



STREAM FINISHING UNITS SF SERIES



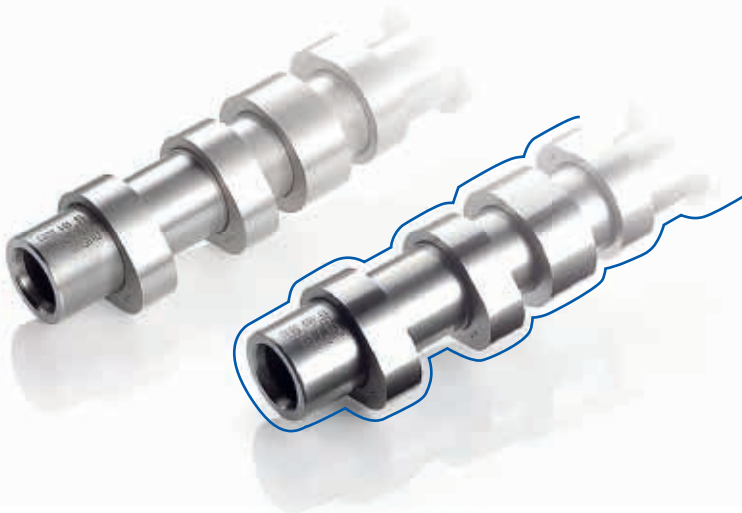
PERFECT SURFACES WORLDWIDE

OTEC: WE MAKE THE DIFFERENCE

The OTEC stream finishing process offers much shorter processing times compared to conventional procedures. It also allows users to automate processes easily without jeopardising reliability. The shorter cycle times mean that the systems can be integrated smoothly into industrial production lines.

In this new process, one or more workpieces are clamped in a holder and immersed in the rotating process drum filled with grinding or polishing media. The actual processing motion is the result of the grinding or polishing media flowing around the workpiece, combined with the rotation of the workpiece itself.

In stream finishing, workpieces can be deburred, smoothed and polished in a single process. The technology can also be used to round workpiece edges. This is made possible by the high flow speeds of the grinding or polishing media achieved using SF technology. The arising forces press the fine polishing media granules into tiny, difficult-to-access areas like grooves and notches. This enables roughness depths of below R_a 0.03 μm . In addition, contour-controlled motions help process certain areas with greater precision. To ensure even abrasion across the entire workpiece, this motion occurs alongside standard processing and is automatically monitored. The machine's special design allows the flow angle of the grinding or polishing media to be adjusted. This enables control of material abrasion to the micrometre level. This combination of high automation, powerful processing forces and quick workpiece changing during the procedure allow for fast and efficient workpiece processing.



Camshaft

Lower R_{pk} values, leading to lower friction and greater energy efficiency. Lower metal abrasion in the oil, resulting in longer replacement intervals



SF 2x4
Film



SF 4
Film



Gear wheel

Smooth tooth flanks lead to lower friction values



SF 2 RLS
Film

Inner forming die
Tools in outstanding quality - Polished forming surfaces lead to longer service lives and lower wear



SF 1 ILS
Film

Milling tool
Rounding the cutting edges increases tool life



SF 3 RLS
Film

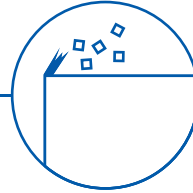
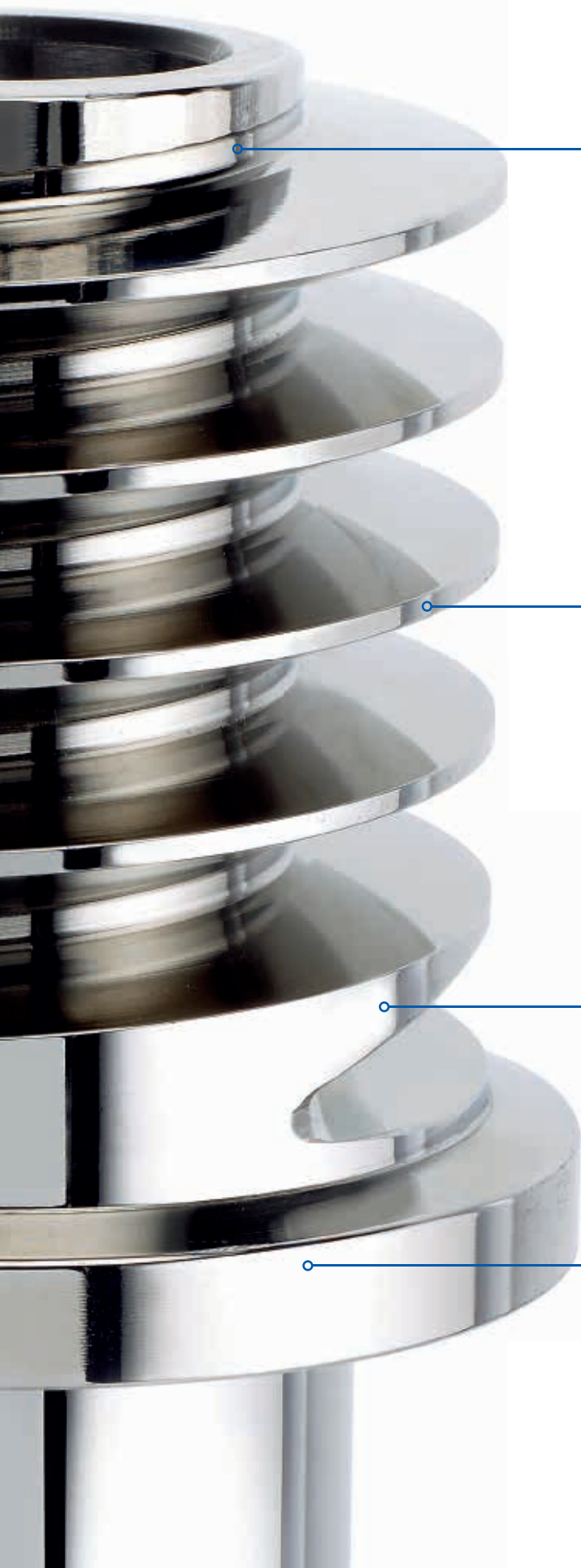


Thread-cutting taps
Polishing reduces cutting forces and wear

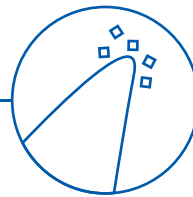


SF 4
Film

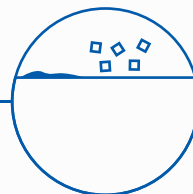
Turbine blades
Defined rounding of inlet and outlet edges with uniform smoothing and no adverse effect on the blade form



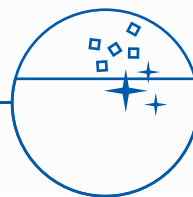
Deburring



Rounding



Smoothing



Polishing

WE GET YOU TO THE FINISH WITH μ PRECISION

OTEC-optimized surfaces ensure that workpieces fulfil the high quality requirements of our customers. The focus here is on the finish or properties of the surface. In series production, reliable repeatable results and cost effectiveness deliver a real competitive edge.

Precision finishing

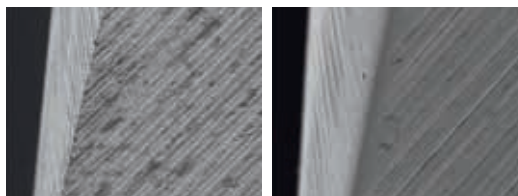
This fast mass finishing process ensures extremely short process times, even with complex shapes. Parts can be deburred, rounded, smoothed or polished in a single work step. This process also effortlessly achieves roughness depths of far below $0.1 \mu\text{m}$.



Example: Camshaft before and after processing

Rounding cutting edges

Rounding a tool's cutting edge by even a small amount like $15 \mu\text{m}$ can stabilise the edge and ensure a perfect, burr-free geometry. This protects the edge against breakages and significantly improves both the service life and process reliability of the tool.



Example: Circumference cutter ground and rounded by $5 \mu\text{m}$ for comparison

Smoothing

With smoothing, the roughness of the surface is reduced, i.e. the unevenness in the peaks on the surface is removed. The benefits this brings include reduced friction, higher contact ratios and less wear. A further benefit is the removal of hard-droplets after PVD coating.



Example: Tooth flank before and after processing

Polishing

In addition to improving the appearance of the workpiece surface, polishing also improves the physical properties of the surface. A polished chip flute on carbide cutters and drill bits can increase the maximum cutting speed, for example, as well as boosting coating adhesion. A polished forming die will have a longer service life and lower friction coefficients.



Example: Die before and after processing

AUTOMATIC QUALITY



OTEC stream finishing machines offer versatile, flexible and efficient surface finishing for small or large series production. If required, they can be fitted with the right automation systems for every application.

By choosing an OTEC SF, not only are you choosing uncompromising German quality, but a secure future too.

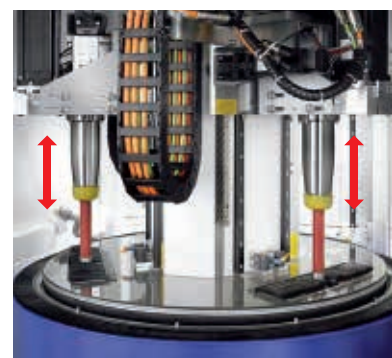
With a comprehensive range of standard equipment, optional extras and countless automation choices, our machines help you scale your production.

You can increase operating comfort and process reliability further with optional modules. Immersion depth control, for example, controls the immersion depth of the workpiece depending on the process. It can be programmed either manually or fully automatically. Wet processing machines feature a dosing unit that allows users to adjust the compound concentration via the touch panel.



Variant 1: Decentralised lifting unit

Here, all holders and workpieces are immersed simultaneously. This version is mostly used with manual loading and unloading.



Variant 2: Centralised lifting unit

All lifting units are immersed individually. One workpiece is changed while the others are processed. This variant results in shorter downtimes and is mostly used with automatic loading and unloading.

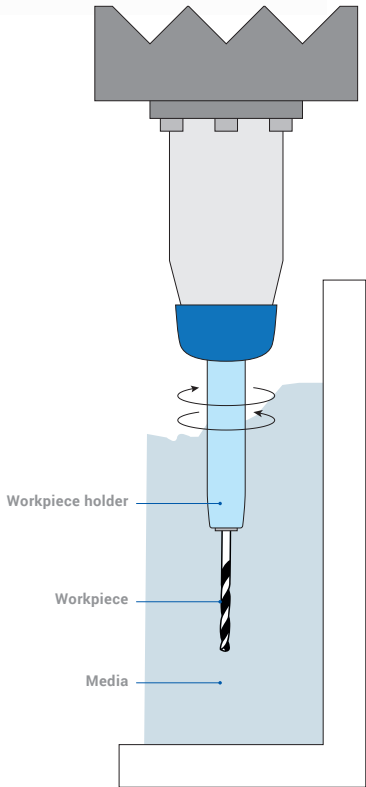
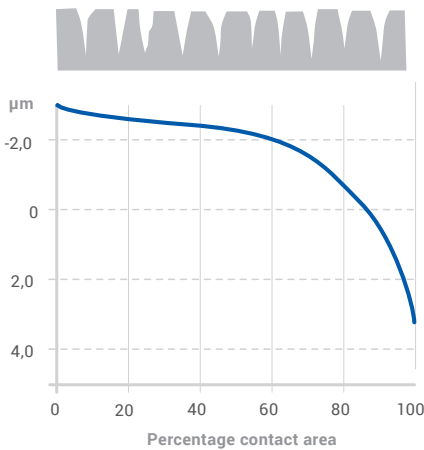
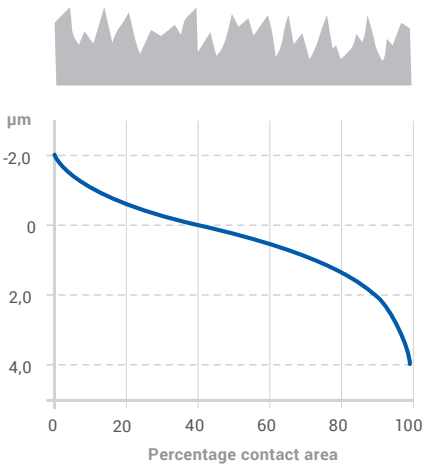
STOP & GO HELPS ACHIEVE GOALS QUICKLY

The smart optional PULSFINISH process ensures an extremely intensive and precisely controllable surface result in a fraction of the normal time.

The newly developed PULSFINISH process is based on repeated, precisely defined movement intervals between the media and the workpiece, with up to 2,000 rpm. The varying speeds caused by the inertia of the rotating media in the container, together with the fast workpiece speed changes, lead to relative accelerations of up to 40 g. The optional pulse drive is available for all stream finishing machines.



Increased surface contact areas



THE QUALITY SERIES FOR SERIOUS QUALITY



SF MANUAL

Perfectly suited for workpiece processing in small to medium-sized production lines.



SF ILS AUTOMATION

The solution of choice for processing small workpiece batches and frequently changing series.



SF RLS AUTOMATION

Perfect for processing high quantities in flexible production.

We reinvent ourselves, just for you

Do you have exceptional requirements for which there is not yet a solution on the market? Speak to us. As the technology leader in innovative stream finishing machines, special solutions made to our customers' specifications are our particular strength. We work closely with you to develop a highly customized solution, including the most suitable process. Our team will be pleased to advise you without any cost or obligation on your part and in absolute confidence. Call us: +49 7082 4911-20.

OTEC SF RLS PERFECT FOR MASS PRODUCTION

The SF RLS (robot loading system) is our answer to questions related to automation and integration in modern production lines, such as in the automotive or tooling industries.

The OTEC SF RLS can also be fitted with the newly developed pulse drive. This allows users to meet the demanding speed, quality and reliability requirements in mass production. It also offers three workpiece holders, allowing three workpieces to be processed simultaneously and changed during the process. These three workpiece holders are cycled and can be controlled individually. This enables users to deburr and round workpieces in seconds, or smooth and polish them from $R_a\ 0.4\ \mu\text{m}$ to $R_a\ 0.1\ \mu\text{m}$. The machine therefore achieves R_{pk} values of



up to $0.1\ \mu\text{m}$ in a few minutes, without affecting the contour of the workpiece. The OTEC SF RLS can be easily integrated as a key element of any production line. Depending on the periphery and cycle time, the grippers can be fitted either manually or fully automatically. With its modular design, the machine can easily adapt to cycle times of often just a few seconds.

A robot arm grabs a milling tool from the workpiece pallet



Touch panel for controlling the robot arm on the SF RLS



A chain loader on the SF 1 ILS fitted with tool

OTEC SF ILS NON-STOP QUALITY

The SF 1 ILS (Integrated Loading System) is the compact OTEC base model for tool processing with automatic loading.

The SF1 ILS with chain loader is the new standard in automated precision finishing. The machine requires no expertise in robotics and is designed for maximum user friendliness. Both the SF and the chain loader are operated via a control panel. It features a chain loader with 64 or 160 positions and can process different workpieces in a single batch. Workpieces and collets can be changed automatically as required. Processing times range from 30 to 300 seconds, depending on the process and workpiece ge-



ometry. With a processing time of 60 seconds per workpiece, the machine processes around 40 workpieces per hour. The SF1 ILS features a lifting unit for the workpiece holder and is suitable for both stream and pulse finishing in wet or dry processing. All these features make the SF1 ILS an extraordinarily effective and flexible machine. Ideal for processing small batch sizes and frequently changing series.



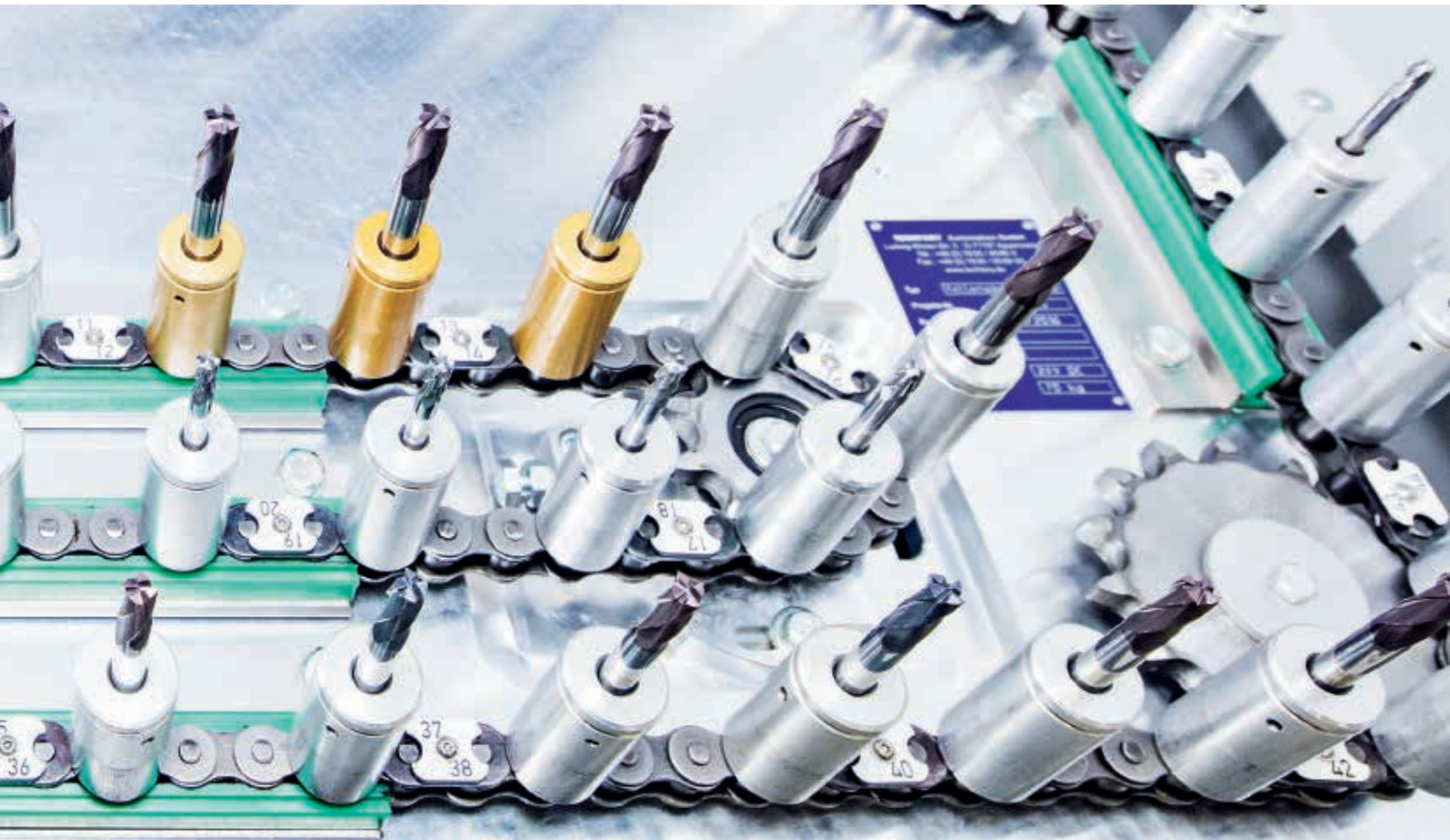
TECHNICAL DATA

SF-Machines	SF 1 78-ILS	SF X/1 78	SF X/1 105	SF 3/3 105	SF H-105
Machine dimensions (W x D x H mm)	2850 x 1370 x 2460	1930 x 1430 x 2585	2560 x 1550 x 2820	2123 x 1980 x 3020	2110 x 1620 x 2820
Process container size (Height in mm)	780 x 420	780 x 420	1050 x 500	1050 x 500	1050 x 500
Loading method	autom. integrated	autom./manual	manual**	automatic	manual**
Supply voltage (V)	400	400	400	400	400
Control voltage (V)	24	24	24	24	24
Holder interfaces	1	1-2	2-5	3	1-2
Maximum diameter (mm)	18*	150	230	150	300
Max. workpiece length (mm)	150*	250	300	250	300
Max. workpiece weight (kg)	0,38	2	15	5	60

* Designed for automatic operation. Manual loading allows for larger dimensions

** Automatic loading available on request

The X after SF stands for the possible number of holders



Standard equipment

- Process drum for dry finishing, in steel, painted exterior with stripper brush
- Process drum for wet finishing, in stainless steel, painted
- Manual clamping of workpieces
- Workpiece angle adjustable up to 30°
- Electromechanical immersion by means of lift system
- Touch screen operation via Siemens S7 control system
- Rotary speed infinitely adjustable via frequency converter
- Automated process control
- Direction of rotation can be preset with automatic reversal of direction

Options

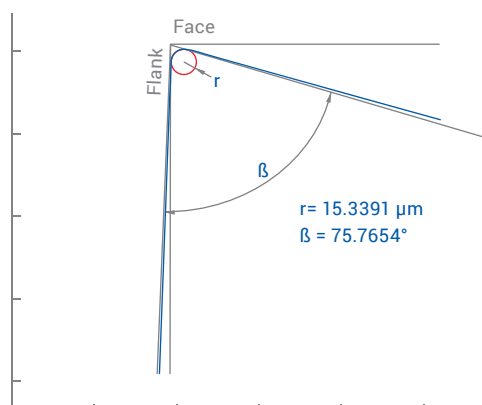
- Additional process drum for wet or dry finishing
- Trolley for changing process drums
- Three-jaw chuck $d = 4-50 \text{ mm}$
- Holder for chucks $d_{\text{max.}} = 26 \text{ mm}$, for $d = 3-26 \text{ mm}$, also suitable for air purging
- Holder for chucks $d_{\text{max.}} = 40 \text{ mm}$, for $d = 20-40 \text{ mm}$, also suitable for air purging
- Indexing function for workpiece drive for the selective finishing of specific surfaces and continuous movement with adjustable angle areas and speeds
- Automatically adjustable immersion angle of 0-25° (via touch panel), exclusively for automation-compatible SF 1, 2 and 3 Profibus or Profinet interface for automatic loading
- PULSFINISH® for shorter processing times, even in areas which are normally inaccessible

MACHINE AND PROCESS – THE DUAL SOLUTION

Every workpiece is different. For a reproducible and efficient process which always results in a perfect surface, all relevant parameters are determined and documented in the lab.

Our OTEC research lab offers you a professional service and can develop a process fine-tuned to your workpiece and your application. After processing a sample, we first create a log documenting all process parameters. On the basis of this information, the details of stock removal, quality of finish, surface compaction and other technical data are clear to see. This provides valuable insights which subsequently enable us to determine the combination of grinding and polishing media that is right for you. Alternatively, we can also advise you without finishing a sample if you send us a high-quality photo of your workpiece. If you order a machine, the process log relating to your application is, of course, free of charge.

The measurement log shows the edge rounding in the μm range





Example of a processing log

Task:	Grinding and polishing	Clockwise rotation:	50 %	Holder:	SF special holder
Workpiece:	Die	Anticlockwise rotation:	50 %		
Material:	Steel				
Manufacturing process:	Turned and milled part				

Machine: SF Manual

Process stage 1	Time	Process	Media	Compound Container	Speed
	8 min.	Wet grinding	KXMA	SC 15 Compound	55



WHERE WE LIVE, QUALITY HAS A LONG TRADITION

Founded in 1996, OTEC has quickly established itself as the market's technology leader by developing new machine concepts, inventions and improvements. OTEC supplies machines which are carefully tailored to the needs of specific industries and which are truly impressive in terms of cost-effectiveness, handling and precision and which are far superior to conventional systems. Around 120 members of staff employed at the company's headquarters in Southern Germany and a global sales network ensures excellent worldwide support and outstanding quality at all times.



CF SERIES



DF Series



OTEC Präzisionsfinish GmbH

Heinrich-Hertz-Str. 24 · 75334 Straubenhardt · Germany

Tel. +49 7082 4911-20 · Fax +49 7082 4911-29 · E-Mail: info@otec.de

www.otec.de