

Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [On the way to Industry 4.0]

Date Submitted: [12 July 2017]

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Re: []

Abstract: [This document is presented to support Interest Group’s activities to make a new standard on enhanced dependability in wireless networks which is focusing on use cases in car industry by showing its demand in MAHLE. By introducing MAHLE group’s current and future business opportunity, Such a demand for dependable wireless networks can be shortly described Some ongoing projects in Germany and Japan are introduced to keep manufacturing initiatives on the way to Industry 4.0.]

Purpose: [information]

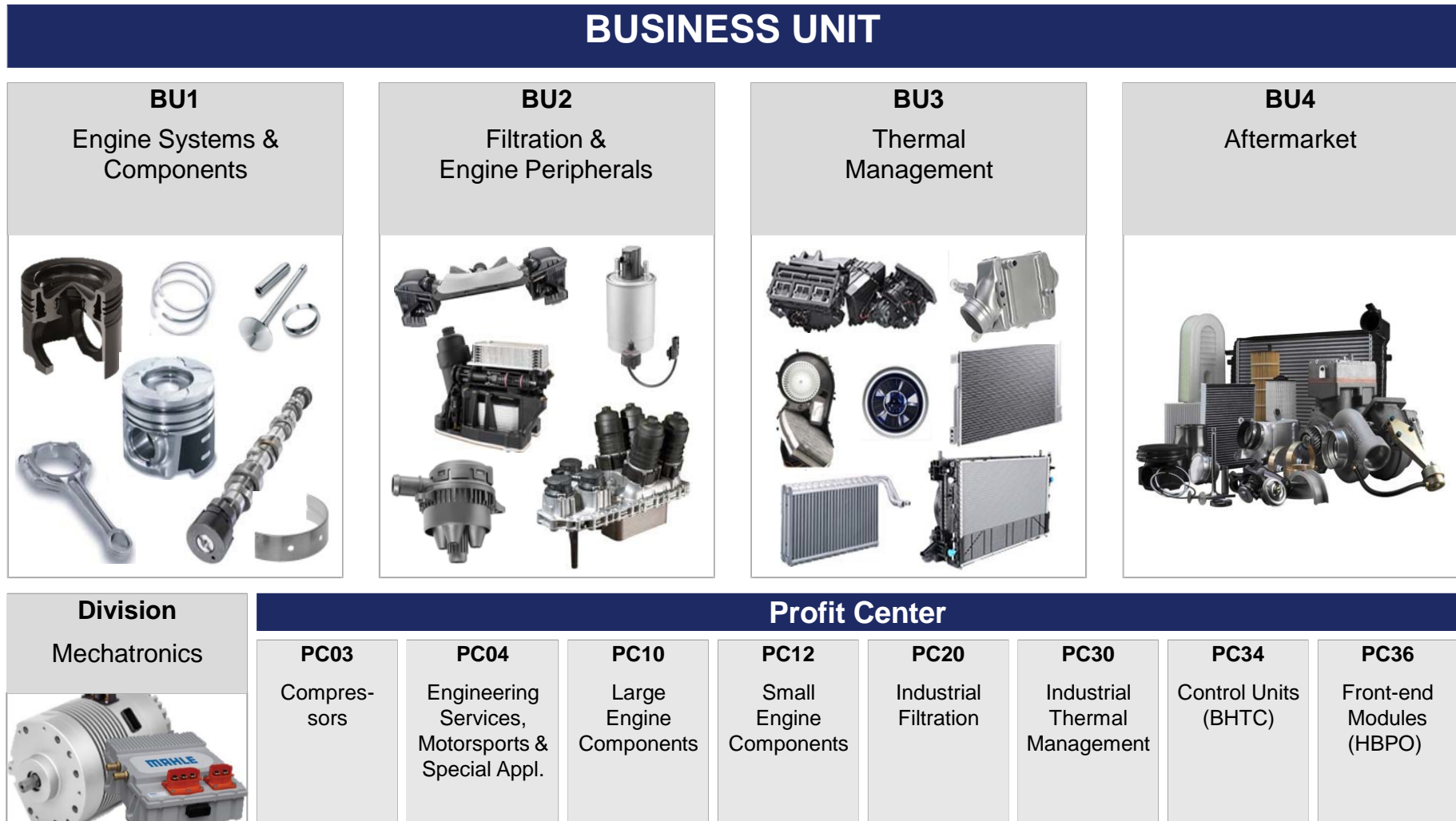
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MAHLE at a Glance



MAHLE - Business Units & Division



MAHLE - Dual Strategy

strengthen our existing market position

shape the future in a changing mobility world

Highly efficient
combustion engines



Emerging markets



Heating Ventilation
Air Conditioning



New projects



Commercial vehicles
& Off-Highway



Aftermarket



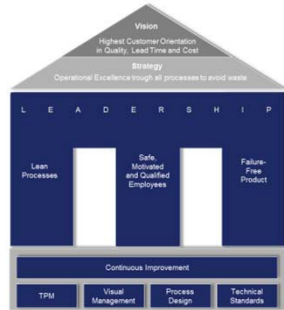
Electric auxiliaries



Electric drives &
Power electronics



Raise the Bar: Manufacturing Initiatives

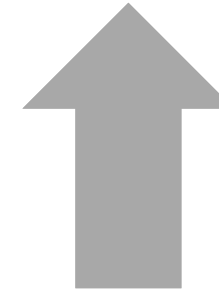
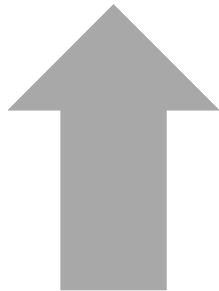


Take manufacturing to the next level!



MAHLE Production System

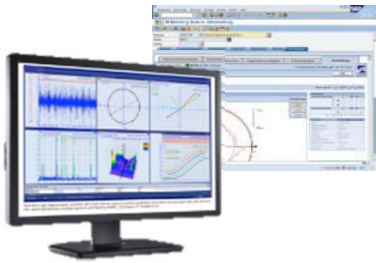
Industrie 4.0



MAHLE Manufacturing initiatives

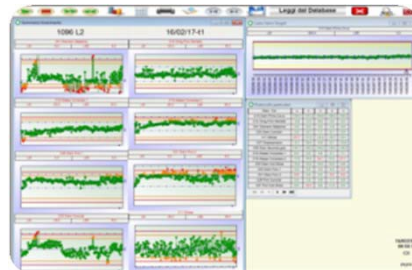
MAHLE Europe- On the way to Industry 4.0

BU1



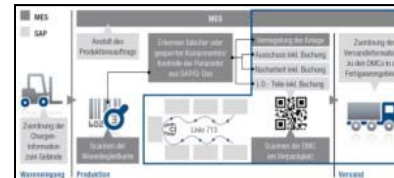
Predictive Maintenance
@ Stuttgart & Yingkou

BU1



Quality Automated
Decision System
@ La Loggia

BU2



Manufacturing
Execution System
@ St. Michael

BU3



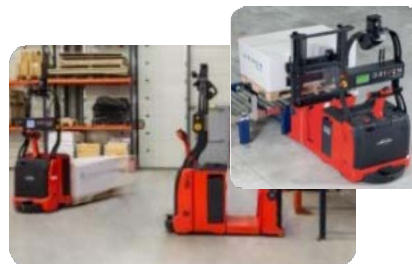
RFID Technology
@ Kirchberg

BU3



Video Assisted Training
for Maintenance
@ Neustadt a.d.D.

BU4



Autonomous
Transportation Systems
@ Schorndorf

IT



Mobile Devices for
Maintenance
@ Mühlacker

IT

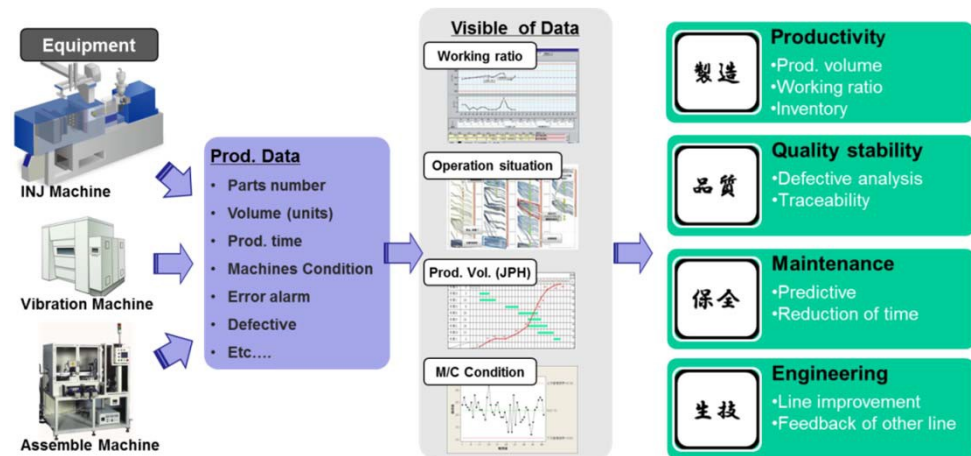


Big Data for Production
@ Rottweil & other
plants

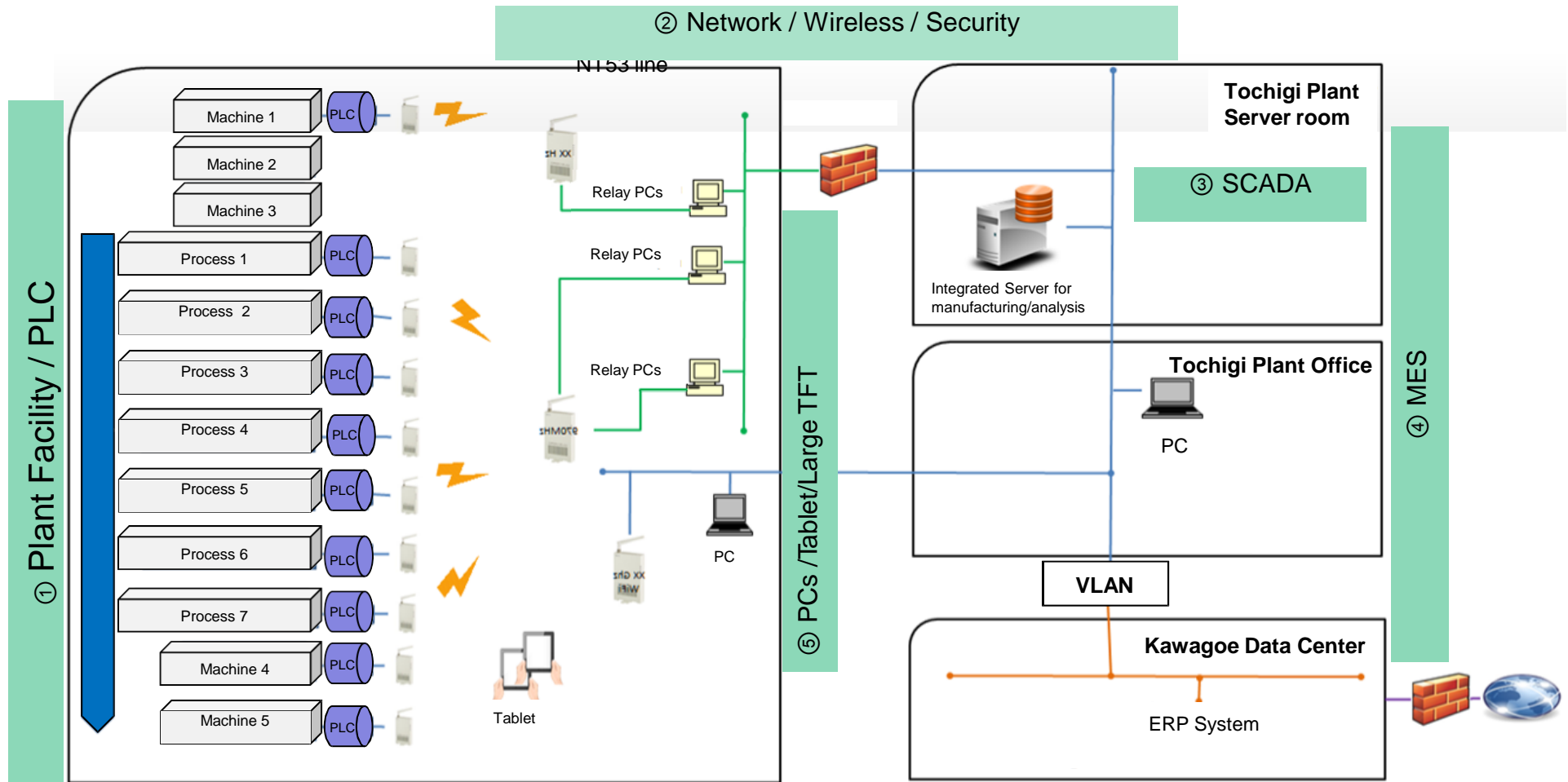
MAHLE Japan - Tochigi advanced plant IoT

Purpose of proactive innovation: **Factory line w/o any waste by advanced IoT technology**

- **Improve productivity**
 - Product volume management
 - Availability of plant facilities
 - Yield and Inventory reduction
- **Stabilization of products quality**
 - Production and products traceability
 - Reduction of defective products
- **Predictive Maintenance**
 - Improve machine availability
 - Reduction of equipment-induced defects
 - Energy saving of plant facilities
- **Automation to assembly line**
 - Assigning man-hours to new production activities



MAHLE Japan - Pilot IoT Assembly Line



SCADA(Supervisory Control And Data Acquisition) : Process control and monitoring with production data and equipment parameter
 MES(Manufacturing Execution System) : Inbound and out bound management with ERP and equipment control

Superior Quality is Part of MAHLE DNA



“Good quality is of crucial importance: there is always room for improvement!”

Ernst Mahle