



Pall Corporation

# Engine Air Intake Protection



**CENTRISEP®**  
EAPS

Centrisep® Engine Advanced Protection System  
for **MIL Mi** Rotorcraft

*Filtration. Separation. Solution.™*

# Introduction

Helicopter engines are constantly challenged by a number of airborne contaminants including dust and sand (brownout), foreign objects, rain, snow, ice, salt spray and hot gas which are flight safety relevant and can induce excessive maintenance cost.

The Centrisep Engine Advanced Protection System (EAPS) is a self-cleaning device that offers excellent protection against all these contaminants

## Installing a Centrisep EAPS on your Mil Mi helicopter can provide the following benefits:

### Flight Safety

- Excellent F.O.D. protection, including cross engine F.O.D. in case of an engine failure, with debris projected forward.
- Safer operation in snow conditions. The Centrisep EAPS is an excellent barrier against snow slush which can cause damage and/or engine flame out.
- Safer operation in icing conditions. Extensive flight tests with fully de-iced helicopters show that the limiting factor for flight in icing conditions is always other equipment on the helicopter, not the Centrisep EAPS. (In most cases, the limiting factor is the main rotor)
- Safer operation under heavy rain. Heavy rain can cause engine flame out. With a Centrisep EAPS fitted, most of the water is removed by centrifugal separation and the remainder enters the engine in the form of a harmless spray.
- Minimized effects of hot gas ingestion. The swirling motion of the air downstream of the Centrisep EAPS mixes the hot gas and the ambient air, thus minimizing the pressure and temperature distortion at the compressor entry plane. This avoids vibration and sudden loss of power in the case of hot gas ingestion.

### Maintenance Cost and Engine Downtime

- The Centrisep EAPS is a self-cleaning system that removes sand and dust contamination before it enters the engine. Sand and dust can quickly erode the rotating parts of a helicopter engine, as well as plug the small cooling holes and foul the combustion chamber. As a result, engines have to be removed much earlier than the programmed Time Between Overhaul, resulting in additional maintenance cost and helicopter downtime.
- By fitting a Centrisep EAPS to your Mil Mi helicopter, you can improve the Mean Time Between Unscheduled Removals for Engine Erosion by up to 10 times compared to existing OEM air cleaners, depending on the contaminant challenge conditions.
- The Centrisep EAPS brings all these features to the Mil Mi helicopter with no significant reduction in available power! This is due to the very low differential pressure across the Centrisep EAPS and the even flow and pressure distribution pattern at the compressor entry plane.



Mil Mi 8



Mil Mi 24



# “Fit & Forget” Helicopter E

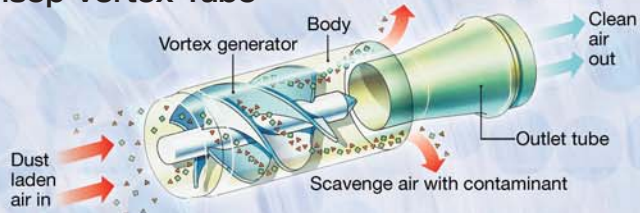
# Principles of Operation

Contaminated air enters the Centrisep EAPS and is given a swirling motion, induced by the vortex generators.

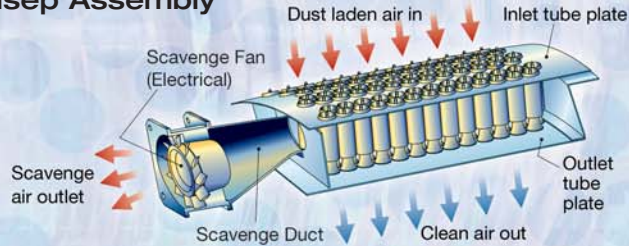
This motion causes the particles and water droplets to be thrown radially outwards by centrifugal force towards the wall of the vortex generator, where they are then scavenged overboard with a small portion of the inlet air. On the Mil Mi series, this scavenge flow is achieved by means of an electric fan.

Clean air flows through the centre of the vortex generators into the engine.

## Centrisep Vortex Tube



## Centrisep Assembly



## Eliminating Threats to Helicopter Engines



**CENTRISEP®**  
**EAPS**

**ICE**  
**BROWNOUT**  
**F.O.D.**

**HOT GAS**  
**RAIN**  
**DUST**

**SAND**  
**SNOW**  
**SALT SPRAY**

For more information visit [www.pall.com/centrisep](http://www.pall.com/centrisep)



Mil Mi 17

Mil Mi 38

# Engine Air Intake Protection

# In-Service Experience

The Centrisep EAPS has been protecting helicopter engines since the 1960's. More than fifty different designs have been certified and operate worldwide. This history, combined with a policy of continual research and development, ensures that Pall Aerospace is able to provide the latest optimized and tailored solutions to suit each airborne system requirement.

Centrisep EAPS are used on a variety of rotorcraft which include AgustaWestland, Bell, Boeing, Denel, Enstrom, Eurocopter, Kaman, Mil Mi and Sikorsky.



Sea King



NH90



EC135



EC130



AW139



CH-47



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