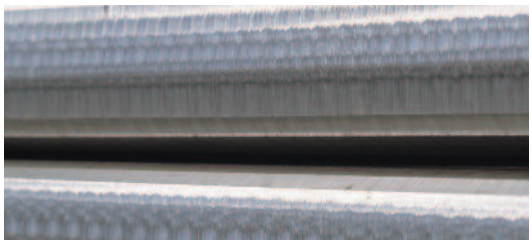
Innovation with tradition

HP high-pressure grinding machines



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BRAUN®
MASCHINENFABRIK

Dipl. Ing. Martin Braun

There are not many industrial companies which manage to maintain their market position for over 160 years in the ownership of the same family. One reason is possessing the courage to launch new products and continue to develop existing products to meet the customer's requirements. Another reason is finding top-class people, investing in their qualifications, working with them for as many years as possible, and promoting team spirit.

We always have been, and continue to be, leaders in quality and technology in all the areas we cover. Listening to our customers, delivering in time and providing customer service, are as much of a priority today as they were when our company was founded in 1848.

Having launched modern abrasive cutting technology back in 1965 and made it suitable for large-scale operation in a wide range of industrial applications, we expanded our product range at the end of the nineties to include a state-of-the-art high-pressure grinding machine. This innovation was the result of our consistent, application-specific research work.

Our new HP (High-Pressure/High-Performance) grinding machine has more than fulfilled expectations; indeed it has surpassed them. Further proof of expertise from BRAUN.

As a member of the sixth generation of the Braun family, I am proud to successfully lead our high technology company in the third millennium.

Martin Braun, President & CEO

Fig. 1 Team @ work – BRAUN specialists deliver the ultimate solution

“Steel cutting and grinding machines” is just one of 3 divisions at BRAUN. As one of our main products, we give the innovative HP grinding machine a high profile. This and the following factors make BRAUN the technology leader worldwide.

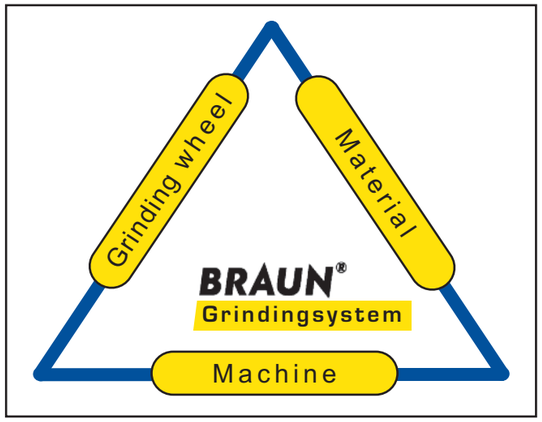


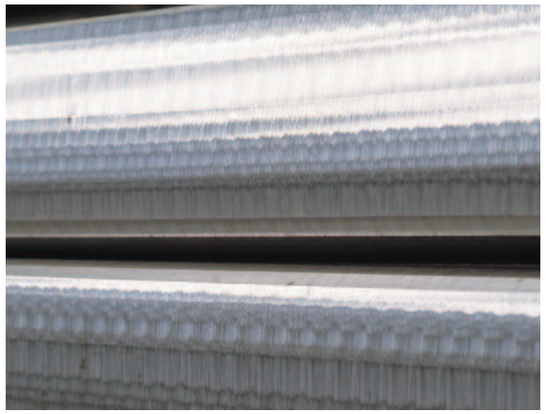
Fig. 2 The grinding system: machine, tool and material

Fig. 3 Special HP grinding head, system BRAUN

- **Technological experience:**
  We have been supplying facilities for abrasive applications all over the world since 1965.
- **BRAUN single-source engineering:**
  We do our own mechanical engineering, electrical engineering and software programming.
- **In-house manufacturing of key components and in-house machine assembly:**
  Our machines are assembled and tested at our works.
- **Effective quality management:**
  The BRAUN quality assurance system complies with ISO 9001 guidelines.
- **Ongoing purpose-driven research and development:**
  We investigate new concepts while continuing to develop current designs and processes.
- **Experience-based knowledge of the complete grinding system (machine – tool – material):**
  The machine and grinding wheel are optimally tuned to the process material.
- **Intensive cooperation with leading grinding wheel manufacturers:**
  Active partnerships with TYROLIT, SLIP NAXOS/RAPPOLD and NORTON yield benefits for our customers.
- **Application-oriented cooperation with our customers:**
  Together we develop innovative, custom-tailored complete solutions.

Before a continuously-cast, rolled or forged semi-finished stainless steel mill product can be processed into a final product, it must be made sure that the surface of the material is free of cracks, scale and other flaws.

High-pressure grinding is the most reliable and effective method for achieving clean surfaces ready for further processing. High-pressure grinding has the versatility to be used for various grinding jobs:



- **Surface grinding:**
  Bright-grinding the entire workpiece surface to remove scale and cracks
- **Edge grinding:**
  Grinding the workpiece edges to remove cracks
- **Spot grinding:**
  Grinding out specific surface flaws from the workpiece surface

Fig. 4 Ground billet surfaces and edges

High-pressure grinding can be used on both cold or hot materials.

HP (High-Pressure/High-Performance) grinding machines from BRAUN have a number of advantages compared to conventional grinding systems:

- Extremely high grinding performance
- Entire surface and all edges of workpiece are ground uniformly
- Low thermal impact on workpiece surface
- Uniform grinding depth even on uneven or curved workpieces
- Grinding head can be adjusted steplessly between 90° and 45°,even during grinding
- Fully automatic operation with visualisation system and data archiving
- Manual interventions can be made immediately so flaws can be ground out as soon as they are identified – system returns to automatic operation of its own accord
- Operator has unrestricted view of workpiece and grinding process
- Grinding wheels are quick and easy to change
- Swarf can be separated according to alloys
- Low noise levels

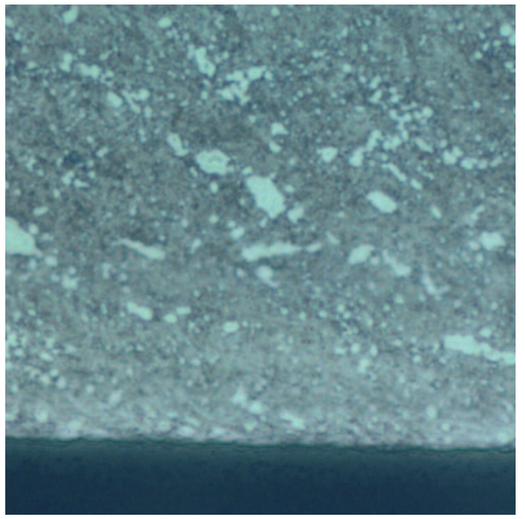


Fig. 5 Micrograph (1500:1 magnification) – edge zone of an HP-surface-ground material: high-speed steel, DIN no. 1.3346

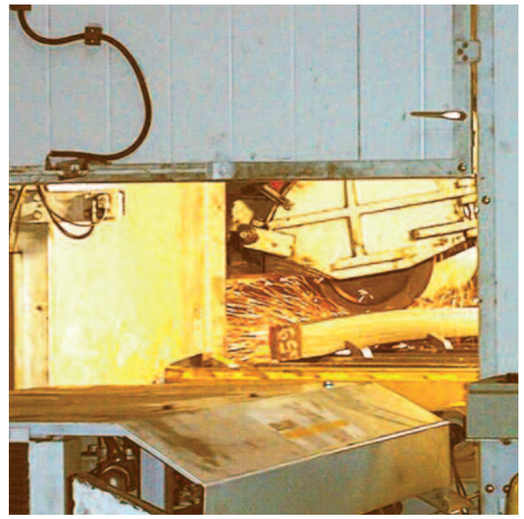


Fig. 6 Reliable grinding of curved billets

Production scenario:

Type of machine: HP 6 (grinding wheel diameter: max. 635 mm)

Material: billets, 112 mm (4-3/8 in) dia. to 132 mm (5-1/4 in) dia., around 4 m (13 ft 1-1/2 in) long each

Alloys: high-speed steels (DIN no. 1.3346) and high-temperature steels (DIN no. 1.4980)

Number of billets: 94 - i. e. 40445 kg (89140 lb)

Grinding program: grind all 4 surfaces and all 4 edges

Grinding head angle: 45° (surface grinding) and 90° (edge grinding)

Grinding depth: 7 % - achieved in a single pass

Surface roughness R_t: approx. 120 MÜm (grain size used: 20)

Average cycle time per billet: 10.7 min

*) The cycle time includes lifting the billet in and out, a practice pass of the grinding carriage to measure the billet, grinding the 4 surfaces and 4 long edges of the billet, and rotating the billet.

Fig. 7 BRAUN HP high-pressure grinding machine in industrial operation

Grain size	Service life of wheel	Ground surface	Grinding performance
6-10	high	rough	high
12-14	medium	medium	medium
16-24	low	fine	low

Fig. 8 Influence of grinding wheel grain size on wheel service life, finish of ground surface and grinding performance

BRAUN HP high-pressure grinding machines are optimised for specific applications and are equipped with the following special features:

- Infinitely-variable grinding wheel drive with high motor rating for consistent cutting wheel speed, regardless of wheel diameter, and optimum grinding results in all operating conditions
- Automatic grinding wheel wear compensation system measures actual diameter of wheel
- Highly-efficient and flexible design of grinding head (grinding axis = pivot axis of grinding head) – components for stepless adjustment of the grinding head between 90° and 45° can be retrofitted at any time
- Hydro-mechanical grinding carriage drive for fast acceleration and high travelling speeds
- Innovative control system for regulating grinding speed and grinding pressure for highest possible grinding performance, automatic detection of end of workpiece and automatic adjustment to the workpiece shape
- Clear, user-friendly process visualization system and data collation using PC with proven software package
- Comfortable, quiet control booth with special operator's seat and panorama window for highest degree of operating convenience and unrestricted visibility
- Special wheel-changing carriage for quick and easy retooling
- Generously proportioned, quiet grinding booth with good access for maintenance
- Customer-specific swarf disposal system with automatic bucket preselection for separating material types

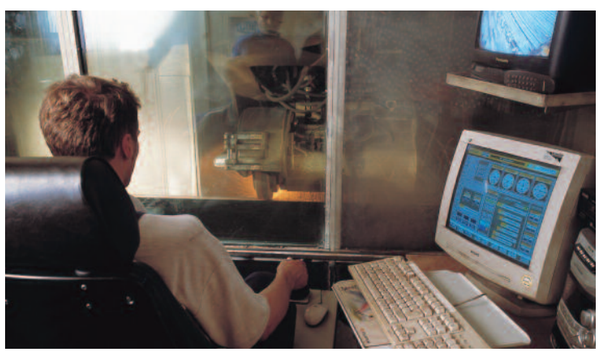


Fig. 9 Control booth – unrestricted view of grinding process

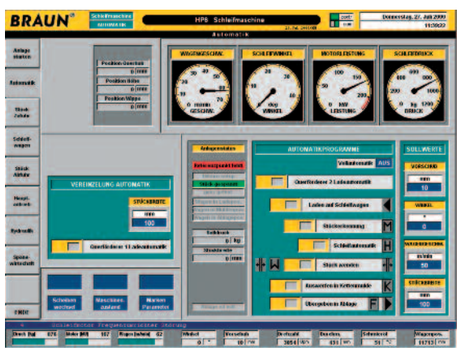


Fig. 10 Screen mask for process visualisation

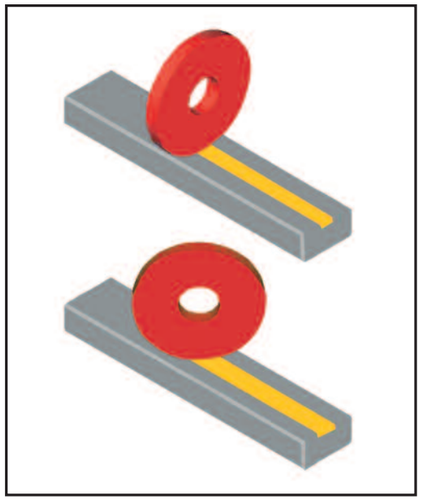


Fig. 11 Set any grinding wheel angle between 90° and 45°)

Grinding angle	Advantages
90°	- minimum grinding wheel wear - good surface roughness
45°	- maximum grinding performance - improved results on materials susceptible to cracking

Fig. 12 Comparison – grinding at 90° and 45°)

The HP high-pressure grinding machine is always an integral part of a whole facility. The entire facility can be designed and delivered – turnkey – by BRAUN, optimised for each specific application.

In addition to conventional handling components such as roller tables and cross conveyors etc., BRAUN designs manipulation systems for special applications.
You can also rely on BRAUN to locate and supply the best bought-in components, such as dedusting systems etc.
And, of course, everything supplied by BRAUN complies with CE conformity guidelines.

Fig. 13 Detail of facility - outlet area with chain trough

The machine code is determined by the maximum possible grinding wheel diameter.
Machine type HP 6: suitable for a grinding wheel with a maximum dia. of 635 mm (25 in)
Grinding wheels are available with a diameter of up to around 950 mm (37-1/2 in).
Depending on the diameter, grinding wheels between 50 and 150 mm (2 and 6 in) thick can be used.

Fig. 14 Machine code

HP-17 en

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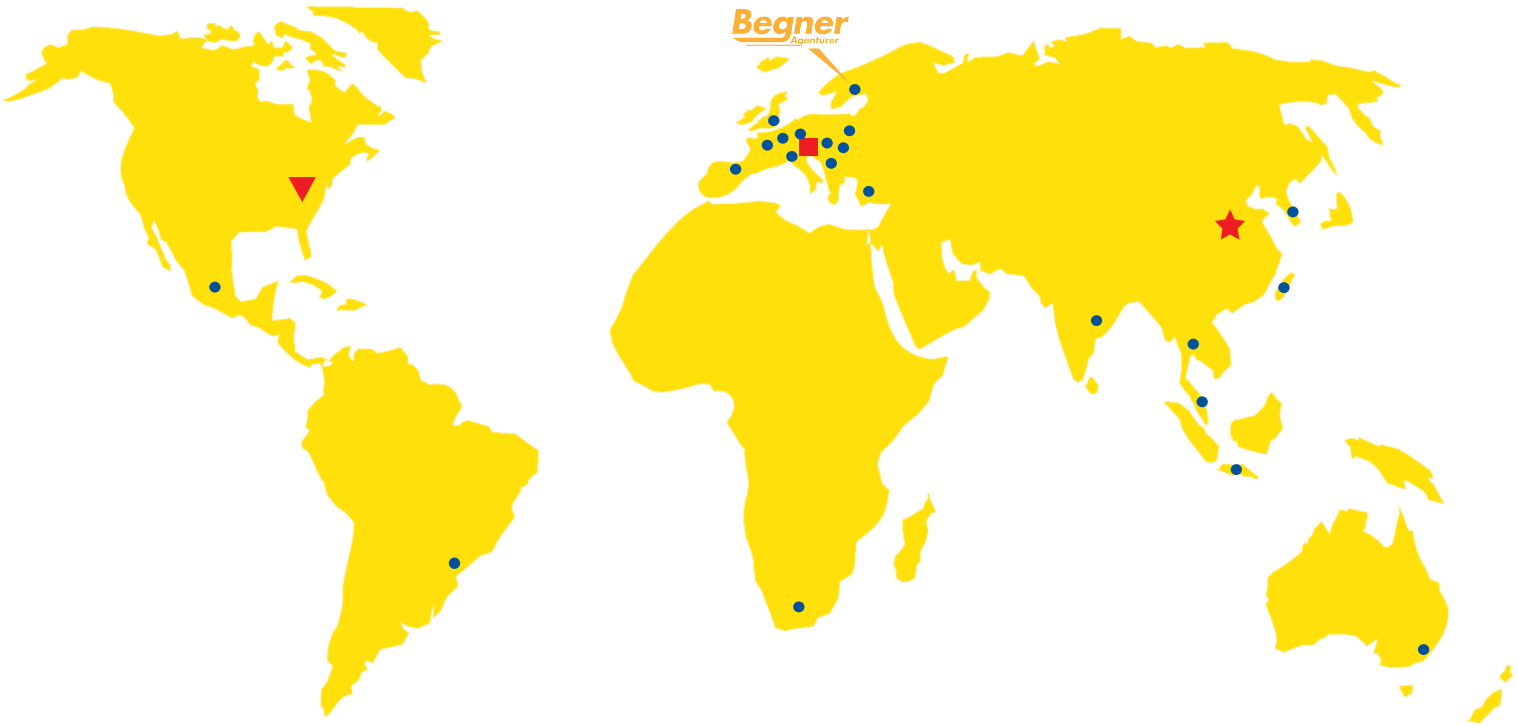
Innovations – Solutions – Customer satisfaction



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