



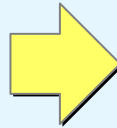
RAM Engineering Trends/Challenges in Army Aviation

2005 DoD Maintenance
Symposium



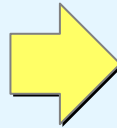
RAM Engineering Trends in Army Aviation

Inspection & Failure Based Maintenance



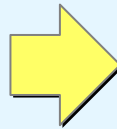
Condition Based Maintenance

Repair to Acceptable Standard



Recapitalization

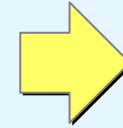
Reliability Hardware Improvement by Engineering Design Change



Reliability System Improvement by Soldier/Engineer System Change



Inspection & Failure Based Maintenance

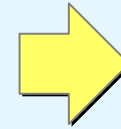


Condition Based Maintenance

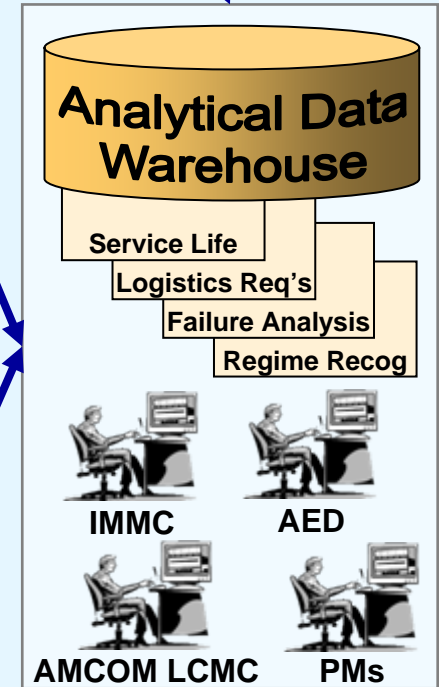
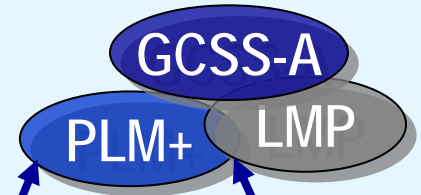
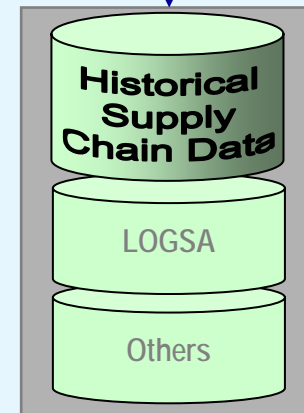
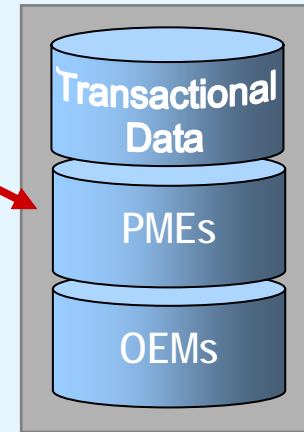
- **A Set Of Maintenance Processes and Capabilities that Improve Operational Availability and Reduce the Maintenance Burden On the Soldier by:**
 - **Enhancing Diagnostics**
 - **Evolving to Predicting Remaining Component Life**
 - **Then to Proactive Supply Transactions**

- **Derived from Near Real-Time Assessment & Analysis of Data from:**
 - **Embedded Sensors**
 - **Platform Maintenance Environments**
 - **Aircraft and Supply Historical Data**

Inspection & Failure Based Maintenance



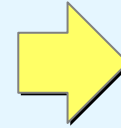
Condition Based Maintenance



Redstone Arsenal



**Inspection & Failure
Based Maintenance**



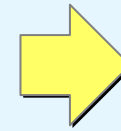
**Condition Based
Maintenance**

■ Challenges

- **Signal to Noise Ratio**
- **Keep up with sensing technology and the technology of the equipment being sensed**



Repair to Acceptable Standard

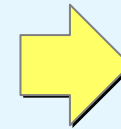


Recapitalization

- **Maintenance burdens and O&S costs are rising due to the aging fleet flying.**
- **Aviation Program Management Offices are executing Recapitalization Programs to address these increasing failure rates and maintenance repair times.**
- **The Recapitalization Programs involve a disassemble, fix, replace, and reassemble process. *TIME=Zero***
- **The mandatory parts that are replaced typically include structural upgrades, new overhaul standards, and new parts.**



Repair to Acceptable Standard



Recapitalization

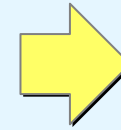
Recap has proven to be a success for Army Aviation. Improvement in overhaul procedures is working.

	Unscheduled Maintenance Man-Hours	Total Flight Hours	Unscheduled Maintenance Ratio
Non-Recap	1732.9	1654.5	1.1
Recap	1805.2	2365.0	0.76
Percent Reduction			30.9%

Recap Part	% Improvement
Longitudinal. Servo	14.46%
LH Nose Gearbox	590.64%
Hydraulic Manifold	11.83%
DIR T/R Servo	137.96%
Main Transmission	123.09%
T/R Swashplate	35.58%
RH Nose Gearbox	236.69%
TADS Turret	52.22%
Tail Rotor Gearbox	-0.54%
Intermediate Gearbox	-5.65%



Repair to Acceptable Standard

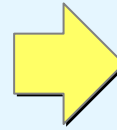


Recapitalization

■ Challenges

- Design for reliability after overhaul
- Pay attention to life requirements

Reliability Hardware Improvement by Engineering Design Change



Reliability System Improvement by Soldier/Eng Sys Change

Soldier Focused Logistics CH-47 Horizontal Hinge Pin & Cartridge Solenoid Valve

Horizontal Hinge Pin

Problem:

- High demand rate.
- Premature Removals.
- Expensive to refurbish.

Solution (Short Term):

- Revise the inspection criteria and produce a DVD showing proper inspection method.



Cartridge Solenoid Valve

Problem:

- High Demand Rate
- Premature Removals

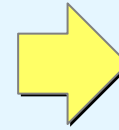
Solution:

- Add troubleshooting guide to procedures and design go/no-go test set.





**Reliability Hardware
Improvement by
Engineering Design Change**



**Reliability System
Improvement by
Soldier/Eng Sys Change**

Mylar Laminate Tear-off Project

Problem:

Iraqi campaign data showed a significant increase in windshield demand, outpacing supply.

- Sand Erosion
- Rock Damage
- Crack Propagation
- 8-Hr Replacement Time

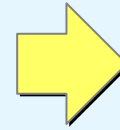
Solution:

The Mylar sacrificial windshield tear-off similar to the tear-offs used in professional auto racing. Additional NRE work to meet aviation specific needs (ie. adhesive, ESD). The Black Hawk was selected as the initial aviation platform due to the inability of the windshield manufacturer to keep pace with demand during OIF/OEF deployment.





**Reliability Hardware
Improvement by
Engineering Design Change**



**Reliability System
Improvement by
Soldier/Eng Sys Change**

■ Challenges

- Go to the field
- Take care of the soldier and he will take care of you