

Producing pump components with MAXXTURN 45 and swing loader



The EMCO machinery at Grundfos in Denmark. Other plants beside the headquarters order from EMCO, too.

Grundfos

The pump manufacturer with its own motor and sensor production is specialized on large-scale production and has long-time experience at machine engineering.

18236 employees (rep. 2008)

2.6 billion € revenue (rep. 2008)

80 sales and service companies in 45 countries worldwide; production sites in Europe, Asia, North and South America



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Requirement profile

- Compact CNC turning center with a loading system for pre-formed parts
- Wide range of application
- Largely automated large-scale production
- Very good price-performance-ratio



Everything's flowing nicely – the diverse uses of pumps

“A pump is a device used to move fluids, such as gases, liquids or slurries. A pump displaces volume by physical or mechanical action. They displace fluid, causing a flow.” This is what Wikipedia tells you. If you consider this concept, you will see how many uses pumps have in our everyday lives – almost without us even noticing: from the simple bike pump to (waste) water pumps and heating pumps in households, through to pumps that connect the electronics and mechanics in your automobile engine.

Pumps are as essential in private households as in industry. GRUNDFOS, the world's largest pump manufacturer according to the German Engineering Federation (VDMA), produces more than 30,000 pumps every day for building services engineering alone, thereby demonstrating their wide range of uses and high level of diversity.

Grundfos – the world's largest pump manufacturer

Grundfos supplies the global market with 16 million pumps every year. To operate in such capacities, it requires machinery that is both highly productive and reliable. This is where the company from Bjerringbro in Denmark turns to its partner of many years – in line with the saying “you know when you've found a good thing”; Grundfos has placed regular orders with EMCO since 2001.

To enable it to efficiently produce parts for connecting the electronics with the mechanics in the pumps, Grundfos laid down a new challenge for EMCO in October 2008. Its specifications were clear: Pre-pressed Nirosta parts needed to be machined by an automatic CNC universal turning machine. The machine should be as compact as possible, have extremely flexible usage options, offer great value for money, and enable largely unmanned production.

Automatic production of pump components using the EMCO MAXXTURN 45

Under precise consideration of Grundfos's requirements, EMCO developed a MAXXTURN 45, equipped with a swing loader, main spindle, tailstock, tool turret incl. driven tools, parts ejector, part catcher and a part accumulating conveyor. With this solution, connection elements can be largely manufactured automatically

and without human involvement: The swing loader takes less than 5 seconds to automatically load the machine with the pre-pressed parts. A chuck that is specially tailored to the dimension of the raw parts is mounted to the main spindle with a spindle bore of 45 mm, making it possible to machine the parts without lengthy conversion. The main spindle's position in large precision bearings facilitates the especially large speed range (0–6300 rpm) and an exceptional running truth. The cooling fins on the symmetrically designed headstock provide excellent thermostability. The tailstock gives the workpiece extra stability during the machining process. It is attached to the roller slide and can be automatically positioned within a range of 510 mm. The tools and the swivel movement of the 12-position VDI 25 radial turret are powered by a servo motor. The parts ejector transports the completed workpiece onto the part catcher. The part catcher places the connection element on the parts conveyor.

The loading and unloading system enables Grundfos to largely automate the manufacturing process. The low level of conversion work enables machine downtime to be kept to a minimum. This leads to excellent productivity and high workpiece profit margins. 50,000 pieces can be easily manufactured per batch. The automation also saves on personnel costs: The machine lead time for this parts range is approximately 65 minutes. “An excellent time, especially when considering how small the machine's footprint is”, according to Helmut Huber, Head of Technical Support Germany at EMCO.

The MAXXTURN 45 can be flexibly upgraded and can therefore be used for diverse machining requirements and parts ranges.



Reliability, precision, productivity, profitability, and – if ever needed – excellent customer service

Grundfos has a clearly defined procedure for procuring a new machine: The procurement department receives proposals from several manufacturers, selects three of these and passes them on to the production technician department and the machine operators. After all, that's who makes the decision. Jesper Knudsen, production engineer at Grundfos, explains, “After all, our production department has to use the machines on a daily basis. We selected EMCO because we have been successfully working with EMCO for many



Reliability, precision, productivity, and profitability are extremely important criteria for us. And so far, EMCO machines have always fulfilled these criteria.



Jesper Knudsen, PT Technician Grundfos



The chuck is customized to the dimensions of the raw parts.

The finished driveshafts made of stainless steel connect the electronics with the mechanics in the pumps.

years. Reliability, precision, productivity, and profitability are extremely important criteria for us. And so far, EMCO machines have always fulfilled these criteria.” EMCO’s service is another factor in the decision. “Our engineers and machine operators have received EMCO service training and are therefore able to independently carry out minor repairs.” If more serious problems ever arise, the EMCO customer service team guarantees a response within 24 hours.

“Extremely non-bureaucratic and highly productive”, that’s how Helmut Huber, Head of Technical Support Germany at EMCO, describes the long-term cooperation with Grundfos. Huber supports the global player in all its technical needs and works with the Grundfos production technicians to develop machines that meet Grundfos’s individual production requirements. “You can tell that the professionals are at work at Grundfos.” Grundfos has extremely high vertical integration: In addition to pumps, the Danish company manufactures engines and sensors and even spent a while manufacturing machine tools. Its expertise is equally as broad.

This means that Grundfos also has the expertise to evaluate the productivity and quality of EMCO machines: “We have been using the MAXXTURN 45 since December 2008. The highly productive loading and unloading system has reduced the machining time by 50% compared with usual machines, and enables us to increase the piece profit margins by 65%, due to a 3 station machine system instead of the old single machine.” This has certainly played a part in keeping everything ‘flowing nicely’ at Grundfos.

The cooperation between EMCO and Grundfos is now on a multi-lateral basis: Grundfos is both an EMCO customer and an EMCO supplier. EMCO machines are used to produce pump parts while the coolant for the lathes and milling machines flows through Grundfos pipes.

Pump solutions [Be > Think > Innovate]

Its original meaning of ‘flowing up out of the ground’ is clearly apt for Grundfos: In 2008, the Danish company and its 18,236 employees around the world generated a turnover of EUR 2.6 billion and is the world’s largest manufacturer of liquid pumps according to the VDMA. With more than 80 sales and service branches in 45 countries and production sites in Europe, Asia and North and South America, Grundfos is a global player and supplies the global market with around 16 million pumps every year. Grundfos’s target areas include fitting private, communal and industrial buildings with heating systems, air conditioning and sanitation facilities; cleaning and (waste) water management; automotive and machine tool supplies and water purification for the food industry.

True to its slogan of ‘Be > Think > Innovate’, Grundfos invests 5% of its annual turnover in research and development and places a great deal of value on high vertical integration. The engines, sensors, and many parts of the pumps are manufactured in house.

Production solutions [Made in the Heart of Europe]

EMCO started producing conventional lathes in 1947. In the years that followed, the company became Austria’s largest manufacturer of machine tools for turning and milling work. Today, the EMCO Group has production sites in Austria, Germany, Italy and the Czech Republic, its own sales branches in Germany, Italy, France, Spain, the USA and the Czech Republic, and is part of the listed industrial group A-TEC Industries AG. The EMCO Group has over 800 highly-qualified employees worldwide and generated a 2008 turnover of EUR 187.1 million. With over 160 sales and service branches, EMCO is represented in all the major international markets. Its comprehensive product range includes training machines, conventional and cycle controlled lathes and milling machines, and CNC turning and milling centers for complete machining. The large range of automation components can be used to upgrade the machines into fully automated manufacturing cells. EMCO has made a name for itself on a global level with its second company division ‘EMCO Industrial Training’, which offers a modular training concept for metalworking with machine tools.



Impressive: the Grundfos headquarters at Bjerringbro/Denmark.

[Technical data]

emcogroup

Designed for your profit

EMCO MAXXTURN 45

Work area	
Swing over bed	430 mm (16.9")
Swing over cross slide	300 mm (11.8")
Main spindle/counter spindle distance	720 mm (28.3")
Maximum part length	300 mm (11.8")
Maximum part length	480 mm (18.9")
Maximum bar diameter (optional)	45 (51) mm (1.8 (2"))
Travel	
Travel in X / Z	160 / 510 mm (6.3 / 20.1")
Travel in Y	+40 / -30 mm (+1.6 / -1.2")
Main spindle	
Speed range	0 – 6300 rpm
Torque at spindle (optional)	78 (100) Nm (57.5 (73.7) ft/lbs)
Spindle nose DIN 55026	A 2-5
Spindle bearing (inner diameter at front)	80 mm (3.1")
Spindle bore hole	53 mm (2.1")
Counter spindle	
Speed range	0 – 6300 rpm
Torque at spindle (Siemens / Fanuc)	42 / 43 Nm (31 / 31.7 ft/lbs)
Spindle nose DIN 55026	A 2-4
Spindle bearing (inner diameter at front)	70 mm (2.6")
C axis	
Resolution	0.001°
Rapid motion speed	1000 rpm
Spindle indexing (disc brake)	0.01°
Drive power	
Main spindle	13 kW (17.4 hp)
Counter spindle (Siemens / Fanuc)	10 / 7.5 kW (13.41 / 10.1 hp)
Tailstock	
Tailstock travel	510 mm (20")
Maximum thrust	6000 N (1350 lbs)
Maximum travel speed	approx. 20 m/min (790ipm)
Tailstock bore taper	MT 4
Tool turret	
Number of tool positions	12
VDI shaft (DIN 69880)	VDI 25

Tool turret	
Tool cross-section for square tools	16 x 16 mm (0.6 x 0.6")
Shaft diameter for boring bars	25 mm (1")
Turret indexing time	0.2 sec
Driven tools	
Speed range	0 – 6000 rpm
Maximum torque	16 Nm (11.8 ft/lbs)
Maximum drive power	4 kW (5.4 hp)
Number of driven tools	12
Feed drives	
Rapid motion speed X / Y / Z	24 / 10 / 30 m/min (944.9 / 393.7 / 1181.1 ipm)
Feed force in X / Z	4000 / 4000 N (899.2 / 899.2 lbs)
Feed force in the Z axis	6000 N (1345 lbs)
Acceleration time from 0 to rapid X / Z	0.1 sec
Positioning scatter Ps VDI 3441 in X / Y / Z	3 / 3 / 3µm (0.0001 / 0.0001 / 0.0001")
Coolant system	
Tank volume	250 liters (66.1 gal)
Pump power standard	0.57 (2.2) kW (0.76 (2.95) hp)
Pump capacity at 3,5 bar / 1 bar	15 / 65 l/min (3.9 / 17.2 gal/min)
Pump capacity at 10 bar / 5 bar (optionally)	5 / 50 l/min (1.3 / 13.2 gal/min)
Power consumption	
Connected load	25 kVA
Compressed air	6 bar (87 PSI)
Dimensions	
Height of spindle center above floor	1100 mm (43.3")
Total machine height	1958 mm (77")
Foot print (without chip conveyor) L x D	2575 x 1790 mm (102" x 70")
Total weight	4000 kg (8818.4 lb)
Safety devices	
	CE conform

SWING LOADER			
Motion speed		2-finger toggle lever grippers	
Horizontal	60 m/min (2362 ipm)	Diameter max.	ca. 30 mm (1.1")
Swing movement	180°/sec	Length max.	ca. 200 mm (7.8")
		Weight max.	2 kg (4.4 lb)
Parallel grippers with rotary module		2-finger grippers with rotary module	
Diameter max.	ca. 60 mm (2.3")	Diameter max.	ca. 60 mm (2.3")
Length max.	ca. 100 mm (3.9")	Length max.	ca. 100 mm (3.9")
Weight max.	2 kg (4.4 lb)	Weight max.	2 kg (4.4 lb)

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