

Donaldson Leonardo AW139 IBF

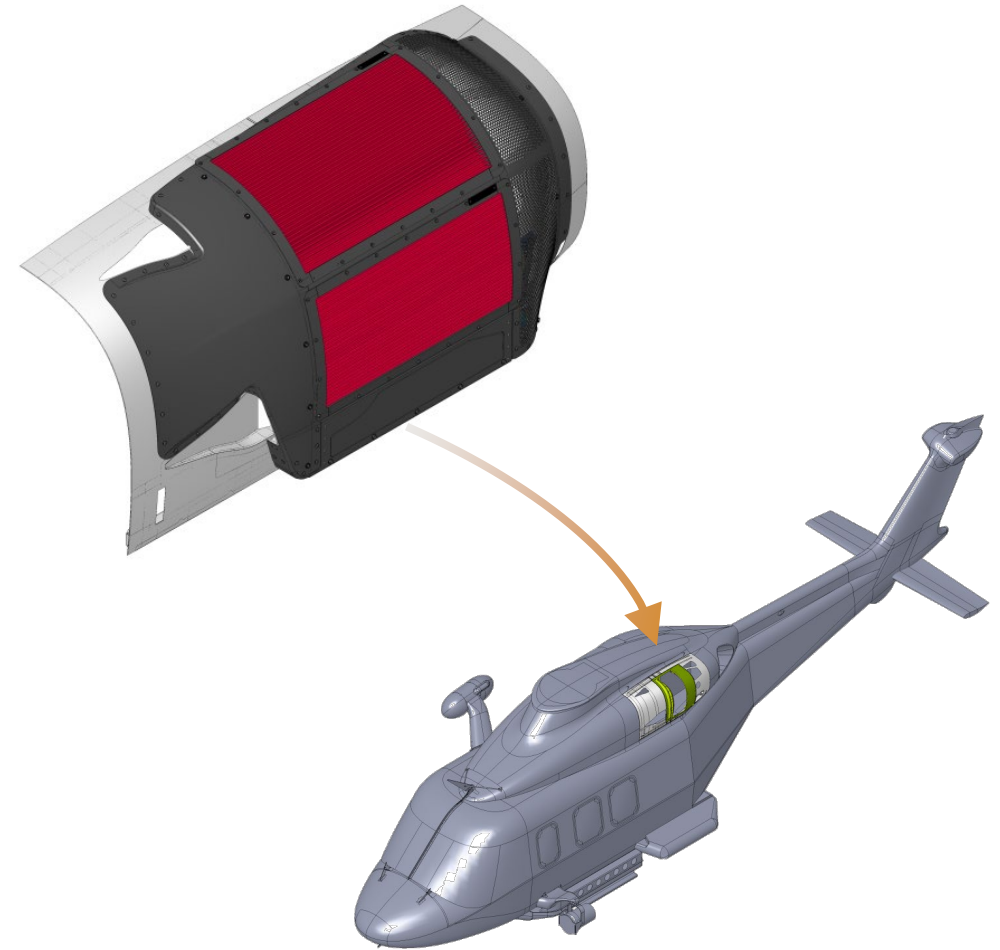
August 1, 2020

AW139 INLET BARRIER FILTER

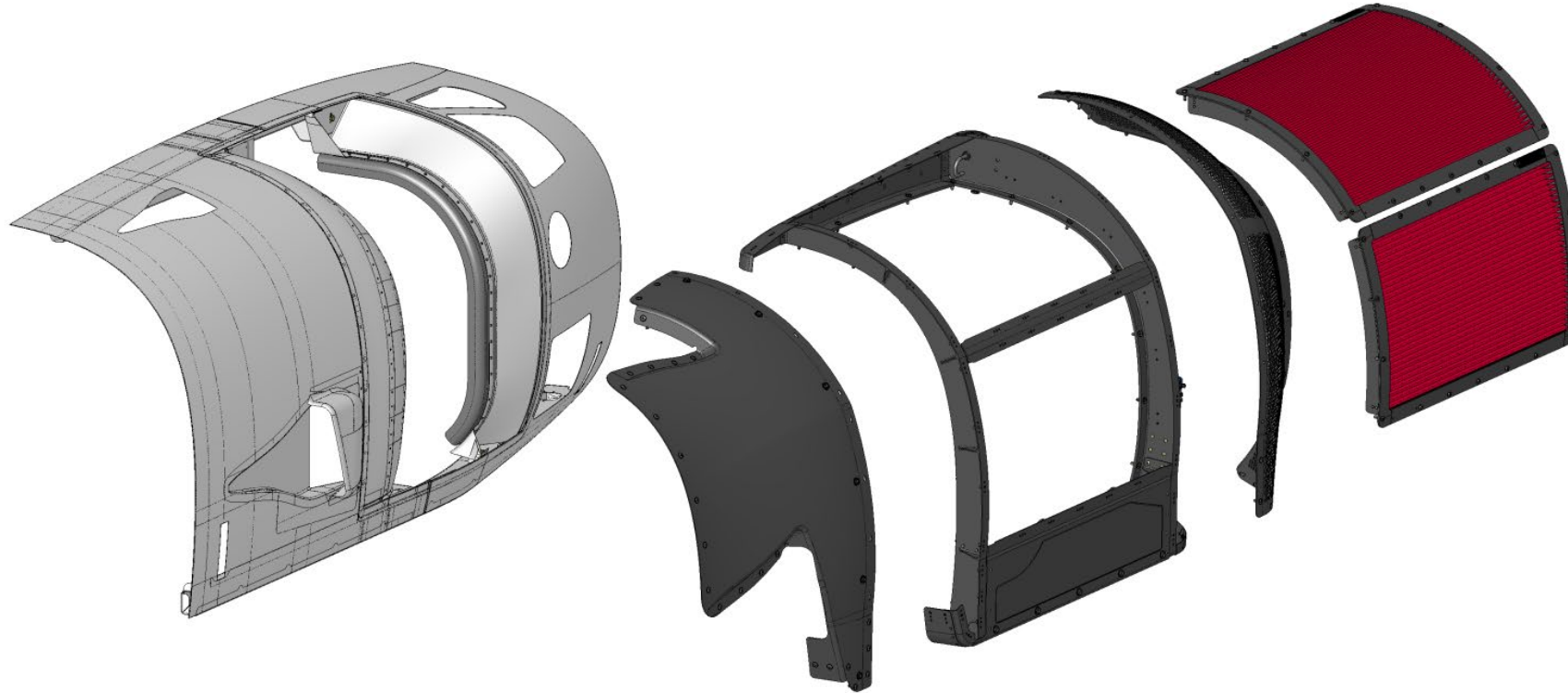


AW139 IBF SYSTEM DESIGN

- The Donaldson AW139 Inlet Barrier Filter (IBF) system is mounted onto the engine cowlings and consists of a Left-Hand (L/H) and Right-Hand (R/H) assembly that seal to the engine inlet and provide clean, filtered engine air.
- The IBF System consists of an external structure skeleton required to modify the existing production cowlings providing an interface to mount the filters, filter assemblies, an aerodynamic forward and aft fairing with a cockpit indicating system and a pilot activated bypass system. Cockpit annunciation alerts the pilot of filter restriction and the bypass system provides unfiltered air to the engines.



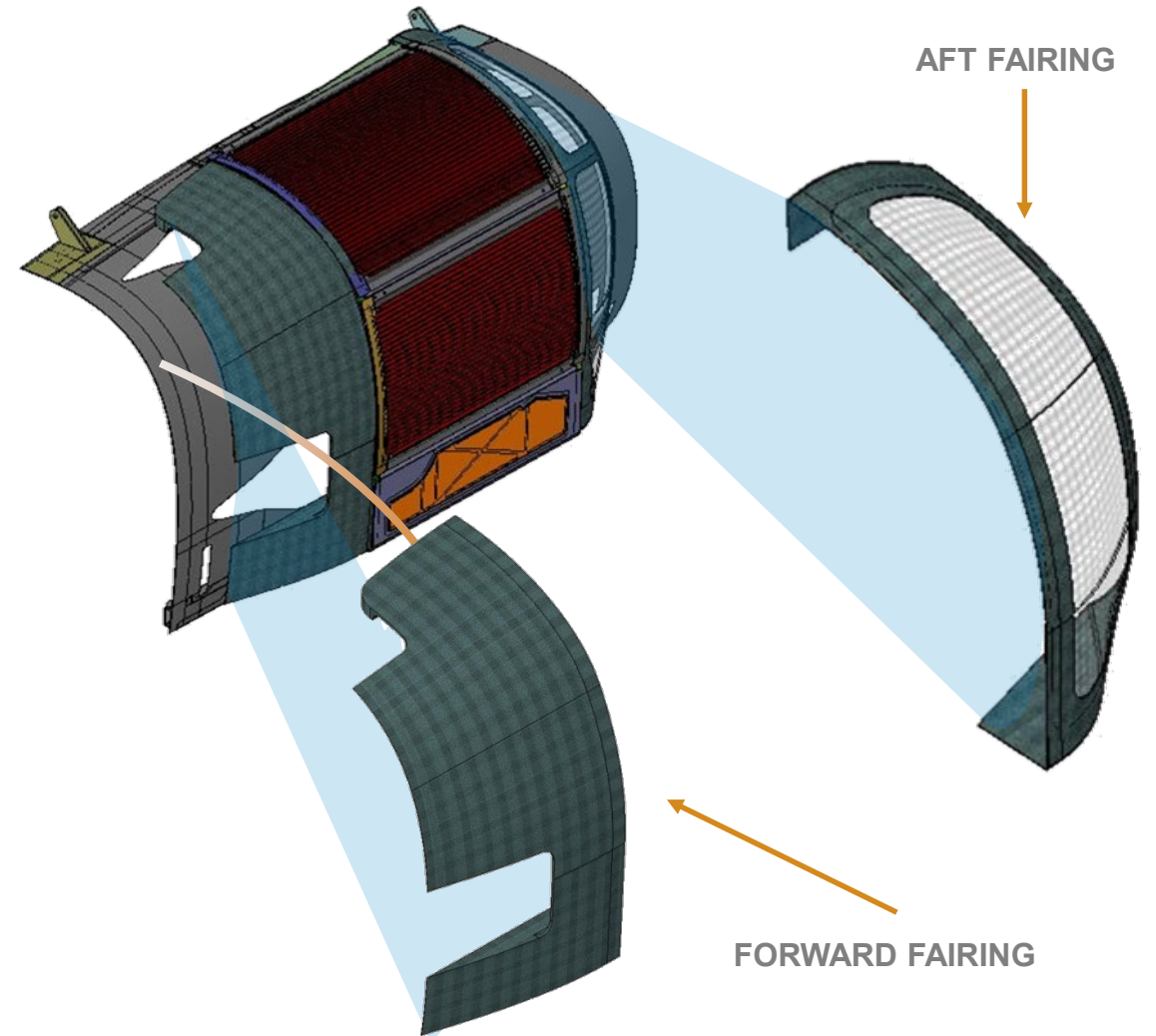
AW139 IBF SYSTEM COMPONENTS



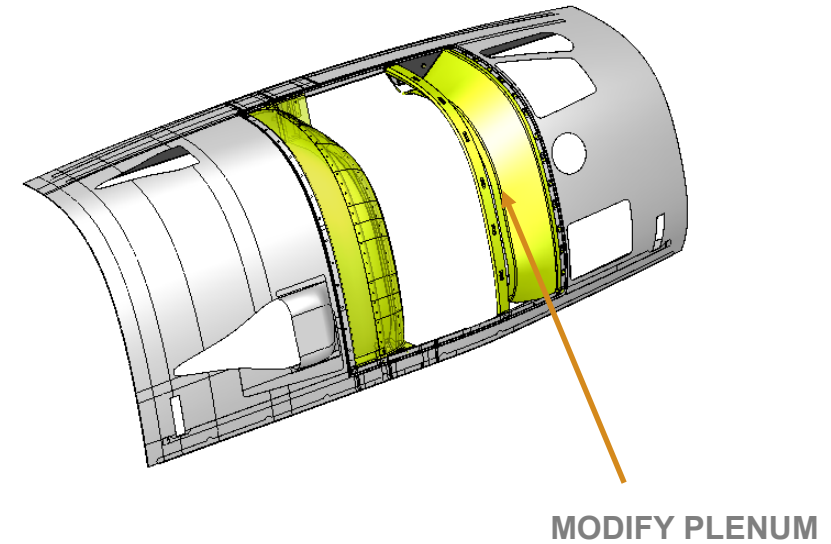
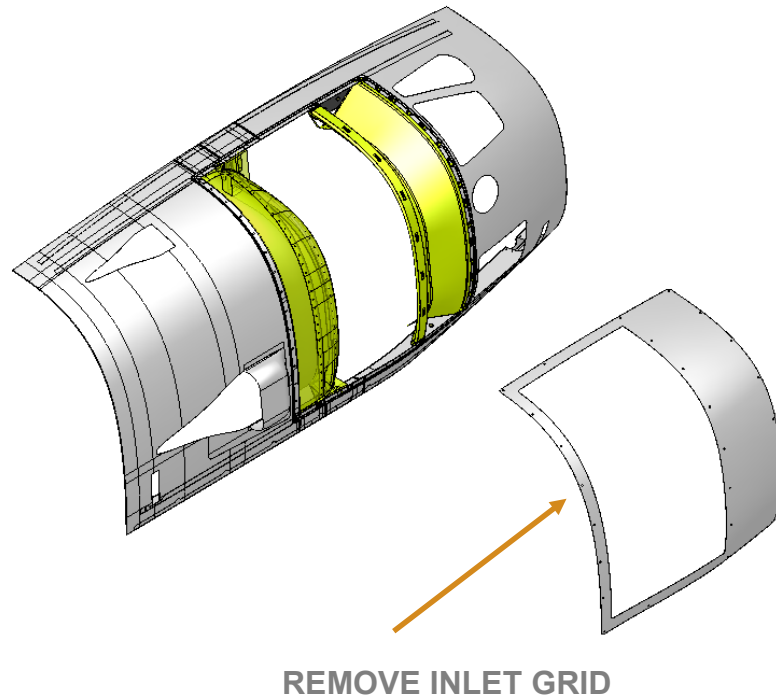
L/H IBF ASSEMBLY

AW139 IBF AERODYNAMIC FAIRINGS

- The Forward and Aft Fairing Assemblies will provide a clean aerodynamic shape for the IBF system.
- These fairings will accommodate the requirements for engine compartment cooling and are state of the art super plastic aluminum components.



AW139 IBF ENGINE COWLING MODIFICATION



The AW139 engine cowl (Leonardo PN's 3G7106P03631 and 3G7106P03531) are modified by removing the existing main air intake screen and modifying the aft stiffener to accept the IBF structure.

AW139 IBF ADAPTER STRUCTURE

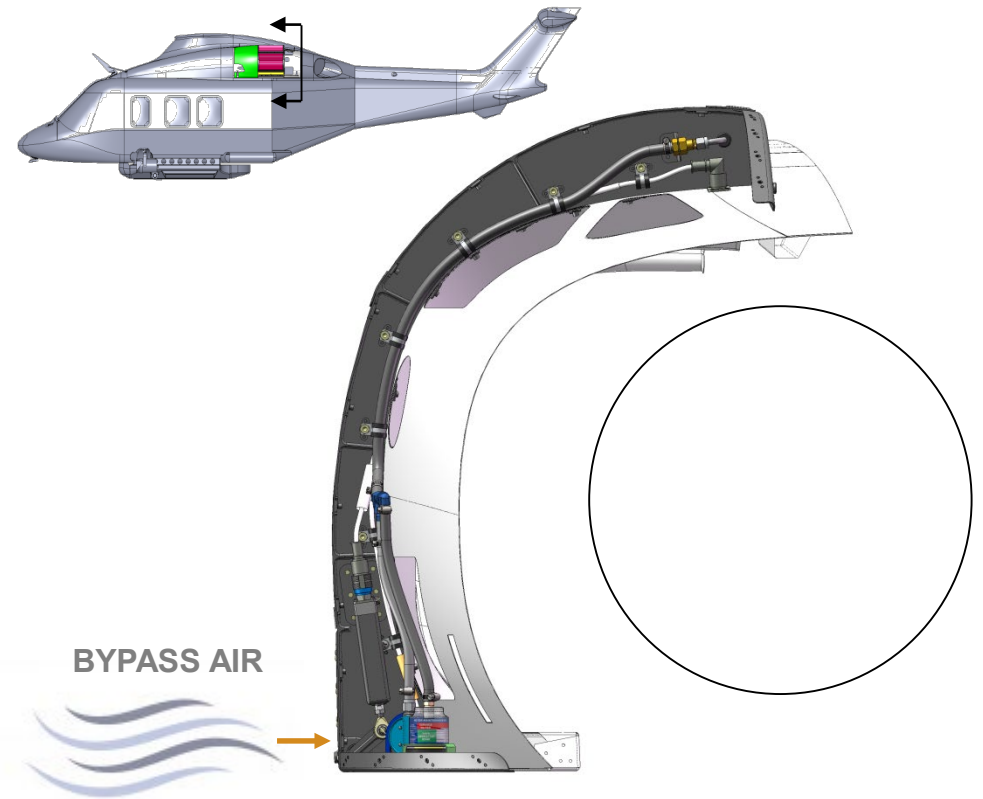
- The AW139 adapting structure is made up of corrosion and erosion resistant sheet metal and machined aluminum parts. This structure will provide mounting provisions for the (2) per side main filter assemblies, bypass system, delta pressure switch and the filter maintenance aid. The system is designed with a lower aerodynamic drag profile than the existing IPS.



L/H IBF ASSEMBLY

AW139 IBF BYPASS SYSTEM

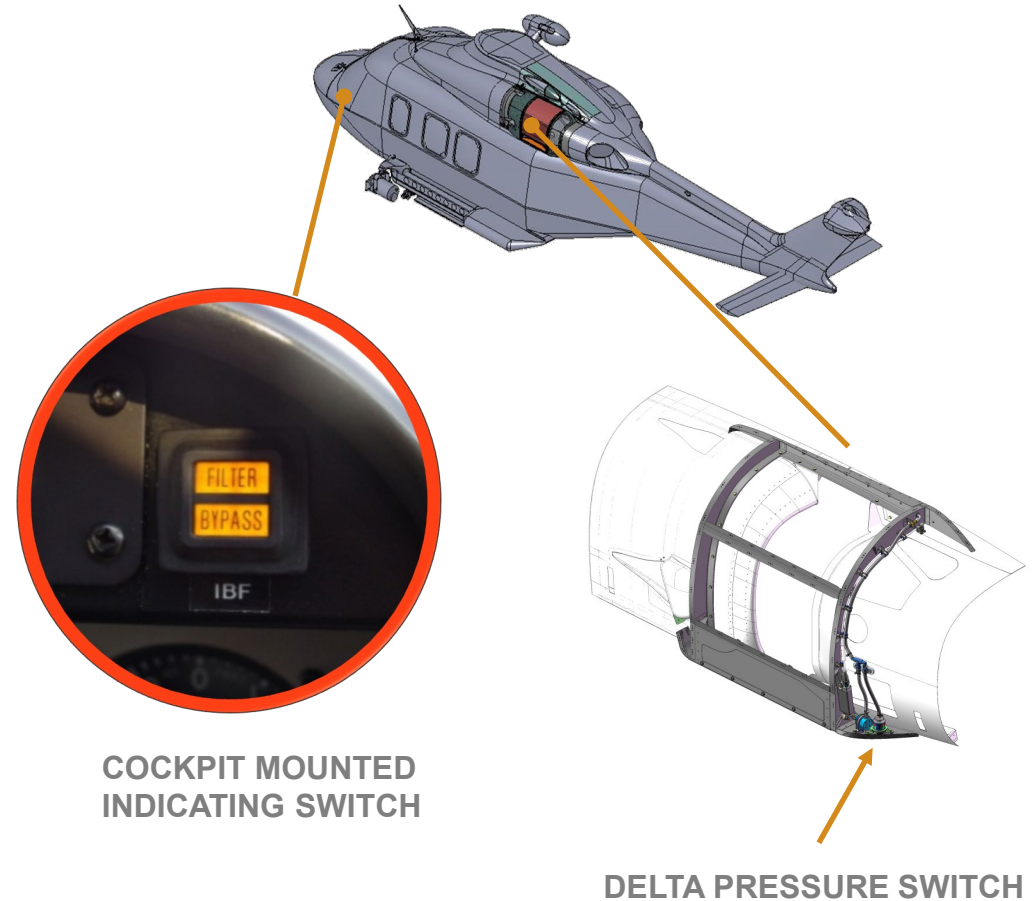
- Donaldson AW139 IBF Bypass System consists of a pilot-activated 28VDC electro-mechanical actuator that opens a bypass door which swings inboard.
- In event of inlet obstruction, the Bypass System allows free flow of air to enter the engine plenum.
- Similar configurations are certified on the MD 900 and the Bell 429.



LOOKING FWD L/H SIDE

AW139 IBF COCKPIT INDICATION SYSTEM

- The AW139 Cockpit Indication System provides the pilot indication of filter restriction (particles have been captured and potential engine damage avoided), allowing the pilot the option to open the bypass door which allows unfiltered air to enter the engine inlet.
- A delta pressure switch is mounted on the adapter structure that measures the pressure across the filters.
- When the delta pressure reaches a defined setting, a signal activates the cockpit indicator. Upon annunciation of inlet generated pressure loss, the pilot may open the bypass doors which will reduce the inlet pressure loss to a safe level.



IBF FILTER MAINTENANCE AID (FMA)

- Pre and Post flight indication of filter contamination level and maximum pressure drop.
- Allows flexibility for mission planning with predictable service cycles, particularly in high tempo desert environments.
- Verification of post cleaning effectiveness.



IBF FILTER MAINTENANCE AID (FMA)

- Provides the ability to meet Condition-Based Maintenance (CBM) between established cleaning intervals, eliminating unnecessary service.
- Measures plenum pressure versus ambient, across the filter system.
- Similar FMA used on other Donaldson IBFs for the Bell 205A, 206B, 206L-1/3/4, 407, 430, Leonardo AW119, Airbus AS350, EC130, MD Helicopters MD500.



IBF BENEFITS: PERFORMANCE

MAXIMUM ENGINE DEBRIS/FOD PROTECTION

Allows consistent flight operations and extends engine time on wing. Improved protection over an inertial design and significantly better protection than a FOD screen.

IMPROVED AIRFLOW

Pleated barrier filter element provides improved air flow versus inertial separation vortex/swirl tubes typical with EAPS.



IBF BENEFITS: VALUE

RETURN ON INVESTMENT (ROI)

- Less premature engine removals, meet the expected engine TBO
- Long-life 4,500 flight hour filter assemblies (15 cleanings – 300-hour intervals)
- Reduction in corrosive salt air entering engine
- Engine overhaul cost reduction due to elimination of erosion and contamination on all rotating and pneumatic components
- Reduced maintenance time with improved plenum access.
- Common Line Replaceable Units (LRU) for mixed IBF fleets.
- Bleed air system maintenance eliminated with IBF



IBF BENEFITS: FEATURES

- Sealed plenum design composed of sheet metal, machined aluminum and superformed aluminum parts.
- IBF replaces Engine Air Particle Separator (EAPS), or FOD screen assemblies.
- Inlet housings mount to aircraft engine door structure similar to IPS.
- Actuator driven dual bypass doors, actuator commone with Donaldson Bell 407 and 206L-3/4 IBF.
- Optional FOD screen configuration interchangeable with barrier filter assemblies.



IBF OPERATIONAL CONSIDERATIONS

- Improved power margin for high/hot operations and confined landing zones. Certified for operation with basic inlet charts.
- Engine performance retention after barrier filter installation.
- Inlet air bypass system backup not available with EAPS; added safety feature.
- Certified for flight in falling and blowing snow IAW helicopter manufacturers flight manual requirements.
- Interchangeable with FIPS components.
- Approved for Category A operation.



IBF COMPARATIVE BENEFITS

- EAPS utilize traditional inertial particle separation technology, barrier filter uses current technology and state of the art integration.
- Barrier filter does not require the use of engine bleed air as the EAPS does which reduces engine power available.
- Engine bleed air system maintenance eliminated along with reduced chance of engine stall from leaking valves and lines.
- Inertial separation vortex/swirl tubes routinely become clogged with straw, leaves and bugs degrading performance; Barrier filter immune to this type debris clogging and operates without degradation.



IBF COMPARATIVE BENEFITS

- Engine Air Particle Separators (EAPS) utilize traditional inertial particle separation technology. Barrier Filters (BF) use current technology and state of the art integration.
- BF does not require the use of engine bleed air. EAPS does require engine bleed air which reduces engine power available.
- Engine bleed air system maintenance is eliminated. Reduced chance of engine stall from leaking valves and lines.
- Inertial separation vortex/swirl tubes routinely become clogged with straw, leaves and bugs degrading performance; Barrier filter immune to this type debris clogging and operates without degradation.



Thank You

Donaldson Company, Inc.
Aerospace & Defense Group

www.DonaldsonAerospace-Defense.com

North America +1-877-314-9640
aerospace.americas@donaldson.com
Europe +33 1 30866698
aerospace.emea@donaldson.com



Donaldson.
FILTRATION SOLUTIONS
AEROSPACE & DEFENSE