• MAHLE Group
• Challenges for the Future Engine
• Integration of Innovation in New Product Development Process
• Innovation Organization
The MAHLE Group Worldwide
The MAHLE Group is a global leader in engine components

Group Highlights

- German group founded in 1920 and headquartered in Stuttgart
- One of the 3 major global suppliers of piston systems, cylinder components, valve train systems, as well as management and filtration of air and fluid systems
- Global leader in partnerships for engine development
- Over 100 production units on 4 continents
- 8 technology centers
- Over 45,000 employees

Revenues (EUR bn)

- 2000: 2.4
- 2001: 2.8
- 2002: 3.1
- 2003: 3.3
- 2004: 3.8
- 2005: 4.1
- 2006: 4.3
- 2007: 5.1
- 2008: 5.0
- 2009: 3.9
- 2010: 5.3

Global Footprint

- MAHLE Group Presence
- MAHLE Group’s Technology Centers
The MAHLE Metal Leve S.A. Group
A history of successful acquisitions and high growth

Acquisitions
- 03-07: Acquisition of 3 business units from Siemens - VDO
- 07: Acquisition of Dana’s engine components business
- 08: Joint Venture with MAHLE HIRSCHVOGEL FORJAS S.A. in Queimados, RJ
- 10: Acquisition of the piston ring business from MAHLE Componentes de Motores by MAHLE Metal Leve

Other Events
- 50: Foundation of METAL LEVE, the 1st piston manufacturer in Brazil
- 71: Initial public offering at Bovespa
- 96: Acquisition of the control of Metal Leve S.A. by MAHLE
- 98: Incorporation of the piston manufacturing plant in Mogi Guaçu, SP

Net Revenues (R$ bn)
Plastic cylinder head cover module
Valve camshaft
Oil filter module
Aluminum cylinder head¹
Valve guide
Valve
Valve seat insert
Aluminum engine block¹
Turbocharger¹
Piston ring
Piston
Piston pin, Piston pin circlip

Oil-mist separator with control valve
Air filter module
Tappet (cam follower, rocker arm)¹
Tumble flap¹
Exhaust gas recirculation valve¹
Intake manifold (charged air distribution)
Blow-by induction¹
Fuel filter
Cylinder liner
Connecting rod
Bearing
Controlled Oil pump¹

Note: 1 Products still not manufactured in Brazil
The MAHLE Metal Leve S.A. Group Locations in Brazil

**MOGI-GUAÇU**
- Headquarters
- Pistons, Pins, Cylinder Liners, Camshafts, Connecting Rods and Filters

**LIMEIRA**
- Distribution Center

**JTJUJUBÁ**
- Piston Rings and Bushings

**QUEIMADOS**
- Connecting Rods and other products forged

**INDAIATUBA**
- Sinter parts

**SÃO PAULO**
- City Office (Investor Relations)

**SÃO BERNARDO DO CAMPO**
- Bearings

**JUNDIAÍ**
- Tech Center

**6 Plants**
**1 Distribution Center**
**1 Tech Center**
**1 City Office**
MAHLE Group South America

Main clients

- Opel
- PSA Peugeot Citroën
- Audi
- Fiat
- Caterpillar
- Renault
- Federal Mogul
- Cummins
- John Deere
- Volvo
- Husqvarna
- Deutz
- Stihl
- Detroit Diesel
- Scania
- Toyota
- MAN
- GM
- Mercedes-Benz
- Ford
Challenges for the Future Engine
Challenges for the Future Engine

Battery?
Hybrid?
Fuel Cell?

“Low cost?”  “Downsizing”?

Bio-fuel?
Considering Well to Wheel calculation

Adapted from "Mobility 2030: Meeting the challenges to sustainability" by World Business Council for Sustainable Development - http://www.wbcsd.org/web/mobilitypubs.htm
• Portfolios ensure the focus without reducing the importance of front end work
• The cross interaction between the teams are important, which makes the matrix organization most recommended.
4 dimensions regarding Innovation Management that will be globally coordinated by product:

1. Intellectual Property
   - 1.1 Patent monitoring
   - 1.2 Opposition support
   - 1.3 Freedom to Operate
   - 1.4 Patent application
   - 1.5 Strategic IP actuation

2. Image
   - 2.1 Manage publications
   - 2.2 Public award participation
   - 2.3 Follow up Projects and Mkt Plan
   - 2.5 Coordinate ED Intranet content

3. Idea Search
   - 3.1 Idea Search (Techniques and Collaboration)
   - 3.2 Idea Management
   - 3.3 Support on government funding

4. Competitive Intelligence
   - 4.1 Competitor monitoring
   - 4.2 CI reports
   - 4.3 Management of the action plan
Objective: Define targets for idea to launch process for all portfolios to guarantee a constant flow of 35 new products launched in the market yearly.

- **125 Projects**
- **Average of 280 Active Projects**
- **>308 Ideas**
- **35 DG 2/3 (General Released) NPB 75% SOLD**
- **45 NPB**
- **15 NDB (B.Tools)**
- **3 NDB (Systems)**
- **25 Patents**
- **61 Patents**
- **28 Projects**
# Team Organization

## Regional Responsibility

<table>
<thead>
<tr>
<th>Region</th>
<th>Responsible Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe – Stuttgart</td>
<td>Dr. Bischofberger, Dr. Mueller</td>
</tr>
<tr>
<td>Europe – Rugby</td>
<td>J. George</td>
</tr>
<tr>
<td>NAFTA</td>
<td>D. Maloney</td>
</tr>
<tr>
<td>Mercosul</td>
<td>A. Ferrarese</td>
</tr>
<tr>
<td>China</td>
<td>Dr. Hao Xu</td>
</tr>
<tr>
<td>Japan</td>
<td>Masateru Yagi</td>
</tr>
</tbody>
</table>

## Global Coordination: Andre Ferrarese

## Product Oriented - Global Coordination

<table>
<thead>
<tr>
<th>Product</th>
<th>Responsible Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pistons &amp; Pins</td>
<td>Dr. Bischofberger</td>
</tr>
<tr>
<td>Rings &amp; Liners</td>
<td>A. Ferrarese</td>
</tr>
<tr>
<td>Bearings &amp; Bushings</td>
<td>J. George</td>
</tr>
<tr>
<td>Conrods</td>
<td>D. Maloney</td>
</tr>
<tr>
<td>Valvetrain</td>
<td>Dr. Mueller</td>
</tr>
</tbody>
</table>

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Staff:
- IP: Mauricio Batista, Natalie Phipps, JP, NAFTA TBD, (CRP)
- Image: coordinated by Dr. Mueller
- Search: Helder Battistini
- Comp. Intelligence: Graziela Tamayosi and Samantha Uehara

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**Innovation Committee**

**Monthly Meetings per product:** to be organized and coordinated by Innovation Coordinator by Product

**Core team to be involved:**
- Global Product Expert team
- From the region of expertise:
  - Regional Director
  - Product Technology
  - Material Science
  - Product Engineer
  - Regional Basic Tools Coordinator

**Meeting Script (Decision Making):**
1. Evaluate New Concepts
2. Follow up Pilot Studies
3. Follow up Project Request
4. Follow up Search Activities
5. Review new Patent Proposals
6. Review Patent Status & Oppositions
7. Review RIA&P per project
8. Review Strategy Activities and Focus
9. Review Publication Plan
10. Review Public Award Participation
11. Review Material Preparation to Tech Mkting
12. Update CI action plan

**All 4 Innovation dimensions are followed.**

**Additional invitations:** can be applied depending on the perspective to be part of the meeting.

**Preparation:**
Plans to be set once a year and revised in a monthly basis / Staff to compile info to the meeting.
How to get more ideas with higher value

- Search activities implemented in 2011. 4 events generated more ideas than it is spontaneous received.

  Some of the search approaches are:
  - Focus group (specific issues)
  - Campaign (better chance in a broader audience)
  - Workshop (fast answer)
  - Mining (very small number of people)

- The use of Tech Fields may improve focus to the received ideas.

- New Innovation Tool (Hype) under implementation will make the interaction with the user more user friendly. It is also a more robust platform to execute some actions like campaigns.

- Creating a more creative environment.
Publication Plan to Events

Overview

1. Meeting with management team to define interesting topics to the region (approval per product)
2. Meeting to transmit decisions and define steps for the preparation. Also registration in the Publication Calendar and ratification with specific product Innovation Committees.
3. Paper construction itself
4. Internal (designed revisor for each paper) and external (typical from the event)
5. Internal (MAHLE Library) and external (actual publication)
6. Exposition in front door with one summary slide (1 to 2 weeks depends on the demand) and in case of a recognition happens from the event too, it is also replicated in the front door and also MAHLE global article.
• The flow is short to enable fast deployment
• Once identified a competitor new product, IM starts the CM requesting PEx to comment in a template (example in the previous slide)
• This proposal is revised by ED, who approves the registration and distribution
Use of competitive analysis

CI Report and Actions

- **PEX evaluation of potential impact on business**
- **Monitoring 1**
  - Structured and not structured info.
- **Actions 3**
  - Product Development, Footprint, publications, interaction w/ customer, etc…
- **Evaluation 2**
We transform ideas into products and needs into solutions

THANK YOU!

MAHLE Metal Leve S.A., 28-February-2012

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