



# WS 11/WS 11-SP

One-of-a-kind – Experience manual Grinding technique!



Grinding in motion

## Unparalleled worldwide – The Duo WS 11 and WS 11-SP.



# WS 11/WS 11-SP

## As precious as a jewel

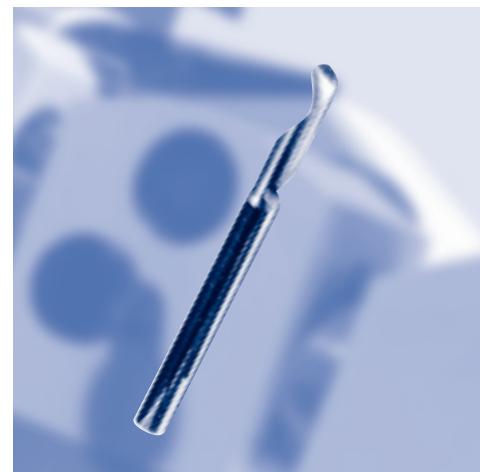
Thousands of universal grinding machines from the WS 11 series are in use worldwide. They offer you everything that is necessary for highly precise, manual grinding.

Whether single pieces or small series, the universal grinding machine WS 11 fulfills all of your requirements. Thus you can economically manufacture or regrind smallest tools and production parts made from carbide, HSS and other materials. Thanks to the WS 11 concept, cylindrical and tapered tools can be ground and measured in one clamping.

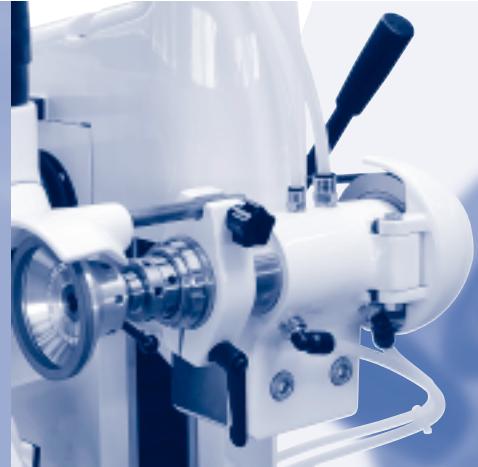
With the universal grinding machine WS 11-SP, a further development of the WS 11, it is possible to, additionally, manufacture tools with straight or spiral toothing.

WS 11 und WS 11-SP – Economical grinding efficiency!





## Grinding in another Dimension



### Hydrostatic Spindle

Through the hydrostatic bearing on the WS 11, the thermal expansion of the grinding spindle is constant and guarantees tightest tolerances.

# Technology

## One of the finest examples of concept and engineering

What unites the two universal grinding machines WS 11 and WS 11-SP is the extraordinary axis concept, which, in combination with the accessories, leaves no grinding wishes to be desired.

The settings of the X-, Y- and Z-axis are optionally visible on a digital display unit. Angle settings are quickly and precisely pre-set with the 3° grating. Through the change-over mechanism by means of the angle micrometer, the values can be set within a tolerance of two minutes.

Thanks to the hydrostatic grinding spindle on the WS 11, the heat expansion is consistently defined; consequently even tolerances of 0.0002 mm are possible. The grinding result may be checked with the optional electronic measuring device. At the same time the chip removal process can be viewed and controlled 1:1 with the measuring optics during the engagement of the grinding wheel.

Both of these universal grinding machines do not leave anything to be desired as far as precision and economics is concerned.

WS 11 und WS 11-SP – A cut above the rest!

### Hand wheels

The X-, Y- and Z-axes can be positioned within  $\mu$  by means of the centrally arranged hand wheels.





#### C-Axis

Your work pieces are mainly clamped on this axis and can be machined either in the indexing or in the rotary grinding mode.



#### Compact Construction

The operator has the overview of the whole machine at one glance and can operate everything from one position.



#### Digital Display Unit

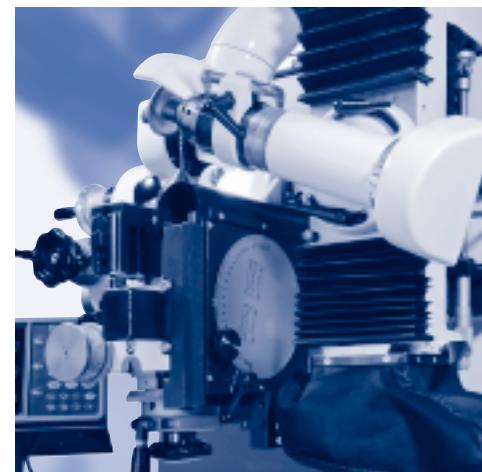
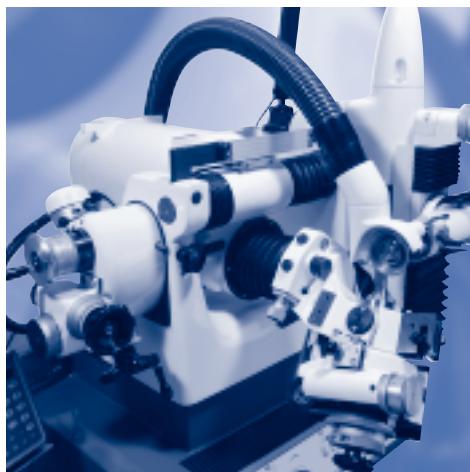
The most important angle settings in the range of 1/1000 can be read-off with this unit.

#### Kinematics

The special arrangement of the kinematics offers you all settings within the room to machine all kinds of work pieces.

#### Pivotability of the Grinding Spindle

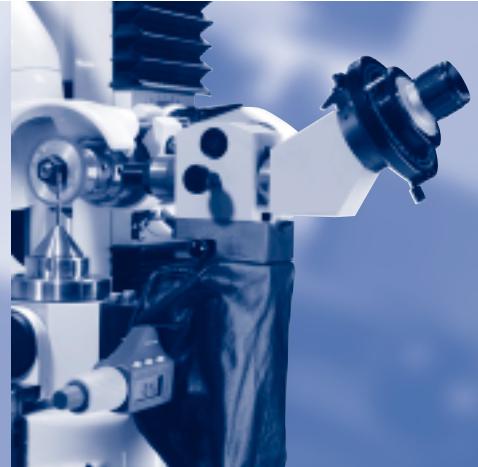
The swiveling and height adjustable grinding spindle of the WS 11-SP makes possible the machining of spiral tools.



#### Sine Bar

All twist angles can be set-up steplessly directly on the WS 11-SP with the sine bar.

## Grinding Flexibility! Guaranteed through extensive Accessories



### Measuring Optics

The grinding process is watched in a magnification of up to 100:1. At the same time angles and diameters are checked as well as measured.

# Accessories

## Adapted to your product variety

Increase your product variety through the optional accessories for the Universal Grinding Machines WS 11 und WS 11-SP.

These accessories, adjusted to challenging grinding processes, allow you to react dynamically to product changes. This gives you the possibility to diversely increase your grinding processes. There are no boundaries to the complex grinding geometries.

The WS 11-SP stands out from the WS 11 because of its swiveling grinding spindle, the integrated sine bar for the grinding of spiral tools with special stroke and a diameter of up to 25 mm.

WS 11 und WS 11-SP – When manual grinding precision is called for!



#### Radius- and Spherical Grinding Attachment

Radii or forms with optimal tangent transition can be ground on tools in one clamping with high accuracy. The spherical grinding attachment is also used for the dressing of form wheels.



#### High Frequency Grinding Spindle

Smallest inside diameter and outer forms can be ground since the high frequency spindle works at up to 100 000 rpm.



#### Electronic Measuring Device OK11

Tolerances of 0.0002 mm can be checked with the electronic measuring device.

## Tecnical Data

Basic Set-up	Travel WS11	WS11-SP	Reading Accuracy WS11	WS11-SP	Measuring System	Resolution
<b>Linear axes</b>						
Cross feed axis X	100 mm	100 mm	0.01 mm	0.01 mm	Glass scale	0.001 mm
Grinding stroke axis Y	100 mm	100 mm	0.01 mm	0.01 mm	Glass scale	0.001 mm
Grinding stroke position axis V		185 mm		0.02 mm		
Infeed axis Z	100 mm	100 mm	0.001 mm	0.001 mm	Glass scale	0.001 mm
<b>Rotary Axes</b>						
Workhead swivel axis A	-135°/+30°	-135°/+30°	1°	1°		
Workhead spindle axis B	0° ... ∞	0° ... ∞	2 min	2 min		
Workhead inclination axis C	+/-15°	+/-15°	1°	1°		
Grinding spindle inclination axis D		+/-35°		1°		
<b>Grinding Spindle Drive</b>						
Grinding spindle power	0.3 kW	0.3 kW				
Rotational speed	50 Hz: 2500/3500/ 4800/6800 min <sup>-1</sup>	50 Hz: 5000/6000/ 7000/8000 min <sup>-1</sup>				
Rotational speed	60 Hz: 3000/4200/ 5760/8160 min <sup>-1</sup>	60 Hz: 6000/7200/ 7400/9600 min <sup>-1</sup>				
<b>Workhead spindle</b>						
Workhead spindle reception	W 20	W 25				
Workhead spindle rotational speed	100–1300 min <sup>-1</sup>	100–1300 min <sup>-1</sup>				
Workhead spindle power	0.25 kW	0.25 kW				
Number of teeth on dividing disc	120 Z	24 Z				
Dividing accuracy	2 min	2 min				
Spindle rotations with sine bar		max.1½ Δ 540°				



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