HUMBEL
Gear Technology

KISSsoft in Production

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KISSsoft Usermeeting 2019

23.10.2019 | Dr.-Ing. Tim Frech

Outline:

- Introduction Humbel Gear Technology
- Use of KISSsoft in Production
  - Use of KISSsoft in AVOR – Work Preparation
  - Tool Design
  - Manufacturing of Special Profiles
- KISSsys and Outlook

The Humbel Group – International Gears

1928
YEAR OF FOUNDATION

6
LOCATIONS

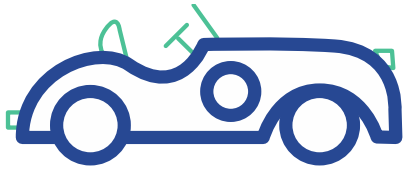
350
EMPLOYEES

Field of activities:

Innovative mindset in different sectors

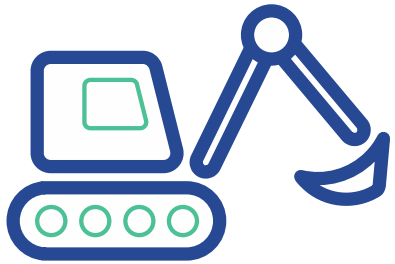
Rail Vehicles

Automotive / E-Mobility

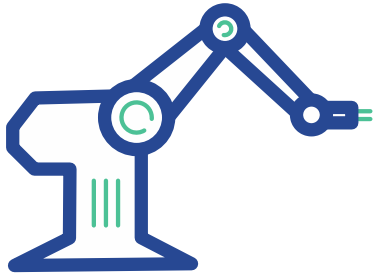


Vintage Cars

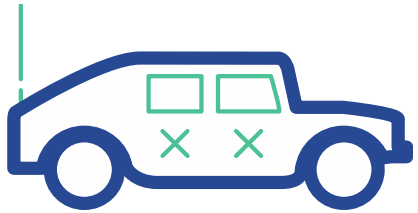
Motor Sport



Commercial Vehicles



Different Industrial Applications



Defence Industry

Aerospace

Highlights of Production:

Gears and Geared Parts

Tip diameter d_a: 20-800 mm Modul m_n: 0.5-12 mm


Engineering


Production


Assembly


Maintenance

Our range of services within the production:

Gear Cutting	Grinding	Broaching Eroding	Turning
Milling Drilling	Heat Treatment	Quality Inspection	And more...


SCHAEFFLER


PORSCHE
STUTTGART


TESLA


STADLER


BOSCH

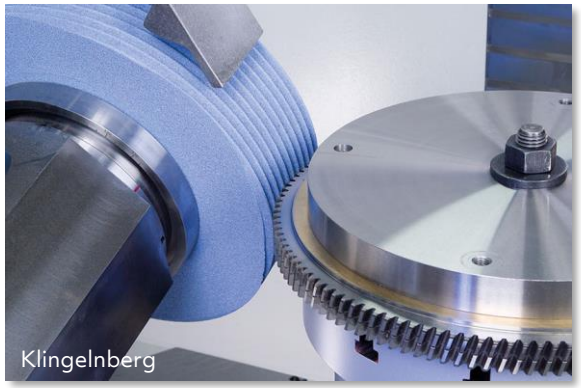

NETSTAL

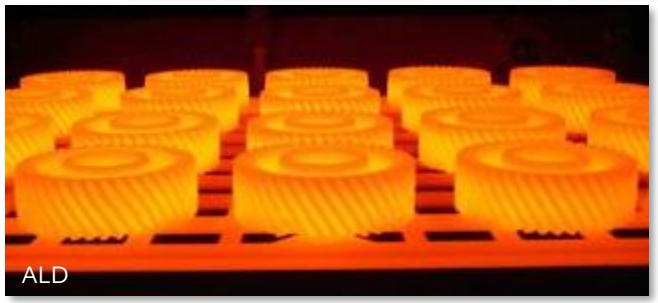

RIETER
R35

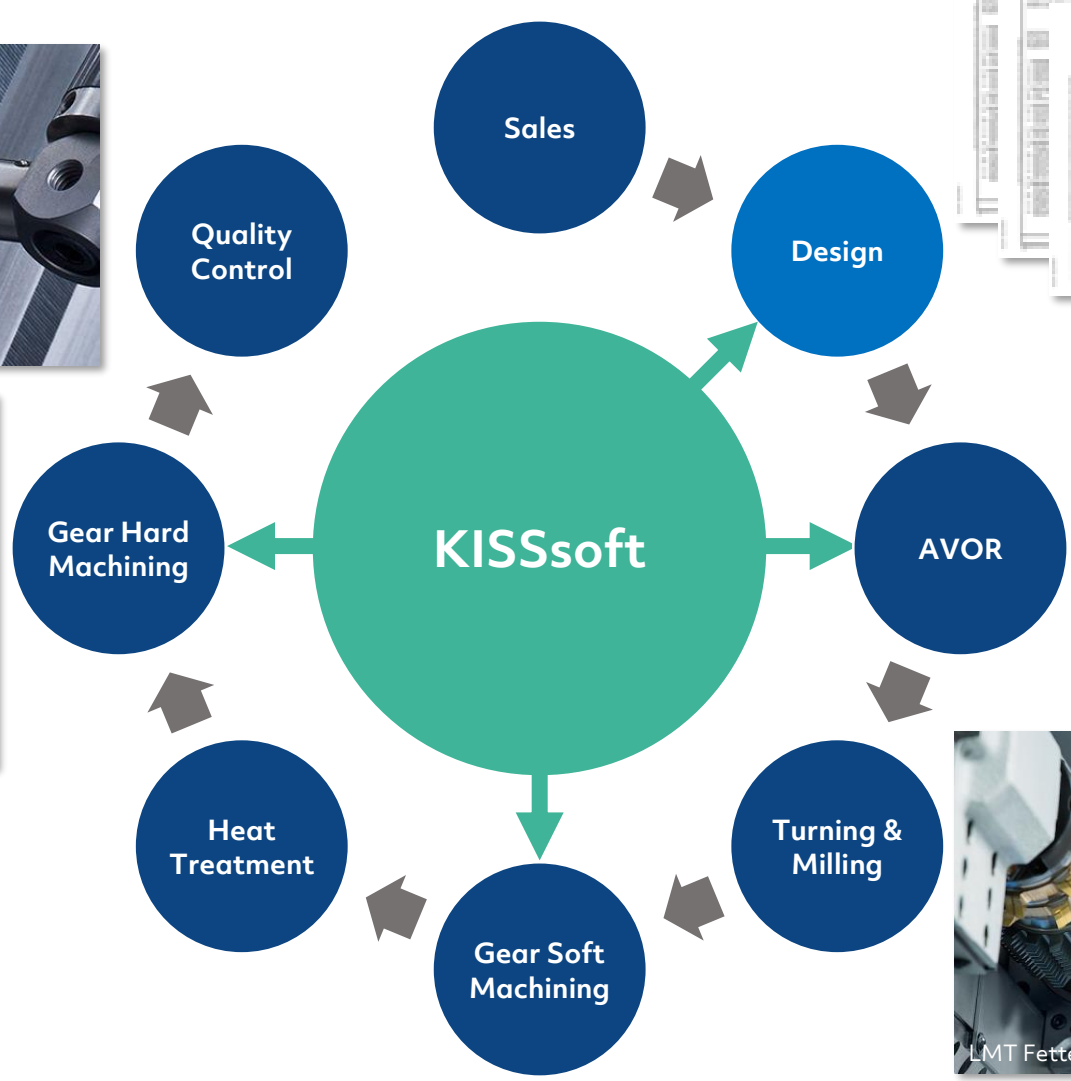

HGT
PRECISION

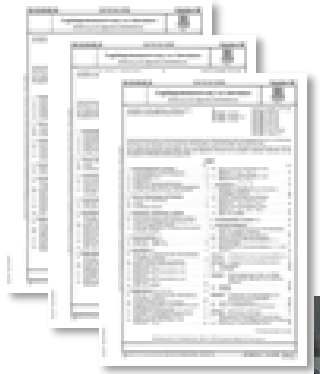
Production Process

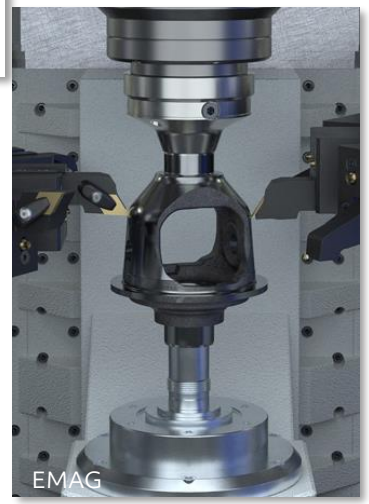
Production Process











AVOR – Work Preparation

- AVOR designs the whole manufacturing process for each gear
- KISSsoft helps to understand gear technology
  - By using gear form
  - By using cutter form and simulating manufacturing processes
  - By designing tools
- KISSsoft helps to visualise the influence on different parameter
- KISSsoft helps to create data and documents for all processes steps in gear production

KISSsoft supports in AVOR every day

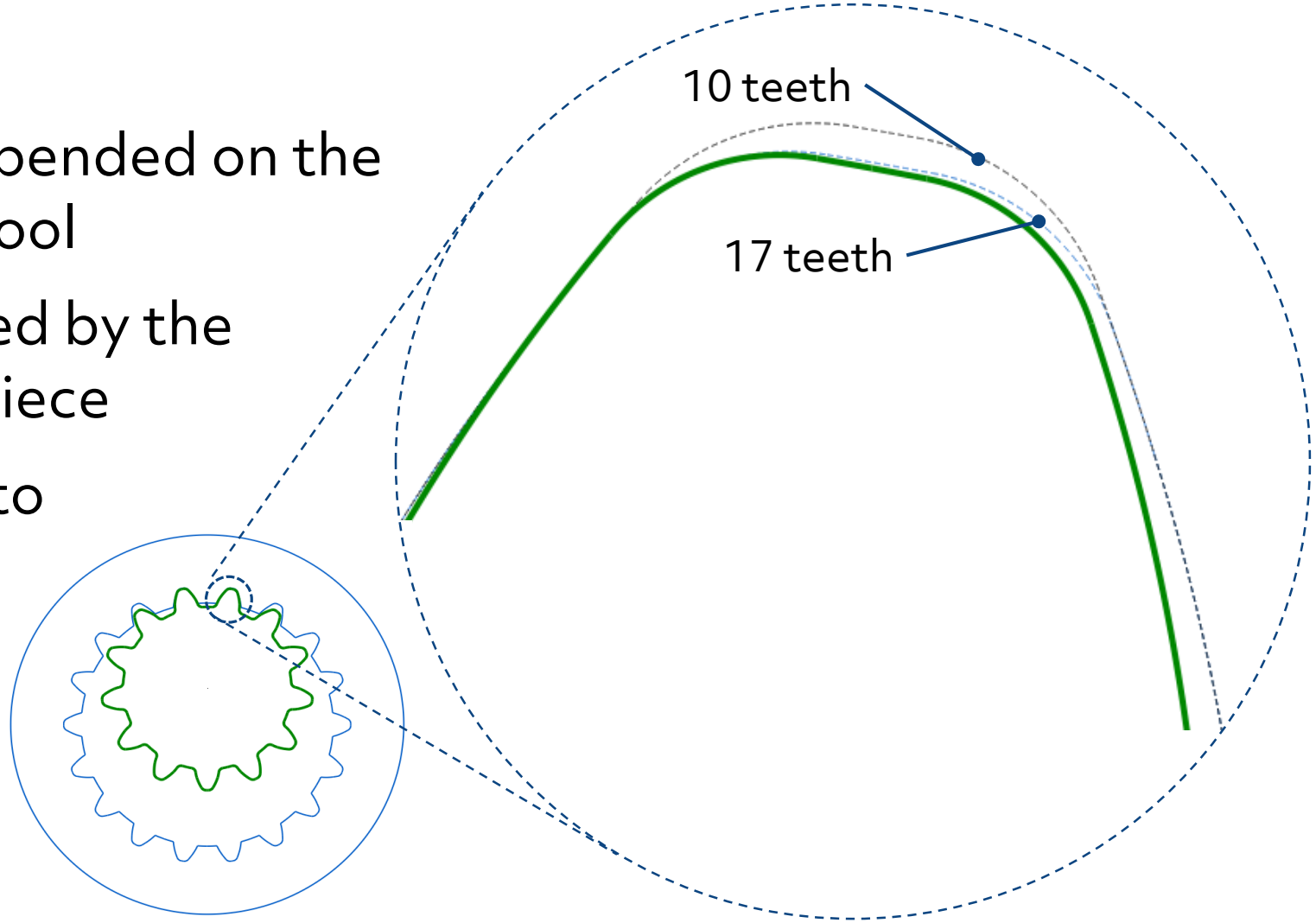
Tool Design and Process Analysis

Tool design for Shaping

- Coated carbide tools
- Tool design in-house
- Tool manufacturing by external supplier
- Reduction of delivery times from approx. 3 Mt. to 3 Weeks

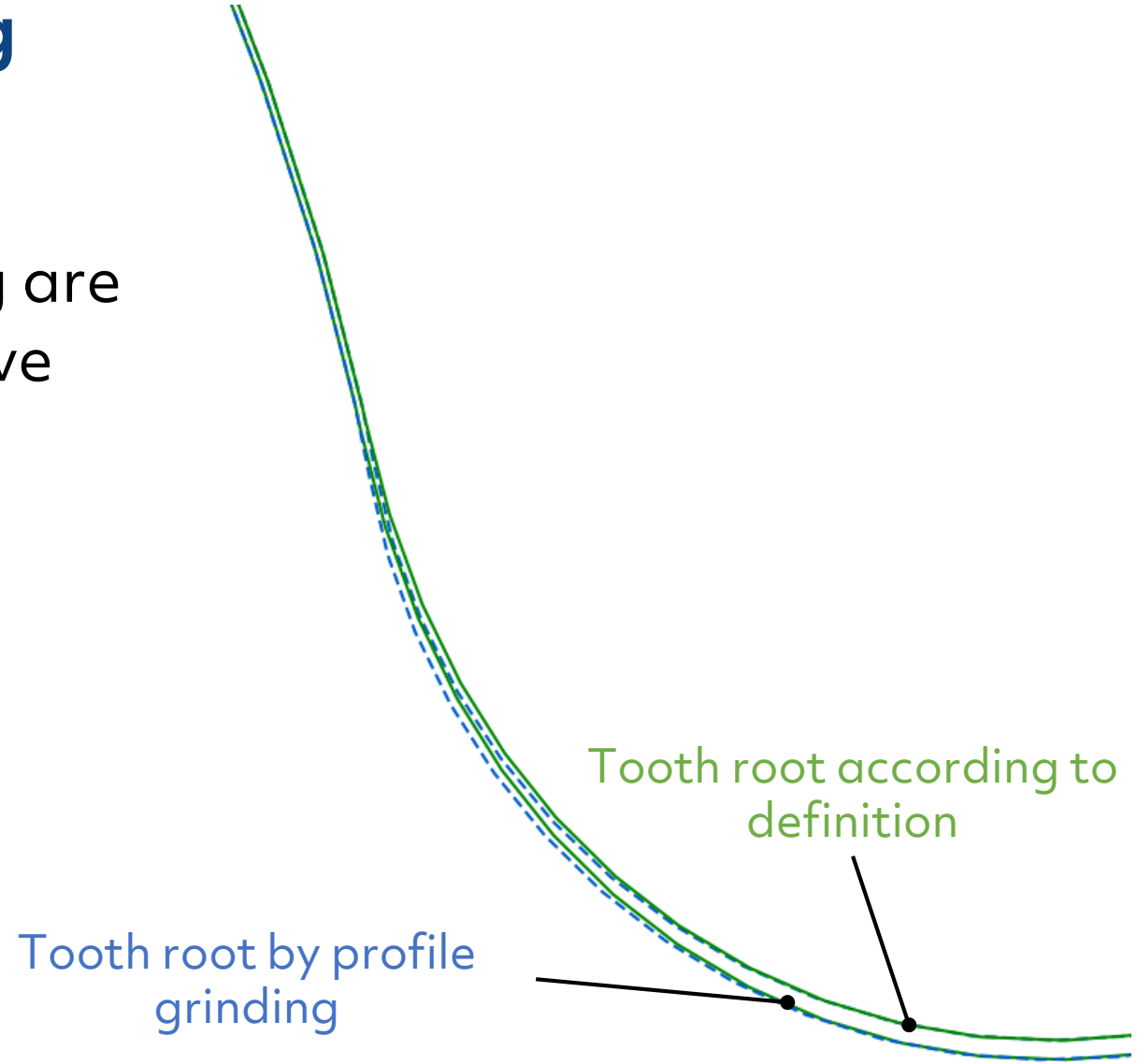
Influence of Number of Teeth

- Tooth root is directly depended on the number of teeth of the tool
- Number of teeth is limited by the dimension of the work-piece
- A stiff tool design helps to optimise gear quality



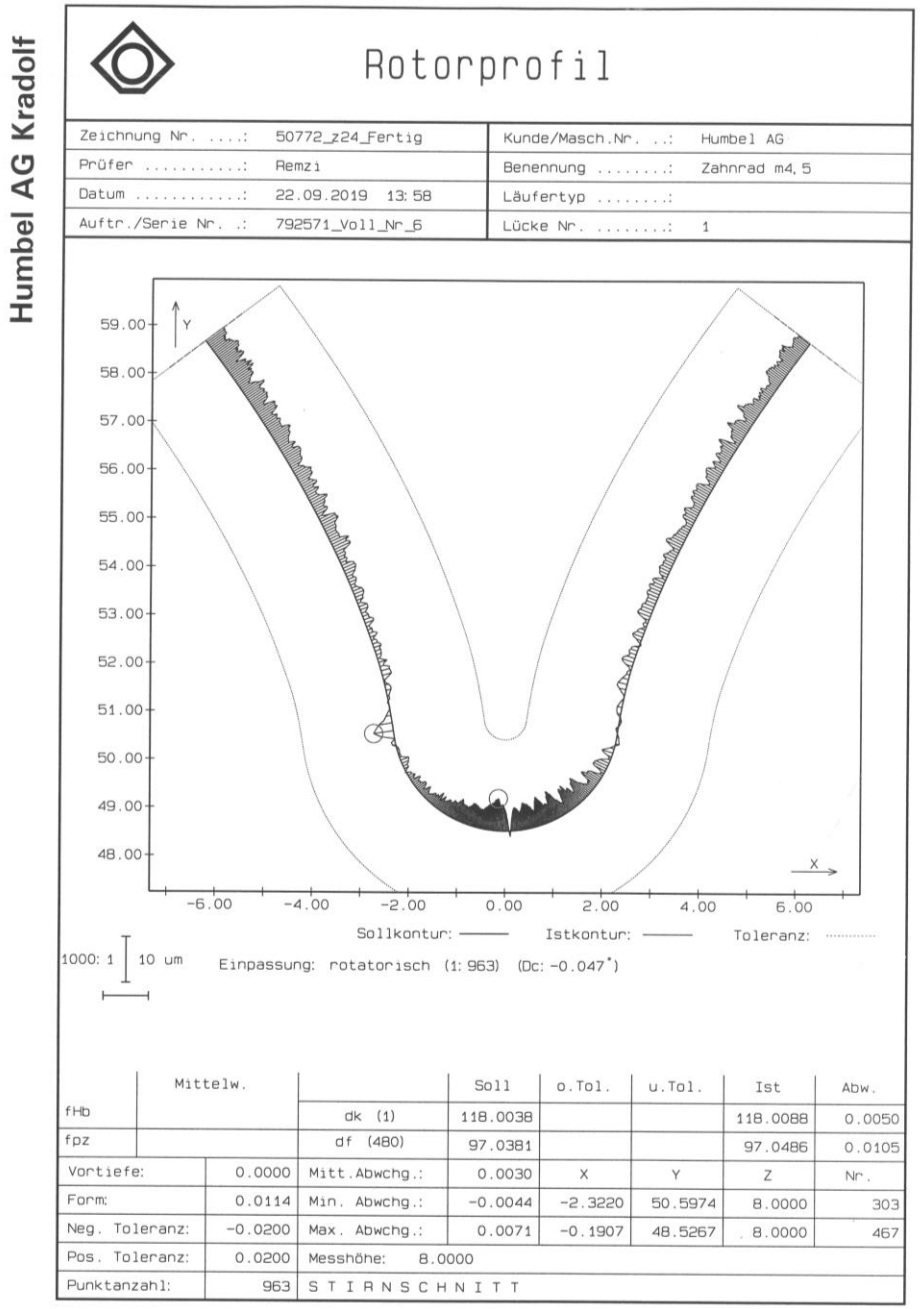
Tooth Root in Profile Grinding

- Tooth roots according to drawing are normally determined by generative processes
- For prototypes or small batches, gears are often produced with profiling processes



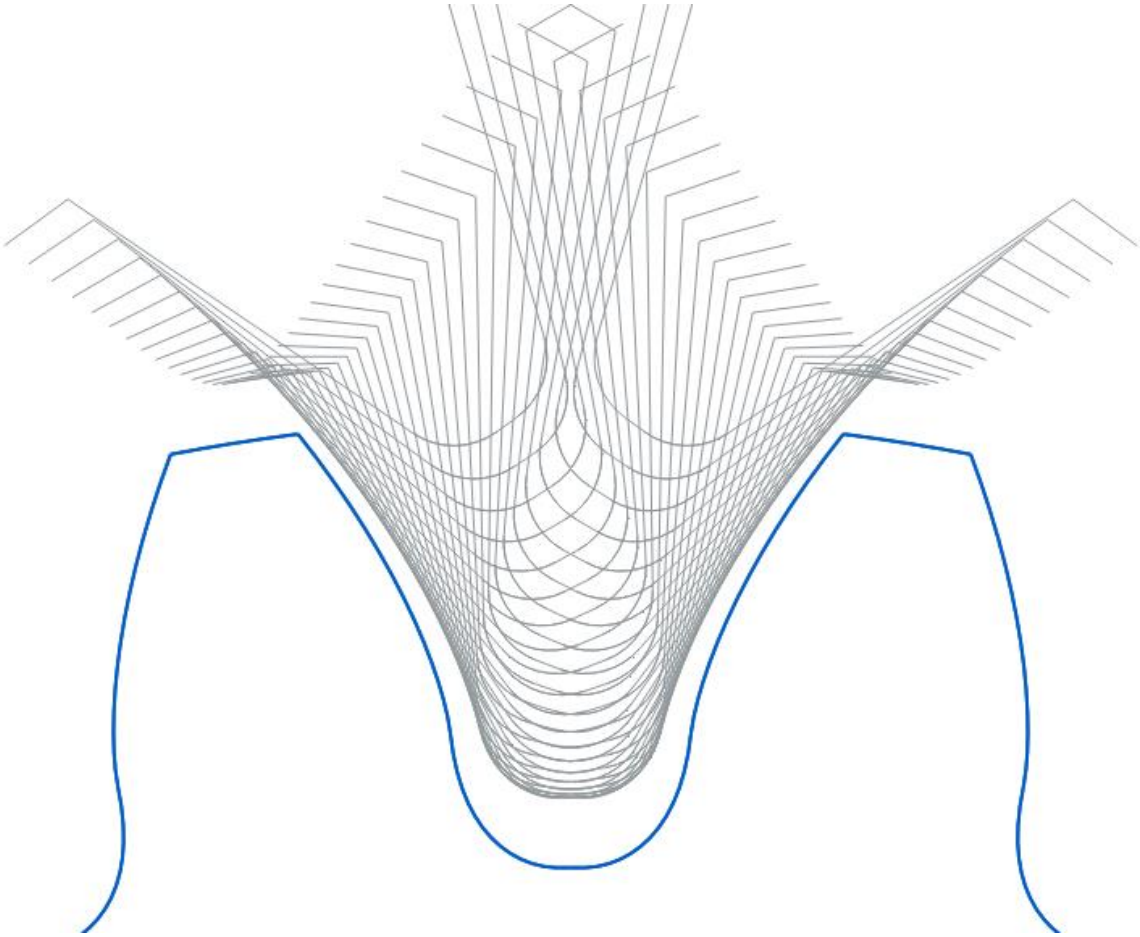
Verification of the Shape

- Checking and documentation of the tooth shape as initial sampling
- Focus on tooth root shape



Gear Soft Machining for Single Part Production

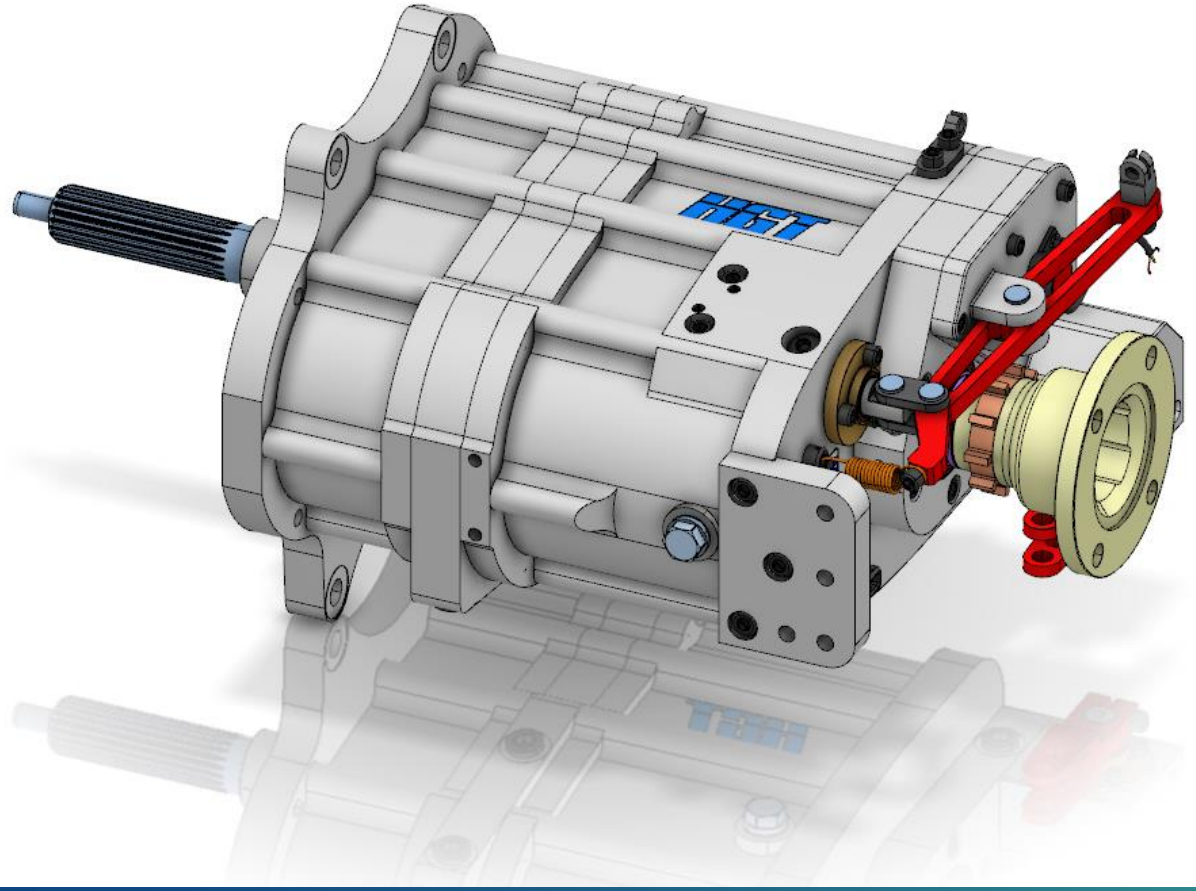
- Procedure for Gears with special module and short delivery times
- Hobbing with similar modul to remove as much material as possible
- Soft grinding for precise involute



KISSsys

KISSsys – System Calculations

Sequential Rally-Gearbox

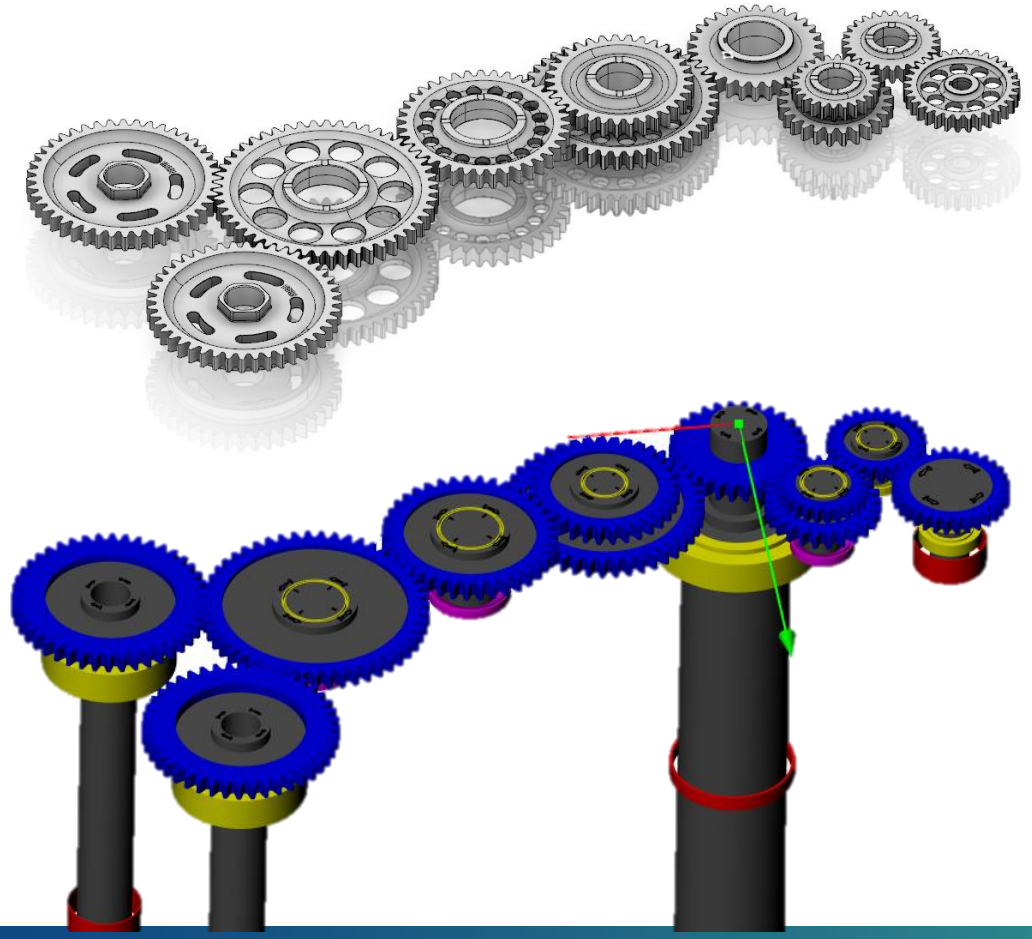


Different variants: 4, 5 and 6-gears

- Optimised with KISSsys / KISSsoft to lightweight
- Modular design (different transmission ratio with similar gears)
- Design of the whole transmission including gears, shafts and bearings

KISSsys – System Calculations

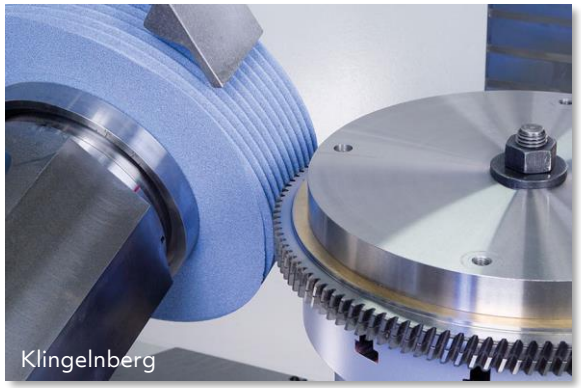
Camshaft Timing Gears for World Rally Championship (WRC)

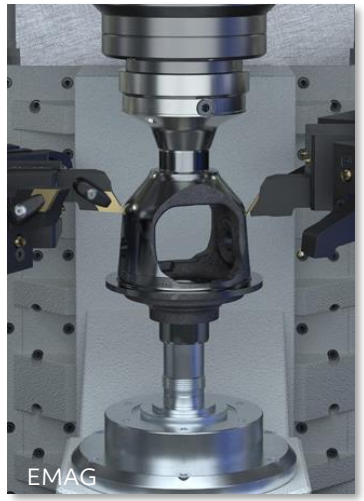


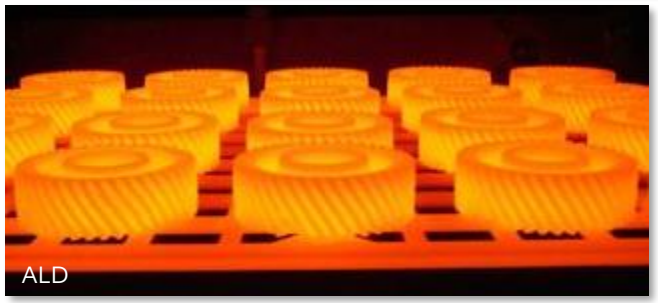
- Multistage design
- Fixed, specified ratio of i = 0.5
- Design with respect to high dynamic loads and precise timing
- Design of the whole transmission including gears, shafts and bearings

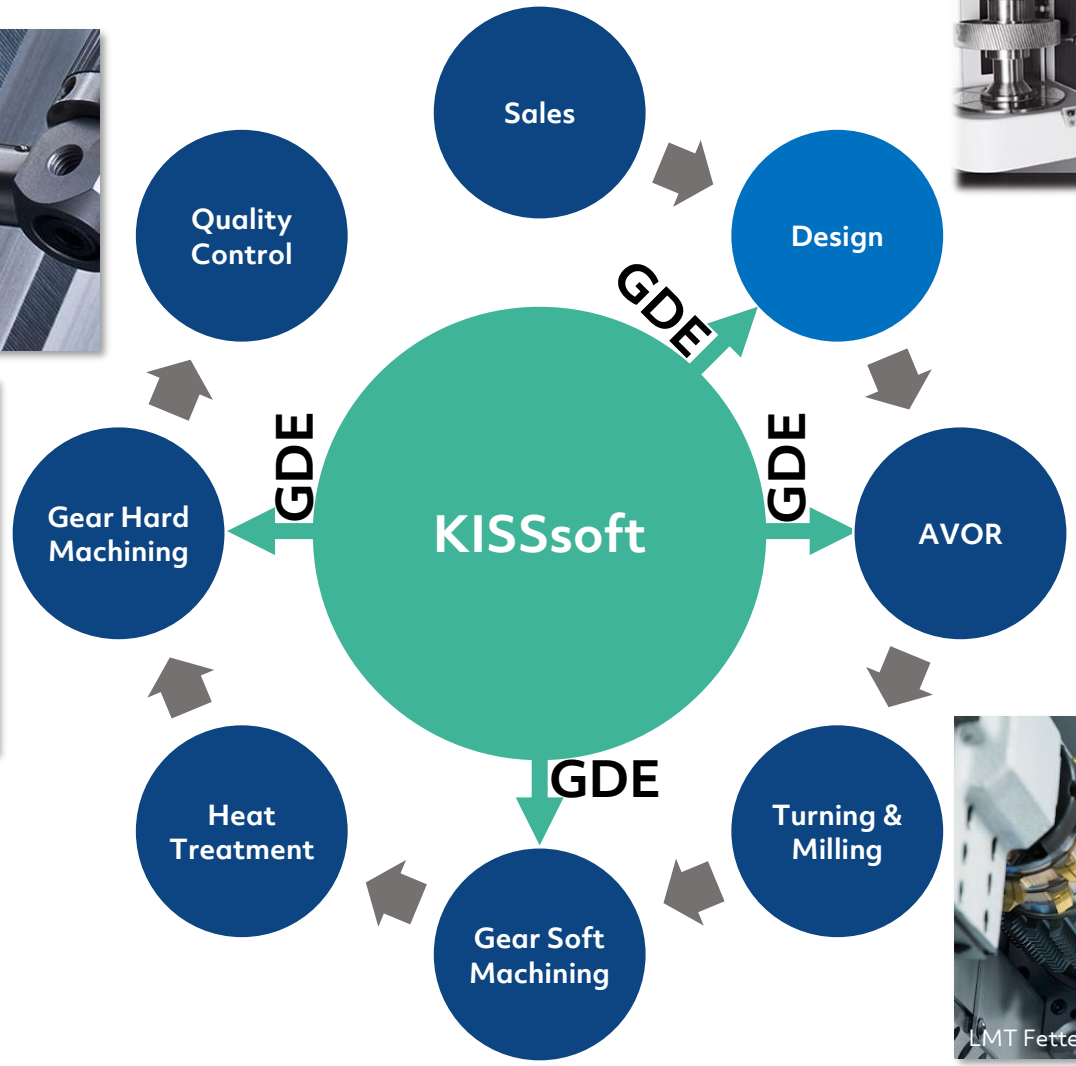
Outlook: Gear Data Exchange Format (GDE)

Production Process









Outlook: GDE-Format

- Could be used for automated generation of machining parameters
- Could be used for automated measuring program
- Could be used for automated interaction of processes

→ Minimise human errors

→ Maximise efficiency

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Thank you for your attention

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