

**EES X GEAR**

**Plastic Gear Expertise**



Plastic Gear Expertise

Key engineers in Switzerland, Germany and Austria manage your project, provide you with expertise, testing facilities and know-how transfer.

[h.dinner.ees@gmail.com](mailto:h.dinner.ees@gmail.com)

+41 79 372 64 89.

## Value proposition



Hanspeter Dinner, Dipl. Ing. ETH

- ✓ 30+ years experience.
- ✓ Gearboxes + bearings.
- ✓ Gear theory, FEM, testing.



Martin Schmid, Ing. Mag. FH

- ✓ 30+ years experience.
- ✓ Injection molding, tool design.
- ✓ Industrialization, Digitization.



Gunter Maierhofer, Dipl. Ing. TU

- ✓ 30+ years experience.
- ✓ Actuators + mechanisms.
- ✓ Gear design, FEM, CFD.



Hans Jörg Dennig, PhD

- ✓ 20+ years experience.
- ✓ Additive manufacturing.
- ✓ Testing.



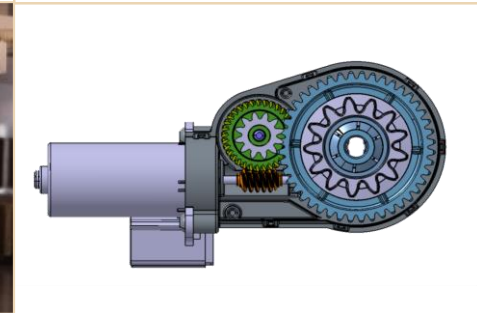
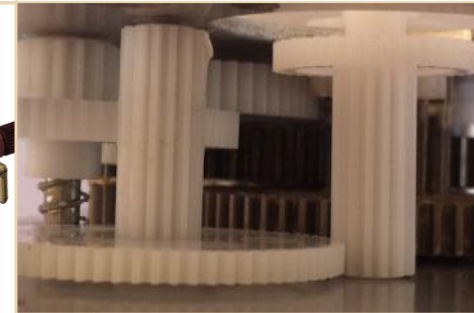
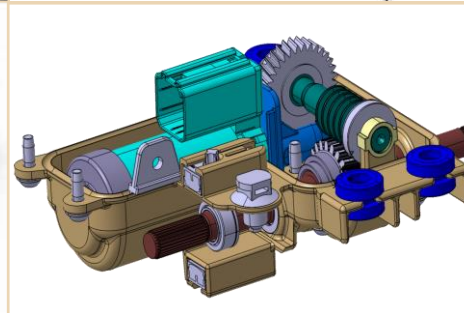
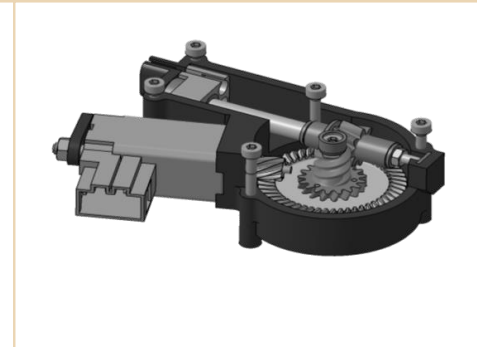
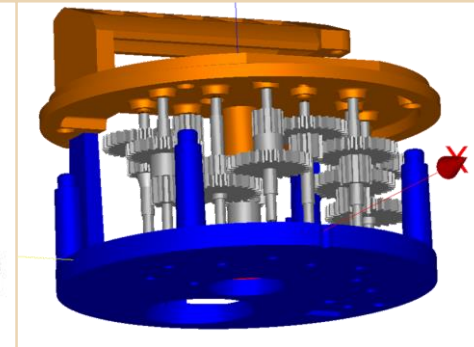
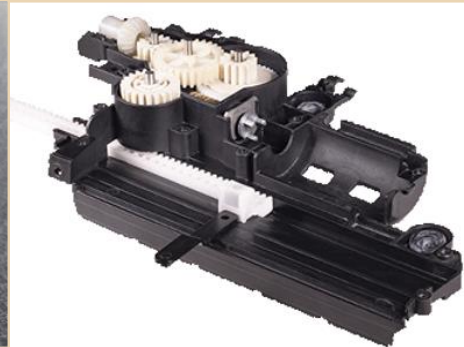
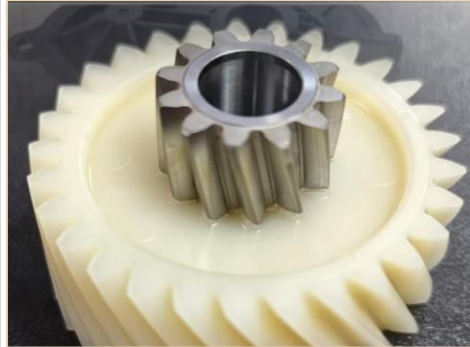
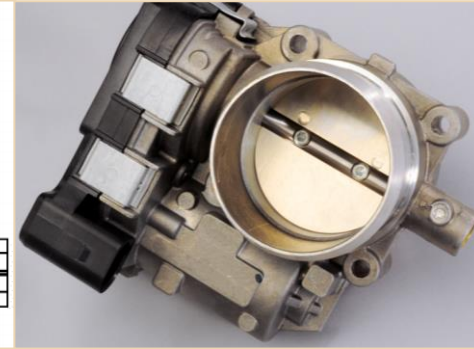
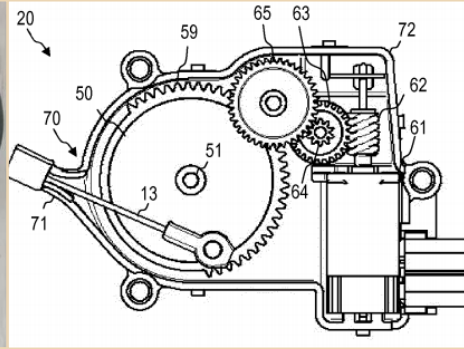
Plastic Gear Expertise

# Value proposition

Actuators and meters, robots and scientific instruments, printers and home entertainment, toys and building automatization, linear or rotary movement, ...

Concepts, kinematic and energetic simulation, gear optimization and design for manufacturing, ...

Patenting, training and sourcing as additional services going beyond the typical role of a third-party engineering office.



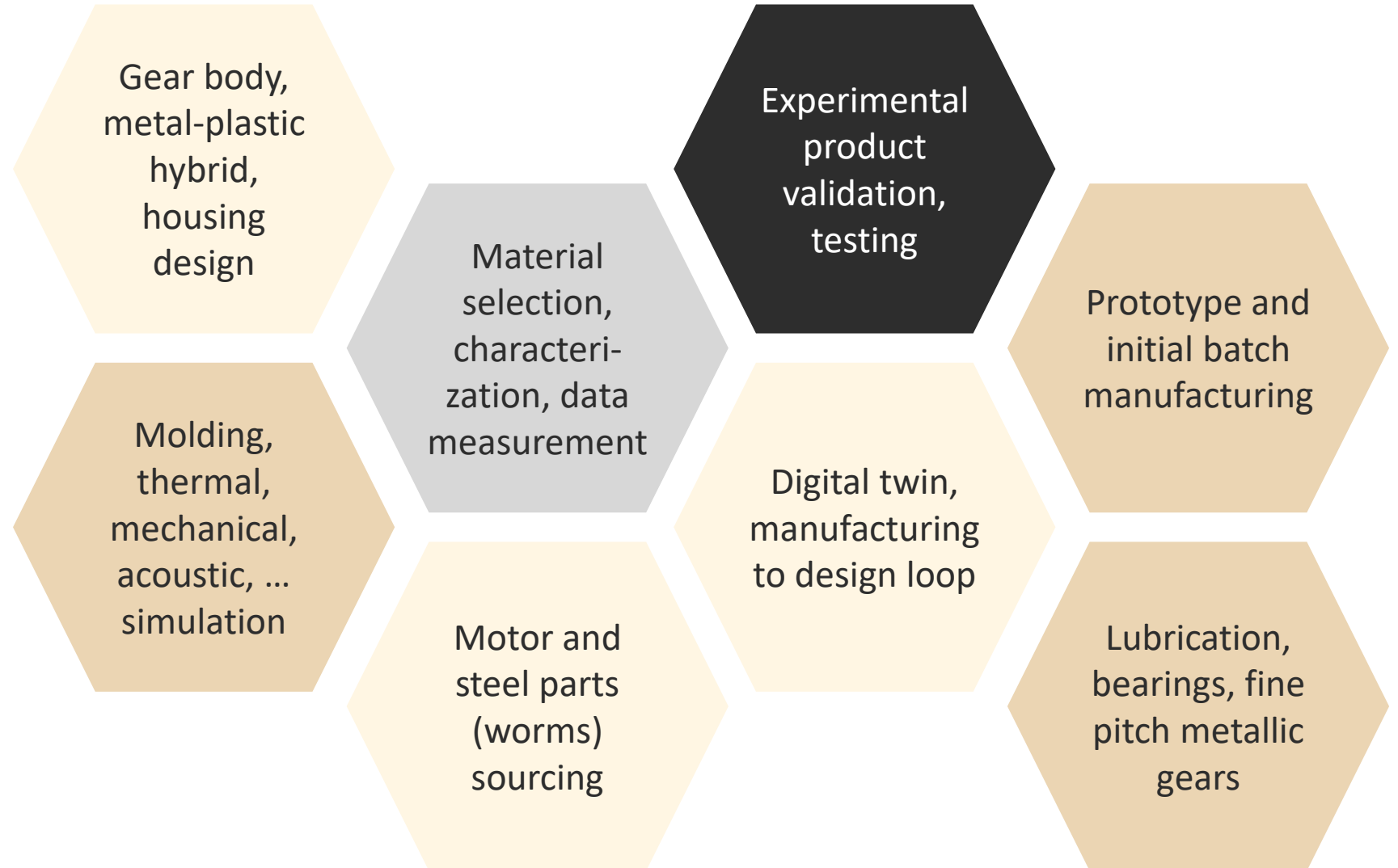


Plastic Gear Expertise

## Value proposition

Our wide range of services meets your requirements along the whole product development cycle.

Ranging from conceptual design to delivering gear parts in volume at competitive pricing.





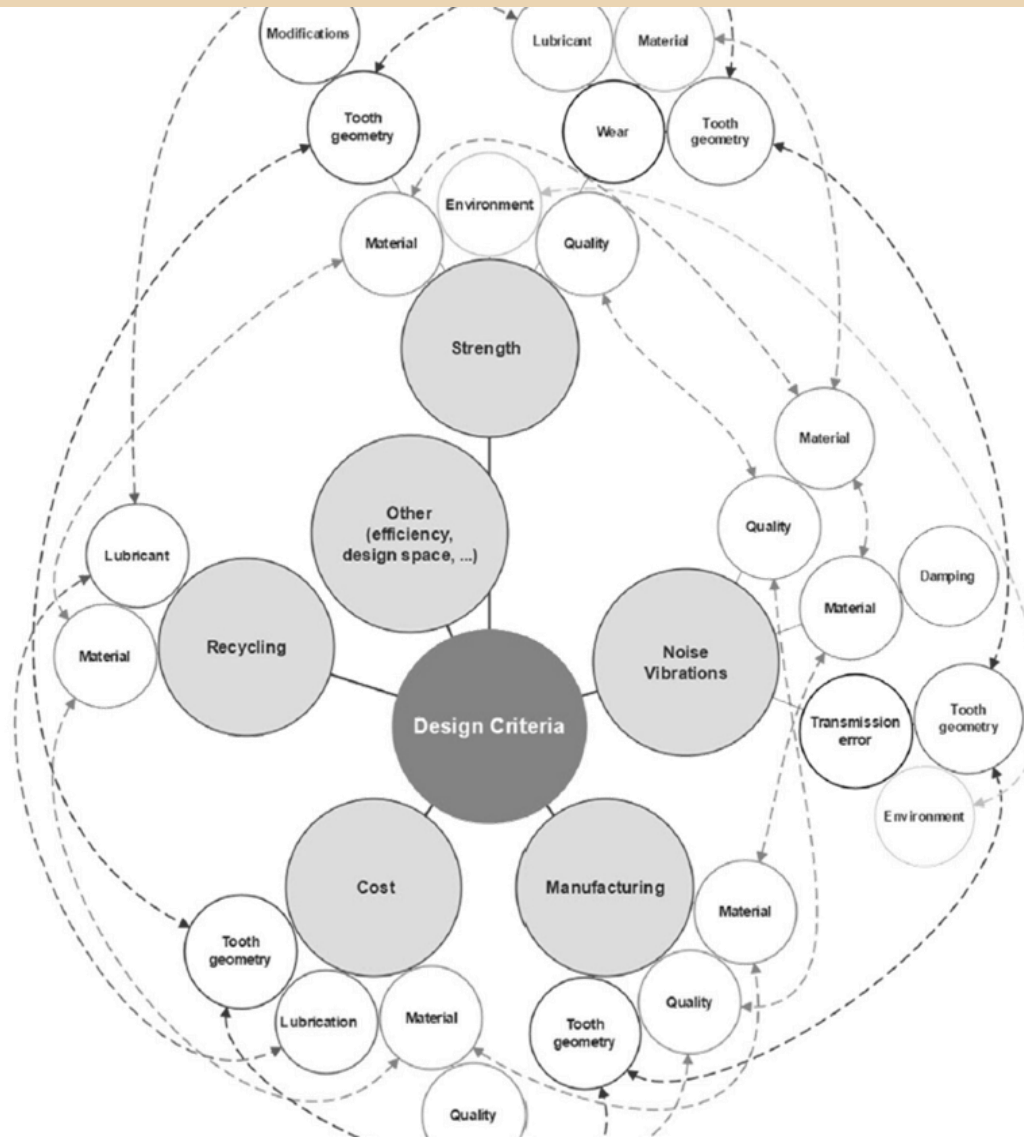
Plastic Gear Expertise

## Design

With our partners, we look at plastic gear design in a holistic approach.

We know typical customer requirements with respect to

- ✓ Design space, cost.
- ✓ Manufacturability.
- ✓ Strength and life.
- ✓ Noise and vibration.



Transmission of torque and movement.

Consistently achieving required grade.

Low mesh excitation, low response.

High homogeneity, regular shrinkage.

Housing – internals fit, heat dissipation.

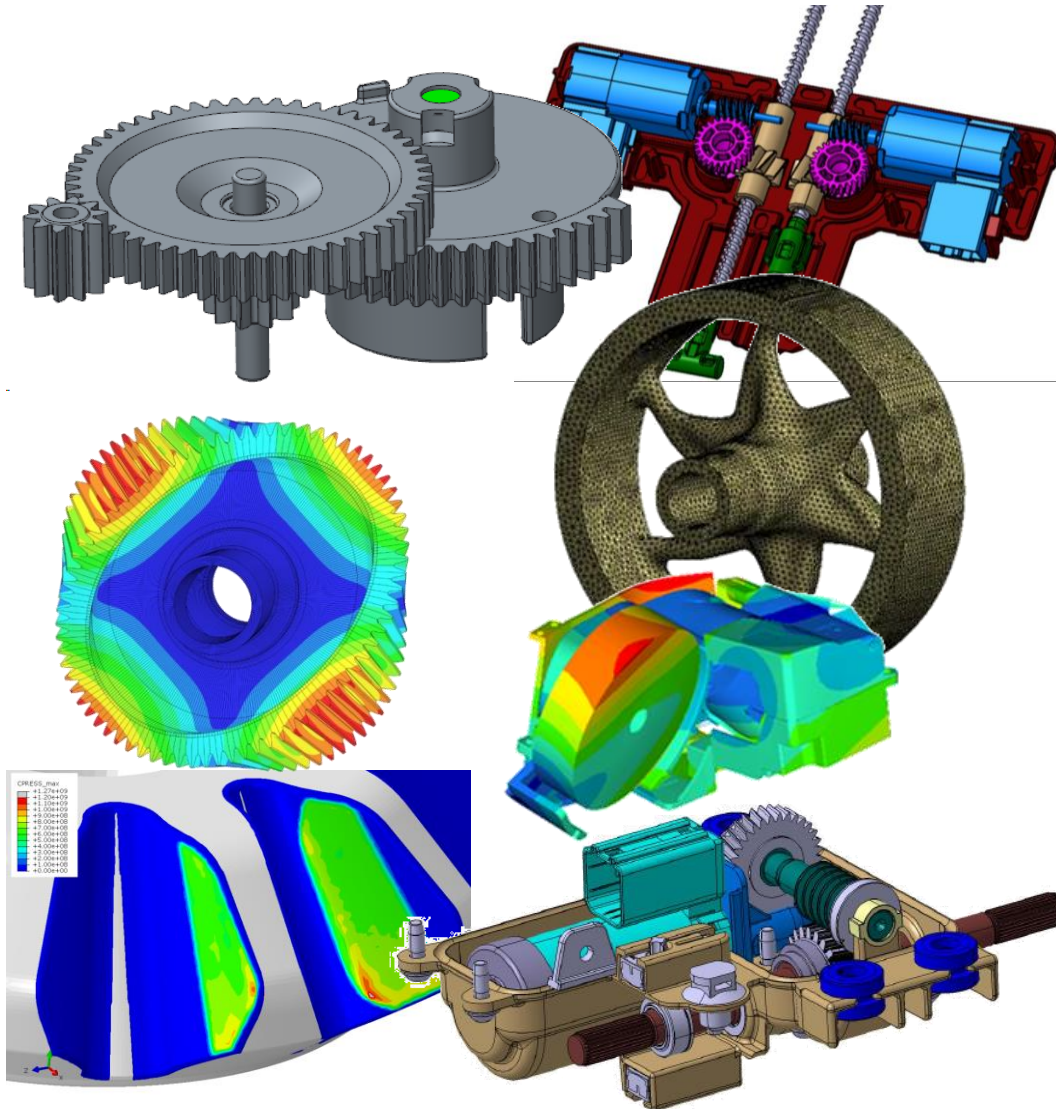
Design for low tolerance sensitivity.

Design for cost.

## Design

Choose us to deliver

- ✓ Single gear design to match a given pinion.
- ✓ Gear sets design and optimization.
- ✓ Conceptual gearbox and actuator layout.
- ✓ Detail design of subsystems including CAD works, drawings, BOM.



Gear design, geometry, strength, tolerances, contact analysis, transmission error.

Linear and non-linear FEM.

Natural modes and frequencies.

Molding, flow and filling analysis.

Thermal, efficiency, temperature distribution, deformation.

Sealing and pressure penetration.



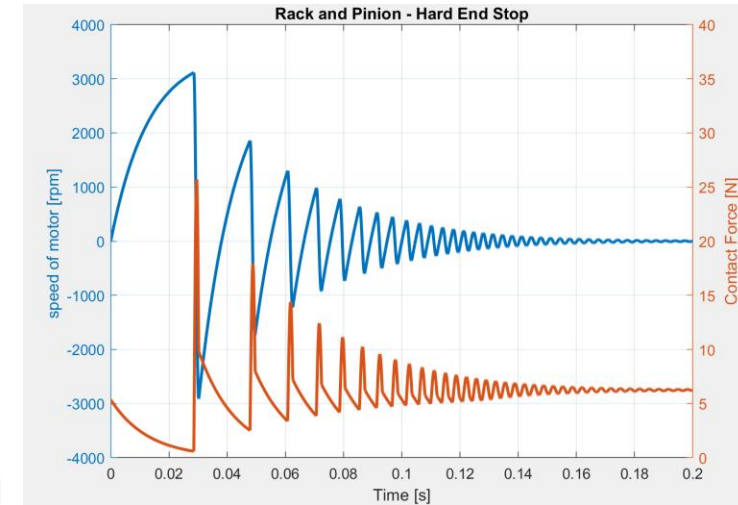
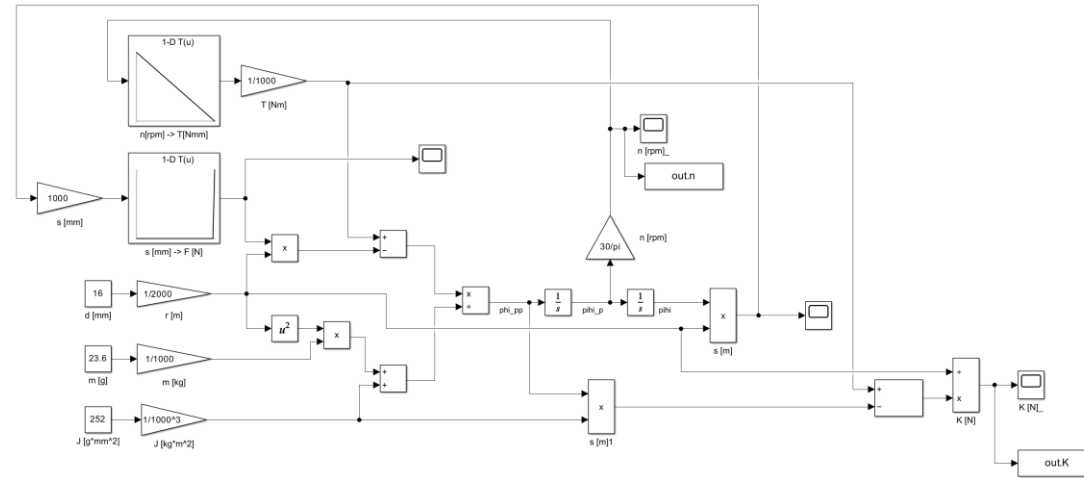
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# Design



# KISSsoft

# CADMOULD



# Ansys

# MathWorks

# Artas Engineering Software

# RECURDYN

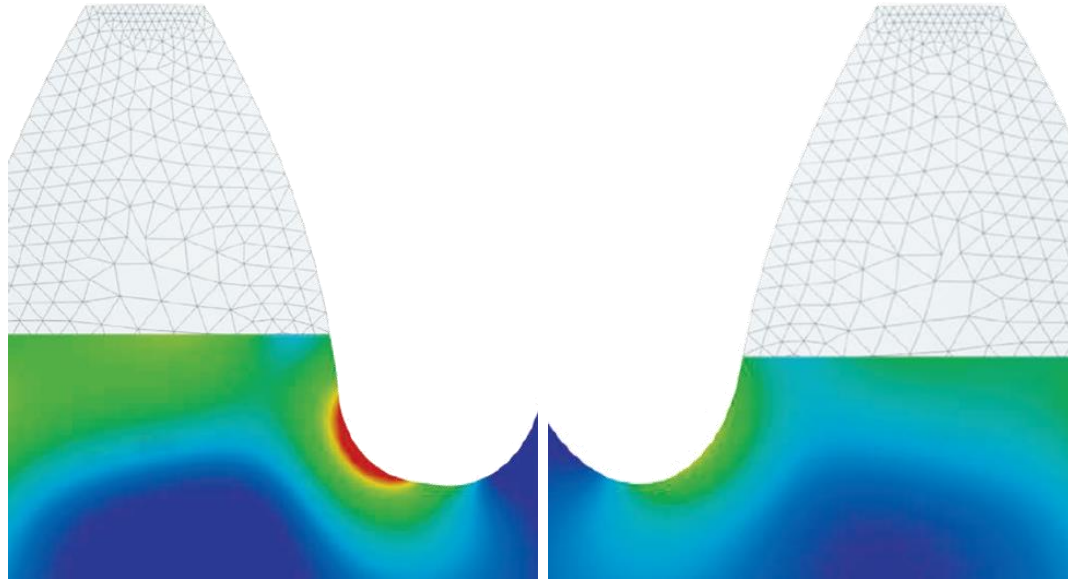


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Our expertise includes root optimization, for maximized durability with minimal cost.

On the flank, we focus on wear, designing modifications to minimize it.

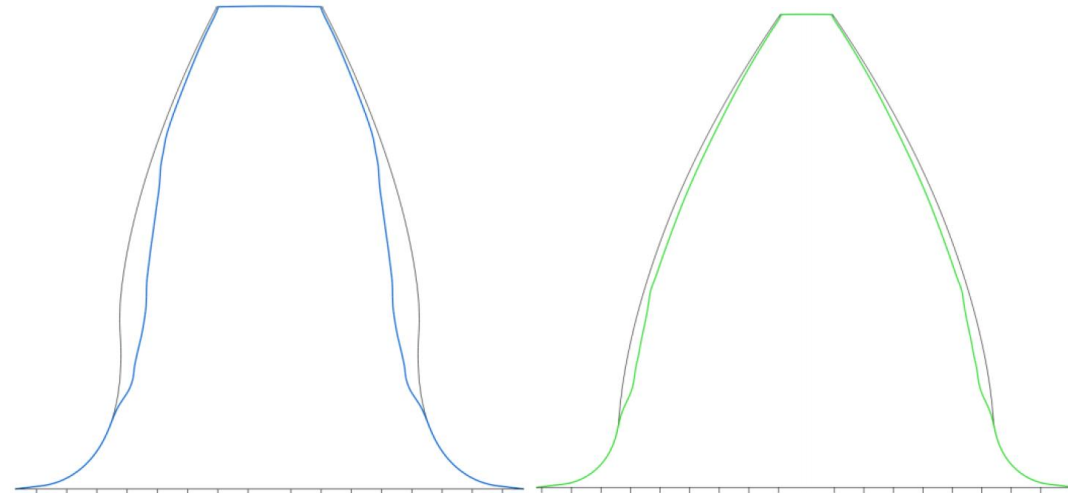
## Design



Profile modifications for low wear, low noise.

Root optimization for maximized bending strength.

Tip modifications optimal manufacturing.



Contact ratio increased for low vibration.

Helix angle modification for uniform load distribution.

Tip and root tolerances for contact ratio controlled.

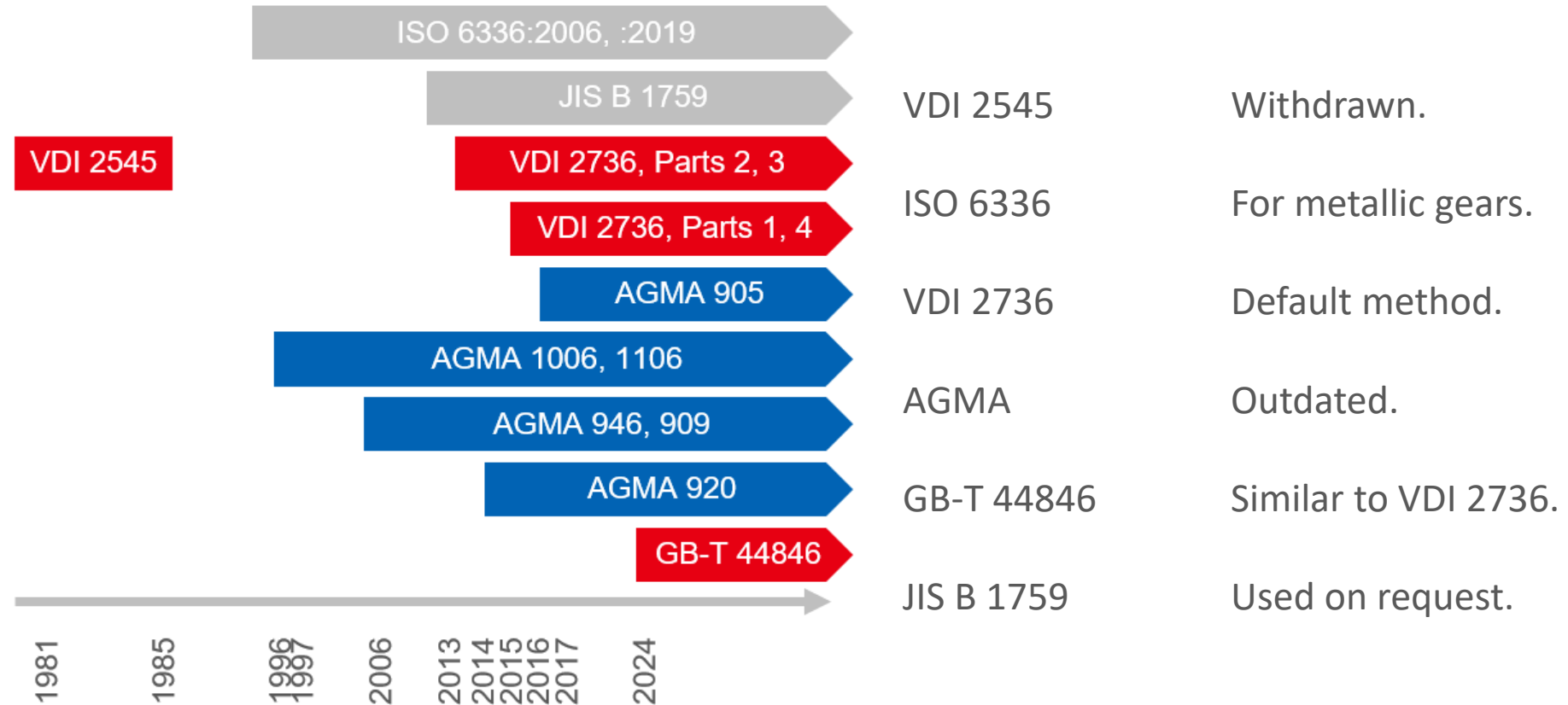


Plastic Gear Expertise

As member of and expert in gearing committees, we are fully aware and contribute to the development of gear standards.

Rating methods are as per your requirements or our recommendation.

# Design



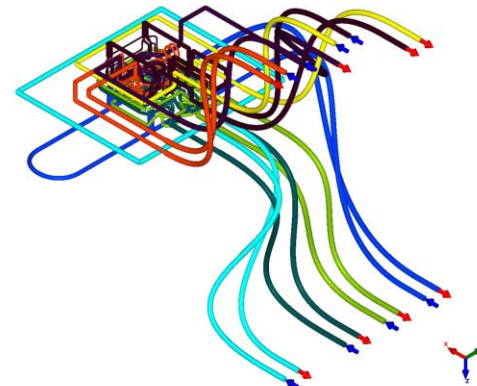
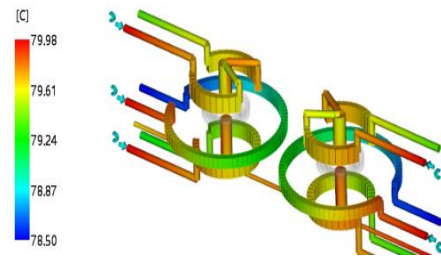
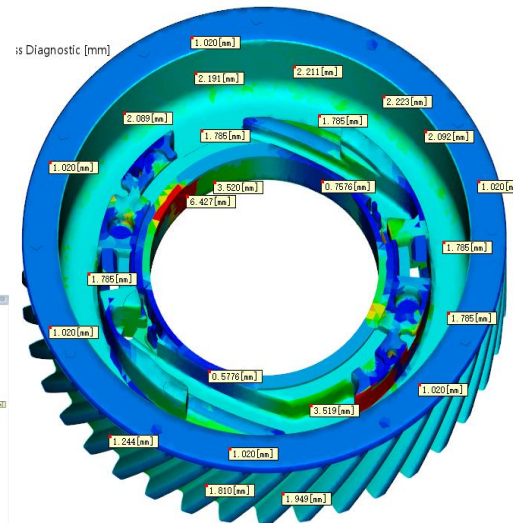
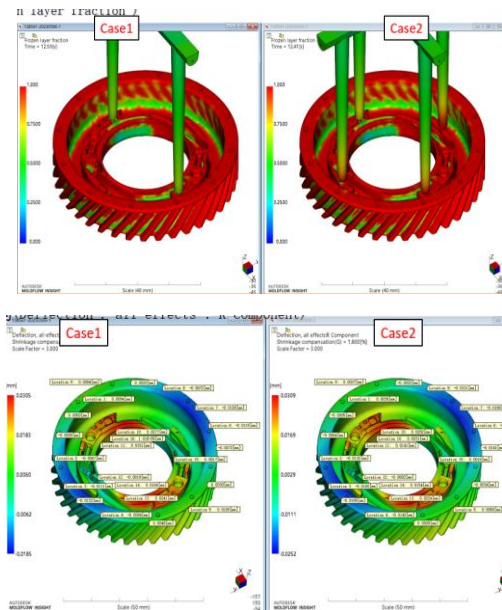


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# Simulation

Any design may be combined with manufacturing studies, in particular molding simulation.

Gates and channels are optimized, so is the density and orientation of the material flow in the part itself.



Tight tolerances, high accuracy.

Fill time, front progression, pressure, temperature, air traps.

Weld lines, sink marks, warpage, excessive shear stress, residual stress.

Injection pressure and temperature, mold temperature, cooling time.

Shrinkage and distortion.

Rheological, thermal, mechanical, process, crystallization.

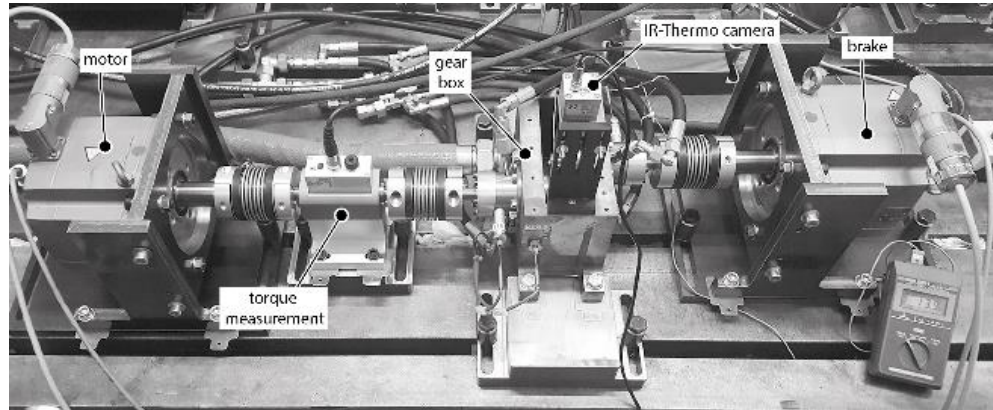


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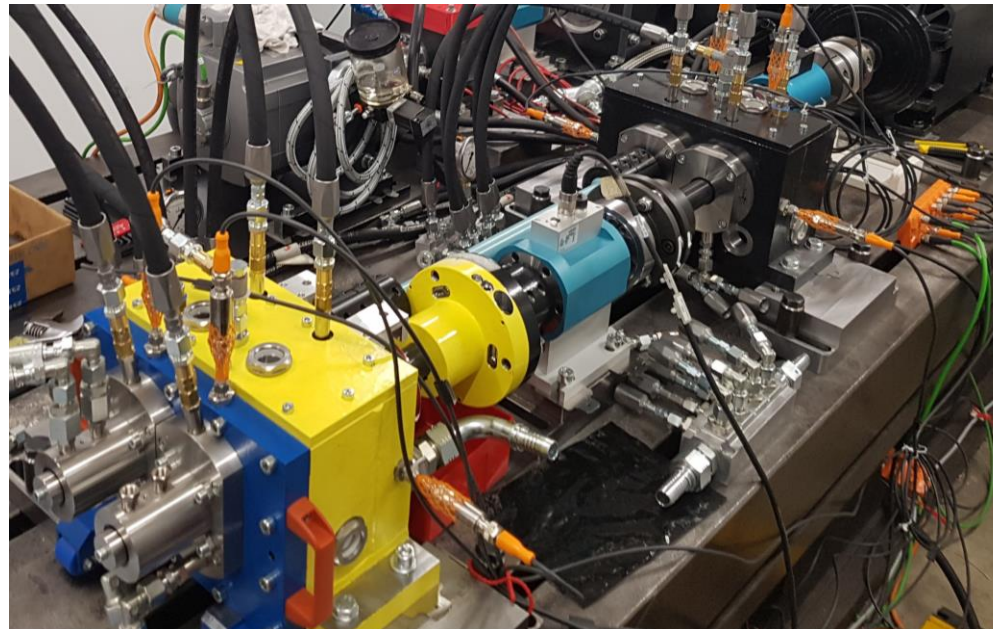
Our European technology partner, university of applied science Winterthur ZHAW provides testing services based on our specifications.

This may be on the material level, the part level or the system level.

## Testing



Test Rig - Plastic Gears, 60 mm:  
According to VDI 2736 | 2 - 30 Nm, 5 kW, 10 – 6000 rpm | Tooth root -20° C to 150° C | Oil-, Grease-, Dry-running



Test Rig – Metal Gears, 91.5 mm: < 800 Nm, 100 – 8000 rpm

Test Rig – Adjustable and Dynamic Testing, 91.5 mm: < 150 Nm, 100 – 8000 rpm

Test Rig – Planetary gearboxes: 350 Nm, 60 kW



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# Projects

Project

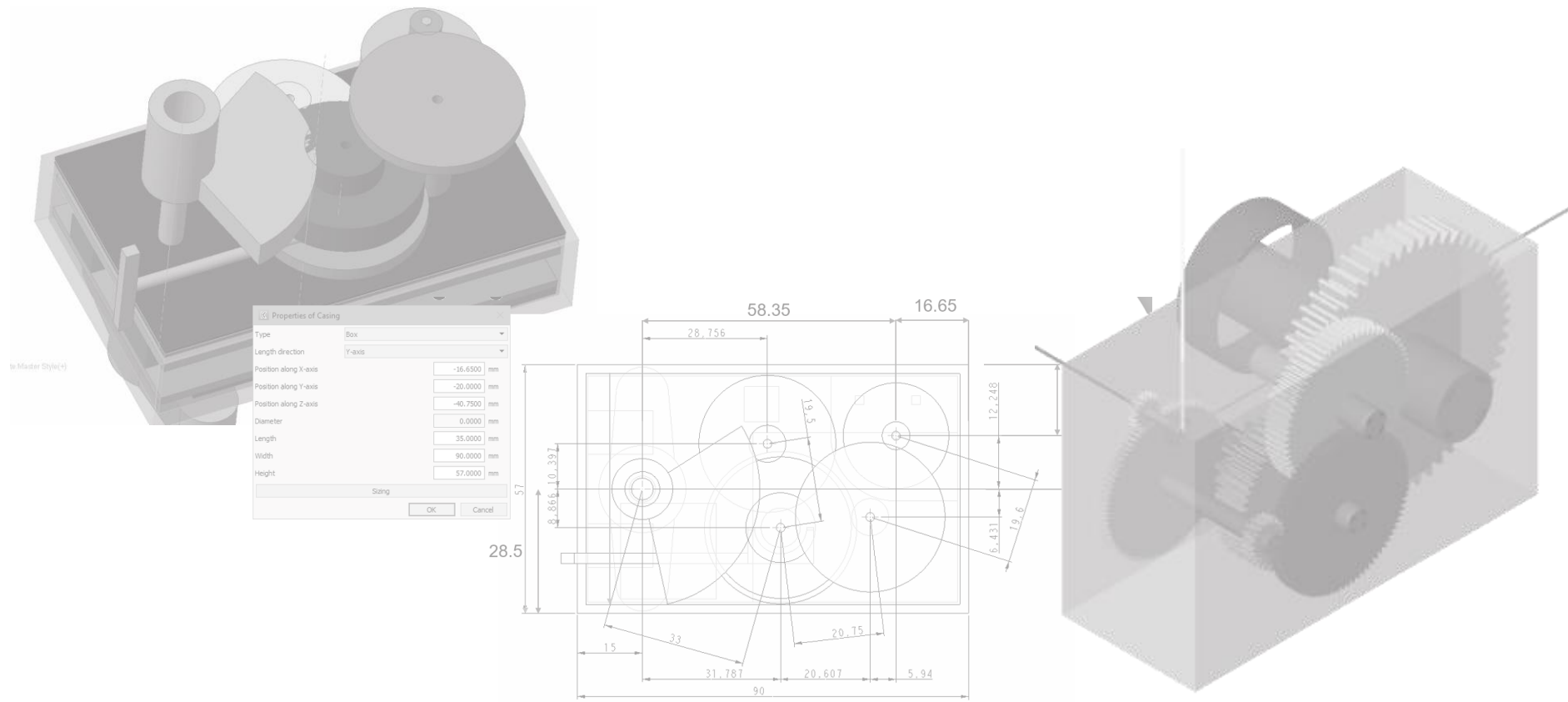
Gear sizing and optimization

Gearbox

Flap drive for HVAC system

Customer

In Czech Republic

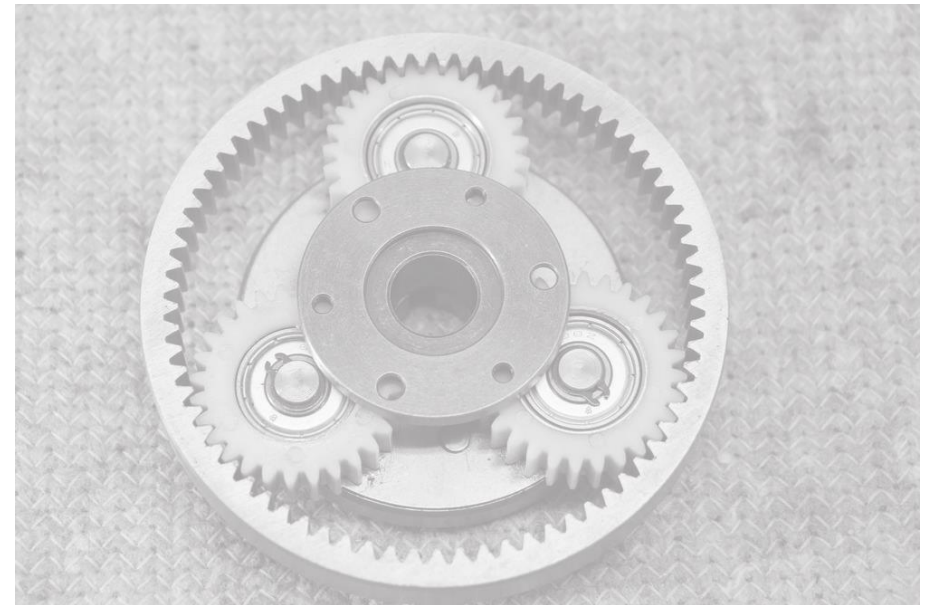




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## Projects

Project	Design, optimization, drawings
Gearbox	Planetary for e-scooter
Customer	In China



## Projects

Project	Design several types of planetary gearheads
Customer benefit	Complete manufacturing data for four types of gearheads
Scope of works	Design, technology selection, training
Customer	Chinese gear company

Gear machines, external spur / helical

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- There four specific producers of such machines
  - Lambert&Wahli
  - Monnier&Zahner
  - Strausak
  - Emag Koepfer

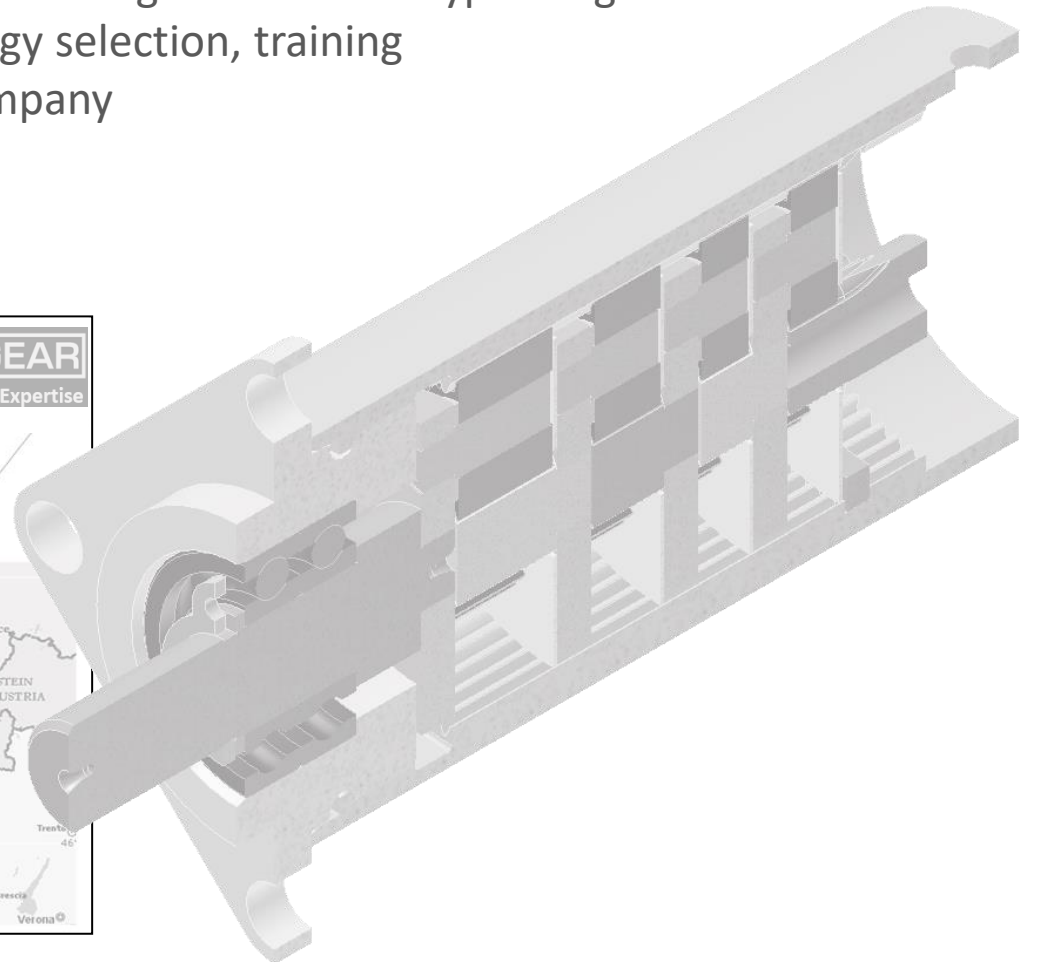
**MZ**  
MONNIER + ZÄHNER AG

**LW**  
LAMBERT - WAHLI AG

**STRAUSAK**  
mikroverzahnungen ag

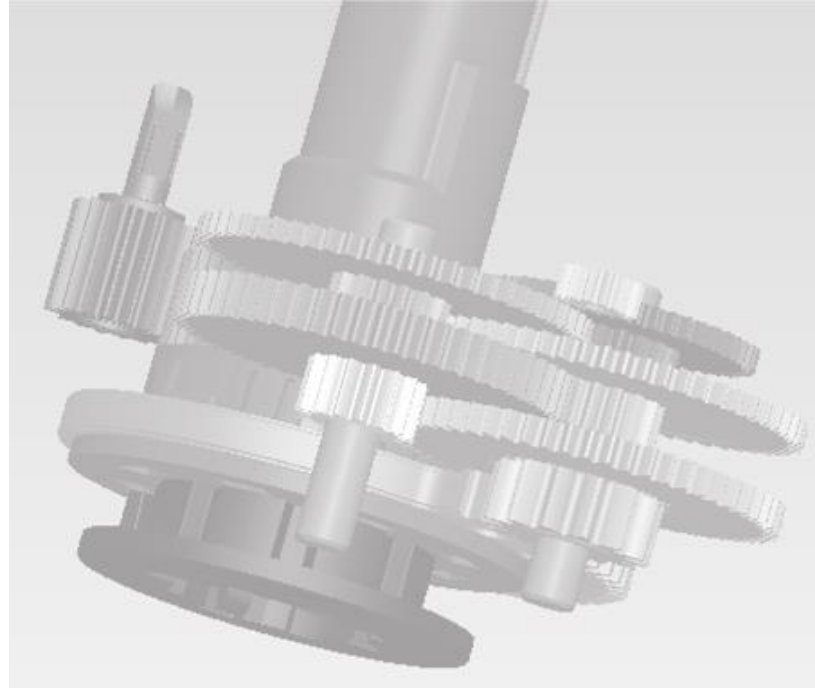
**EMAG**

Switzerland and Liechtenstein  
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## Projects

Project	Gear design of Cobra actuator
Customer benefit	Gear train passes test in first run...
Scope of works	Consultancy, Training, Reviews, Gear optimisation
Customer	US company in building automatization



## Projects

Project	Consultancy and training on gear design
Customer benefit	Noise reduction / less dependency on supplier
Scope of works	Design review, gear technology training, SW training
Customer	Global player in cash systems, Singapore / Germany



ND77 dot matrix POS printer

Three-station printer for receipts, the journal and documents, with a high printing rate and a small footprint



Thermal POS Printer TH230+

The ideal printer for printing receipts, coupons, vouchers and transaction documents at the POS.



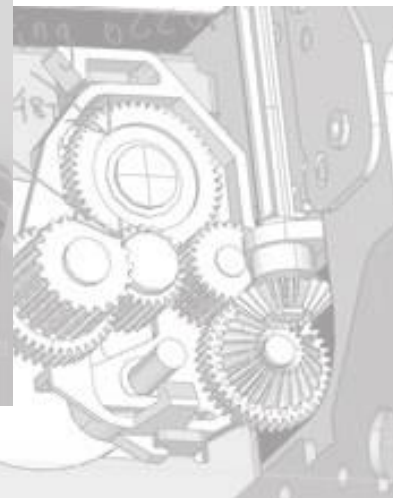
TH320

Modular hybrid printer designed for the use at modular BEETLE POS systems and PC's in MF countries.



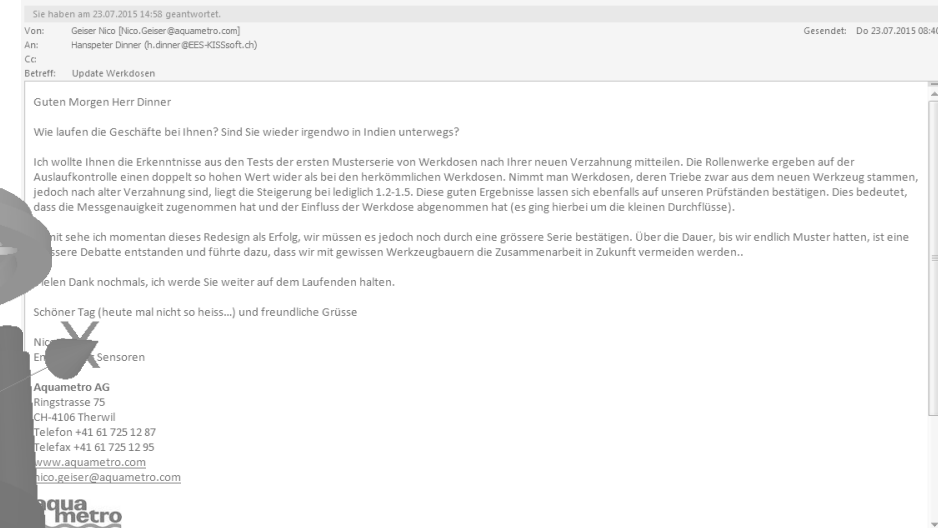
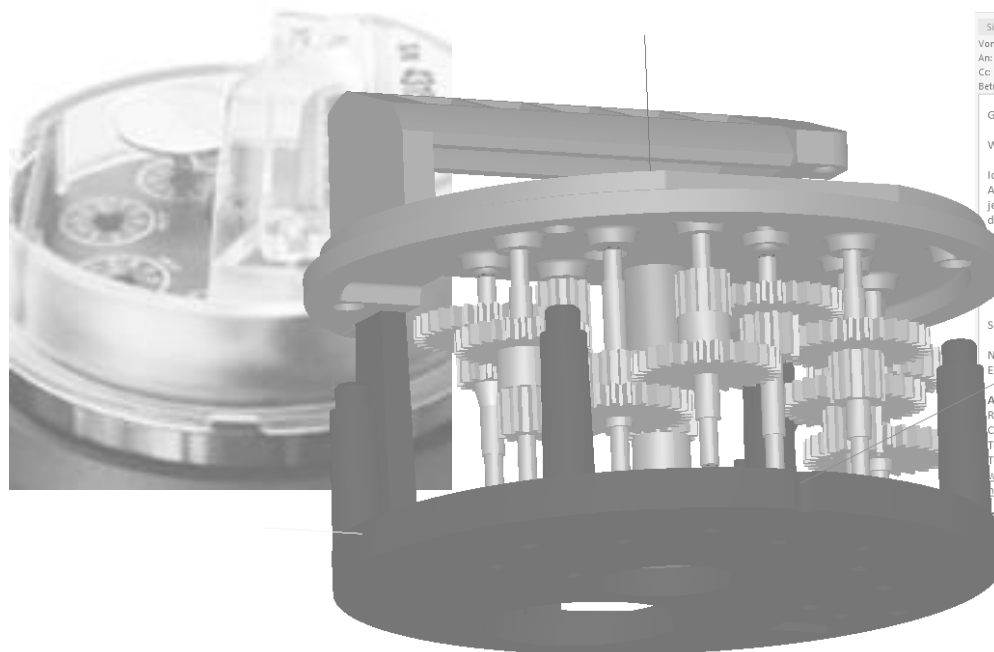
Thermal POS Printer TH180

Receipt printer with high print speed and graphics functionality and built-in power supply



# Projects

Project	Gear Design Assessment for a water meter
Customer benefit	Understanding of their own design, Proposal for design improvement, Decision basis for tool modifications
Scope of works	Understanding of their existing design, assessment Proposal for improvements
Customer	Aquametro AG, Switzerland



## Projects

Project

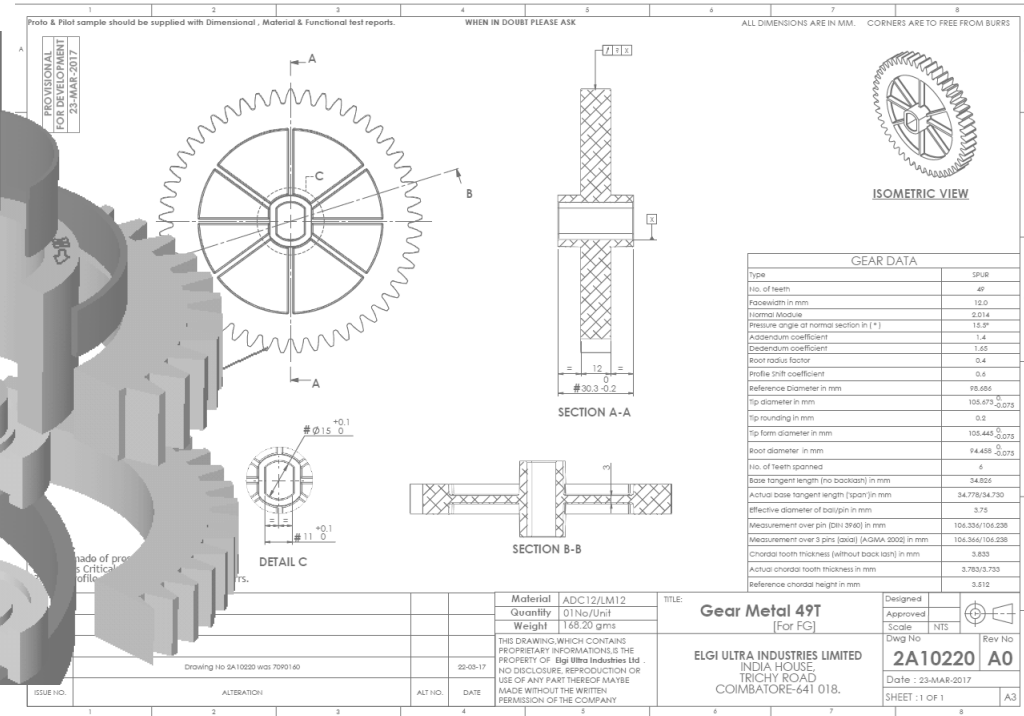
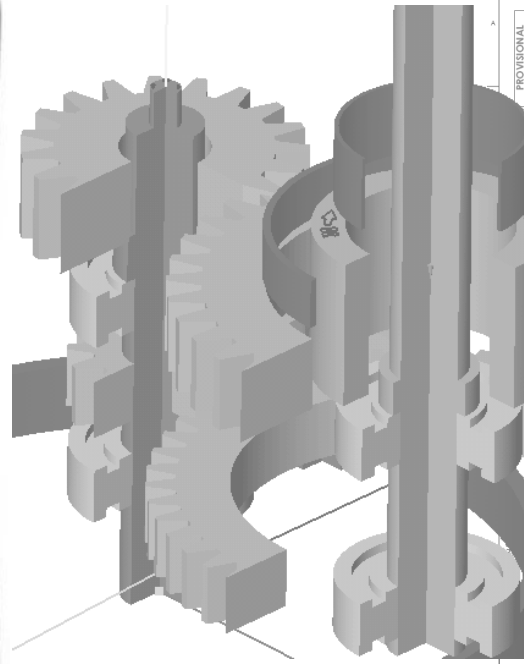
Gear train for grinder / household appliance

Gearbox

Two parallel gear trains for coaxial-counter rotating gear train, plastic gears

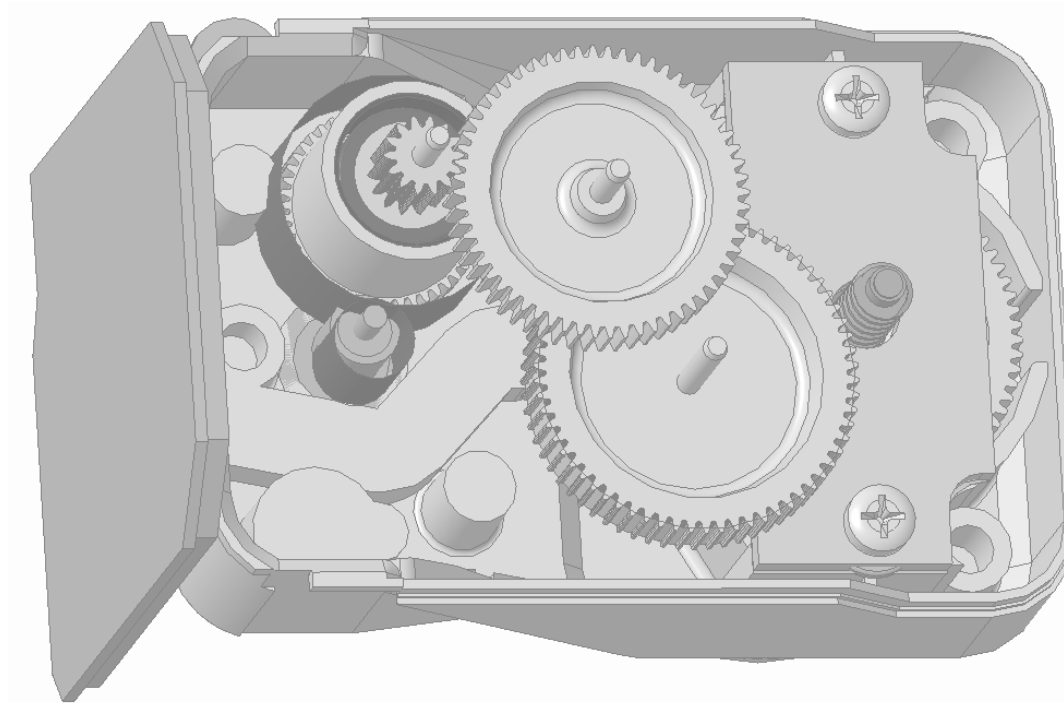
Customer

Elgi Ultra, India



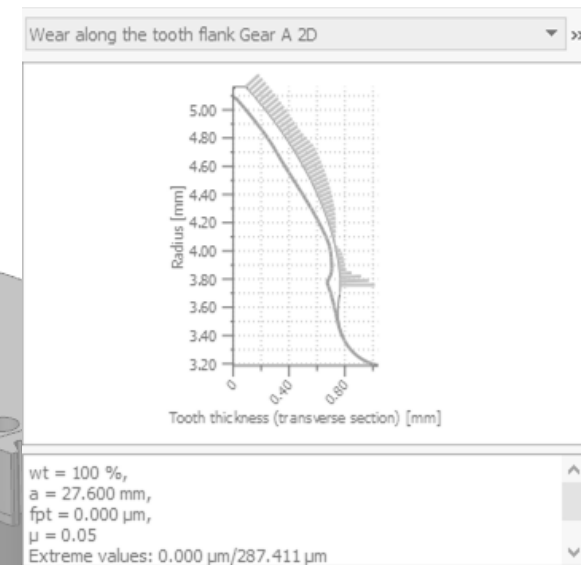
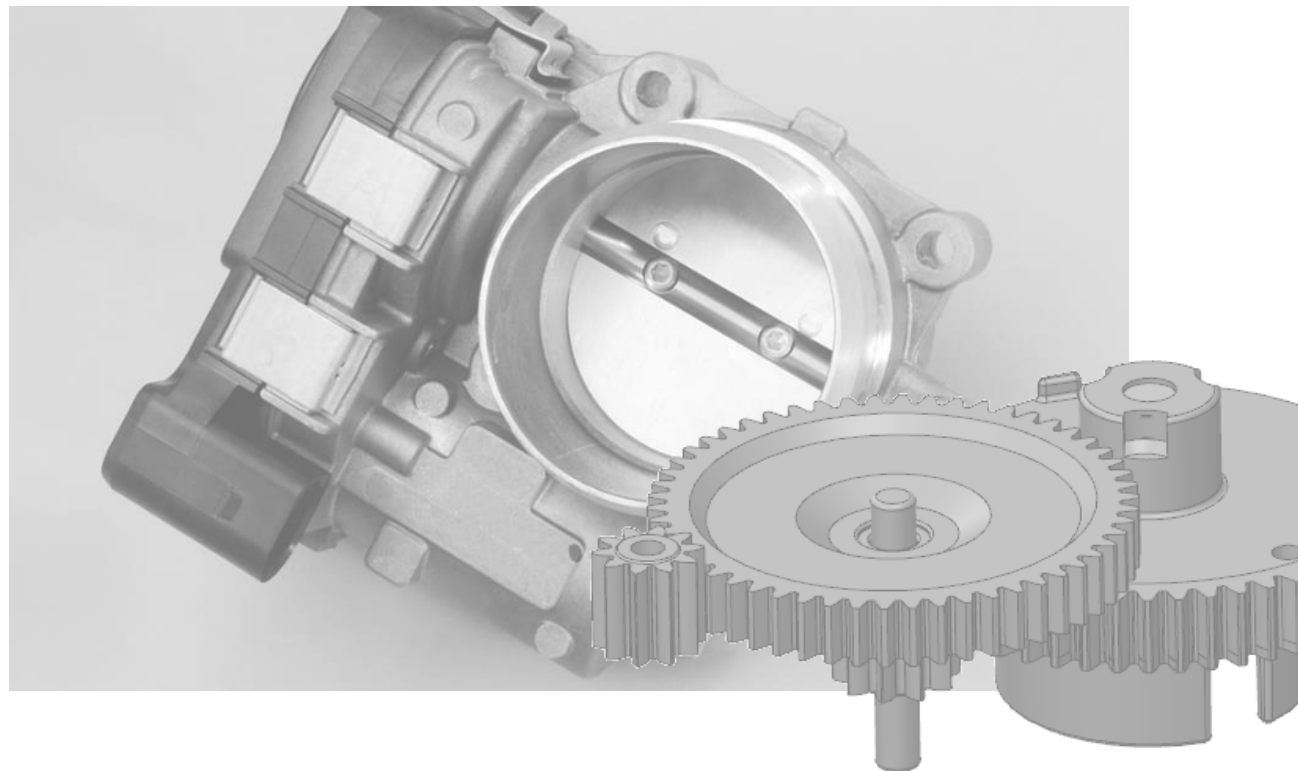
## Projects

Project	Gear optimisation for reduced vibration level, actuator for radiator
Gearbox	Multistage spur gears, metallic - plastic
Customer	In Czech Republic



## Projects

Project	Design, optimisation of plastic gear train, at elevated temperature
Gearbox	Two stage with metallic pinion for engine flap actuator
Customer	In China



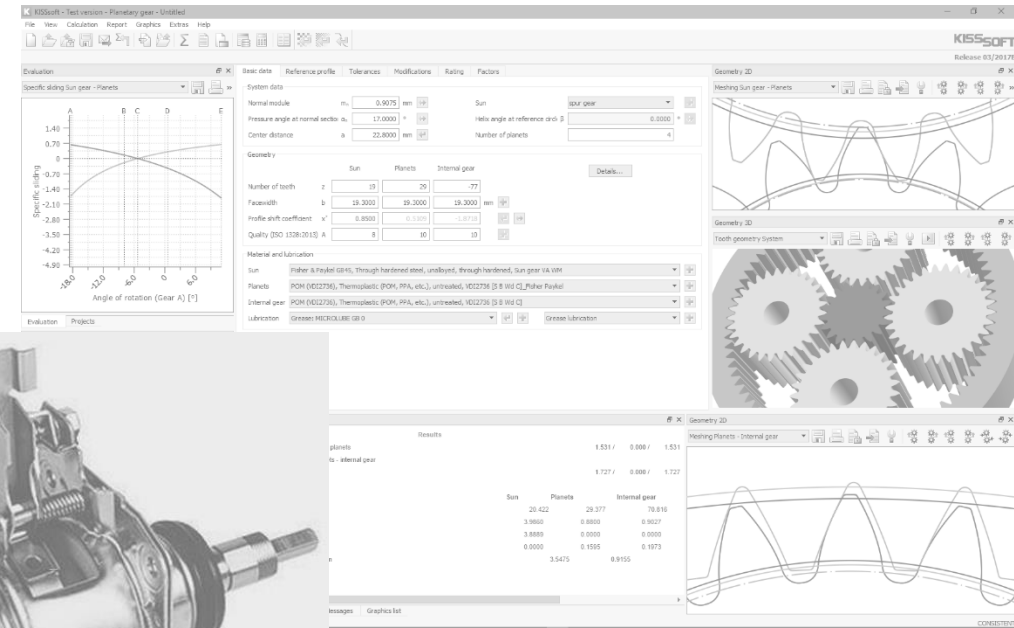


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# Projects

Project  
Gearbox  
Customer

Gear design, material selection, gear optimization, rating  
Compound planetary gearbox, plastic gears  
OEM, New Zealand





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