity



**AIB & LA to continue the PRV monitoring**

## HPV 70645A02\* In-service occurrences

### High Pressure Valve (HPV) 70645A020001

- HPV Failed Closed
  - RCP-Saneo-36-0339
  - TFU 36.11.00115
  
- HPV Failed Open
  - RCP-Saneo-36-0380
  - TFU 36.11.00106



# HPV 70645A02\* Fault - Failed closed (FC) system effect

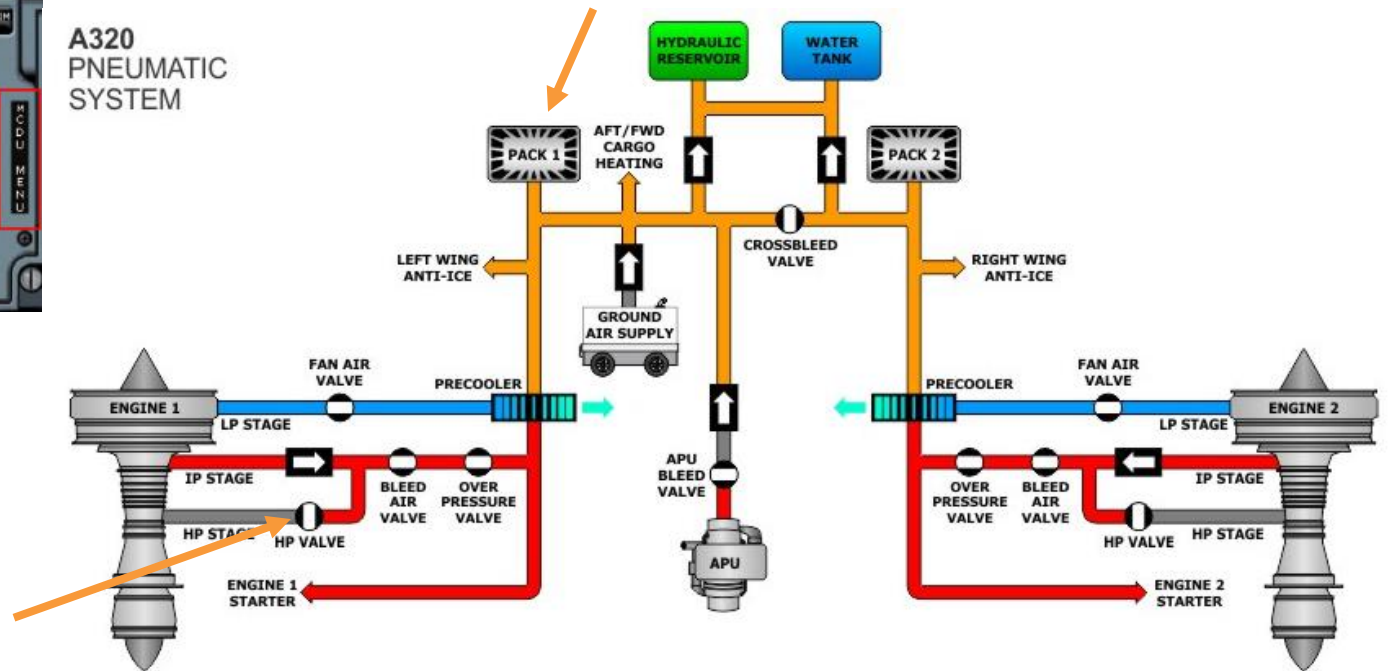


## Context

Cruise, bleed on Intermediate Pressure port

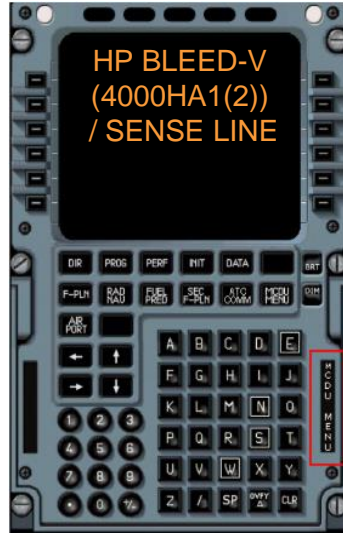
Top of descent leads to engine thrust reduction

Pack Inlet Pressure is detected below 18 psig



HPV is detected closed while commanded to open

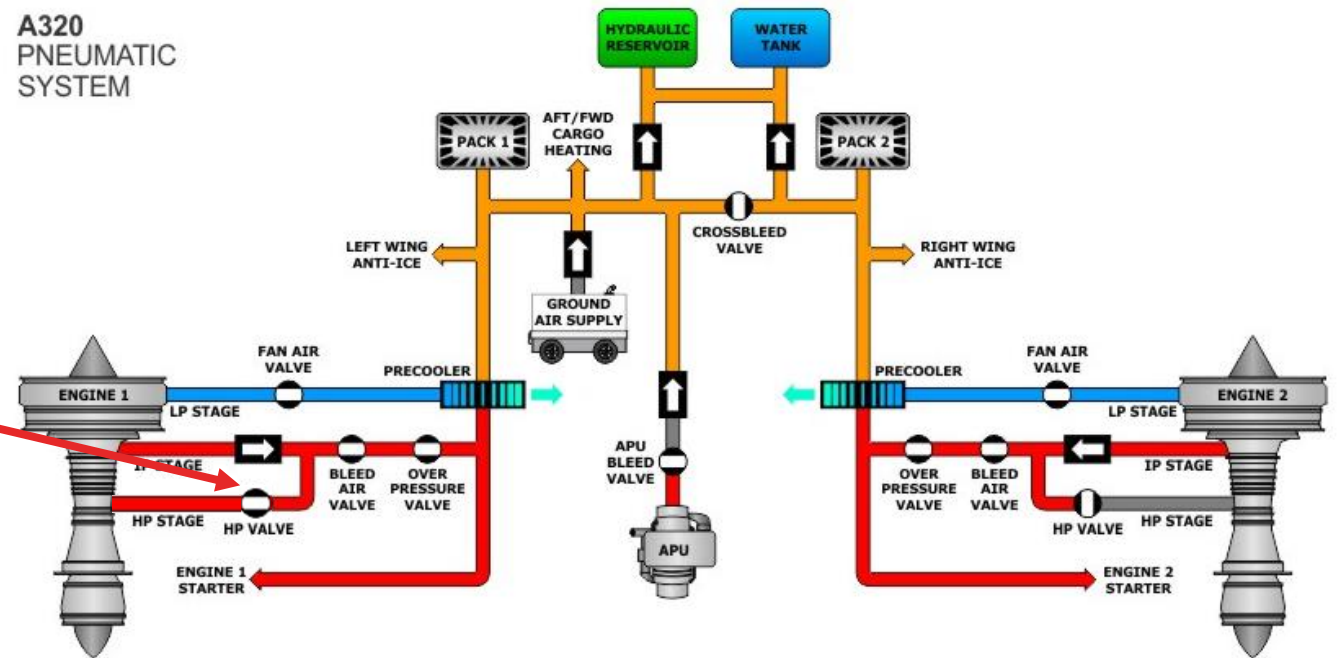
# HPV 70645A02\* Fault - Failed open (FO) system effect



**In-service occurrence**  
Most cases occur on ground at Take-off during engine thrust increase to Take-off level

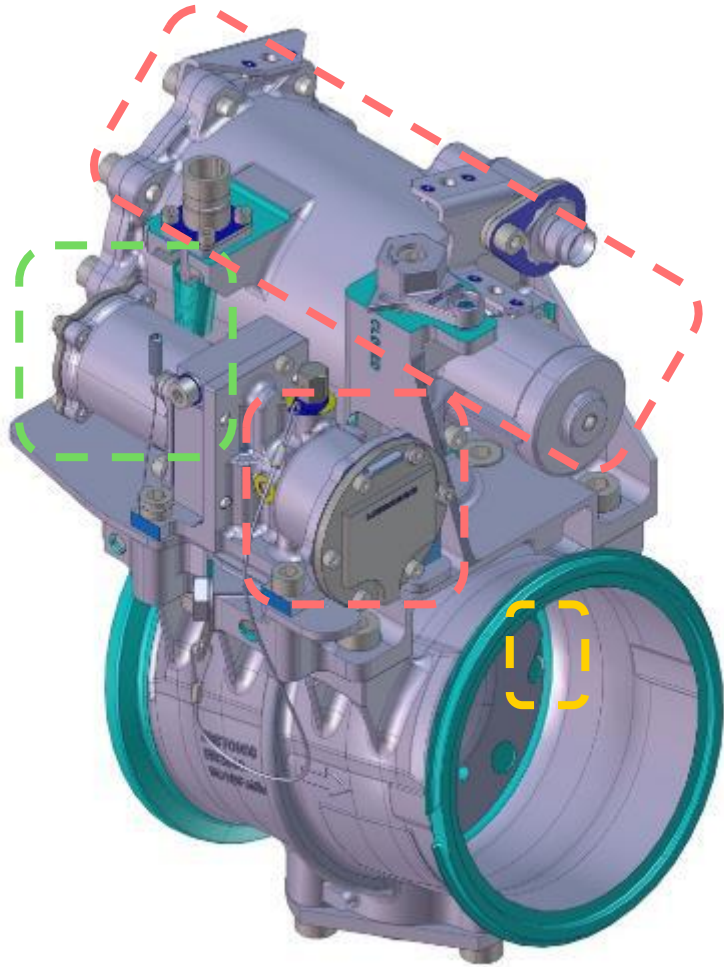
BMC detects HPV is open also it is commanded to close  
BMC isolates the bleed and closes corresponding PRV

A320 PNEUMATIC SYSTEM





# HPV 70645A02\* Faults in-service findings



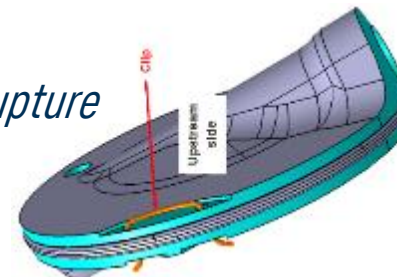
✓ *Aluminium phosphate exudation from JPXX32 graphite on actuator seals and regulation clapper (already fixed by SB 70645-36-01, Amdt A)*



✓ *Solenoid winding weakness*

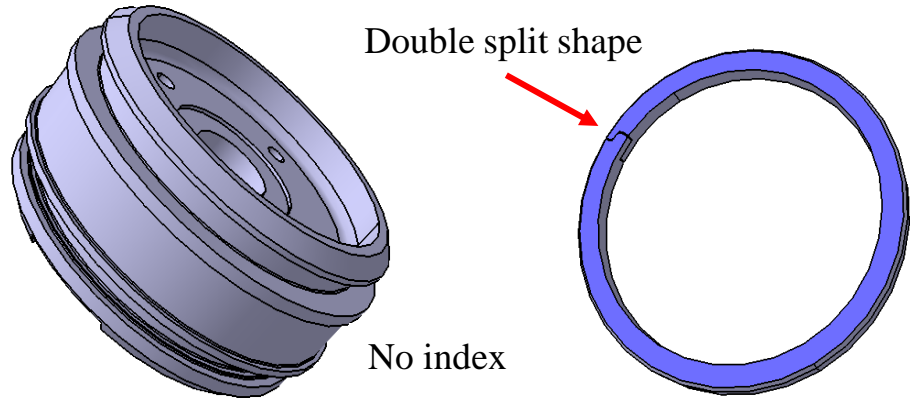


✓ *Butterfly clip rupture*

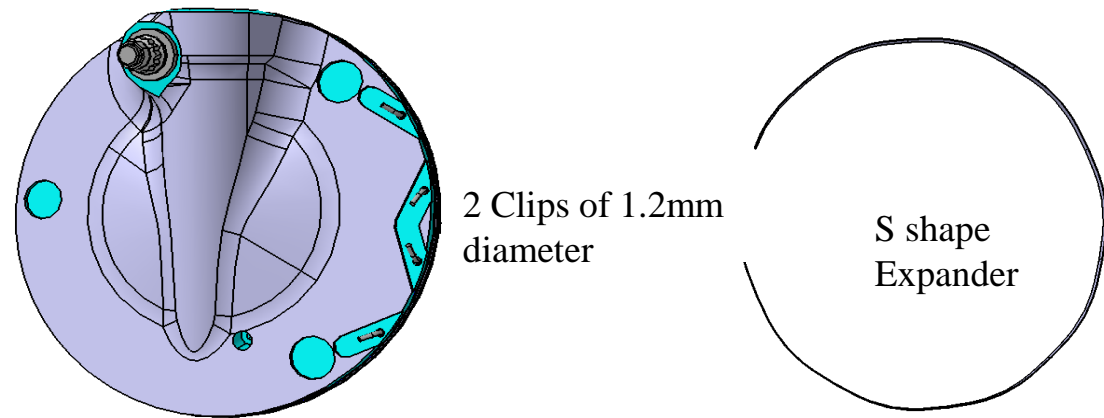


# HPV A03 modifications

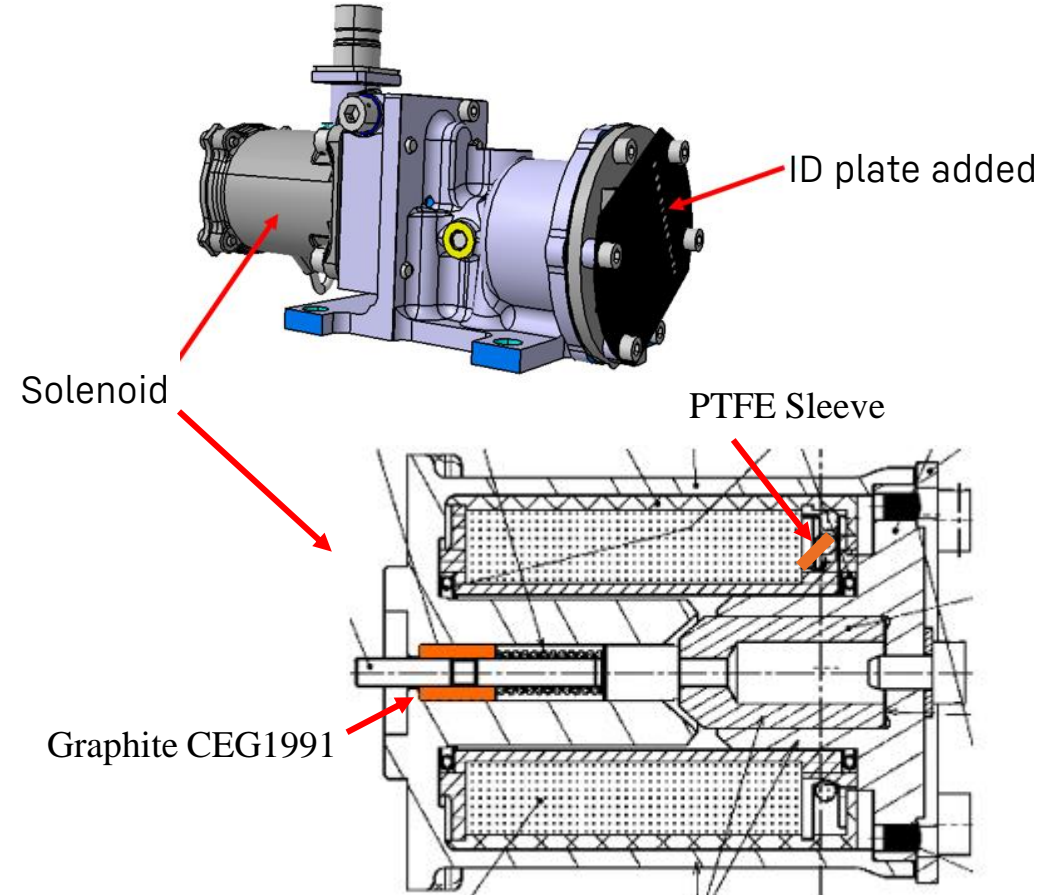
## ✓ Actuator



## Butterfly

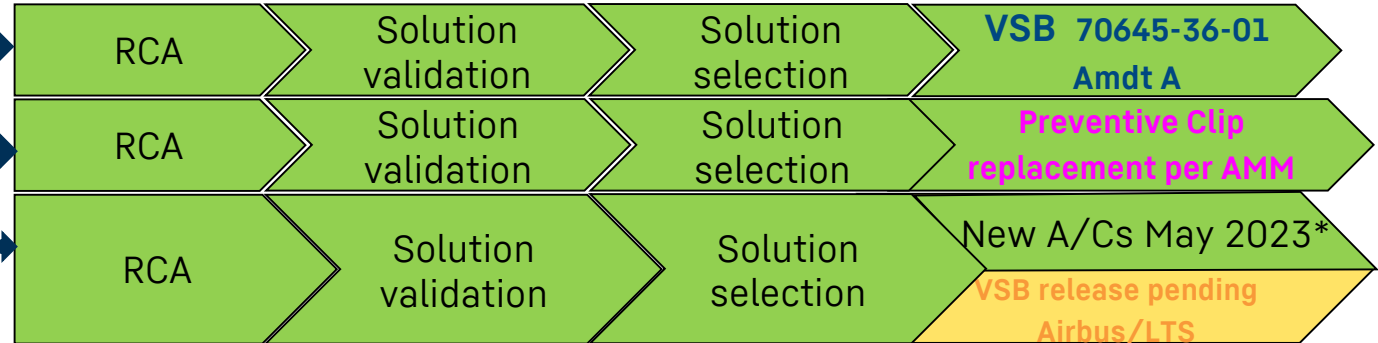


## ✓ Solenoid & ID plate



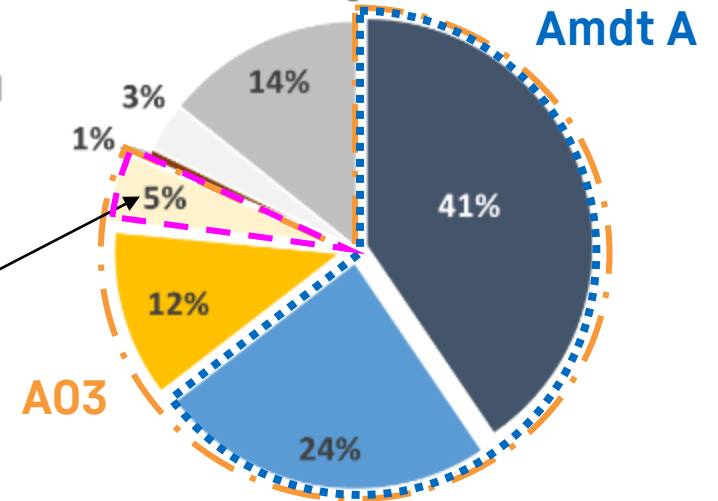
# HPV faults & solution + mitigation generalization timeline

Design solutions	Failure Mode		Amdt A	clip replt	HPV A03
	FC	FO			
Graphite piston seals	X	X	✓		✓
Graphite regul. clapper	X		✓		✓
Butterfly clip		X		✓	✓
Solenoid sleeve	X				✓



Major finding HPV 70645  
Study period [Jan 2018-Oct 2021]

- ACTUATOR SEALING EXUDATION
- REGULATOR S/A EXUDATION
- SOLENOID S/A failed
- CLIP RUPTURE
- BEARINGS WORN
- INDUCED
- NFF



Leap : AMM 36-11-51-000/400-805-A

PW : AMM 36-11-51-000/400-806-A

Or Preventive clip replacement in Shop

# Agenda

- 1 A320NEO ATA 36 training
- 2 PRV & HPV status
- 3 A320NEO Fleet Status and Product Support Summary**
- 4 BMC software status
- 5 DPS Sensor NFF status
- 6 FAV body status

# Fleet Status & Product Support Summary – APAC Region

Operator: Region > Country    Operator Name    Manufacturer > Family > Type    Engine Type    Status

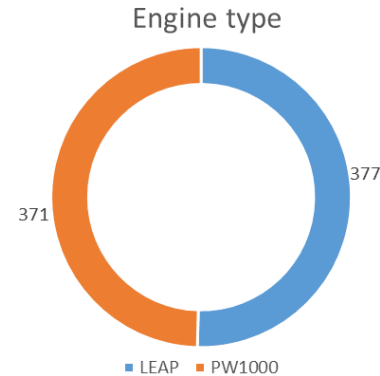
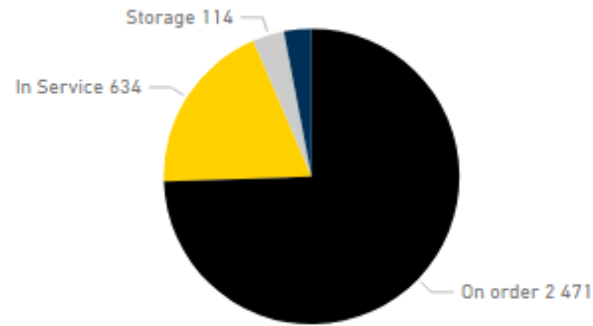
Asia    Tout    Plusieurs sélections    Tout    Tout

**3 319**  
Total Nb MSN

**748**  
In Service + Stored  
(85 % In service)

**3,4**  
Average Age

Nb aircraft (MSNs) per Status



## PRODUCT SUPPORT OBJECTIVES

- To minimize contribution to OI through product modifications and improvements
- To secure and increase spares availability
- To increase Liebherr in-house repair share
- To promote tailored maintenance programs
- To provide OEM technical expertise

### Focus "In Service" aircraft

634

## KEY FACTS

- **APAC region represents 25%** of the World-Wide A320NEO in-service fleet.
- APAC A320NEO fleet **average age** (3.4 years) is **slightly higher** than World-Wide (3.1 years).
- Focus on **OI contributors** → Liebherr will propose specific product modifications
- Commitment on **beneficial support conditions** → Liebherr priority to boost customer satisfaction

Number of aircraft in service per Operator (Top 20)



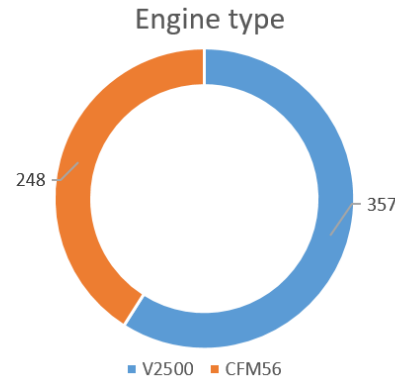
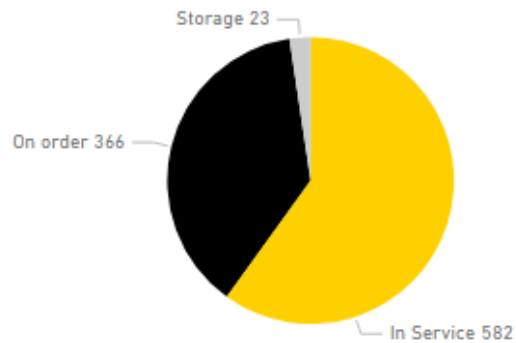
# Fleet Status & Product Support Summary – China

Operator: Region > Country    Operator Name    Manufacturer > Family > Type    Engine Type    Status

China    Tout    Plusieurs sélections    Tout    Tout

**971**    **605**    **3,1**  
 Total Nb MSN    In Service + Stored (96 % In service)    Average Age

Nb aircraft (MSNs) per Status



## PRODUCT SUPPORT OBJECTIVES

- To minimize contribution to OI through product modifications and improvements
- To secure and increase spares availability
- To increase Liebherr in-house repair share
- To promote tailored maintenance programs
- To provide OEM technical expertise

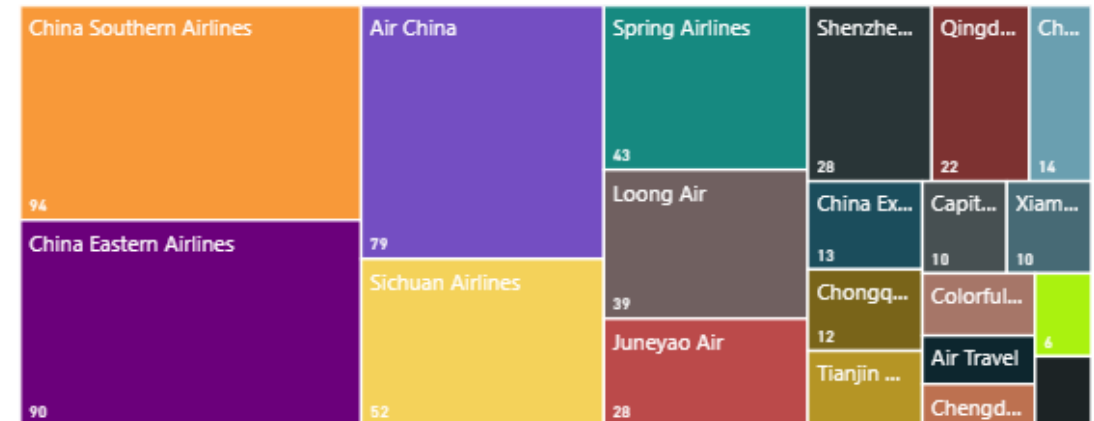
### Focus "In Service" aircraft

582

## KEY FACTS

- **China represents 20%** of the World-Wide A320NEO in-service fleet.
- APAC A320NEO fleet **average age** (3.1 years) is **the same as** World-Wide (3.1 years).
- Focus on **OI contributors** → Liebherr will propose specific product modifications
- Commitment on **beneficial support conditions** → Liebherr priority to boost customer satisfaction

Number of aircraft in service per Operator (Top 20)



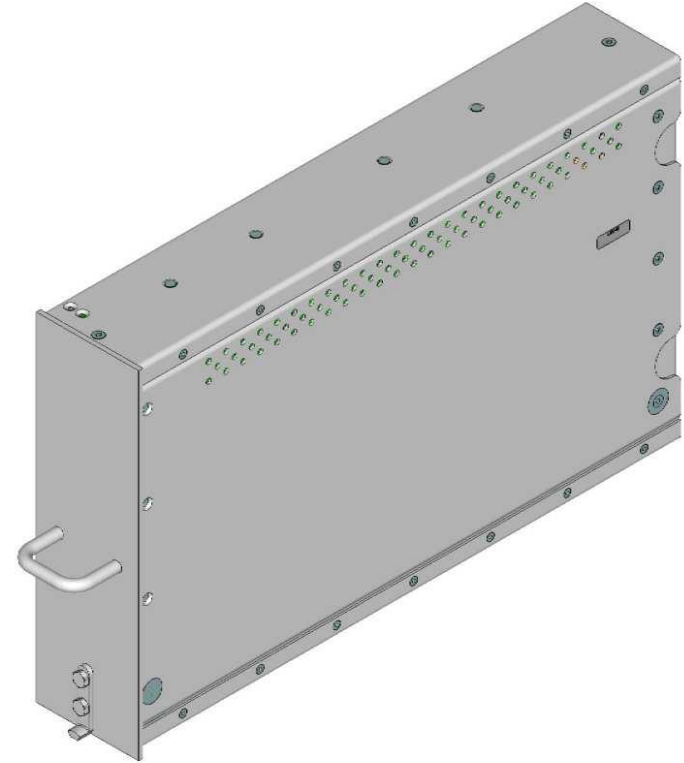
# Agenda

- 1 A320NEO ATA 36 training
- 2 PRV & HPV status
- 3 A320NEO Fleet Status and Product Support Summary
- 4 **BMC software status**
- 5 DPS Sensor NFF status
- 6 FAV body status

# BMC software status

**Bleed Monitoring Computer (BMC)**  
**70418A010001**

- RCP-Saneo-36-0361





## BMC software evolution

The BMC software evolution embeds several upgrades on the following topics:

- Low altitude HP/IP switching ( to avoid unnecessary HPV opening/oscillation in cruise below 30000fts)
- HPV/PRV monitoring
- BMC Orphan messages (the majority will be avoided with the new soft)
- BMC no response occurrences



**The new software SW 4.4 is to be released in Q1/Q2 2024**

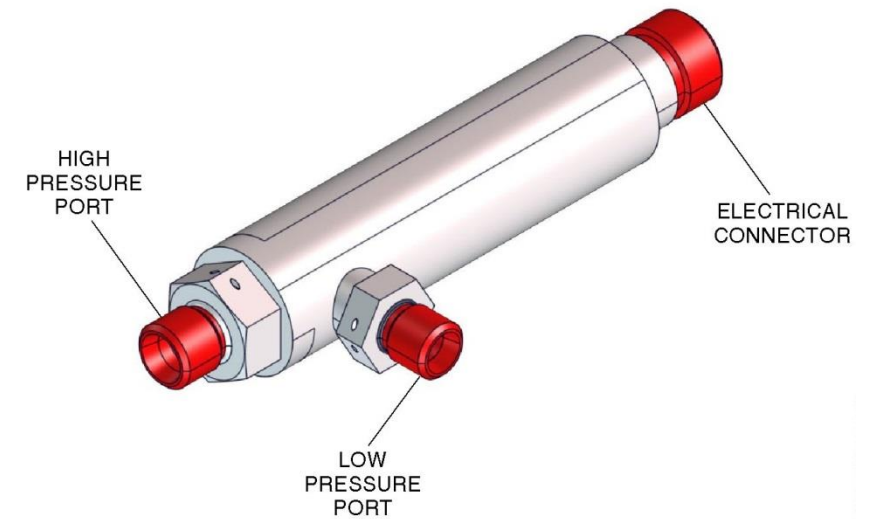
# Agenda

- 1 A320NEO ATA 36 training
- 2 PRV & HPV status
- 3 A320NEO Fleet Status and Product Support Summary
- 4 BMC software status
- 5 DPS Sensor NFF status**
- 6 FAV body status

## DPS drift on PW installation ( high NFF rate)

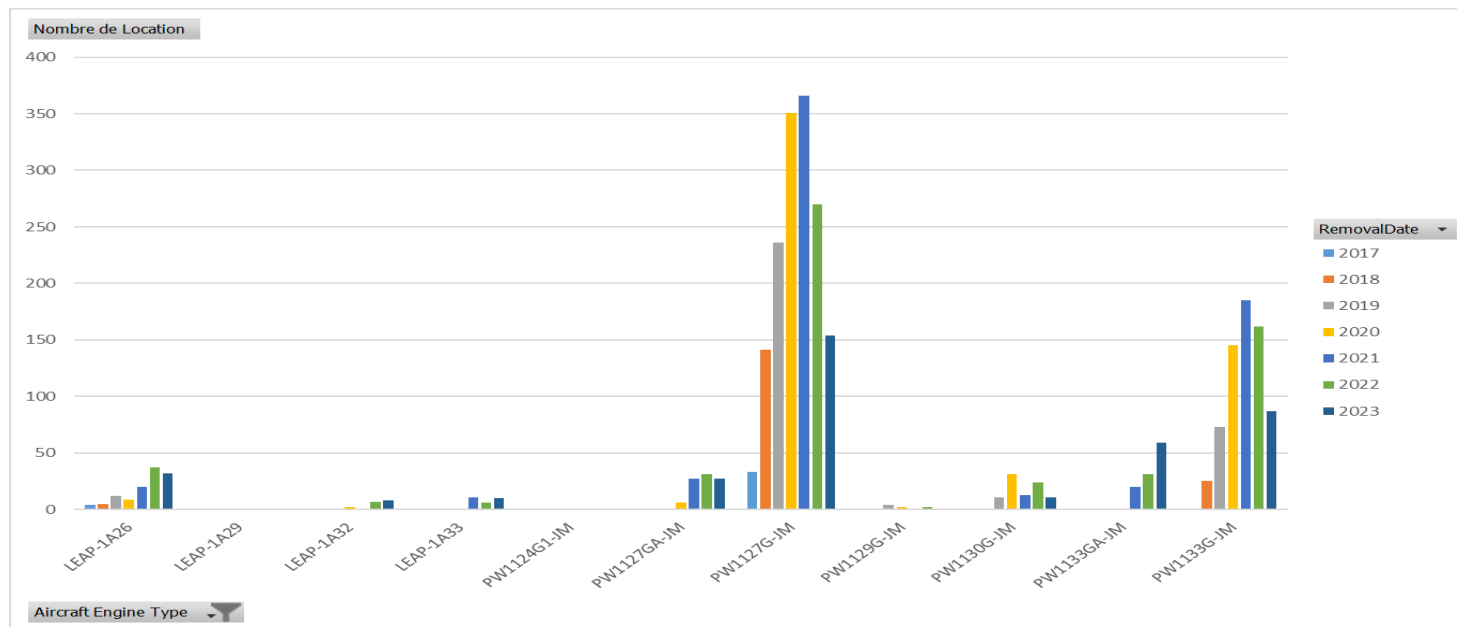
**Delta pressure Switch  
25002A010001**

- RCP-Saneo-36-0319



## DPS drift measurement on Pratt & Whitney installation

- Multiple Differential Pressure Sensor (DPS) removals due to "DRIFT DIFF-PRESS XDCR /SENSE LINE" or "DIFF-PRESS XDCR /SENSE LINE"
- PW engine installation is more affected (91% of removals)
- 80% of DPS are No Fault Found during ATP at ambient temperature.
- Sense line modification deployed by Airbus to avoid water migration inside the sensor
  - ➔ Despite Operators report DPS faults after modification, improvement can be observed
  - ➔ The sensor are not damaged by water/ice

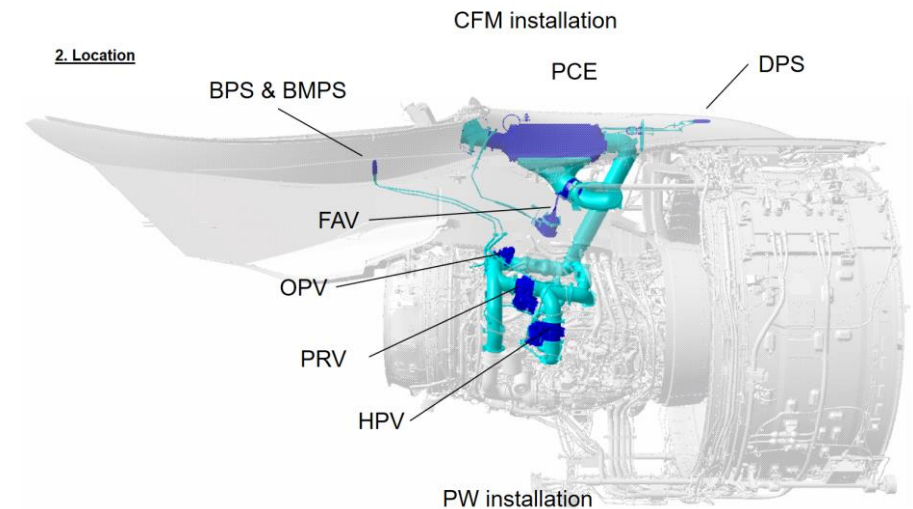
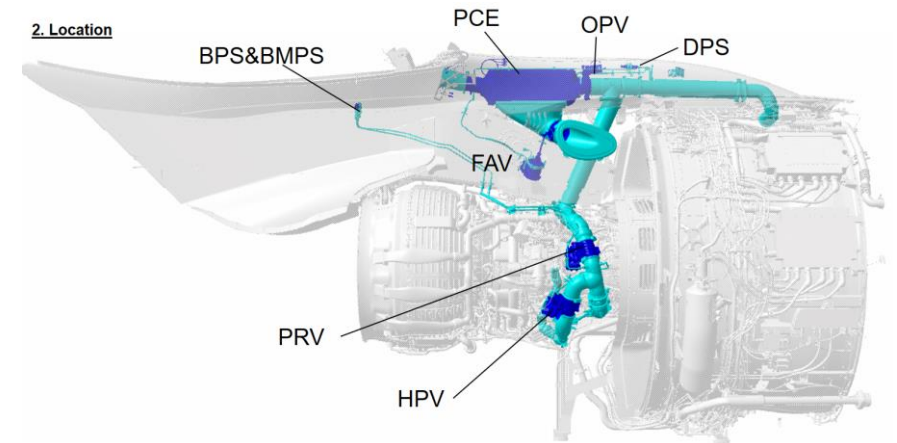


# DPS drift measurement on Pratt & Whitney installation

- The Weibull analysis per engine and per manufacturer confirms the sensor is performing well
- The two DPS manufacturer have the same reliability on LEAP and the same reliability on PW

Data	Average MTF	Lower MTF @90%	$\beta$
25002A010001	51 180	38 931	2.19
70653B*	63 450	44 340	1.12
CFM	6 488 779	203 843	0.68
PW	16 122	13 321	1.49
70996A*	30 185	20 724	1.75
CFM	<i>not enough data for a consistent result</i>		
PW	15 352	11 901	2.02

Weibull analysis per manufacturer and per engine



DPS reliability & solution efficiency under monitoring

# Agenda

- 1 A320NEO ATA 36 training
- 2 PRV & HPV status
- 3 A320NEO Fleet Status and Product Support Summary
- 4 BMC software status
- 5 DPS Sensor NFF status
- 6 FAV body status**

## FAV In-service occurrences

### Fan Air Valve (FAV) 70649A01000x (body)

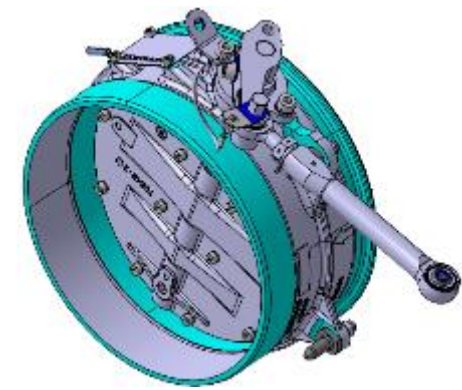
- FAV Investigation
  - RCP-Saneo-36-0318
  - TFU 36.11.00104



6- FAV body status

# FAV body (PN 70649A01\*)

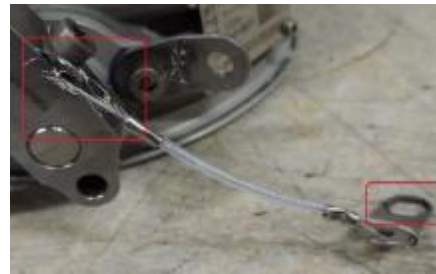
## FAV body induced damages



FAV valve body overview

Acoustic resonances from the fan inlet scoop are transmitted to the FAV, generating induced damages on FAV (body & rod) for both P&W and Leap engine installations.

Retaining cable damaged



Retaining cable missing



Lock wire or seal damaged



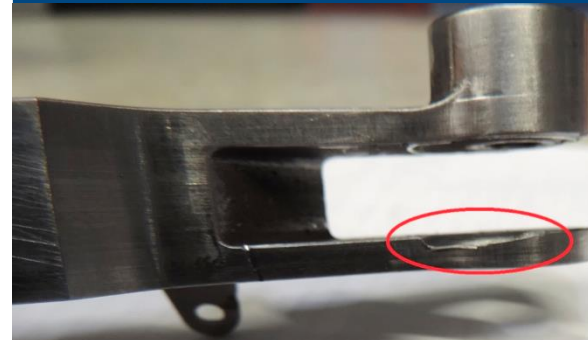
Pins damaged



Valve body damaged



Lever assy damaged



Special screw damaged





# FAV body (PN 70649A01\*)

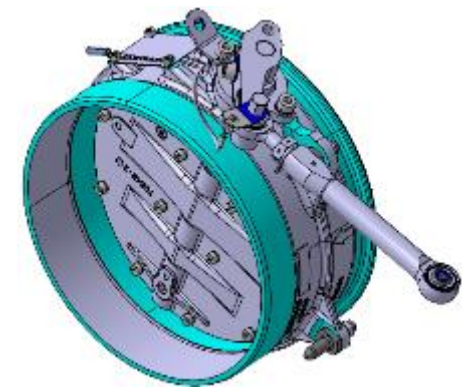
## Situation with Brackets modification



Damages on A/C are observed even with reinforced brackets i.e:

- Airbus POST SB 54-1045 or POST MOD 164147 for PW engines
- Airbus POST SB 54-1044 or POST MOD 163328 for CFM engines

Typical finding post mod described here:



FAV valve body overview



FAV FIN 7120HM1/7120HM2  
PN 70649A010001 (PW)  
PN 70649A010002 (CFM)



On aircraft with reinforced brackets, main damages concentrate at pin and cinematic level