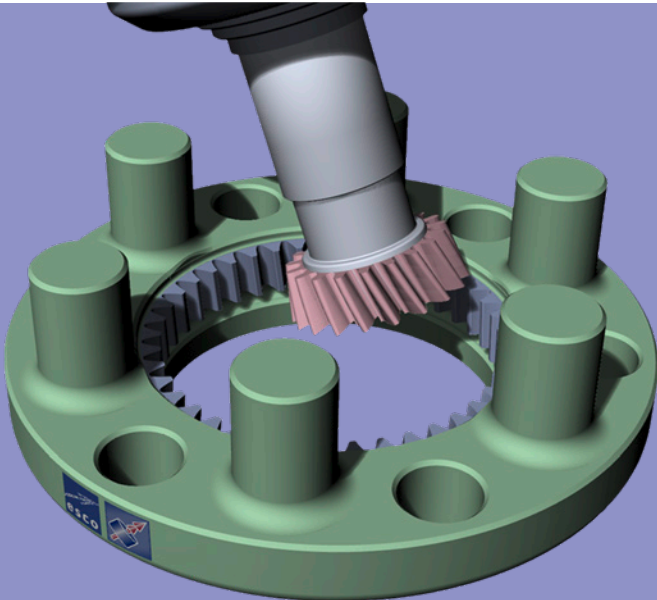


Power Skiving: Efficient technology support

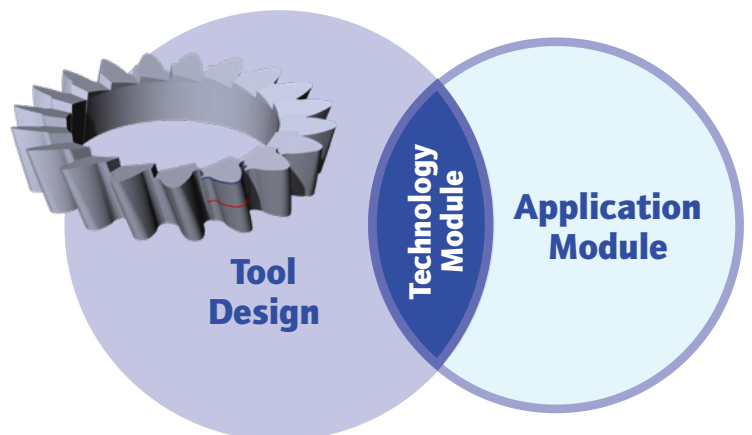


Technology Module for high performance Power Skiving

Power Skiving is a challenging process to manage, and powerful software is needed to simulate, evaluate and optimize the process. The purpose of the Technology Module is to create the perfect tool and to implement this tool in the manufacturing environment generating highest possible machining output at lowest possible cost.

Technology Module features

An important enhancement has been added to the existing PTM software which already covers the design and manufacturing chain of skiving cutters. With the Technology Module, the designer will significantly expand the possibilities to create not only the perfect tool, but also an efficient cutting process. The powerful analysis options provide excellent means to find the optimum skiving conditions for the specific gear to be produced.



Features:

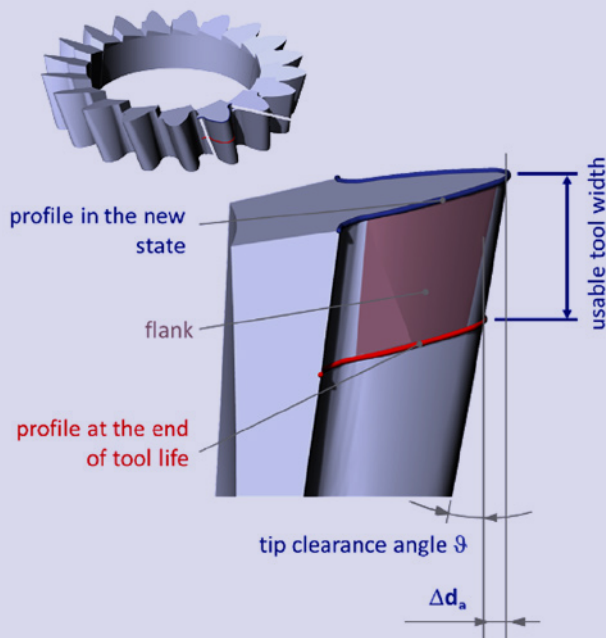
- Definition of machining strategy / cut distribution for gear production
- Identification of cutting- and sliding velocities, analysis of rake- and clearance angles for each individual cut along the engaged cutting edge
- Output of main machining time
- Exact regrinding simulation and profile evaluation of each reground status, calculation of corresponding optimized setting data
- Total tool life evaluation

Regrinding process and machining economy

For conical skiving tools (most widely used), the diameter change due to reshaping must be considered in the machine tool settings. Therefore, it is essential to have full control of the regrinding process. Knowing the profile form and tooth thickness deviations to be expected after each regrinding process, the Technology Modul provides the corresponding optimized machine tool

setting data. An essential result, based on the comprehensive evaluation of the regrinding states, is a reliable information about the usable tool width. This set of information is the guarantee for the most economical use of the skiving cutter, a robust process and a good machining economy.

Virtual regrinding: Dedicated end of tool life information



PTM provides

- Full information about reshaping effects
- Automated optimization of machine setting data for each reground status of the tool
- Reliable information regarding the maximum usable tool width

The result is a robust process and an optimized machining economy.

Parameters, Results

	before optimization			after optimization			
	left	both	right	left	both	right	
Profile comparison							
Difference of tip form diameter	-0.6463	-	-1.1583	-0.3219	-	-0.5637	mm
Difference of root form diameter	-1.1871	-	-0.6256	-0.5865	-	-0.3113	mm
Difference root diameter	-	-1.4643	-	-	-0.3954	-	mm
Average of tooth thickness deviation	0.1924	0.3886	0.1962	-0.0082	-0.0016	0.0066	mm
Dif. of normal tooth thickness dev. (pitch diam.)	-	0.2863	-	-	-0.0003	-	mm
Profile angle deviation $f_{H\alpha}^*$	0.0012	-	-0.0167	-0.0004	-	0.0002	mm
Profile form deviation $f_{f\alpha}^*$	0.0013	-	-0.0001	0.0017	-	-0.0004	mm
Center distance adaptation root diameter	-	25.0924	-	-	25.0922	-	mm
Center distance adaptation av. tooth thickness	-	24.8936	-	-	24.8945	-	mm
Shaft angle optimized	-	-22.1969	-	-	-22.1971	-	°
Tilt angle optimized	-	0.5200	-	-	0.5235	-	°

Setting data optimization for reground tool status

Cutting speed	200	m/min
<input type="checkbox"/> Single flank cutting		
Flank offset total		mm
<input type="checkbox"/> Analysis of rake and clearance angles, cutting speeds		
Cut distribution		
<input checked="" type="checkbox"/> Roughing		
Remaining allowance		mm
Change of chip volume / cut	100	%
Minimum one input, both possible:		
Minimum number of cuts	3	
Approximated eff. rake angle tool exit gamma*	-30	°
<input checked="" type="checkbox"/> Semi-finishing		
Total allowance semi-finishing	0.3	mm
Change of chip volume / cut	100	%
Minimum one input, both possible:		
Minimum number of cuts	2	
Approximated eff. rake angle tool exit gamma*	-20	°
<input checked="" type="checkbox"/> Finishing		
Total allowance finishing	0.2	mm
Change of chip volume / cut	100	%
Minimum one input, both possible:		
Minimum number of cuts	1	
Approximated eff. rake angle tool exit gamma*	-10	°
<input checked="" type="checkbox"/> Automatic workpiece tip diameter		
Workpiece tip diameter	89.3427813986	mm
Draw generating positions for cut	1	
<input checked="" type="radio"/> Adjust shaft angle to diameter		
<input type="radio"/> Fixed shaft angle		
Analysis of rake and clearance angles, cutting speeds		
Draw results for cuts	1-20	

<input checked="" type="checkbox"/> Calculation of main machining time		
Feed radial approach	40	mm/min
Feed reverse motion	60	mm/min
Axial feed roughing	10	mm/rev
Axial feed semi-finishing	10	mm/rev
Axial feed finishing	10	mm/rev
Axial overtravel	1	mm
Radial safety distance	1	mm
Width/Length	15	mm

Input mask for technology and application module

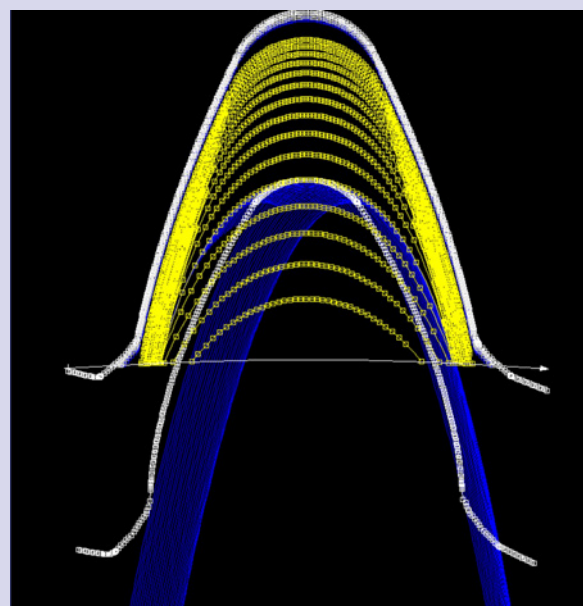
Easy and comprehensive user interface

The software provides a comfortable way to define technology conditions. It provides high flexibility in entering technology data and simulating its effects on the process in the virtual environment. The results offer great support for the designer in optimizing the cutting tool and the process data already in the design phase.

Power Skiving: The seamless connected application support

The Application Module

The Application Module provides a seamless interaction between tool design and application engineers. The application specialists who work on-site have full access to the tool data in order to use them for the gear cutting simulation. With the tool in hand and this information, the application specialists at the customer's plant or together with the machine tool manufacturers can optimize the skiving process independently – supported by the included full functionality of the Technology Module. If the test results under real machining conditions should require a final geometry optimization, the corresponding data to be changed can be fed back directly to the design department. In summary: The Application Module allows the application engineer to simulate and optimize cutting performance and machining economics – including means to optimize tool life.

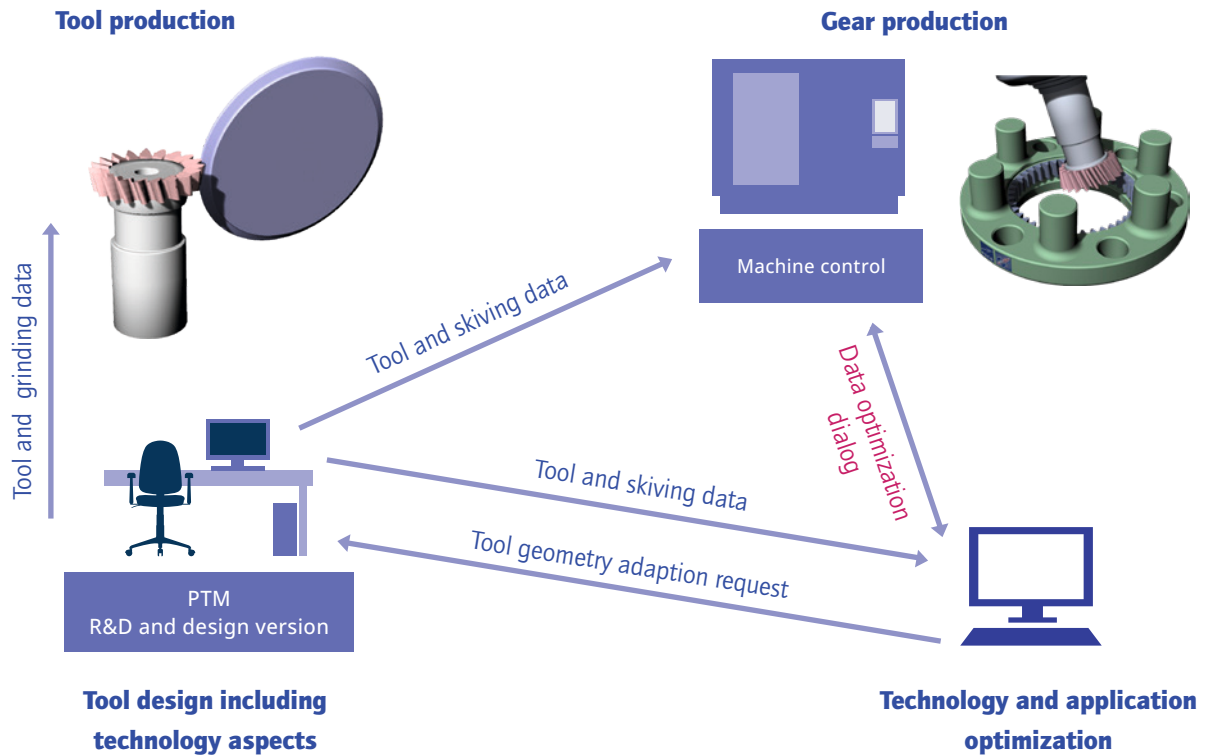


2D representation of cut distribution and rolling motion within one defined infeed position

The PTM solution offer for skiving

The Technology Module for the integration of technology and tool optimization aspects already in the tool design stage is available as an add-on to the proven PTM solution which already covers the design and manufacturing chain of skiving cutters.

The Application Module can be seamlessly connected to the PTM skiving system and supports application specialists on-site with the full range of functions of the Technology Module in optimizing the skiving process in the production environment.



Process efficiency and economy in focus

esco's prime focus is to support its customers and partners to reach the highest possible efficiency in their processes. Being supported throughout the entire chain from tool design, manufacturing, quality inspection and finally application, users of esco's software solutions can realize maximum value, reduce their overall costs and increase their competitiveness.



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