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Chinese market leader for mining machinery: investment pays off

20% efficiency increase thanks to four boring mills

The three parallel axes of the KCR 160 guarantee reliable machining precision

Xi'an Coal Mining Machinery Co., Ltd., one of China's leading manufacturers of mining machinery, invested in four planer-type boring mills by UnionChemnitz at the beginning of 2013. The investment goal: to increase the efficiency and at the same time raise the machining quality of components in the production of shearers. Four years after commissioning, the manufacturer of mining machinery looks back on a profitable investment.

The completely enclosed boring and milling machines with a boring spindle diameter of 162 mm are generously dimensioned with between 3,200 and 4,000 mm traverse in the X-axis (workpiece table transverse direction) and 2,500 mm in the Y-axis (column vertical), and therefore perfectly suited for the complete machining of large, heavy workpieces. Machining shearer components requires particularly high machining precision. "The greatest challenge in machining these components is the concentricity of the bores," says Mrs. Wang Xiaojing, Deputy Director of the technical committee of Xi'an Coal Mining Machinery. The stable design of the KCR with a strongly ribbed column, made of a single piece of cast iron, and excellent damping characteristics predestine the machines for high requirements in terms of precision.

Three parallel axes for higher precision

Specifically developed for precision machining, the K-Series by UnionChemnitz has three parallel axes: V (column longitudinal), Z (ram) and W (boring spindle). Thanks to these, the machines meet even the tightest tolerances, as the column, ram and spindle movements overlap, which minimizes geometric inaccuracies. This results in absolutely stable cutting conditions beyond the middle of the table. As expected, UnionChemnitz met the tolerances regarding geometric and positioning accuracy required by Xi'an Coal Mining Machinery to the customer's full satisfaction when machining a test workpiece on the boring machines during the preliminary acceptance test.

Increased efficiency

Besides an increase in machining accuracy, Xi'an Coal Mining Machinery's main investment goal was an optimization of machining times. In order to achieve maximum production efficiency and a reduction of downtime, the boring and milling machines are equipped with an automatic tool changer and some with a pick-up station for milling heads. Wang Xiaojing is satisfied with their long-term performance: „Thanks to the new machines, we were able to increase the overall efficiency of the production facility by approximately 20%."

A sister company of Xi'an Coal Mining Machinery that is also based in Xi'an, Shaan'xi Construction Machinery, ordered two more machines, a KCR 150 with a spindle diameter of 150 mm and a table-type TC 130 with an automatic tool changer, as part of the same contract. The boring mills are used to manufacture machine components for road construction machinery. The deciding factor for the orders to be placed with UnionChemnitz was the reliable adherence to the high precision requirements and tight tolerances; however, the German technology leader has more advantages to offer. In its sister company WaldrichSiegen's representative office in Beijing, an expert is available exclusively for customers interested in UnionChemnitz machines. Customers in China are supported by competent staff throughout the entire life cycle of the machine.

Editorial

Dear readers,

Economic activities in industrial business sectors around the world are increasingly subject to political and financial turbulence. Insecurities due to political upheavals and shaky transnational trade agreements, Great Britain's exit from the EU and Asian markets cooling off are great challenges for long-term planning in international production processes.

Additional pressure caused by globalization, new technologies and ever-increasing rationalization in value chains put a strain on many new, but also on traditional companies worldwide. A stable and reliable partner is an important support in this difficult economic environment.

UnionChemnitz has gathered vast experience in handling constant change during its history, which spans more than 160 years, and has successfully implemented this experience in its actions. In each challenge arising in the economic environment, we identify and use every chance – and every risk that is to be avoided, as well. Thanks to this conscious differentiation, UnionChemnitz has been able to build up durable strength and reliability over the years. These reflect not only in our day-to-day actions, but also and especially in our quality products.

Boring mills made by UnionChemnitz are a reliable resource at numerous production facilities across the globe. The boring mills are characterized not only by high precision and performance when machining demanding workpieces; they are also flexibly adaptable to the production requirements of the future. Thus, in these uncertain times, UnionChemnitz is a strong and reliable partner for its customers – not only today, but also in the future.

Dr. Benedikt Sitte
President and COO

Second PCR 160 for Gontermann-Peipers

Boring mill strengthens roll manufacturer's machine inventory

Gontermann-Peipers is a world-renowned producer of rolls and cast products. For decades, HerkulesGroup companies have maintained close business relations with the long-established company headquartered in Siegen, Germany. Roll lathes and grinders made by Herkules and WaldrichSiegen, among them the largest roll lathe in the world, are in operation in its production facility. In 2013, UnionChemnitz supplied a horizontal boring mill; followed by another order covering one more boring mill of the type PCR 160.

Roll manufacturers face ever-increasing demands regarding the machining quality of rolls – their customers' quality standards rise continuously. When Gontermann-Peipers decided to invest in a new boring mill in order to expand its production and increase the product quality, the highly precise PCR 160 by UnionChemnitz with 4 m traverse in the X-axis and 3.5 m traverse in the Y-axis quickly proved the ideal substitute for an aged predecessor.

Powerful, precise and practically wear-free

One of the challenges at Gontermann-Peipers are difficult-to-machine materials. In comparison to the standard UnionChemnitz boring mill, the machine performance has therefore been increased to 68 kW at torques of 4,720 Nm and speeds of up to 2,200 min^{-1} to cover these heavy-duty machining tasks. The PCR's stable machine bed and an extremely stiff, strongly ribbed column guarantee the highest machining accuracy. Moreover, the boring mill has excellent damping characteristics and is practically wear-free thanks to hydrostatic guides in all linear axes.

A technical highlight of the PCR 160 permits the roll manufacturer to apply a new machining strategy at its production site: from now on, roll necks can be completely machined in a single set-up with the help of a CNC-controlled vertical milling head. This is a huge time-saver, since workpieces no longer have to be re-mounted.

In order to efficiently cover the complex machining tasks required by Gontermann-Peipers, the traverse of the ram (Z-axis) and spindle (W-axis) have been extended to a total of 2,400 mm. A universal milling head covers a broad range of applications when machining roll necks and containers. The different boring and milling heads used are quickly and automatically changed via a pick-up station.

The PCR 160 has been in operation at Gontermann-Peipers' headquarters since late 2016. After the installation of the first PCR in 2013, it is another example of successful cooperation between UnionChemnitz and Gontermann-Peipers.

Difficult-to-machine materials do not pose a challenge to the new PCR 160

Current highlights in the UnionChemnitz portfolio

UnionChemnitz tailors its boring mills exactly to its customers' requirements and develops special solutions for their individual applications. One example is the combination of machine tools to form flexible machining systems that function either independently or combined; another is the integration of turning or grinding applications in boring and milling machines. When it comes to product development, UnionChemnitz's innovative solutions for special machining challenges set new benchmarks in the market, as is the case with the new precision boring mill KG: its machining accuracy is almost identical with that of a jig boring machine. The technology leader even develops entirely new machine concepts, such as the rotor slotter that machines generator and turbine rotors on a single machine, which has been designed and built in cooperation with its sister company WaldrichSiegen.

Duo arrangement: MILLFORCE 1 and PCR 150 – Flexible machining system eliminates downtimes

One of the most effective methods of saving time and money in the production of machine components is machining parts in a single set-up. UnionChemnitz used this method to eliminate downtimes when designing a machining system for a world market leader in the area of earth-moving and construction machinery – with a boring mill of the type PCR 150 and a travelling column mill MILLFORCE 1 in duo arrangement.

The system permits machining of workpieces – in this case, excavator arms, cantilevers and machine frames – from two sides simultaneously. It consists of a MILLFORCE 1 with 7 m traverse in the X-axis and a floor-type boring mill PCR 150 with a boring spindle diameter of 150 mm. The boring mill is equipped with a ram and travels 10 m in the X-axis. The workpiece is set up on a floor plate between the machines. An additional rotary table with 1,600 x 2,000 mm set-up area is situated at the end of the boring mill's X-axis.

Both machines work simultaneously in the floor plate area in this arrangement. If a machining process on one side of the workpiece takes significantly longer than that on the other side, the machines can be uncoupled. The MILLFORCE 1 then operates in the floor plate area, while the PCR 150 works in the table area. Both machines are equipped with an additional control section for that purpose. A collision control system makes sure that the machines operate safely. The result: highly precise and flexible machining without downtimes.

Duo arrangement: coupled machining of a workpiece from two sides on the floor plate

Machining generator and turbine rotors on a single machine: New concept by UnionChemnitz and WaldrichSiegen

From generator shafts to flange bores and fir tree grooves – generator rotors and turbine rotors each pose a number of critical and very different machining challenges. This is why the machining of these complex workpieces usually requires two separate, specialized machine tools. WaldrichSiegen and UnionChemnitz have now developed a universal rotor slotter that allows for the efficient machining of both workpieces on a single machine.

The new rotor slotter: a combination of a PCR 260 (left) and a set-up system by WaldrichSiegen

The innovative machine concept is based on UnionChemnitz's most powerful horizontal boring and milling machine, the PCR 260 with a spindle diameter of 262 mm, a power of 128 kW and a torque of 19,000 Nm, combined with a sophisticated, CNC-controlled set-up system designed by WaldrichSiegen. Depending on the workpiece, the rotor slotter adapts to various machining tasks with a broad range of boring and milling units.

The units weigh up to 4 t, which is why the machine is designed for outstanding stability. Its performance data are impressive: when slotting generator shafts, a disk cutter with a diameter of 1,250 mm is mounted. It can mill grooves with a depth of 125 mm in a single cut, applying 111 kW spindle power at a torque of 33,000 Nm, and removal rate of about a ton per hour. Despite these forces, the rotor slotter works with outstanding precision – for example when boring flange bores, which form the connection between turbine and generator, to tolerances of 10 µm.

The machine meets each specific machining challenge with customized spindle units, milling heads and tools and the appropriate NC programming solutions: curved fir tree grooves in turbine rotors, for example, an extremely complex machining task, are pre-machined with a large bell cutter and finished with a finger cutter. An automatic tool changer permits quick and efficient switching between machining applications. The rotor slotter is unique in its universality, allowing for complete machining of both generator and turbine rotors.

Precision boring mill KG: product innovation fills gap between classic boring mill and jig boring machine

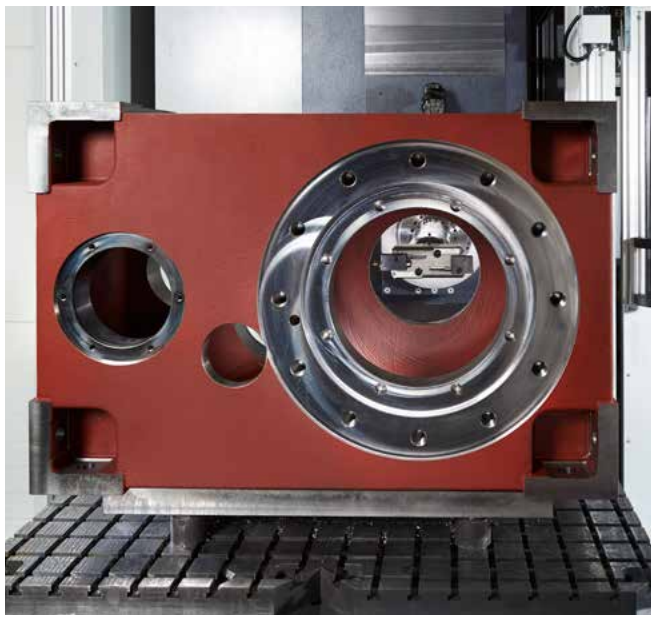
The highly precise horizontal boring mill KG closes the gap in the market between a classic boring mill and a jig boring machine in terms of precision and price-performance ratio. In special gear manufacturing, it has proven itself already as a reliable and economical solution for the machining of extremely demanding workpieces.

The innovation by UnionChemnitz combines the advantages of a classic boring mill with those of a precision machine. “The positioning accuracy and geometric precision of the KG are significantly higher than those of a classic boring mill. On top of that, compared to a jig boring machine, it provides much more flexibility thanks to the boring spindle and greater traverse. We are the first manufacturer to tap into a new market segment here,” says President and COO Dr. Benedikt Sitte.

The machine concept of the KG is based on the tried-and-tested planer-type horizontal boring mill by UnionChemnitz. Its accuracy has been multiplied in comparison to a standard boring mill by comprehensive optimization measures and a specially designed thermal management.

Highlights of the machine include an optimized ribbing for increased stiffness of the machine bed and column, linear guides of the highest precision level and hand-scraped guidance rails. Enhanced table stability and the precision-ground table surface allow for the machining of the most demanding workpieces. In addition, the machine features cutting-edge measuring systems in all machine axes.

The precision boring mill KG achieves machining results that are almost identical with those of a jig boring machine – while providing significantly higher degrees of freedom, greater traverse and lower investment costs.



Machining of a gearbox housing with the highest precision

Boring, milling, turning and grinding: Multi-functional machines and comprehensive equipment

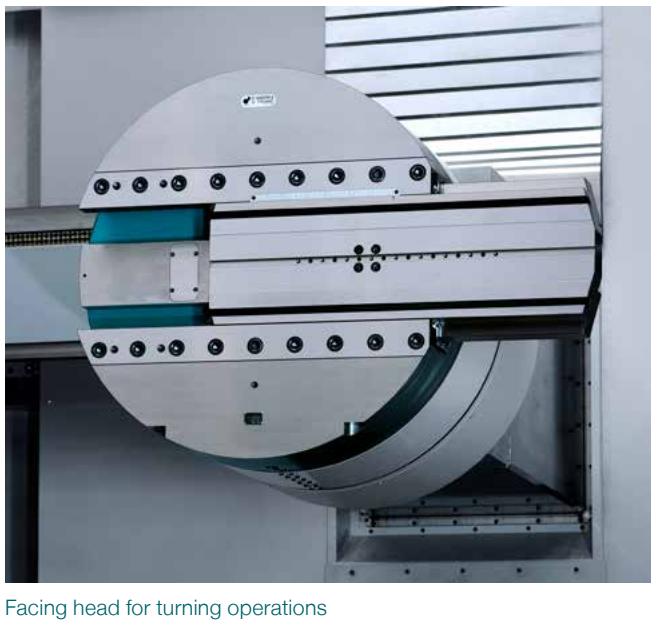
Successful process integration: in order to allow for vertical turning of workpieces with a weight of up to 50 t on top of boring and milling, UnionChemnitz installed an additional high-speed rotary table at its boring mill.

Turning operations are often necessary when machining bulky workpieces or during a complete machining process. In addition to a rotary and traversing table, UnionChemnitz equipped a boring mill for an Austrian customer with an additional high-speed rotary table along the X-axis to permit vertical turning. The turning unit is automatically inserted via an integrated pick-up station. The horizontal boring mill with a spindle diameter of 150 mm now covers the entire spectrum of boring, milling and turning, saving time and money in the production.

Another tried-and-tested solution to integrate turning operations in UnionChemnitz boring mills is the use of a facing head. It is either permanently installed in the boring mill or available as additional equipment.

Grinding operations can be performed with the help of a grinding unit. One example for its application is the machining of landing legs for aircraft. Standard boring mills can be modified to cover grinding of tungsten carbide-coated bores for screw spindle pumps, as well. The customer advantage: using the flexible enhancement options for UnionChemnitz boring and milling machines is an economical alternative to investing in a costly special-purpose machine.

In addition, UnionChemnitz offers a comprehensive range of equipment in order to adapt machines to special customer requirements. Rotary, traversing and tilting tables and high-speed rotary tables for vertical turning are manufactured in-house according to the highest quality standards. A large number of milling heads for different applications are produced within the company group, as well. Pick-up stations allow for the milling heads to be changed automatically. Additional automation options, such as a tool changer, state-of-the-art measuring and inspection devices and a broad range of special and additional devices are available, too. With its comprehensive portfolio, UnionChemnitz offers the right solution for any application.



Facing head for turning operations

Traditional employee picture

The entire UnionChemnitz staff gathers for a photo shooting

Tradition is an integral part of the corporate culture of UnionChemnitz, the oldest existing machine tool manufacturer in Europe: all employees meet up regularly to have the employee picture taken

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UNION Werkzeugmaschinen GmbH
Chemnitz
Clemens-Winkler-Str. 5
09116 Chemnitz
Germany
T: +49 (0) 371 8741 0
F: +49 (0) 371 8741 407
unionchemnitz.com

Responsible:
HerkulesGroup Corporate
Communications