SMCG – Second Industry day
19.04.2013

Lufthansa Technik Group
“Measurement and driving of Safety Performance”
<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger Transportation</td>
<td>The Group’s airlines rank among the world’s leading carriers.</td>
</tr>
<tr>
<td>Logistics</td>
<td>Lufthansa Cargo – One of the world's leading cargo carrier in international air traffic.</td>
</tr>
<tr>
<td>Lufthansa Technik</td>
<td>Lufthansa Technik – Leading supplier of engineering services in the world's airline business.</td>
</tr>
<tr>
<td>Maintenance, Repair, Overhaul</td>
<td>LSG Sky Chefs – World's largest provider of airline catering and integrated in-flight solutions.</td>
</tr>
<tr>
<td>Catering</td>
<td>Lufthansa Systems – One of the world’s leading IT service providers for the airline and aviation industry.</td>
</tr>
<tr>
<td>IT Services</td>
<td></td>
</tr>
</tbody>
</table>
Lufthansa Technik Group

- **731** customers worldwide
- **2,249** aircraft under exclusive contracts
- **2,375** engines under contract
- **1,700** aircraft inspections per day
- **30** subsidiaries and affiliates worldwide
- **58** line maintenance stations worldwide
- **20,282** employees worldwide

Lufthansa Technik Product divisions (PDs)

- Aircraft Maintenance Services
- Aircraft Overhaul Services
- Engine Services
- Component Services
- Landing Gear Services
SMS at the LHT Group

History

Complexity

Processes
- SMS processes published

Gap Analysis
- Interpretation of SMS documentation and requirements

Risk Management
- Risk Management Set up

Approval
- Acceptance of HGK CAD

Key safety personnel
- Nomination of key safety personnel

Safety data
- Gathering and processing of safety data

Safety performance
- Definition of safety indicators and targets

Continuous Improvement
- Continuous Improvement of SMS processes

Database
- Requirement data base set up

Processes
2009
2010
2011
2012
Today

Time
SMS at the LHT Group

The set up of SMS

SMS Processes
- Standardized processes and clearly assigned responsibilities

Integrated Management System

SMS Tool
- Workflow management system and risk management module

SMS Reporting
- Single items and KPIs
- Trends
- Learning's

LHT Group Safety Level
Gathering and processing of safety data

* 2012: 2500 events

Gathering safety data

Processing safety data

Occurrence reporting findings acc. Part-145, Part-M, Part-21

Audit Findings

Other Findings

Gathering safety data

Quality Issue (not safety relevant)

Safety relevant event, repetition

Error Investigation (65%)

Cause Investigation (32,5%)

Audit Findings

Temporary actions

Corrective actions

Preventive actions

Sustainability check

Effectiveness check

Investigation follow ups
### LHT Quality Management Review Process

**Accountable Manager / Senior Persons / Safety Manager LHT Group**

- Efficiency of LHT quality management system and its processes
- Reports published **semi-annually** and **quarterly**
- KPI's cover **key compliance issues**, **safety and quality indicators**
- **Scope:** Binding for LHT Group companies

#### KPI definition, data supply and comments **by process owner** and **Safety Manager**

- Reports are **cascaded** for reviews on Group and PD level:
  - LHT Group report
  - Product Division report
  - Detailed report
LHT measurement facts Q3/Q4 2012
Measurement and driving of safety performance

<table>
<thead>
<tr>
<th>QKPI</th>
<th>LHT Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total AF&amp;O</td>
<td>928 ea (1,138) total AF&amp;O (internal 258 ea* (203)) internal reports decrease by 49%. Drivers COM, ENG, AOQ, CIH, WP. Neg. trend - needs to be monitored.</td>
</tr>
<tr>
<td>Open Investigations</td>
<td>224 ea* (201) 85,7 days (125) Investigation were improved by 30% (in Q1 was 116 days). Driven by intensified FGQ review.</td>
</tr>
<tr>
<td>Risk level</td>
<td>high 18 ea* (9) 208 ea* (203) Sign of change - major issues are still not fully adapted within group approval.</td>
</tr>
<tr>
<td>Investigation Time</td>
<td>19.7 days (5) Improved focus and speed visible in FGQ with local FM reviews. Fast investigations QM/COM/ENG/MTC (32%).</td>
</tr>
<tr>
<td>occurrence</td>
<td>20.8 days (5) High focus on “Reaction Time” established.</td>
</tr>
</tbody>
</table>

Comment:

- **Total AF&O:** Total no. of occurrences and audit findings (general trend)
- **Risk level:** Management attention to major/top findings in detail
- **Investigation time:** speed matters, specific target for fast investigation analyzing and closing
### Qantas-Deviation from AD/SB performance procedure

**Description**
- Deviation from AD/SB performance procedure by replacing a clamp in the A 380 fuel pipe system.
- SB was performed by using a non Qantas approved alternate method.
- Finally a workflow has been signed which is indeed acc. to SB-procedure and did not fit to the alternate method.

**Causes**
- The LHT mechanic did contact Qantas personal, in this case a LAME (similar to an EASA CAT-C qualification), but he did not realize that this person is not authorized to approve alternate methods for Qantas.

**Actions**

<table>
<thead>
<tr>
<th>Owner</th>
<th>Due date</th>
</tr>
</thead>
<tbody>
<tr>
<td>WB6</td>
<td>Closed</td>
</tr>
<tr>
<td>WB6</td>
<td>28.02.13</td>
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</tbody>
</table>

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**Source:** TQ2

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* IA = Internal Audit, AA = Authority Audit, CA = Customer Audit, OC = Internal Occurrence, QI = Quality Investigation, SC = Spotcheck

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**Customer**
- QFA

**Risk level**
- high

**Repetition**
- N

**CNQ**

<table>
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<tr>
<th>A/C reg. / PNR / Engine type</th>
<th>ID</th>
<th>Source*</th>
</tr>
</thead>
<tbody>
<tr>
<td>VH-XXX, VH-XXX</td>
<td>A-001065</td>
<td>QI</td>
</tr>
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**Source:** TQ2

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LHT measurement facts Q3/Q4 2012

Measurement and driving of safety performance – example of major finding
LHT measurement facts Q3/Q4 2012
Top items are distributed throughout the entire LHT Group
During troubleshooting in fuel tank system a cable fire occurred, although all CBs in the concerned system were pulled.

**Causes**

- No obvious reason for the cable fire was found, therefore the behaviour of Kapton wire in combination with humidity was blamed on that.
- Boeing statement: very small damage to the Kapton layer of the wires suspected. Due to the known facts that the wire is hygroscopic (i.e. absorbs water) rendering it susceptible to wet arc tracking and due to wire aging, hairline cracks will appear after the wire has dried which can lead to micro current leakage (i.e. electrical 'ticking' faults) which in turn can eventually culminate in an explosive arc tracking event (i.e. short circuit).

**Actions**

- As a precaution and based on the experience made in SHJ, the mechanics are obliged to follow the guideline of AMM and FIM before a CB will be reset again and the work will be confirmed via CRS.

**LCAG MD11F, D-AXXX cable fire**

- **Description**
  - During troubleshooting in fuel tank system a cable fire occurred, although all CBs in the concerned system were pulled.

- **Causes**
  - No obvious reason for the cable fire was found, therefore the behaviour of Kapton wire in combination with humidity was blamed on that.
  - Boeing statement: very small damage to the Kapton layer of the wires suspected. Due to the known facts that the wire is hygroscopic (i.e. absorbs water) rendering it susceptible to wet arc tracking and due to wire aging, hairline cracks will appear after the wire has dried which can lead to micro current leakage (i.e. electrical 'ticking' faults) which in turn can eventually culminate in an explosive arc tracking event (i.e. short circuit).

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<td>high</td>
</tr>
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<td>Repetition</td>
<td>N</td>
</tr>
<tr>
<td>CNQ</td>
<td>Kasko</td>
</tr>
</tbody>
</table>

**A/C reg. / PNR / Engine type**

<table>
<thead>
<tr>
<th>A/C reg. / PNR / Engine type</th>
<th>D-AXXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>A-001031</td>
</tr>
<tr>
<td>Source*</td>
<td>QI</td>
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Source: TQ2
LHT measurement facts Q3/Q4
Measurement and driving of safety performance – Top Ten causes

Comment

- Top Ten causes give us well information how to prioritize general “construction sites”
LHT measurement facts Q3/Q4

Driving safety performance

- Effectiveness: positive trend in use of sustainability checks (+25%), improved process understanding will be supported.
Future
SMS challenges

- Lufthansa Airline interface – How to take part of the $10^{-8}^*$

- Safety information: Gathering of customer feedback information

- Expecting EASA regulation

*$10^{-8}^* = \text{The overall safety goal of the Lufthansa Group}$
Thank you very much…

Hendrik Bödecker

Senior Engineer

Regulatory Compliance and Authorities Liaison

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