



THE COMPANY

Since it was founded in 1996, OTEC has quickly established itself as a technological market leader due to its innovative machine designs, new product development and enhancements to existing products. For each sector of industry, OTEC supplies custom and specially developed machine designs which offer extraordinary features in terms of cost-effectiveness, handling and precision processing, all of which are superior to conventional processes. With 50 employees at the corporate headquarters in the south of Germany and a worldwide distribution network, OTEC can guarantee that the quality of technical processes and customer service are always second to none.



Perfect surfaces. Worldwide.  
Perfect surfaces. Worldwide.

# DF-Tools



TOOLS | INDUSTRY

► OTEC ECO SERIES  
For the CNC turning shop



► OTEC CF SERIES  
For high-precision workpieces



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# Precision finishing for perfect surfaces

The drag finishing process (in which workpieces are dragged through a container of grinding or polishing media in a precisely controlled manner) was originally used in the jewellery industry for polishing heavy rings to a brilliant shine. Today this process is also well established in other industry sectors, such as toolmaking, medical and pharmaceutical. The main reason for this is its cost-effectiveness and superior results as compared to conventional grinding and polishing processes. The DF-Tools generation of machines has been specially designed to meet the requirements of tool manufacturers. The main areas of application for these machines are:

- ▶ Edge rounding of cutting tools (resulting in a considerable increase in tool life)
- ▶ Smoothing and polishing of the flutes (resulting in superior chip flow and lower cutting forces)
- ▶ Removing droplets from the coating process (resulting in better chip flow)
- ▶ Deburring of complex and high-precision HSS tools, such as thread cutting taps, hobs, and dental drills (at the same time, improving overall surface quality)

## THE PROCESS



## Areas of application

### Edge rounding

The main application here is the processing of tungsten carbide cutting tools, such as end mills and drills. Depending on the degree of rounding the process takes from 1 to 20 minutes. The advantages of the DF-Tools series are a highly reproducible process in the micron (0.001mm) range, precise rounding of the cutting edges and a simultaneous smoothing of the chip flute. This makes the DF-Tools series far superior to other processes.

### Smoothing and polishing

The processing time is approx. 2-3 minutes for coated tools and approx. 5-30 minutes for uncoated ones. The geometry and design of the workpiece holders ensure that the specific geometry of each tool does not interfere with the process but contributes to its efficiency. The resultant smoother surfaces in the flutes considerably reduces built-up edges, which in turn increases cutting speed and results in a significant increase in tool life. With forming tools, material flow is improved and considerably less force needs to be exerted during the forming process. This leads to a far superior surface quality on the finished product.

### Droplets

Droplets from the coating process are removed in approx. 2-3 minutes. This increases the rate of chip flow.

### Deburring

Burring is a problem encountered especially during the manufacture of tools from HSS. The DF-Tools series of machines is a very fast and effective solution to this problem. The burrs are removed and the chip flute is smoothed in 2-6 minutes. Edge rounding is achieved in the same process. **Result:** tool life is increased by up to 16 times.

# DF-Tools

## Drag-finishing machines for the processing of tools

Fast payback, extremely easy handling and consistent processing quality even after processing large quantities of tools – these are the advantages of the OTEC drag finishing machines. All machines in the DF-3 Tools, DF-4 Tools, DF-5 Tools, DF-6 Tools and DF-10 Tools series have been specially designed for the processing of tools. This means that the features of these machines have been enhanced for this specific application.

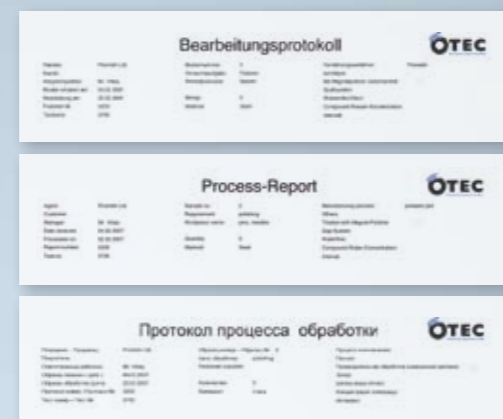


## Improved technology

Highlights at a glance

VISIBLY BETTER!

Form your own opinion about the efficiency of the DF-Tools series of machines. Simply send us a sample part for processing in our test lab. We will then send you a processing plan specifically tailored to your application, including a list of suitable grinding and polishing media and report documenting all the process parameters (on request in any one of twelve languages). All free of charge, of course, and with no commitment on your part and in absolute confidence. Demand the proof of improved technology.



The DF-Tools machines are technological leaders. New detailed solutions make this generation of machines faster and more economical while giving better processing results:

► **Angled rotating tool holder**

The clamping of workpieces into an angled tool holder is already a standard feature of the technically sophisticated drag finishing machines. OTEC has now refined this principle still further. The new DF generation is optionally available with an angled tool holder whereby the mounted adaptors rotate on their own axis. This rotating angled position enables the front surface and complex geometries of tools such as forging dies to be processed to perfection.



► **Independently driven tool holders**

With this type of tool holder, each workpiece rotates individually in addition to the general rotation. This optimizes the processing of the flutes, while achieving much shorter processing times and more consistent results. Independently driven workpiece holders are available with various speeds and for a variety of workpiece weights.

► **Automatic tool length identification**

For greater reliability, a laser is used to determine workpiece length, enabling the immersion depth to be set with great accuracy. This guarantees that the process is repeatable and consistent, time after time.



► **Dual motor drive for the tool holder**

With the dual motor drive the speed of the rotor and of the workpieces can be set independently of each other. This means that the machine can be fine-tuned to the exact requirements of the workpiece.

# Overview of the DF-Tools Series

## Technical specifications

	DF-3	DF-4	DF-5	DF-6	DF-10
Dimensions (b x d x h in mm)	1155 x 970 x 2010	1155 x 970 x 2010	1300 x 1150 x 2010	1300 x 1150 x 2010	1650 x 1300 x 2450
Container volume (effective capacity)	80 litre	80 litre	114 litre	114 litre	170 litre
Weight	310 kg	325 kg	780 kg	810 kg	850 kg
Maximum immersion depth	250 mm	250 mm	250 mm	250 mm	250 mm
Holder interfaces	3	4	5	6	10
Maximum workpiece diameter	250 mm	210 mm	250 mm	210 mm	200 mm
Maximum workpiece weight	3 x 15 kg	4 x 15 kg	5 x 15 kg	6 x 15 kg	10 x 15 kg
Adapter interfaces with 4-way/6-way holder	12 / 18	16 / 24	20 / 30	24 / 36	40 / 60
Maximum workpiece diameter with 4-way/6-way holder	85 mm 55 mm	82 mm 55 mm	85 mm 55 mm	82 mm 55 mm	65 mm 55 mm
Maximum workpiece weight* with 4-way/6-way adapter	0.5 kg 2.0 kg	0.5 kg 2.0 kg	0.5 kg 2.0 kg	0.5 kg 2.0 kg	0.5 kg 2.0 kg
Additional drive	Optional	Optional	Optional	Optional	Optional
Voltage	400 V	400 V	400 V	400 V	400 V
Power consumption, depending on specifications	2-3 kW	2-3 kW	3-5 kW	3-5 kW	3.5-7 kW

\* various workpiece holders available

### Standard model

- ▶ Process container in stainless steel
- ▶ High-quality, sealed exterior in steel, painted on the exterior walls and bottom
- ▶ Octagonal flow-optimized process container
- ▶ Lifting spindle with ball screw drive for 90% operating time
- ▶ Display and preselection of vertical workpiece position
- ▶ Storage for 200 programs
- ▶ Greater clearance between container rim and holder for easier setup
- ▶ Collet chucks for clamping tool holders
- ▶ Program backup on external MMC card

### Options

- ▶ Additional process container
- ▶ Trolley for changing process container
- ▶ Independently rotating holders for up to 4 workpieces
- ▶ Independently rotating holders for up to 6 workpieces
- ▶ A variety of tool holders for burrs, drills, cutting tips etc.
- ▶ Immersion depth control
- ▶ Media volume monitoring
- ▶ Printer interface
- ▶ Process container cooling
- ▶ Dual motor drive
- ▶ Angled position for drive holder
- ▶ Discharge device for workpieces



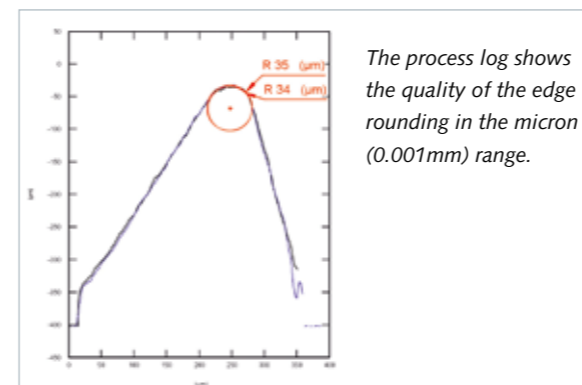
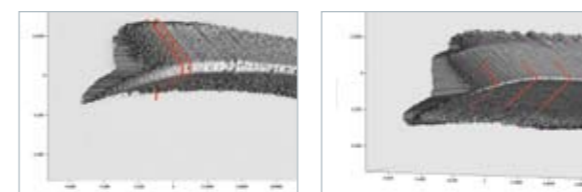
## PROCESSING EXAMPLES

### Example 1 – Edge rounding of an end mill

Material: tungsten carbide

Processing time: 10 minutes

- ▶ Increase in tool life of up to 300%

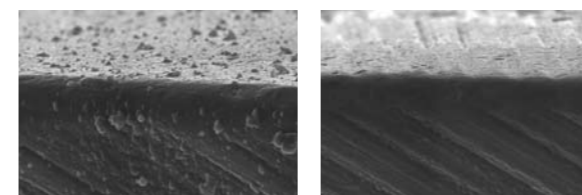


### Example 2 – Removal of droplets

Coated tool

Processing time: 2 minutes

- ▶ Improved chip flow, lower heat generation

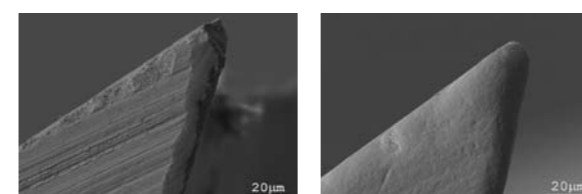


### Example 3 – Edge rounding of cutting tool

Material: tungsten carbide

Processing time: 6 minutes

- ▶ Three-fold increase in tool life



# Media

## In-depth know-how

To achieve the best possible finish it is essential to choose the right grinding or polishing media. The quality, shape and size, together with the abrasive material used, are the factors that produce a perfect surface. You will find detailed information on which media to use with which machine on our website [www.otec.de](http://www.otec.de). In all cases we will work in close consultation with you to determine the best composition of media for your applications before the machine is delivered. **The most important are:**

### Walnut shell granulate, e.g. H 1/100, H 1/400 etc.

- ▶ Processing HSS tools e.g. H 1/400
- ▶ Polishing, gentle deburring and edge rounding
- ▶ Low stock removal rate, depending on grinding or polishing additive
- ▶ Polishing paste: P 17



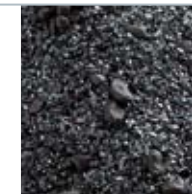
### HSC granulate, e.g. HSC 1/300

- ▶ Processing HSS and tungsten carbide tools
- ▶ Polishing coated tools and removing droplets
- ▶ Smoothing and polishing tungsten carbide tools
- ▶ Edge rounding of tungsten carbide up to max. 0.015-0.020 mm
- ▶ Removing solder residues
- ▶ Medium to high stock removal rate depending on grain size
- ▶ Gives a very high quality surface finish e.g. Rz.0,5 (previously Rz 2,5)



### SIX granulate

- ▶ Processing tungsten carbide tools
- ▶ Deburring and edge rounding of HSS tools
- ▶ Smoothing and edge rounding of chip removal tools in tungsten carbide up to 0.030mm
- ▶ Processing cutting tips
- ▶ Stock removal rate: high
- ▶ Gives a high quality surface finish



### QZ 1-3

- ▶ Pronounced edge rounding from approx. 0.030mm
- ▶ Stock removal rate about twice that of SIX.
- ▶ High-grade corundum with a grain size of 1-3 mm
- ▶ With small edge radii of less than 0.030mm, QZ 1-3 gives a rougher surface than SIX or HSC granulate.



### Coconut shell granulate e.g. K3/400

- ▶ Natural granulate coated with PP1polishing powder
- ▶ Polishing tungsten carbide tools with only a gentle degree of edge rounding of approx. 0.010-0.015mm
- ▶ Removing droplets

