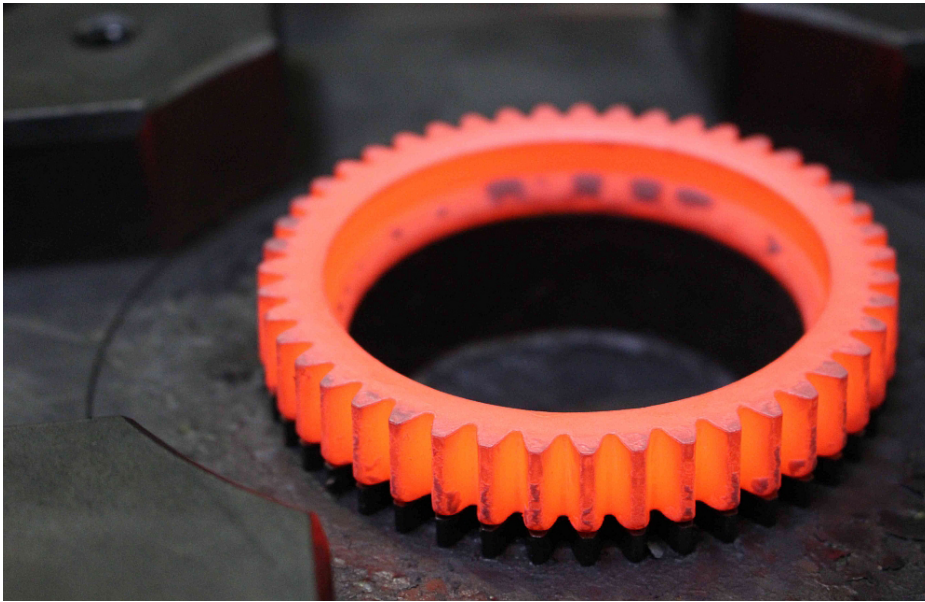


## Lightweight design: thermomechanical precision forging



### Auf einen Blick

- Multi-stage precision forging at different temperatures
- Process-integrated thermomechanical treatment in single-part production
- Optimized grain sizes by means of thermomechanical process control
- Improved geometry and surface through second forming process

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**IFUM | IFUM uses thermomechanical process control to produce thin-walled gear rims. Within the scope of the joint research project "Lightweight Forging", such gear rims are combined to weight- and efficiency-optimized gear wheels used for gearboxes in cars.**

The central demonstrator developed in the joint research project "Lightweight Forging" is a gear wheel in multi-component design with optimized weight and efficiency. IFUM's contribution is a thin-walled gear rim produced using multi-stage precision forging with thermomechanical process control. Thanks to a second forming stage at reduced temperature, the grain size of the case-hardened steel used can be reduced significantly. In addition, the second forming stage serves for component calibration in order to improve component accuracy and surface characteristics.

Research results prove that a fine-grained structure increases the strength and resistance of forged parts, thus making components more robust and less prone to failure. This and the multi-component design make hybrid gear wheels a lot lighter than previous versions. Consequently, vehicles have a lighter weight and an improved energy efficiency. Moreover, the production process is more resource-efficient, because less postprocessing is needed due to an improved contour accuracy and average roughness value.

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