



Rolls-Royce

Rolls-Royce Aero Repair & Overhaul Human Factors & MEMS Status 5th November 2004

Leadership – The Key Success Factor

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Aero-Repair and Overhaul Business

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Will Cover:

- The Rolls-Royce AR&O Global Business, who are we?
- My background and my role in the company's HF programme
- The training we have provided with a focus on leadership
- The training we are providing to our employees
- Finish up with some wider thoughts on HF, leadership development programmes and academia's role
- I will not cover our quality procedures or error reporting system in much detail.

The AR&O Global Business

- Ten years ago AR&O did not exist, now a \$2bn global business with over 6,000 employees at the following locations:
 - Derby, East Kilbride, Ansty, Bristol, Nottingham, Oakland, Singapore, Houston, Germany, Hong-Kong, Montreal, Philippines, Spain, Brasil and Mexico. (Some units are Joint Ventures with major airlines, e.g. AA. SIA).
- Product lines are mostly civil and military, with circa 5,000 units/year repaired and/or overhauled, at whole engine, module and component repair levels
- Growth in Civil aftermarket alone is set to grow considerably over the next twenty years. We are also seeing growth in Marine, Energy and Oil & Gas
- Aftermarket revenues now form a significant and growing element of Rolls-Royce plc's revenue stream
- However, larger fleets of engines = larger risk exposure to maintenance errors

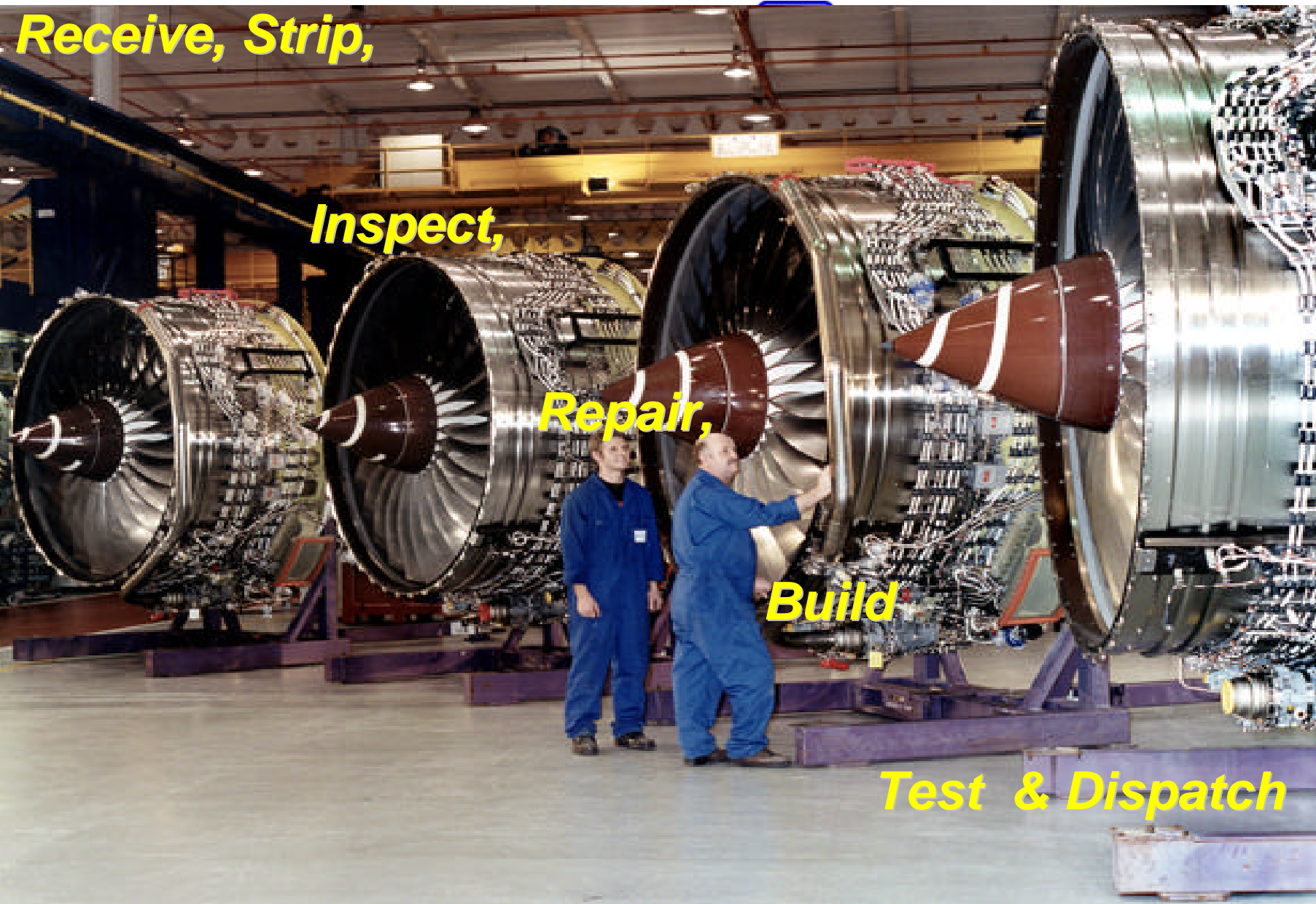
Receive, Strip,

Inspect,

Repair,

Build

Test & Dispatch



My Background and Role

- **Background Royal Air Force:** apprentice, technician, instructor and later an education officer – very familiar with the operational environment and its pressures – e.g. Nimrod, Puma and Chinook Squadrons.
- **Joined Rolls-Royce in 1992 and became the Engineering Training Manager for the Company during development of the Trent family of engines**
- **Management Development Manager for the Aerospace Group, then four years as Director of Career Development & Training for Rolls-Royce N.America**
- **Since Jan 2003 have been in role as Head of Learning & Development AR&O**
- **Co-Chair of HF Steering Group, with Director Engineering & Quality. Members include the Heads of Ops, Quality Managers and some of my L& D Team**

AR&O's Approach. Train the Leaders First

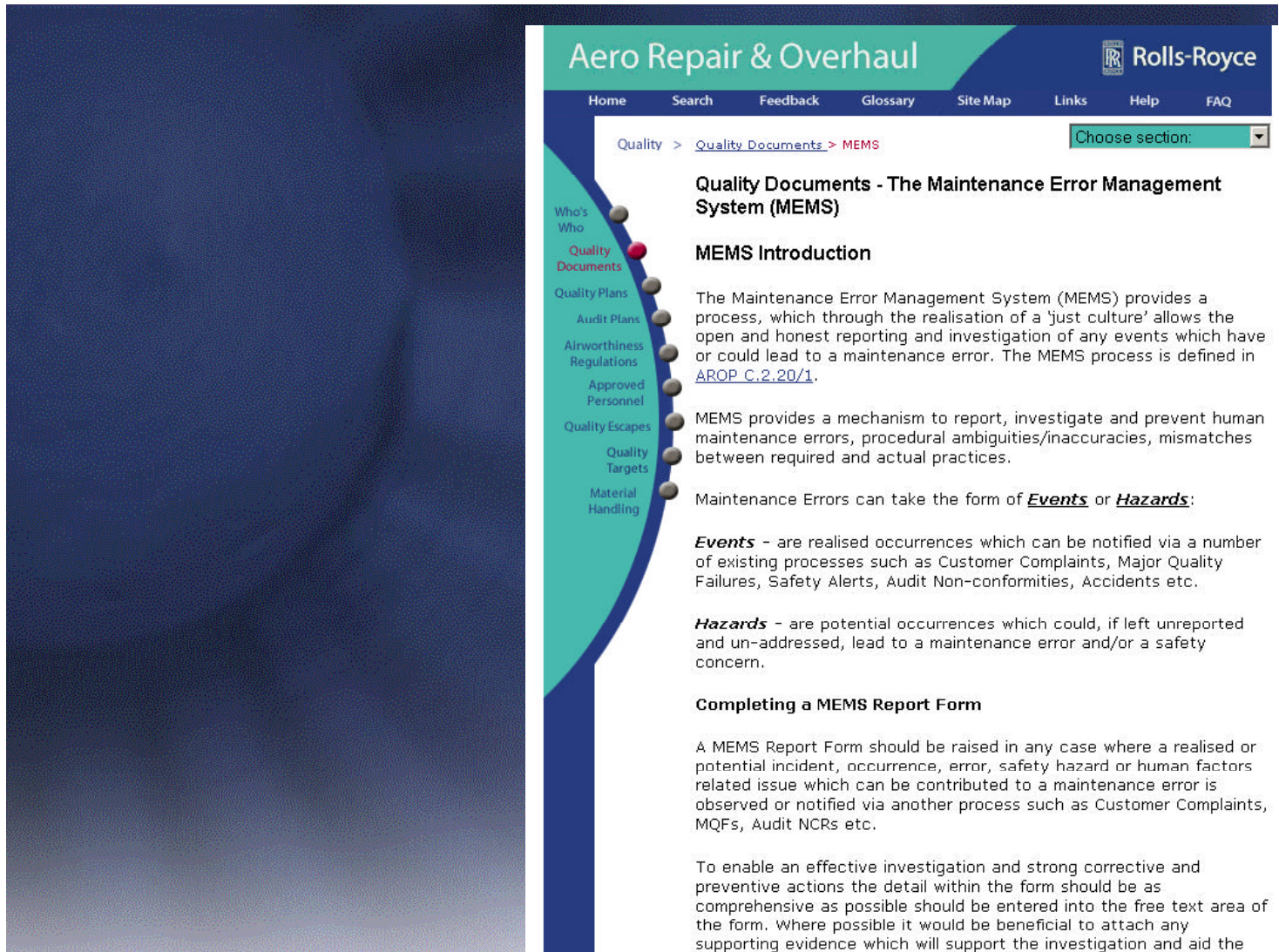
- Gaining understanding – CAA HF programme – set up a small core team
- Two-stage strategy, train the leaders first. Including trade union rep's
- Piloted a half-day course 'Introduction to HF for Leaders' - by August 2004 we had completed training of 175 managers and the majority of the TU Reps
- June 2004 we trained 8 MEDA investigators (now increased to 13)
- Quality Board decided to go external for our HF training. A two year contract was set through our Indirect Procurement Group.
- A Senior Executive Seminar was held for MD/Executive on October 13th, the go ahead was given for site safety surveys and the employee's HF programme.
- One of four pilot programme needed some customisation & revision; over 200 employees have now been trained. Feedback so far has been very positive.


AR&O Leadership Introduction Programme 'EASA Part 145 & Human Factors'

Today's Agenda (1/2 day)

- Human Factors (HF) overview and legislation changes
- AR&O's Maintenance Error Management System (MEMS)
- The cost and consequences of errors caused by Human Factors
- Slips, errors, violations, discipline and culpability
- The manager's role in HF and MEMS
- CAA curriculum for a two-day HF course
- Plenary session
- Close

MEMS System and Procedures in Place



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Quality Documents - The Maintenance Error Management System (MEMS)

MEMS Introduction

The Maintenance Error Management System (MEMS) provides a process, which through the realisation of a 'just culture' allows the open and honest reporting and investigation of any events which have or could lead to a maintenance error. The MEMS process is defined in [AROP C.2.20/1](#).

MEMS provides a mechanism to report, investigate and prevent human maintenance errors, procedural ambiguities/inaccuracies, mismatches between required and actual practices.

Maintenance Errors can take the form of Events or Hazards:

Events - are realised occurrences which can be notified via a number of existing processes such as Customer Complaints, Major Quality Failures, Safety Alerts, Audit Non-conformities, Accidents etc.

Hazards - are potential occurrences which could, if left unreported and un-addressed, lead to a maintenance error and/or a safety concern.

Completing a MEMS Report Form

A MEMS Report Form should be raised in any case where a realised or potential incident, occurrence, error, safety hazard or human factors related issue which can be contributed to a maintenance error is observed or notified via another process such as Customer Complaints, MQFs, Audit NCRs etc.

To enable an effective investigation and strong corrective and preventive actions the detail within the form should be as comprehensive as possible should be entered into the free text area of the form. Where possible it would be beneficial to attach any supporting evidence which will support the investigation and aid the

AR&O Senior Executive Seminar on HF

Aims:

- To ensure executives gain a clear understanding of Human Factors in the engine maintenance environment and appreciate how to implement the critical elements of a successful, organisation-wide Maintenance Error Management System (MEMS) as required by EASA Part 145 and associated Acceptable Means of Compliance and Guidance Material
- To provide a forum for the senior management team to discuss and plan in detail how they will support the implementation of an EASA Part 145, MEMS within Rolls-Royce AR&O and agree their personal commitment to deliver the total system, communications and employee training package

Senior Exec' Seminar Key Outcomes:

- **Human Factors and MEMS has to be seen in the total context of 'safety and airworthiness' as delivered by our whole AR&O Maintenance System. This is a long-term programme that needs a clear communication from us**
- **Leadership carries the ultimate responsibility for the cultural norms that prevail and influence safety. Individuals carry responsibility for their own personal actions**
- **There is sometimes a fine line between errors and violations, our discipline policies are clear and distinguish between these categories. A paper on Just Culture and confidentiality rules of MEMS is being drafted, at the Derby Trade Unions request**
- **We do not know the extent of our unreported hazards (our iceberg below the waterline). There was 100% agreement to run the industry standard ShowMe safety surveys across all UK sites. (Planning is in now progress – John Anfield will report results Feb 05).**

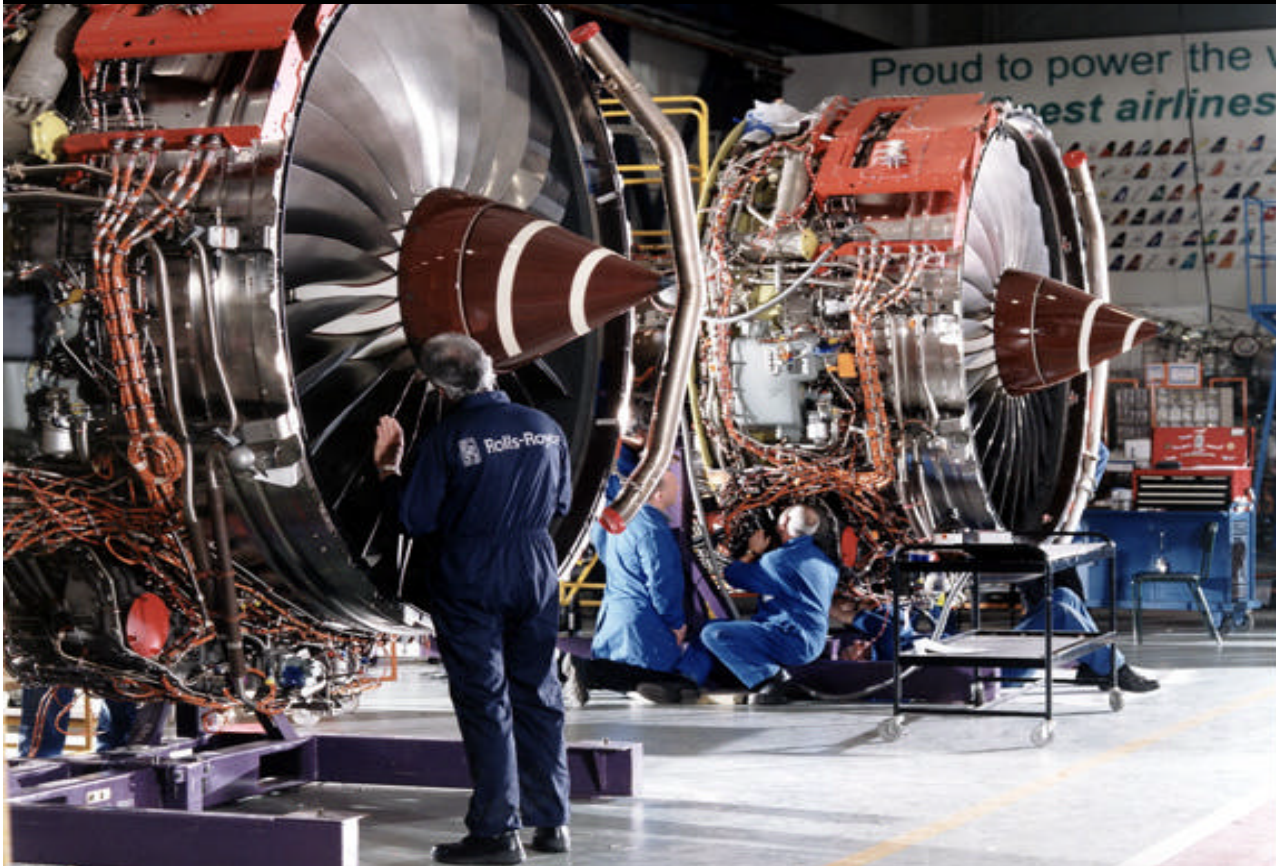
Aims of Human Factors Training Programme for Rolls-Royce AR&O Employees:

- To give you an understanding of human factors and human performance limitations in the engine maintenance environment and the potential impact of human factors in your work
- Enhance employee safety awareness and meet competence targets as required by EASA Part 145
- To train employees in the specific use of Rolls-Royce AR & O's error reporting system
- Civil or military ...any difference?



Customisation is Important

Module 1 - Introduction to Human Factors



HF Training Summary:

- **If you haven't started then it's almost too late!**
- **First ensure that the whole leadership team are fully on board and are backing the HF & MEMS campaign – build trust, communication, commitment to training plans and budgets for employees to attend**
- **Ensure that MEMS and your investigative resources are in place before you start the employee training, not necessary for leadership training**
- **Ensure the all leaders attend introductory and employee training programmes, 'Leading from the front'**
- **Take the Trade Union through the plans, and listen to their ideas**
- **Expect some employee scepticism and venting of frustrations at first.**
- **Keep it going: This is going to be a long-term cultural change programme**

Some final thoughts on HF & 'Leadership Development':

- Leaders are entering the aviation industry in many different ways today, e.g from the Auto sector – not necessarily fully aware of airworthiness and aviation safety issues – Is your induction process good enough?
- Predictable trend for HF to move from safety critical industries to other sectors – potential £££ gains are huge
- My view - HF is the missing ingredient in TQM, Six Sigma, BPR, BPI, CC etc
- Most leadership training programmes ignore HF altogether, using a systems approach that assumes 'perfect people', e.g. Ops Mgt - Factory design
- Opportunity for academia to incorporate HF training into the curriculum of leadership programmes. There is a large body of knowledge (mostly Prof James Reason's work) that should be mandatory in university's general MBA and MSc programmes, but is currently totally absent.

Thanks for Listening, Any Questions?

Roll-Royce AR&O Human Factors & Error Management Training

