Establishing a Human Factors Programme

Presented by: Chow Hock Lin
Human Factors coordinator
SIA Engineering
SIAEC : The Company

• Incorporated in 1992
• Key operational functions of the engineering division of SIA
• Handles a full spectrum of maintenance activities including
  – Heavy maintenance checks
  – Component and engine overhaul
  – Specialised repair/overhaul
We at SIA Engineering Company are at the leading edge of this global tide of change. Everyone is aware of and proud of our excellent safety record. And senior management is totally committed to providing tools which will enable all of us to find and remove the causes of incidents before they cause harm.

Statement made by Mr. Robert Tan, former Chief Executive of SIA Engineering Company, in the Human Factors & Error Management video titled “The Truth About Us”
• Globalisation?
• Regulation Requirement?

• The need to improve
• Best practices

Suitability - Program & Consultant

The Drivers

Program design

Program Implementation in Stages

Feedback from staffs

New Initiative/Ideas

FAA
JAA
ICAO

UNION
When & Why Human Factors?

- Globalisation of Aviation Maintenance Business
- Regulation Requirements: ICAO, FAA, JAA
- Need to be proactive in our pursuit for excellence
  - Growing workforce
  - Increasing complexity of operations
  - Expected increase in airline traffic volume over the next 12-15 years
- Need to appreciate the causes of error and how they affect safety
How? - Programme & Consultant

- Engaged one of the most notable practitioners in Human Factors:
  - Professor James Reason of Manchester University
- Assistance of the Boeing company on maintenance error investigation (MEDA)
- David Marx
Who? - The Drivers

- Top Management
- Human Factors Administrator
- Internal Champions
- MEDA Investigator
The ‘Swiss Cheese’ Model

DEFENCES
- Good management
- Reliable maintenance
- Airmanship
- Teamwork
- ATC

THE GAPS
- Operational pressures
- High workload
- Mismatch component
- Misjudgement by Crew
- Inexperience Engineer
- Communication problem with ATC

CFIT

IFSD
The system overall view

1. How to improve human performance?

2. How to identify & control process?
   - Undesired Consequences
     (Impact on safety, reliability and economics)

3. How to strengthen weak defences and stabilise already strong ones?

Erroneous Actions

Defences breached

System Defences
PLANNING PROCESS

Management support ➔ Select administrator or coordinator ➔ Attend seminar & conferences

Search for appropriate consultant ➔ Direction?

- “Just Culture”
- “No-Blame”
- “Blame”

Implementation ➔ “Best practices”
What? - Implementation

1. Selection & Training
   HFEM Course
   Possible Human Reliability Programme?

   Directly Reducing Erroneous Actions / Improving Human Reliability

2. MEDA
   ERK

3. MESH
   Audits
   Demerit Point System
   Development of a Reporting Culture

   Strengthen & Stabilise Defences

Undesired Consequences
(Impact on safety, reliability and economics)

Identification & Control of Processes that Breach Defences
Selection & Training

- Selection
  - Fundamental in the development of a reliable workforce

- Training
  - Need to optimise the training process
  - Regulatory authorities
  - Re-current training
Skills Training

- New initiative in enhancing the skills for the next millennium
- To date 1000 old and new staff trained, comprising:
  - Trainees
  - Technicians
  - Engineers
R.E.A.L. Program

- **R.E.A.L.** Communication
  - Reach out to others
  - Extend help willingly
  - Affirm people
  - Listen actively to learn

- Training hopes to develop:
  - Communication skills
  - Interpersonal Skills
  - Effective teamwork
**HFEM Course**

- Two day training course
- Syllabus and training materials devised by Prof Reason
  - Introduction to HFEM
  - Basic physiological knowledge for aircraft maintenance
  - Basic aviation psychology
  - Environmental factors
  - Basic aviation human factors
  - Aviation organisational factors
  - The HFEM ‘toolbox’
  - Case studies
Maintenance Error Decision Aid (MEDA)

- Uses Boeing-designed MEDA format
- On-going implementation
- Review Disciplinary Policy
- Progressive Disciplinary approach using the “Demerit Points” system
- Unions participation

Identification & Control of processes that breach defences
• Developed in 1997 by Psyman human factors
• Designed to identify omission prone steps in a specific task
• Proactive approach
Managing Engineering Safety Health (MESH)

- Proactive approach
- Questionnaire for examining problems in the work area
- Data collated for management
- Actions fed back to staff
- Presently re-developing ‘MESH’ programme
Audits

- With routine audits, we can
  - Review procedures and processes
  - Identify active / latent failures
  - Strengthen Defences!
But what exactly is a JUST CULTURE??

Proactive Inputs
MESH Training Audits

Strengthen / Stabilise Defences

Safety Culture

Reporting Culture

Application of a Just Culture
Disciplinary System Design

MESH Audits
Demerit Point System
Development of a Reporting Culture

3

3

3
A Just Culture

Organisational culture

“Blame” Culture

“Just” Culture

“Blame-free” Culture
A ‘Just Culture’ rather than a ‘No Blame’ culture

• A ‘no blame’ culture neither feasible nor desirable - why?
  – Some unsafe acts merit sanctions
  – Blanket amnesty lacks credibility with both the workforce and the public

• A just culture is about
  – An atmosphere of trust
  – Being clear about “where the line is drawn” between acceptable and unacceptable behaviour
Disciplinary System

- **Disciplinary system characteristics**
  - Effective event investigation CANNOT occur UNLESS the issue of ‘where the line is drawn’ between acceptable and unacceptable behaviour is well understood by both the workforce and management
  - Definition of levels of **CULPABILITY**
  - The best people can make the worst mistakes
  - Type of disciplinary system
    - Progressive discipline
    - “Demerit point” system used
“Maintenance Errors and You” booklet for all staff
INCIDENT / ACCIDENT INVESTIGATION PROCESS

1. **Employee Reporting**
   - Possible sabotage or suicide? (Without mitigation)
     - Yes: Disciplinary Action
       - Quality and Production Management will jointly recommend Disciplinary Inquiry.
       - Review occurrence with employee & Union.
       - Brief employee & Union on Disciplinary Inquiry recommendation.
     - No: Carrying out MEDA process and data-entry.
   - Possible substance abuse? (Without mitigation)
     - Yes: Disciplinary Action
       - Quality and Production Management will jointly recommend Disciplinary Inquiry.
       - Review occurrence with employee & Union.
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   - Possible reckless violation?
     - Yes: Administrative Action
       - Quality and Production Management will apply the Schedule of Demerit Points, determine the total demerit points and appropriate Administrative Action as per current schedule.
       - Review occurrence with employee. Brief employee & Union the Technical Inquiry or Punitive Action recommendation.
       - Punitive Action
       - Technical Inquiry Process
       - Technical Appeal Process
     - No: Carrying out MEDA process and data-entry.
   - Possible negligent error/ violation?
     - Yes: Administrative Action
       - Quality and Production Management will apply the Schedule of Demerit Points, determine the total demerit points and appropriate Administrative as per current schedule.
       - Review occurrence with employee. Brief employee the appropriate Administrative Action and meet out the appropriate Administrative Action.
       - Punitive Action
       - Technical Inquiry Process
       - Technical Appeal Process
     - No: Carrying out MEDA process and data-entry.
   - System induced error?
     - Yes: No Action Needed
     - No: Carrying out MEDA process and data-entry.
   - History or blameless error?
     - Yes: Technical Inquiry
       - Review occurrence with employee. Brief employee & Union on Technical Inquiry or Punitive Action recommendation.
       - Punitive Action
       - Technical Inquiry Process
       - Technical Appeal Process
     - No: Carrying out MEDA process and data-entry.
   - Appeal?
     - Yes: Technical Inquiry
       - Review occurrence with employee. Brief employee & Union on Technical Inquiry or Punitive Action recommendation.
       - Punitive Action
       - Technical Inquiry Process
       - Technical Appeal Process
     - No: Carrying out MEDA process and data-entry.

2. **Company/ Customer Reporting**
   - Possible sabotage or suicide? (Without mitigation)
     - Yes: Disciplinary Action
       - Quality and Production Management will jointly recommend Disciplinary Inquiry.
       - Review occurrence with employee & Union.
       - Brief employee & Union on Disciplinary Inquiry recommendation.
     - No: Carrying out MEDA process and data-entry.
   - Possible substance abuse? (Without mitigation)
     - Yes: Disciplinary Action
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     - Yes: Disciplinary Action
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   - History or blameless error?
     - Yes: Technical Inquiry
       - Review occurrence with employee. Brief employee & Union on Technical Inquiry or Punitive Action recommendation.
       - Punitive Action
       - Technical Inquiry Process
       - Technical Appeal Process
     - No: Carrying out MEDA process and data-entry.
   - Appeal?
     - Yes: Technical Inquiry
       - Review occurrence with employee. Brief employee & Union on Technical Inquiry or Punitive Action recommendation.
       - Punitive Action
       - Technical Inquiry Process
       - Technical Appeal Process
     - No: Carrying out MEDA process and data-entry.

**INCIDENT / ACCIDENT OCCURRENCE**

**SUBMISSION OF REPORT TO DIVISIONAL HEAD & VP(Q)**
# Schedule of punitive actions

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF CULPABILITY</th>
<th>PUNITIVE ACTIONS RECOMMENDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sabotage or malevolent damage or suicide</td>
<td>• Inform Personnel Division for suspension from work</td>
</tr>
<tr>
<td>2.</td>
<td>Drug abuse</td>
<td>• Withdraw all Authorisations</td>
</tr>
<tr>
<td>3.</td>
<td>Substance abuse without mitigation</td>
<td>• If necessary, inform Singapore Police or Civil Aviation Authority of Singapore</td>
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<tr>
<td></td>
<td></td>
<td>• Conduct Disciplinary Inquiry</td>
</tr>
<tr>
<td>4.</td>
<td>Reckless behaviour that could endanger the safety of others or cause injuries to another person.</td>
<td>• Suspend Authorisation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If necessary, inform Singapore Police or Civil Aviation Authority of Singapore</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Conduct Technical Inquiry</td>
</tr>
<tr>
<td>5.</td>
<td>Substance abuse with mitigation</td>
<td>• Recommend appropriate punitive action:-</td>
</tr>
<tr>
<td>6.</td>
<td>Reckless behaviour</td>
<td>e.g.: - Suspend License and Authorisation allowance for a period of between one and twelve weeks</td>
</tr>
<tr>
<td>7.</td>
<td>Multiple acts of negligent behaviour : accumulation of 12 demerit points</td>
<td>- Job re-assignment or</td>
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<td></td>
<td></td>
<td>- Formal warning</td>
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<tr>
<td>8.</td>
<td>Covering-up or falsifying evidences in an investigation</td>
<td>Or</td>
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<td></td>
<td></td>
<td>• Conduct Technical Inquiry</td>
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</table>
### Schedule of demerit points

<table>
<thead>
<tr>
<th>ITEM</th>
<th>LEVEL OF NEGLIGENT BEHAVIOUR</th>
<th>DEMERIT POINTS</th>
<th>DESCRIPTION / EXAMPLES</th>
</tr>
</thead>
</table>
| 1.   | HIGHEST                     | 8              | • Negligent behaviour that could endanger safety  
|      |                              |                | • Skip work processes that have safety or airworthy impact  
|      |                              |                | E.g.: Replaced component and skipped the complete operational test |
| 2.   |                              | 6              | • Negligent behaviour or failure to follow procedure |
| 3.   |                              | 4              | • Failure to complete job  
|      |                              |                | E.g.: Failure to install washer, Failure to install correctly rated lamp  
|      |                              |                | • Failure to use approved parts or raw material  
|      |                              |                | • Failure to provide certification  
|      |                              |                | E.g.: Failure to pen signature against completed task  
|      |                              |                | • Losing paperwork |
| 4.   |                              | 3              | • Failure to follow procedure that will not endanger the safe operation of the aircraft  
|      |                              |                | E.g.: Failure to tag removed component  
|      |                              |                | • Poor workmanship  
|      |                              |                | E.g.: Sloppy inspection work |
| 5.   |                              | 2              | • Incomplete documentation  
|      |                              |                | E.g.: Illegible handwriting, Leaving out data, failure to pen signature against sub-task |
| 6.   | LOWEST                      | 1              | • Deviation from standard or good engineering practices  
|      |                              |                | E.g.: Failure to de-burr drilled holes, Failure to wipe away excess grease after servicing |
### Administrative actions

<table>
<thead>
<tr>
<th>ITEM</th>
<th>ADMINISTRATIVE ACTIONS RECOMMENDED</th>
</tr>
</thead>
</table>
| 1.   | Greater than or equal to 12 demerit points:  
**Inquiry Action Recommended**  
Suspend License and Authorisation allowance for a period of between one and twelve weeks;  
Job re-assignment or  
Formal warning |
| 2.   | Greater than or equal to 8 demerit points:  
Issuance of warning letter |
| 3.   | Greater than or equal to 5 demerit points:  
Issuance of letter of caution |
| 4.   | Greater than or equal to 2 demerit points:  
Carry out staff counseling and record event |
Difficulties experienced

• Lack of trained HF professionals/administrators
• High implementation costs
• Uncertainty of returns
• Initial resistance of the unions and staff
• Cultural differences
• Wide choice of approach
Future Issues & Challenges...

- **Training**
  - Application of “Westernised training” methods to a multi-cultural environment like Singapore?
  - Human Factors Specialist training
- **Implementation of Human Reliability Programme**
- **Stabilising defences**: How do we continuously keep safe systems safe with rapid technology advancements?
- **Common platform for the collection of maintenance errors and unsafe acts among carriers and maintenance organisations**
- **System to quantify losses caused by unsafe acts, incidents and accidents**
Helpful Development Tips

• Tip #1:
  – Continuous High-Level Management Support

• Tip #2:
  – Start with Incident Investigation and build up

• Tip #3:
  – Select Good Consultant

• Tip #4:
  – Share And Learn
Final Challenge

Tomorrow's Organisation

Optimum Profit

Maximum Safety
ARE WE A ...

DINOSAUR?

ONE WAY
END OF PRESENTATION
THANK YOU