



# **German Market for Remanufactured Engines**

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Chairman VMI, Germany**



## **German Market for Remanufactured Engines**

- ✓ **Introduction of VMI**
- ✓ **Involvement of VMI**
- ✓ **Remanufacturing WHY?**
- ✓ **Market for remanufactured engines in Germany**
- ✓ **Remanufacturing Technical aspects**
- ✓ **Remanufacturing Innovative processes**
- ✓ **Duties and responsibilities of VMI**
- ✓ **Future Prospects**



## Introduction of VMI

- ✓ VMI is the german association of engine remanufacturers
- ✓ VMI has 5 executive committee members
- ✓ VMI has a staff office located in Ratingen with 2 employees
- ✓ VMI has today 

75	full members
28	sustaining members
- ✓ VMI is organized in 6 regions within Germany



## Introduction of VMI

### **Main activities of VMI**

- ✓ Lobbying
- ✓ Public relation
- ✓ Service for members
- ✓ Project work, within project teams for the following issues
  - Technical data and developments
  - Material and Parts availability
  - Exhibitions and trade shows
  - Junior project team



# Involvement of VMI

## Memberships



## Partnerships



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Chair Manufacturing  
and Remanufacturing  
Technology

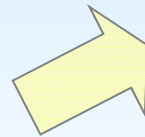
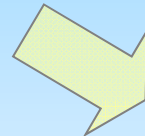




## Remanufacturing WHY?

### Remanufacturing as an economical solution

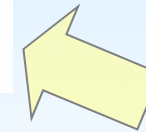
Up to 50% savings  
compared to brand  
new engines



High quality standard  
due to stringent  
inspections!



Partial repair work  
is more costly and  
time consuming...

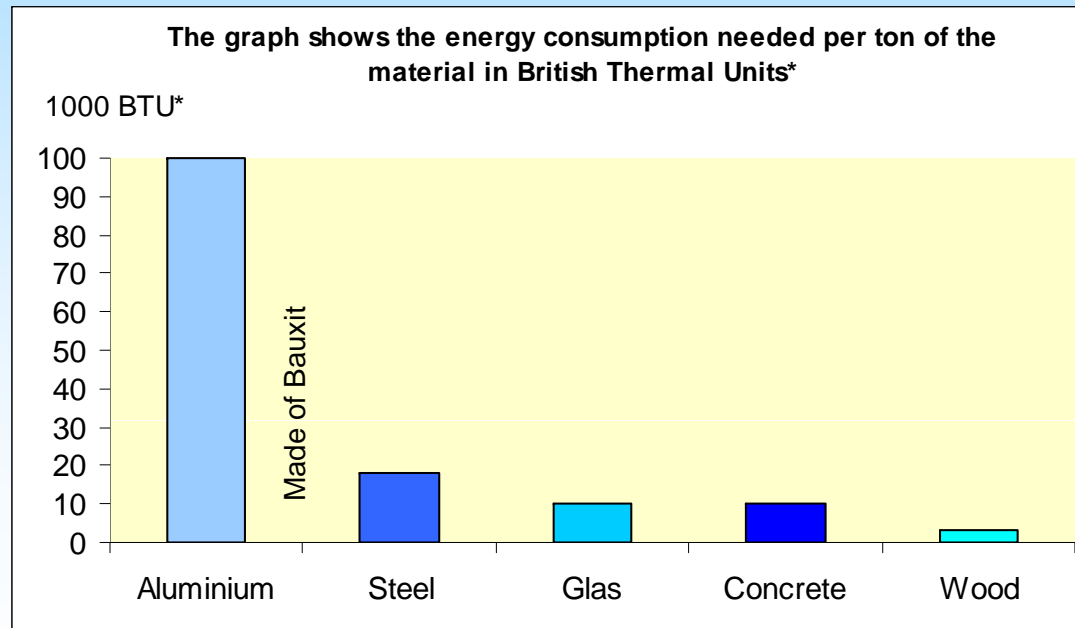


and the operational  
reliability is not  
guaranteed 100%!



## Remanufacturing WHY?

- ✓ Remanufacturing saves Energy and Resources
- ✓ Energy needed for remanufacturing is about 10 % of energy needed for manufacturing of a new item
- ✓ As an example energy needed for fabrication of aluminum cylinder heads





## Remanufacturing WHY?

### **Remanufacturing because it means best quality**

- ✓ All steps in the process are carried out in accordance with standards set.
- ✓ Remanufactured parts are on the same level as new parts, during the industrial remanufacturing process all parts are checked, reconditioned or replaced
- ✓ The engine is given a new identification and its life is the same or even better as a new part.





## Remanufacturing WHY?

### **Remanufacturing because it saves the world's environment**

- ✓ Raw material is saved because of the numerous lives given to a product.
- ✓ Landfills are spared from dumping of million of tons of material by using cores for remanufacturing.
- ✓ Air pollution and energy consumption is reduced by using cores. Melting of old material is not required.



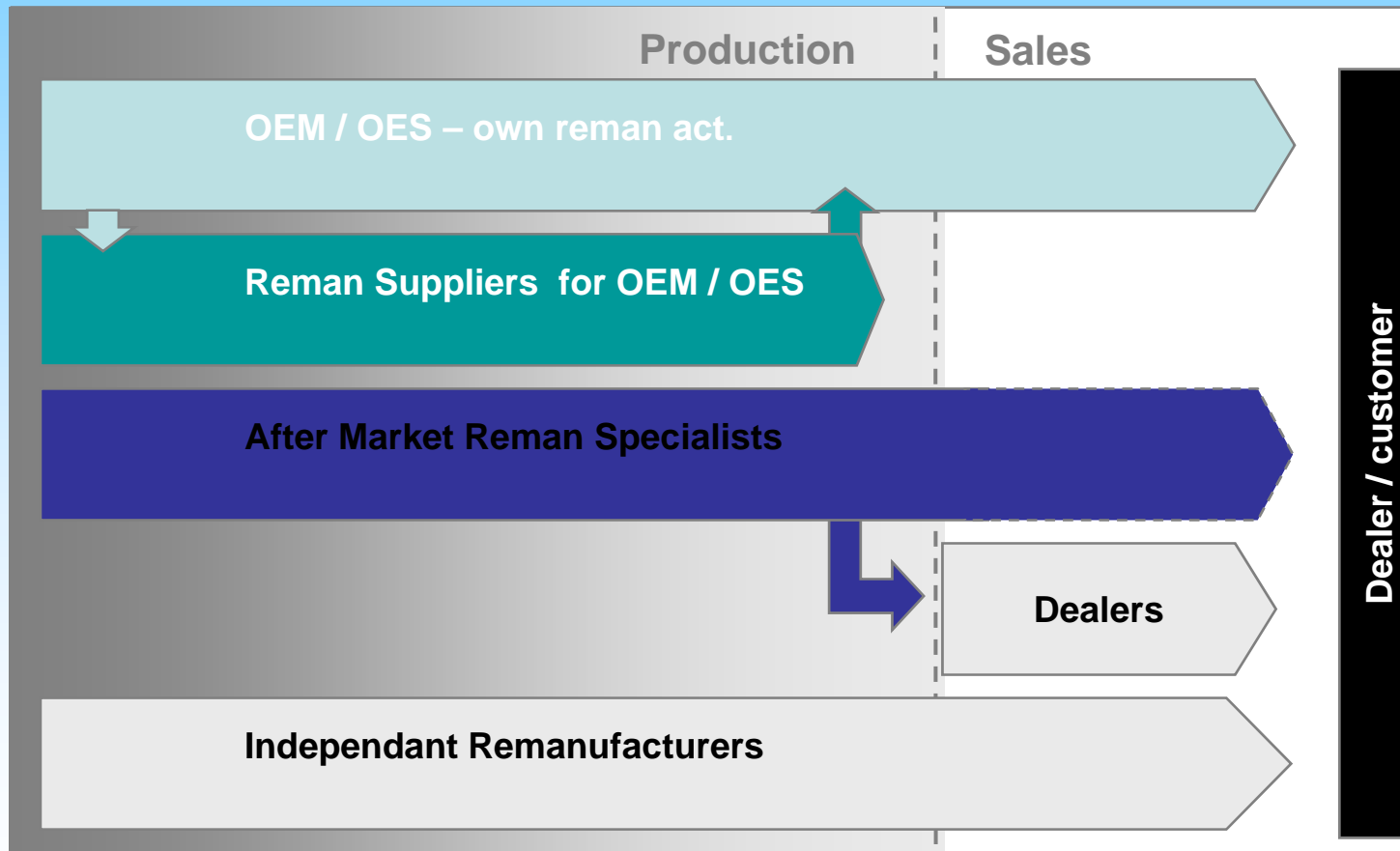
## Market for remanufactured engines in Germany

### **Engine remanufacturers, areas of operation**

- ✓ Car engines, short blocks, long blocks, complete engines
- ✓ Cylinder heads, incl. Retrofitting to gas
- ✓ Truck engines
- ✓ Engines for construction equipment
- ✓ Engines for boats and ships
- ✓ Engines for Power Generators and Block Heating Stations
- ✓ Components of engines,  
like fuel pumps, fuel injection systems, generators, turbochargers



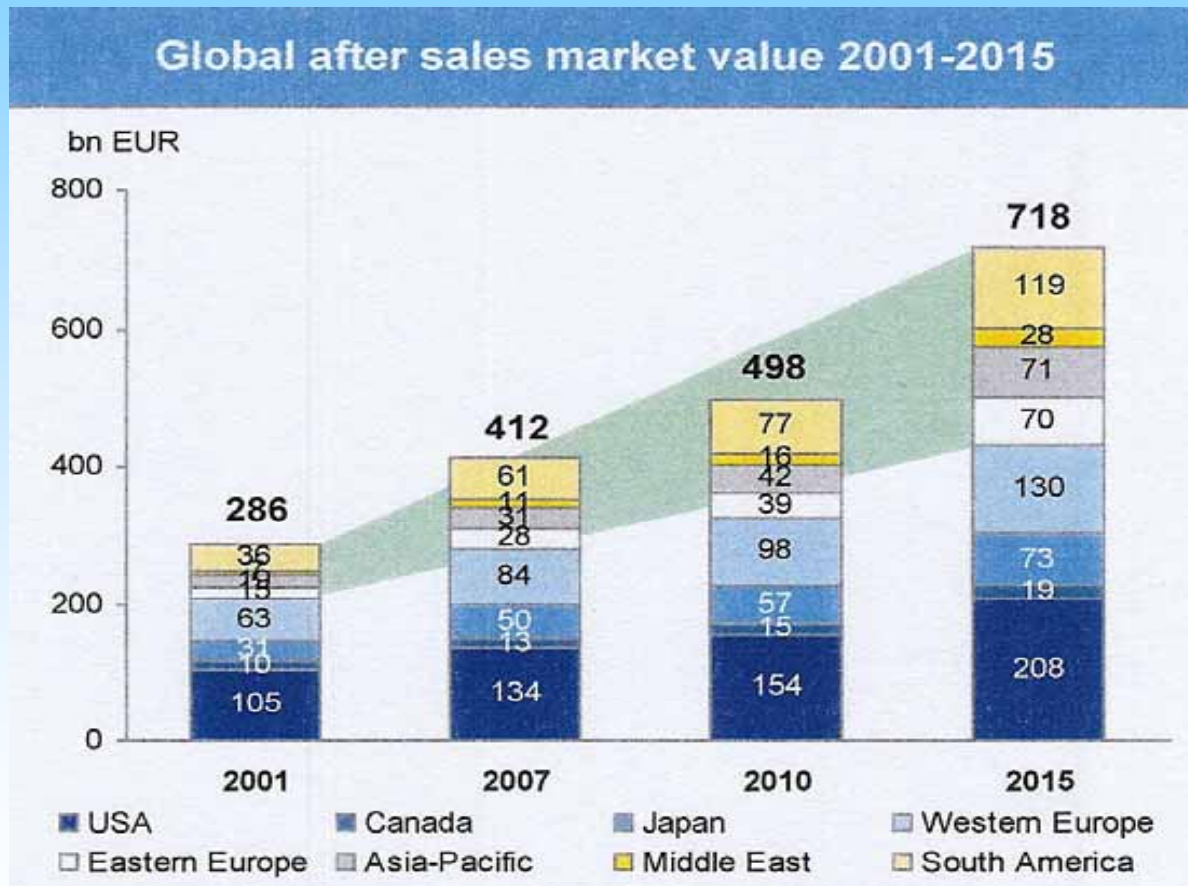
## Market for remanufactured engines in Germany OE and Independant Remaufacturers



Quelle: Arthur D. Little

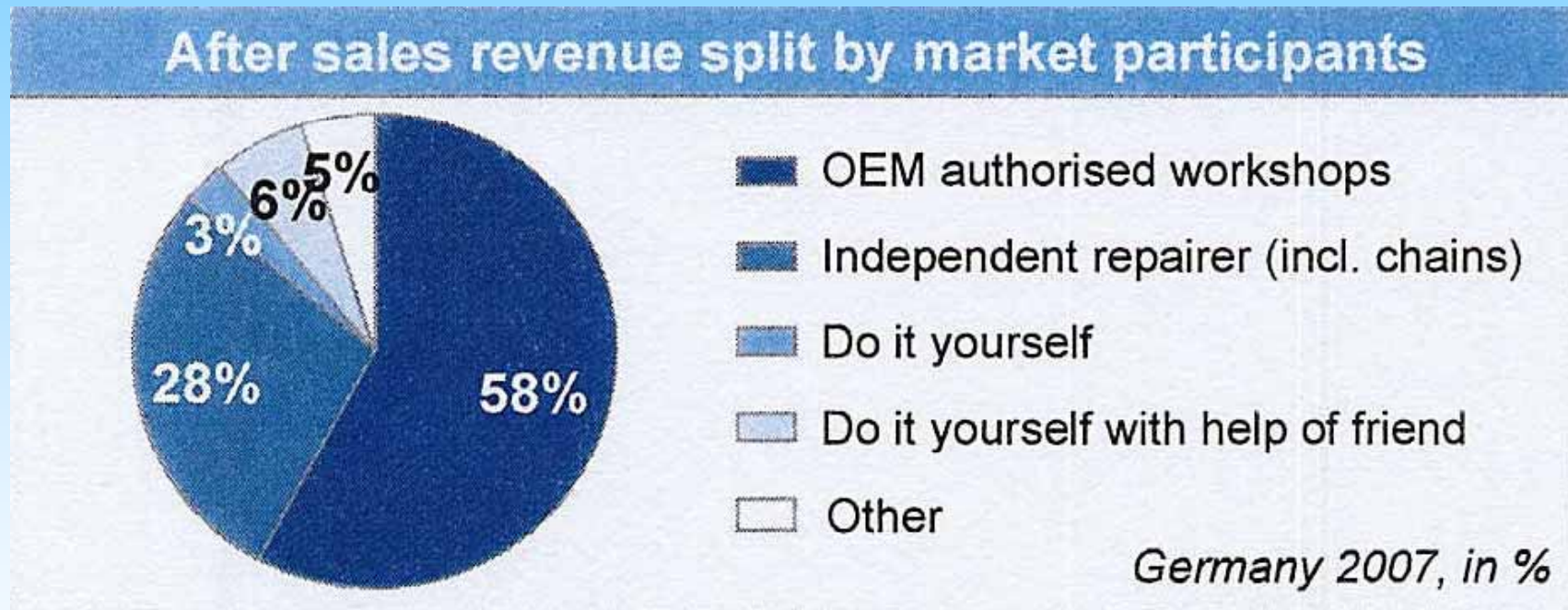


## Market for remanufactured engines in Germany



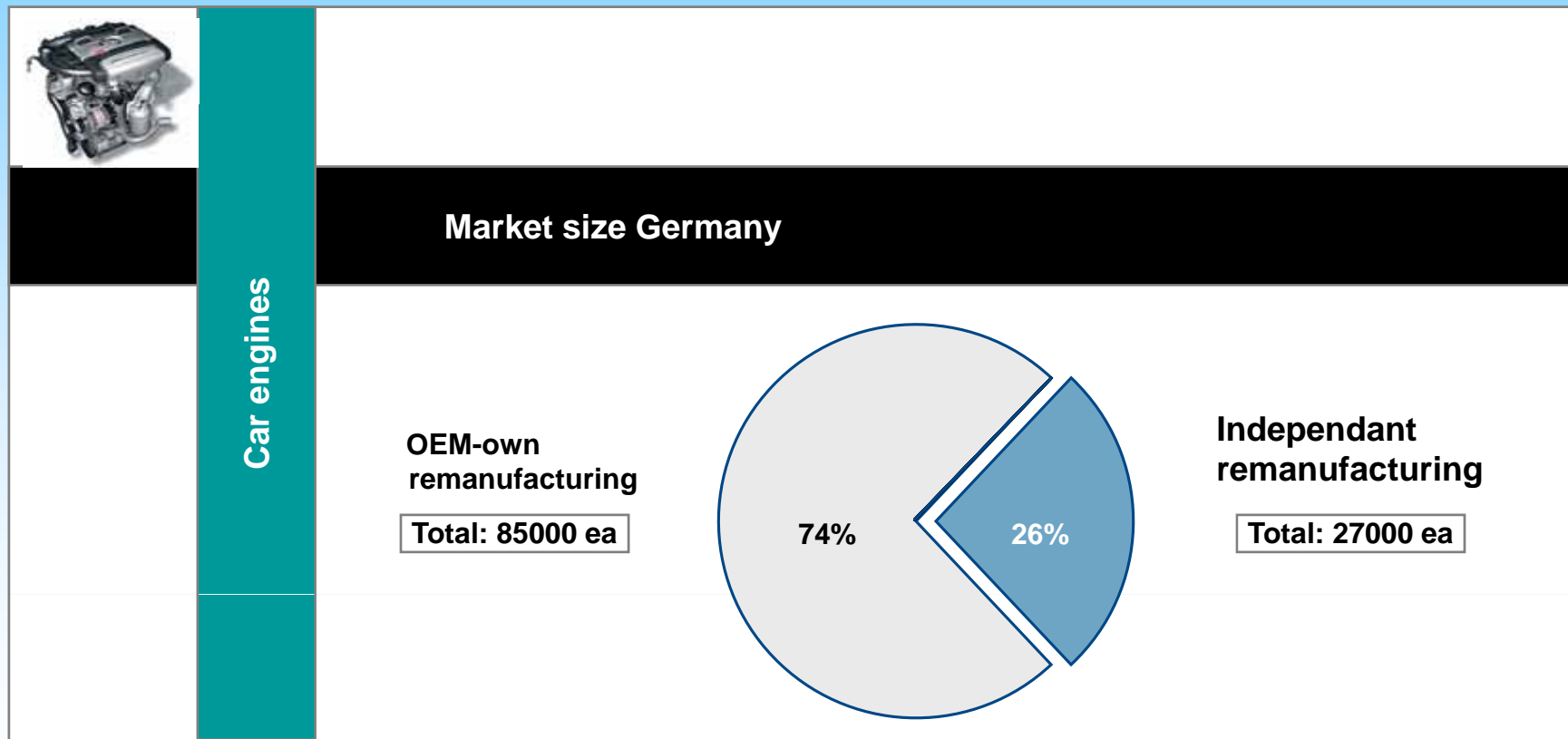


## Market for remanufactured engines in Germany





## Market for remanufactured engines in Germany





## Remanufacturing Technical aspects

### Core management

- ✓ Used parts contain valuable resources in terms of recyclable material
- ✓ In the cycles of the remanufacturing process it is essential to ensure that there is no break in the supply chain therefore the core management is of high importance
- ✓ Cores will be inspected to external damage, sorted to and stored.



## Remanufacturing Technical aspects

### **Technical expertise and technical data**

- ✓ In order to guarantee a quality product for the customer and to develop procedures and modifications to prevent stress and failure identification for the final product, the remanufacturer ...
  - needs to have a highly skilled and motivated work force.
  - needs to have access to technical data as used by OEM
  - needs to perform RCA Route Cause Analysis in case no data are available or if the engine show failures

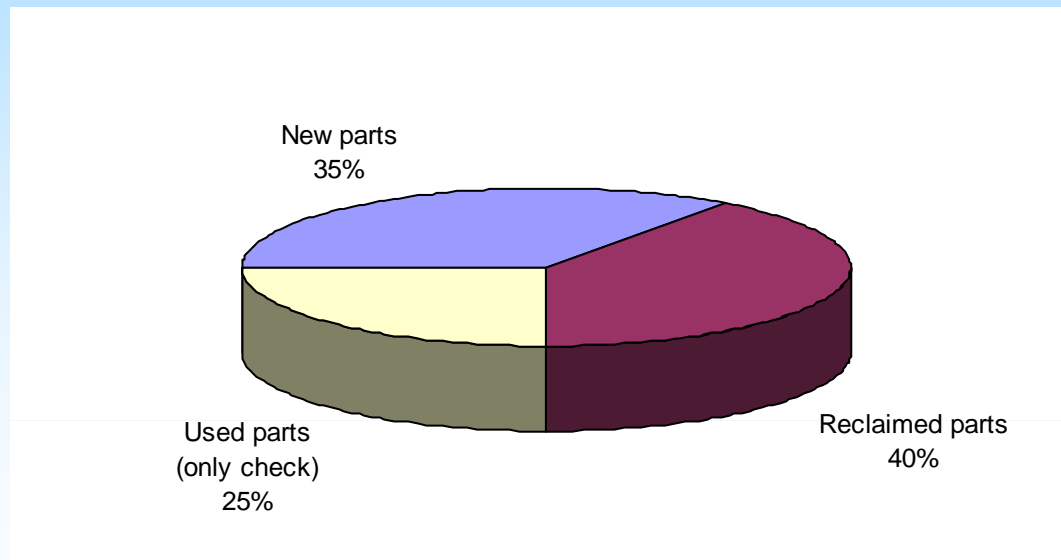




## Remanufacturing Technical aspects

### Spare Parts

- ✓ To reach customer confidence it is required to use parts which meet OEM standards.
- ✓ During the remanufacturing process, new parts e.g. gaskets, bushings, pistons, O-rings, lip seals, teflon rings will be required





## Remanufacturing Technical aspects

### Quality Management

- ✓ To guarantee a quality project, remanufacturers need to establish process oriented work procedures under use of certified tools and equipment
  
- ✓ Part of the Quality Management System implemented, should be methods like
  - FMEA
  - 8 D Reports
  
- ✓ To support the quality process, analysis and tests like the following need to be performed
  - Diagnosis on incoming cores
  - Test of remanufactured engines on a test rig is required



## Remanufacturing Innovative processes

### Cleaning and Blasting

- ✓ A core competence of remanufacturing is the cleaning process, belong others, following issues have an impact on the processes established
  - Oil carbon
  - Optical requirements
  - Residue, requirements from Customer
  - Environmental requirements
  
- ✓ Based on the impacts shown, the cleaning technologies presently used will change more and more from
  - mainly chemical processes
  - to
  - mechanical processes
  
- ✓ In future, processes like blasting with high water pressure, blasting with Potassium Sulfate and Soda, as well as blasting with ice and similar processes will play the main role





## Remanufacturing Innovative processes

### Testing

- ✓ OEM's use as end of line tests today mainly Cold Test Facilities
- ✓ As standard application in the remanufacturing of car engines, generally a short or long block is used, therefore a hot test is too complicated
- ✓ Features of cold test rig
  - Pressure Tests – ensures that all gaskets and seals are seated properly and there are no cracks in the block, heads or freeze plugs
  - Measure Breakaway Torque and Rotating Torque – pass or fail engines based on predetermined specs
  - Compression Tests – verifies correct clearances of the piston rings and also checks that the valves and head gaskets are seated correctly.





## Remanufacturing Innovative processes

### Electronic Control Units

- ✓ The main technological challenges in order to be able to remanufacture engines of today's and future cars are the modern control units.
- ✓ The interconnection and information exchange between the engine and other systems, like gear box may CAN – bus controlled.
- ✓ Since no data of manufacturers are available a way must be found to handle the ECU's
- ✓ Reverse engineering of Systems is required, to find the operating points in reality and compare the test bench results with the reality, to define specifications.
- ✓ For this reason we need assistance from Institutes like the University in Bayreuth





## Remanufacturing Innovative processes

### Gas driven cars

- ✓ New technologies, will influence the business of remanufacturing, This means new challenges and new chances for remanufacturers
  
- ✓ In order to reduce cost and CO2 emission, gas driven cars engines advancing fast
  - Cost reduction compared to gasoline driven cars about 65 %
  - CO2 emission is reduced by 15 % LPG and 25 % CNG
  
- ✓ The engines used may have problems with some parts used, like
  - Valve seats
  - Valve guides
  - Valves



## Duties and responsibilities of VMI

### Lobbying

Participation in the Right to Repair Campagne



### What are the aims of the Right to Repair Campagne?

- ✓ Improve the visibility and understanding of the independant automotive aftermarket
- ✓ Ensure that the legal right of access to technical information, tools and equipment, parts and training is upheld
- ✓ Uphold motorists' rights to have their vehicle serviced, from day one, by the workshop of their choice



## Duties and responsibilities of VMI

### Research and Development

- ✓ The complexity of the technical challenges are increasing continuously and the remanufacturers are normally not able to research new technologies like CAN Bus - based control systems
- ✓ Based on this, associations like VMI may support their members in finding solutions to develop of modern technics and technologies
- ✓ Together with the University Bayreuth, the VMI is looking to establish an Research Project to develop a Brand independant diagnosis systems for engines



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## Duties and responsibilities of VMI

### Technical Issues

- ✓ VMI has established several internal and external project teams to solve Technical issues
- ✓ Based on the initiative of Günter Wolf, President of VMI, a working team with VDI, Düsseldorf was established to define the term „Remanufacturing“ in a VDI Standard



- ✓ Members of this working team, under the administration of the President VMI are members of OEM and independant remanufacturers as well as Members from high schools and Universities



## Duties and responsibilities of VMI

### Public Relation, Marketing

✓ Participation on trade fairs, like Retroclassics

✓ Participation as speaker at simposia



✓ Publishing technical articles and advertisements in technical magazines



## Future Prospects

- ✓ The aftermarket and with it the world of remanufacturing will become more important in future
- ✓ The global challenges in view of CO<sub>2</sub> and NO<sub>x</sub> emissions as well as the climate change will increase drastically
- ✓ The complexity of the remanufacturing in view of
  - new technologies
  - drastic increase in product range
  - regulations for environmental protection
  - global competitionwill grow from year to year



## Future Prospects

We are faced with tremendous challenges in the next years,  
we can solve this only as a team

