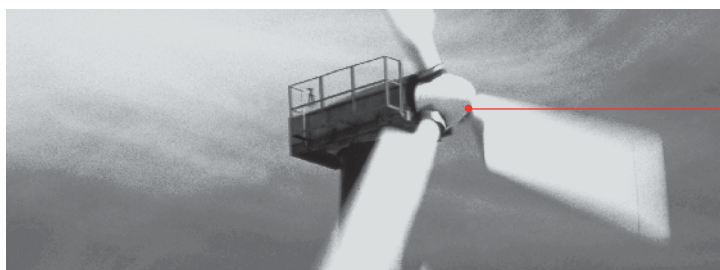


# Finish hard turning up to part $\varnothing$ 1500 mm

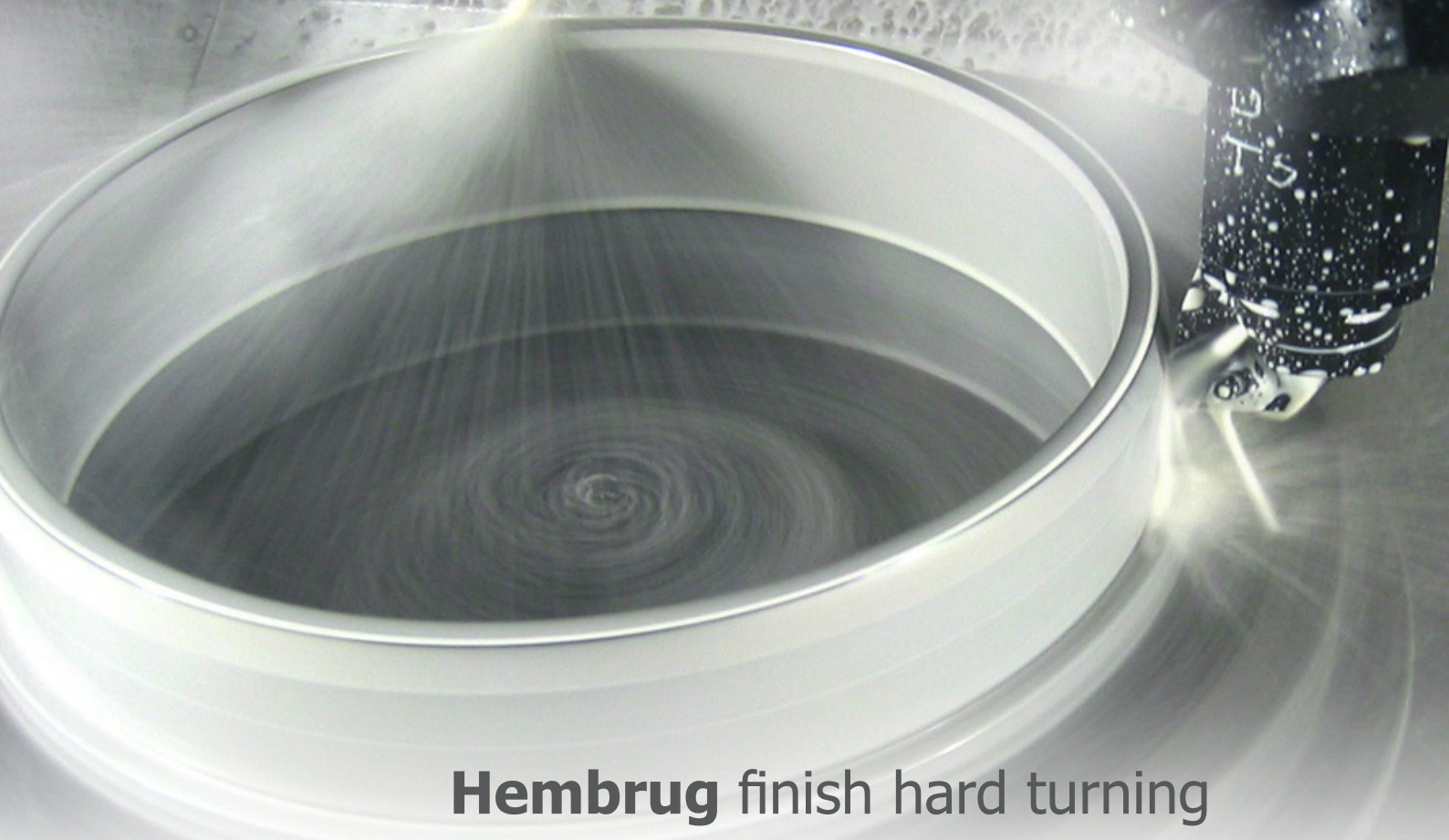


Best tolerances available in hardened steel parts:

- Surface finish tolerances : 0.1 – 0.4  $\mu\text{m}$
- Shape accuracies : 0.1 – 2  $\mu\text{m}$
- Dimensional accuracies : 2  $\mu\text{m}$
- Max. part diameter : from 450 - 1,500 mm



The **hard turning** company



## Hembrug finish hard turning

Finish hard turning offers significant **advantages** when machining workpieces having complex shapes

### Cost **saving**

Multiple operations can be done in one set-up which eliminates the need for a multi-step machining process that historically would involve two or three separate machining steps.

### Environmental **friendly**

Hard turning is a dry and environmental green process due to the absence of machining fluids.

Finish hard turning refers to the process of single point cutting of hardened pieces within the 2 micron range having hardness between 55 and 68 HRC. It's a simple and reliable process, especially for workpieces having complex shapes or requiring a combination of external and internal machining.

### Narrow **tolerances**

Finish hard turning allows machining of parts in one set up resulting in narrow tolerances especially for concentricity, squareness and roundness.

### More **flexibility**

With a single point standard CBN tool and clamping set-up a wide variety of parts with different contours and sizes can be machined. This provides more flexibility in production environments and reduces change over time.

### Higher **productivity**

The high metal removal rates leads to low cycle times and a high productivity.

# Turning within **sub micron tolerances**

Hembrug Mikroturn® Vertical hard turning machines are installed to finish turn a wide variety of parts that fit within the maximum turning diameter of  $\varnothing$  1.500 mm.

Tolerances of < 2 micron and surface finish Ra 0,1 micron are no exception anymore. Constant innovation by Hembrug allows our customers to improve part quality and process reliability. By using Hembrug Mikroturn® ultra precision turning machines today's and future requirements are met.



## Hembrug **hydrostatic** slides and main spindle

High accuracy requirements on precision parts can only be achieved with suitable machine concepts. Required is a superb static and dynamic stiffness, a sub micrometer run-out of the main spindle as well as a high thermal stability.

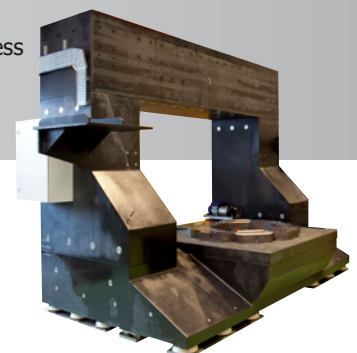
The hydrostatic system in the Hembrug Mikroturn® series is superior to any conventional bearing system and offers significant advantages.

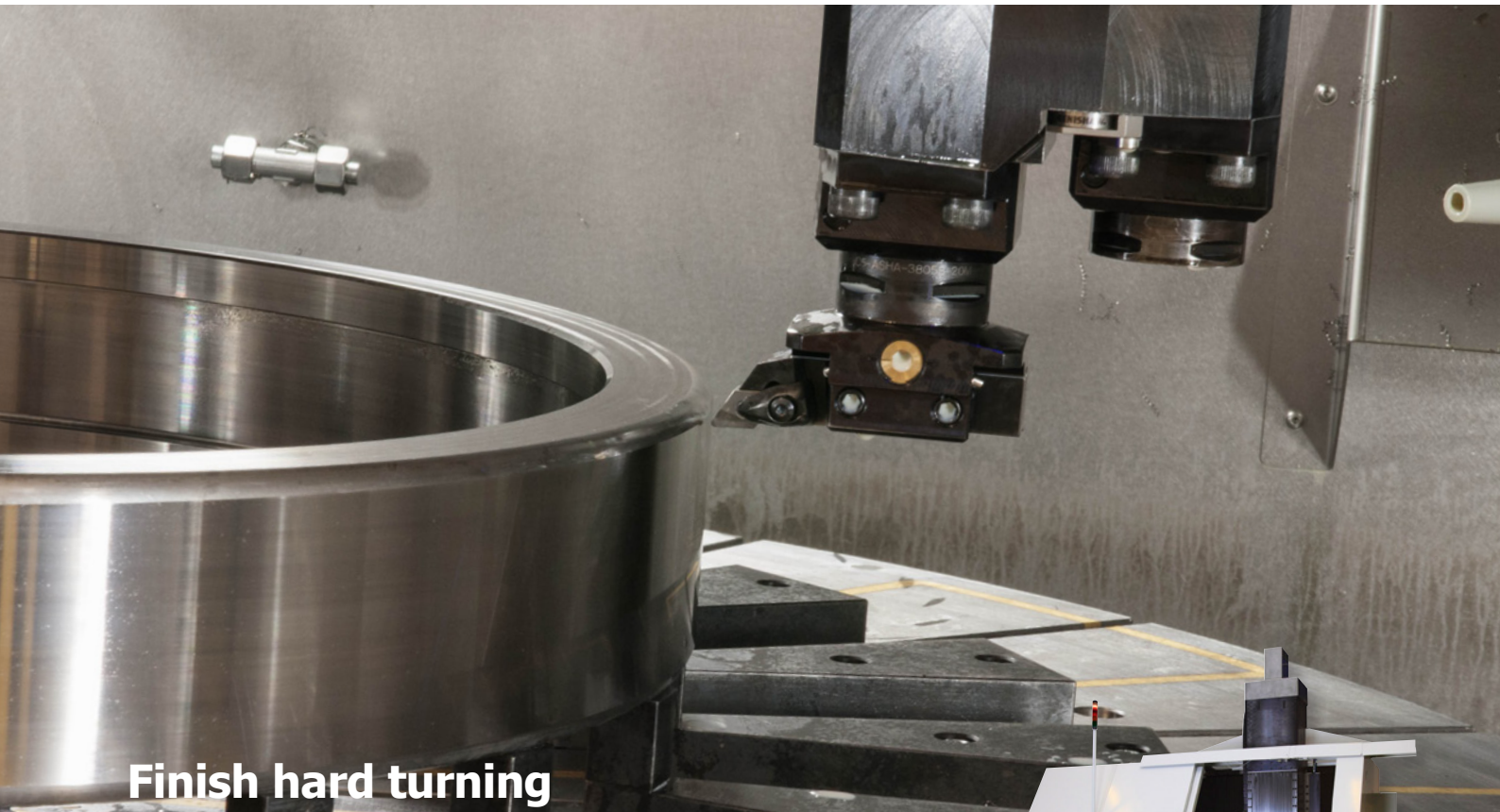
- A new continuous oil film over the entire length of the guideways and bearing elements provides excellent damping properties and a high static and dynamic stiffness.
- The absence of metal contact and thus wear ensures a long and reliable machine life and low operational costs.
- The temperature controlled oil flow guarantees thermal stability.
- Due to the absence of the stick-slip effect smallest incremental steps of 0.01 microns are possible.

## Natural **granite** machine base

During the cutting of hardened steel parts high process forces are generated. These have to be absorbed by the machine tool system. That is why natural granite has been selected as base material. Natural granite offers much higher stiffness than polymer concrete or other base materials. It is corrosion and stress free and has a low thermal expansion coefficient resulting in superior thermal stability.

- Excellent damping properties
- High thermal stability
- High static and dynamic stiffness
- Free of stress
- Corrosion free





## Finish hard turning

### Hembrug 2-axis vertical lathe

The Vertical Mikroturm® 2-axis can depending on model machine parts up to diameter 1,000 mm. The series ensures a flexible, ultra precision production of large rotation symmetric parts. The horizontal workholding allows easy part handling. Part distortion is limited to a minimum. The surface finish accuracies eliminate in many cases the need for additional finishing operations.



Mikroturm® Vertical 1000 V



## Outer ring

Dimensions : 870 mm (O.D.)/810 mm (I.D.)  
 Material : 100MnCr6  
 Hardness : 60-62 HRC  
 Stock : 0.3 mm

### 2-axis machining time

|    |             |           |
|----|-------------|-----------|
| 1. | I.D. Rough  | 5.9 min.  |
| 2. | I.D. Finish | 7.8 min.  |
| 3. | O.D. Rough  | 8.3 min.  |
| 4. | O.D. Finish | 10.2 min. |
| 5. | Facing      | 8.0 min.  |
| 6. | Facing      | 8.0 min.  |

-----+  
 Total machining time 48.2 min.

# 2-axis hard turning

Hydrostatic XZ-slide  
having 0,1 µm  
repeatability

Automatic  
Tool  
Changer  
(optional)



Natural  
granite  
base

Hydrostatic rotary table  
run-out 0,2 µm

## Specifications

| Hembrug Mikroturn®                  | 650V       | 800V       | 1000V      |
|-------------------------------------|------------|------------|------------|
| Max. turning diameter               | 650 mm     | 800 mm     | 1.000 mm   |
| Max. turning length                 | 350 mm     | 350 mm     | 350 mm     |
| Max. part weight incl. chuck        | 800 kg     | 800 kg     | 2,000 kg   |
| Max. spindle speed                  | 1,200 rpm  | 600 rpm    | 200 rpm    |
| Nominal torque                      | 270 Nm     | 300 Nm     | 800 Nm     |
| Run-out main spindle / rotary table | 0.2 µm     | 0.2 µm     | 0.2 µm     |
| Z-Axis travel                       | 400 mm     | 400 mm     | 400 mm     |
| X-Axis travel                       | 700 mm     | 700 mm     | 700 mm     |
| Rapid travers rate                  | 10 m/min   | 10 m/min   | 10 m/min   |
| Max. feed rate                      | 0-10 m/min | 0-10 m/min | 0-10 m/min |
| CNC resolution                      | 0.01 µm    | 0.01 µm    | 0.01 µm    |
| Positioning accuracy                | 1 µm       | 1 µm       | 1 µm       |
| Repeatability guideways +/-         | 0.1 µm     | 0.1 µm     | 0.1 µm     |
| Machine weight (approx.)            | 18,000 kg  | 18,000 kg  | 20,000 kg  |



## Finish hard turning

### Hembrug 4-axis vertical lathe

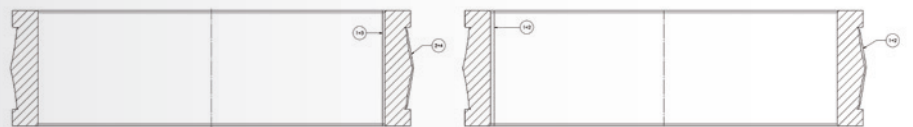
The Mikroturn® 4-axis Vertical series can machine parts up to a diameter of 1,500 mm. Thanks to the 4-axis configuration the machines are able to machine an inner and outer diameter simultaneously, resulting in cycle time reductions of up to 40% compared to 2-axis machining operations.



Mikroturn® Vertical 1000 V4

## Inner ring

Dimensions : 815 mm (O.D.)/710 mm (I.D.)  
 Material : 100MnCr6  
 Hardness : 60-62 HRC  
 Stock : 0.3 mm

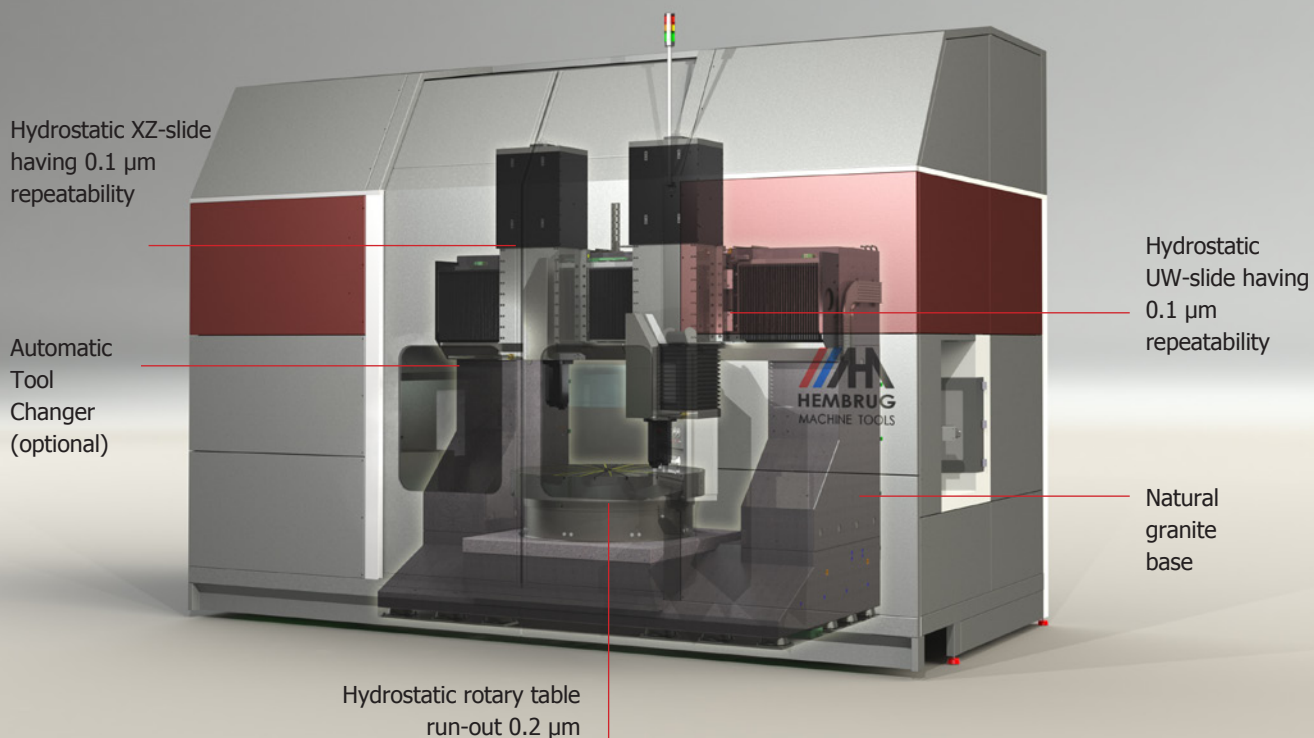


| <b>2-axis</b> machining time |             |           |
|------------------------------|-------------|-----------|
| 1.                           | I.D. rough  | 10.2 min. |
| 2.                           | O.D. Rough  | 22.2 min  |
| 3.                           | I.D. Finish | 22.0 min. |
| 4.                           | O.D. Finish | 16.0 min. |
|                              |             | -----+    |
| Total machining time         |             | 70.4 min. |

| <b>4-axis</b> machining time |             |             |         |
|------------------------------|-------------|-------------|---------|
|                              | X/Z axis    | U/W axis    |         |
| 1.                           | I.D. rough  | O.D. rough  | 18 min. |
| 2.                           | I.D. Finish | O.D. Finish | 30 min. |
|                              |             |             | -----+  |
| Total machining time         |             |             | 48 min. |

More than 30% cycle time reduction time when machined in a 4-axis configuration.

# 4-axis hard turning



Vertical, high-precision hard turning in 4-axes meets the current requirements in industry: shorter lead times, lower costprice and flexible quantities, without compromise to quality. Hembrug Machine Tools offers a machine concept that ensures the highest process capability.

## Specifications

| Hembrug Mikroturn®                  | 1000 V4    | 1500 V4    |
|-------------------------------------|------------|------------|
| Max. turning diameter               | 1,000 mm   | 1,500 mm   |
| Max. turning length                 | 350 mm     | 350 mm     |
| Max. part weight                    | 2,000 kg   | 3,000 kg   |
| Max. spindle speed                  | 200 rpm    | 200 rpm    |
| Nominal torque                      | 800 Nm     | 1,200 Nm   |
| Run-out main spindle / rotary table | 0.2 µm     | 0.2 µm     |
| Z-Axis travel                       | 400 mm     | 400 mm     |
| X-Axis travel                       | 750 mm     | 750 mm     |
| Rapid travers rate                  | 10 m/min   | 10 m/min   |
| Max. feed rate                      | 0-10 m/min | 0-10 m/min |
| CNC resolution                      | 0.01 µm    | 0.01 µm    |
| Positioning accuracy                | 1 µm       | 1 µm       |
| Repeatability guideways +/-         | 0.1 µm     | 0.1 µm     |
| Machine weight (approx.)            | 28,000 kg  | 30,000 kg  |

# Options

- Automation
- Temperature controlled wet coolant
- High pressure coolant
- Tool presetting probe
- Tool break detection
- Automatic tool changer with 20 Capto C5 tool holders
- Automated part centering
- Chip conveyor
- Graphic simulation of part programs on the operator screen
- Milling head and / or grinding spindle



## The leading edge finish hard turning today

Hembrug have a long tradition in design and manufacturing of machine tools. Today we already have more than 50 years experience in engineering, manufacturing and marketing of ultra precision hydrostatic turning machines. The strength of our organisation is being able to fulfill manufacturer's needs to meet current market demands for high part quality and productivity.

## Hembrug, now a Danobat company having representation all over the world

The head office is located in Haarlem, the Netherlands. Sales and Service are provided by an extensive network of high quality agents and distributors world wide. We have our own sales office in the USA. Since September 2019 Hembrug is part of the Spanish machine tool manufacturer Danobat. Danobat designs, manufactures and supplies grinding machines and turning machines, as well as complete turnkey lines for the manufacturing of high added-value components



Represented by:



The **hard turning** company

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