An international high-technology group

14.7 billion euros annual sales*

66,241 employees in 57 countries

3 core businesses

Aerospace
Defence
Security

* At December 31, 2013
SNECMA
AT A GLANCE

5.6 billion euros annual sales*

14,662 employees worldwide**

35 plants worldwide

* Company annual sales as of December 31, 2013
** As of December 31, 2013
CFM INTERNATIONAL
AT A GLANCE

CFM is an equally-owned subsidiary of Snecma (Safran), France and GE, United States.

Design, development, production, sale and support of commercial aircraft engines in the 18,000 to 50,000 lb thrust range
From EIS to engine teardown Snecma cares for your engines
Engineering Services
CFM56 Key figures

A **dozen** of sensors

300 to 500 measurements in flight (temperature, pressure, vibrations, etc…)

Huge amount of data + experience in operations → **from reaction to anticipation**
ENGINEERING SERVICES
HEALTH MONITORING

CURATIVE MAINTENANCE

"ON CONDITION" MAINTENANCE
Line Maintenance
Engine Shop Visit

STANDARD REMOTE DIAGNOSTICS

ENGINE HEALTH MONITORING TOOLS
Flight Data Collection
Flight Data Analysis
Automatic Warnings

EngineLife
COMPREHENSIVE REMOTE DIAGNOSTICS

DIAGNOSTICS SPECIALISTS
Trend Monitoring
Performance Reports
Early Failure Identification
Corrective Actions Recommendations

EngineLife
FLEET MANAGEMENT

SPECIFIC ANALYSIS & INFORMATION
Flight Ops Information
On Wing Best Practices
Fleet Utilization Optimization
Engine Removal Plan Optimization
Engine Maintenance Program Customization

Better anticipated event and minimized disruption
Prognostics Health Monitoring (PHM) built to anticipate maintenance actions.
Example: Start monitoring on CFM56-7

1. **Automatic troubleshooting:**
   After a ‘No start’, *localize* the equipments failures in order to *minimize* the maintenance operation

2. **Diagnosis:**
   Before a ‘No start’, *detect and localize* the LRU degradations

3. **Prognosis:**
   *Guarantee* the start capability for the *next flights*

Start capability monitoring enables to reduce delays & cancellations
Prognostics Health Monitoring LEAP
PHM offers **new** monitoring functions to **enhance engine health monitoring**

- Oil System
- Gath Path Performance Monitoring
- Control System Monitoring
- Start System
- Mechanical Health
- Fuel System
LEAP PHM
NEW FUNCTIONS

Hardware/software **dedicated** to health monitoring

**More efficient** ground system platform

**More precise** data acquisition & processing on wing

**More accurate** fault isolation & prognostics

Enabling to **advise** operators of maintenance action **ahead** of an event

Precision, accuracy and efficiency to **anticipate** potential system failures
LEAP PHM
PROCESS OVERVIEW

**On-board acquisition**

- Data snapshot
- Software + hardware

**On-ground processing**

- Ground system
- Health indicators
- Recommendations
- Software + hardware + intelligence

**On-wing maintenance**

- Action + feedback

PHM, an integrated on-wing/on-ground system
LEAP PHM
GROUND SYSTEM BUSINESS PROCESS

Global process same as CFM56 with new reasoner processing
LEAP PHM benefits:

- **Allow** better planning of line maintenance tasks
- **Improve** fault isolation / troubleshooting
- **Improve** shop workscoping
- **Minimize** maintenance costs
- **Reduce** D&Cs and AOG situation

**LEAP PHM** is a real breakthrough in maintenance burden reduction.
KEY MISSIONS, KEY TECHNOLOGIES, KEY TALENTS