Can Gear Skiving Be the Game-Changer I Need for My Business?

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Why Gear Skiving?

Why is the industry considering changing from well-established gear manufacturing processes to something that is much more complex at first glance?

Gear manufacturing has been its own "world" in metal cutting, dominated by companies with very specific expertise around gear technology. Production output has been high, but flexibility is limited. The technicians running these machines are highly skilled, but recruiting new staff with these skill sets has become more and more difficult.

Over time, the production philosophy has changed, and the industry is looking at manufacturing systems that are more flexible to better manage just-in-time demand. Very large batch sizes are—for most manufacturers—no longer the case.

Modern multitask machines have gained a high market share in metal cutting in the last 30 years. The concept of machining as many operations as possible in one set-up has many benefits.

The quality and lead-time reduction that can be reached by complete machining is a very attractive option. This is also the case for manufacturing components with gear and spline features.

As multitask machine tools were developed to be suitable for gear skiving, the concept of flexibility could be combined with high productivity. This triggered a fundamental change in the gear manufacturing industry. The implementation of mill-turn centers started about 15 years ago and has been going on ever since. Initially, some skepticism was expressed, but quite soon the doubts were eliminated, and the concept of multitask machining has since then had a very positive development. This technology shift has had a strong impact on how gears are produced today—and how gears will be produced in the future.

Motivating Factors for ChangingTechnology

The big question for the gear industry is now how to validate gear skiving versus the well-established machining methods which have been used for decades. The tremendous growth in e-mobility has increased the need to validate and decide on future manufacturing technologies, accurately and rapidly. The machining equipment used in the past is probably not generating the desired results needed for high-precision gear components used in e-mobility transmission systems. How can I, with reasonable precision, determine whether I will benefit from implementing gear skiving for my business?

A change to skiving means in most cases that investments in new machine tools are needed, which represent a significant cost. The production or technology manager needs to have a good business case with trustworthy arguments to justify the investment.

Looking at the Options When Considering Implementing Skiving

- Convert internal broaching of splines, and change to multitask machining.
- Convert shaping for internal and external machining of splines and gears.
- Change from single-purpose hobbing and shaping machines to multitask machines.
  - Partly replace hobbing with skiving.

The conversion to skiving should preferably be taken stepwise to generate and spread know-how in the organization over time. Most companies that have implemented skiving see no point of return and most of them are striving to expand the technology once the first processes have been established.

Implementation of skiving is giving users a competitive edge, which can result in gains in lowered component costs that are outstanding. Correctly implemented, also excellent quality and surface conditions can be reached. Skiving does not mean any compromise versus the traditional technologies; many applications show rather the opposite.

The Need for Qualified Software Tools to Support Decision-Making

There is a need to identify the possibility to implement skiving from a technical and commercial perspective. Software that can give answers to the fundamental questions in the decision-making process for, or against, skiving is crucial.

1. Can I use gear skiving for a certain process?
2. Which conditions should I apply for reaching the best result?
3. What is the level of productivity that I can reach?
4. What is the total commercial impact of changing the process?
5. How can I define and specify what I need for my cutting tool supplier?

The new esco software module, *eSkiving.FS* is developed to guide the industry toward correct decision-making based on facts, exact simulation, and visualization.

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Validation and Estimation of Commercial Impact

» **New Projects**

Detailed analysis of technical and commercial aspects already in the gear design and manufacturing planning phase

- Secure design suitable for machining and define ideal machining conditions

» **Existing portfolio**

Review component portfolio suitable for skiving

- Determine impact of changing technology and future capacity requirements

» **Improve the knowledge of specifying high-performing cutting tools and thereby:**

- Reduce time-to-market
- Reduce risk for error.

The esco Gear Skiving Platform, ePP

eSkiving.FS Comprehensive evaluation of technical and commercial feasibility studies. Intended for gear design- and manufacturing companies within design and manufacturing engineering / manufacturing planning.

eSkiving.TD Advanced design software, primarily for the cutting tool industry. Tool design based on the skiving kinematics. (Can be an alternative for manufacturing companies aiming at having very high skills and want to be able to develop own design / manufacture own tools or give detailed information to their cutting tool supplier)

eSkiving.TA Important add-on to eSkiving.TD for analysis of technologically relevant parameters for optimized tool design and definition of optimum geometrical cutting conditions as well as giving output for usable tooth width and re-grinding setting data.

eSkiving.AS Software to support optimized cutting conditions based on input from TD. Enable seamless communication between cutting tool design and tool application. The software is intended for application specialists and process technology engineers.

eSkiving.TM Software configured for manufacturing of skiving cutters.