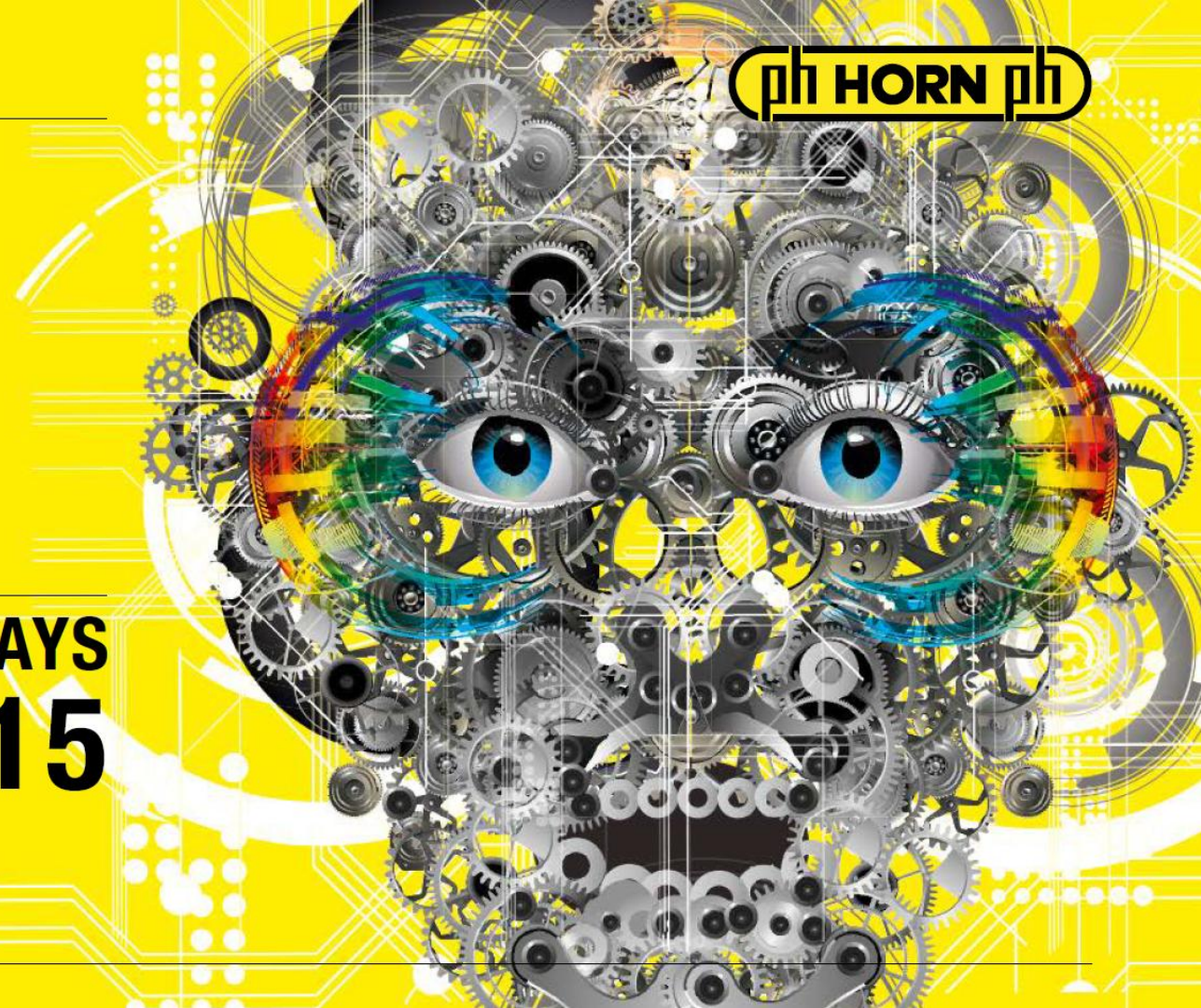


Welcome



DISCOVER
WHAT IS BEHIND
TECHNOLOGY DAYS
HORN 2015



Precision tools in the added-value chain

Speaker: Brett Kischnick

Precision tools in the added-value chain





Energy consumption of a machine tool

- Energy Efficiency

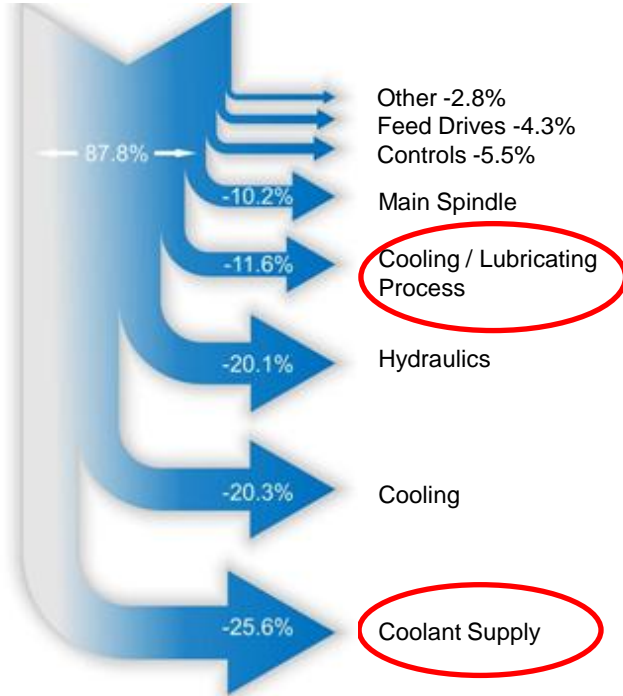
Machine Builders looking anxiously at the light bulb

Per regulation of the European Union, the future will bring even more efficient machine tools. The industry would like to avoid more regulation.

06.10.2011, von **HOLGER PAUL**

- "Eco-Design Directive"

Energy consumption of a machine tool.



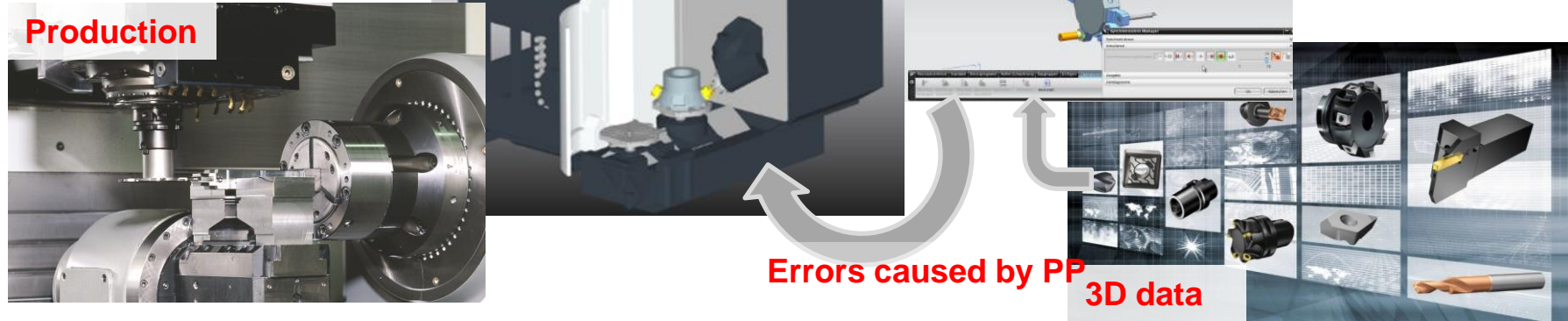
- Approx. 37% of power consumption is attributable to cooling & lubricating cutting edges.



Less is more!
Either MMS or
targeted use at the cutting zone

Virtual machine

- Simulation based on real NC data
- No post-processor as risk factor
- Availability of 3D data?



Virtual machine

- Data provision



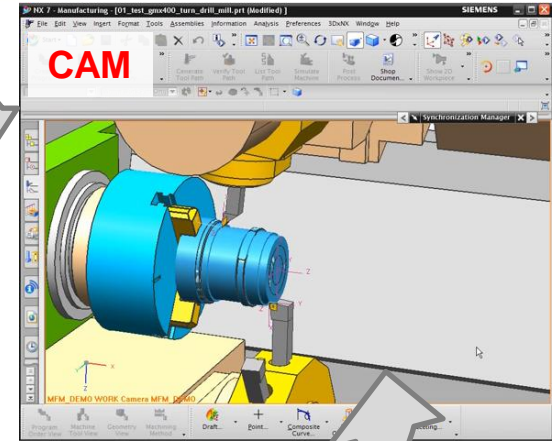
Horn standard master data
CAD data ISO 13399



DIN/ISO master data
CAD data ISO 13399



Graphical Tool Data Exchange
DIN 4000 master data
CAD data ISO 13399



Cutting data calculation – online → <http://hct.phorn.de>

- Without access data



Horn Circular Technology User Gastzugang | Logout

ph HORN ph Hartmetall-Werkzeugfabrik - Paul Horn GmbH English ▾

Home Calculation of cutting data NC-Programme Video Info

Manual input / Recommended data for threadmilling internal

Man. input speed rate <Vc> and medium chip thickness <hm> or variable data
 Speed rate and medium chip thickness (Experience data)

Recommended Carbide grade

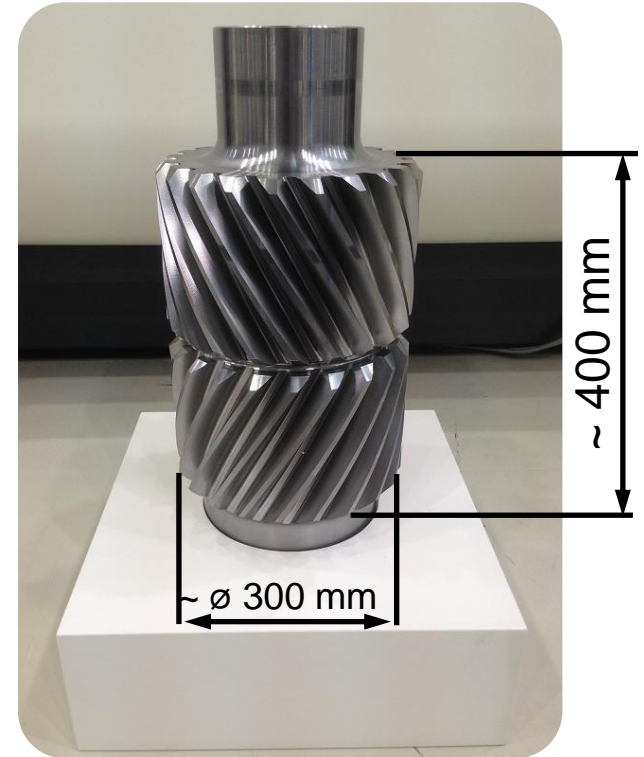
<p>Material group</p> <ul style="list-style-type: none"> Carbon steel 0.2% C Carbon steel 0.4% C Carbon steel 0.6% C Alloyed steel: annealed Alloyed steel: heat treated 280 HB Alloyed steel: heat treated 350 HB High alloyed steel (annealed) Stainless steel Cast steel not alloyed Cast steel alloyed Malleable cast iron Grey cast iron Spheroidal graphite cast iron: ferritic Spheroidal graphite cast iron: perlitic Heat resistant alloys Heat resistant alloys (Ni or Co) Al-Alloys (not heat treatable) Al-Alloys (heat treatable) Cast Al-Alloys (not heat treatable) Cast Al-Alloys (heat treatable) Coper-Alloys 	<p>Machine rigidity factor</p> <ul style="list-style-type: none"> High rigidity Rigid Not rigid <p>Clamping rigidity factor</p> <ul style="list-style-type: none"> Very rigid clamping Rigid clamping Miserable clamping <p>Interface of milling cutter and length</p> <ul style="list-style-type: none"> Very rigid design Rigid design Miserable design <p>Surface quality</p> <ul style="list-style-type: none"> excellent surface Rz=1 High finished surface Rz= 4 Finished Rz= 6.3 to 16 Roughed Rz=16 to 40 	<p>Tool factor</p> <ul style="list-style-type: none"> Insert type 314 with milling cutter Insert type 328 with milling shank Insert type 311 / 313 with milling shan MINI insert with milling shank Others (rigid design) Others (miserable design) <p>Width of insert
</p> <p>2,000 mm</p> <p style="text-align: center;">Search carbide grade</p>
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Next Cancel

New technologies

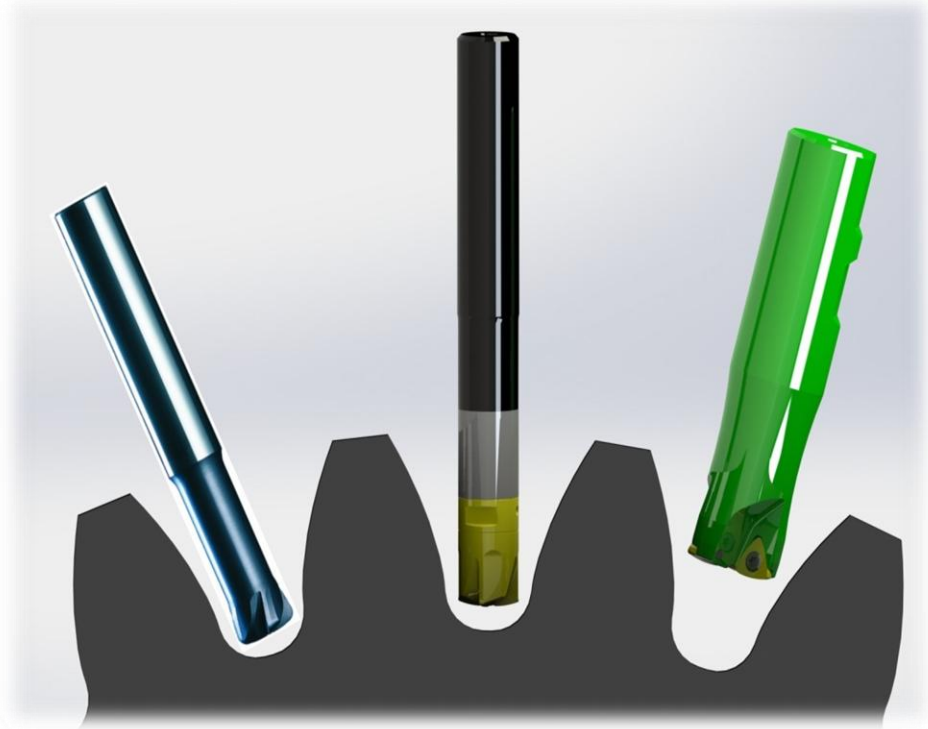
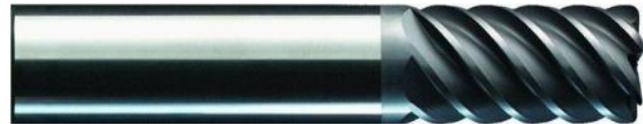
e.g. gear milling with standard tools

- Use of new high-feed rate technology
- New process workflows
- Standard tools
- Standard machines



Gear milling

- Maximize material removal rate
- Adapted tool concepts
- Rough machining with DAHM25
- Finishing with DSM12



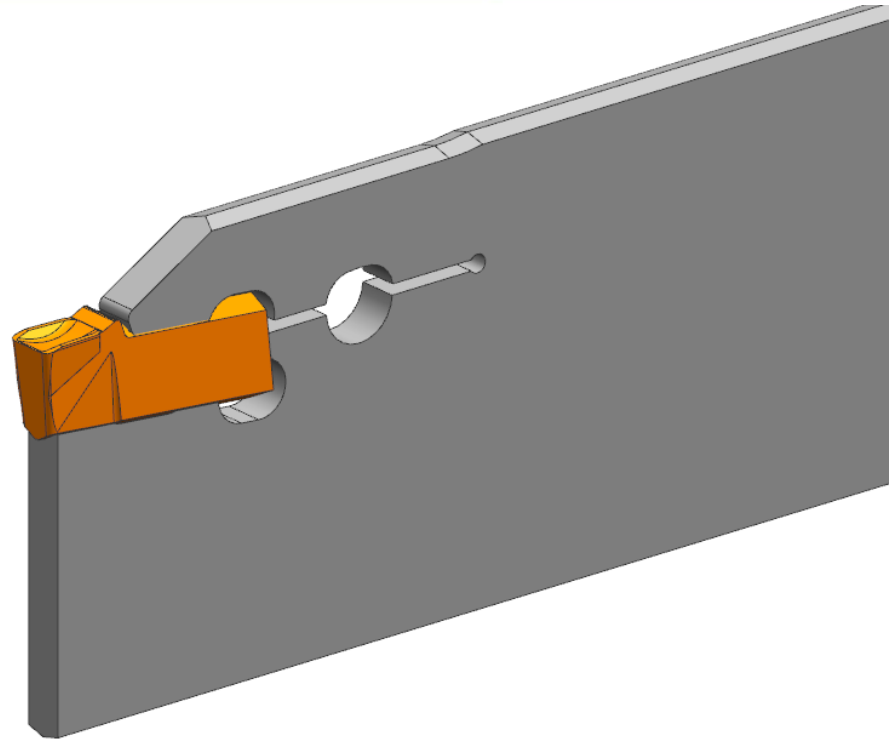
State-of-the-art technology

Blades with/without internal cooling

Projection length adjustable

BUT:

- Rigidity?
- Precision?
- Tool life?
- Productivity?



The future

Modular grooving systems 845/842

- Maximum rigidity
- Integrated cooling
- Construction kit
- Height-adjustable

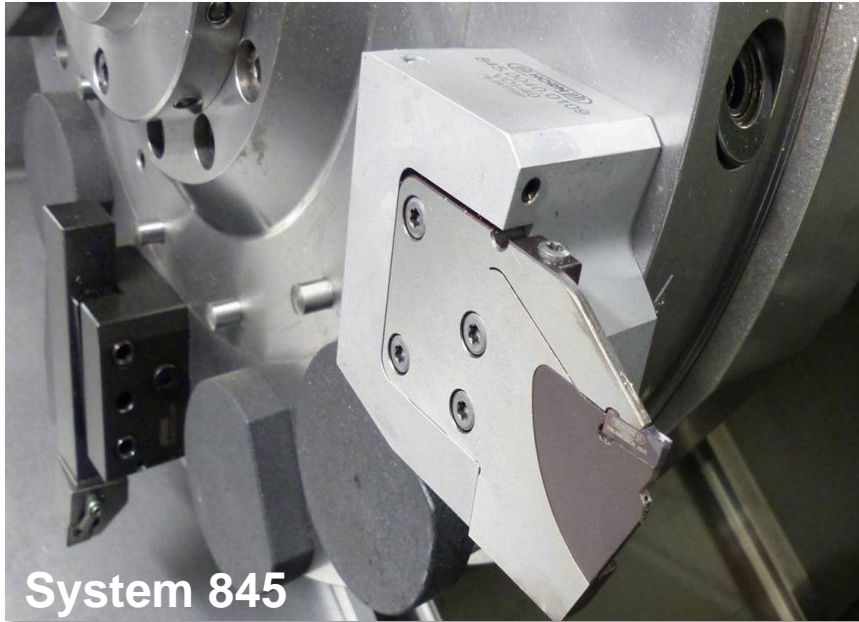
Advantages

- Cutting parameters
- Tool life
- No face turning!

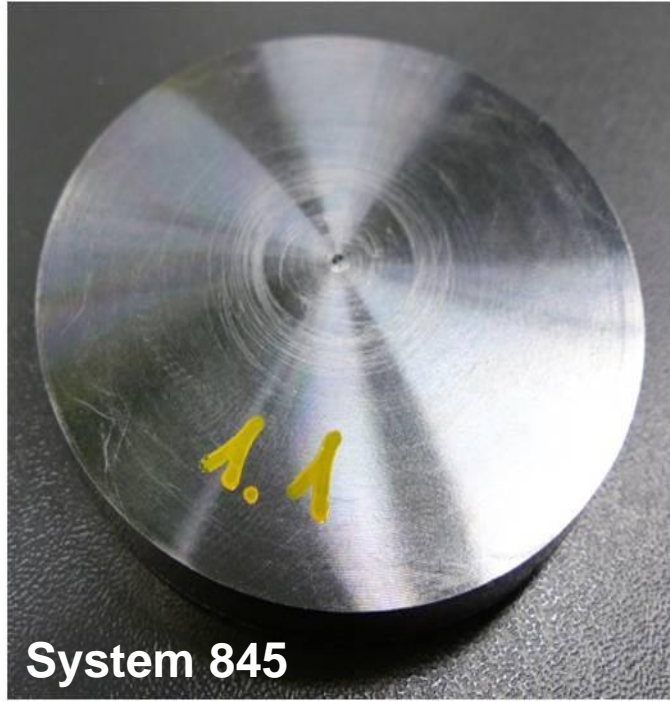


The proof

Comparison of flatness and roughness of cartridge 845/parting-off blade



Comparison of parting-off surface flatness

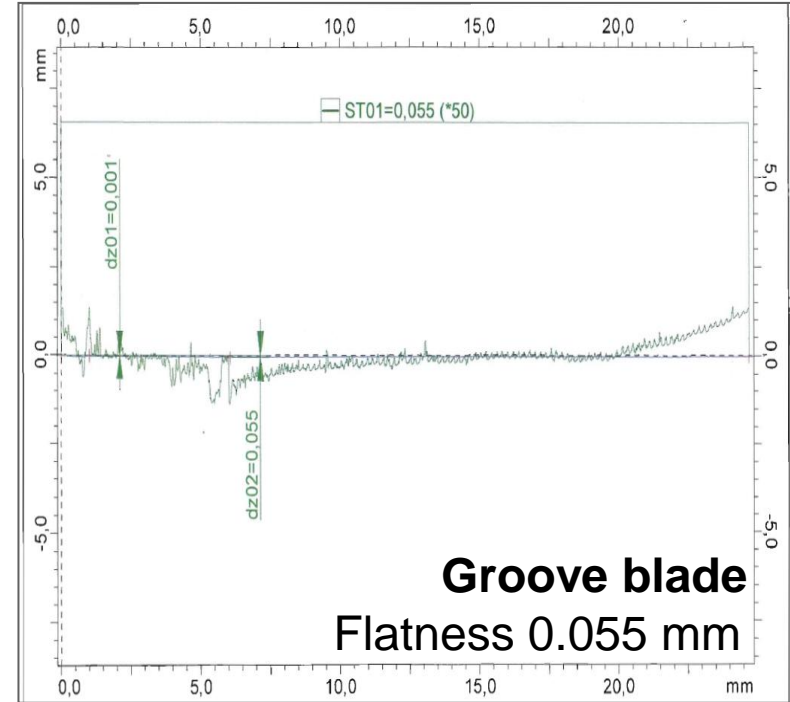
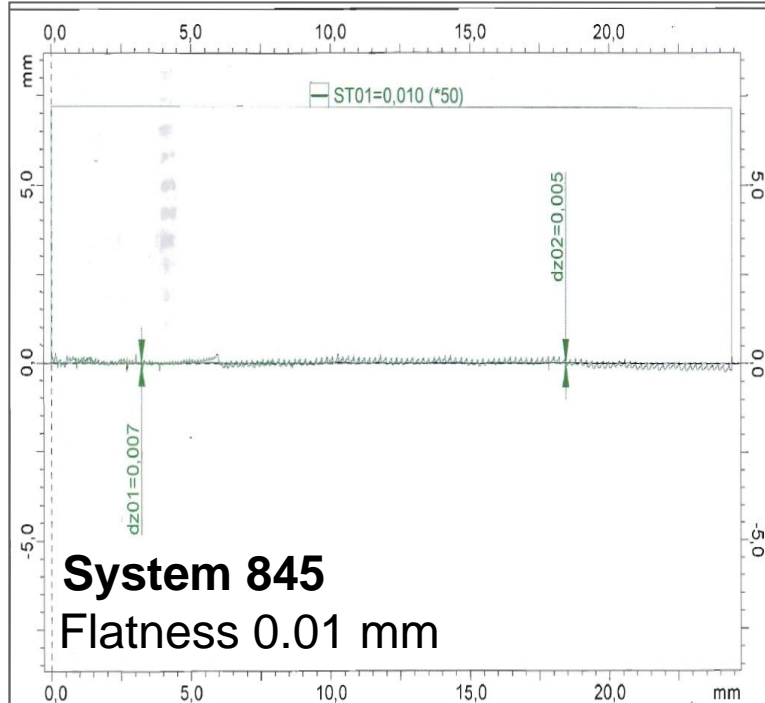


System 845

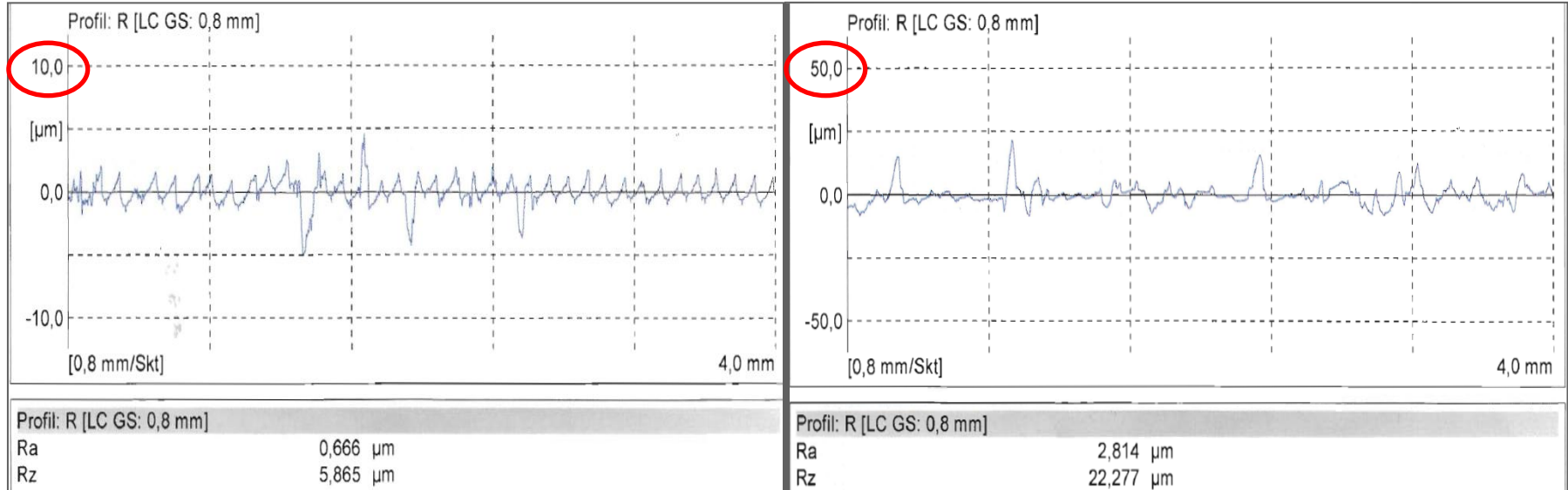


Groove blade

Comparison of parting-off surface flatness



Comparison of parting-off surface roughness



System 845

$R_z = 6 \mu\text{m}$

Groove blade

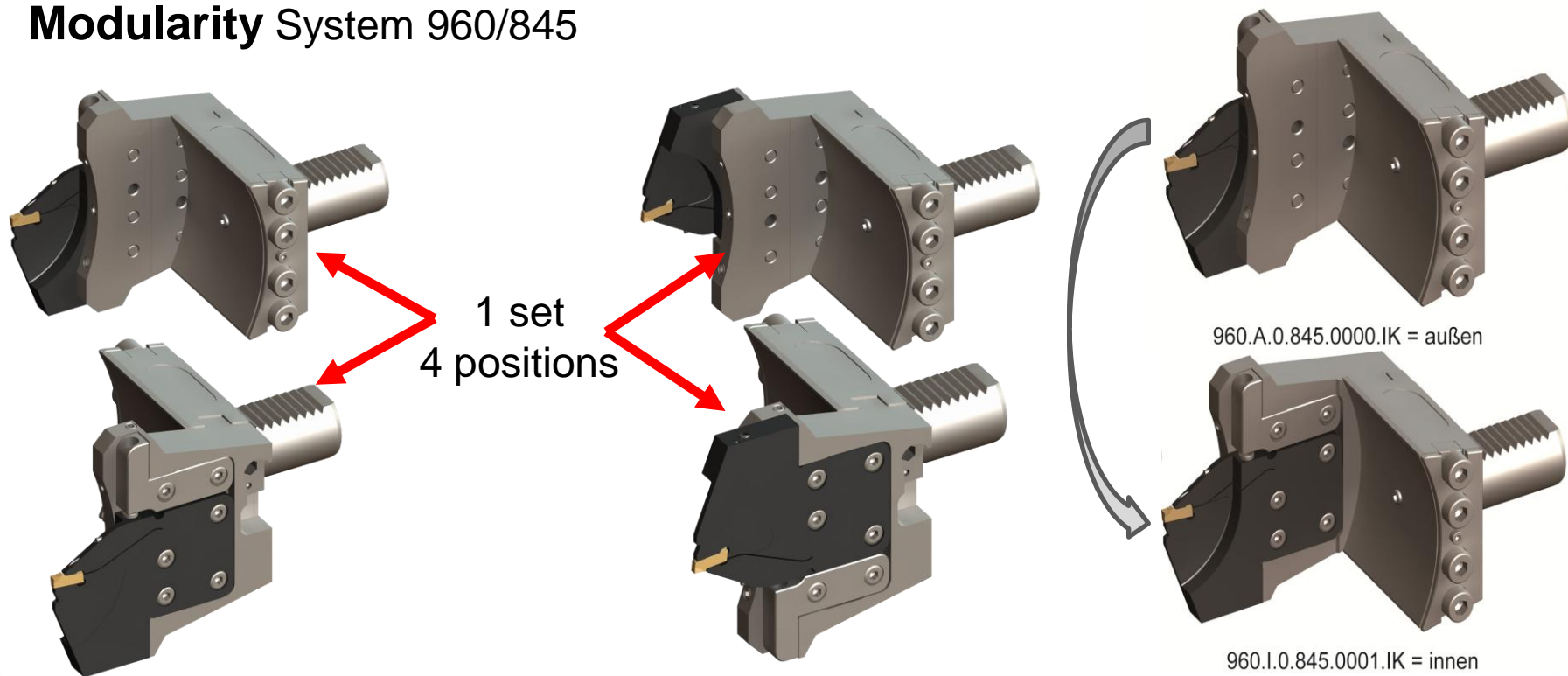
$R_z = 22 \mu\text{m}$

Modularity System 960/845

- For many BMT connections
- For VDI 25, 30, 40, 50
- Height-adjustable
- 1 holder → 8 positions



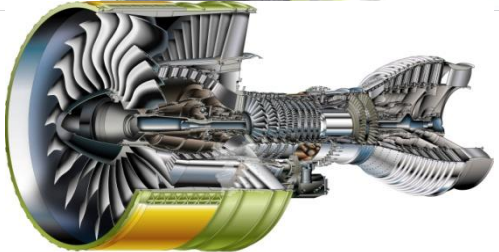
Modularity System 960/845



Materials

Technological developments are promoting the use of special steels and materials.

Mercedes-Benz SLS AMG E-CELL



Examples

- Lightweight construction: High-strength steels and carbon materials
- Appearance: Stainless steels in architecture
- Effectiveness: Superalloys in thermal processes
- Medical: Titanium, stainless and chromium cobalt steels

Increased use of duplex steels



Der neue international Flughafen von Doha mit seinem Dach aus nichtrostendem Duplexstahl (Quelle: Qatar Airways)



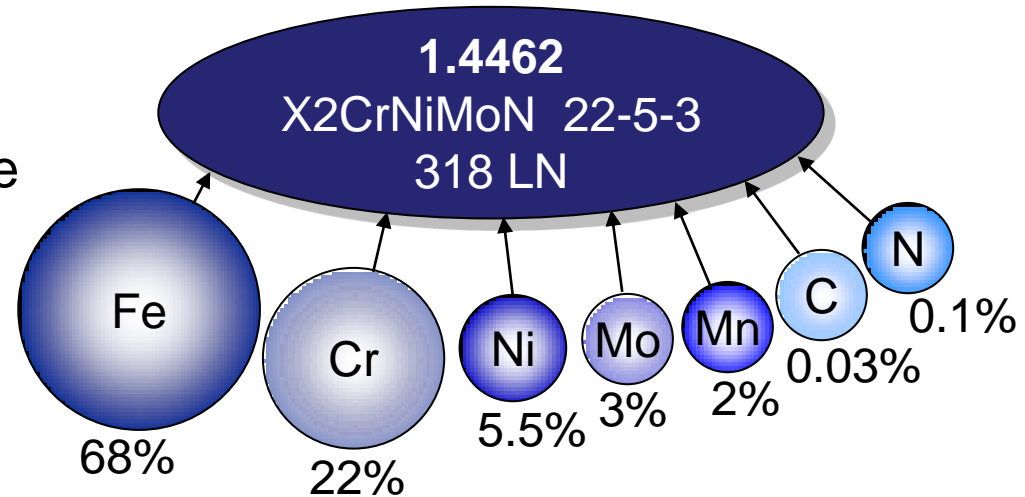
„The Helix“, Singapur, mit einem Tragwerk aus dem Duplexstahl EN 1.4462 (2205) (Quelle: Financial Dynamics/C. F. Jones)

Increased use of duplex steels

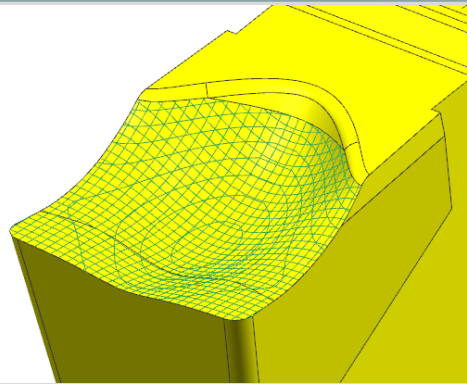
- Previously: Offshore, chemical, food
- New: Automotive (fuel, air conditioning, etc.)



- Austenitic/ferritic structure
- Very good corrosion resistance
- High strength
- Low nickel content
- Price
- Processing?



Parting off duplex steel 1.4462



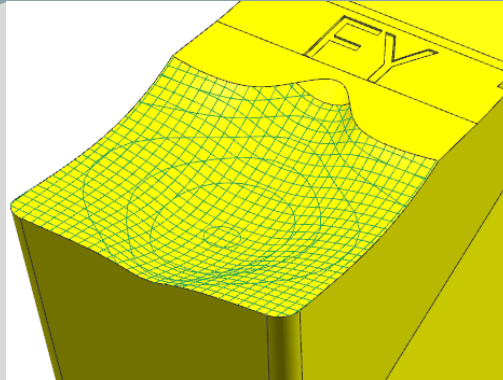
F geometry

$v_c \rightarrow 70 - 110 \text{ m/min}$

$f \rightarrow 0.04 - 0.1 \text{ mm/rev}$

Spiral chips

Good chip control



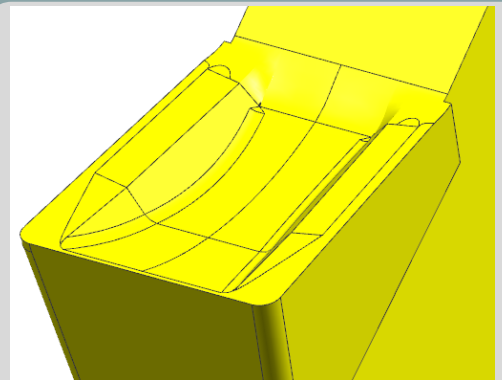
FY geometry

$v_c \rightarrow 50 - 110 \text{ m/min}$

$f \rightarrow 0.04 - 0.16 \text{ mm/rev}$

Spiral chip, short chip

Good chip control



3V2 geometry

$v_c \rightarrow 70 - 110 \text{ m/min}$

$f \rightarrow 0.08 - 0.16 \text{ mm/rev}$

High performance

Surface \rightarrow

Parting off duplex steel 1.4462



FY / $f=0.16 \text{ mm/rev}$



F / $f=0.1 \text{ mm/rev}$



3V2 / $f=0.1 \text{ mm/rev}$

Summary

- New requirements being placed on tools, e.g. energy consumption or information procurement
- Increasing requirements in familiar areas, such as material removal rate
- Enhanced requirements, e.g. materials

**THANK YOU
FOR YOUR ATTENTION!**