

## ES1012 501-KB/KH turbine power and durability upgrade

Hardware improvements reduce maintenance costs and increase power output



### Engineered solution purpose

This engineered solution increases the power output and the mean time between overhaul of the engine

### Applicability

501-KB, KB5 and KH engines

### Technical description

The upgrade replaces the first stage turbine blades with new Directionally Solidified (DS) blades and the first stage vanes with Thermal Barrier Coated (TBC) vanes. The second stage turbine blades are replaced with new platinum aluminide (Pt-Al) coated, MAR-M247 material blades. The second stage vanes are coated with Pt-Al coated and have honeycomb interstage seals.

For engines employing Turbine Inlet Temperature (TIT) control, the full power improvement potential of the engineered solution is realised by converting to Turbine Outlet Temperature (TOT) control

### Second stage turbine vane

### Benefits

The enhancements made to first and second stage turbine hardware will improve the following:

Power - 11% expected improvement

Heat rate - 2% expected improvement

Durability - 30% increase (30k to 40k thermal life improvement)

The upgrade reduces the cost of commonly replaced parts. The honeycomb interstage seals provide improved fit and increased rub resistance

### Experience

Introduced in the early 1990s, this upgrade is the production standard on all new units and has accumulated millions of hours of operational experience. A partial list of customers includes:

Enterprise Products, Mount Belvieu - 2 units

Chevron Texaco, Bakersfield - 8 units

International Power Technologies - 6 units

AEC Ecuador - 7 units

BP China - 2 units offshore

Marathon Equatorial Guinea - 2 units

## Fact sheet

### Scope of work

Replace first stage turbine blades and vanes.

Replace second stage turbine blades and vanes.

Replace the TIT thermocouples and harness with TOT thermocouples and harness, modify rear turbine bearing support

Modify and/or replace controls (digital controls required).

Modifications to the complete drive train and driven equipment may be required to take advantage of the increased horsepower.

Other package upgrades may be required to accommodate these changes.

### Bill of materials

First stage turbine blades, MAR-M247DS, Pt-Al

First stage turbine vanes, MAR-M247, TBC

Second stage turbine blades, MAR-M247, Pt-Al

Second stage turbine vanes, MAR-M247LC, Pt-Al

TOT thermocouples and harness [ES1011]

Controls modification or replacement

### Undertaken

At overhaul

### Bundling opportunities

501 combustion Liner Upgrade [ES1001] for further reliability improvement

For dual fuel engines that run more than 5% on liquid fuel, the 501 pilotless nozzle conversion [ES1006] should be considered

Controls upgrade [ES6006]

Complete package refurbishment [ES6001]



First stage turbine blade



Second stage turbine blade



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