

## Thread Whirling Machines

Whirling Machine

**LWN 300 PM**

- Milling and Hobbing  
in One Machine

## ***Customer Satisfaction remains the Highest Priority***

This heavy duty machine has been developed specifically for today's high performance mud motor manufacturers. To dramatically increase penetration rates well drilling systems require high torque power sections. An integral element to achieving consistent high torque ratings is to produce more accurate rotor profiles. The Leistriz method of hobbing produces a superior geometry, while improving the surface roughness of the rotor prior to chrome plating. By reducing and sometimes eliminating the polishing before chroming the profile integrity remains intact and thus a mud motor which produces a consistent torque is guaranteed.

### **Performance Characteristics**

- Possibility for multi machine operation during hobbing
- No more extensive tool presetting for milling
- Process capability regarding profile accuracy
- Surface finish in (semi-) finish quality by hobbing therefore drastical reduction of polishing work
- No influence on the workpiece profile by grinding and polishing
- Increase of productivity by 100% compared to milling

## **LWN 300 PM**

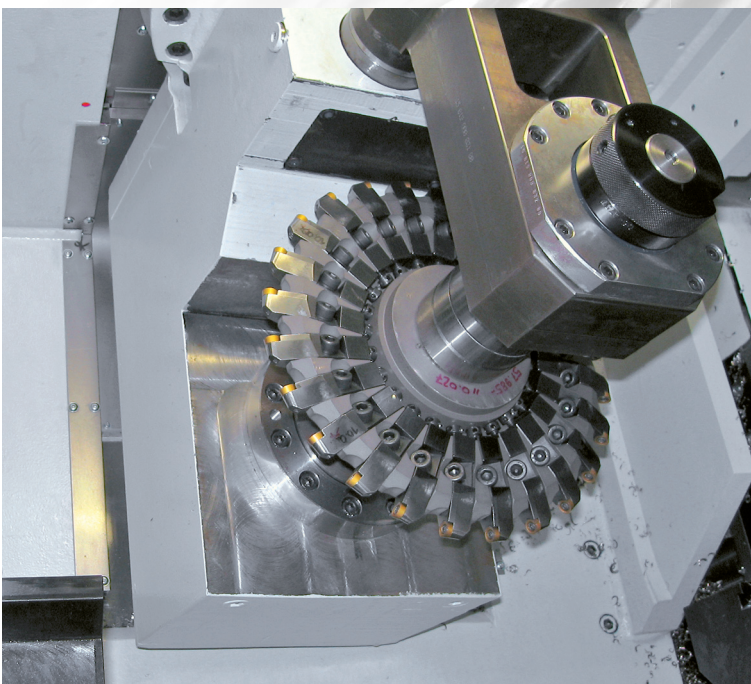
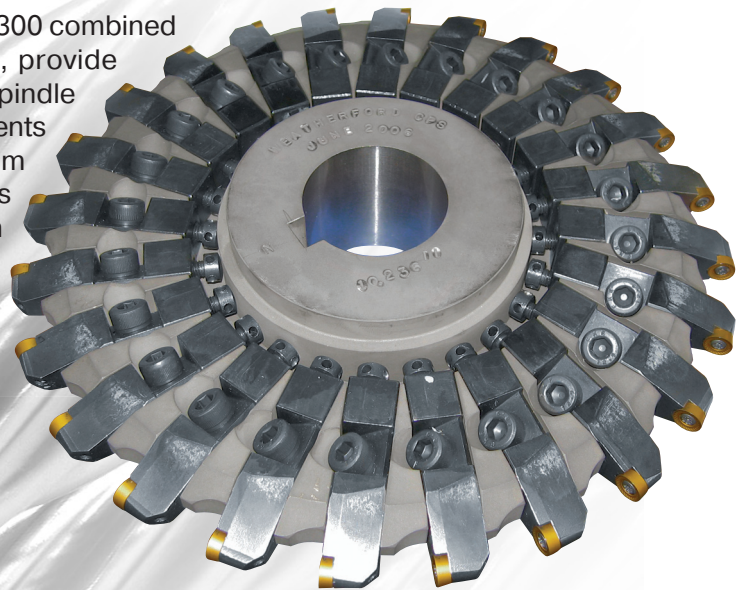


## MILLING

The Leistritz Power Mill 300 is a fully capable side milling machine. Familiar side milling cutters are arbor mounted to a  $\varnothing$  50 mm spindle with a 12 mm wide drive key spindle and outboard support with running bearing, to provide greater rigidity. This superior support produces better surface finishes and improves tool life of the standard button inserts. This insures rigidity while maintaining fast tool change-over times.

The Leistritz Power Mill 300 is able to run CNC programs of competitive machines. Leistritz provides a simple software routine to convert your existing programs for the NUM control to work fully automatically with the Siemens control. With a single mouse click, your existing programs are converted to the coordinate system of the Power Mill 300.

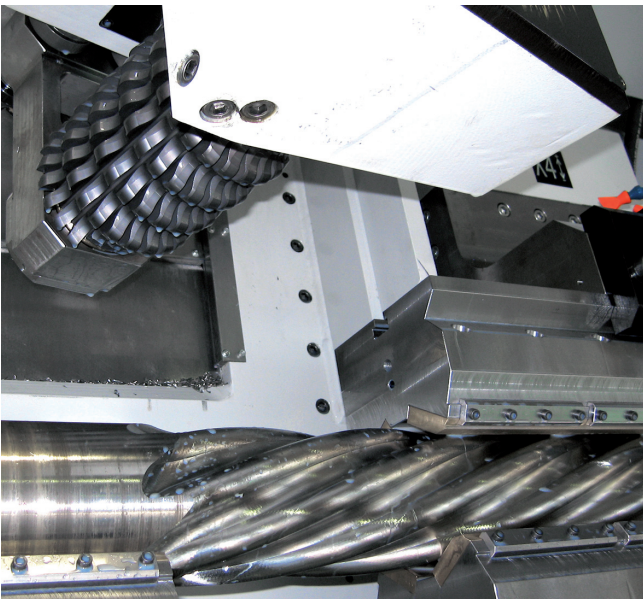
That the superior positioning accuracy of the Power Mill 300 combined with the super fast processor of the Siemens control, provide improved rotor profiles even with milling. The 800 rpm spindle permits higher cutting speeds for future tooling advancements like ceramic inserts. The arbor mounted cutter system permits the use of 2 milling cutters. So when the inserts of the first cutter become dull, the machine "Y" axis can shift to use the second cutter. This can be done automatically after a preset cut length or by the operator when he chooses.



*This view shows the "A" axis rotated to the tool change position. This allows the operator better access. This position is automatically reached after the tool cuts for a predetermined length.*

## HOBGING

Hobbing offers far faster material removal rates while improving surface finish. The inherent advantages of hobbing have been proven through centuries, but the long lengths of power section rotors combined with difficult geometries have prevented this technology from infiltrating the mud motor industry. Leistritz has developed the Power Mill with continuous, diagonal hob shift.



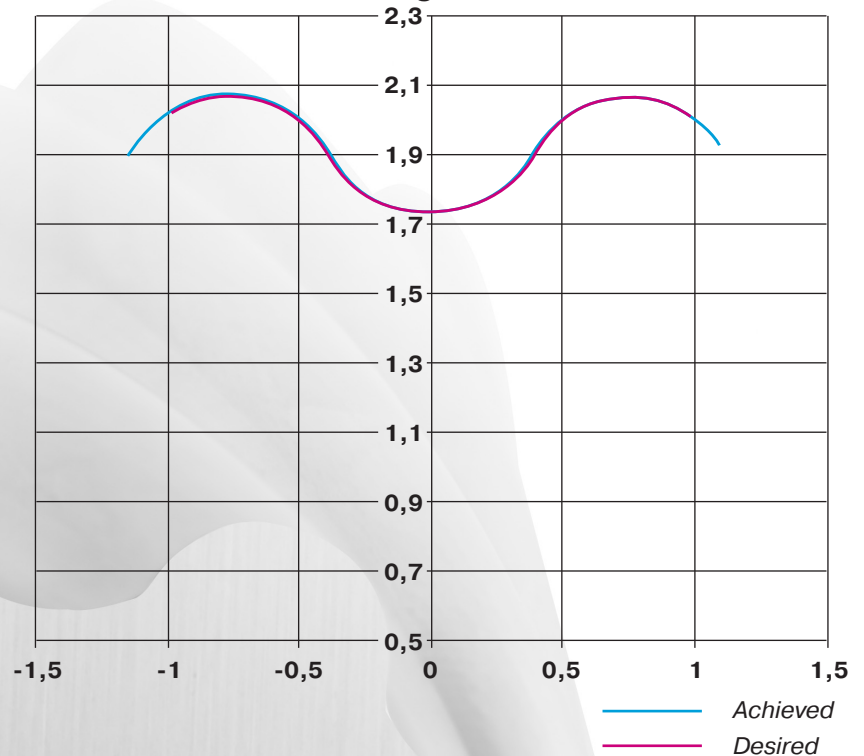
The CNC controlled “Y” axis for hob shift utilizes the entire hob face during the cutting of one rotor to evenly distribute tool wear. A complete rotor can be hobbed without the frequent stops for measuring or changes of inserts. The Power Mill 300 can confidently be run unmanned through an entire rotor regardless of its length.

A large savings is also seen in the amount of polishing that is required before chrome plating. Depending on the step-over amount used for milling and the feed rate used for hobbing, the polishing can be eliminated or reduced.

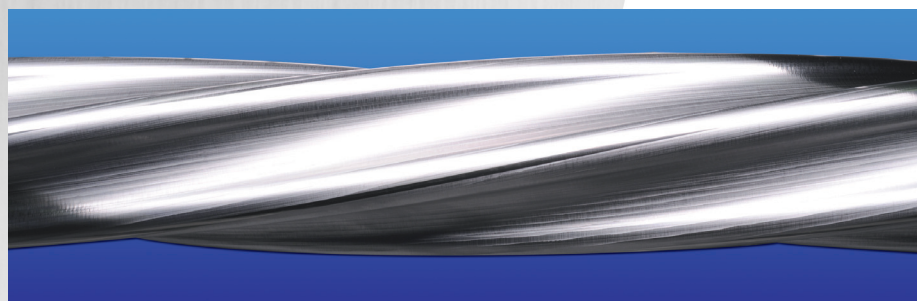
The Power Mill 300 machine is equipped with intelligent support rests. These units are programmable for center height position as an axis of the CNC. They use the parametric values for the bar stock diameter and major diameter to determine the proper height to extend to. The rests automatically retract to permit the tool carriage to pass by then raise again to support the work behind the cut. By always recording the position of the "Z" axis slide the CNC determines the correct height.

These rests also are used for loading/unloading the bars from the machine. They are equipped with wide V rests to properly hold the bars while not damaging the surface.

## Profile 6.75 labe 3.0 stage

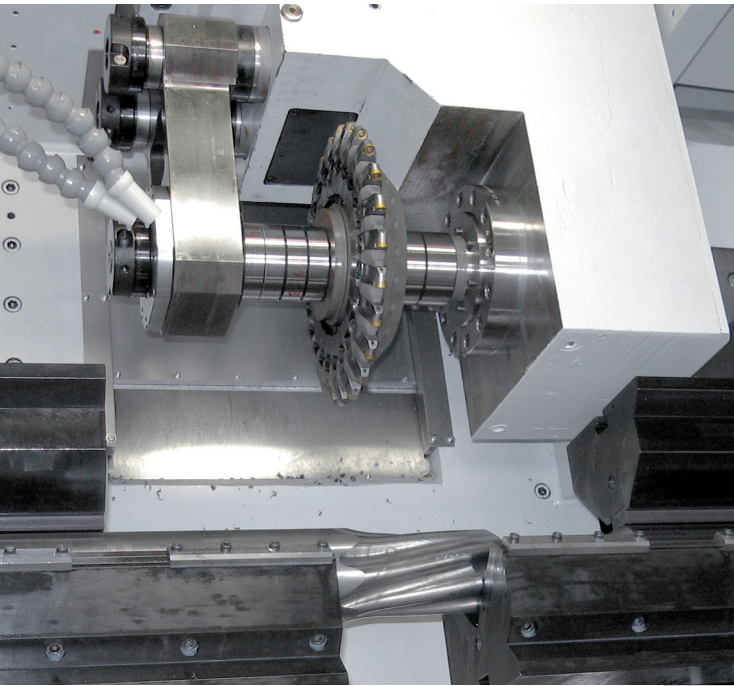


The chart shows a typical hobbled profile. The precision is obvious as the blue "Achieved" and magenta "Desired" lines overlap. A clear corner at the interface of the root radius and flank can be seen. This demonstrates a key feature of hobbing, as this is unattainable by milling yet ideal for a high performance mud motor.



## Tool Systems

Massive, self-centering, follower rests on each side of the cut support the work whether milling or hobbing. Each side is individually programmable for clamping force as a percentage of the maximum force produced by the drive system. Movement is actuated via a left/right hand ballscrew and servo motor. Each jaw can be axially positioned within a dovetail mount to give optimal support as close to the cutting forces as possible. The jaws are also equipped with coolant passages for lubrication and to flush unwanted chips away and prevent scratching of the rotors.



With highly skilled and experienced engineers with specialized equipment for grinding all types of cutting tools Leistriz can provide the most economic, state of the art tooling solutions to our customers.

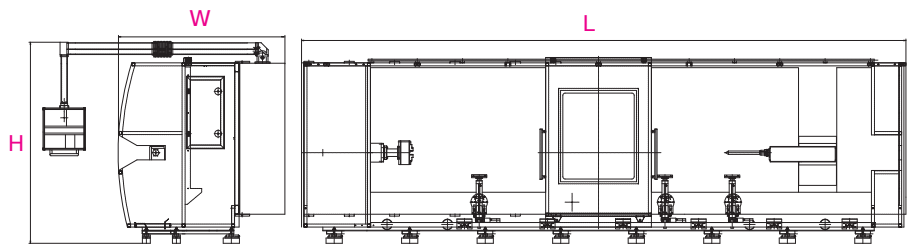
*Custom screens are used within the Siemens CNC to aid the machine operator to set-up the hobbing operations. Only the necessary critical data from the rotor and hob designs are entered through the above pages.*



## General Machine Specifications LWN 300 PM

Machine dimension with guarding and electrical panel  
Without chip conveyor (LxWxH)  
**approx.: 12,75 m x 3 m x 3,2 m**

Machine weight with guarding, electrical panel and chip conveyor approx. 41,000 kg



Technical Data		LWN 300 PM
<b>Headstock (C-axis)</b>		
Spindle through-bore (may be reduced depending on chuck type)		ø 130 mm
Spindle nose (for chuck acc. DIN 6353)		ø 220 mm
Resolution of the C-axis		± 0.01 °
<b>Follower rests:</b>		
Stroke max.		150 mm
Clamping range		ø 40 - 200 mm
steady rest jaw sizes		3
Clamping force		800 - 8,500 N
<b>Longitudinal axis (Z-axis)</b>		
Positioning Accuracy over 2000 mm		0.005 mm (according to VDI/DGQ 3441)
Repeat Accuracy over 2000 mm		0.003 mm (according to VDI/DGQ 3441)
<b>Cross slide (X axis)</b>		
Positioning Accuracy		0.002 mm (according to VDI/DGQ 3441)
Repeat Accuracy		0.001 mm (according to VDI/DGQ 3441)
<b>Combined milling unit</b> (milling/hobbing)		
Tool diameter (hobbing)		150 mm
Tool diameter (milling)		250 mm
Speed range		120 - 800 rpm
Drive type		Spindle Motor
Power max.		22 kW
Helix angle adjustment (A-axis)		± 90 °
Resolution of A-axis		± 0.01
Shifting of Y-axis		180 / ± 90 mm
Y-axis with sub assembly: Positioning Accuracy		0.005 mm (according to VDI/DGQ 3441)
Y-axis with sub assembly: Repeat Accuracy		0.003 mm (according to VDI/DGQ 3441)
Process capability/Profile accuracy		< 0.008 mm / 500 mm
<b>Workpiece</b>		ø 25 - 250 mm
<b>Machining length (max.)</b>		8,000 mm (to customers spec.)
<b>CNC control</b>		5 interacting axes

Technical alterations reserved

## Leistritz Product-Range of Whirling Machines

The perfect machine solution for each application

<b>LWN 65</b>	Small gear worms · bone screws
<b>LWN 90</b>	Steering worms · gear worms
<b>LWN 120</b>	Gear worms · mini ball-screws · bone screws · EPS worms · small eccentric screws small pump screws · rack and pinion spindles
<b>LWN 160</b>	Ball screw spindles · spindles · eccentric worms
<b>LWN 190</b> <b>LWN 300</b>	Pump screws · eccentric worms · ball screw spindles · plastification worms
<b>LWN 300 PM</b>	Cavity pump rotors · single and multi-lobe rotors for downhole motors
<b>INNOVATION 200</b>	Complete and hard machining of thread nuts

## Partner for modern Technology

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