



## PSM2000-A2 automatic specimen grinding machine

### Tensile specimens from sheet metal Video Prototype

<https://youtu.be/fhi0GLAVO48>

- with the experience of more than 70 years in testing technology
- Always further developed, unsurpassed quality of the tensile specimens
- for single samples up to 1000/shift
- Unique parallelism of 0.02mm in the measuring length
- excellent sample edges for R+N value determination
- also suitable for parallel strips (pipe stiffeners, tapes etc.)
- Competitor machines grind deeper on the radius due to the system = head tear ... that doesn't happen with this!
- New in 2020: Improved, maintenance-free parallel guides, improved belt guidance
- for flat tensile specimens made of sheet metal (0.1 - 10.0 mm, new: with cooling also up to 15 mm)

**Note:** The quality of the sample grinding and the effectiveness of the cooling were investigated within the framework of a research contract by the TUM Technische Universität München - Univ.-Prof. Dr.-Ing. Wolfram Volk under the scientific supervision of

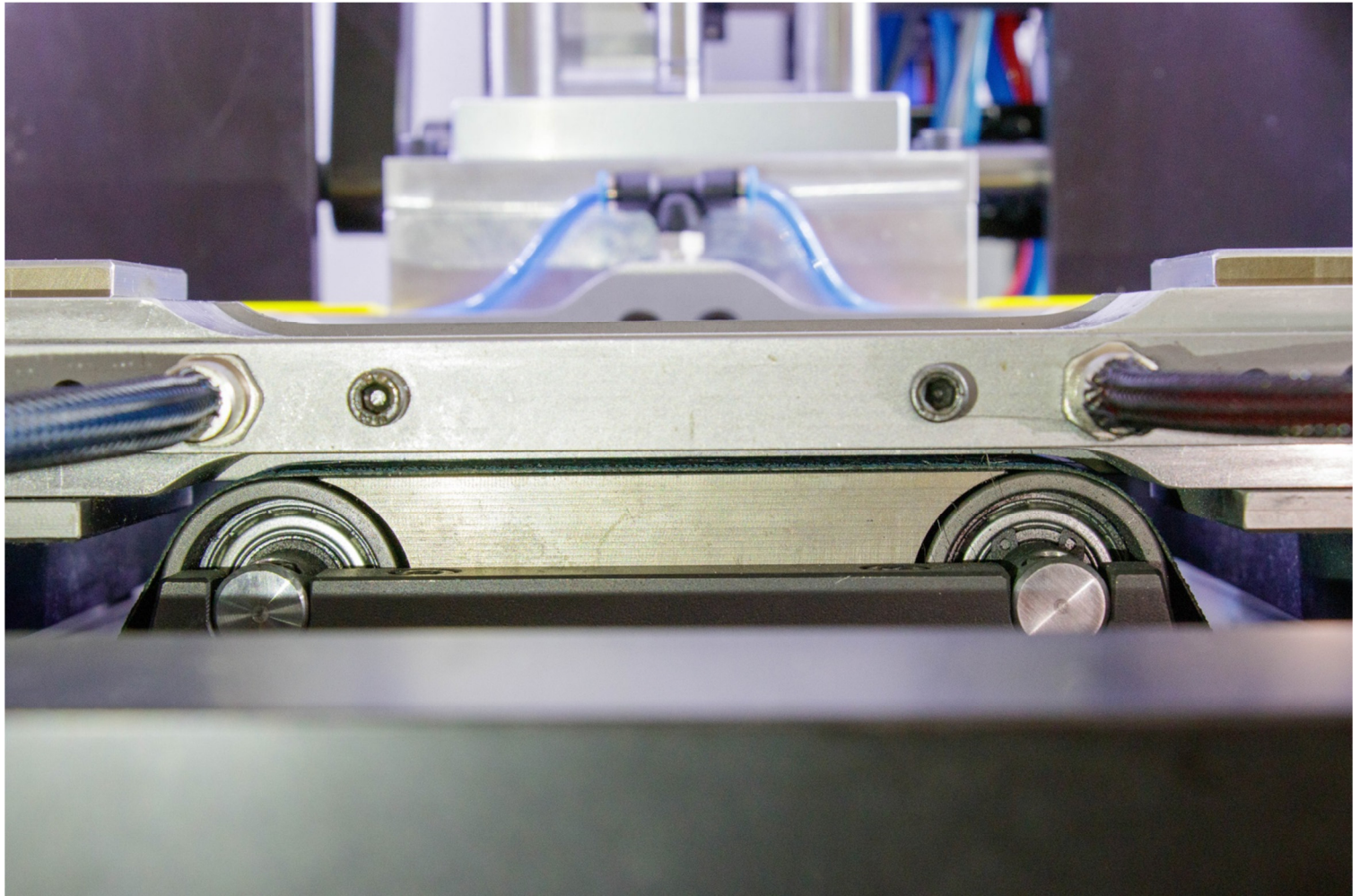
Mr. Maximilian Gruber, M.Sc. and confirmed. On request, we will send you the corresponding results of the bachelor thesis.

In 2021/2021, the automatic sample grinding machine PSM 2000-A2 was newly developed to actively cool samples during grinding. The operating principle of the specimen grinders is based on contour grinding. The deflection rollers / rolls / grinding table correspond to the transition radius between gauge length and specimen head and the parallel length  $L_c$  from radius to radius. Within approx. 2 - 5 minutes, approx. 0.3 to 1.5 mm (programmable) of material is removed from each side of the specimen. Grinding rationally removes the damaged edge areas caused by specimen fabrication, which influence the results (Rp0.2 | Rt0.5 | A%).

This is mandatory according to the standard and technologically:

- a.) Even the best tensile testing machine can only give false results if a specimen is manufactured defectively.
- b.) Standard requirement ISO 6892 and others: "The production of these specimens by stamping can lead to significant changes in the material properties, especially the yield/elongation limits (due to strain hardening). Materials that harden strongly should always be finished by milling, grinding, etc."
- Punching                      Work hardening / densification: soft grades = wrong  $>R_{p0.2}$  / hard grade  $>1/3 - 1/2$  elongation
- Laser cut                      Heat input - microstructure change = wrong  $>R_{p0.2}$
- Sawing / Water jet cutting                      Rough flanks - low elongation
- Press hardening / hot forming Molybdenum steels                      Toughness prevents milling

Only the specimen grinder PSM2000 guarantees a shape retention of  $\leq 2/100$  mm in the parallel length ( $L_c$ ) (small specimen shape 0.04 mm). Former patent DBP 360 7818 C 1- Class B 24 B. For any specimen shape according to ISO, ASTM, BS, Afnor, Jis or others, longitudinal grinding incl. radii, ready for operation Delivery incl. 10 grinding belts (grit 80) for initial operation. Without surcharge: On request (please specify separately!) centre tapered by up to 4/100 per side.



#### Special features PSM2000-A2

- \* fully automatic operation: clamp samples, close, start
- \* Specimen grips made of high-strength aluminium with cooling channels, quick-change coupling (other specimen shape), pneumatic clamping, floating bearing, rotating mechanism. Clamping, floating bearing, rotating mechanism
- \* automatic lifting-turning mechanism for grinding the opposite side
- \* Reinforced construction of the oscillation table with support frame for specimen holder and turning mechanism.
- \* Height adjustment by ball screw with controlled stepper motor feed (programmable)
- \* PLC control with convenient operation
- \* Highly effective, external cooling unit - all samples remain below 40 degrees
- \* Complete enclosure incl. door locks
- \* Maintenance-free precision linear guides of the oscillation carriage
- \* Simple setting for tape direction correction
- \* New sample holder receptacle - completely insensitive to dirt
- \* Pneumatic cleaning system for exact position of the sample clamping device

**Note: For operation additionally required:** grinding head + specimen holder (per specimen shape - combi item 223100-A2). The belt is tensioned pneumatically: The customer requires a pneumatic connection  $>3$  bar. Alternatively, a small compressor can be used. Due to the pneumatic belt tensioning, an exact belt tension is achieved by means of pneumatic cylinders, which ensures an excellent parallelism of the sample. In addition, the belt tension is not set too high (prevents premature wear of the belt table).

Sheet metal tensile tests according to DIN/EN/ ISO6892 (50125) ASTM, JIS, AFNOR etc.

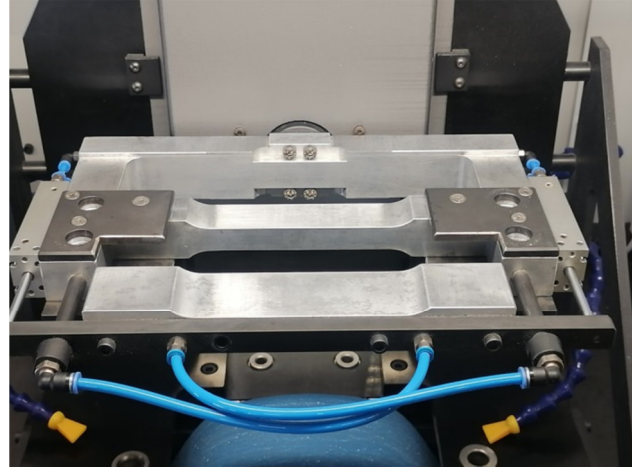
## NEW in 2022 PSM 2000-A2 fully automatic machine

### Grinding of tensile specimens manufactured by punching:

The basic requirement for obtaining correct, reproducible test results is the good quality of the tensile specimen. Punching is the most economical way of producing specimens, provided that it is possible to remove the strain-hardened edge zone of the test specimen cleanly, quickly and without heat input.

### Grinding of tensile specimens that have been cut by laser or water jet:

Due to the further development of steels, high-strength plates are increasingly used in industry and especially in automotive construction (A / B pillars, frame parts). Today, sheets with a strength of up to 1300 MPa or even 2000 MPa are widely established.



A tensile specimen can be made from these sheets  $\leq 1600$  MPa by stamping. Alternatively, the specimens are cut by laser beam - especially since these sheets still have to be cut to exact dimensions after being formed by laser.

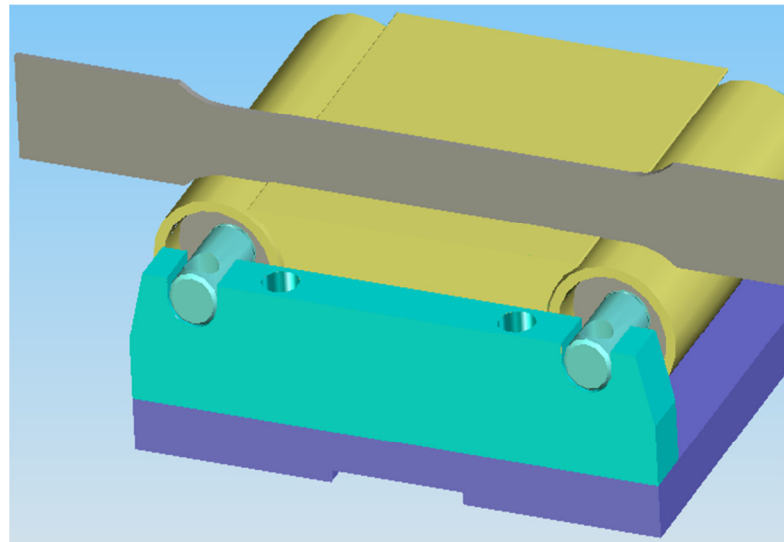
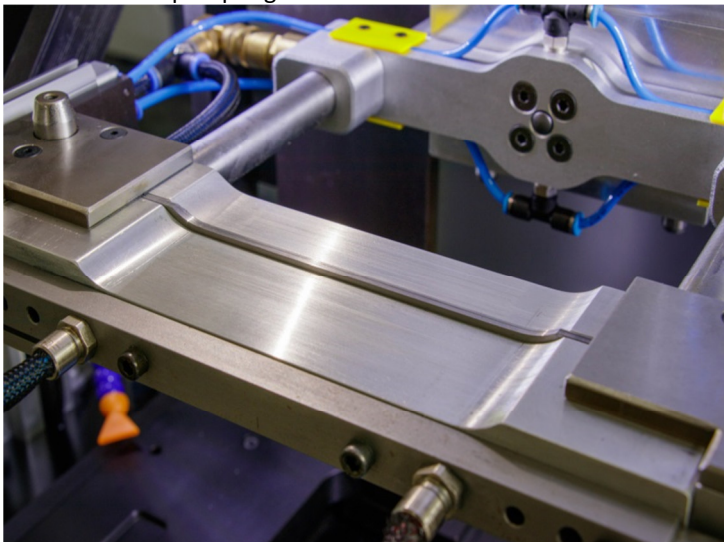
Cutting the test specimen by means of a laser beam produces melting of the edges and changes the material properties of the tensile specimens (depth approx. 0.3 - 0.5mm and more). The surface of this cutting process is by no means sufficient for a tensile test. If the sample is cut out by water jet cutting (transverse to the test direction, with conical flanks) the quality of the surface is also insufficient or even conical. Both methods influence the material / the measuring length in such a way that the results are unusable.

The PSM2000 is recognised as the only proven means of achieving reliable results. The specimen grinding machine, known since 1967, has been improved again and again. With this machine it is easily possible (even for semi-skilled workers) to produce absolutely parallel specimens with a high surface quality in a minimum of time. The guaranteed parallelism of the specimens is  $>0.02$  mm (according to the recommendation of the IDDRG International Deep Drawing Research Group).

### Central sample crack guaranteed within $L_0$ or within $L_e$ (cutting edge distance of the extensometer)

Do you have to rely on central specimen cracking by using a probe arm extensometer? In general, this measure is **not** necessary (especially for soft grades) because in "all" cases a central specimen crack occurs. The harder a specimen is, the more critical is the bending influence of the tensile testing machine or the grips. In order to provoke a central specimen break, the specimen grinder can be designed for central tapered grinding on request: Each side approx. 0.03 mm / total approx. 0.06 mm) permitted shape retention  $<0.12$  mm

Weight approx.	: 600 kg	Sanding belt (please test)	Grit 80 = $\leq 6$ mm :
Dimensions width / height / depth cm	: 102 x 167 x 57		Grit 60 = $\geq 6 - 10$ mm
Cooling Width / Height / Depth cm	: 29 x 47 x 58	Tape tension	: pneumatic, 6 bar compressed air required
Colour	: light grey / dark grey	Grinding system	: Side A, then side B
Sanding belt length	: 2000 mm	Time required for grinding	: approx. 1 - 3 minutes
Belt speed	: approx. 15 m/sec	Extraction	: optional (dry / water mist)
Power supply	: 400V / 50Hz / 1,5kW / 8A (D)		
Connection	: Plug 16A - CEE plug	The chiller can be positioned on the machine	
Number of grindable samples	: 50 - 500 (depending on hardness)		
Number of samples per grind	: Stack $< 20$ mm		



Subject to technical changes - in the sense of improvement