



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%.

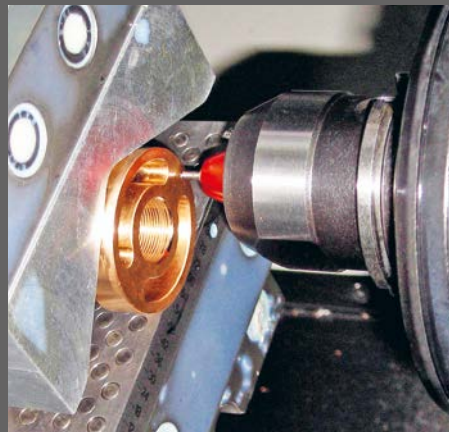
Automated deburring of undefined edges – on CNC machines or robots



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.

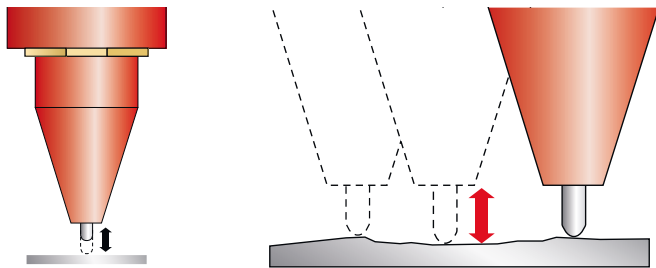
Ways to enter the desired text

- 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

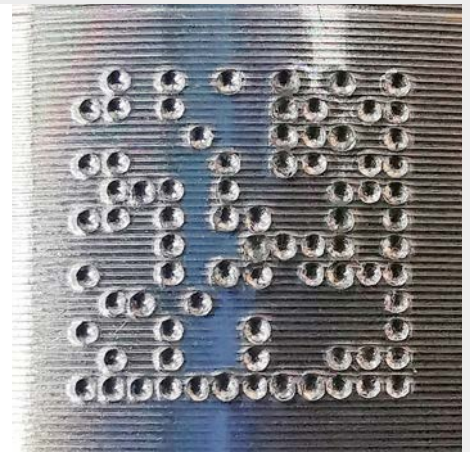


3

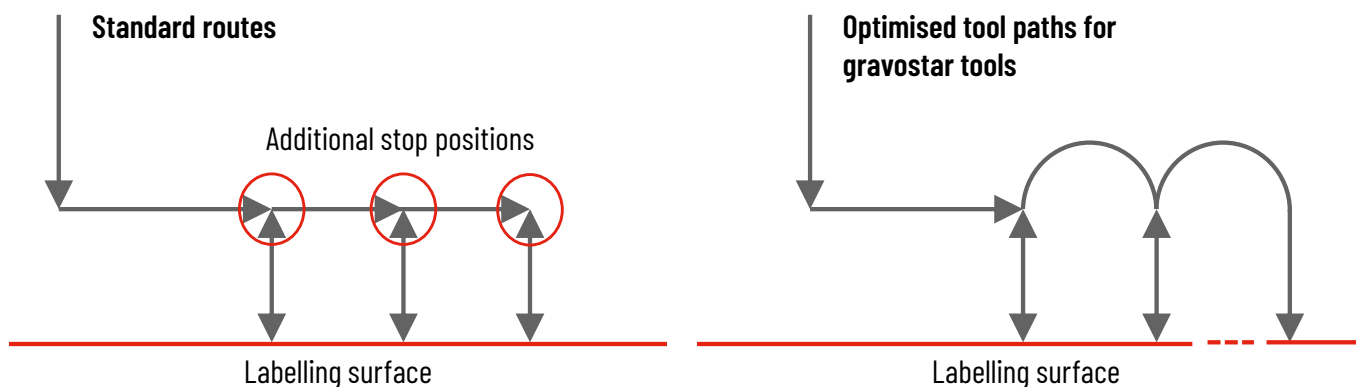
Import into a separate
marking programme

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

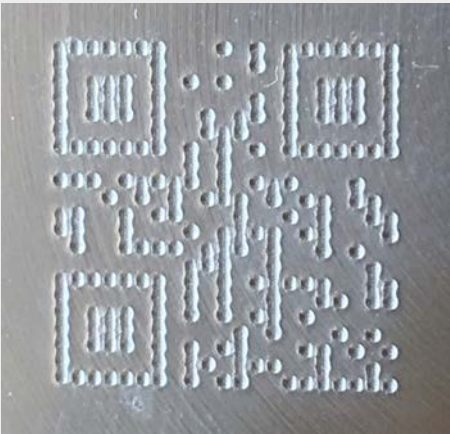
The part marking is created when the spring-loaded carbide needle leaves a fine indentation in the material at the points it passes over. This automatically compensates for unevenness of several millimetres.

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.

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



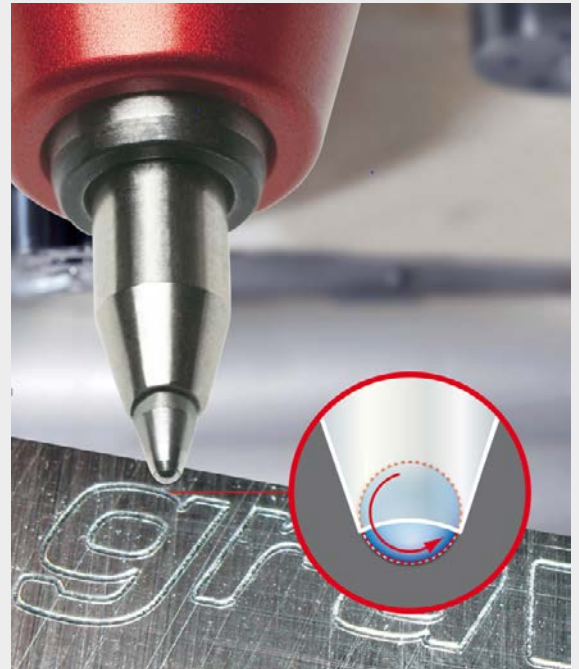
Completely chip-free technology



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.

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