



RELIABLE. PRECISE. AUTOMATED.

engraflexx deburring tools

Maximum process reliability and productivity thanks to the innovative **engraflexx** tooling solutions for deburring irregular contours on CNC machines and with robots

**decision for
the best** gravostar.com

MARKING. DEBURRING. AUTOMATION. PERFECTION.

Precision that speaks for itself – tool solutions that make your process smarter

When productivity, repeatability and absolute process reliability are crucial, you need solutions that don't just work – they think for themselves. We develop and sell highly

specialised tooling solutions that integrate directly into your existing production processes, thereby generating measurable added value:

Process-integrated part marking – directly on your CNC machine



With our **gravostar** technologies, you can mark every workpiece automatically, with traceability and in a unique manner.

No extra steps. No human error. No detours.

The result: clarity, order, security – and a production process that can be standardised 100%.

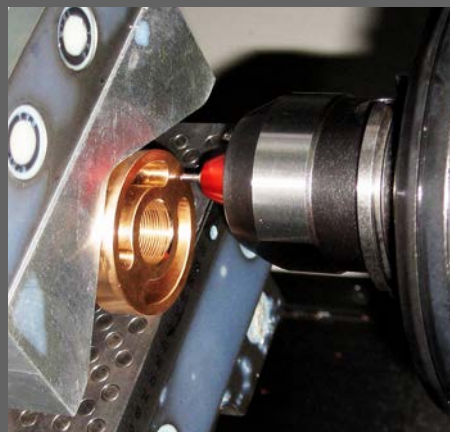
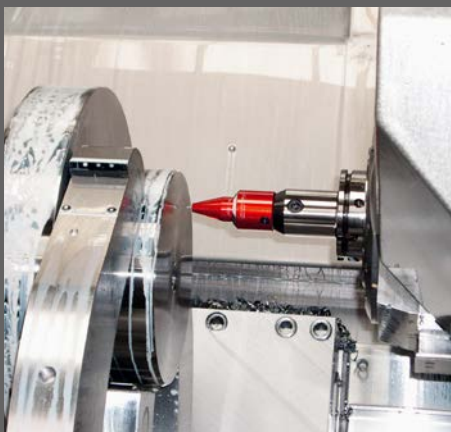
Automated deburring of undefined edges – on CNC machines or robots



Whether cast, pressed or forgings, or highly complex contours: our **engraflexx** deburring tools automatically adapt to varying geometries.

They eliminate uncertainties, improve quality and make the process more robust – even when component specifications vary.

Here's how to turn a recurring risk into a predictable, stable step in the process.



Automated deburring of cast, pressed or forged components

Engraflexx deburring tools are used for the automated deburring of undefined edges. They are primarily used in machining centres, CNC lathes or robotic systems. Depending on the

specific task, the version with radial or axial spindle deflection is generally preferred.

The benefits for you



Process reliability

Our solutions address one of the most critical factors in industrial decision-making: maximum process reliability.



Cost-effectiveness

The automated process eliminates one process step – **resulting in better part quality and shorter lead times.**



Error minimisation

Fewer manual interventions, **fewer sources of error** – preventing assembly, operational and post-production problems (e.g. breakdowns, recalls).



Process stability

Standardised repeatability ensures **consistency** – a fundamental requirement in any production-related decision.



Health and safety at work

Critical processes relating to health and safety (e.g. manual deburring) are eliminated, the risk of injury is removed, and staff absences are thus prevented.



- 1 Consistent deburring of a cast housing**
Automatic compensation for dimensional deviations.
- 2 Countersinking cast-in bores**
Radial compensation for positional differences.
- 3 Deburring internal bores**
Deflection of the milling cutter at the drilling edge.

A highly flexible tool family



Core idea

A flexible mounted (deflectable) tool spindle that compensates for deviations on the actual contour.



Result

Consistent deburring even on undefined edges.



Advantages

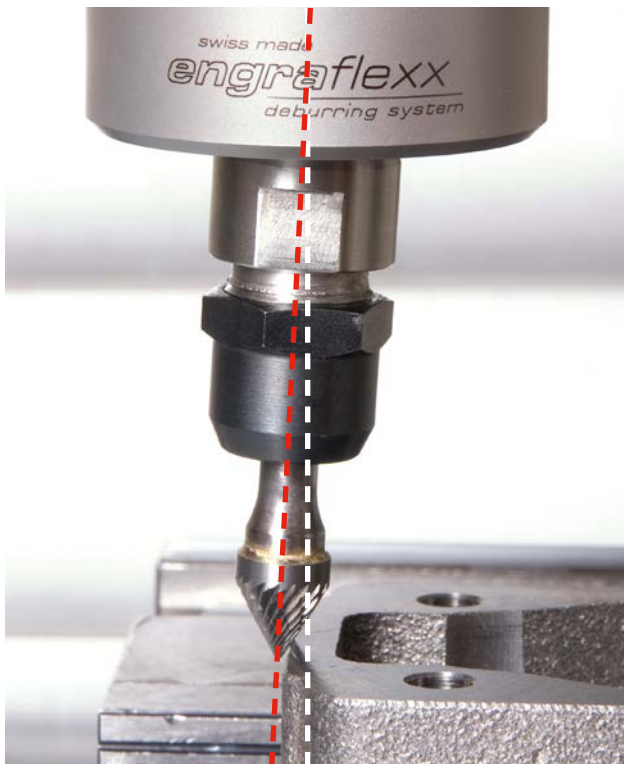
1. Automation without complex workpiece clamping
2. Maintenance-free operation (no periodic maintenance required)

Radial deflection & axial clearance compensation

There are two types of contour compensation – depending on the tool type, these are applied either in the radial or axial direction.

Radial tools

Models EC



Maximum deflection
Standard: 5 mm
Special: 12 mm

Axial tools

Models LC



Maximum distance compensation
Standard: 10 mm
Special: 20 mm

Principle of operation

A key feature of the engraflexx is its flexible tool spindle, which can deflect so that it can deflect radially or axially, depending on the tool design. The preloaded integrated spring ensures that the spindle is always pushed back towards its neutral starting position.

The workpiece area to be deburred is programmed by entering the theoretical workpiece contour with a 'too small' milling cutter radius compensation. As a result, the milling cutter is

positioned too close to the workpiece edge and, depending on the dimensional deviation, is pushed away to a greater or lesser extent along with the spindle.

This means that the milling cutter is always pressed evenly against the workpiece edge. This ensures that all areas of the contour are automatically deburred evenly – regardless of any dimensional or position deviations.

Radial or axial tool

When to use which engraflexx tool depends on various factors. These include: the material, shape and size of the workpiece, batch or production run size, maximum geometric deviation, and quality requirements. Often, it is the small

details that make the difference between success and failure! Take advantage of our many years of extensive experience – let us provide consulting services. It is certainly worth it.

Adjustable preload

On most tools, the spindle preload can be adjusted continuously using the adjustment sleeve, meaning that the tool does not need to be removed from the machine. In combination with the feed rate and spindle speed, this allows the deburring depth to be set to the desired level.

On some tools, adjustment is carried out using an Allen key through the Weldon shank.



Different deburring cutters

Depending on the application, deburring cutters of various shapes and sizes can be used. For first-time applications, our application engineers will usually discuss these with you in advance and supply them as part of the delivery.

As a solutions provider, our primary goal is to ensure a smooth implementation and customer satisfaction. That is why we always provide a fully functional system complete with a deflection tool and the appropriate cutting tool. The milling cutters are a key component of the overall deburring system.

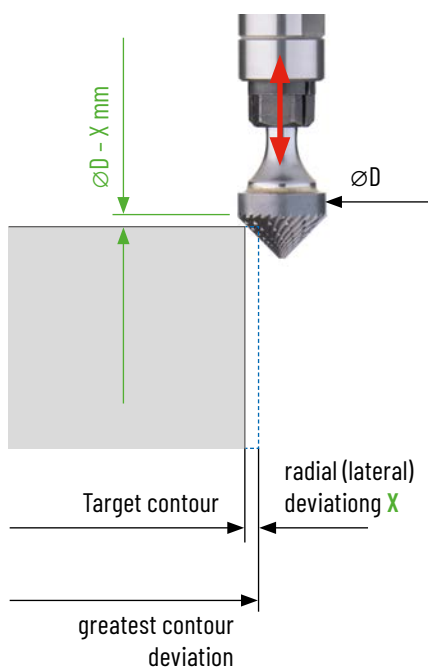
Operating principle: axial tool – radial compensation

An axial tool can compensate not only for height deviations in the contour, but also for radial deviations. It is important that the milling cutter always rests on the edge to be deburred with a slight tension. This is achieved by adjusting the Z-axis or by using radius compensation, whereby you move the cutter closer to the edge to be deburred. If the edge is slightly further

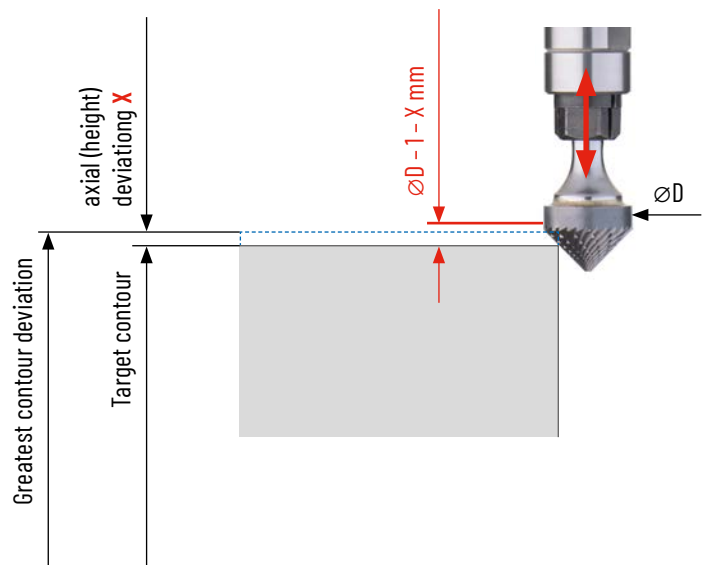
out, the milling cutter is automatically pushed upwards; if it is slightly further in, the milling cutter is also automatically pushed downwards. This results in a uniformly deburred edge.

Deburring in the case of radial or axial deviations (standard method)

Compensate for lateral deviations



Compensate for differences in height



Tools, milling cutters & accessories

- **Deburring cutters (tapered, cylindrical)** – often solid carbide; standard: 90° conical deburring cutters.
- **Cylindrical deburring cutters** – for milling of excess material.
- **Special-purpose milling cutter** – e.g. for precise chamfers or smooth radii.
- **Grinding pins & brushes** – for use with robots and on special surfaces.



Note:

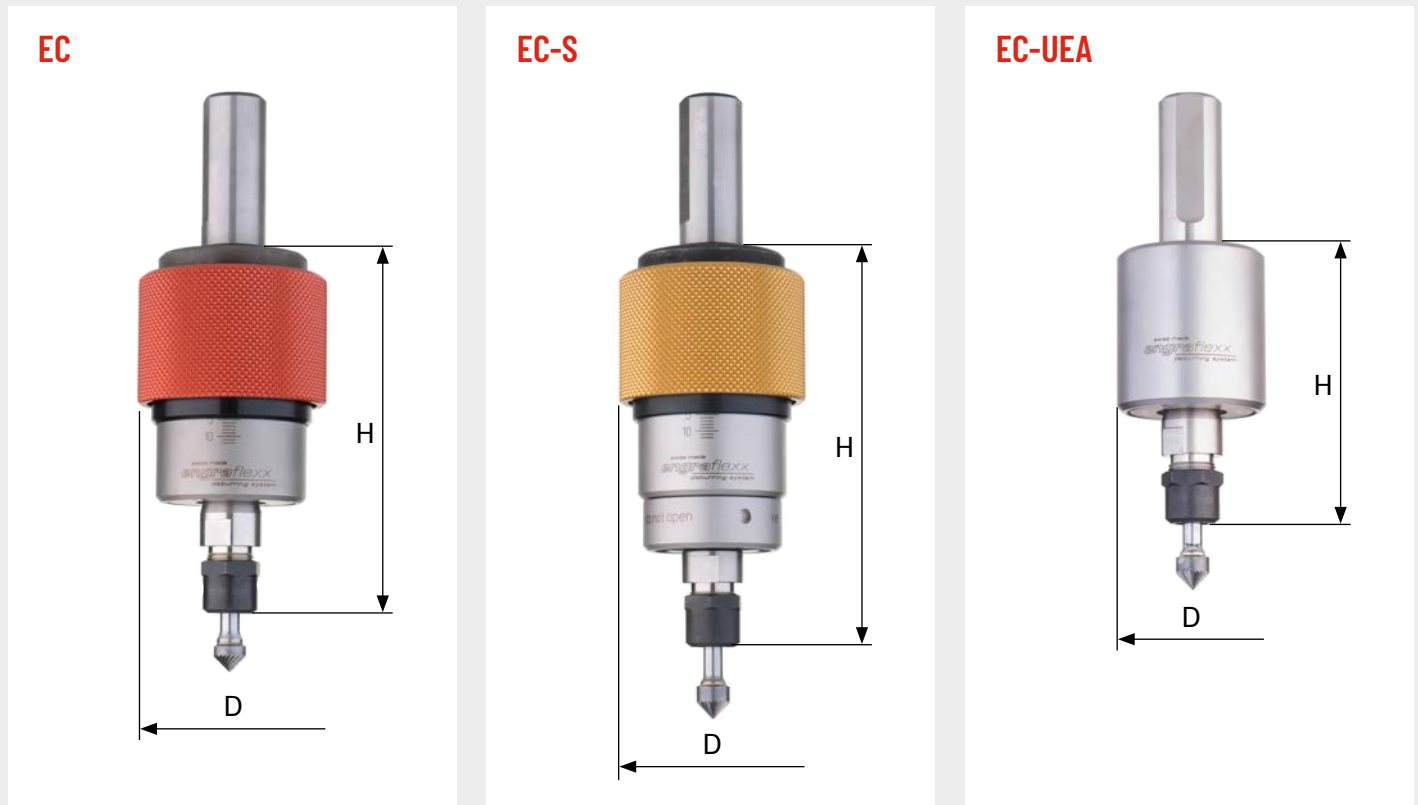
If selected correctly, router bits cause minimal wear; many standard tools are available from stock.

Standard engraflexx tools

Engraflexx tools are fitted as standard with a $\varnothing 20$ mm Weldon shank and a $\varnothing 6$ mm collet for holding deburring milling cutters. They are suitable for machine tools, machining

centres, automatic lathes, etc. (no additional installations required).

Radial-acting tools - EC models



Models	Application	max. deflection [mm]	Speed range ① [rpm]	Feed range ① [mm/min]	D [mm]	H [mm]
EC	For applications that change frequently	5	3'000 - 6'000	2'000 - 6'000	58	109.5
EC-S	For thicker burrs	6	3'000 - 8'000	2'000 - 6'000	58	125.5
EC-UEA	Standard tool for serial production	5	3'000 - 6'000	2'000 - 6'000	46	83.0

Note: ① The values for speed and feed rate are general guidelines; these may vary depending on the application.

Standard engraflexx tools

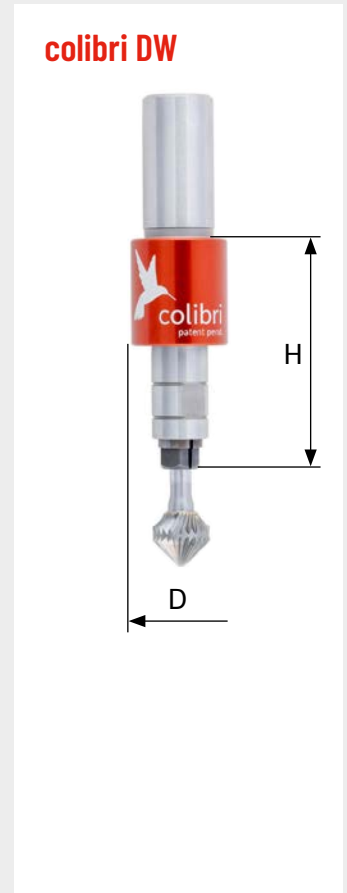
Engraflexx tools are fitted as standard with a $\varnothing 20$ mm Weldon shank and a $\varnothing 6$ mm collet for holding deburring milling cutters. They are suitable for machine tools, machining

centres, automatic lathes, etc. (no additional installations required).

Axially acting tools - LC models



Our colibri entry-level models

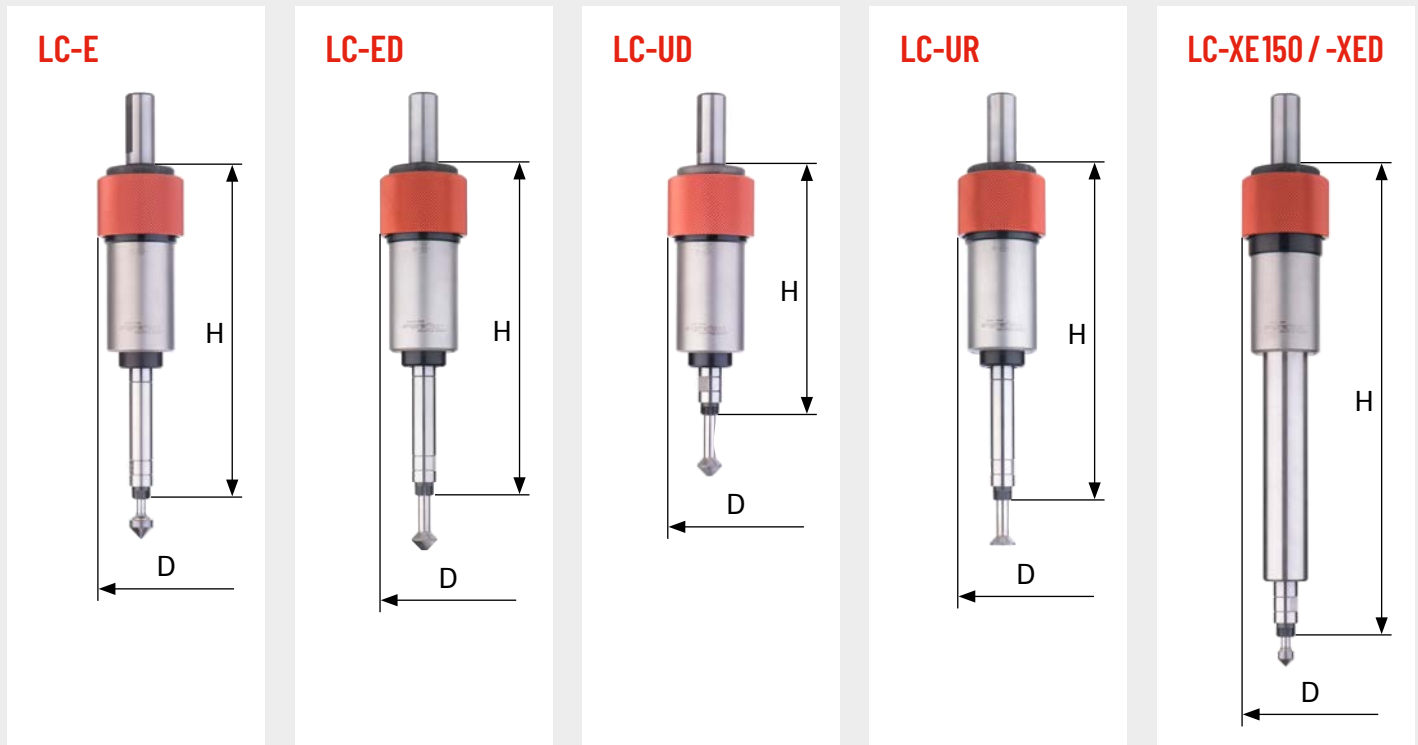


Models	Application	Max. gap compensation [mm]	Speed range ① [rpm]	Feed range ① [mm/min]	D [mm]	H [mm]
LC-U	For applications that change frequently	10	3'000 - 8'000	2'000 - 5'000	48	145
LC-UEA	Standard tool for serial production	10	3'000 - 8'000	2'000 - 5'000	46	101
colibri VW	Entry-level tool for light machining - forward-acting	10	3'000 - 8'000	2'000 - 5'000	27	64.7
colibri DW	Entry-level tool for light machining - forward and reverse action	on both sides 10 each	3'000 - 8'000	2'000 - 5'000	27	64.7

Note: ① The values for speed and feed rate are general guidelines; these may vary depending on the application.

Special engraflexx tools

LC-type axial-acting tools

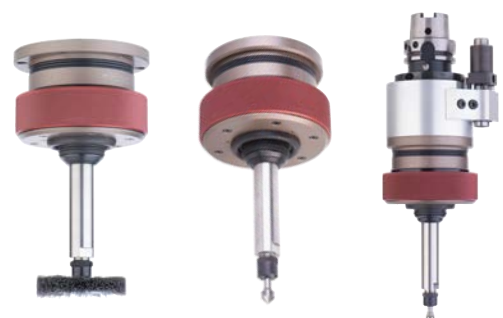


Models	Application	Max. gap compensation [mm]	Max. speed [rpm]	Feed range [mm/min]	D [mm]	H [mm]	Collet \varnothing [mm]
LC-E	Deburring and reworking of any workpieces with deviations in their positioning or poorly defined positioning.	10	3'000 - 5'000	2'000 - 5'000	58	221	6
LC-ED	Workpieces with deviations in the edges at the top and bottom , which must be machined from one side (forward and reverse) .	on both sides 10 each	3'000 - 5'000	2'000 - 5'000	58	221	6
LC-UD	Workpieces with edges on the top and bottom that must be machined from one side (forward and reverse) .	on both sides 10 each	3'000 - 8'000	2'000 - 5'000	58		8
LC-UR	Workpieces with edges on the reverse side (rear-facing) .	10	3'000 - 8'000	2'000 - 5'000	58	169	8
LC-XE150	Extra-long version for workpieces with extremely deep deburring contours (forward-acting).	10	3'000 - 5'000	2'000 - 5'000	58	310	6
LC-XED	Extra-long version for workpieces with extremely deep deburring contours (forward and reverse action).	10	3'000 - 5'000	2'000 - 5'000	58	310	8

SX spindles for special applications

Special solutions are sometimes be required for specific applications involving deburring or brushing operations. Please contact us to discuss your specific requirements. We have plenty to offer in this regard!

The engraflexx SX is shown below. It combines maximum robustness with process stability and is primarily used for radial brushing.



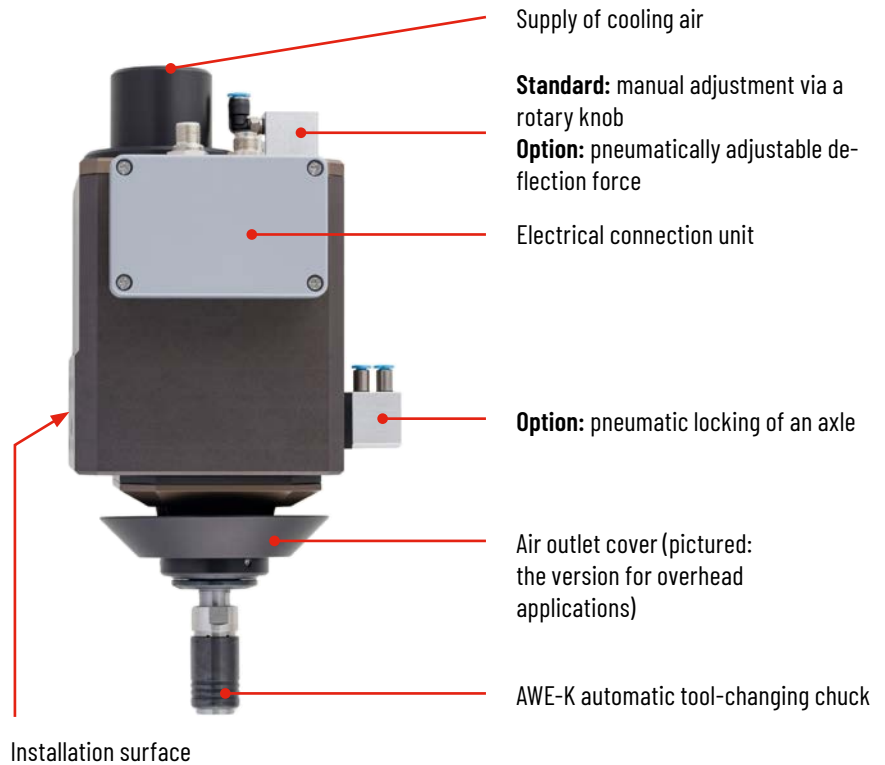
engraflexx ESP for custom systems or robots

The engraflexx ESP is a radial-action deburring tool with an integrated electric spindle and a wide range of options and capabilities for an automated, reliable deburring process.

The tool is fitted with a collet chuck for deburring cutters, brushes or polishing tools. As standard, the ESP features a 360° lateral spindle deflection function. The motor is controlled via a frequency converter, which is connected to the robot controller or the higher-level machine controller.

Options for specific applications:

- Two-axis deflection function
- Single-axis deflection function: spindle can be swivelled sideways or forwards and backwards
- Deflection lock function or switchable spindle lock
- With increased lateral preload
- AWE-K Automatic Tool Change and Storage System
- For overhead application
- and much more



The AWE-K adapter unit contains:

- 1x ER11 collet (available in either $\varnothing 6$ mm or $\varnothing 8$ mm)
- 1x shelf

Accessories for engraflex tools

Standard conical deburring cutters – for collets $\varnothing 6$ mm or 8 mm

When using the deburring tools we manufacture, the choice of the actual cutting tools is of crucial importance due to the swivelling spindle.

For every new application, we offer our customers a complete tool solution: the swivelling deburring tool, together with the ideal cutting tool for your specific application. For most applications, special solid carbide cutters are used – standard products are listed below.

Forward-cutting deburring cutters

Art.-Nr.	Axial WZ	Radial WZ	$\varnothing d$ [mm]	$\varnothing D$ [mm]	Angle W	Sketch	Comments
85.050.06	A / G	-	6	6	90°	1	
85.052.06	A / G / S	-	6	6	90°	1	
85.056.06	A / G / S / I	-	6	6	90°	1	
85.050.00	A / G	G	6	10	90°	2	
85.052.00	A / G / S	A / G	6	10	90°	2	
85.056.00	A / G / S / I	A	6	10	90°	2	
85.050.40	A / G	G	6	10	90°	3	angled tip
85.052.40	A / G / S	A / G	6	10	90°	3	angled tip
85.056.40	A / G / S / I	A	6	10	90°	3	angled tip
85.040.00	-	A / G	6	10	60°	2	
85.042.00	-	A / G	6	10	60°	2	
85.046.00	-	A / G	6	10	60°	2	
85.050.16	A / G	-	6	16	90°	2	
85.052.16	A / G / S	-	6	16	90°	2	
85.056.16	A / G / S / I	-	6	16	90°	2	
85.056.20	A / G / S / I	-	6	20	90°	2	
85.056.28	A / G / S / I	-	8	26	90°	3	angled tip

Double-sided deburring cutters

Item no.	Axial WZ	Radial WZ	$\varnothing d$ [mm]	$\varnothing D$ [mm]	Angle W	Sketch
85.076.05	A / G / S / I	-	6	16	90°	4
85.072.05	A / G / S	A / G	6	16	90°	4
85.061.13	A / G / S / I	A / G	6	13	90°	4
85.072.28	A / G / S	-	8	26.5	90°	4
85.076.28	A / G / S / I	-	8	26.5	90°	4

Note:

This overview shows our most commonly used milling cutters and is by no means exhaustive!

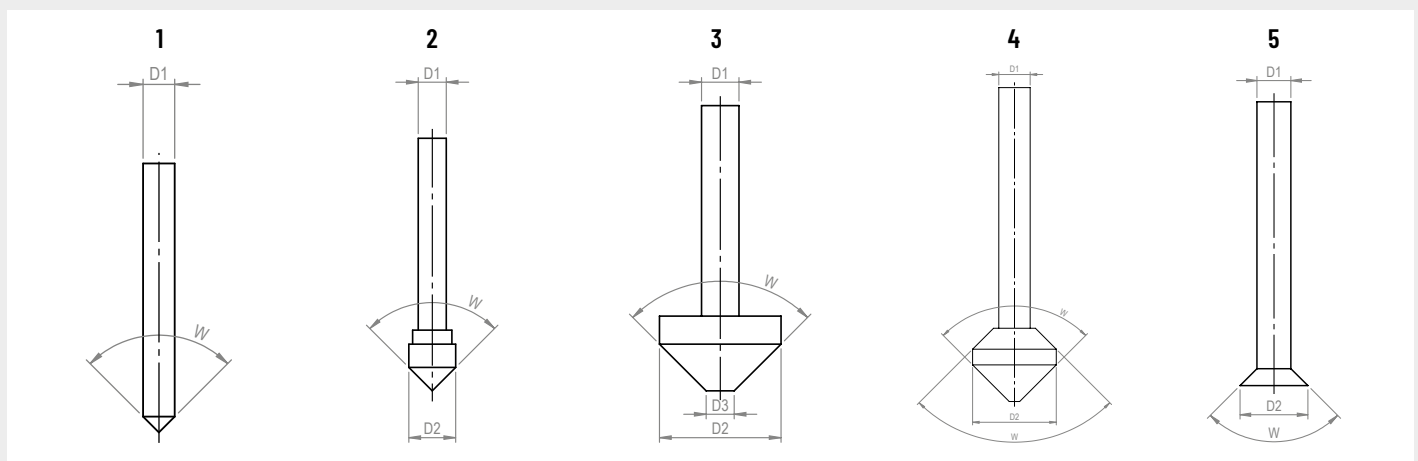
We have over 100 different milling cutters in stock and also manufacture special milling cutters for custom applications. **All our deburring cutters are also available in coated versions.**

Reverse-action deburring cutters

Item no.	Axial WZ	Radial WZ	$\varnothing d$ [mm]	$\varnothing D$ [mm]	Angle W	Sketch
85.063.00	A / G / S / I	-	8	16	90°	5
85.056.05	A / G / S / I	-	3	5	90°	5

Key:

A Aluminium **G** Cast iron
S Steel **I** Inconel



Virtually unlimited applications

There is hardly a sector of the manufacturing industry in which our deburring solutions are not already in use. Below is a selection of the most relevant sectors.

Cars



Chassis & Drivetrains



Aerospace



Plant & Mechanical Engineering



Defence industry



Energy & Water



Dental and Medical Technology



Watch industry



The most important wear and spare parts

Although engraflexx deburring tools are designed to be **completely maintenance-free** for mass production, there are process-related wear parts that should be kept in stock to ensure smooth operation on the production line.

- 2-3 deburring cutters per machine (consumables)
- Replacement collets

Maintenance recommendations

- **Cleaning:** Regularly remove swarf and dust from the deflection unit and the collet to ensure that the spindle deflection mechanism operates smoothly.
- **Visual inspection:** Check the deburring cutter for chips, particularly after machining castings containing hard inclusions.

Enquire without obligation

Feasibility assessment and recommendations from an applications engineer.
Tel. +41 71 940 06 76, Email: info@gravostar.com