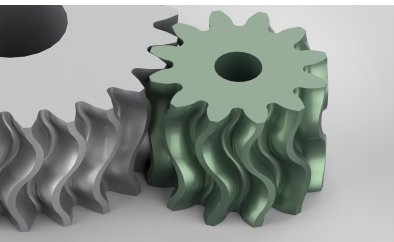


Parabolic and wave-shaped cogwheels

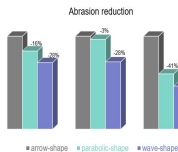
The development of the cogwheel for transmissions and gear ratios seemed complete. Improvements were only possible in a very small scale. Now scientists at OTH Regensburg developed and patented a new approach to gear design in which a third dimension greatly improves the quality of power transmission. A parabolic or wave-shaped design of the tooth flank opens up completely new possibilities in power transformation.



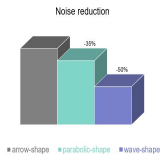
Increased power, less space and more quiet!

It becomes possible to generate required properties of the cogwheels and gears by shaping the tooth flanks in a parabolic or other curve function. This can for example add or eliminate side pressure on a cog. The challenge of implementing this geometry lies in its manufacturability: at the current development status the technology seems to perfectly match to additive manufacturing.

- 01 Adjustable to axial forces
- 02 Improved load capacity allows higher rotation speeds
- 03 Homogeneous power distribution
- 04 Less noise and reduced wear offer comfort and longer lifespan



In terms of abrasion the first results are eye-catching. Compared to a common arrow shaped cogwheel of the same material the wear reduced up to 54 percent in the test environment.



First tests investigating the sound of the wheelsets show up to 50 percent reduction in running noise.

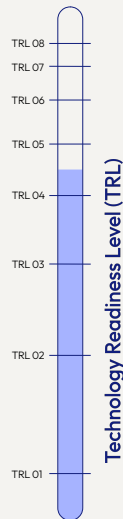


CHALLENGE

Cogwheels are everywhere! Transmissions and gearboxes accompany our daily life. Constant improvements have made them more specialized for all versatile types of applications. After 2300 years (the first cogwheel was invented around 300 bc), one might think the development is complete. But there is always a demand for products with improved properties: scientists of a Bavarian University accepted the challenge and have taken the cogwheel to the next level.

INNOVATION

Additive manufacturing processes provide the key to improving the properties of gears in direct engagement for power transmission and gear ratios. Numerous properties can be improved by a wave-shaped or parabolic tooth flank design in contrast to conventional cogwheels. Smooth running reduces noise, vibrations and abrasion. Larger contact surfaces increase power transmission. Off-axis teeth design compensates bearing clearance and enables adjustable axial forces.



01 Basic principles observed · 02 Technology concept formulated · 03 Experimental proof of concept · 04 Technology validated in lab · 05 Technology validated in relevant environment · 06 Technology demonstrated in relevant environment · 07 System prototype demonstrated in operational environment · 08 System complete and qualified

An invention of Technical
University of Applied Sciences
Regensburg



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