

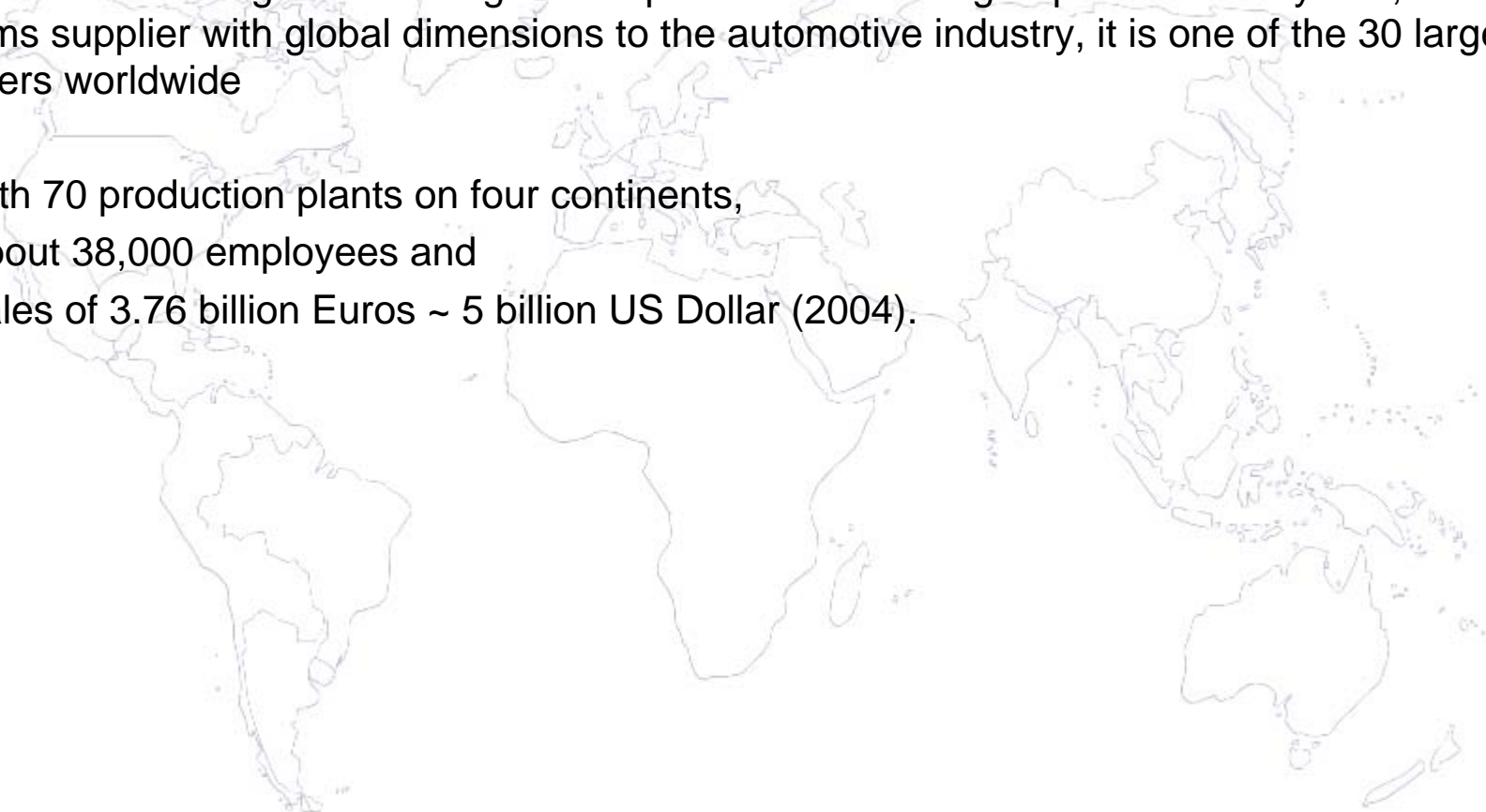
June 30, 2005, 10.30 to 2.00 pm



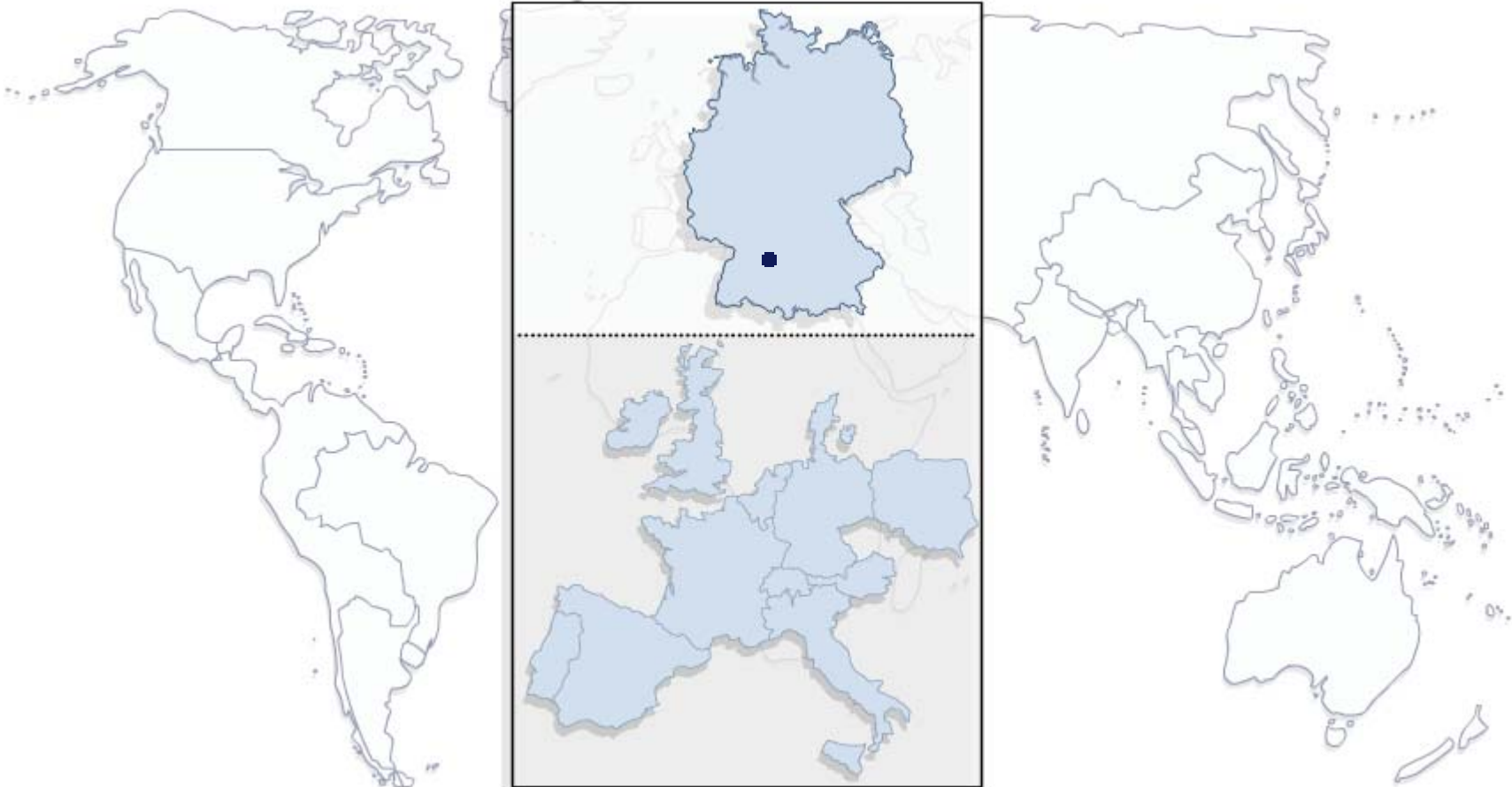
## Press Conference “MAHLE Expands Powertrain Capabilities”

MAHLE ranks amongst the 50 largest independent industrial groups in Germany and, as a systems supplier with global dimensions to the automotive industry, it is one of the 30 largest parts suppliers worldwide

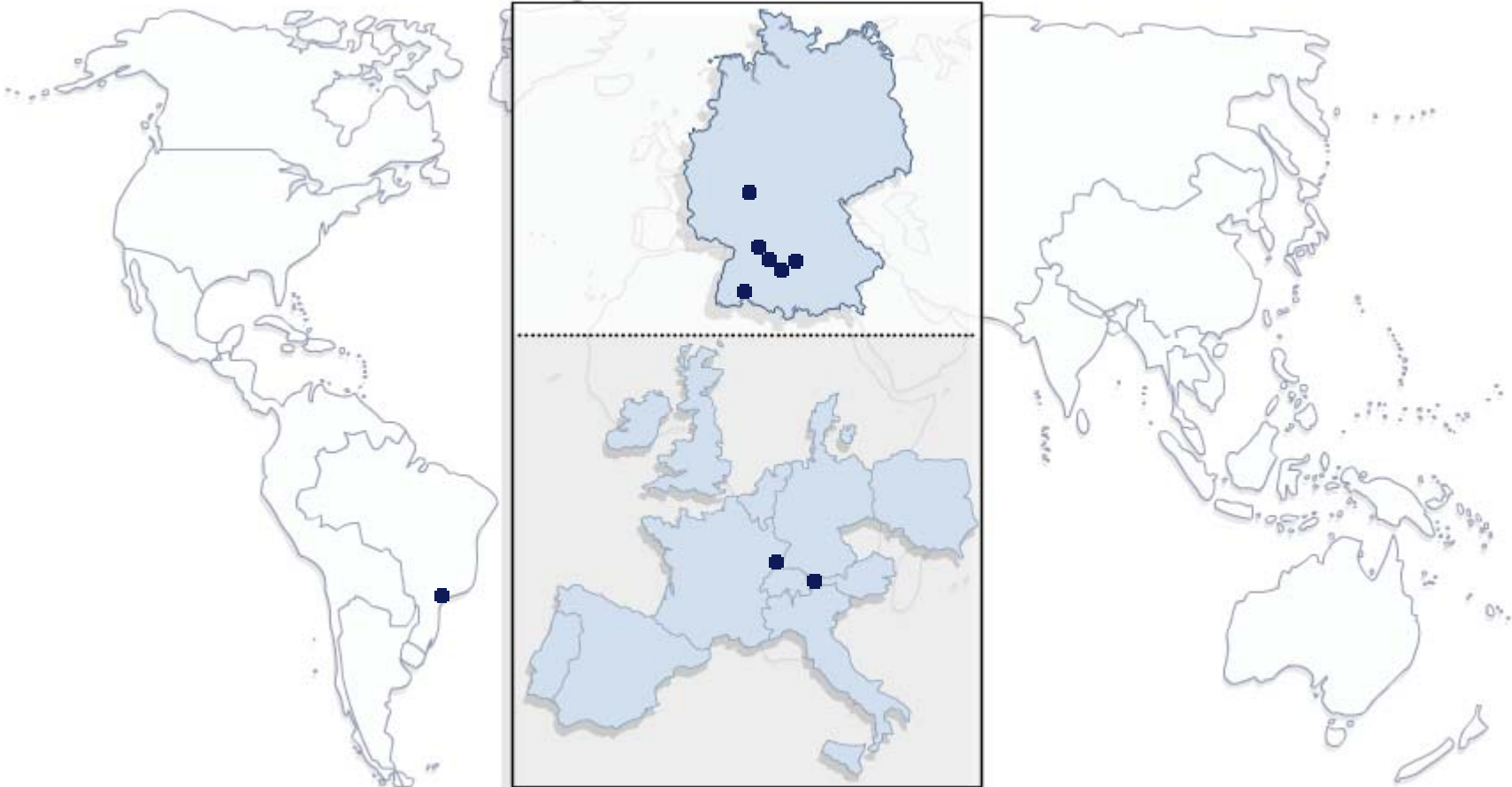
- with 70 production plants on four continents,
- about 38,000 employees and
- sales of 3.76 billion Euros ~ 5 billion US Dollar (2004).



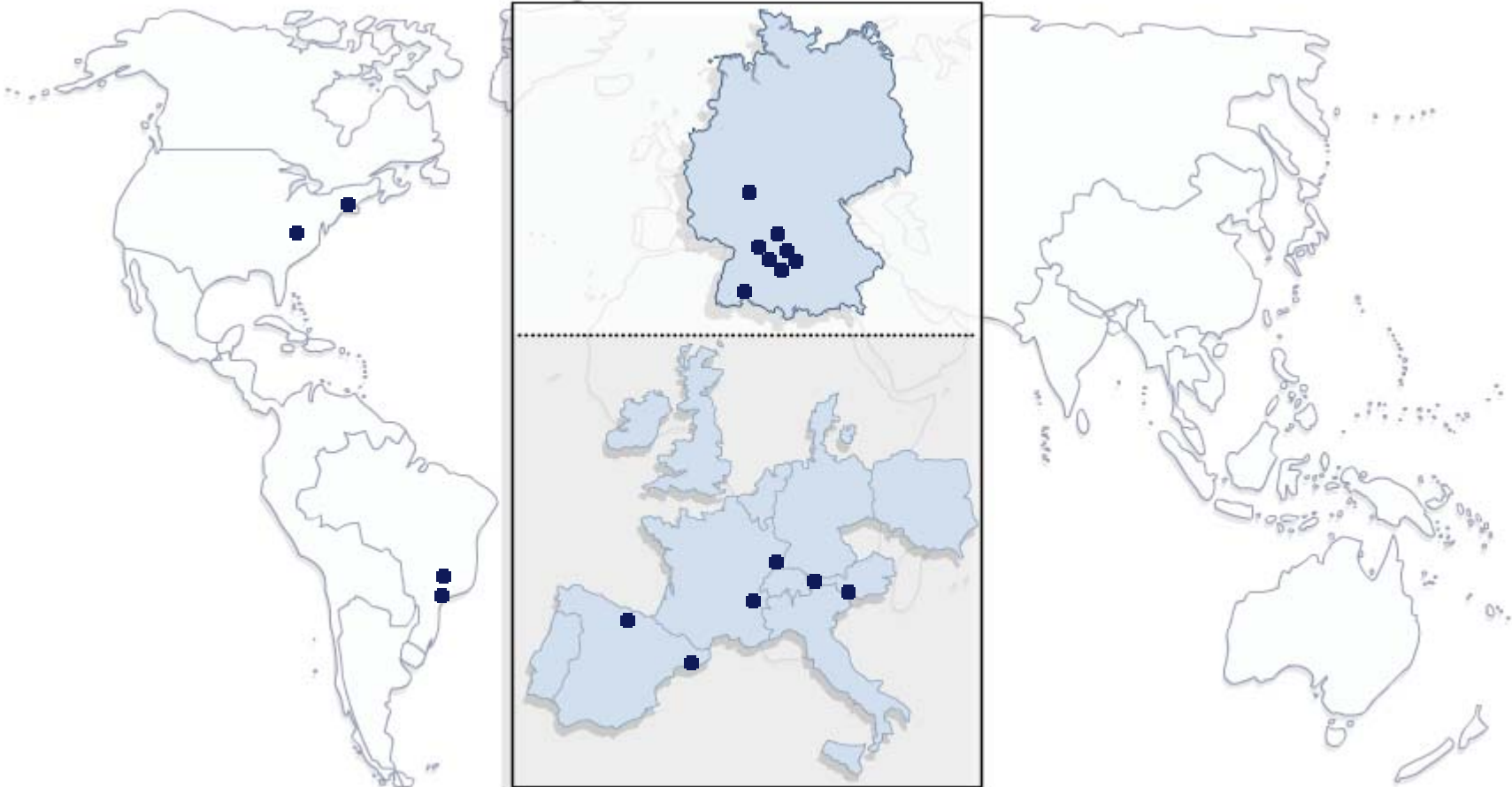
# Historical Site Development 1920



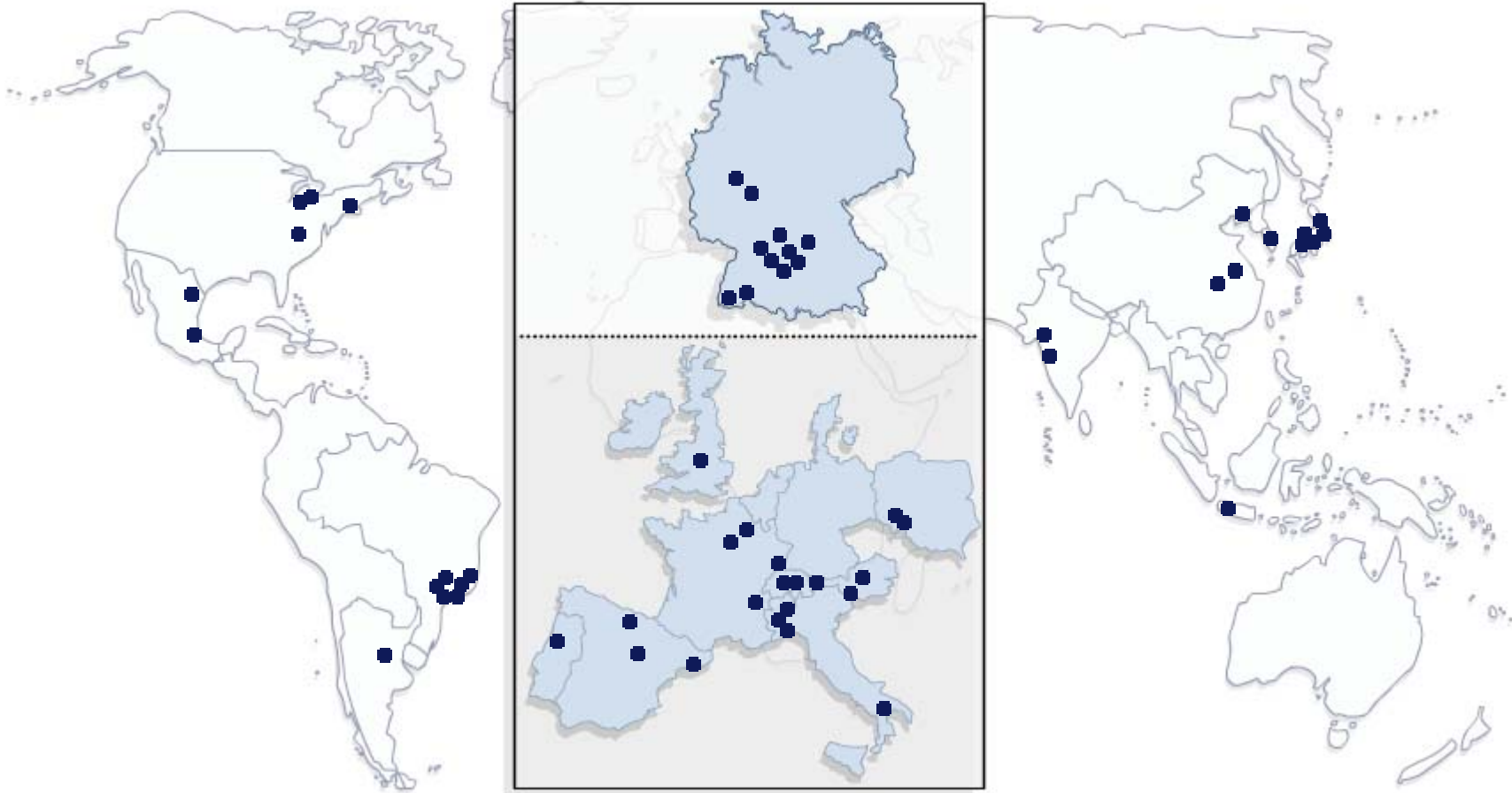
# Historical Site Development 1970



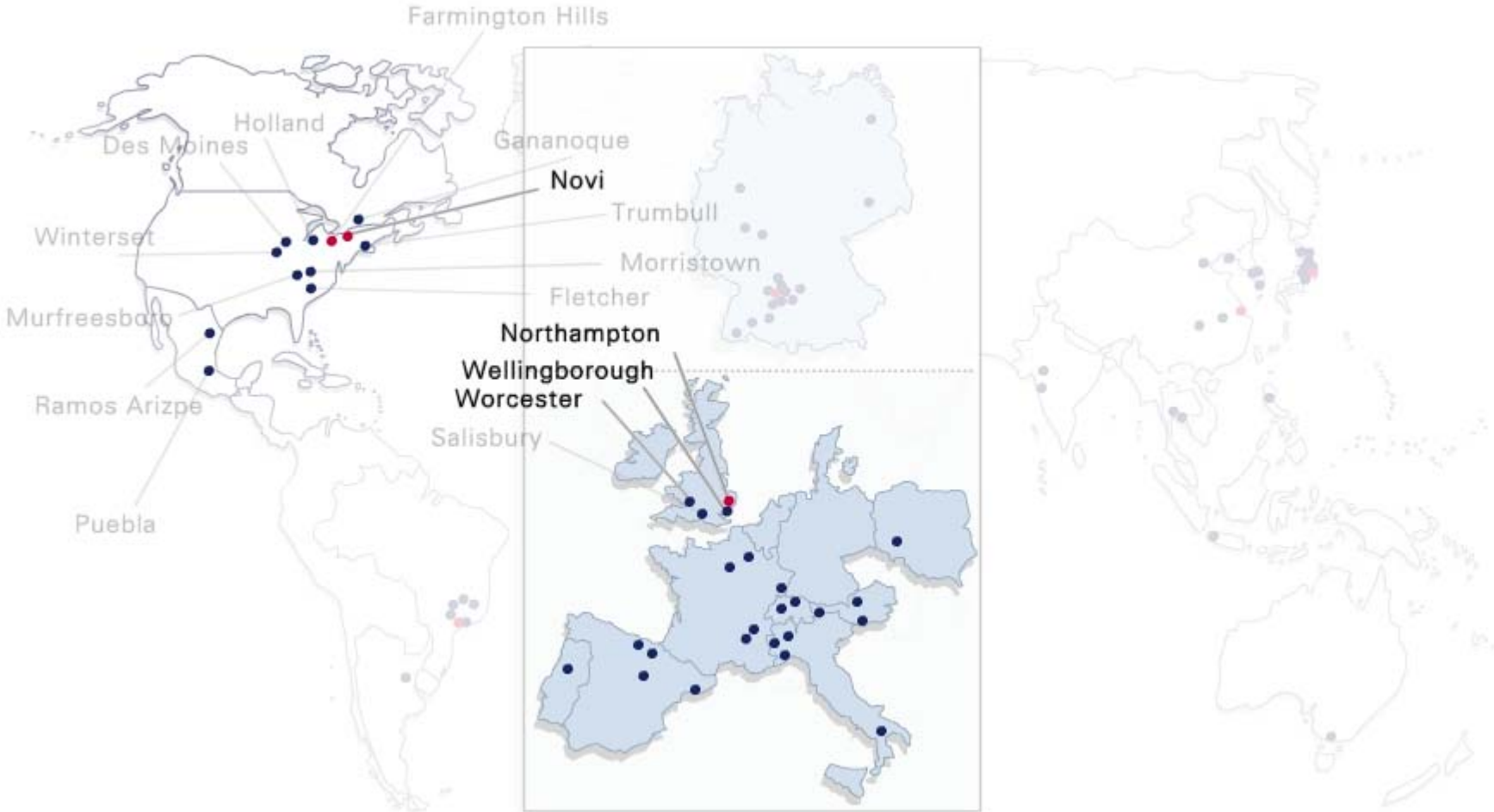
# Historical Site Development 1980



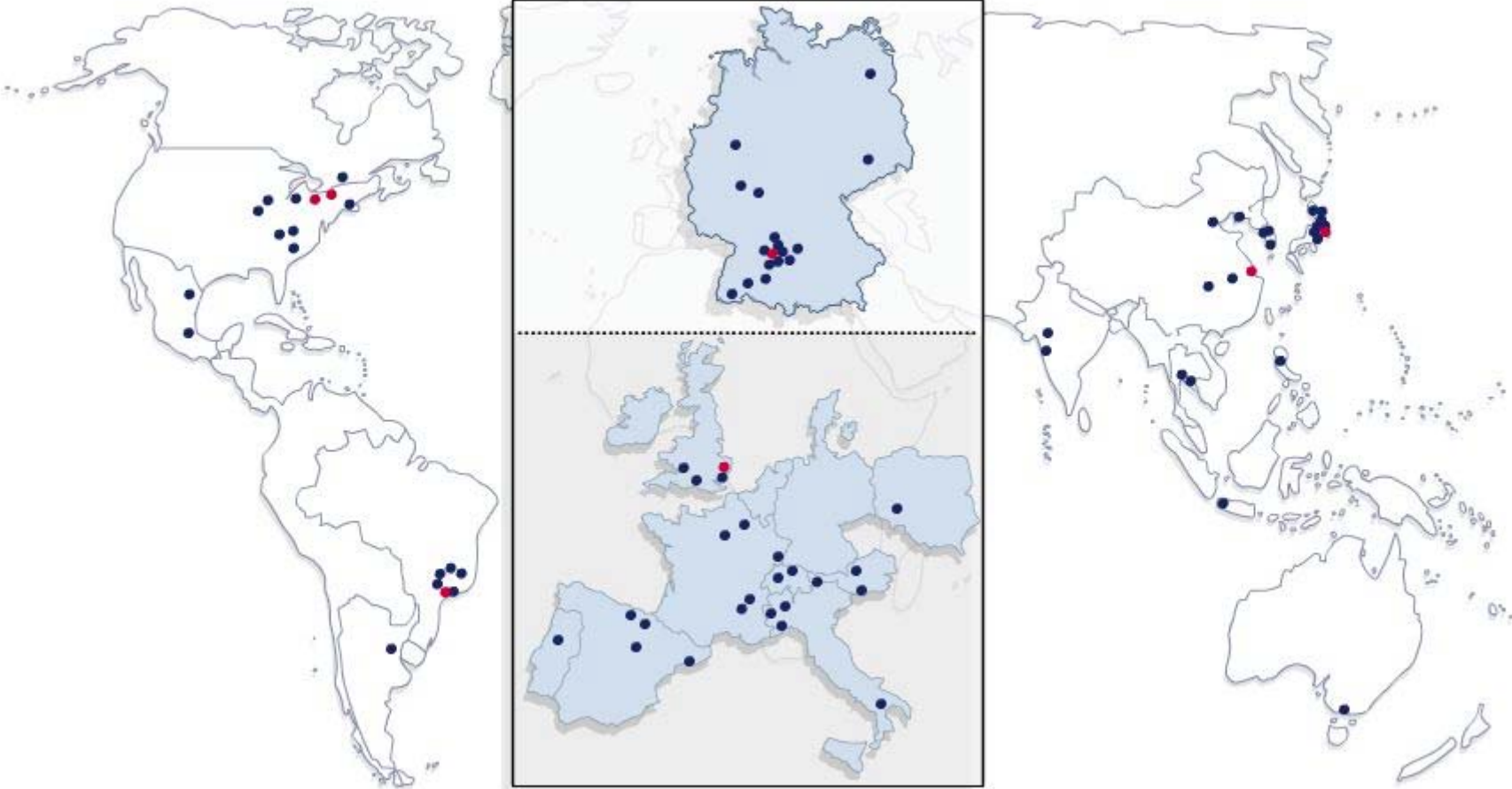
# Historical Site Development 2000



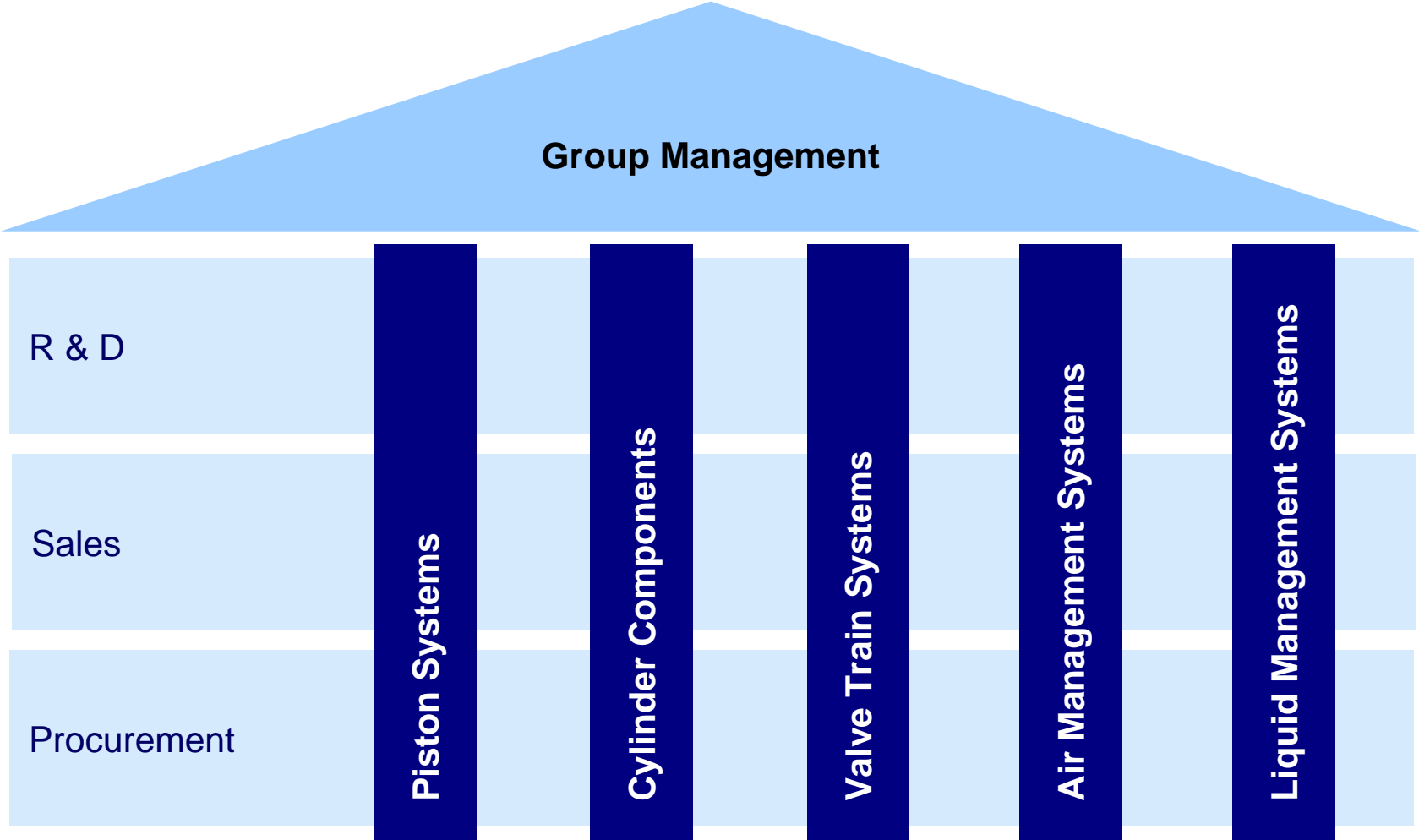
# Acquisition Cosworth Technology Group



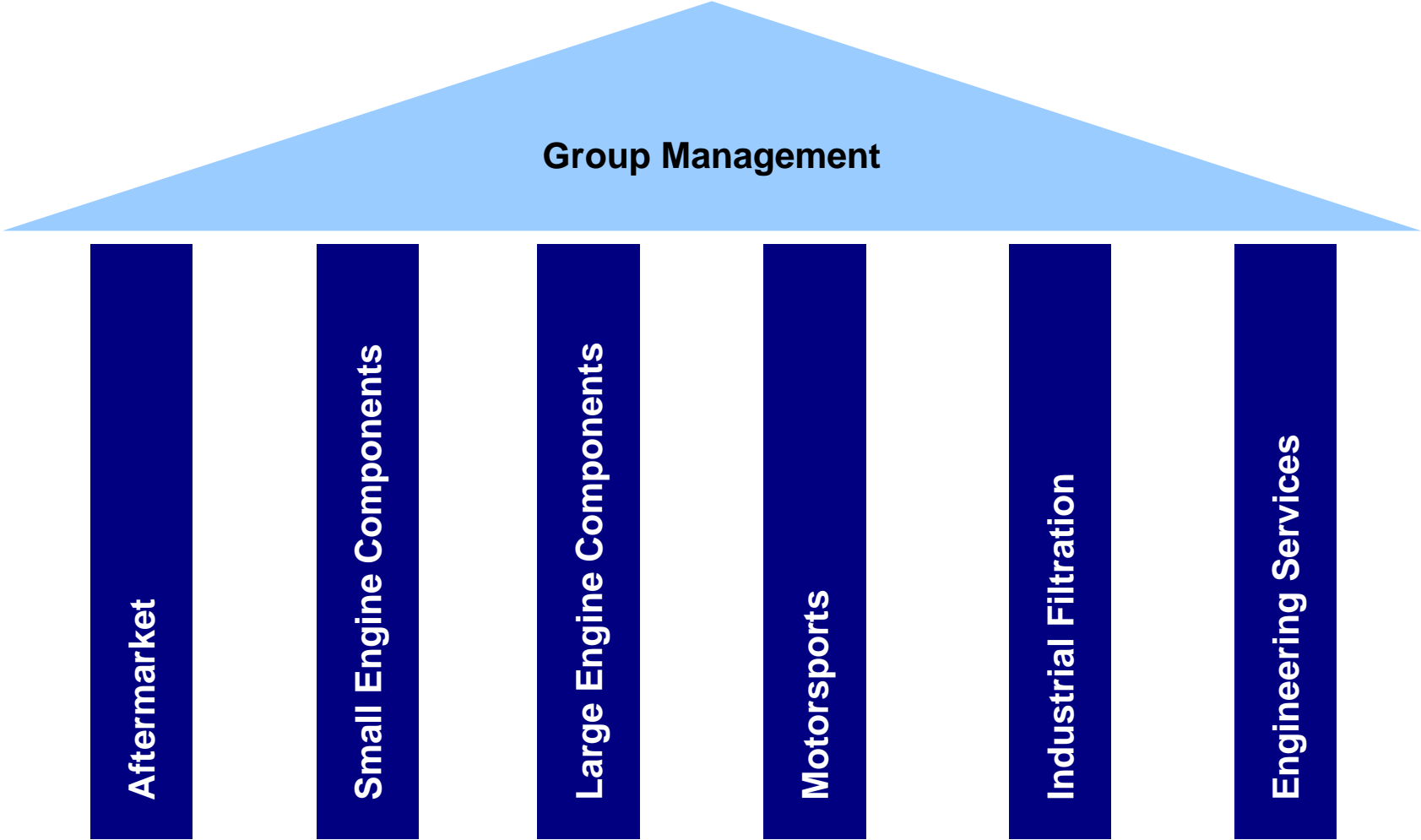
# Locations World-wide



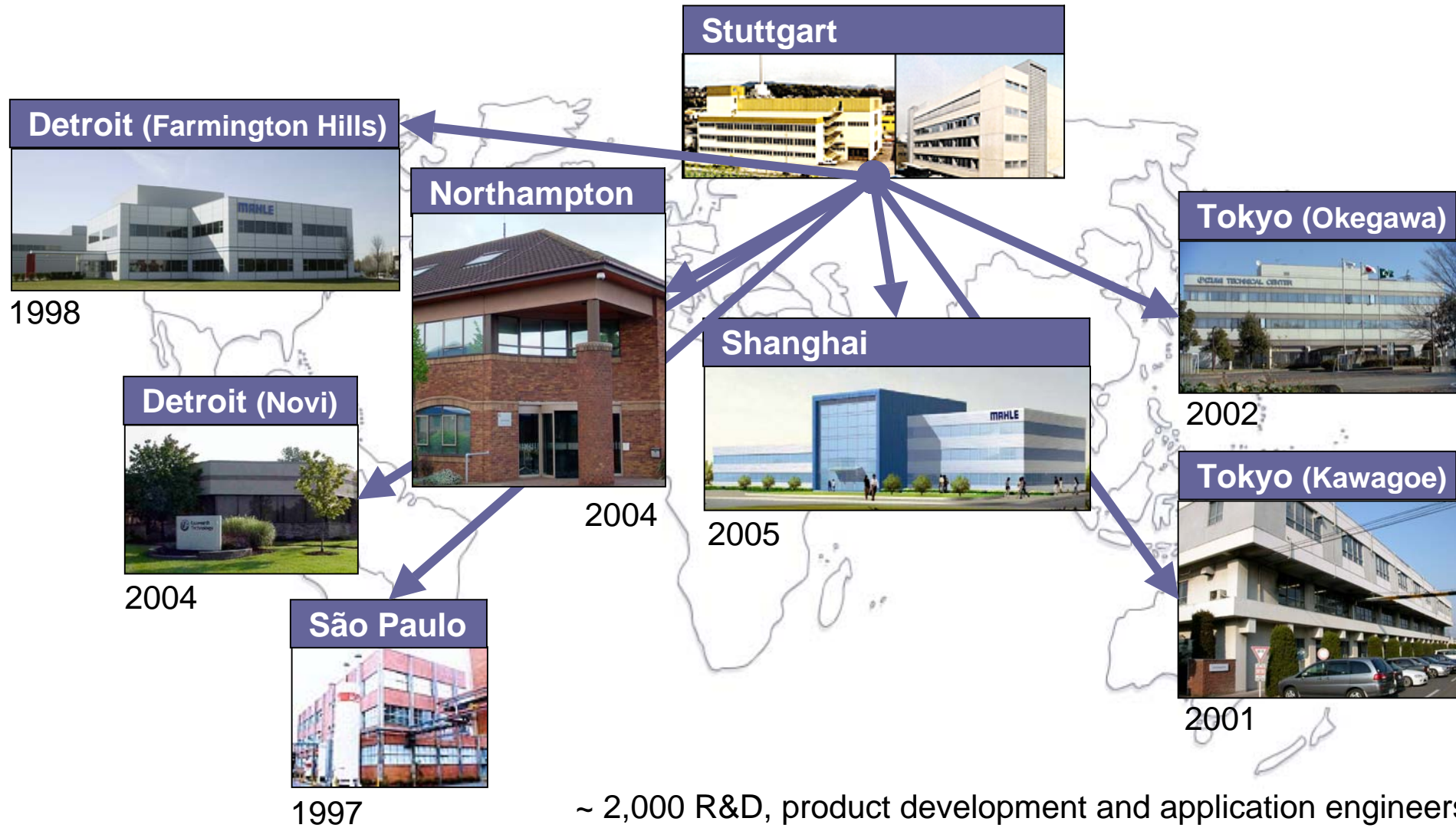
Product Lines



Profit Centers

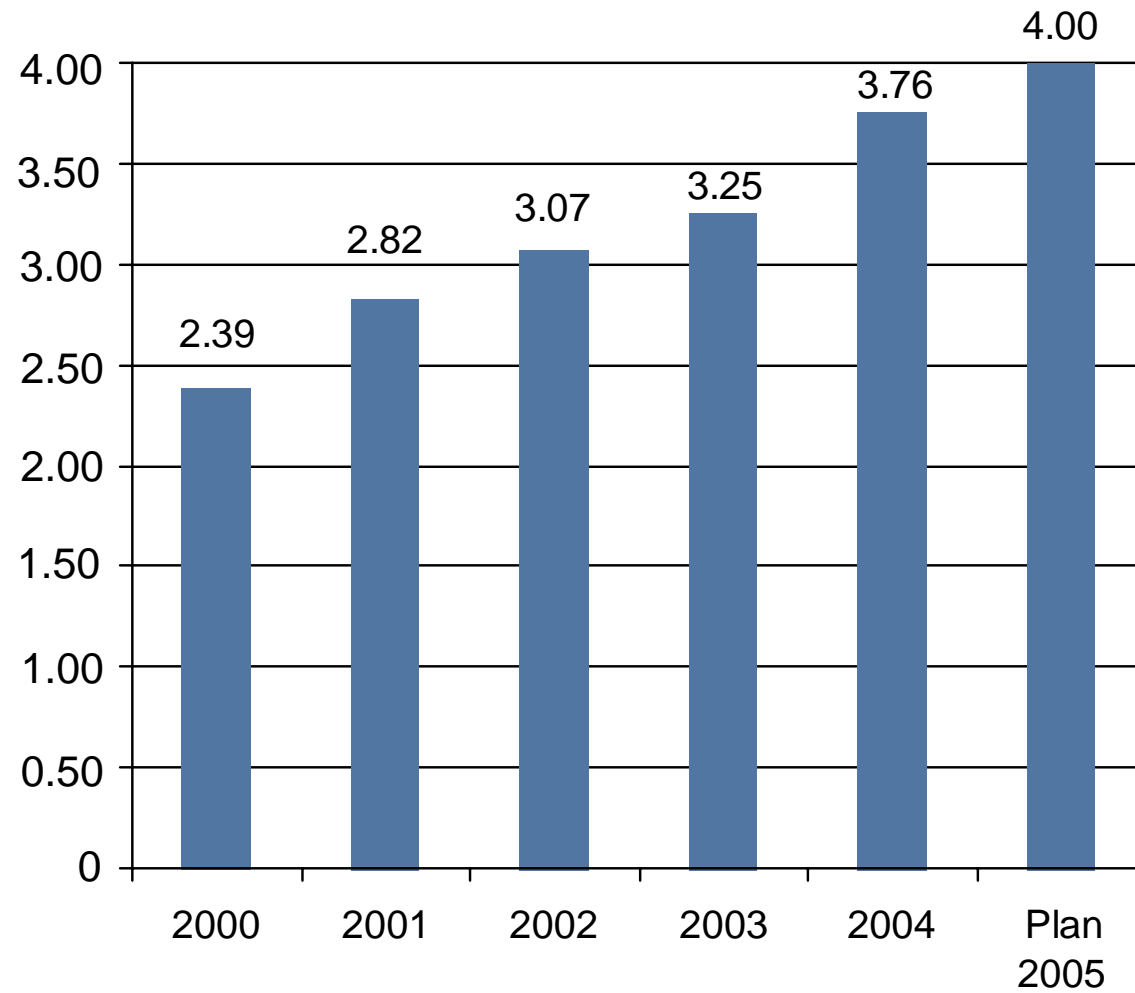


# Research and Development Centres



~ 2,000 R&D, product development and application engineers  
~ 100 Hot engine test cells, 7 full size vehicle roller test rigs

## Sales Trend in billion Euros



# Sales Trend by Region

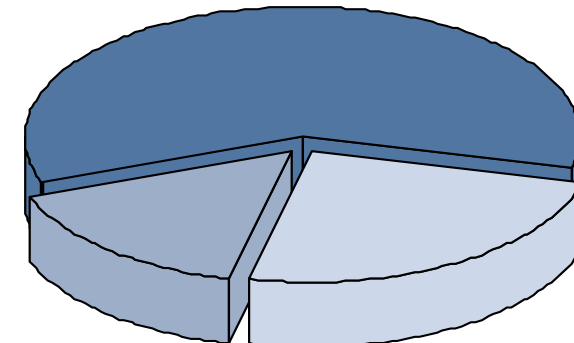
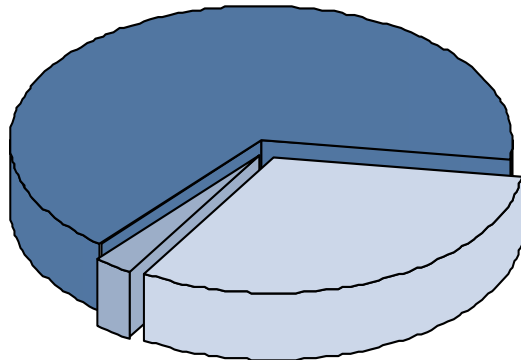


2.39 billion EUR **(2000)**

**(2004)** 3.76 billion EUR

Europe  
66%

Europe  
59%



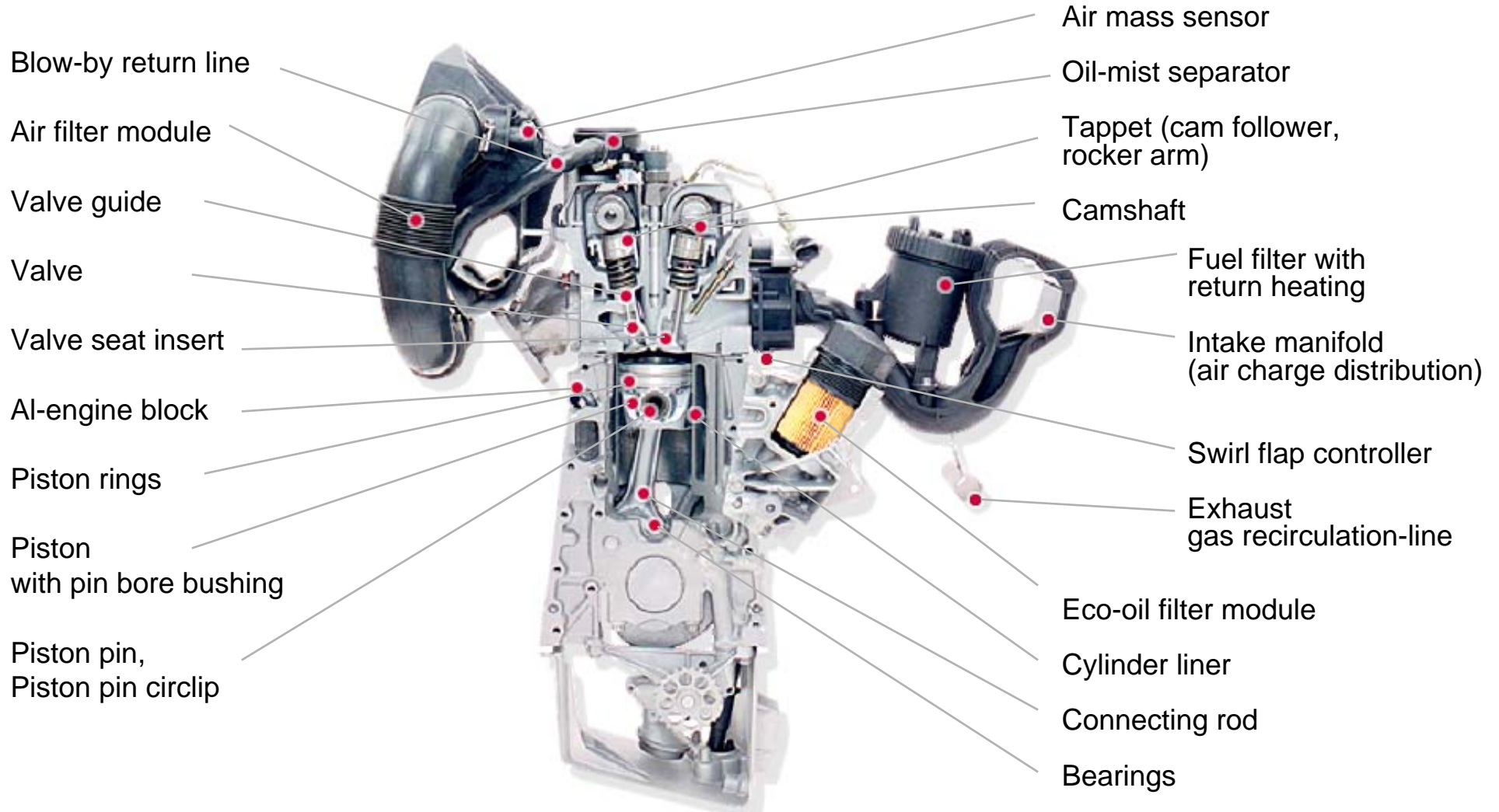
Asia and ROW  
2%

America  
32%

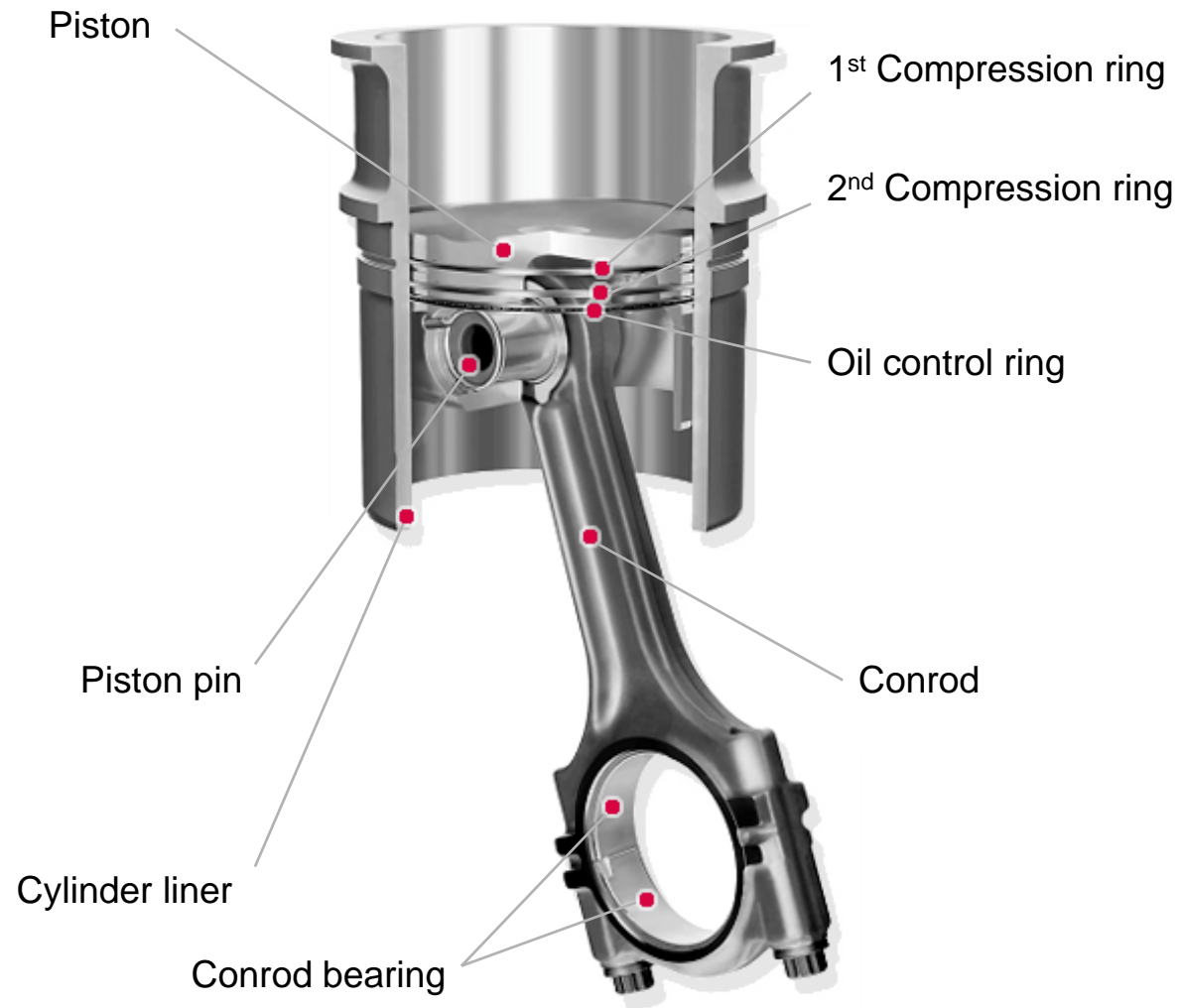
Asia and ROW  
16%

America  
25%

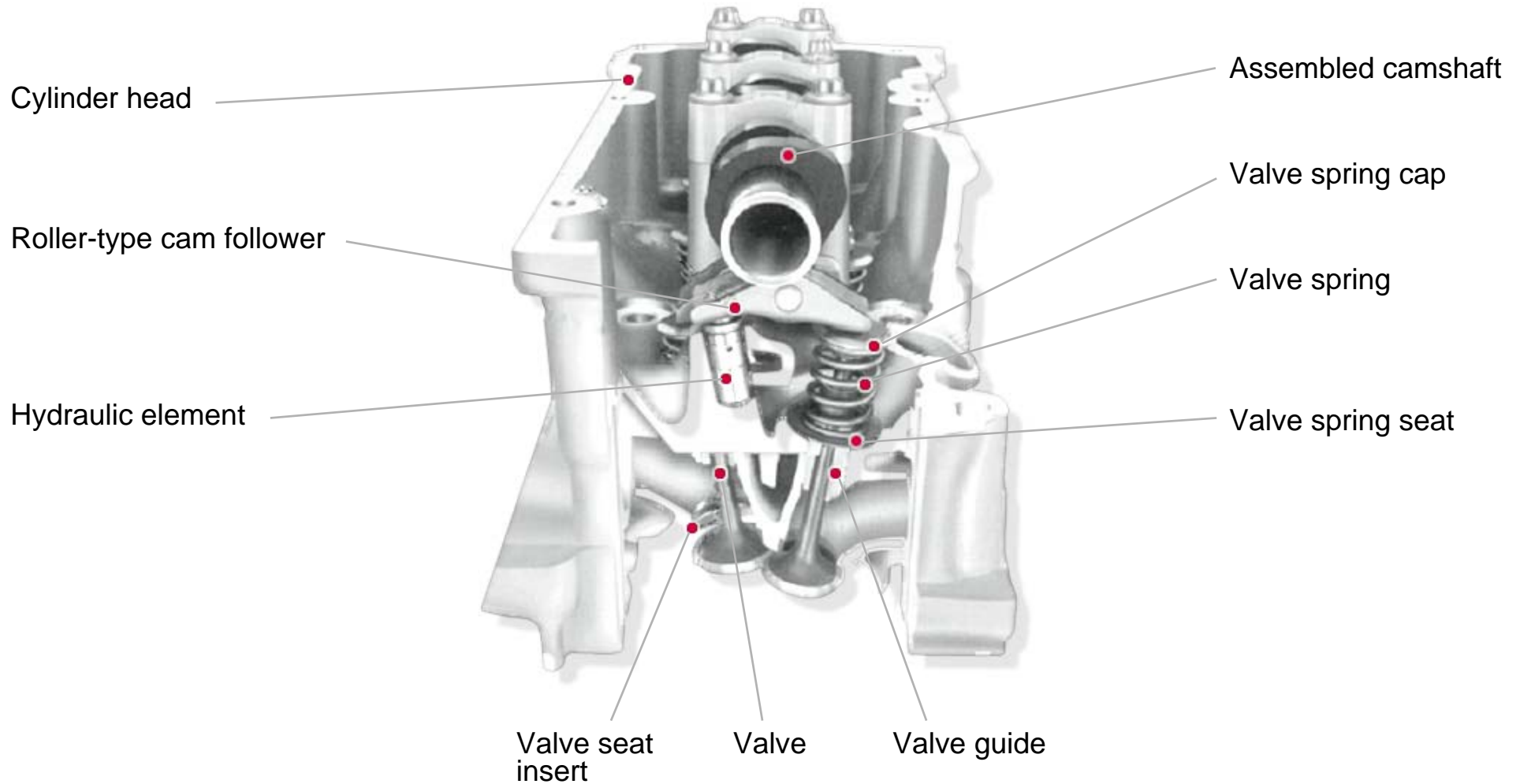
# Product Range



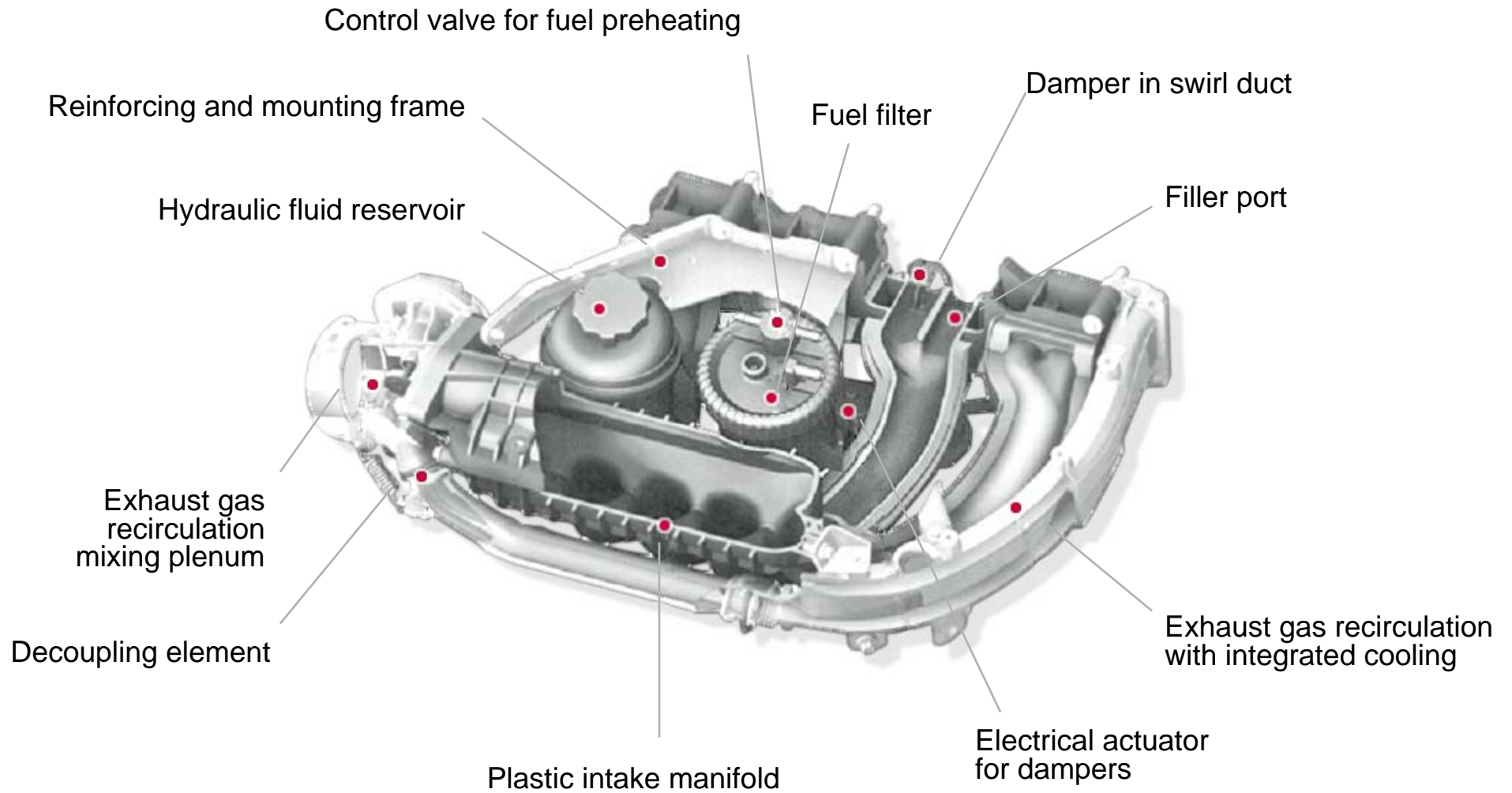
# Power Cell Module



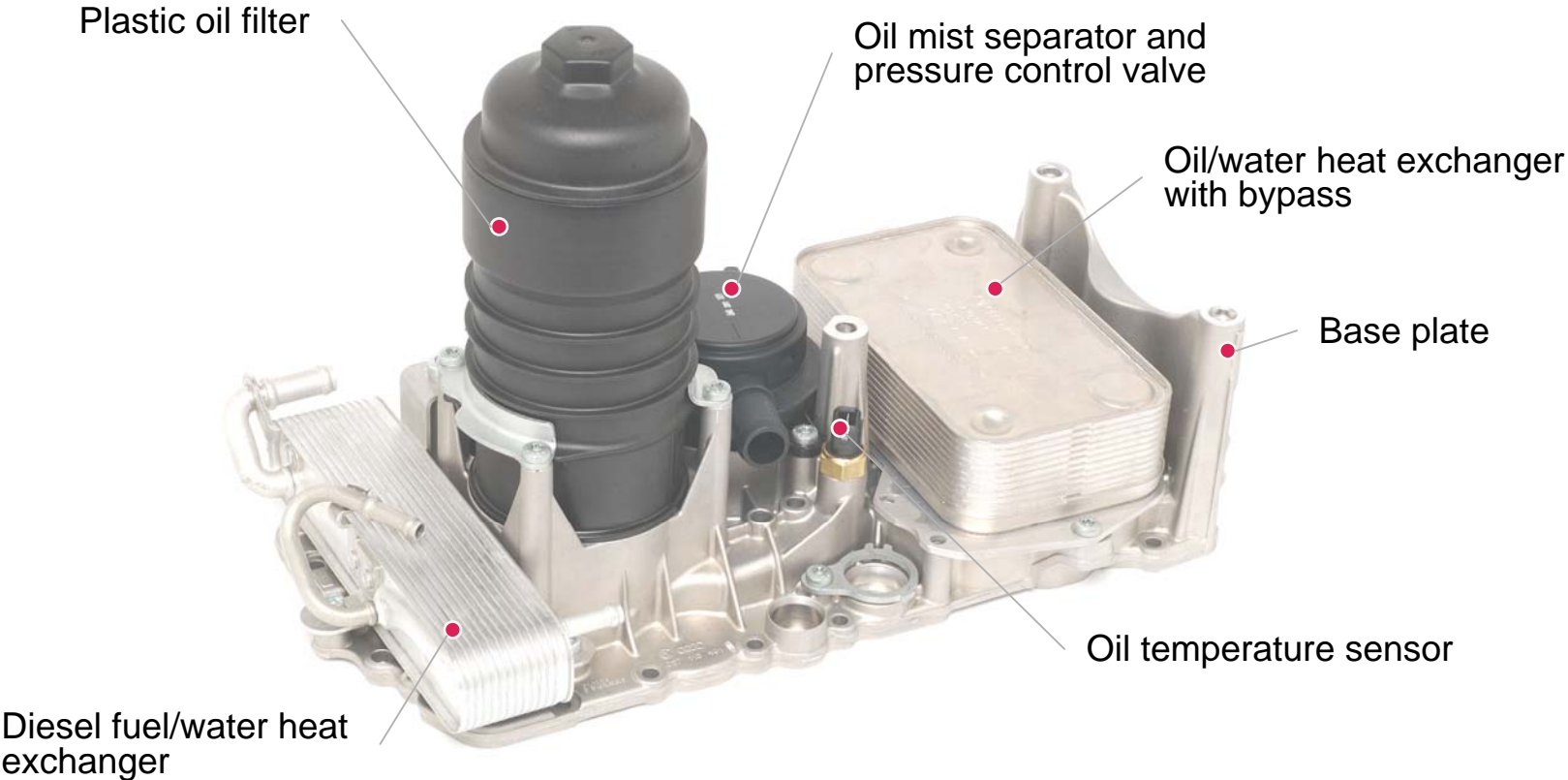
# Cylinder Head with Fully Assembled Valve Train



# Air Intake Module



# Oil Filter Module



# First All-MAHLE Engine



## Rationale for Acquiring Cosworth Technology



- Customer expectation for „Turn Key“ system solutions
- Intent to increase the product range of engine hardware with engineering services
- Requirements for future powertrain/engine system development
- Offering a complete cylinder head module

## Future Prospects

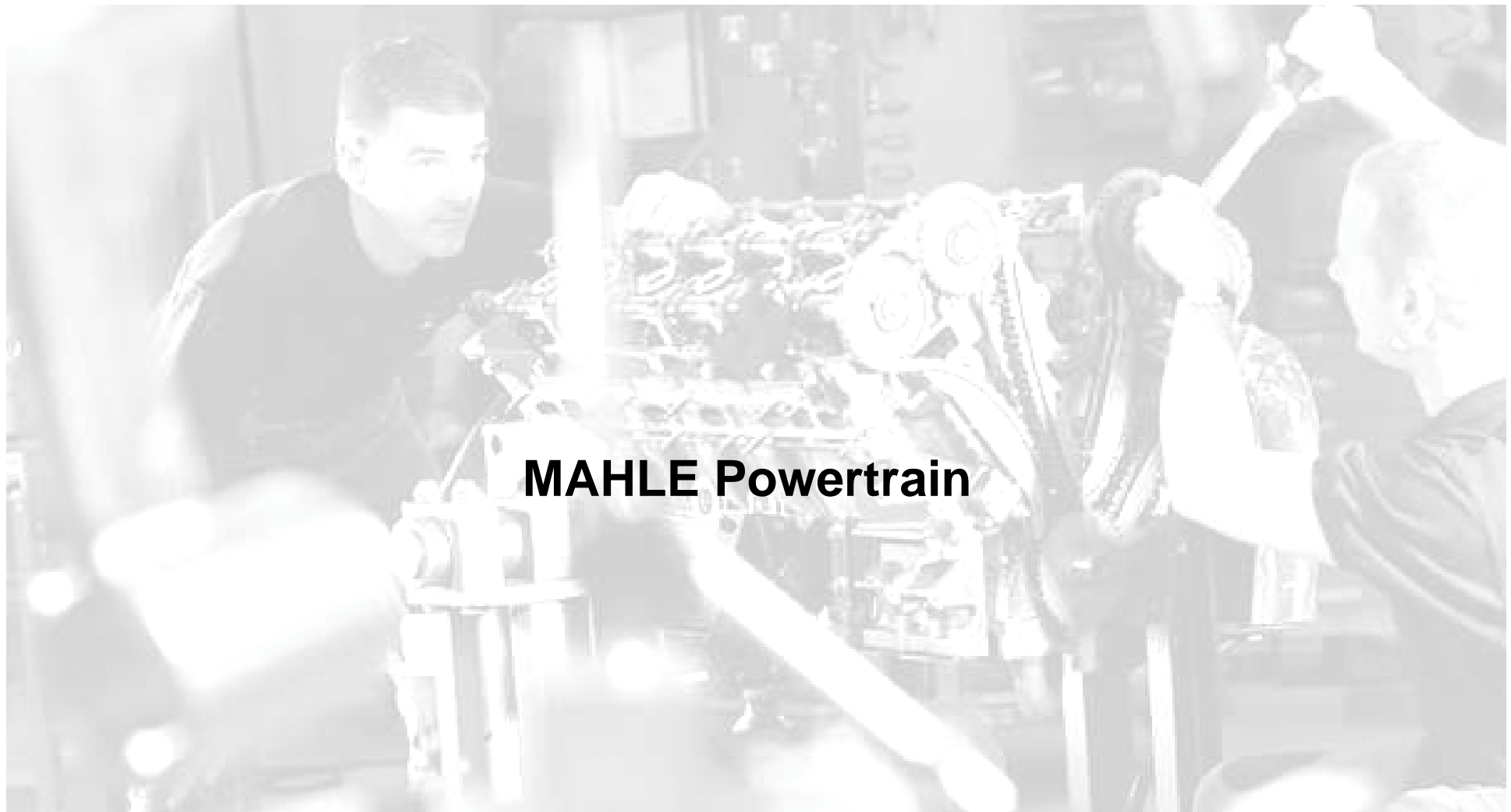


- Cosworth Technology becomes MAHLE Powertrain as of July 1<sup>st</sup>
- Potential customer interest in services and products of MAHLE Powertrain
- MAHLE Powertrain benefits from MAHLE's global sales and engineering network and global customer base
- Acquisition by MAHLE leads to independence from OEM



**Thank you for your attention!**

**MAHLE**



**MAHLE Powertrain**

## MAHLE Powertrain Status



- January 1<sup>st</sup>, 2005: MAHLE GmbH acquired Cosworth Technology Group from AUDI AG.
- July 1<sup>st</sup>, 2005: Cosworth Technology Ltd. will be renamed to MAHLE Powertrain Ltd.  
Cosworth Technology, Inc. will be renamed to MAHLE Powertrain, Inc.

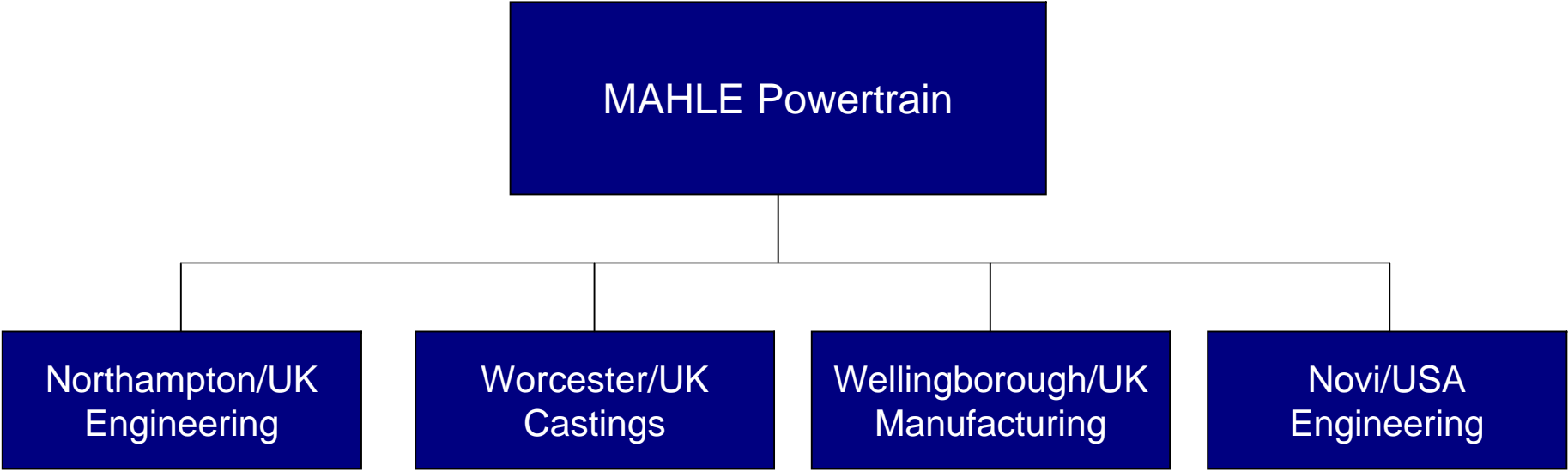
# MAHLE Powertrain Milestones



- 1958** Northampton founded by Mike Costin and Keith Duckworth
- 1979** Foundry established at Worcester
- 1984** Manufacturing plant established at Wellingborough
- 1995** Acquisition of Intelligent Controls Inc., Novi/USA
- 1996** New foundry opened in Worcester, new Emissions and Driveability Centre opened in Northampton
- 1998** Cosworth Technology Ltd. and Cosworth Technology, Inc. formed
- 2000** New Vehicle Workshop built in Northampton
- 2002** New Logistics Facility opened in Wellingborough
- 2003** Offices extended in Novi/USA, new manufacturing site opened in Wellingborough
- 2005** MAHLE acquired Cosworth Technology Ltd. and Cosworth Technology, Inc.  
MAHLE Powertrain formed



# MAHLE Powertrain Structure



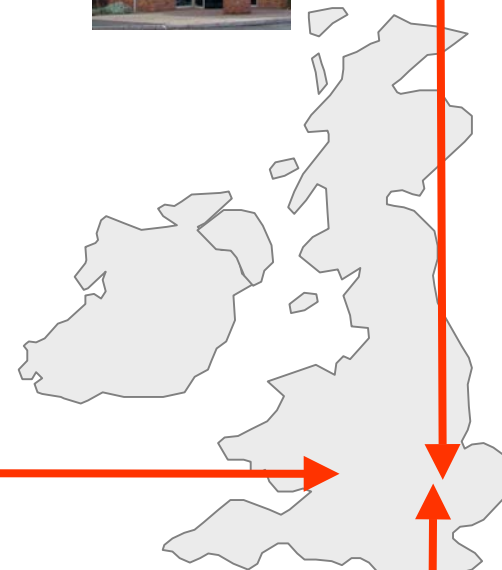
# MAHLE Powertrain R&D and Manufacturing Centres



**Novi, Michigan (USA)**  
Founded: 1995  
Activity: Engineering



**Northampton (UK)**  
Founded: 1958  
Activity: Engineering



**Worcester (UK)**  
Founded: 1979  
Activity: Casting

**Wellingborough (UK)**  
Founded: 1984  
Activity: Manufacturing and Assembly



# MAHLE Powertrain Site Certification

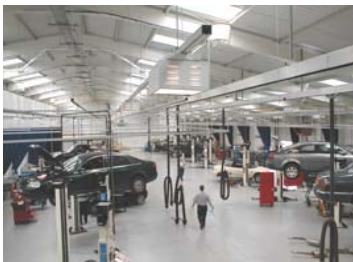


## Quality:

- ISO/TS 16949 (Northampton, Wellingborough, Worcester)
- ISO 9001 (Novi)
- Ford Q1 Award (Northampton, Wellingborough, Novi)

## Environmental:

- ISO 14001 (Northampton, Wellingborough, Worcester, Novi)
- Eco-Management and Audit Scheme – EMAS (Northampton, Wellingborough, Worcester)



# MAHLE Powertrain Capabilities



MAHLE Powertrain is the only **Integrated Powertrain Solutions** supplier, with complete and proven capabilities in the total powertrain supply and development chain:

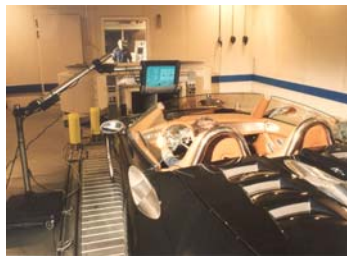
- Concept
- Design and Analysis
- Development and Calibration
- Validation
- Casting (Aluminium)
- Machining and Manufacture
- SOP Support
- Post SOP and Aftermarket Support



# MAHLE Powertrain Engineering - Powertrain



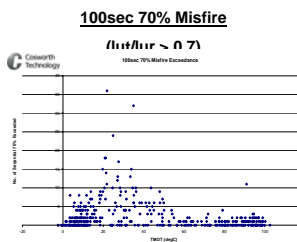
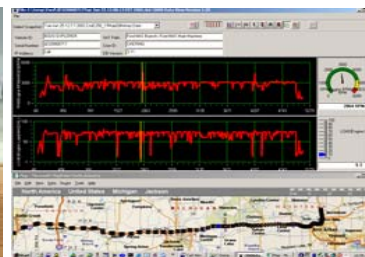
- Development of series engines from design to SOP
- Concept engines from initial design stage to running prototype
- Analysis – performance prediction, kinematics, CFD
- Development of high performance engines based on high-volume series production
- Powertrain design, development and calibration
- Vehicle installation/integration/validation
- NVH analysis and predictions
- Fleet service
- Resident engineers



# MAHLE Powertrain Engineering - Electronics



- Diagnostic engineering and software implementation
- Fleet support/telematics/EOL test
- Dealership, manufacturing, aftermarket
- Electronics products :
  - Visual Authoring Tool – software application allowing rapid development of unique programs
  - Secondary Controller – controls alternative fuel system hardware on dual fuel delivery systems vehicles
  - eCATS Project (Electronic Configuration And Test System) – complete end-of-line, repair bay system including fixed, portable and rolling road
  - i3000<sup>®</sup> – detects, captures and logs intermittent faults data for diagnosis
  - IDAA (Integrated Data Acquisition and Analysis) – objective measure of data headroom

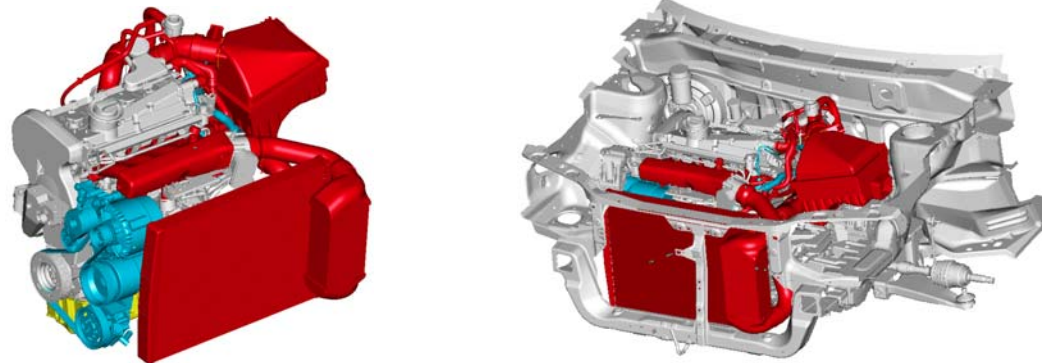


# MAHLE Powertrain Powertrain Supply Solutions (PSS)



## Engineering:

- Lead or assist optimum powertrain selection process
- CAD based package feasibility study to assess ideal powertrain (MAHLE Powertrain has full OEM CAD data access and supports most systems)
- Design and analysis of client specific powertrain components (Flywheel/Adaptor plates etc.)
- Cooling and AC system design and development to satisfy engine and vehicle manufacturer sign-off requirements
- In field extreme climate territory testing (organised by MAHLE Powertrain or support only)
- NVH and drive by noise optimisation



# MAHLE Powertrain Powertrain Supply Solutions (PSS)

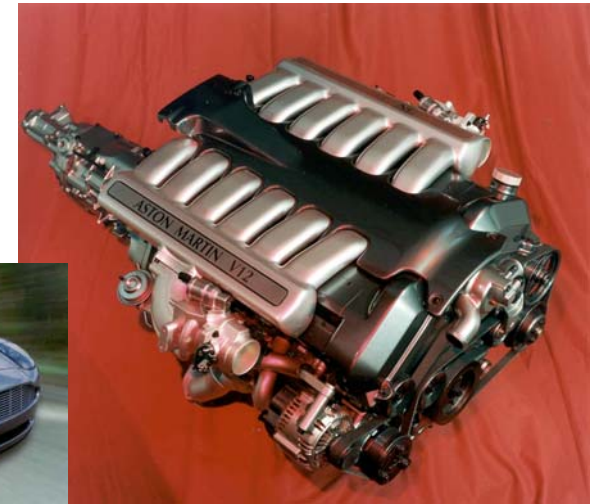
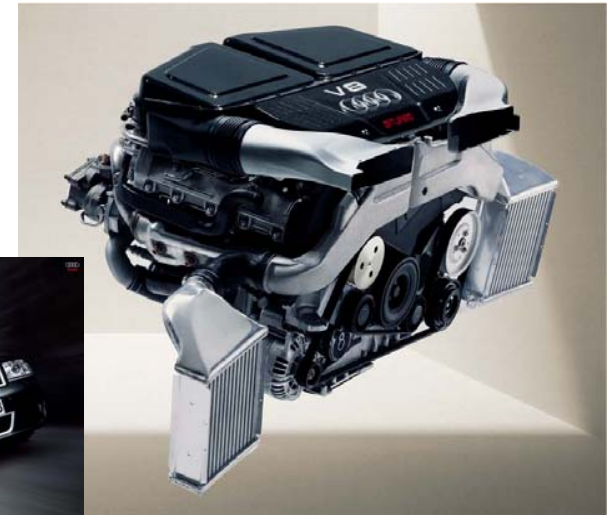


## Engineering:

- Fuel system design and optimisation including EVAP systems
- Design and optimisation of vehicle electrical architecture
- Engine management system integration (ECU, TCU and Immobiliser as fitted to donor vehicle, very limited recalibration)
- (Or) Replace and recalibrate engine management system with vehicle manufacturer preferred system
- Gateway module design to link different electronic architectures (ABS, EMS, TCU, Instrument Cluster)
- Emission certification USA and Europe



# MAHLE Powertrain Past Examples



# MAHLE Powertrain Motorsport



# MAHLE Powertrain Strategy



- Integrate MAHLE Powertrain into the worldwide MAHLE R&D network (Stuttgart, Detroit, São Paulo, Tokyo, Shanghai - as from end of 2005) with focus on complete engines, systems and electronics
- Increase marketing of MAHLE Powertrain products and services through presence in selected MAHLE locations
- Enhance MAHLE's profile as a system provider (system integrator) through MAHLE Powertrain know-how
- Further develop MAHLE Powertrain's capabilities in diesel, hybrid and hydrogen technologies



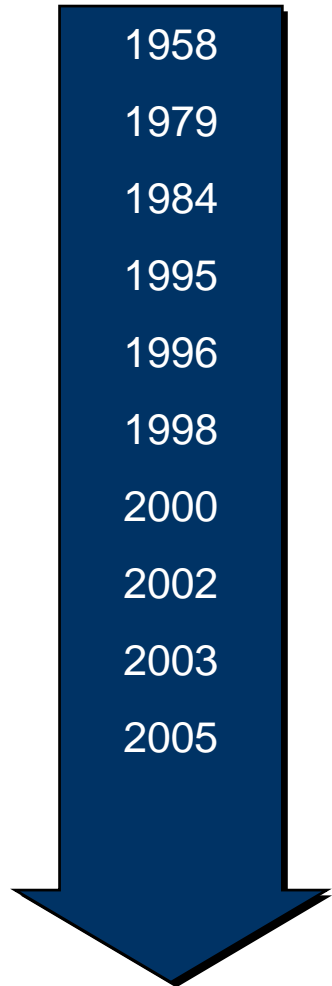
**Thank you for your attention!**

**MAHLE**



**MAHLE Powertrain  
Manufacturing Capabilities**

# MAHLE Powertrain Milestones



1958

1979

1984

1995

1996

1998

2000

2002

2003

2005

- From Race to Road
- Excitement and Innovation
- Powertrain supply solutions



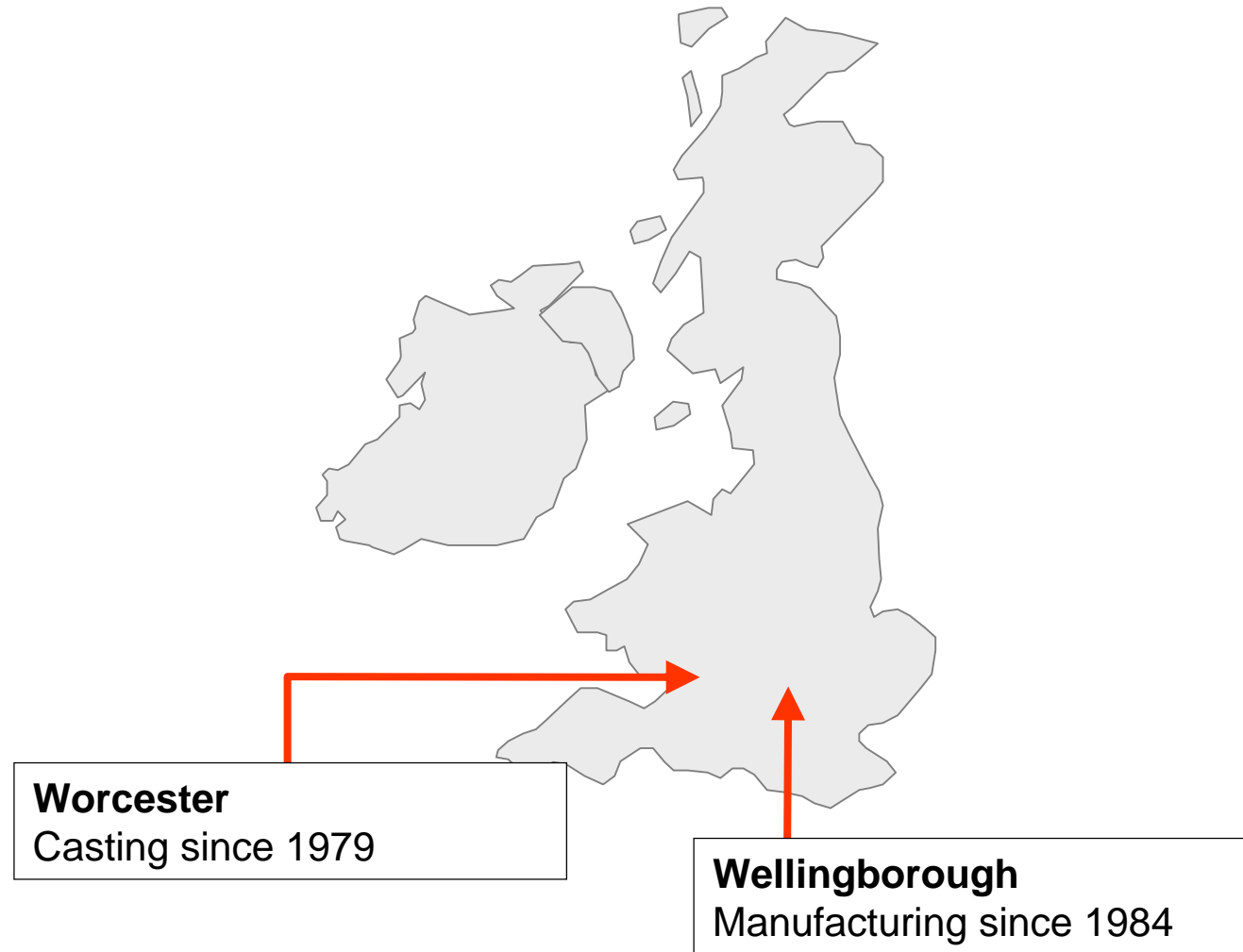
# MAHLE Powertrain UK Manufacturing Locations



Wellingborough Facility



Worcester Facility



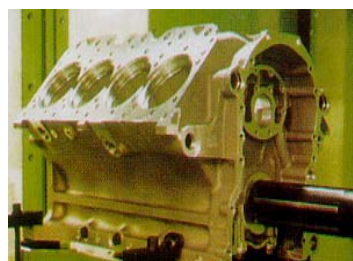
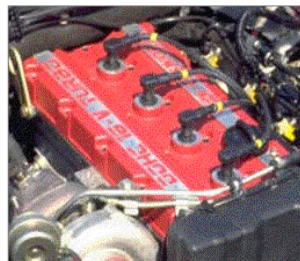
# MAHLE Powertrain Previous Product Developments



Wellingborough facility first established on Park Farm in 1984 to support Mercedes and Ford.

## Products:

- V6 and 4 cylinder engines supplied for Ford Cosworth
- V8 and V6 Bi-Turbo engines supplied to Audi for RS6 and RS4
- 16V cylinder head assemblies supplied to Mercedes 190 2.3l and 2.5l
- 2.0l 16V cylinder heads supplied to GM Opel for Astra and Calibra
- C.I. cylinder heads supplied to Perkins 3 and 4
- V8 engines supplied to Rolls-Royce
- 2.9l and 4.0l V6 iron heads for Ford Cologne and Livonia



# MAHLE Powertrain Current Product Developments



- New 4 and 6 litre diesel engines
- Machining of cast iron cylinder head and engine block then assembled with bedplate
- For various JCB vehicles in off-highway construction equipment sector
- 2.8l V6 VW Group engine assembly
- Ford 2.3l Balanceshaft oil pan assembly



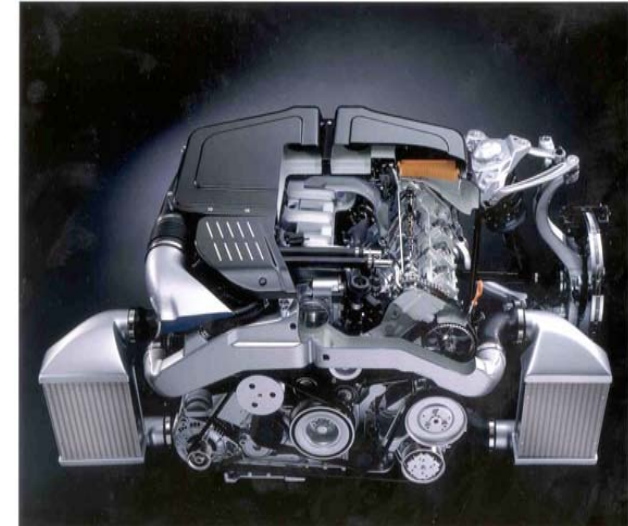
# MAHLE Powertrain Foundry Operations



# MAHLE Powertrain Manufacturing Machining and Assembly Facilities



- 25,000 square metre site owned outright
- 9,500 square metre manufacturing area
- 1,750 square metre logistics (off site - lease)
- 2 engine assembly lines (up to 100 engines per day)
- 60+ CNC machining centres
- 6 hot engine test stands and 3 dynos
- 5 co-ordinate measuring machines (CMMs)



# MAHLE Powertrain Manufacturing Casting Facilities



- 6,000 square metre site owned outright
- 2,500 square metre Manufacturing
- 60 staff
- 1 low to medium volume production plant – up to 20,000 units per annum
- Specialised/prototype development unit up to 2,000 per annum
- Dedicated tool room for development projects
- Multi-alloy casting facility
- Full measurement facilities



# MAHLE Powertrain Manufacturing Implementation



- Fast and flexible processes
- Shorter production lead-times
- Flexible volume capability
- Economy of scale approach to meet product requirement
- Engine assembly based on cost effective combination of capital and labour
- Process traceability
- Continuous improvement approach
- Close co-operation with customers on facility and process development



# MAHLE Powertrain Manufacturing Casting Process

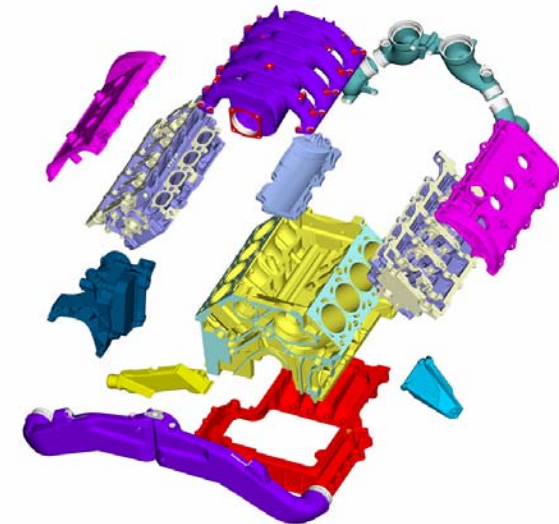
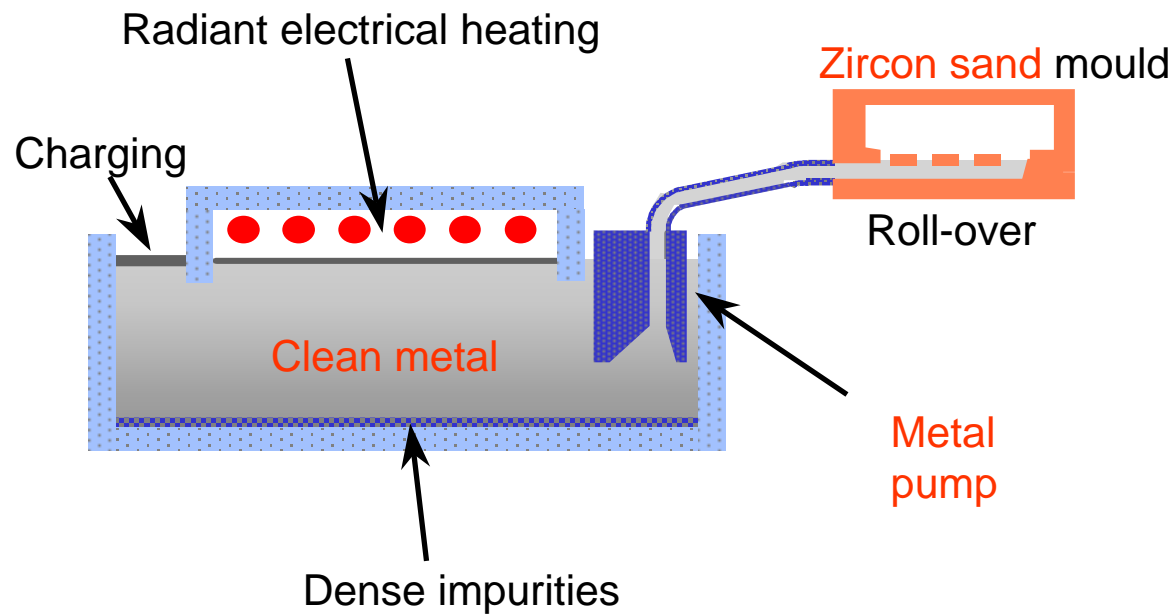


- Problems experienced with racing engine castings
  - Porosity
  - Random dimensional errors
  - Early fatigue failures
  
- Engine design, performance and reliability limited by
  - Casting dimensional capability
  - Casting material capability

# MAHLE Powertrain Manufacturing Casting Process



- The Casting Process provides:
  - An elegant and robust sand casting process
  - Casting with high dimensional accuracy and integrity
  - Racing castings that can last many seasons
  - Equally applicable to road engine casting applications



# MAHLE Powertrain Manufacturing Supply Chain



- Global automotive supplier base
  - 277 suppliers in Europe, USA and Japan
- Local and central purchasing team
- Full logistics capability
- Strategic partnerships with logistics service providers
- Integrated MRP II operation
- SAP Business Management System
- Supplier approval
  - System/process audits
- Sub-contractor approval
  - Health and safety pre-tender agreement
  - Compliance with health, safety and environmental guidelines



# MAHLE Powertrain Manufacturing



- Comprehensive powertrain manufacturing
- ISO /TS 16949 approved
- Broad customer base - proven track record
- Flexibility and experience
- Achieving challenging lead times and aggressive targets
- Delivering to customers expectations





**Thank you for your attention!**