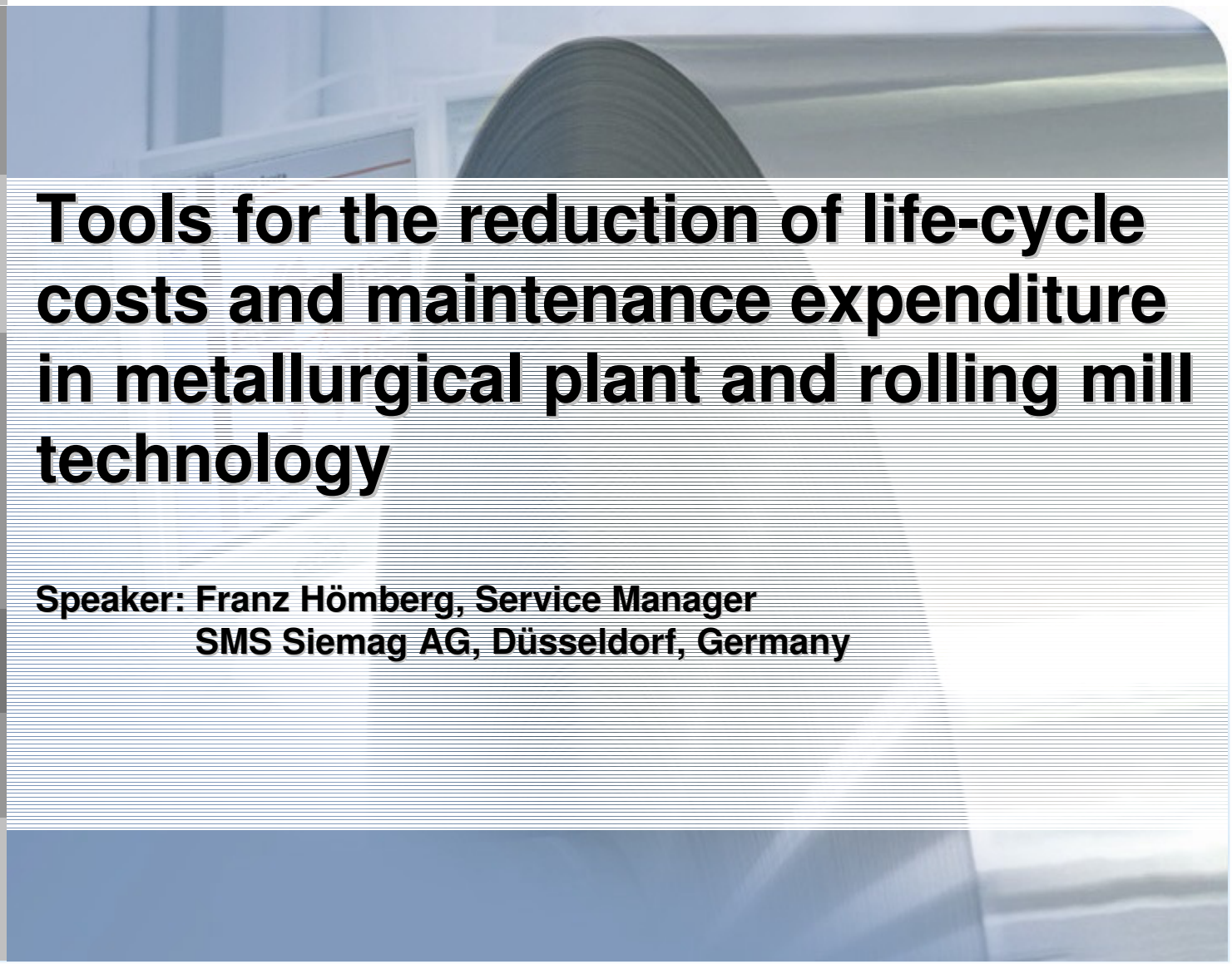
SMS SIEMAG
SMS group

X-Cellize®



Tools for the reduction of life-cycle costs and maintenance expenditure in metallurgical plant and rolling mill technology

Speaker: Franz Hömberg, Service Manager
SMS Siemag AG, Düsseldorf, Germany

Tools for the reduction of life-cycle costs

Contents

Tools for the reduction of life-cycle costs

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Business Areas and Divisions

- Steel meltshops and continuous casters
- Hot rolling mills
- Cold rolling mills
- MORGOIL® bearings
- Aluminium rolling mills
- Strip processing lines
- Logistic systems
- Electrical & automation systems
- Technical service

- Tube mills
- Long-product rolling mills
- NF plants
- Extrusion and forging technology
- Ring rolling mills
- Inductive technology

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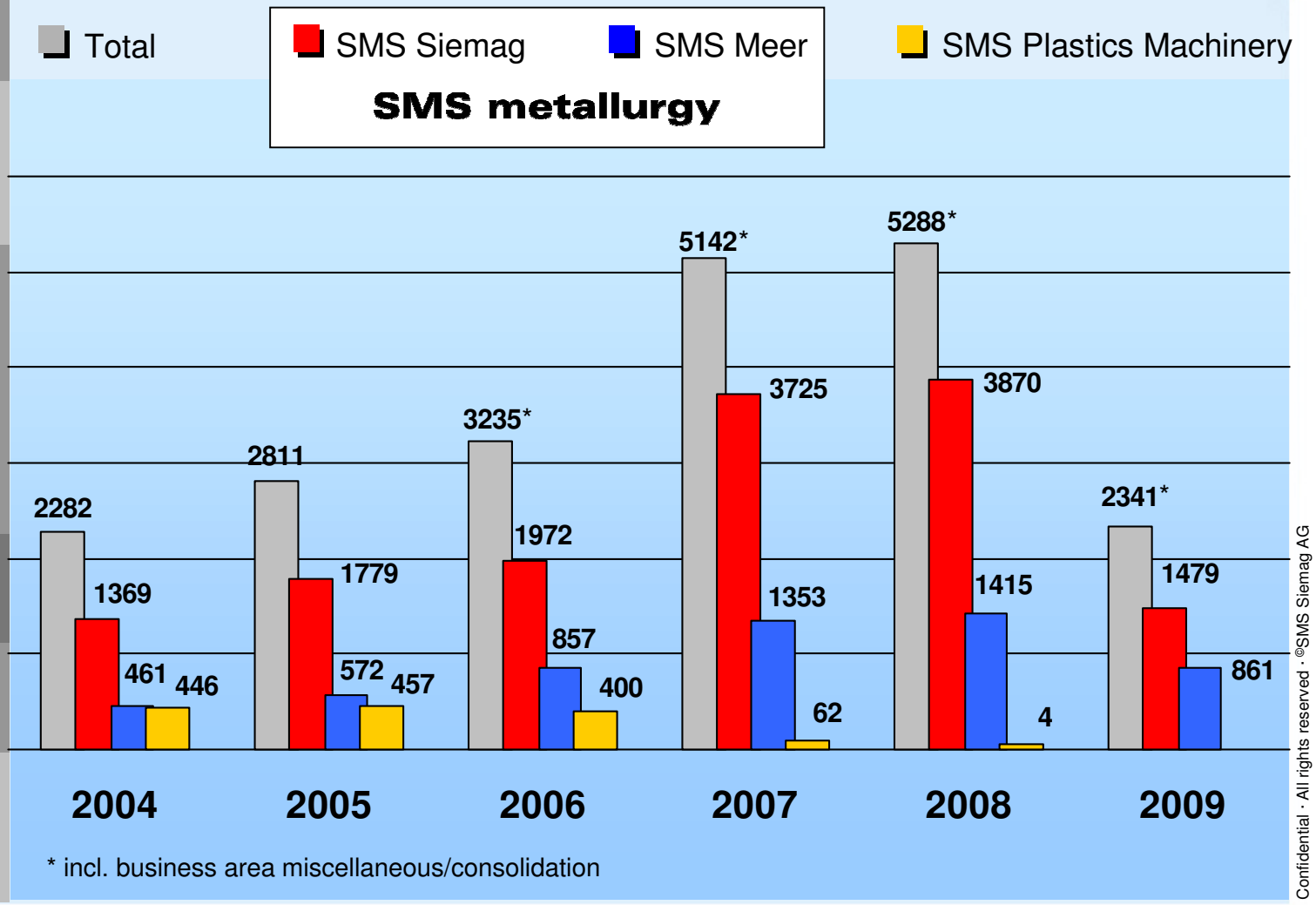
Order intake by Business Areas in million EUR



* incl. business area miscellaneous/consolidation

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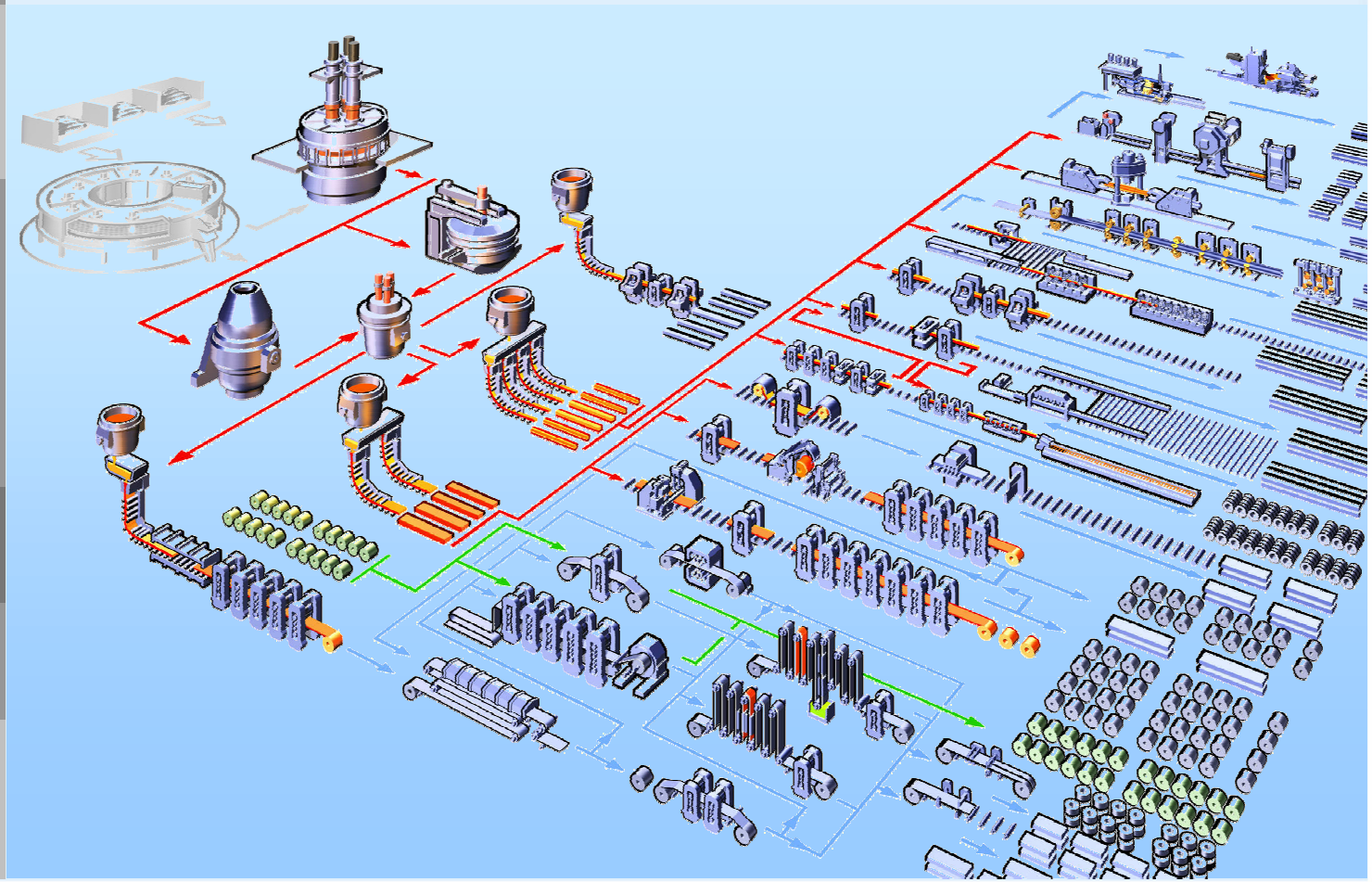
Product range



Tools for the reduction of life-cycle costs

Definition

Life-cycle costs

are the accumulated costs which are incurred by a plant or a system during its **entire life cycle**.

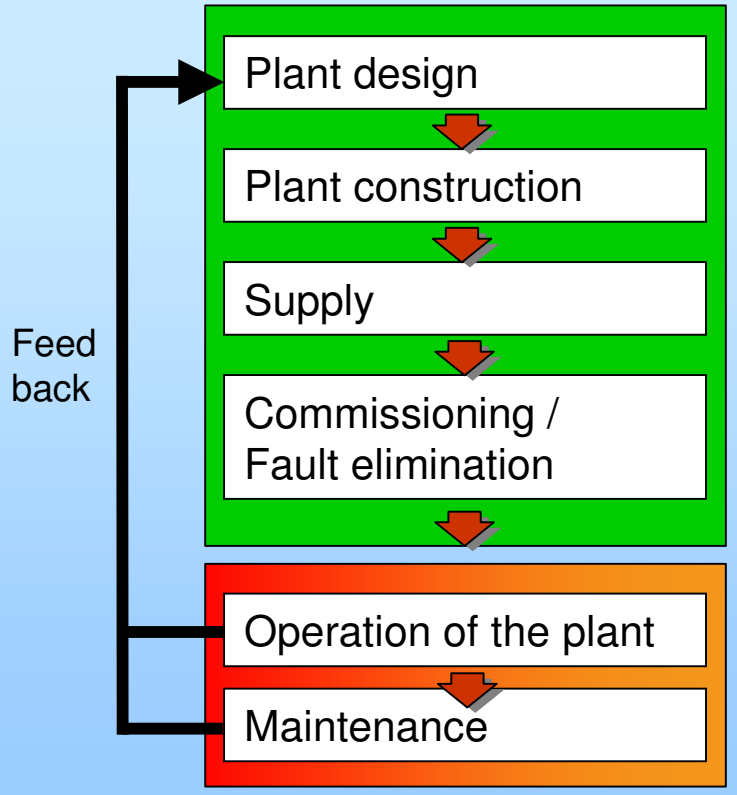
This concept is based on the assumption that **each product only has a limited life cycle** and goes through various phases during this period, such as initiation, planning, implementation, utilisation and taking out of service.

Life cycle of a plant

Source: Wikipedia

Tools for the reduction of life-cycle costs

What do life-cycle costs comprise?



For drawing up of costs, knowledge of the duration of utilisation and amortisation as well as scope of maintenance is of great importance.

The largest portion of the costs is incurred in these two phases and by far exceeds the purchase price in most cases.

Source: Pocket book "Maintenance Logistics" by Kurt Matyas

Tools for the reduction of life-cycle costs

Definition

Computerized Maintenance Management System (CMMS)

CMMS is a computer-aided process which controls the planning of all tasks related to the maintenance of your plant.

Source: Wikipedia

This also includes:

- Planning of maintenance
- Recording of all fault information
- Spare parts management
- Technical / cost controlling

Past working method

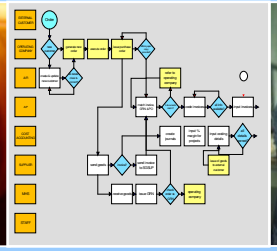
Future working method

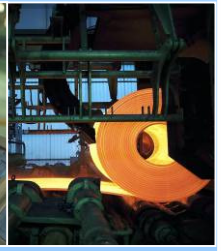
Tools for the reduction of life-cycle costs

Why do 70% of the CMMS introductions fail? *)

- The **amount of work required for preparing** the necessary data has been **underestimated** or the data have not been fully recorded
- The system has **not** been given **any** continuous support or encouragement nor **has it been updated**.
- The required **size of the system** has been incorrectly assessed - today this is no longer a problem.
- The **organisation of the company** is not suitable for the operation of the system.

In order to prevent failure, personnel with technological background are required for the planning, for the installation and for the support of the CMMS.

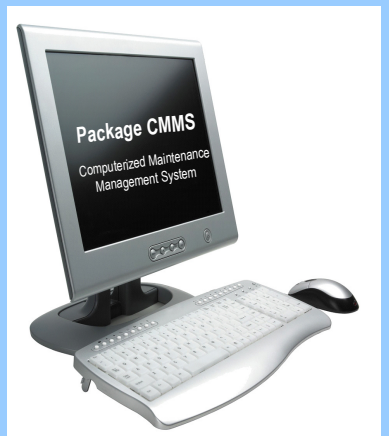


*) Source: Business Industrial Network

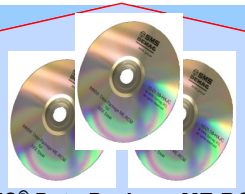
Tools for the reduction of life-cycle costs

Monitoring and Maintenance Management Systems

IMMS® Integrated Maintenance Management System



- Planning of maintenance
- Recording of all fault information
- Spare parts management
- Technical and cost controlling



IMMS® Data-Package ME-RCM

Maintenance Engineering, based on
Reliability Centered Maintenance Methods

"Best Practice Maintenance" strategy

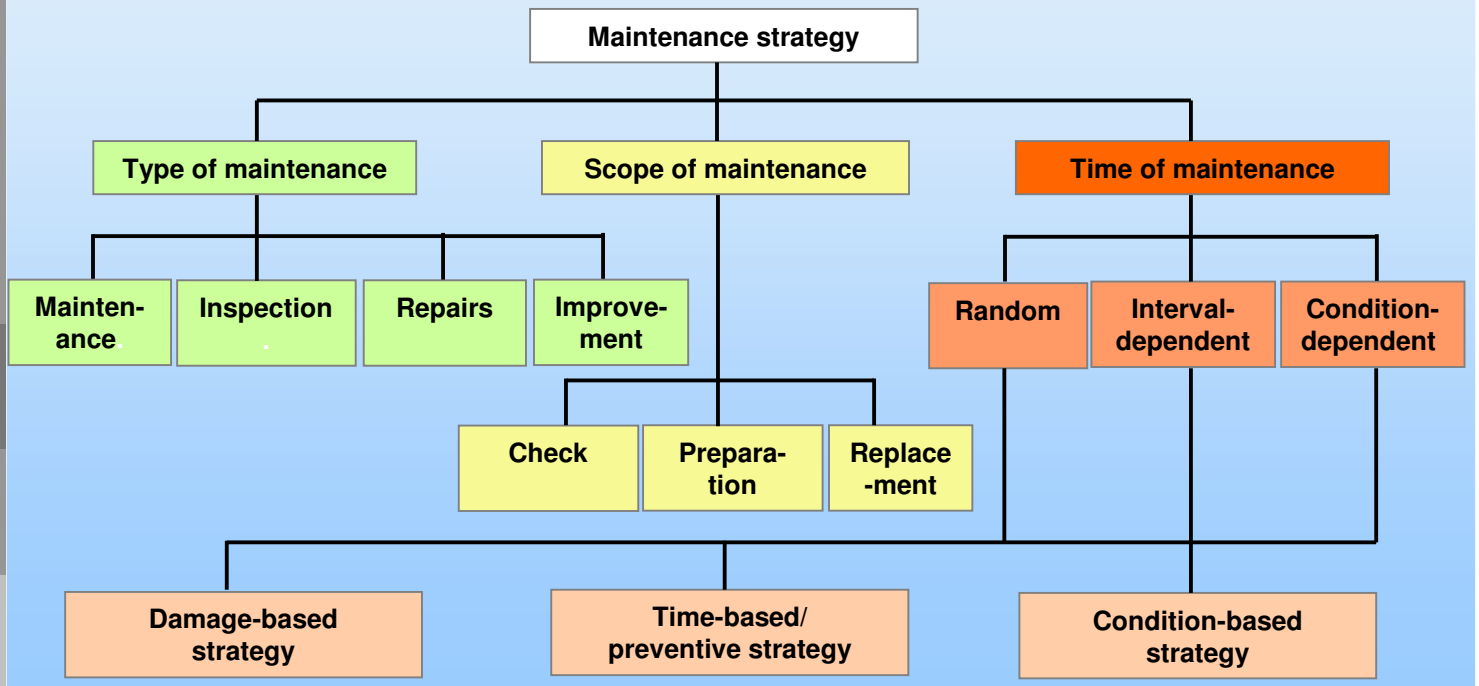
Tools for the reduction of life-cycle costs

Characteristics of a maintenance strategy

Strategies of maintenance *):

A maintenance strategy determines:

Maintenance**TYPE**, maintenance**SCOPE**, Maintenance**TIME**



*) DIN 31051, VDI 2895

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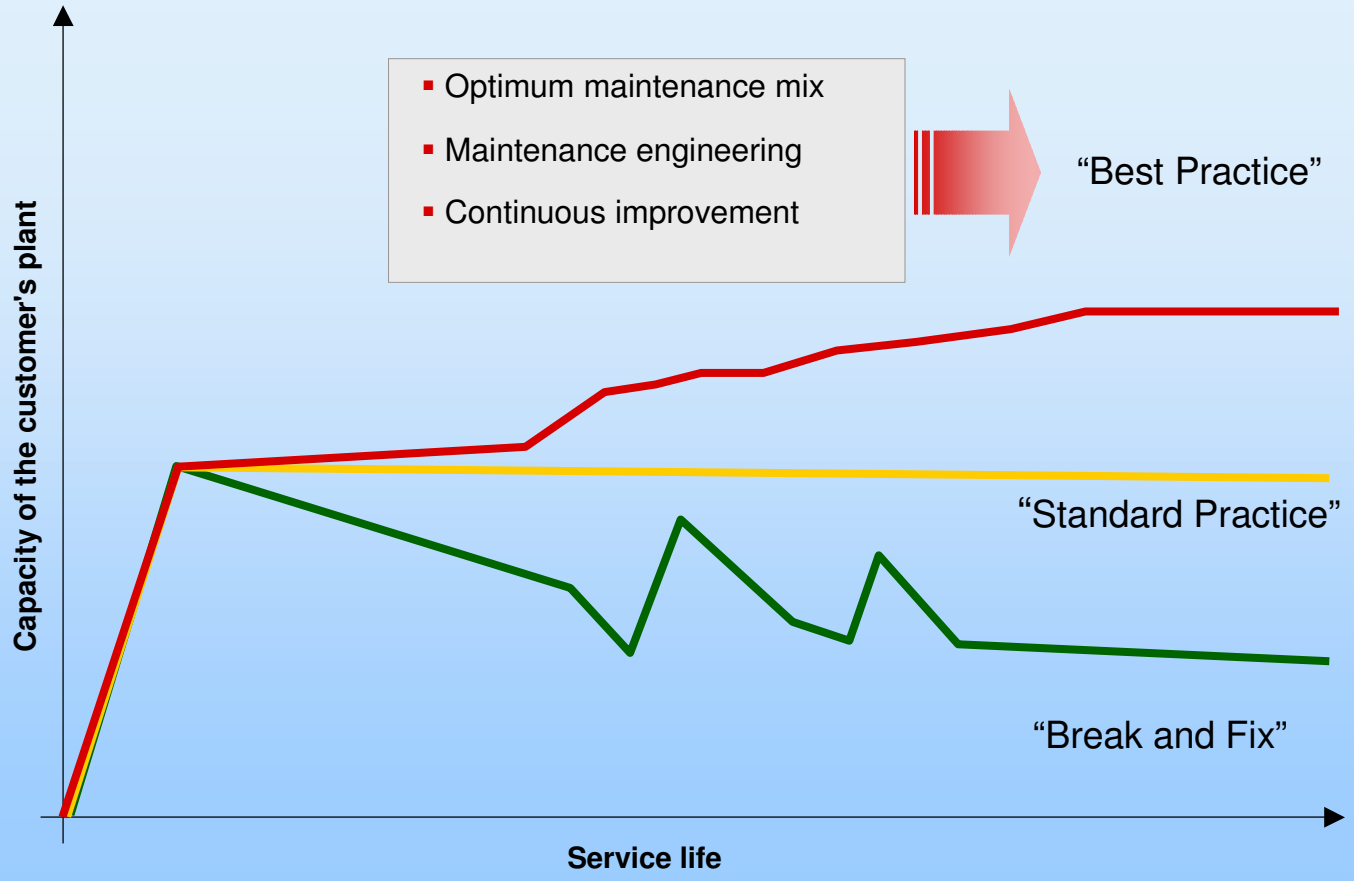
Maintenance philosophy – a key to improved OEE*)

"Break and Fix" or systematic maintenance management?



*) Overall Equipment Effectiveness

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Structure and preparation of the RCM analysis

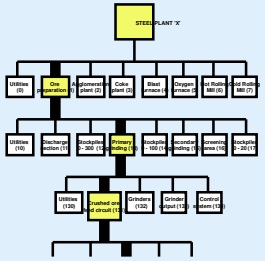
Data collection → **System structure** → **FMECA, decision analysis** → **Collection of results**

Data collection

- Operating data
- Design data
- Tech. manual
- Drawings

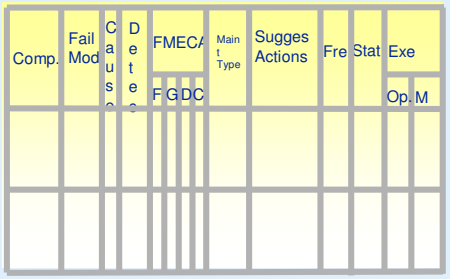
System structure

- Equipment tree



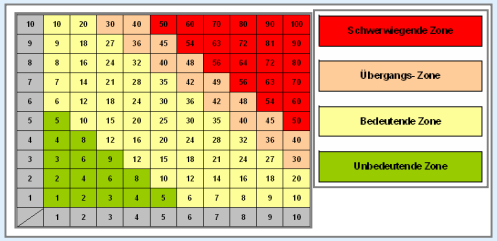
- Functional model

FMECA, decision analysis



FMECA, analysis of the
- Malfunction
- Reasons
- Effects
- Critical malfunctions

- Critical components



Collection of results

Maint. strategies

Actions, tasks
- Inspection plans

Time intervals

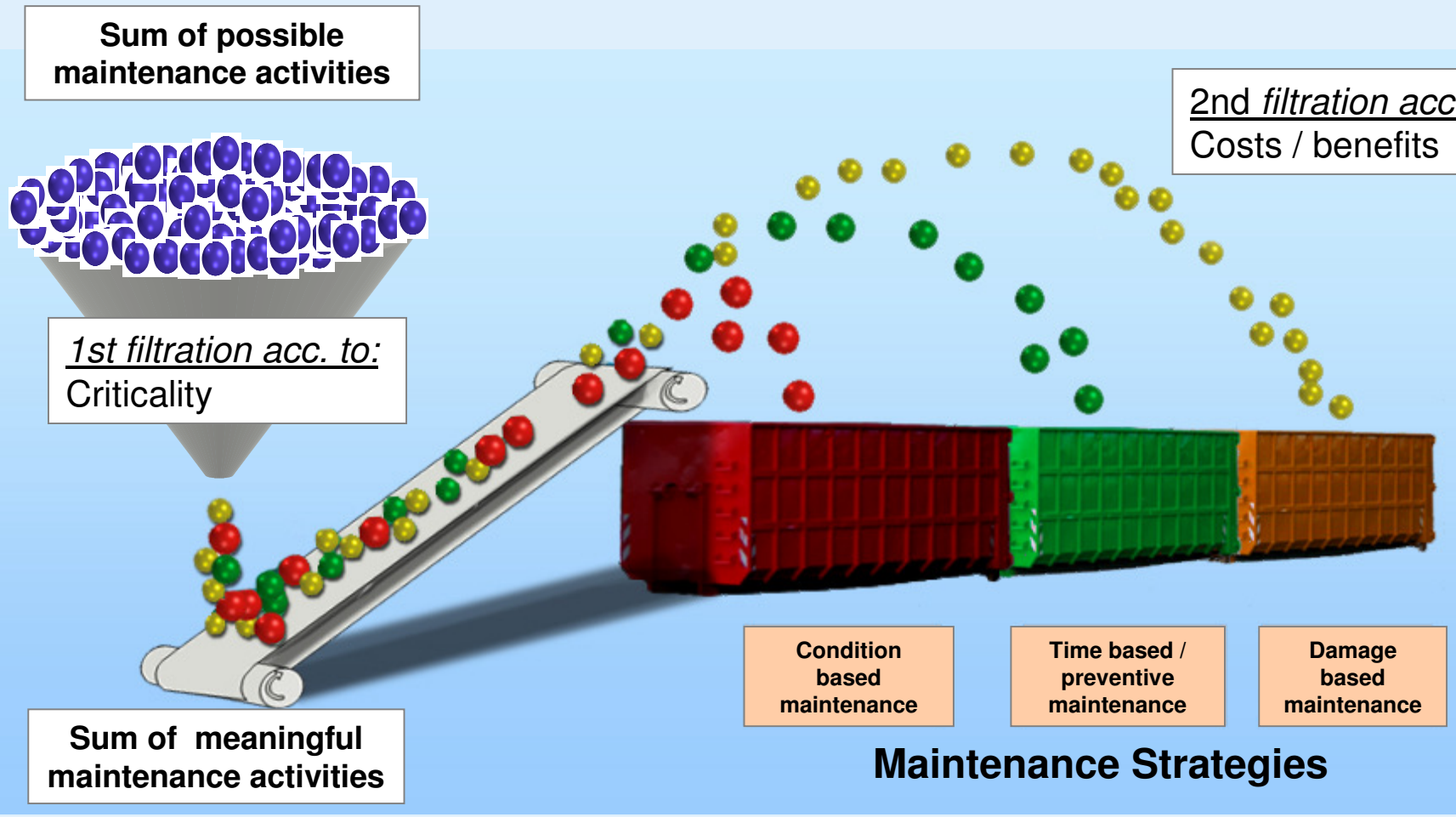
Time expenditure

Selection of personnel
- Operator / Maint. engineer

Machine status
- Stop/Run

Tools for the reduction of life-cycle costs

"Best Practice" maintenance strategy



Tools for the reduction of life-cycle costs

Definitions

Condition Monitoring:

The Condition Monitoring concept is based on a **regular or permanent recording of the machine condition through measurement and analysis of authoritative physical magnitudes** such as, for example, vibrations, temperatures, position/approximation etc.

The Condition Monitoring pursues two objectives:

1. **Safety**
2. **Machine efficiency**

Source: Wikipedia

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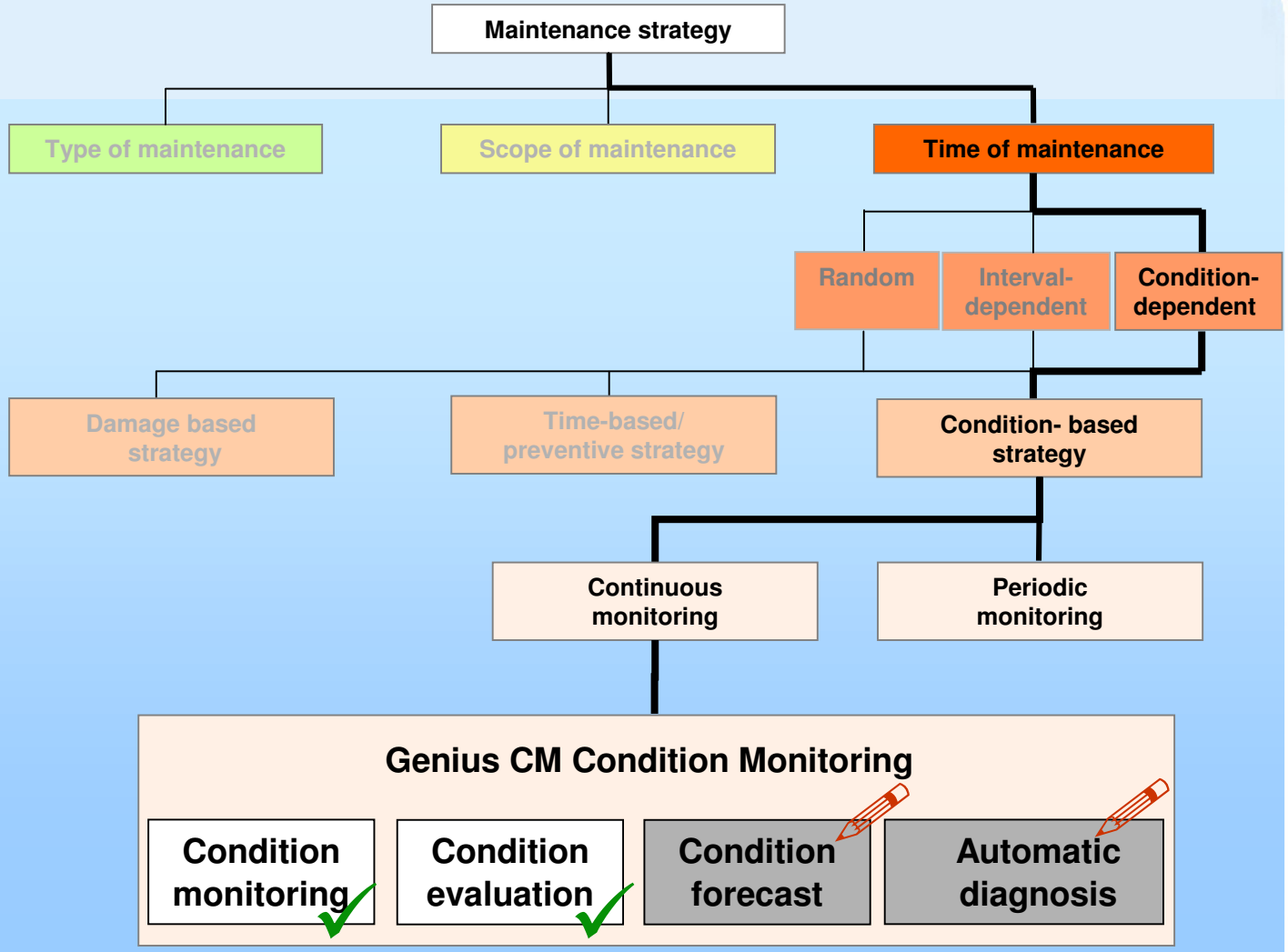
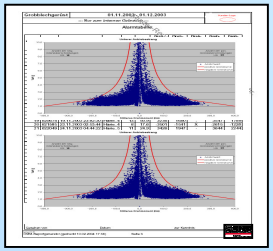
Condition Monitoring strategies

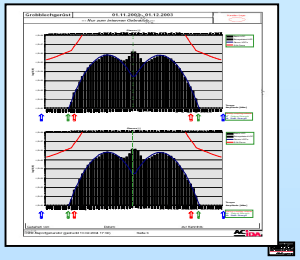


Tools for the reduction of life-cycle costs

Genius CM (Condition Monitoring): Data Management

- Monthly condition analysis reports
- 24/7 experts teleservice





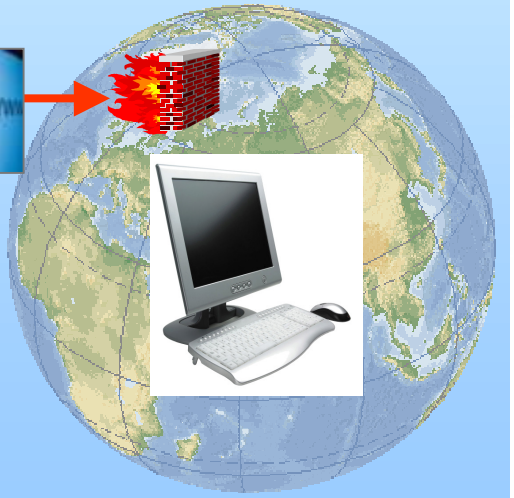
Plant automation
Levels 1 / 2

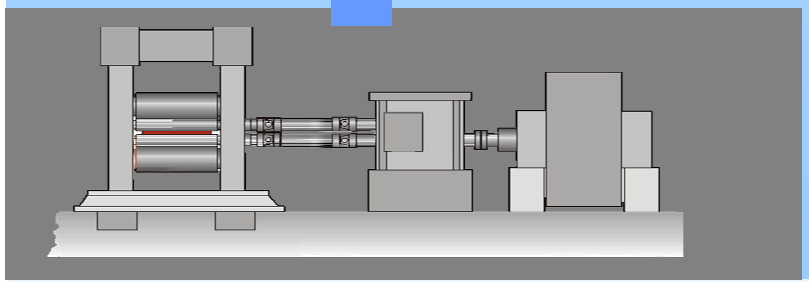
SMS Siemag
online analysis software

Unconditioned signal memory

ALARM archives
Special events with background

TRENDS and TRIGGER data memories





Plant automation

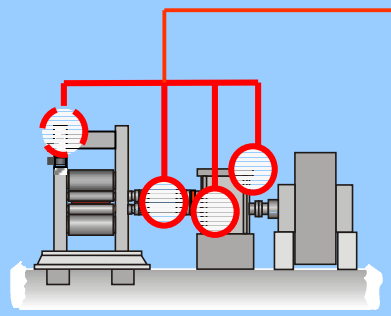
GENIUS CM

Tools for the reduction of life-cycle costs

Monitoring and Maintenance Management Systems

Genius (CM)

- Indicates wear tendencies
- Signals acute events
- Generates maintenance orders



- Condition of gears
- Condition of bearings
- Condition of hydraulics
- Condition of spindles
- Condition of sensors
- Condition of process
- Condition of drive
- Temperatures

IMMS®

Integrated Maintenance Management System

Planning of maintenance
Recording of all fault information
Spare parts management

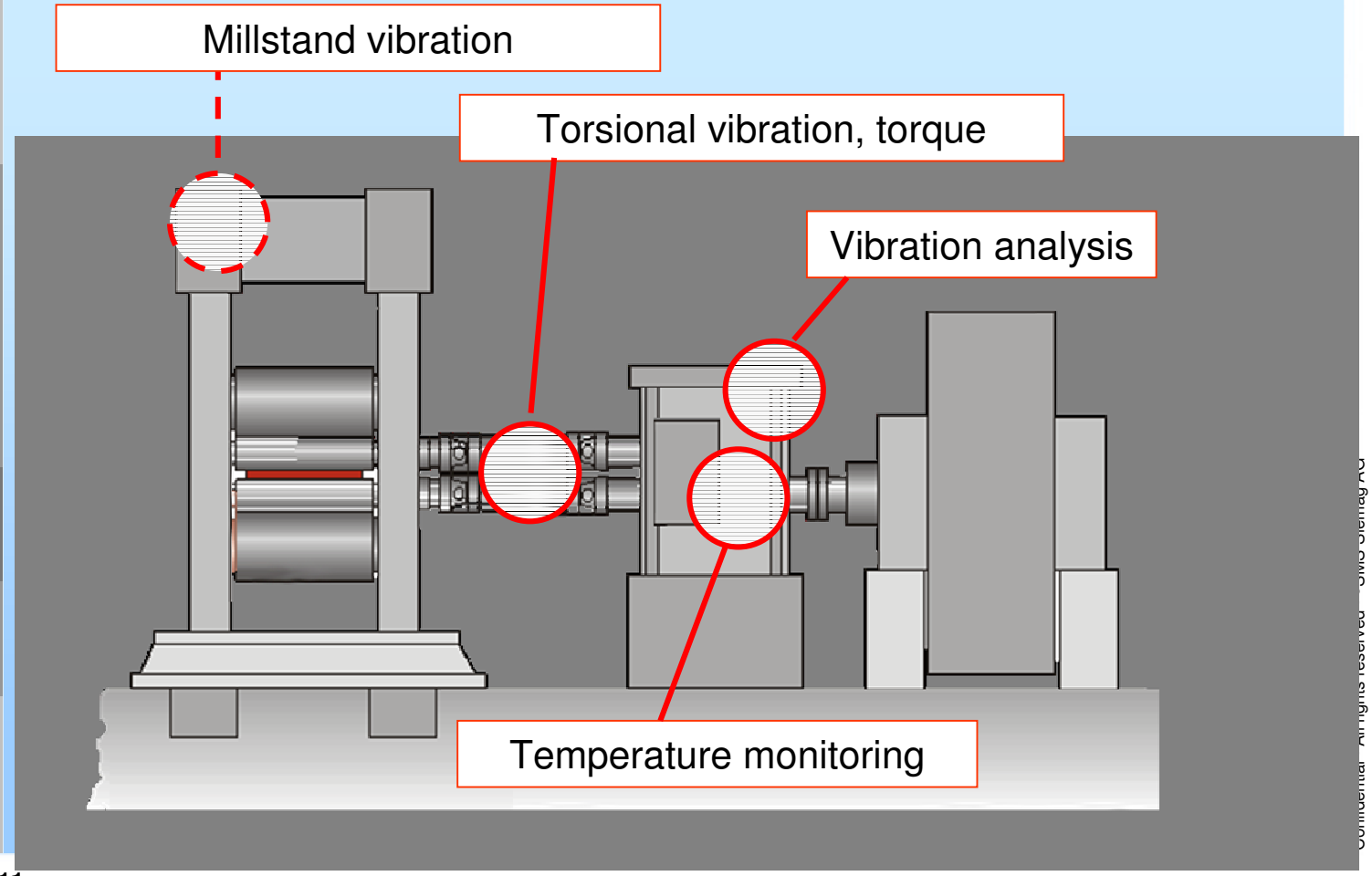
Technical and cost controlling

IMMS® Data-Package ME-RCM
Maintenance Engineering, based on
Reliability Centered Maintenance Methods

"Best Practice Maintenance" strategy

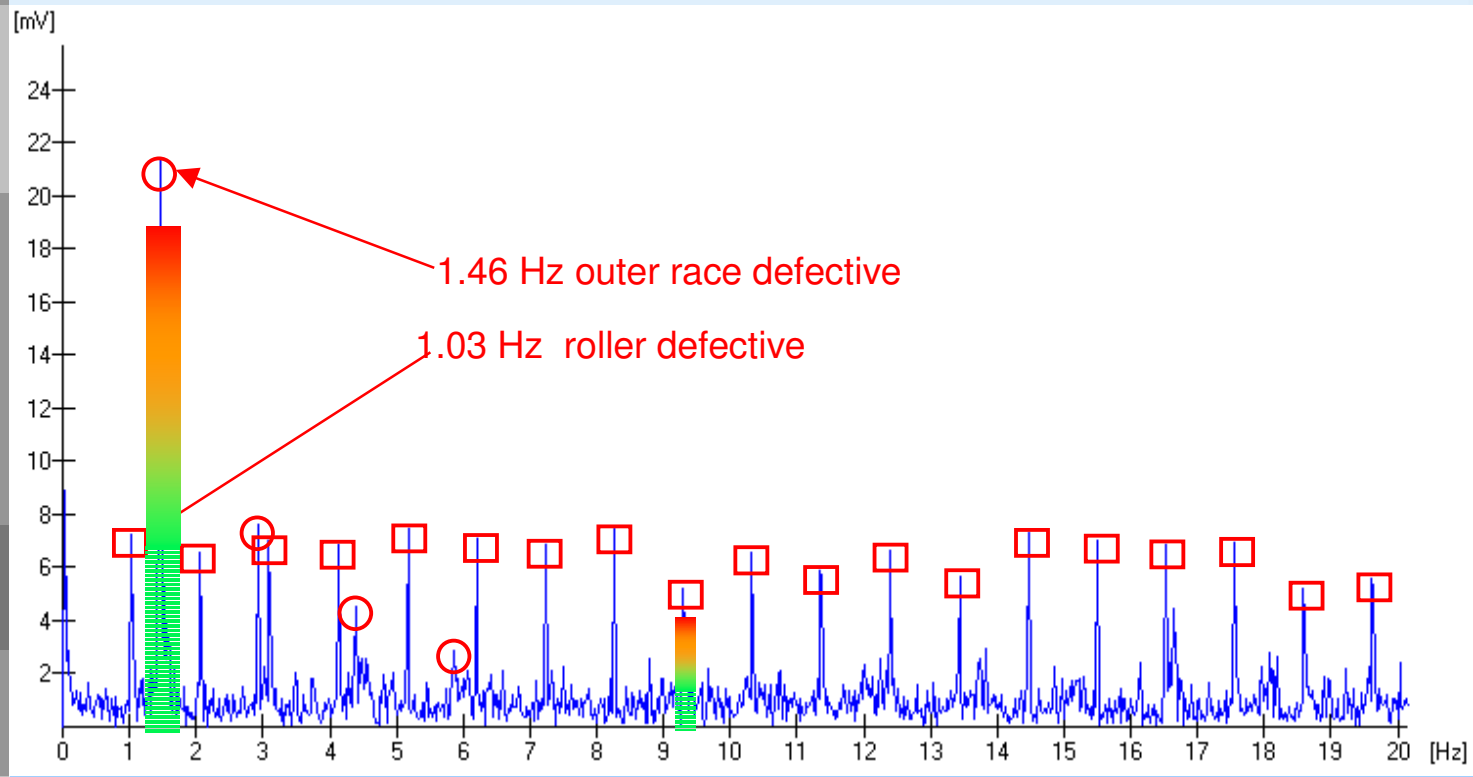
Tools for the reduction of life-cycle costs

Genius (CM) drive module
Condition Monitoring through intelligent sensor selection



Tools for the reduction of life-cycle costs

Genius (CM) Example I: Analysis of bearing vibration



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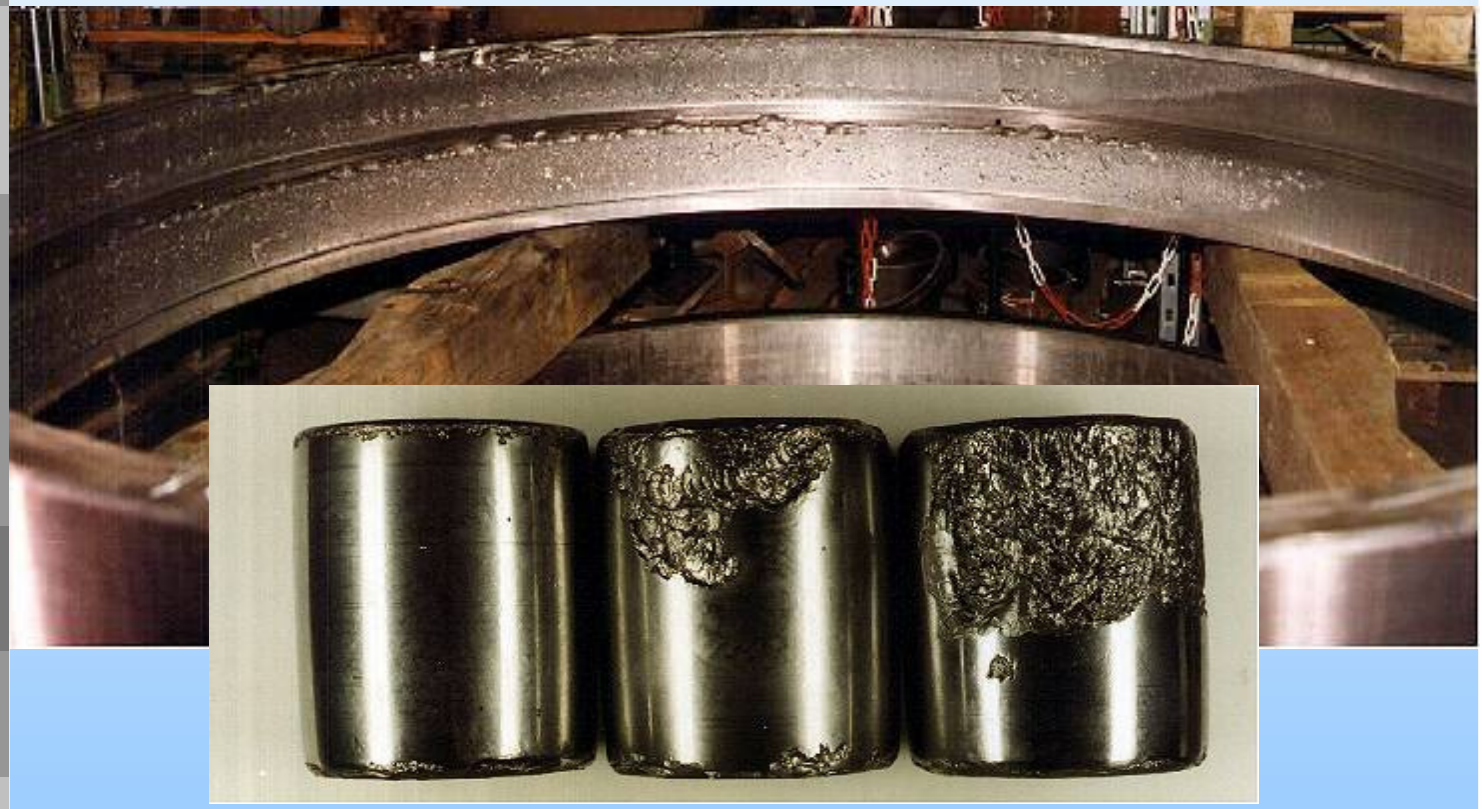
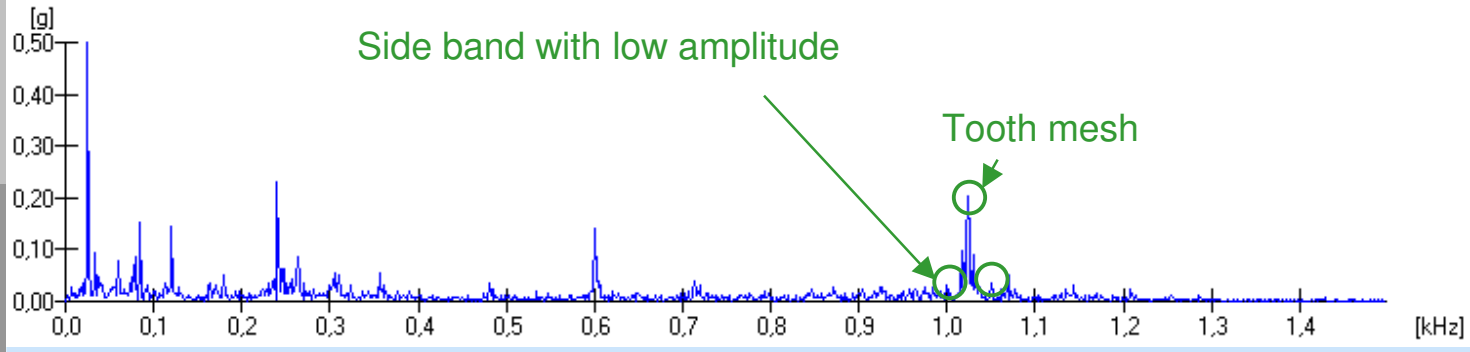
Genius (CM) Example I.I:
Analysis of bearing vibration, damaged bearing



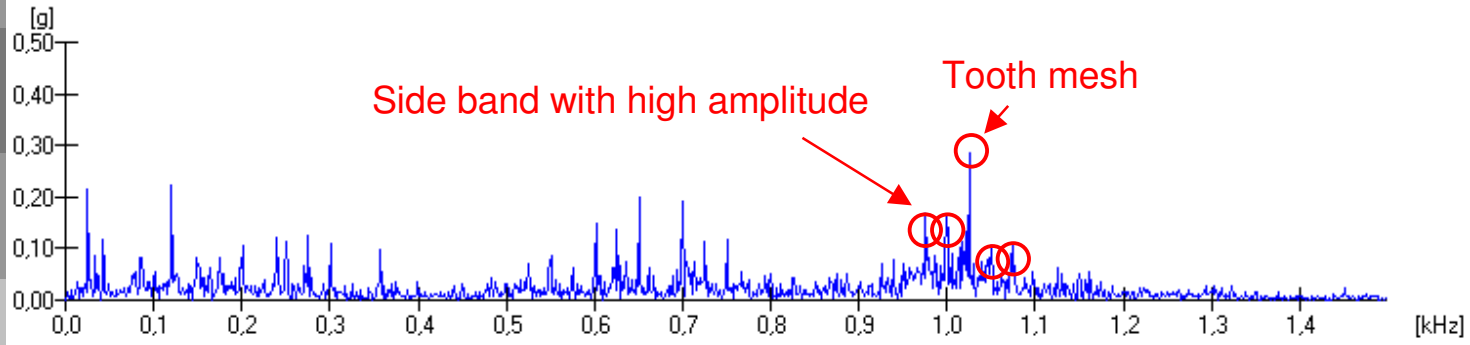
Tools for the reduction of life-cycle costs

Genius (CM) Example II: Condition Monitoring of gear units

Good condition:

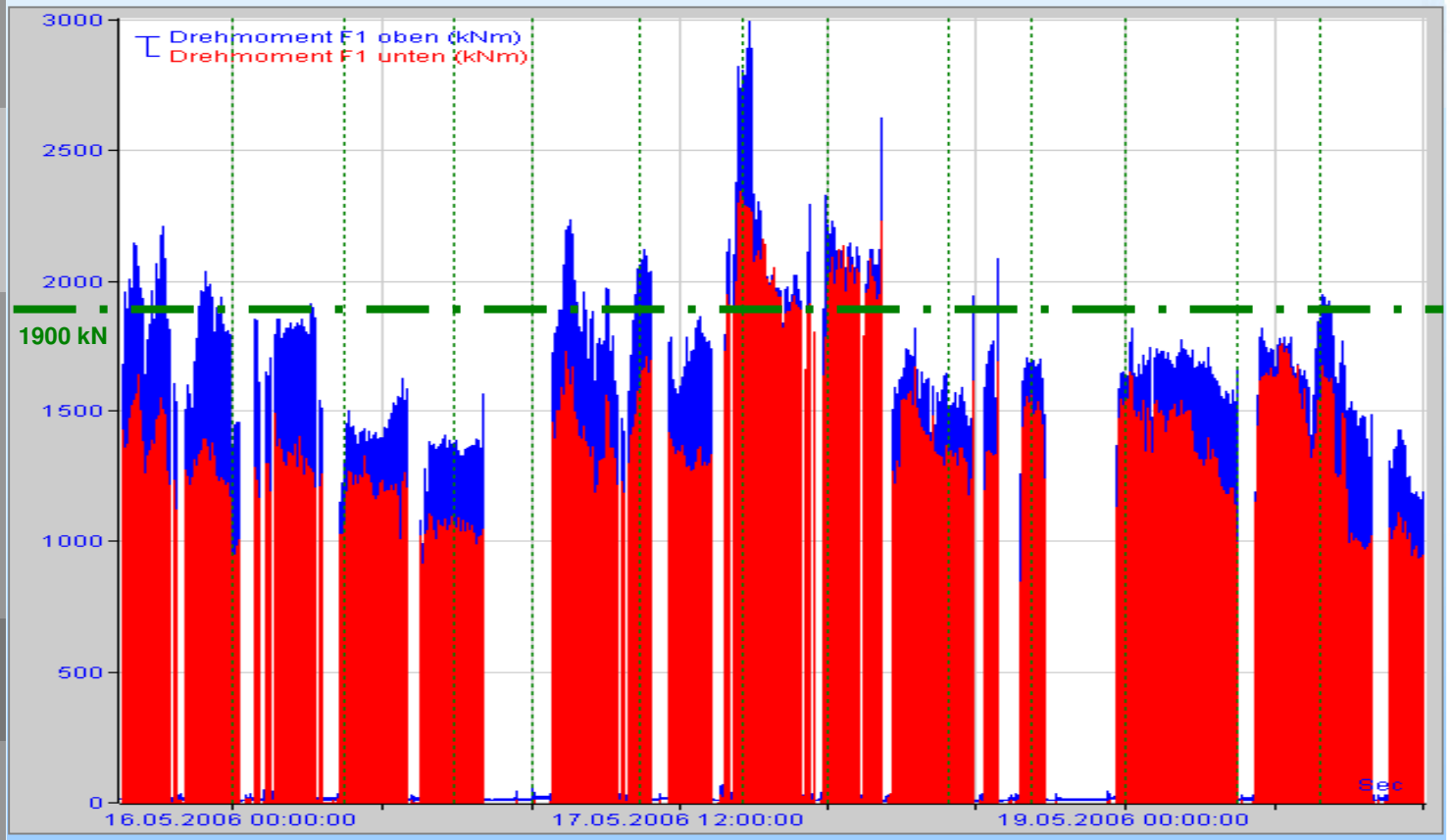


Poor condition:



Tools for the reduction of life-cycle costs

Genius (CM) Example III: Load on millstand F1



The drive train is designed for an endurance limit of 1,900 kN. After seven years of operation, this limit has been regularly exceeded owing to modifications to the production program and has thus resulted in increased wear on the drive spindle.

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Genius (CM) Example III.I: Load on millstand F1

Before optimisation

Overloads up to 40% on millstand F1 for 5% of the overall production:
Result: Premature failure of the spindles

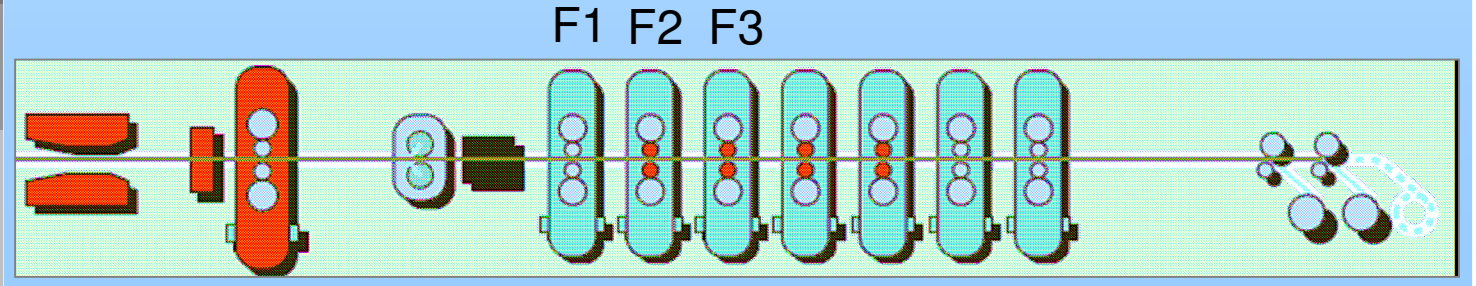
5% of the annual overall production, 30% wear on drive unit

After pass schedule optimisation

of the passage sequence:
Maximum load on millstand F1 reduced to 100%, and the load is distributed on millstands F2 and F3

Production remains uniform
<10% wear on drive unit

CONCLUSION:
Same production, however, without overloads



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Summary

Reduction of the life-cycle costs through:

Reduction of maintenance costs: I.

- "Best Practice" maintenance strategy
- Improved personnel utilisation
- Optimised spare parts/store management
- Reduced spare parts consumption by means of condition-oriented spare-part changing

Reduced production costs: II.

- Low consumption of utilities and consumables, such as energy, lubricants, casting powder,...

Higher production volume: III.

- Higher availability
  = longer production time
  = more output
  = reduced fixed costs / product

Improved product quality: IV.

- Optimum components quality:
  (no excessive vibration, rattling etc.)
- Process optimisation through monitoring (e.g. pass schedule, oscillation,...)

Tools for the reduction of life-cycle costs

Thank you very much for your attention!

technical.service@sms-siemag.com