

**Honeywell**

## TREND MONITORING

Health and performance services that significantly reduce cost of ownership



# Trend Monitoring

Honeywell's Predictive Trend Monitoring and Diagnostic (PTMD) service provides real-time APU usage data, status information, and estimates time-to-failure which reduces aircraft downtime and overall maintenance and replacement costs. APU performance data, trending and failure diagnostics are downloaded through the Aircraft Communication and Addressing Reporting System (ACARS) which is reported to the PTMD server and made available through an internet portal.

## Condition Based Maintenance

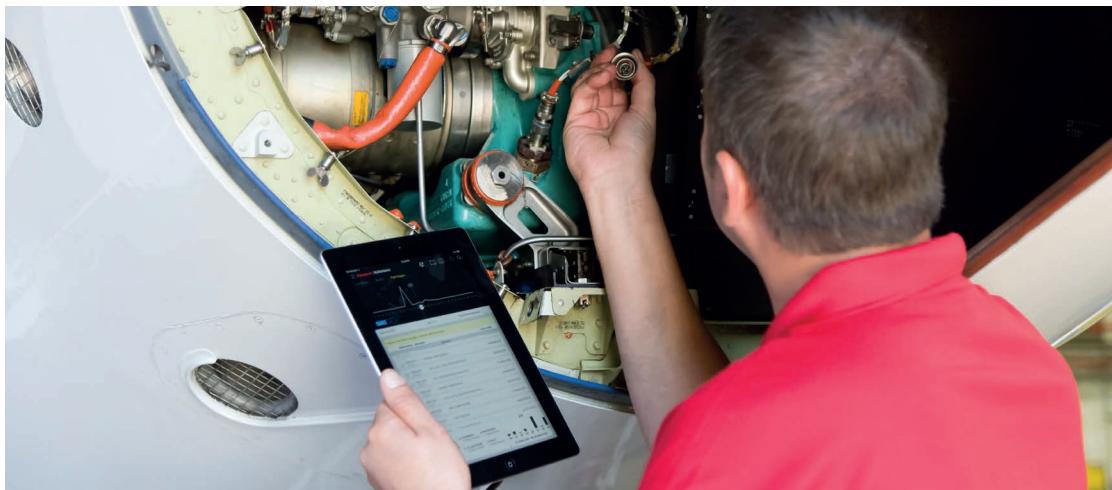
PTMD enables Condition Based Maintenance (CBM) through real-time data access by maintenance personnel. This technology provides APU health and performance, enabling the most effective planning, management and execution of APU maintenance.

Advanced predictive algorithms are used to calculate estimated time-to-failure and optimize maintenance planning. PTMD also diagnoses, troubleshoots and pinpoints APU problems to help reduce time-to-repair and increase total aircraft availability. Honeywell repair and customer support teams can also access PTMD for analysis and to recommend maintenance support. Customers using PTMD have been able to reduce their overall on-hand spares on average 10%; and reduce overall life cycle costs on average by 15%.

## Fleet Management

PTMD enables proactive fleet management through performance trending collaboration and data availability. Advanced trending, prognostics and troubleshooting improves failure detection, fault detection and time-to-failure calculations. Having visibility to this predictive data enables informed decision making, requiring only those aircraft meeting the required flight to be scheduled for maintenance. This technology enables optimized flight planning, increased dispatch reliability and reduced delays and cancellations. Having this real-time data available means operators can effectively plan each APU maintenance cycle for total fleet management.

**Integrated web-based monitoring tool that provides advanced trending, prognostics and troubleshooting to reduce overall maintenance time.**





## User Interface

The intuitive web-based user interface provides priority symbols for easy interpretation of health and performance data. Basic usage information, such as time since new (TSN), cycles since new (CSN), time since repair (TSR) and cycles since repair (CSR) are shown in APU hours. Calculated parameters, such as start time, power margin, EGT margin, bleed pressure margin, anticipated next repair for TSN are all reported from the APU reports received, not from usage estimates. When there is a flagged parameter, an email alert is sent by PTMD to the appropriate contact. The prognostic recommendation for the alert is found in the PTMD tool.

## Current Capabilities:

DETECTION FEATURES CAPABILITY BY PTMD MODEL TYPE	331-350	331-500	131-9A	131-9B
EGT trends (relate to APU - Hot section deterioration, compressor rub; relate to LRU - fuel nozzles)	YES	YES	YES	YES
Bleed margin trends (relate to APU inlet, load compressor conditions)	YES	YES	YES	YES
Oil temperature trends (relate to LRU -oil cooler, cooling fans, thermostatic valve)	YES	YES	YES	YES
Inlet temperature trends (relate to LRU - inlet temp sensor faults)	YES	YES	YES	YES
Inlet pressure trends (relate to APU - intake blockage; relate to LRU - P2 sensor)	YES	NO	NO	NO
IGV position trend (relate to APU - power section problem; relate to LRU - IGV fault)	YES	YES	YES	YES
Peak starting EGT trend (relate to APU - hot section deterioration; relate to LRU - fuel nozzles, fuel flow divider faults)	YES	NO	YES	YES
Starting time trends (relate to APU - comp housing crack; LRU - starter)	YES	NO	YES	YES
Surge valve position trends (relate to APU - load comp scroll housing crack; relate to LRU - surge valve fault)	YES	YES	YES	YES



## PTMD Advantages

PTMD enables more predictive maintenance to reduce overall operating costs:

- Reduces unscheduled removals
- Provides visibility for spare level control and minimizes spare requirements
- Minimizes AOGs, delays and cancellations
- Reduces borescoping needs
- Enables planned vs reactive maintenance
- Minimizes unnecessary removals

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### IMPROVE OPERATIONS

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REDUCES TURN-AROUND TIMES



INCREASES APU TIME ON WING



REDUCES REROUTING COSTS FOR EXTENDED-RANGE TWIN-ENGINE OPERATIONAL PERFORMANCE STANDARDS (ETOPS)



REDUCES RENTAL COSTS AND GROUND START CARTS



REDUCES MAINTENANCE COST BY UP TO 15%



REDUCES CANCELLATIONS



REDUCE BORESCOPE INSPECTIONS



ENABLES REDUCED INVENTORY LEVELS



REDUCES APU TROUBLESHOOTING TIME

## **Global Network of Support Services**

Honeywell's resources span the Americas, Europe, Middle East, Africa, Asia and the South Pacific to deliver dedicated 24/7 service support. As a world leader in aviation aftermarket services, our global repair centers, logistics network and field services engineering teams are able to quickly repair, supply, and warranty equipment whenever and wherever it is needed.

## **Honeywell Aerospace**

Honeywell is a leading global provider of integrated avionics, engines, wheels and brakes systems and service solutions for aircraft manufacturers, airlines, business and general aviation, military, space and airport operations.

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