

## List of Machinery & Processes



Your  supplier for:

**High-precision mechanical engineering**






**Components**

**Surface treatment**

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## Milling




**Materials:** Aluminum, Non-ferrous metal, Nitriding steel, Stainless steel, Titanium, Cast, Block  
**Surface:** Ra ≤ 0.2 (depending on machine and process)  
**Accuracy:** Tolerance 0.005 mm to 0.02 mm (depending on machine and process)

Number	Specification	Processing range [mm]		
		X	Y	Z
4	<p>5-Axis Machining Center  <b>HERMLE C42</b>                      Robot for material, part, and pallet handling.                      Low staff 7/24h – operation.                      504 Tool places on each machine tool.                      Spindle speed 20'000 min<sup>-1</sup>                      Tool system HSK-A63.                      TNC640 Heidenhain control unit                      with option <u>high accuracy package</u>.</p> 	800	800	550
4	<p>5-Axis Machining Center  <b>DMG DMC 60 U</b>                      180 and 303 Tool places                      Simultaneous 5-axis- and 5-sided machining                      Spindle speed 18'000 min<sup>-1</sup>                      Tool system HSK-A63.                      ITNC530 / TNC640 Heidenhain control unit                      Pallet changer with 10 places each.                      With option <u>high accuracy package</u>.</p> 	600	750	600
3	<p>5-Axis Machining Center  <b>DMG DMU 50 3<sup>rd</sup> Generation</b>                      60 Tool places                      Simultaneous 5-axis- and 5-sided machining                      Spindle speed 20'000 min<sup>-1</sup>.                      Tool system HSK-A63.                      TNC640 Heidenhain control unit.</p> 	650	520	475
1	<p>5-Axis Machining Center  <b>DMG DMU 50</b>                      30 Tool places                      5-axis- and 5-sided machining                      Spindle speed 10'000 min<sup>-1</sup>.                      Tool system ISO40.                      ITNC530 Heidenhain control unit.</p> 	500	450	400
1	<p>5-Axis Machining Center  <b>DMU 50 eVolution</b>                      60 Tool places                      5-Sided machining                      Spindle speed 18'000 min<sup>-1</sup>.                      Tool system HSK-A63.                      Millplus Heidenhain control unit.</p> 	500	400	400

## Turning






**Materials:** Aluminum, Non-ferrous metal, Nitriding steel, Stainless steel, Inconel, Dispal, ...  
**Surface:** Ra ≤ 0.4 (depending on machine and process)  
**Accuracy:** Tolerance 0.005 mm / Roundness < 0.002 mm (depending on machine and process)





Number	Specification	Processing range [mm]	
		Max. Ø	Max. length
2	<p>Multifunctional Machining Center (Turning-Milling) <b>Index R300</b> Main and counter spindle with 2 additional milling spindles <b>Simultaneous milling process by parallel machining on main and counter spindle.</b> 140 Tool places Machining from the bar or in chuck</p> 	100 (Bar) 250 (Chuck)	250
1	<p>Turning-Milling Machining Center <b>Index G300</b> Complete machining in Chuck With counter spindle. Two 12-fold-revolvers with driven tools Fully automatic gantry loading system Incl. B-Axis</p> 	180	300
2	<p>Turning-Milling Machining Center <b>Index G220</b> Machining from the bar With counter spindle. With <b>separately milling spindle</b> and a magazine with 140 tools One 18-fold revolver with driven tools Incl. B-Axis</p> 	65	250
2	<p>Turning-Milling Machining Center <b>Index G200</b> Machining from the bar with bar loading magazine. With counter spindle. Three 14-fold-revolvers with driven tools With <b>separately milling spindle</b> and a magazine with 6 tools Incl. B-Axis</p> 	65	200

Number	Specification	Processing range [mm]		
		Max. Ø	Max. length	
2	Turning-Milling Machining Center <b>Index C200</b> Machining from the bar with bar loading magazine. With counter spindle. Three 10-fold-revolvers with driven tools		90	70
1	Turning-Milling Machining Center <b>Index C65</b> Machining from the bar with bar loading magazine. With counter spindle. Three 12-fold-revolvers with driven tools		65	70
2	CNC Precision Lathe <b>Schaublin 842</b> For high precision finish machining in the chuck 16-fold revolver		100	100

## Grinding / Honing

Materials: Aluminum (hard anodized), Steel, Hardened steel, Titanium, Inconel  
 Surface: Ra ≤ 0.10  
 Accuracy: Roundness < 0.0003 mm, Cylindricity < 0.001 mm, Flatness < 0.001 mm,  
 Concentricity < 0.002 mm, Tolerance: diameter and linear dimension < 0.002 mm,  
 Match-tolerance < 0.001




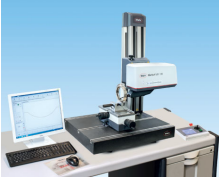
Number	Specification	Processing range [mm]		
		Max. Ø	Max. length	
2	CNC Universal Grinding Center <b>Studer S41 (C-Axis)</b> Cylindrical-, Form- and Thread grinding. Internal and external grinding. In-process measurement control. High Speed Machining. Synchronous tailstock (makes it possible to process without carrier).		400	350
1	CNC Grinding Center <b>Studer S145</b> Cylindrical grinding (internal and external) Special software for internal grinding. <b>Robot for load and re-loading.</b> Incl. measurement control.		350	400
1	CNC Grinding Center <b>Studer S145</b> Cylindrical grinding (internal and external) Special software for internal grinding.		350	400
1	CNC Grinding Center <b>Studer S40</b> Cylindrical-, Form- and Thread grinding. External complete machining Measurement and control system for <b>pair grinding.</b> Manually operated or fully automated. <b>Robot for load and re-loading.</b> Incl. measurement control.		350	400
1	CNC Grinding Center <b>Studer S31C</b> Cylindrical-, Form- and Thread grinding. Internal and external machining. High Speed Machining. <b>Robot for load and re-loading.</b> Incl. measurement control.		320	220

Number	Specification	Processing range [mm]	
		Max. Ø	Max. length
1	<p>CNC Grinding Center <b>Studer S31</b> Cylindrical-, form- and thread grinding External complete machining. Measurement and control system for <b>pair grinding</b>. Manually operated or fully automated. <b>Robot for load and re-loading</b>. Incl. measurement control. Synchronous tailstock (makes it possible to process without carrier).</p> 	320	220
1	<p>CNC Grinding Center <b>Studer S31</b> Cylindrical- and thread grinding External complete machining. With the option <u>Shoe-Grinding</u> for very thin-walled workpieces (rings).</p> 	320	220
1	<p>CNC Grinding Center <b>Studer S131</b> Cylindrical grinding (internal and external). Special software for internal grinding.</p> 	300	300
1	<p>Honing Machine <b>Sunnen ML2000</b></p> 	165 (man.) 100 (autom.)	170

**Also available processes at Polymeca:**

- Surface lapping
- Flat grinding
- Laser marking

**Inspection / Quality Control**




Inspection room according VDI/VDE 2627, Grade 3, ±0.5 °C/h					
Number	Specification	Measuring range [mm]			
		X	Y	Z	
1	High Precision Coordinate Measuring Machine <b>Leitz PMM C 12107</b> Accuracy in µm (L in mm): E = 0.7 + L/400 P = 0.6		1'200	1'000	700
1	Precision length measuring instruments <b>Mahr ULM520-SE</b> U1 = (0.09 + L/2000) µm		520	-	-
1	CNC Precision Formtester <b>Mahr MMQ 400</b> Accuracy in µm: Roundness ≤ 0.1 Flatness ≤ 0.1 Cylindricity 1.0/100mm Straightness 0.25/100mm Right angel ≤ 0.1		Ø 350	-	300
1	Shape- and Roughness Device <b>MahrSurf DU 130</b> Accuracy in µm (L in mm): EA = 1.0 + 2 L/150 Resolution in Z = 2 nm		130	-	10



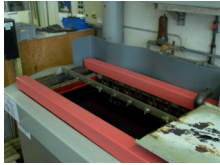
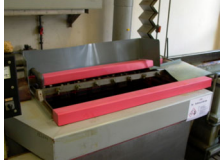
Inspection room according VDI/VDE 2627, Grade 4, ±1.0 °C/h					
Number	Specification	Measuring range [mm]			
		X	Y	Z	
1	Coordinate measuring machine <b>Leitz Reference Xe 10.7.6</b> Accuracy in µm (L in mm): $E = 1.4 + L/350$ Repetability range in µm: $R = 0.9$		1000	700	650
1	Coordinate Measuring Machine <b>Leitz Reference 15.9.7</b> Accuracy in µm (L in mm): $E = 1.0 + L/350$ $P = 1.0$		1'500	900	700
1	<b>Optical CMM Tesa Visio 300 GL manual</b> $MPE_{xy} = (2,5 + 4 L/1000) \mu m$ $MPE_z = (2,9 + 5 L/1000) \mu m$		900	200	150
1	<b>Leitz Sirio Xi</b> Shop Floor CMM With pallet system Accuracy µm (L in mm): $E_0 = 1.7 + L/300$		600	800	800




**Surface treatment and finishing**

Anodizing: Aluminum  
 Electroplating: Aluminum, Steel, Copper, Brass, Bronze  
 Painting: Metall, Plastic  
 Support Proc.: Cleaning, Blasting

<b>Anodizing</b>			
Specification	Facilities size [mm]		
	L	W	H
<p><b>Anodizing</b>                      Fully automatic system                      GS-process colorless and organic coloring.                      Colors: deep-black, gold-orange, blue, red, violet, green, and other on request.                      Corrosion protection, decorative layers, wear protection.  <b>For Aluminium und Aluminium alloys.</b></p> 	2'500	600	1200
<p><b>Passivation of aluminum</b>                      Fully automatic system.                      Transparent (SurTec 650).                      Ideal priming for paints.                      Brilliant conductor (EMV).  <b>For aluminum and aluminum alloys.</b></p> 	2'500	600	1200
<p><b>Chemical Gloss</b>                      Manually operated.                      High gloss surface.                      Together with glass pearl blasting gives a satin finish.  <b>For aluminum and aluminum alloys.</b></p> 	800	600	700

<b>Electroplating</b>				
Specification		Facilities size [mm]		
		L	W	H
<p><b>Burnishing for stainless steel (SWOX)</b> Decorative black surface. Light corrosion protection. <b>Only for stainless steel.</b></p>		600	400	1'000
<p><b>Stainless steel passivation</b> Homogenization for surfaces. Better corrosion protection. <b>For stainless steel.</b></p>		800	600	700
<p><b>Blue annealing for brass</b> Rich black, decorative. Reduces stray light in the optical industry. Less measure removal. <b>For brass with Cu-content from 58 till 65 %.</b></p>		800	600	700
<p><b>Electrolytic copper plating</b> Ductile, light bright (preserved shiny) <b>For steel, aluminum, brass, and die-cast zinc with pre-treatment.</b></p>		1'200	600	1'000
<p><b>Nickel plating, galvanic</b> Ductile layers. Dull-, semi-bright- or bright nickel. <b>For iron, aluminum, copper, brass.</b></p>		1'200	600	1'000
<p><b>Nickel plating, chemical</b> Bright layers. Corrosion- and wear protection. Non-magnetic, 480 till 560 HV. With heat treatment (400°C / 1h) approx. 1'000 HV P-content ~ 9 till 13 %. <b>For iron, aluminum, copper, brass.</b></p>		1400	500	800


Specification	Facilities size [mm]		
	L	W	H
<p><b>Shiny Chrome plating</b>                      High-shine surface, decorative.                      Max. coating area 18 dm<sup>2</sup>.                      Layer thickness tolerance ±0.005 mm.  <b>For iron, copper, brass.</b></p> 	1'200	600	1'000
<p><b>Black chrome plating</b>                      Decorative black coating with high corrosion protection.                      Prevent reflections on optical layers.                      Max. coating area 18 dm<sup>2</sup>.                      Layer thickness tolerance ±0.002 mm  <b>For iron, copper, brass, and stainless steel.</b></p> 	1'200	600	1'000

<b>Industrial Wet Painting</b> (Aluminum, steel, non-ferrous metal and plastics)				
Number	Specification	Facilities size [mm]		
		L	B	H
1	<p><b>Dust-free Spray booth</b>  <b>CMC Industrie 350</b>                      Maximum part weight: 1'000kg.                      Drying of paint in the cabin possible.                      Water- und solvent based paint                      1- and 2-Component Systems.                      Structure painting and stove-enamel up to 240°C.</p> 	8'200	3'400	2'300
5	<p><b>Spray booth ICS / 140</b>                      Maximum part weight 10kg.                      Drying of paint in the cabin possible.                      Water- und solvent based paint.                      1- and 2-Component Systems.                      Structure painting and stove-enamel up to 240°C.</p> 	1'400	1'400	500
<b>Industrial Powder Painting</b> (Aluminum, steel, non-ferrous metal)				
1	<p><b>Powder coating cabin</b>                      Electrostatic Method.                      Maximum part weight 25kg.                      Plain- and Structure coating.                      Stove-enamel up to 240°C.</p> 	1'900	1'500	2'800

<b>Support- Processes</b>				
Specification		Facilities size [mm]		
		L	W	H
<p><b>Ultrasonic Cleaning</b> Semi-automatic cleaning facility. Ultimate cleanliness.</p> <p>If required <b>packaging under flow box.</b></p>		1'200	800	1'000
<p><b>Ultrasonic Cleaning Machine</b> Shop floor full-automatic cleaning unit.</p>		480	660	340
<p><b>Tumble Deburring / Vibratory Grinding</b> For the removal of burrs and to reaching a uniform grinded surface. Several machines installed in different places.</p>		div.		
<p><b>Sand- and Glass Pearl Blasting</b></p>		div.		
<p><b>Sand Blasting</b> Blasting medium: Al2O3</p>		1000	800	500
<p><b>Glass Pearl Blasting</b> Blasting medium: Glass pearls</p>		600	500	250
<p><b>Powder Blasting</b> Blasting medium: SiC powder</p>		500	300	250

## Laser marking / Layer removing

Removing anodized or painted layers.

Number	Specification	Processing range [mm]		
		X	Y	Z
1	<p><b>TruMark Station 5000</b> with Trumpf Laser marker. TruMark 3130</p> <p>max. part dimension: 680 mm x 500 mm x 700 mm max. part weight: 25 kg</p> 	290	290	(500)

## Assembly

For your benefit: Reduction from logistical and storage effort

**Complete solutions from a single source:**

Procurement - Machining - Surface treatment - Assembly - Testing.

### Assembly area

Infrastructure:

- Automatic thread insert assembly
- Assembly robot for small parts
- ESD-protected area (for electronic Assembly)
- 3D-glueing robot
- Glueing carousel
- Flow Boxes
- Curing oven



### Engineering of control systems

- With functionality- and tightness test-bench for hydraulics and pneumatics
- Assembly of components for engineering
- Control cabinets and control systems
- Testing in accordance with EN60439-1

