Industry 4.0: A Best Practice Project of the Automotive Industry

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Abstract. FORCAM provides the industry with innovative production software technology (Factory Framework™) and consults on state-of-the-art shop floor management. World class companies from diverse manufacturing sectors like automotive, machinery, aerospace, medical engineering and packaging are utilizing FORCAM's shop floor management solution.

Keywords: shop floor, automotive, sensors, best practice, FORCAM.

1   Introduction

It is worldwide known and accepted that FORCAM provides the industry with innovative production software technology (Factory Framework™) and consults on state-of-the-art shop floor management. World class companies from diverse manufacturing sectors like automotive, machinery, aerospace, medical engineering and packaging are utilizing FORCAM's shop floor management solution. It enables companies to measure performance of their machines and plants in real-time to quickly recognize and correct errors and waste, and to continuously optimize their productivity.

2   FORCAM Advantages and Results

With FORCAM technology, elite companies have increased productivity by up to 25% within the first year, measured by TRUE Overall Equipment Effectiveness (OEE).

- Daimler (Mercedes-Benz)
  - Factory of the Year Award (by A.T. Kearney)
  - Delivering monitoring and optimization of more than 14,000 machine tools
- Audi
  - Audi Stamping Plants – 20% increase in TRUE OEE within 12 months
  - Audi Components Plants – 10% increase in TRUE OEE within 12 months
- BorgWarner
  - Exceeding expectations with unique shop floor management strategy
  - 4.3% increase in TRUE OEE within 6 months
- Weir Minerals
  - 12% increase in TRUE OEE within 6 months

FORCAM offers you a unique solution, based on the Lean Manufacturing Philosophy of how to successfully manage and operate manufacturing facilities.

"FORCAM will bring True OEE to your company."

3   At FORCAM, We Value TRUE OEE

With the help of FORCAM, elite companies have been able to increase productivity measured with TRUE OEE by up to 25% within the first year.

The Recipe for Success - holistic Shop Floor Management that effectively combines the most advanced Shop Floor Management System with the Lean Management philosophy.
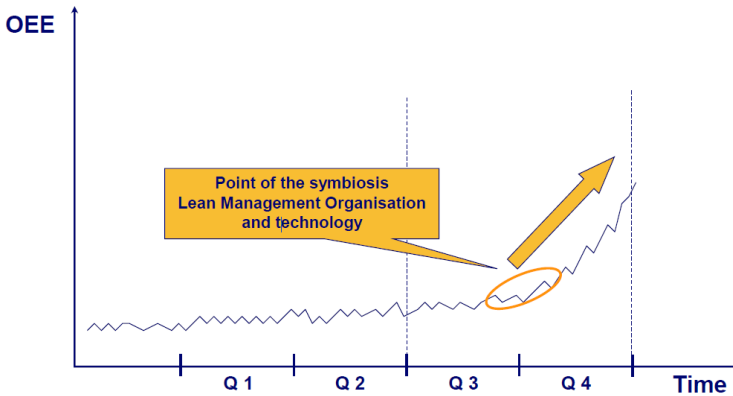

A Recipe for Success in Shop Floor Management

- Measuring REAL OEE - what you cannot not measure you cannot improve
- Adopting Lean Management principles and lead by OEE
- Creating a Continuous Improvement Process (CIP) organization with closed-loop communication
- Delivering the right information to right people at the right time
- Delivering planned vs. actual information to shop floor operators
- Establishing a PDCA (Plan-Do-Check-Act) cycle with actions and measures
- Setting regular TRUE OEE goals for continuous improvement

4   Overall Equipment Effectiveness Is Optimized

OEE - Overall Equipment Effectiveness

Shop Floor Management (SFM) is a strategy designed for the continuous optimization of the plant availability by eliminating errors and waste. The most important key figure to measure the performance is the OEE – Overall Equipment Effectiveness.
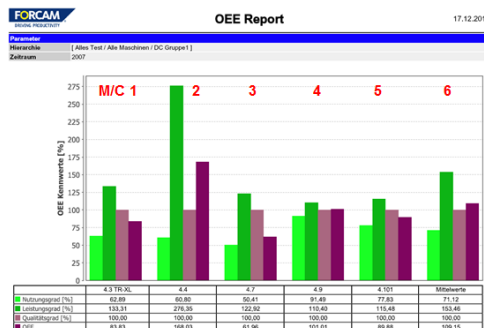

- OEE is the most important key figure (KPI) to implement the SFM strategy.
- OEE is the measure for the added value of a machine.
- OEE visualizes exactly which machine and process losses can be minimized.

OEE - Three Crucial Performance Metrics: Availability, Productivity, Quality

As key performance indicator, OEE results from three performance data which FORCAM monitors and visualizes in real-time, and therefore available anywhere and at any time:

- How long has it been producing?
- How fast has it produced?
- How well has it produced?

5 Advanced Shop Floor Management Creates the Transparent Factory

Measuring and Optimizing the Performance of Manufacturing Plants in Real-Time
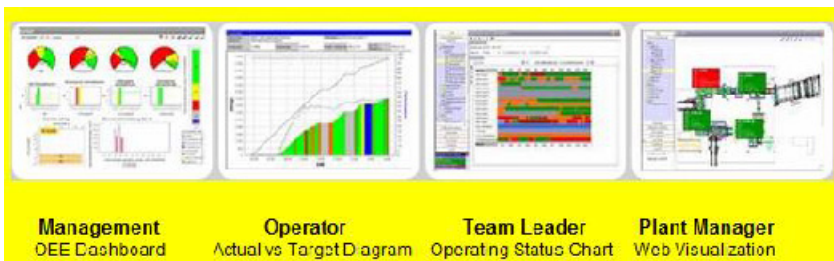
FORCAM provides the industry with innovative production software technology Factory Framework™ and consults on modern shop floor management. Leading companies from diverse manufacturing sectors like automotive, machinery, aerospace, medical engineering and packaging are utilizing FORCAM shop floor management solution. It enables companies to measure performance of their machines and plants in real-time to quickly recognize and correct errors and waste, and to continuously optimize their productivity.

Planning and Production are Now Synchronized

"Nowadays, companies need resource efficiency in processes and in the manufacturing."

FORCAM's Chairman, Franz Gruber, states. Everything has to intertwine in a way that errors and waste can be recognized immediately and eliminated sustainably. The FORCAM technology complements standard ERP-software on the planning level (top floor) using objective performance data coming directly from all factory assets (shop floor) – from one single machine to multiple plants worldwide. The efficiency factor of standard ERP-software is enhanced due to the real-time data capture by FORCAM. Concurrently, FORCAM enables customers to apply the technology themselves in their company following a pilot phase.
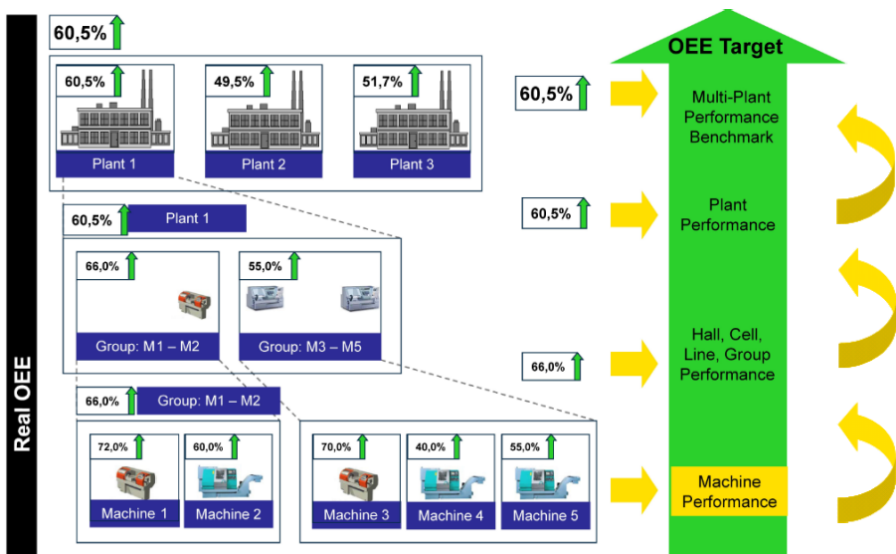

Management	Operator	Team Leader	Plant Manager
OEE Dashboard	Actual vs Target Diagram	Operating Status Chart	Web Visualization

6   State-of-the-Art Shop Floor Management

Flexible Web-Based Connectivity of a Diverse Number of Machine Controls

FORCAM's Factory Framework™ solution is technologically leading Manufacturing Execution System (MES). It enables improvement processes on all levels of the production. Factory Framework™ connects, collects, and standardizes real-time data from most different machine controls. For every production level, the signals provide comparable web-based operational states of machines and plants (production, malfunctions, and downtimes). Result: Transparent and reliable performance data – runtime, speed, quality. Additionally, Factory Framework™ connects production data with ERP data from corporate planning such as targets for orders and resources.

From the Operator to the Manager

All roles involved are able to continuously optimize productivity within their role.

Leading-edge Technology: Complex Event Processing (CEP) with Live Cache FORCAM uses Complex Event Processing (CEP) with Live Cache, a technology used for real-time analysis of event stream from the financial sector. FORCAM combines CEP with the proven and tested MES in a rule-based approach in an optimal way.

7   Conclusions, Results

- Fast reaction with latencies in the millisecond range and high throughput (factor is 100 times higher than in the past product generation)
- Rule-based approach enables flexible, user-defined functions
- Global deployment potential with Unicode language support and centralized server architecture