MECAMAX®MB STEELS

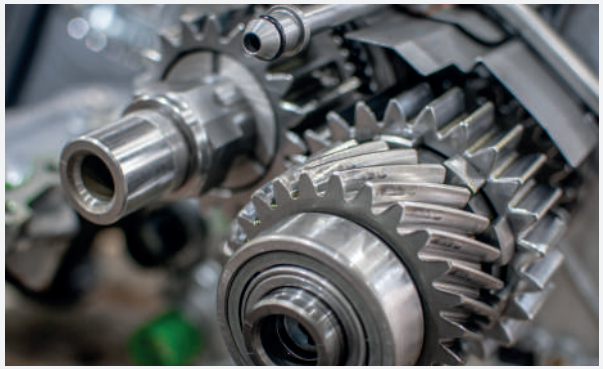
Create Value in Machining

SIDENOR technologies to increase end-user productivity

sidenor steel

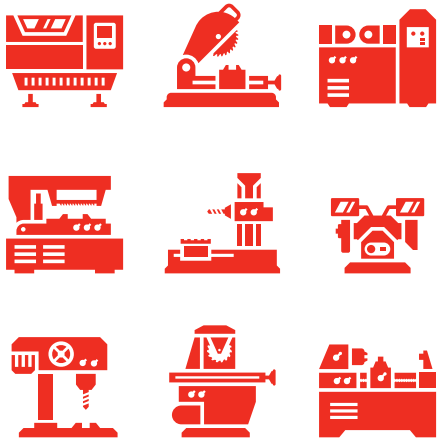
What is MECAMAX® MB?

- Developed by Sidenor in order to **reduce machining costs** of steel parts in a wide range of machining operations (turning, drilling, broaching...)
- This technology is recommended for **high performance applications** guaranteeing the required mechanical properties



Where is MECAMAX® MB Used?

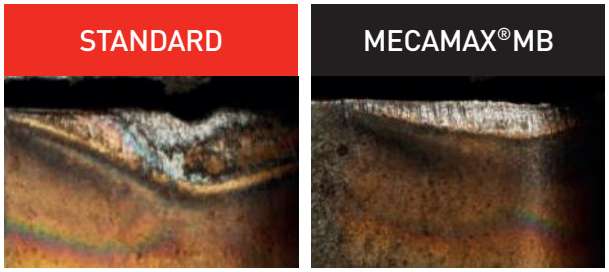
- Tailored solutions for any part /process /customer

For any...	In all...	Whatever...
		
steel grade	machining operations	the part is

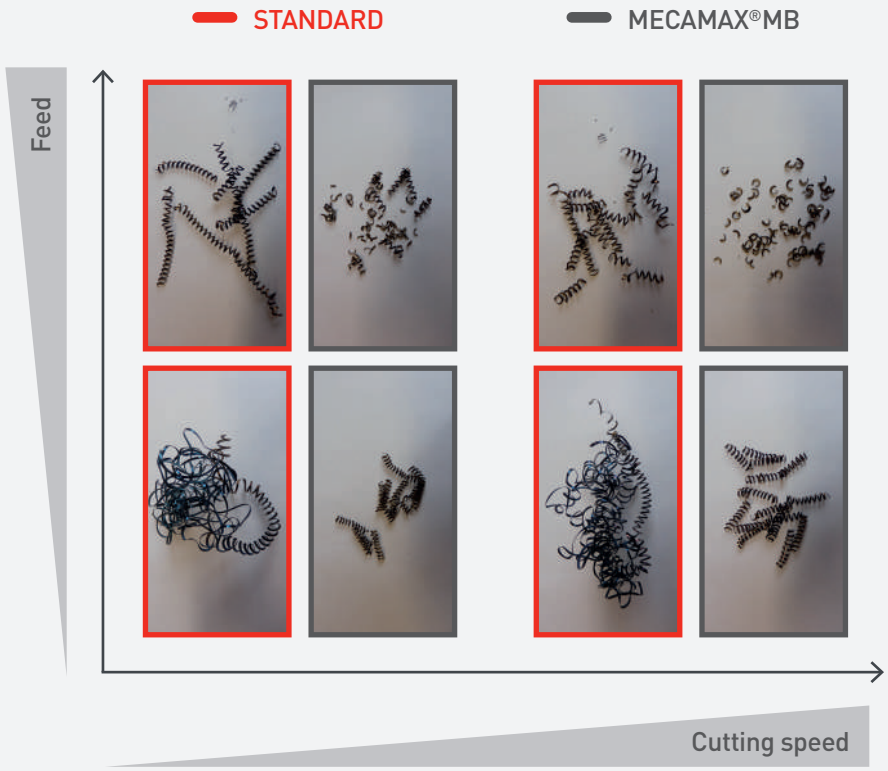
How does MECAMAX® MB Improve Machinability?

- MECAMAX® MB technology is demonstrated to improve the steel machinability

  - ✔ ... facilitating the chip fragmentation
  - ✔ ... reducing the tool wear
  - ✔ ... increasing productivity
  - ✔ ... enhancing steel isotropy in comparison to other improved machinability steels

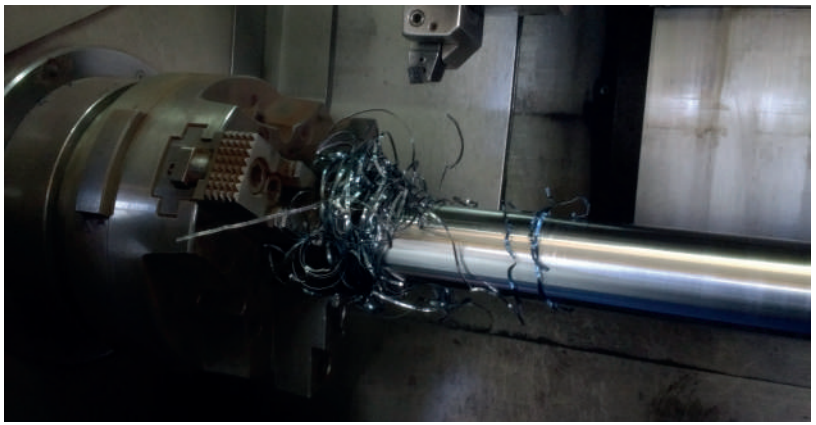


16MnCr5 turning test (a_p 1 mm)



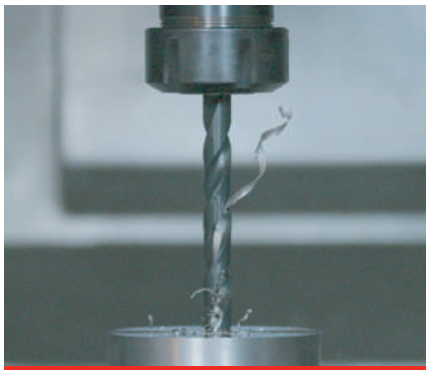
Excellent Chip Quality

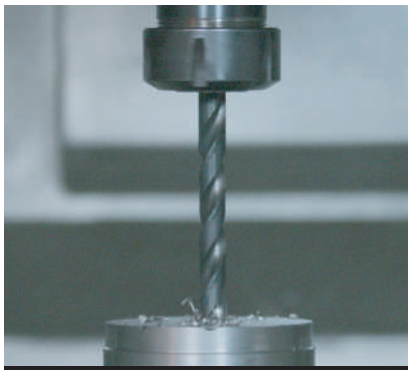
- The long chips generated during the machining of standard grades produce severe overcosts:



- ✔ Accumulation of chips in the work areas
- ✔ Block of extractor conveyors
- ✔ Machine stops and robot failures
- ✔ Chips tangled up in parts...

- These setbacks can be solved by **MECAMAX® MB technology,** which **promotes chip fragmentation**

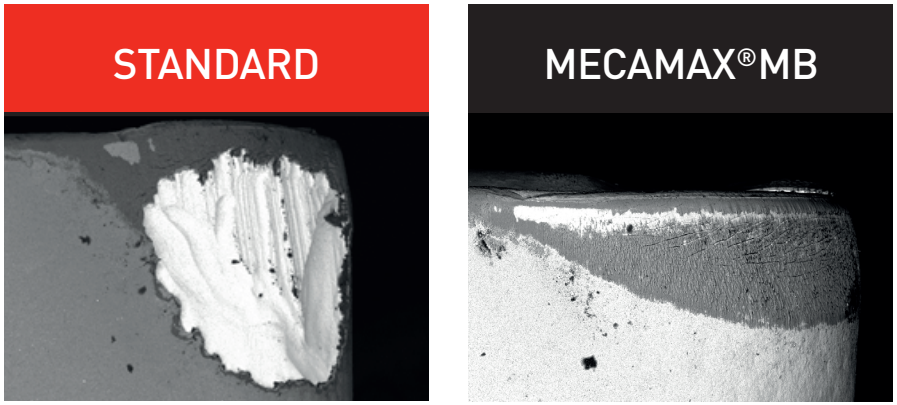


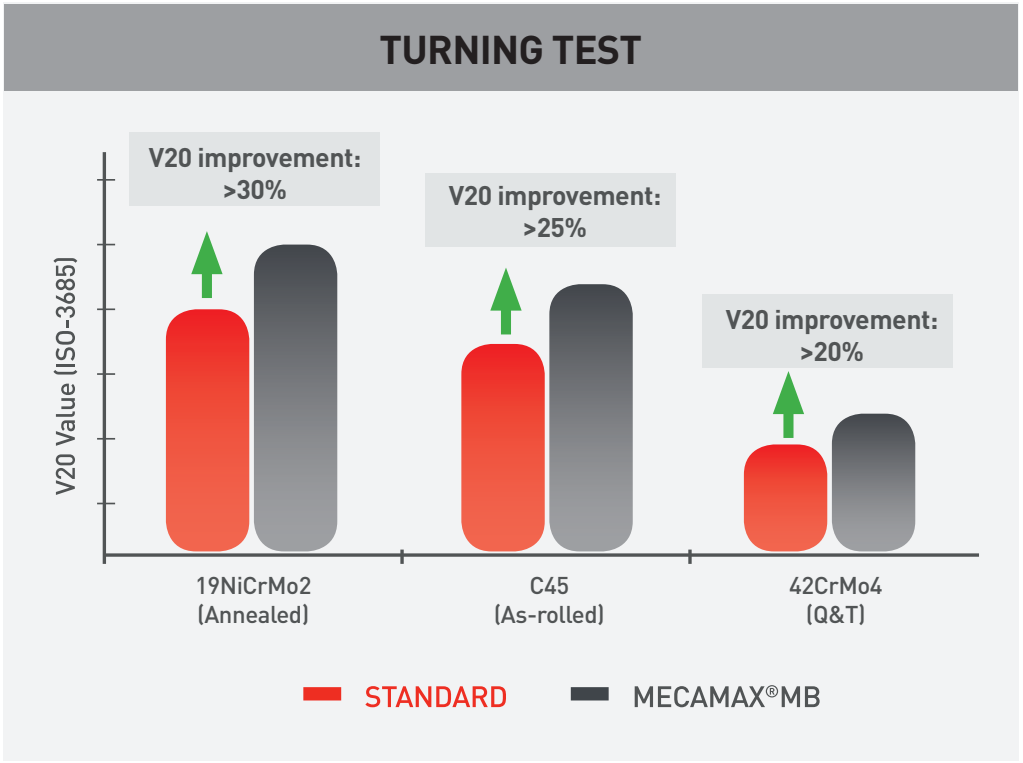


Drilling laboratory tests on 16MnCr5 standard and MECAMAX® MB under the same cutting parameters

Minimum Tool Wear

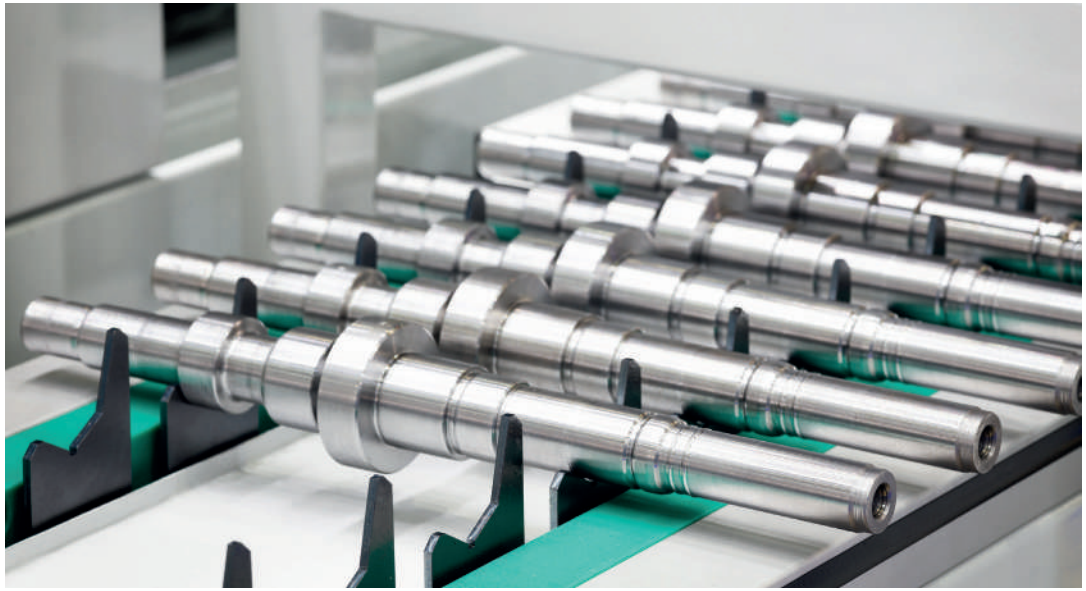
- Tool wear reduction up to 50% thanks to the:
  - ✔ Self-lubrication effect
  - ✔ Reduction of the cutting temperature and forces





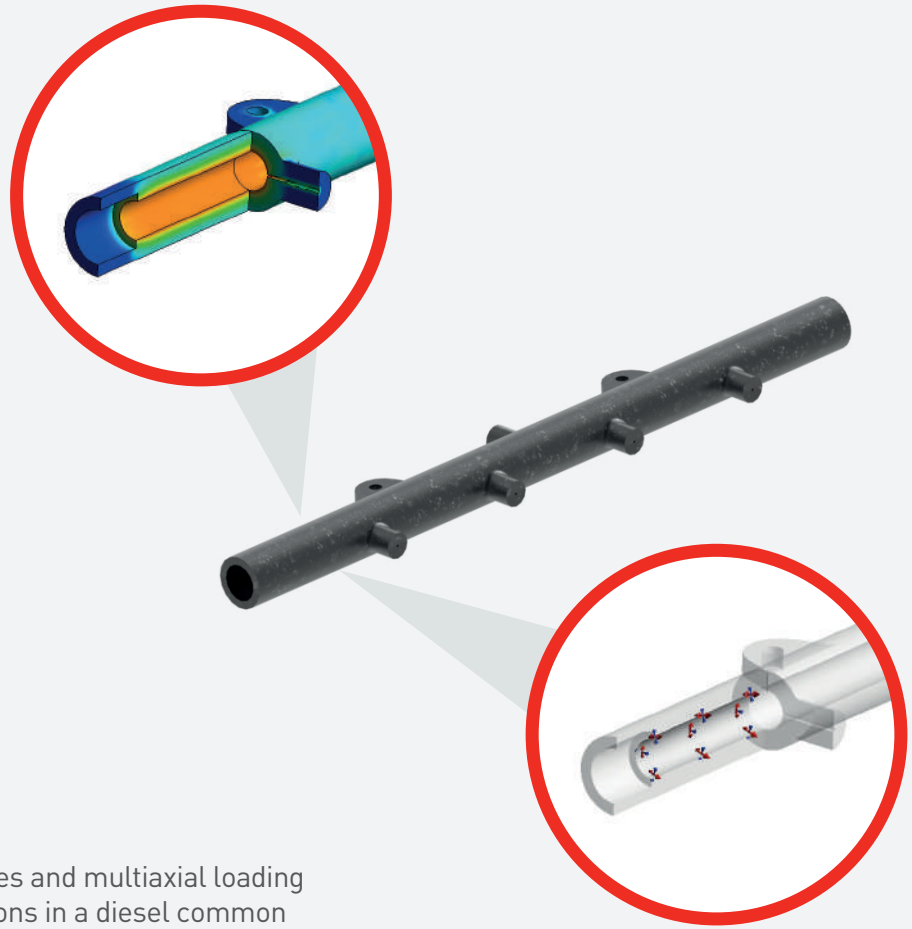
Maximizing Productivity

- Both chip quality and cutting tool life determine economic efficiency of machining process
- **Productivity increase is guaranteed** (up to 50%):
  - ✔ Optimization of the total working time (less tool changes are necessary)
  - ✔ More parts per hour based on cutting speed increment



Isotropy optimization

- Sulphur addition is the most common way to improve the steel machinability, however the steel transversal properties are affected negatively
- To maintain the mechanical properties Sulphur content, and consequently machinability, must be reduced
- An alternative to compensate this machinability deterioration without penalising the **steel isotropy** is MECAMAX® MB

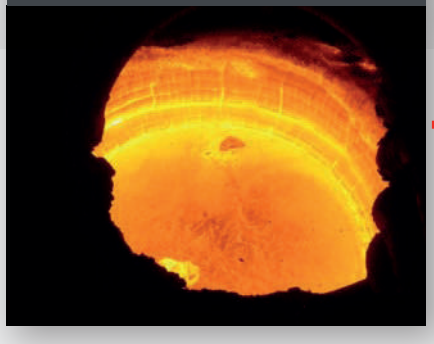


Stresses and multiaxial loading directions in a diesel common rail injection system

How is MECAMAX® MB Manufactured?

- The excellence of the manufacturing process ensures optimum quality of MECAMAX® MB steels. It comprises special developed procedures in the steel shop, continuous casting and rolling mill
- To optimize the process, SIDENOR made important investments in research, turning MECAMAX® MB steels into the best solution for your machining process

Heat homogenization



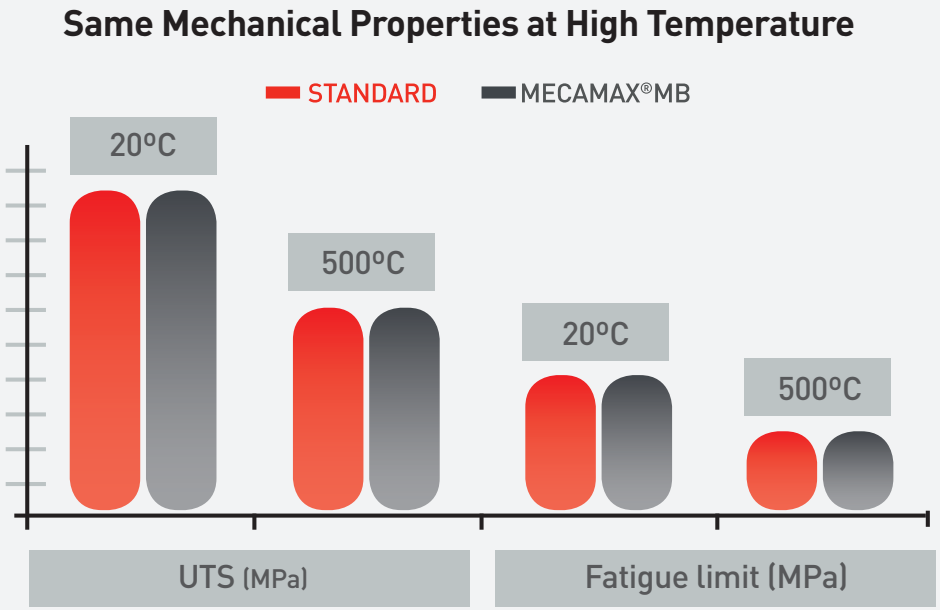
Continuous casting

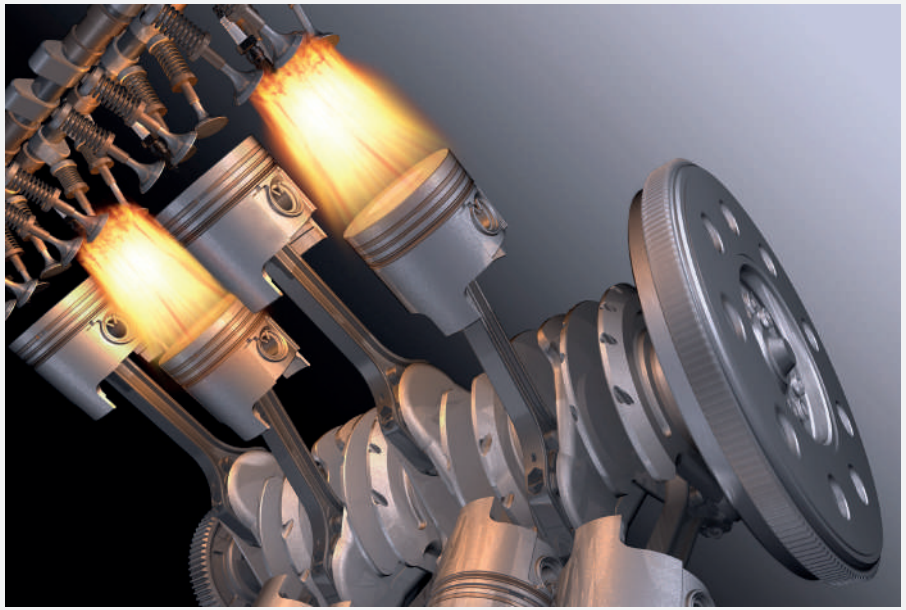
Cooling of semiproducts

Hot rolling

Mechanical Properties Are Not Affected

- The mechanical properties and fatigue performance are not deteriorated, even at high testing temperatures

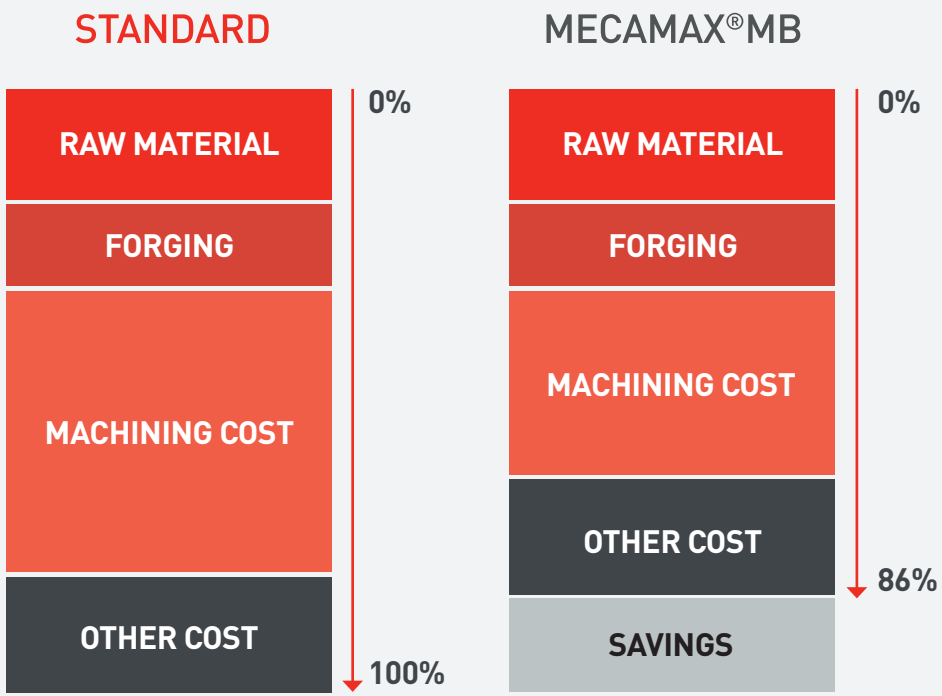




Cost Savings

- Depending on the part geometry and its manufacturing process, the **machining costs can be reduced up to 35%**

Crankshaft Manufacturing Costs Breakdown

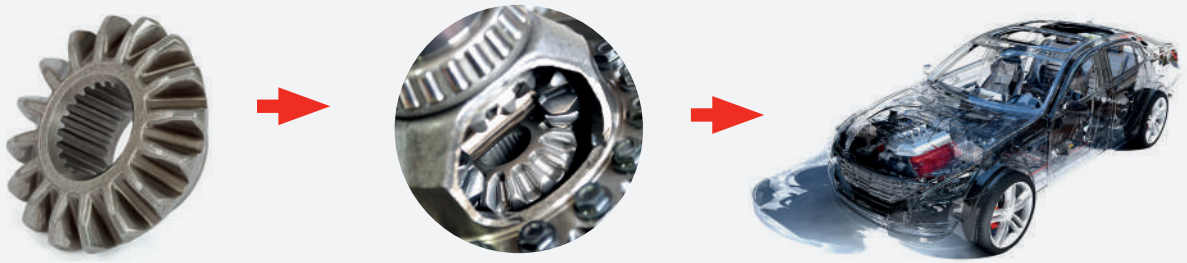


Real Implementation in Automotive Industry

- Good results regardless of the forming route:
  - ✔ Direct machining
  - ✔ Hot forming
  - ✔ Cold forging

PRODUCTIVITY

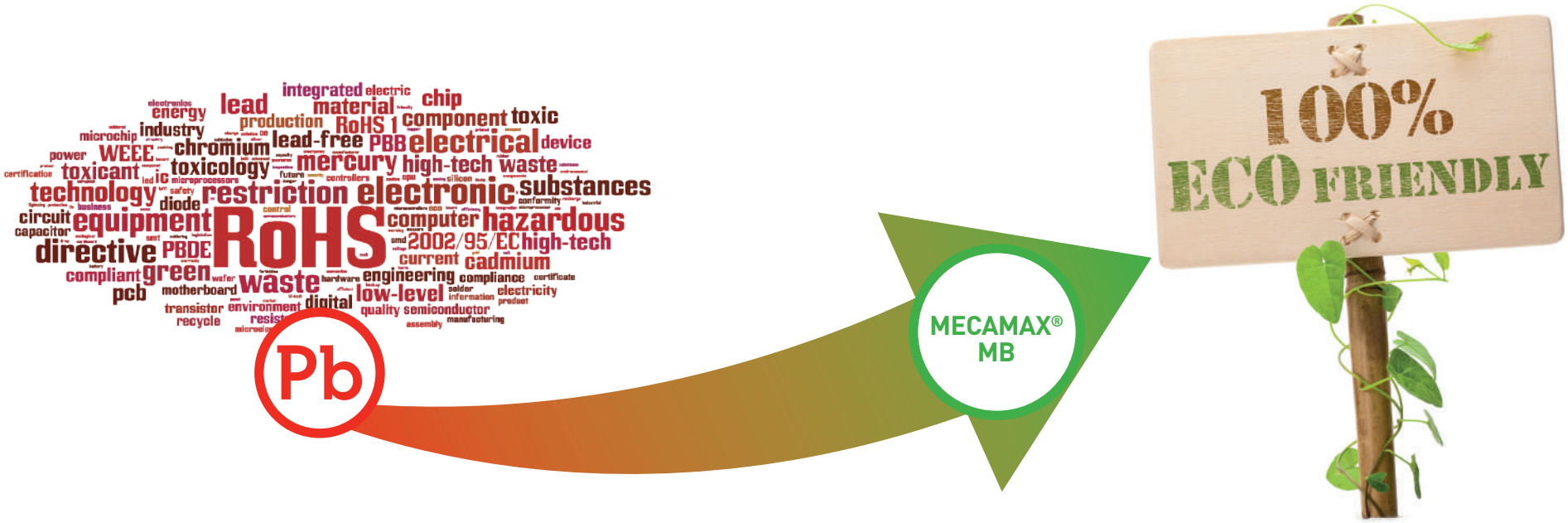
MECAMAX® MB



Standard cutting conditions	Higher cutting conditions (+10% rpm)
+55% tool life	+25% tool life -15% process time

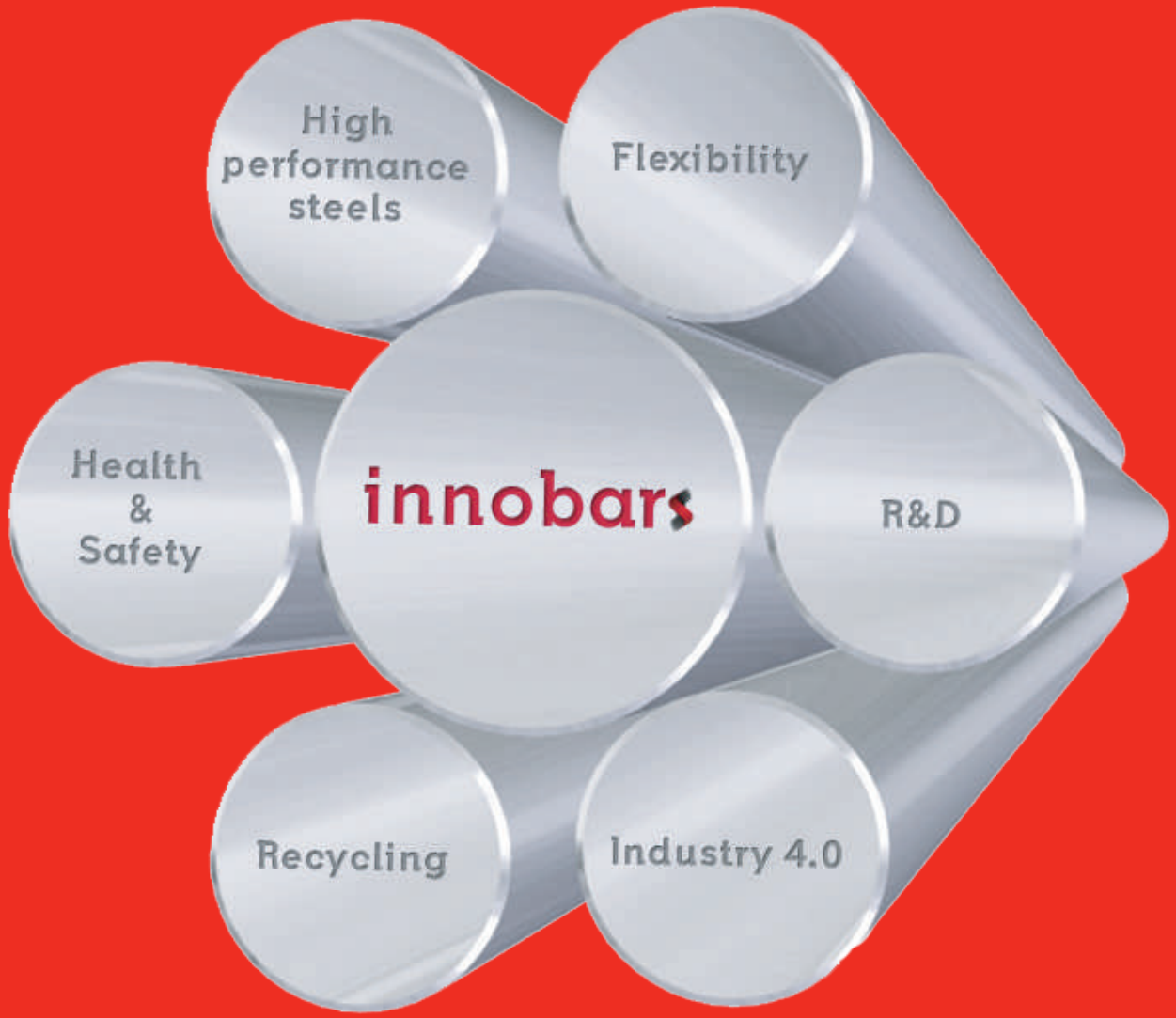
An Eco-Friendly Material

- Many of MECAMAX® MB applications are for non-toxic replacement of leaded steels. Unlike other machinability improved steels containing Pb, MECAMAX® MB is harmless to health and can be recycled as many times as you want without following any special regulation.



MECAMAX® Technology

Engineering Steels with Improved Machinability



MECAMAX® Technology: Engineering Steels With Improved Machinability

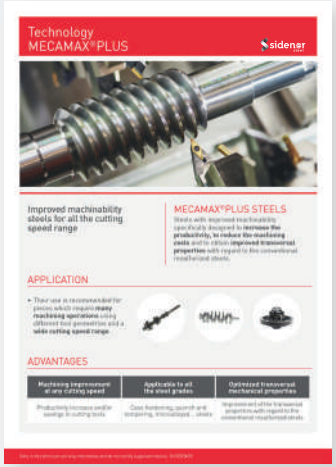
MECAMAX® MB

Improved machinability steels for high performance applications

MECAMAX® AV

Improved machinability steels for high cutting speeds

MECAMAX® PLUS



Improved machinability steels for all the cutting speed range

Thank you very much

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