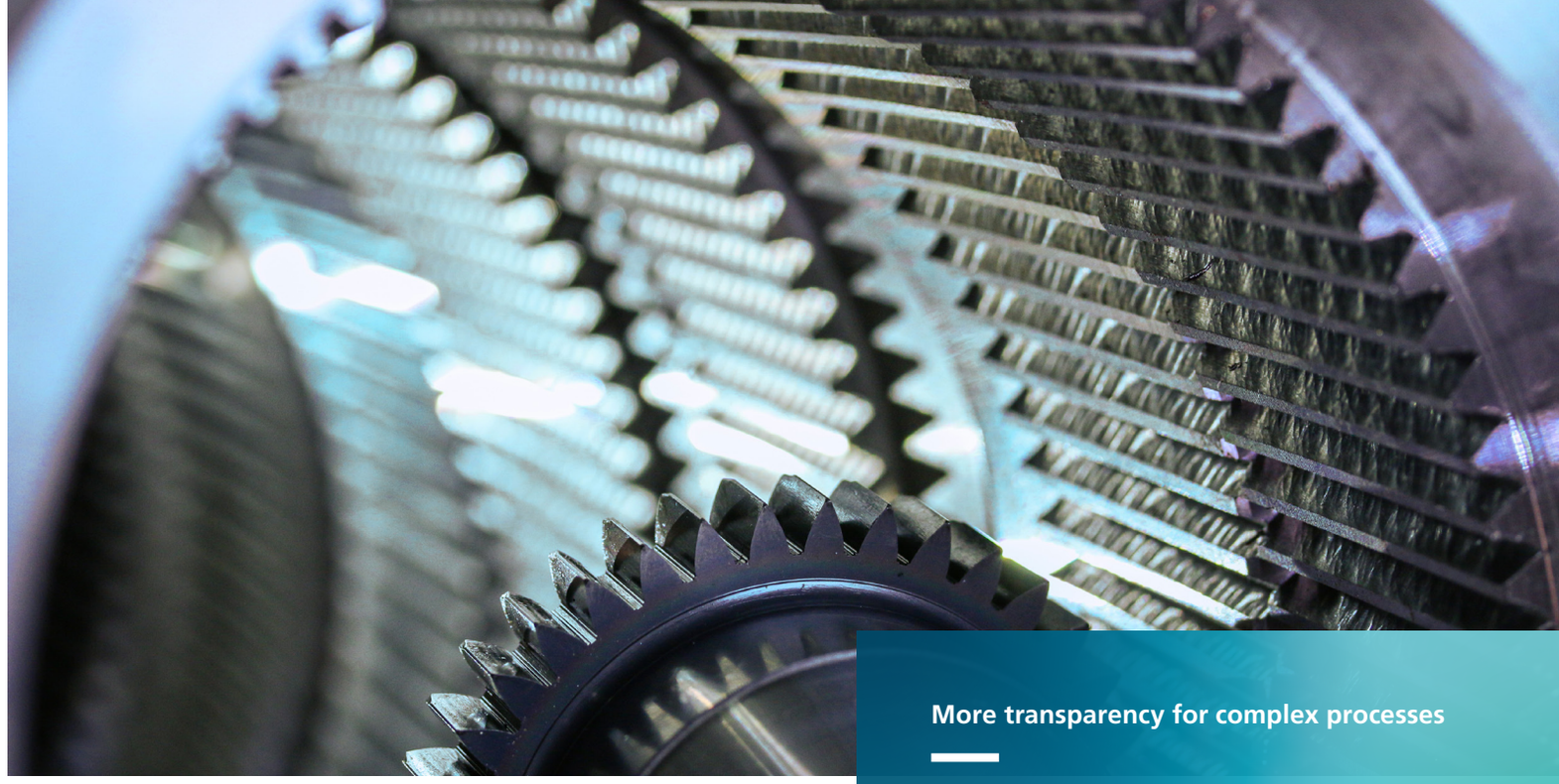
Design of power skiving processes with SkiveAll

With SkiveAll, existing processes can be analyzed and optimized as well as new technologies can be designed. Based on the workpiece and its interfering geometry, these steps take place:

1. Proposition of a technology adapted to the workpiece by the software (in variants)
2. Graphical analysis of the collision situation in a 3D environment with tool and workpiece for each cut
3. Prediction of the error pattern on the workpiece tooth flank based on number of teeth ratio and tool runout
4. Design of cutting strategies on the basis of technological variables such as chip thickness or clearance angle
5. Analysis and optimization of the cutting conditions by individualized settings for each cut
6. Comparison of variants regarding costs and productivity
7. Technology transfer via interface to the CNC machine



More transparency for complex processes

SkiveAll – Software for the Design of Power Skiving Processes

»With SkiveAll, we are able to check processe ourselves and optimize them in case of problems. Previously, we had to rely on third parties or proceed according to the trial-and-error principle.«

Linus Müller,
Process expert power skiving

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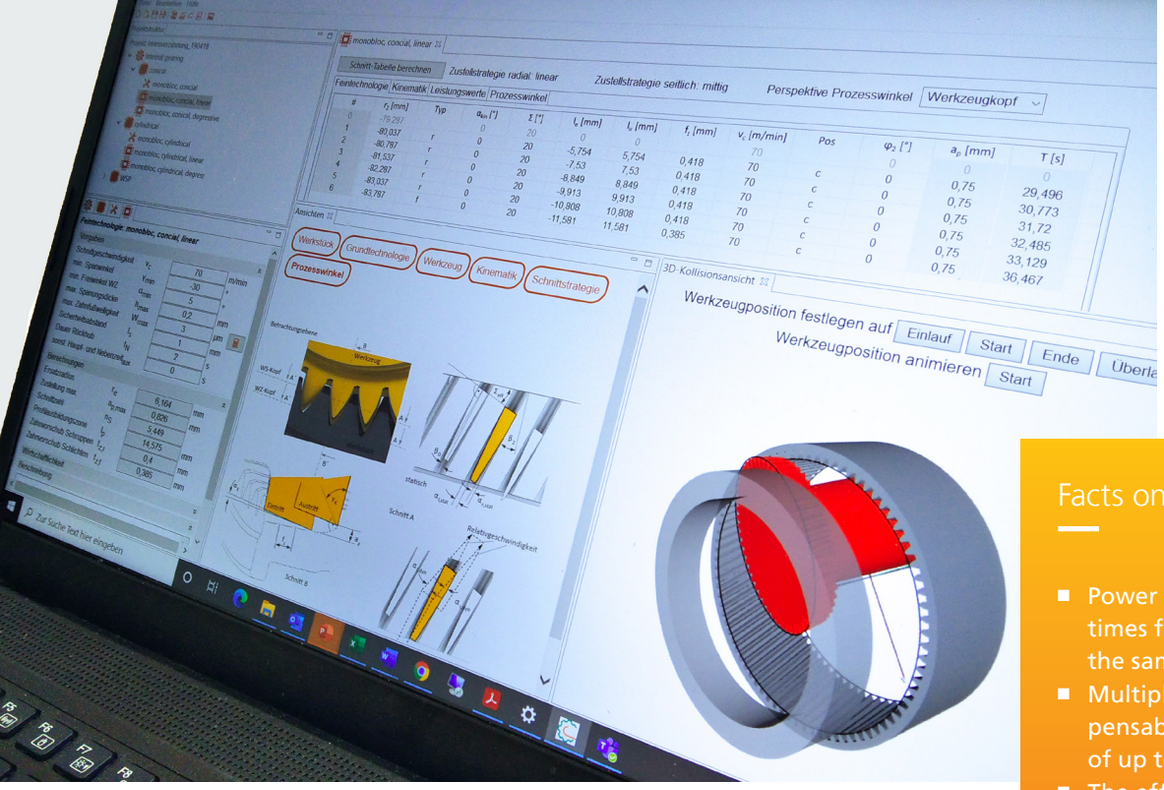

Facts on power skiving

- Power skiving tools rotate 3 to 6 times faster than milling tools of the same diameter.
- Multiple-cut strategies are indispensable, as otherwise rake angles of up to -70° occur.
- The effective clearance angles can change by up to 50° from the first to the last cut.

Demystifying Power Skiving: SkiveAll

Interference geometry, quality, costs: key figures for optimum process design

Many hopes rest on the power skiving process. Since its increased industrialization from the 2010s, it has become clear how much potential this technology holds, but also how many problems still need to be solved.

Making complexity manageable

Anyone dealing with power skving for the first time will realize that everything is connected with everything else: The collision situation is determined by the axis cross angle as well as by the type and size of the tool. Changing one of these factors has dramatic consequences in other areas, such as productivity and quality. Many users – even proven gear experts – do not have the confidence to design their own power skiving processes and are therefore dependent on third parties, such as tool or machine manufacturers. The rather complex interdependencies are not directly apparent, and comparisons with known processes such as gear hobbing or shaping are often misleading.

These questions need to be addressed:

- **What does my basic technology look like?**
  The axis cross angle is the central variable, it is influenced by the interference geometry.
- **What kind of tool do I use?**
  Conical or cylindrical basic shape and which number of teeth for an optimal tooth flank topography?
- **How do I design my cutting strategy?**
  High feed rate, little infeed or vice versa? And which key figures can be used to determine this?
- **Which of the many screws do I turn to optimize?**

The software SkiveAll

At Fraunhofer IWU in Chemnitz, research has been carried out on the Power Skiving process for ten years. From the knowledge we have gained, we have been able to develop a mathematical model and finally develop the user software SkiveAll.

With SkiveAll, all aspects of the design of Power Skiving processes can be considered in context. The software provides characteristic values for process variables such as chip thickness and process angle, but also for quality, times and costs.

Where do these vibrations come from?

High speeds and a lack of dynamic machine stiffness are often assumed to be the cause. In fact, however, negative effective clearance angles are the cause in 95 percent of cases.

SkiveAll makes it transparent.