



INTEGRATED. WEAR-RESISTANT. RELIABLE.

Smart automation of part marking

Maximum process reliability and productivity thanks to the innovative **gravostar** part marking solutions for CNC machines, custom-built systems and 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** technology, you can mark every workpiece automatically, with traceability and uniqueness. No extra steps.

No human error. No detours.

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

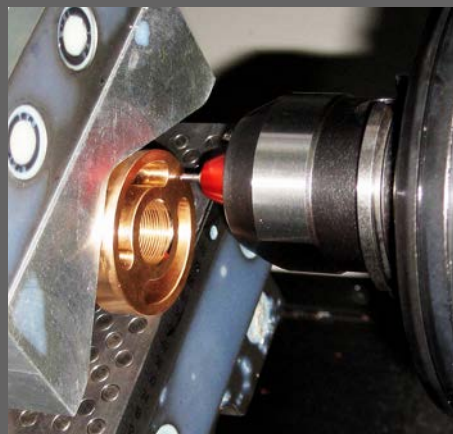
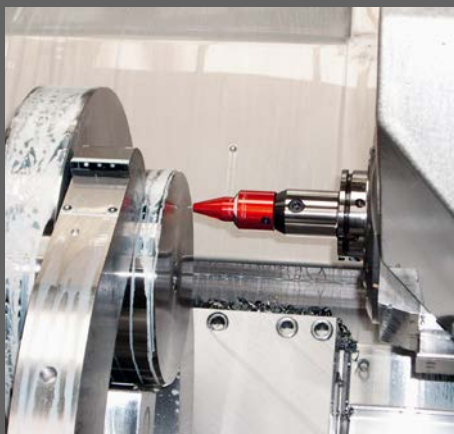
Automated deburring of undefined edges – on CNC machines or robots



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 with components of varying dimensions.

This allows you to turn a recurring risk into a predictable, stable process step.



Tuning for your parts marking process

With the gravostar marking tool, parts are machined and marked in a single process step; in other words, every machined part emerges from the machine tool already provided the desired marking.

The **gravostar** is used primarily in machining centres and CNC lathes, much like a conventional machining tool, and can perform marking on virtually all machinable materials up to a hardness of approx. 62 HRC.



The benefits for you

Part marking as a separate process step



Part marking with integrated process step



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 – ensuring a reliable method and shorter throughput times.



Error minimisation

No missing or incorrect markings due to parts being mixed up, as the part markings are an integral part of the machining program.



Any text area

Suitable for use on machined or raw surfaces, as well as straight, curved or beveled surfaces, with automatic compensation for dimensional and positional differences in the marking surface.



No material weakening

The gravostar non-cutting marking process is ideal for both thin and high-stress parts, as it does not destroy the material structure. **Needle marking is one of the few marking processes permitted in the aviation industry!**



Virtually no maintenance required

Durable and virtually maintenance-free marking tools, as well as marking needles with an extremely long service life.

AN EXCELLENT NON-MACHINING MARKING PROCESS.

Product ranges of part marking tools



quickly

Short marking time:
Feed rates of up to 5,000 mm/min
are possible.



wear-resistant

The service life of the marking needles
is measured in dozens of hours of use.



reliable

Maximum process reliability thanks
to a chip-free method combined
with in-process monitoring.



needle embossing – A high-quality method offering a wide range of possibilities

In needle embossing, depending on the type, the needle vibration is generated by feeding coolant or compressed air through the machine spindle. All functional elements of the impulse control system are integrated into the tool. Due to the high oscillation frequency, the individual marking points are placed so close together that they are no longer individually recognisable. This results in the marking outline appearing as a solid, indented line. However, needle embossing can also be used to produce individual points, which is ideal for creating a grid for a Data Matrix code.



Scratch marking – The simple way to mark

Because the marking needle is spring-loaded, the scratch marking process does not require an active needle drive. As soon as the needle tip is pressed against the workpiece, it penetrates the surface of the material with a defined preload pressure.



Roller embossing – Delicate markings for the highest visual standards

What makes this method unique is the marking needle, which is axially spring-loaded and fitted with a freely rotating solid carbide ball. The marking pattern is created by the compaction of the material caused by the rolling carbide ball on the surface of the material.



Tamping – Deep marking with integrated distance compensation

The ability to mark raw castings or other deviating surfaces, combined with a large marking depth of up to 0.8 mm, makes this method unique. This technology opens up entirely new applications for subsequent painting or for use in abrasive environments.

Needle embossing

The marking process with gravostar essentially follows the same procedure as engraving, i.e. the desired marking is traced by the machine axes. Unlike engraving, however, no spindle speed is required and the process can be carried out at a much higher feed rate (up to 5,000 mm/min).

How needle embossing works

Unlike engraving, needle embossing does not involve any material removal – instead, it involves a fine, localised displacement and compaction of the material. This is achieved through the vertical oscillating movement of the marking needle. The needle oscillation is generated by the pulse control system integrated into the tool. As soon as the air supply or internal cooling is switched on, the needle begins to oscillate at a frequency of approx. 300 Hz. Due to the very high oscillation frequency, the individual marking points are arranged very

close together, so that they are no longer individually recognisable. This results in the marking appearing as a continuous, indented line.

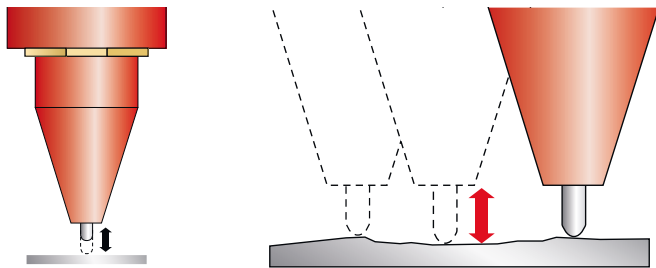
Ways to enter the desired text

- Direct input in the marking programme on the machine tool
- Programming at the programming station (CAD/CAM) when creating the machining programme
- Input into a separate marking programme

Good to know!

What makes the gravostar marking tools we have developed so special is the non-cutting process. Needle marking is one of the few approved marking processes permitted in

the aviation industry, as no material is removed; instead, material is simply displaced and compacted.



Clearance compensation and material displacement

Gravostar tools automatically compensate for differences in dimensions or unevenness in the marking surface of **up to 3 mm**.

This ensures a consistent marking depth even on uneven surfaces (e.g. rough castings, etc.).



Model W coolant-driven tools

In the gravostar W tool type, the needle oscillation is generated by the internal coolant flow supplying coolant. All functional elements of the pulse control system are integrated into the tool.

For use in machine tools, automatic lathes, etc. – no additional installation required.

Modell	W-20	WS-20	WSRX-20	WSXP-20
				
Application	defined surfaces	significant irregularities or dimensional deviations, such as rough castings, etc.	defines a specified (tolerated) marking depth (e.g. safety-critical components in turbine construction, etc.)	deeper markings with greater irregularities or dimensional variations, such as rough castings, etc.
Required coolant pressure	10 – 50 bar	5 – 50 bar	5 – 120 bar	5 – 80 bar
Distance compensation 	up to ca. 0,5 mm	up to approx. 3 mm	up to approx. 3 mm	up to approx. 3 mm
Adjust the tool	-	Pressure reduction can be carried out directly at the tool		
Note:  The gap compensation depends on the working pressure at the tool				

Requirements for the CNC machine tool

no additional installation required



Tool holder

Sealed Weldon chuck for 20 mm shanks. Custom solutions with integrated HSK interface.



Coolant pressure

The pressure must be kept constant (the pressure at the tool spindle is important).



Coolant adjustment

Adjustable in steps or, ideally, continuously.



Coolant filter assembly

There must be at least one standard filter capable of filtering particles up to a maximum size of 80 µm.



Marking software

The machine or CAD-CAM system must be equipped with engraving software (otherwise, separate marking software is required).

Model H pneumatic tools

In the H-series tool models, the needle oscillation is generated by compressed air supplied through the machine spindle. All functional elements of the pulse control system are integrated into the tool.

For use in machine tools, automatic lathes, etc. – no additional installation required

Modell	H-20	H-20 PP	HRY-20	HRY-20 PP
				
Application	defined surfaces	deeper marks with regular, uneven or rough surfaces	deeper markings with a predefined (tolerated) marking depth (e.g. safety-critical components in turbine construction, etc.)	Deep markings with high quality requirements and a predefined (tolerated) marking depth (e.g. safety-critical components in turbine construction, etc.)
Required air pressure	3 – 8 bar	2 – 8 bar	3 – 8 bar	2 – 8 bar
Distance compensation 	up to approx. 1 mm	up to approx. 3 mm	up to approx. 1 mm	up to approx. 3 mm
Adjust the tool	-	-	integrated, precisely adjustable compressed air regulator (for precise adjustment of the pre-set marking depth)	
Note:  The gap compensation depends on the working pressure at the tool				

Requirements for the CNC machine tool

no additional installation required



Tool holder

Sealed Weldon chuck for 20 mm shanks. Custom solutions with integrated HSK interface.



Compressed air pressure

The pressure must be kept constant (it is recommended that a separate pressure-regulating valve be installed).



Compressed air regulation

Step-by-step or, ideally, continuous adjustment



Compressed air

Dry or oiled (no filter or water separator required)



Marking software

The machine or CAD-CAM system must be equipped with engraving software (otherwise, separate marking software is required).

Data Matrix code programming procedure

Input options for the desired selection



1

Programming directly on
the machine tool



2

Programming at the
CAD/CAM workstation

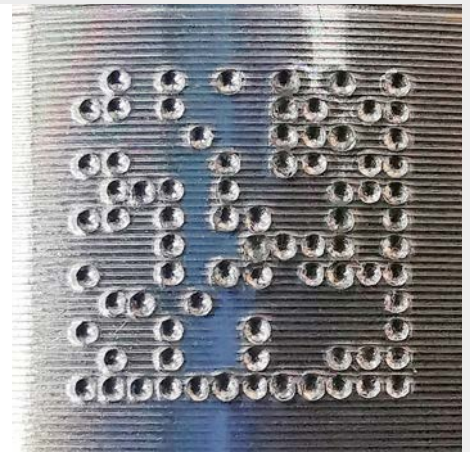


3

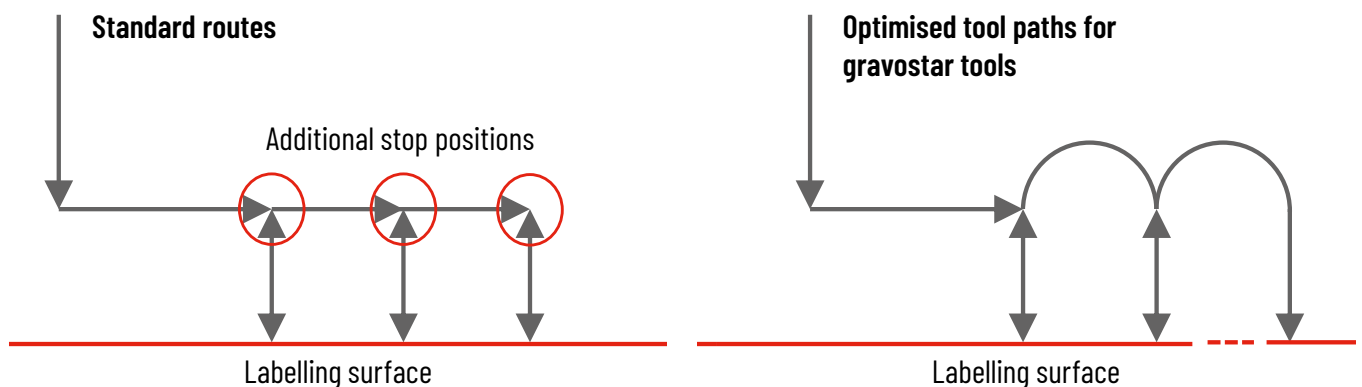
Import into a separate
marking programme

Gravostar needle embossing marking

- ✓ Dot markings and DM codes are no problem with gravostar's needle embossing tools (smallest DMC size: approx. 8 x 8 mm)
- ✓ The marking depth and width, the radius and the angle can be adapted to meet the required specifications.



Data Matrix code programming method



Scratch marking

Automated ‘in-process marking’ of workpieces

Parts are machined and marked in a single process step, meaning that each machined part emerges from the machine tool already providing the required marking.

Tools that are very easy to use

The tools in the **gravostar** R series are very easy to use in virtually any cutting machine.

Customised markings can be permanently applied to both flat and uneven surfaces. No tool spindle speed is required, and very high feed rates of over 5,000 mm/min are possible.

The process is the same as for engraving

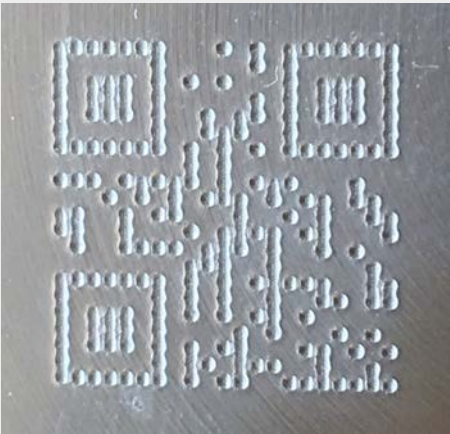
The part marking is created when the spring-loaded carbide needle leaves a fine indentation in the material at the points it passes over. This automatically compensates for unevenness of several millimetres.

The **gravostar** is clamped into the tool holder and the engraving path is traced by the machine axes, just as in engraving.

Modell	R-20	RM-20	RM-12L
			
Application	rather fine markings with a regular or uneven surface	Compact, short design for relatively fine markings on surfaces that are either smooth or have an uneven surface	Very compact design (Weldon Ø12 mm) for relatively fine markings with a smooth or uneven surface
Length / Diameter	152 mm / Ø40 mm	102 mm / Ø20 mm	53 mm / Ø12 mm
Automatic distance compensation	up to approx. 6 mm	up to approx. 5 mm	up to approx. 3 mm
Adjust the tool	Adjust the marking depth using the individually adjustable setting sleeve ❶	2 different adjustable marking depths ❷	Marking depth can be individually adjusted using the adjustment screw
Note: ❶ with a scale for repeatable adjustment of the preload pressure ❷ Preload force of the marking needle: 30 N or 80 N			



Marking of text, logos, etc. on flat or unfinished surfaces using needle embossing.



Marking of Data Matrix codes or QR codes on any surface using needle embossing.



Marking of outer surfaces on a turning machine using needle embossing.

ABRASIVE ENVIRONMENTS OR PAINTED WORKPIECES.

Embossing tool for deep markings

The gravostar QP-20 embossing tool

Our innovative embossing tool for deep markings, which is driven by the machine's spindle. It is primarily used for marking components that are used in harsh, abrasive environments. It is also ideal for marking workpieces that are subsequently painted or treated with paint.

The workpiece is marked using a rotating, spring-loaded tool. The tip of the tool (needle tip) has ground surfaces on the sides to engrave the marking into the material. It is a combination of material displacement and, depending on the material, also a cutting process. As soon as the needle tip is moved against the workpiece, it presses into the material surface with a defined preload pressure and the marking process can begin.

Thanks to the constant preload pressure exerted by the marking needle, which is spring-loaded in the axial direction, even uneven marking surfaces can be marked with a consistent character depth.



Application	Length / Diameter	Automatic distance compensation	Adjust the marking depth
Deep markings on flat and uneven surfaces	167 mm / Ø56 mm	up to approx. 6 mm	Yes, adjustable spring tension

A range of accessories for the marking tools is available

Replacement marking needles



Standard angles: 90°, 60°, 120° or other angles also available on request

Extended needle holders



Standard needle extensions of +15, +50 or +100 mm for W & H type needle embossers

Longer needles



Longer needles to fit the extended needle holder on W & H type needle embossers

Pressure gauge



Hydraulic pressure gauge for the WSRX-20 and pneumatic pressure gauge for the HRY-20 / PP

Special interfaces



Standard Weldon shank Ø20 – other shanks such as HSK, Capto, VDI etc. available on request

Customised solutions



We assess tailored solutions for technical feasibility, with no minimum order quantities

Roller embossing

Roller embossing marking tools for process-integrated part marking

Visually high-quality, completely burr-free, fine marking achieved using a carbide embossing ball that rolls smoothly.



Unprecedented marking quality



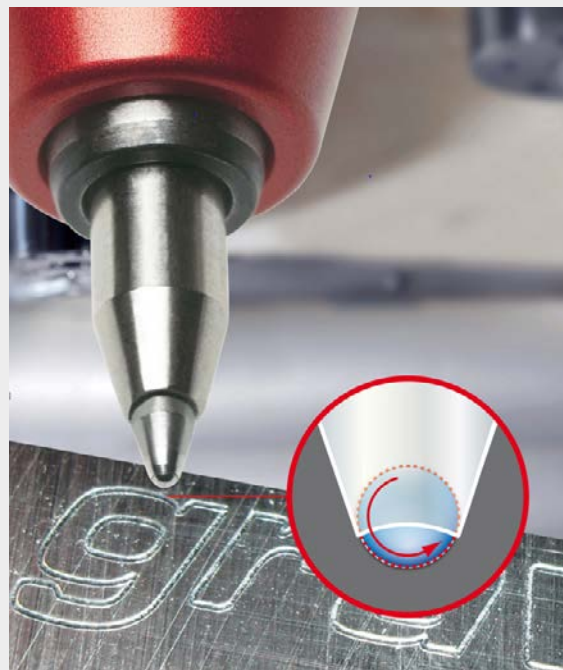
Completely chip-free technology



Extremely easy to use on any cutting machine



No needle drive required



Model	RB-20	RMB-20	RMB-20L	RMB-12
				
Specification	Engraving depth can be individually preset via the adjustment sleeve (with a scale for precise, repeatable pre-tension adjustment)	Reinforced steel plate in the clamping area (to prevent clamping deformation). Standard preload pressure of the marking needle (98 N)	Reinforced steel plate in the clamping area (to prevent deformation under clamping force). Light preload on the marking needle (45 N)	Very compact design with a sturdy steel housing and a hardened Ø12 mm Weldon shank.
Length / Diameter	145 mm / Ø40 mm	76 mm / Ø20 mm	76 mm / Ø20 mm	64 mm / Ø14 mm
Automatic distance compensation	up to approx. 5 mm	up to approx. 4 mm	up to approx. 4 mm	up to approx. 6 mm
Adjust the tool	Adjust the marking depth using the individually adjustable setting sleeve ①	0	0	0
Note: ① with a scale for repeatable adjustment of the preload pressure				

Virtually unlimited applications

There is hardly a sector within the manufacturing industry where our marking solutions are not already in use. Below is a selection of typical sectors that utilise our solutions.

Automotive



Chassis & Drivetrains



Aerospace



Plant & Mechanical Engineering



Defence industry



Energy & Water



Dental and Medical Technology



Watch industry



The most important wear and spare parts

Although gravostar marking 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 production operations.

- 1-2 marking needles per machine

Maintenance recommendations

- **Cleaning:** Regular removal of particles or dust.
- **Visual inspection:** Check the marking needle for wear.

Enquire without obligation

Feasibility assessment and recommendations from an applications engineer.

Tel. +41 71 940 06 76, Email: info@gravostar.com



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%.

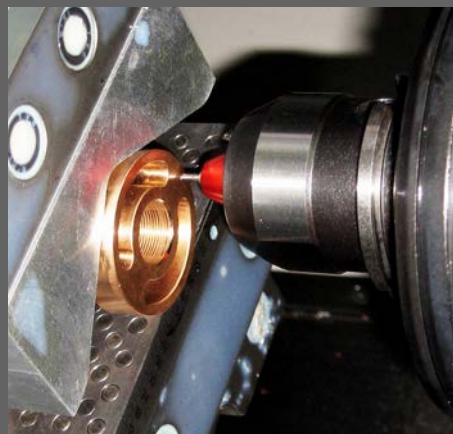
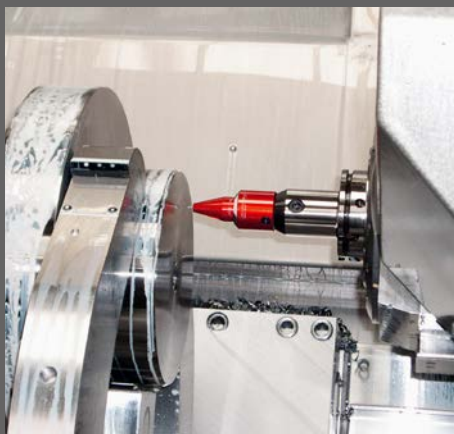
Automated deburring of undefined edges – on CNC machines or robots



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.



ENGRAFLEXX – TOOLS THAT MAKE PROCESSES SMARTER.

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

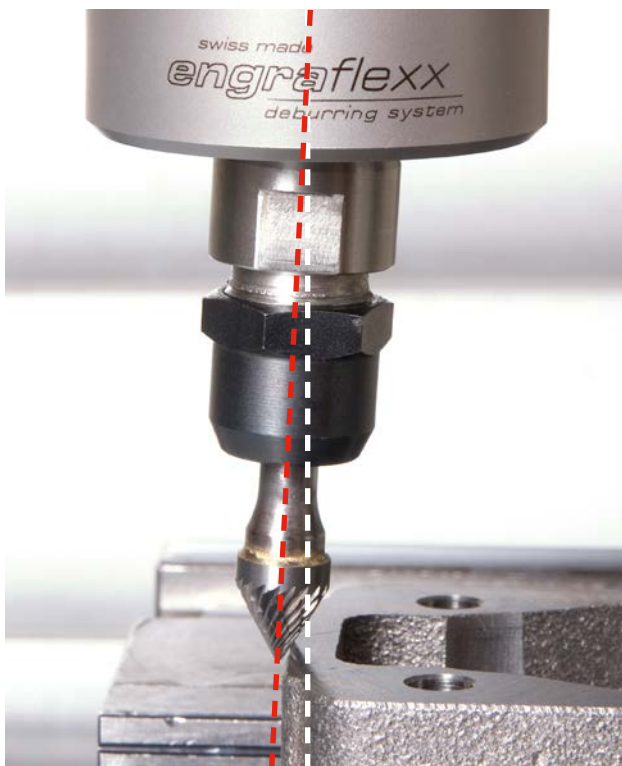
1. Automation without complex workpiece clamping
2. Maintenance-free operation (no periodic maintenance required)

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.

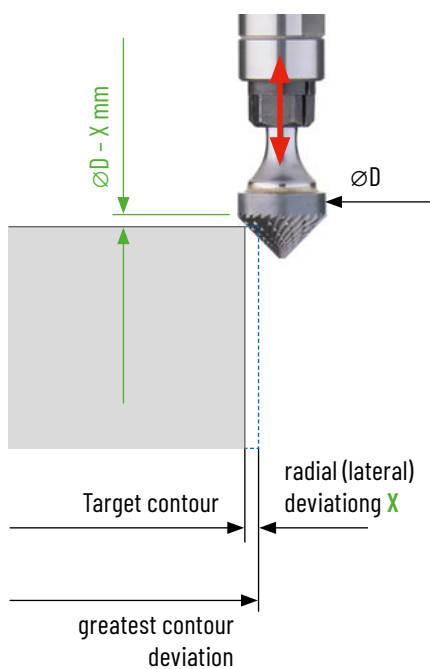
Operating principle: axial tool – radial compensation

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

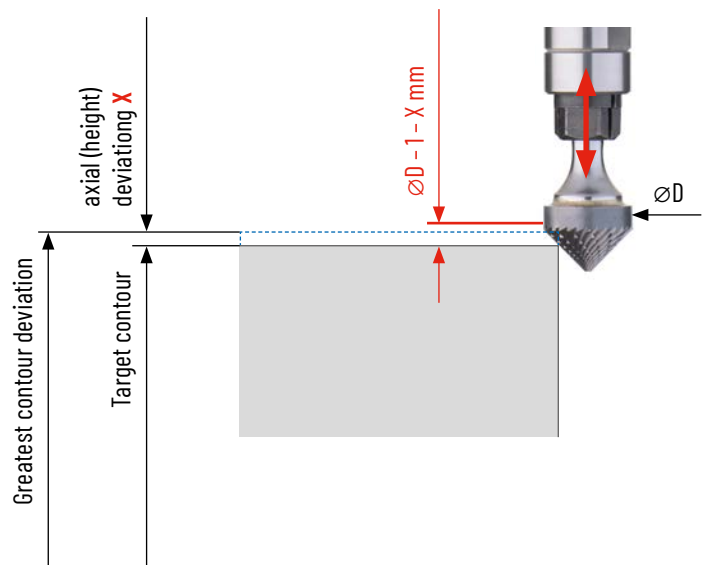
out, the milling cutter is automatically pushed upwards; if it is slightly further in, the milling cutter is also automatically pushed downwards. This results in a uniformly deburred edge.

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:

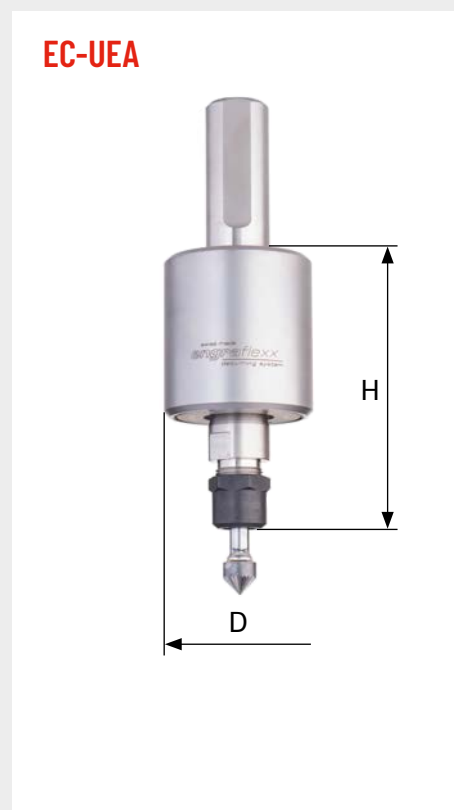
If selected correctly, router bits cause minimal wear; many standard tools are available from stock.

Standard engraflexx tools

Engraflexx tools are fitted as standard with a Ø20 mm Weldon shank and a Ø6 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 ❶ [rpm]	Feed range ❶ [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: ❶ The values for speed and feed rate are general guidelines; these may vary depending on the application.						

Standard engraflexx tools

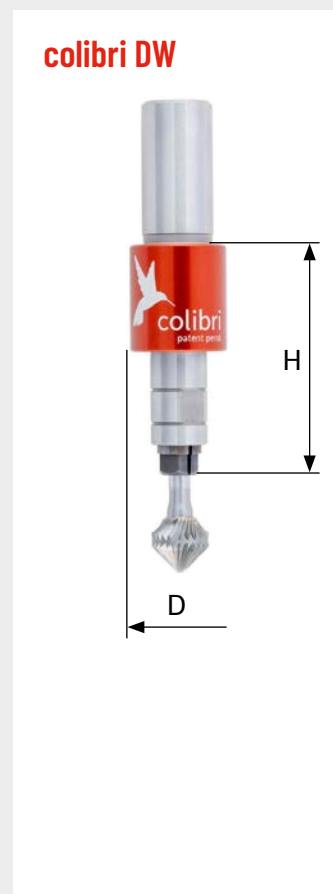
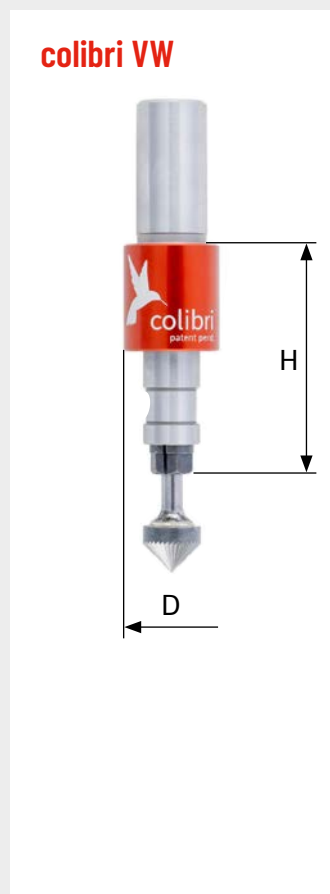
Engraflexx tools are fitted as standard with a $\varnothing 20$ mm Weldon shank and a $\varnothing 6$ mm collet for holding deburring milling cutters. They are suitable for machine tools, machining

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

Axially acting tools - LC models



Our colibri entry-level models

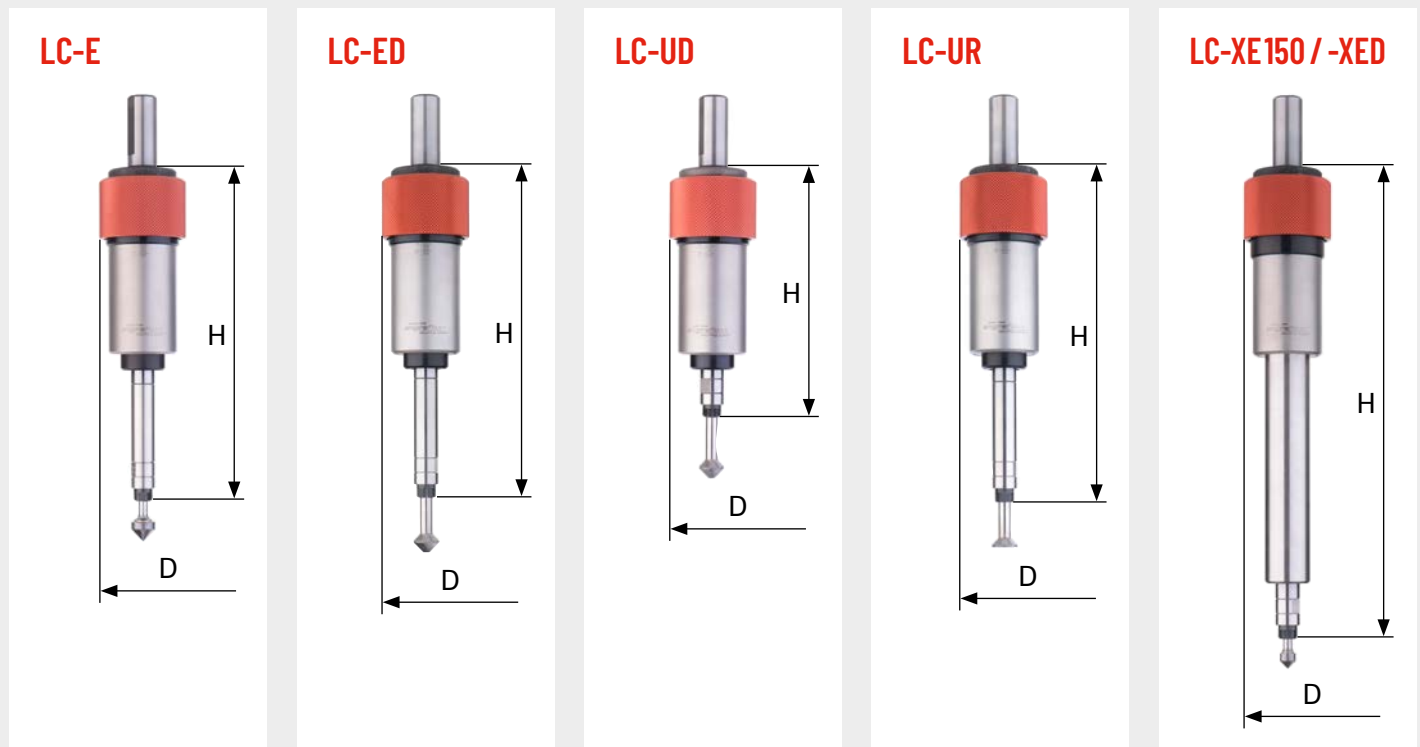


Models	Application	Max. gap compensation [mm]	Speed range ① [rpm]	Feed range ① [mm/min]	D [mm]	H [mm]
LC-U	For applications that change frequently	10	3'000 - 8'000	2'000 - 5'000	48	145
LC-UEA	Standard tool for serial production	10	3'000 - 8'000	2'000 - 5'000	46	101
colibri VW	Entry-level tool for light 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 Ø [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



Accessories for engraflexx tools

Standard conical deburring cutters – for collets Ø6 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	Ød [mm]	ØD [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	Ød [mm]	ØD [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!

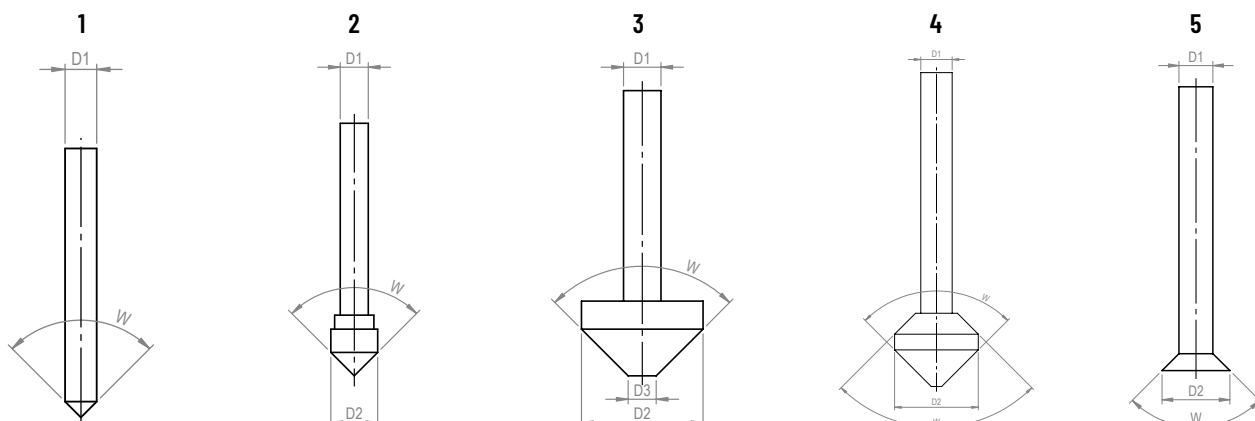
We have over 100 different milling cutters in stock and also manufacture special milling cutters for custom applications. **All our deburring cutters are also available in coated versions.**

Reverse-action deburring cutters

Item no.	Axial WZ	Radial WZ	Ød [mm]	ØD [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