Lean Maintenance Methods at Lufthansa Technik

by

Björn Kohrs

Lufthansa Technik
Agenda

- Lufthansa Technik – at a glance
- Going Lean – a strategic decision
- Our roadmap to Lean – a story of small steps
- Lean maintenance – a few examples of how we do it
- Change management – the challenge in lean transformations
- Closing question
Agenda

Lufthansa Technik at a glance

Going Lean – a strategic decision

Our roadmap to Lean – a story of small steps

Lean maintenance – a few examples of how we do it

Change management – the challenge in lean transformations

Closing question
Lufthansa – excellence in aviation

Aviation Group

The Lufthansa Aviation Group is one of the world’s leading air transport corporations.

It comprises more than 400 subsidiaries and affiliates, active in business segments including passenger business, logistics, repair and overhaul, catering and IT services.
Key facts about Lufthansa Technik Group

- About 25,000 employees worldwide
- Over 4.7 billion Euros in sales*
- More than 580 customers worldwide
- More than 450 jetliners entered in its Total Technical Support TTS® program, more than 1,400 aircraft under exclusive contracts

*Lufthansa Technik and all companies of Lufthansa Technik Group.*
Six Product Divisions will offer:

- competent service and support
- around the clock and around the world
Lufthansa Technik Engine Services

Organization

- Component Services
- Aircraft Overhaul
- Engine Services
- Aircraft Maintenance
- Landing Gear Services
- VIP & Executive Jet Solutions

**Engine Service**
- Repair and Overhaul of Commercial Jet Engines

**Engine Parts Repair**
- Engine Parts and Accessories Repair

**Engine Lease**
- Spare Engine Coverage

**APU**
- Repair and Overhaul of Auxiliary Power Units
Lufthansa Technik Engine Services

Key facts

We are the leading international independent provider offering engine repair & overhaul.

Turnover: • More than 1,4 billion € in 2007

Workforce: • More than 4,000 employees worldwide
  • approx. 2,000 in Hamburg

Global network: • 11 facilities around the world
  • 40 % workload from LH Group
  • 60 % workload from more than 150 customers worldwide

Facilities: • 8 test cells with up to 84,000 lbs thrust capacity
  • All facilities meet highest EU environmental standards

Product range: • 33 supported engine and APU types
These customers already benefit from us
Some of more than 150 satisfied engine & APU customers worldwide
Agenda

- Lufthansa Technik at a glance
- Going Lean – a strategic decision
- Our roadmap to Lean – a story of small steps
- Lean maintenance – a few examples of how we do it
- Change management – the challenge in lean transformations
- Closing question
Chaos ante portas ...
...change before you have to!

„ We always did it this way......!“
Chaos ante portas ...  
...change before you have to!

Always trying the **same** method and to expect different results ...

....is probably just a synonym for insanity!
Market conditions for german company’s .....stormy weather!

- skepticism concerning the big coalition
- only timid political reforms
- hope for economical growth
- crisis in the finance sector
- high euro / dollar rate
- still high rate of unemployment
- global competition (go east....)
Taking the next step towards excellence

Cost reduction

Winning the cost saving award

"Me too"

Best value for money

What can be the next step?

Best quality in town

Scrap avoidance repair dev.

PMA, surplus

automatisation

QM

EDP Tools

Process optim.

Quality

Reliability

TAT

Lean Maintenance Methods at Lufthansa Technik, February 28th, 2008
HAM WT/KVP, Björn Kohrs
Lean Maintenance at Lufthansa Technik.ppt
Seite 14

Lufthansa Technik
Upgrade to Industry Leadership!

Reaching the next performance level requires

- a *holistic* approach of
- optimizing the entire *production system*.

Implementation of Lean in Production and Administration

- „Create the perfect value stream.“
- with the aim to use resources efficiently,
- to fulfil the customer's expectations and
- to sustainable increase the company's competitiveness.
Agenda

Lufthansa Technik at a glance

Going Lean – a strategic decision

Our roadmap to Lean – a story of small steps

Lean maintenance – a few examples of how we do it

Change management – the challenge in lean transformations

Closing question
The genesis of Lean – Toyota Production System
Toyota’s Prediction in 1991

We get brilliant results from average people managing and improving brilliant processes. Our competitors get mediocre results from brilliant people managing around broken processes.

When they get in trouble, they try to hire even more brilliant people.

We’re going to win…
The Kaizen-Approach

KAIZEN

Continuous Improvement Process

Verbesserungs-Vorschlagswesen (Lufthansa Impulse)

5S

Expert-CIP

Employee-CIP

Production & Suppliers

Organisation & Administration

Kaizen is Japanese and has the meaning of “change to the better” = improvement
The CIP Cycle

5S - focus

Establish order, tidiness and ensure standards.
- Sort
- Straighten
- Shine
- Standardize
- Sustain

CIP – focus

Accomplish improvements and define new standards for:
- Working process
- Working system
- Working environment
- Safety

Quelle Bild: Daimler Chrysler Produktionssystem MPS
Lean Production Basics

Waste
All actions that do not change the product
- Waiting…
- Transportation…
- Searching…
- Moving…
- Unnecessary work on the product
- …

Added Value
All actions that increase the products value (the customer is willing to pay more for it after accomplishment)

Additional needed work
Non value adding but necessary activities (e.g. rigging a tool for machining)

Focus:
It is the intention of Lean to increase the share of the value adding activities by continuous improvements and sustainable reduction of waste and non value adding activities.

Quelle: McKinsey
Reduce waste (muda) by...

- **Poka Yoke** – built in failure proof
- **preventive maintenance** increases reliability of machines
- see what is happening instead of looking into EDP systems
- **Little’s law**.....reduction of production lots reduces turntime
- Just in time deliveries
- **tidyness reduces search times**

- e.g. **Best Practices**
- "Do you already work or are you still setting up your machine?"

- Physically interlocked workstations in a process oriented way

- **e.g.** Physically interlocked workstations in a process oriented way

- **5S**

- **Physical interlocked workstations**

- **Poka Yoke** – built in failure proof

- **Lean Tools**

- **Just in time deliveries**

- **Tidyness reduces search times**

- "What are you already working on or are you still setting up your machine?"

- Physically interlocked workstations in a process oriented way
Implementation phases of Lean

**Description**

- WR2 Airfoil Shops (~250 employees)
- WR1 Administration (~50 employees)
- WP3 CFM56 (~350 employees)
- Lighthouses (~350 employees)
- Lean Roll out (~850 employees)

- 2005
- 2006
- 2007
- 2008

**Lufthansa Technik AG (LHT)**

**Triebwerke**

HAM TC, 01.01.2007

**Lean Maintenance Methods at Lufthansa Technik, February 28th, 2008**

**HAM WT/KVP, Björn Kohrs**

**Lean Maintenance at Lufthansa Technik.ppt**

**Seite 22**
Typical Milestone-Plan for Implementation of Lean Basics

**Start**
- Goals
- Timeline

**Qualification**
- Kaizen Trainer (7 Tage)
- 5S Qualifikation for all employees (4h)
- Communication of vision in management cascade (2h)
- supervisor training in lean communication skills (3 days)

**Umsetzung**
- 5S-Workshops
- Standardisation
- Introduction of Kaizen & KPI Boards
- Establishment of regular communication


**End**
- Review
Agenda

Lufthansa Technik at a glance

Going Lean – a strategic decision

Our roadmap to Lean – a story of small steps

Lean maintenance – a few examples of how we do it

Change management – the challenge in lean transformations

Closing question
Dozens of workshops performed
Make it sustainable
5S Audits and Standards
New cards (opportunities or problems)

Responsibility assigned

completed (rejected or realized)

Results of 5S audits
Kaizen cards: Examples

- **Safety & health:**
  - Improve noise & dust protection
  - Provide rubber mat for damping

Safety & health:
- Improve noise & dust protection
- Provide rubber mat for damping

Quality, zero defect:
- Improve transport devices

**110 Kaizen cards from staff of 150 within 6 months - 85% worth to be implemented.**

<table>
<thead>
<tr>
<th>Types of improvements</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement of workplace</td>
<td>43</td>
</tr>
<tr>
<td>Elimination of irregularities / production problems</td>
<td>39</td>
</tr>
<tr>
<td>Cost reduction</td>
<td>12</td>
</tr>
<tr>
<td>TAT</td>
<td>7</td>
</tr>
</tbody>
</table>

- **Implemented:** 74
- **In progress:** 10
- **Rejected:** 17

**110 Kaizen cards from staff of 150 within 6 months - 85% worth to be implemented.**
What problems to adress first?

Few big issues...
...some larger ones...
...but very many small issues!

Focus on these topics:
- easy to fix
- allow for quick improvements
- bring momentum

complexity

time needed for realisation
Visualisation of division targets

- Targets for entire product division are defined and published in every department
- Departments specify these targets for their processes and visualize them in KPIs
Key Performance Indicators (KPI) in Lean Production

- KPI-Boards complement the Kaizen Boards
- Relevant processes (turntime, cost, M/H) are shown with actual / planned / target figures
- An index for customer delivery performance and customer satisfaction is always included
Total Productive Maintenance
Availability of machines is essential for OTD & TAT

TPM ensures:
- availability
- reduces TAT variance
- allows cost reduction
- ensures product quality
Process Improvements
WR248 Turbine Blade Repair continuous flow production

**Before**

**After**
Leadership
VSM + §12 as prerequisites for success

Executive Summary of the 14 Toyota Way Principles

Principle 12. Go and see for yourself to thoroughly understand the situation (genchi genbutsu).
- Solve problems and improve processes by going to the source and personally observing and verifying data rather than theorizing on the basis of what other people or the computer screen tell you.
- Think and speak based on personally verified data.
- Even high-level managers and executives should go and see things for themselves, so they will have more than a superficial understanding of the situation.

There is muda in all processes!
Engine Flow Line CFM56
Growing market ahead

Cost

MH per SLE & capital finance

Lean Production

Market Potential CFM56

CFM56 Revenue (bn$)

2006 2007 2008 2009 2010 2011 2012
Engine Flow Line CFM56

Advantage for the customer

- Considerable shortening of turntime
- Excellent compliance with delivery dates
- Significant improvement in productivity gives lead over competitors
Engine Flow Line CFM56
View on office building and final assembly
Agenda

- Lufthansa Technik at a glance
- Going Lean – a strategic decision
- Our roadmap to Lean – a story of small steps
- Lean maintenance – a few examples of how we do it
- Change management – the challenge in lean transformations
- Closing question
One important factor of success in a change project is communication!

Success of mergers was threatened, because

- integration of employees too late 87%
- not enough transparency 86%
- late, poor, imperfect and incomplete communication of objectives and contents 81%

Source: Emnid-Survey year 2000
Information & integration of employees

- Change exhibition – info prior to start for all affected employees, gives room for questions
- Info-Market e.g. in entrance to canteen
- Newsletter – also by E-Mail, but better printed
- Internal Newspaper
- Courses and Trainings for key players
- Workshops in production und office – conviction at the very own working places

The depth of information required has to be defined individually for each level!
Clear definition of the vision.....

- Guiding principles are understood as pictures of an achievable and desirable future state.
- A guiding principle is a clearly structured vision and shows the strategy how to achieve the company’s goals.
- It also comprises relevant company culture aspects.
Create consciousness for the necessity to change
Your middle management is the main driver....

Willingness to change

80%

Vice-President

60%

Senior-Manager

30%

Production Manager

80%

Blue/White Collar

Source: Ingenics AG, Interviews with managers in different organisations

Sustainable success is only achievable by amplification of the involvement of the middle and lower management levels!
Change (the) management
Aspects of feelings and emotions

Reaching the emotional level will boost the change project and make achievements sustainable. This will be the selflearning organisation continuously practising kaizen!

TOP-Management required!
Change (the) management
Bonding by successful relationships!

Human beings
are designed
for successful relationships!

The nucleus of all human motivation is to find
and give,

interpersonal recognition,

valuation and thoughtfulness.

Source: Joachim Bauer:
Prinzip Menschlichkeit – 2006
Another factor of success – corporate culture
Lufthansa Technik „Wertekanon“

The corporate culture has direct influence on the duration of a change project and the requirement for training and information!
Agenda

- Lufthansa Technik at a glance
- Going Lean – a strategic decision
- Our roadmap to Lean – a story of small steps
- Lean maintenance – a few examples of how we do it
- Change management – the challenge in lean transformations
- Closing question
Can Lean Maintenance Methods work in the MRO industry?

Yes, but.....

- requires strong management down to the working level
- requires managers to ask questions in continuous improvement cycles rather than giving instructions „do it my way“
- requires managers providing help and asking the right questions
Thank you for your attention!

Your open questions please!