



DIGEST

Corum Group

SUMMER-2020

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Armored Face Conveyor
SPC230-41

ZMECHANIZOWANA DŁUGOWA ŁĄCZOWNIA
TYPU D20-15-23 P20

RYNNA PRZENOŚNIKA ZGRZEBŁOWEGO
SPC230-41



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DEAR CLIENTS!

Our company is presented in the machinery market for over 130 years. Over the years, the company itself and its employees have faced financial crises, military conflicts, and various social upheavals. Corum Group found opportunities for the stable production, development of new products for your most demanding needs, even in the most difficult times. The ability to successfully overcome challenges has become part of our brand's DNA.

Such qualities as flexibility in relation to the client, ability to offer turn-key solutions thanks to a wide product range of equipment, high quality demands for the products, innovativeness and the desire to create safe working conditions help us to be in a potential state and keep market leadership. Let me give a few examples of how this works in our company.

FLEXIBILITY. Under quarantine conditions, we conducted an on-line acceptance tests of the innovative transformer substations KTPV-DV-630 for Belaruskali company, one of the largest potash fertilizer producers in the world. The client got a unique opportunity to look inside the electrical equipment through the gadget display and immediately ask our experts and get an answer. After successful acceptance, the equipment was delivered to the customer at the Petrikovsky mining and processing complex in the Republic of Belarus.

TURN-KEY SOLUTIONS. Reactivation of the ventilation shaft at the Komsomolskaya mine in Vorkuta will be the first stage of a turn-key solution for our regular customer – Vorkutaugol. After the completion of mine construction work by our Corum Minespecialbuild division, namely, pumping water from a flooded mine, additional sinking and shaft reinforcement, our company equips it with a powerful Corum Group hoisting machine Ts-3,5x2,4. Due to such a comprehensive solution for the shaft restoration and equipping, the client will have, in fact, a turnkey facility ready for operation.

QUALITY. Based on proven benchmarking, we are among the best manufacturing enterprises in terms of key factors of assessing the quality level – the reliability of our equipment during operation and the stability of the production process. For our client this means the efficiency and reliability of our products during operation.

We achieved this quality level for our products as a result to the coordinated work of the quality management service and production subdivisions, regular training of our employees and updating the process equipment of our plants, that is, a change in the thinking culture of our employees. For example, this spring we commissioned the Czech TOS VARNSDORF machine for high-precision machining of large dimension parts. We certified our welding manufacturing process for compliance with the requirements of the international standard ISO 3834-2: 2008, as well, for that we purchased a batch of modern welding machines from the best world manufacturers and significantly improved the qualifications of our welders. To speed up the results generation of quality control, we invested in equipping our laboratory: we purchased Spectromax LMF07 spectrum

analyser, Germany, for the composition of the metal alloy determination in 10-15 minutes instead of two days. All this will allow further improve of the products quality. For our customers this is a guarantee that they buy and operate reliable equipment. And they will have such an opportunity in the future. And the most important: we are ready to be liable to the client for maintaining the mechanical availability rate factor of our equipment.

INNOVATION. We are optimistic about the future. We began training our design engineers in new approaches and techniques in designing equipment for additive technologies (3D printing). In future, this will allow each client to get maximum effect from using the created solutions. In addition, the use of 3D printing will reduce the time for the production of spare parts from several weeks to several hours. This means that your business will be able to work without downtime and meet goals on time or even ahead of schedule. We closely monitor the dynamic innovation process in mining industry towards the digitalization and robotization. Coal companies are rather willing to use innovation to develop and optimize their business. For example, the Yubileinaya mine (DTEK Energo company) conducted Wi-Fi network to a depth of 500 meters and installed 400 access points. For us, this is an incentive to create machines that can be controlled remotely using wireless connection capabilities, what we are currently under. Anticipating these changes, our company has already begun to use such components in the most advanced models of CLS450 shearer and roadheader RH160 with anchoring system. These machines can be controlled remotely, which makes the work of miners even safer.

SUMMARY. We live in times of tremendous changes. Some engineering companies will not pass such tests. Corum Group is immune to crises. We continue to work stably, to build new facilities, to produce equipment so that tomorrow your mines and ore mines will be able to work efficiently and safely. We are always ready to support you. Our sympathies with you!

Mikhail Potapov
CEO Corum Group

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INDIVIDUAL APPROACH TO CUSTOMER THE WAY IT IS IMPLEMENTED IN CORUM

Corum Group applied the largest number of claims for inventions among industrial enterprises of Ukraine. These data are provided in the 2018 report by Ukrpatent – the official state authority in the field of patent registration.

Then our company registered 6 claims for inventions in Ukraine only. Summarizing together with utility models claims that Corum Group applied for in Russia, Belarus and Kazakhstan at same year, will amount to 45. This was the maximum number of claims applied by our company per one year.

Today the company does not slow down and continues to patent inventions actively. Since the beginning of 2020, Corum Group has already obtained 5 patents for inventions in Ukraine and another 9 patents for utility models in Ukraine, Russia and Kazakhstan. Since the beginning of

the year, 16 new claims have been applied for with the patent offices of Ukraine, Russia and Kazakhstan for obtaining patents for inventions and utility models as well. And we are far from the end of the year!

Corum Group inventions are born in close cooperation with customers. Our company does not do stamping. It replaces serial production with individual production, which takes into account all the wishes of customers. Therefore, our equipment fits perfectly into any mining and geological conditions. Especially roof support. In this case, we offer only individual tailoring.



Video about all the production stages of roof supports watch after scan QR code.



The list of serial models of equipment in Corum Group is very short: mine cars, substations and electric locomotives. All longwall, tunnelling and hoisting equipment is produced according to specific technical requirements.

Competently



Igor WASSERMAN

Corum Group Roof Supports Sales and Development Manager

The optimal approach to the development of requirements for powered roof supports is the joint work of customer engineers, having necessary knowledge of the conditions of the mine and experience in operating the equipment, with Corum designers, who have decades of experience in developing and analysing the operation of roof supports, as well as options for new effective technical solutions. This interaction allows develop or clarify the terms of reference for powered roof supports at an early stage of work, taking into account all the needs and specifics of the customer's conditions.



As a result of the joint work of the Corum team of specialists and the mine department, we determined the main parameters and technical solutions for the DT 08/18 roof support structure: double rack section with an operating resistance of at least 600 kN/m², with hard lapping, a separate double-hulled base, a reinforced base lifting mechanism (Corum patent), specific solutions for fixing hydraulic racks, with a pilot multi-sleeve control system, etc. It took about 9 months to complete the analysis, development and approval of basic solutions for the roof support construction.

In September 2017, following a tender results in which European manufacturers participated, the Corum proposal was declared as a winner. In October, we signed a contract for the supply of 200 sections of DT 08/18 roof support to Pokrovskoye Mine Administration. The joint work continued: after Corum specialists developed the design documentation, the final solutions were agreed by the engineers of Mine Administration. Customer representatives visited the Corum Druzhkovsky Machine-Building Plant, taking part in the roof support production supervision.

After the production of the pilot sections, roof supports were successfully tested at the STD-2000 stand according to the program corresponding to the European standard EN-1804. The engineers of the Mine Administration took part in the tests, as a result of which the sections were accepted by the customer.

Corum Druzhkovsky Machine-Building Plant manufactured 200 sections of DT 08/18 roof support in accordance with technical requirements. Supply to the Pokrovskoye Mine Administration was completed in June 2018. Three months later, a 300-meter-long longwall equipped with this roof support was put into operation (with the support of Corum service engineers).

Currently, longwall development has been successfully completed: with an average mined thickness of the seam of 1.40 ... 1.45 m, the average mining capacity was 4200 tons/day (maximum - up to 5200 tons/day). This is fully consistent with the target values. The roof support is preparing for underground remounting to a new longwall.

The main advantage of such cooperation between Corum and the customer at all stages of the project: from the development of the technical requirements and technical documentation, production and testing to service maintenance in the mine, is the most complete compliance of the equipment to the requirements and operating conditions of the customer. This becomes the key to the success of our clients and therefore our common success.

One of the examples of the effectiveness of the interaction between Corum Group engineers and client experts was the development process of the DT 08/18 roof support for the Pokrovskoye Mine Administration (Ukraine) in 2017. Mine Administration required longwall equipment for thin seams with a thickness of 1.3-1.7 m.

Among the parameters that determine the complex geological conditions of the seam the following should be noted: the presence of discontinuous tectonic disturbances with an amplitude of up to 0.75 m; wavy hypsometry; erosion of the seam by siltstone and sandstone ($f = 6-7$) to a thickness of 0.85 m; moderate severity of main roof; medium stability of direct roof; hazard of coal dust explosions; high corrosiveness of the environment, water inflow – up to 16 m³/h.

SADKINSKOYE MINE ADMINISTRATION INCREASES THE PRODUCTION WITH THE HELP OF CORUM EQUIPMENT



Competently



Aleksandr KOVALCHUK
Director of Corum Svet Shakhtera Plant

The development of a longwall complex was based on the unique design solutions of our R&D engineers. For example, engineers increased the power supply of the KDK500 shearer: they applied a diagnostic system and control of the main components. This allows to control the operation of the main components of the shearer and online display of information on the shearer screen and on the dispatcher's display at the surface. The so-called "black box" is installed in the shearer as well, which records all indicators of sensors and operating modes. This allows viewing and analysing the operation of the shearer over the past few months. The conveyor was equipped with a long life pan with casted sidewall and drives with a total installed capacity of almost 1 mW. This helps to control the temperature of the oil and coolant in critical components. Information is displayed on the screen.

Optimal connection of the complex (roof support-conveyor-shearer) allows the LC to work efficiently in a seam with a thickness of 1.4 to 2 m, provides safe, reliable and high rate coal production in difficult mining and geological conditions of Sadkinskoye Mine Administration. Turn-key supply and service maintenance of the LC from the same supplier ensured the mine high production efficiency and high-quality equipment maintenance. The effect of complex cooperation with Corum was obtained through the development of longwall No. 45 and No. 47 of the Sadkinskoye mine administration. They plan to get the same result during commissioning and operation of the next longwall No. 49.



Yuri ZUEV
Director of Sadkinskoye Mine Administration

“The first complex, delivered in autumn of 2018, proved to be reliable and productive equipment. It worked effectively even under mining and geological disturbances. The service provided by Corum Group reduced downtime to a minimum. Of course, when it came to purchasing the second complex, we no longer doubted the selection of supplier. Corum are our reliable partners who manufacture unique equipment.”

Client Feedback

Corum manufactures a longwall complex (LC) for the Sadkinskoye Mine Administration. This is the second complex that machine builders produce to equip the face of this mine administration. The first was shipped to the customer at the end of 2018.

With the help of the first Corum LC the miners of Sadkinskoye Mine Administration reached a record pace of coal production – 278 thousand tons per month. Two months ahead of the schedule, the miners completed the 2019 annual plan of 2 million 81 thousand tons of coal. The mine reached such rates for the first time. To maintain high production rates, the miners ordered one more LC from the Corum Group machine builders.

The composition of the second complex is identical to the first: a KDK500 shearer, face conveyor SPTs230-21.3 and stage loader SPTs230-63.1 and 203 sections of the 3KD90T powered roof support.

The term for putting the longwall complex No. 2 into operation is January 2021. The complex will operate in the longwall No. 49 of the Sadkinskoye Mine Administration.

After-sales service of the LC operating at Sadkinskoye is carried out on an ongoing basis by a division of Corum Repair.



Video and more photo.

LC No.1 for Sadkinskoye Mine Administration – watch after scan QR code.



LONGWALL COMPLEX FOR SIBIRSKAYA MINE IS AN AMBITIOUS PROJECT

Competently



Andrey LITVINENKO
Business Development Manager,
Corum Rus Trading Company

235 sections of powered roof support DTM 14/35 will be manufactured by Corum Group for the Sibirskaya mine. The new equipment will operate in connection with German EICKHOFF shearer and the CAT face conveyor. This is the first Corum Group project in Kuzbass, where our company will act as the general supplier of the entire longwall complex (LC).

The miners will operate the equipment in the 1106th longwall of Sibirskaya mine. Its length is 400 m, and the planned production volumes are 1 million tons of coal per month. This will be the fourth longwall in the world with similar characteristics. For Corum Group, this order is a confirmation of our company's expertise in the development and production of powered roof supports for various difficult mining and geological conditions and the implementation of complex pro-

jects taking into account all the specific requirements of the client.

Corum Group approached this ambitious project in Kuzbass with an extensive portfolio of real cases. A number of LCs were produced by our engineering company for the mines of Russia and Ukraine. This equipment helped coal enterprises to set records for coal mining in a short time (see more information on page 6). Two powered roof support sets are successfully operated in mines in Poland (see more information on page 8).

The pilot section of the roof support for LC of the Sibirskaya mine was produced by Corum Group in May 2020. Tests began according to the requirements of Eurostandard EN 1804 at the STD-2000 stand: the roof support is to be subjected to a load that is 1.25 times higher than the maximum operating load, acting by compression and torsion. This simulates the complete life cycle of the roof support and gives a guarantee of reliable operation in underground conditions.

After three months of testing, production of the entire batch of the Corum Group powered roof support sections for the Sibirskaya mine will begin. The order will be shipped to the client in mid-2021.

LC for the Sibirskaya mine is a large-scale project, which the client entrusted our company with reason to implement. The knowledge and experience of the design engineers of our R&D department is invaluable in the development of powered roof support sections for individual client conditions and the geological features of the longwall. The metal purchased from the best suppliers in Europe, plus the quality of welding, confirmed by the European certificate ISO 3834-2, as well as an individual approach to the implementation of the order – the client receives all this under attractive financial conditions. We got a great opportunity to prove our expertise and strengthen the position of Corum Group in Kuzbass. And we will not miss this chance.





EUROPEAN DIRECTION OF CORUM THREE ROOF SUPPORT SETS FOR POLAND



Corum Group manufactured 127 sections of the ZRP 15/35 powered roof supports for the Wesola mine. This supply of equipment became the third for the Polish coal company Polska Grupa Gornicza (PGG). In total, since 2018, our company has produced and shipped over 400 sections to the Polish market.

Roof supports ZRP 15/35 are used for operation in seams with a thickness of 1.6 to 3.5 m. High working resistance – over 6000 kN – allows withstanding the load of heavy roofs of mines in Poland.

The innovative “filling”, which Corum Group engineers equipped the roof supports with, creates a safe working environment for miners. The function of on-line monitor-

ing of the working fluid pressure is implemented in hydraulic system. In case of a malfunction, the system alarms the maintenance personnel. Roof support elements are equipped with electronic tags that allow identification and history recording of operation process. This is a kind of electronic catalogue with information about the production date, manufacturer and place of operation.

“Our company produces sections of ZRP 15/35 powered roof supports made of Ukrainian metal, which is purchased by European manufacturers,” says Mikhail Lysenko, Corum Group Project Manager. – Components – produced by leading foreign manufacturers. This symbiosis allows achievement of optimal parameters for the cost of equipment ownership. Plus, our production uses welding machines and machine tools of European manufacturers. All this allows us to produce equipment that meets the EU requirements.”

Certificates received: ISO 9001 – on the conformity of quality management and ISO 3834-2: 2008 – of the welding production quality meeting with the requirements of the European Union – confirm that our company works according to international standards.

Stable operation of powered roof supports in the longwalls of Polish mines is the success of Corum Group in the Polish market.

Competently



Jaroslaw ZNALEZNIAK

Director of the Corum Poland trading company

Our company won half of the tenders held in Poland for the production and supply of powered roof supports. Due to the fact that, on our part, all orders were completed efficiently and on time, the Polish PGG mines can achieve their goals, and we will have the opportunity to implement the next similar project.

Client Feedback



Adam ROZMUS

Director of the Piast-Ziemowit Mine (PGG)

“ We got Corum powered roof supports half a year ago and already using them in longwall. The sections have good quality of execution, which we were able to verify when we visited the manufacturing plant in Ukraine. Our miners will work under the protection of this roof supports for many years without the need for overhauls. I am sure with that.

Competently



CORUM GROUP BEGAN SUPPLYING HYDRAULIC EQUIPMENT TO KUZBASS



Corum Group sees prospects in Kuzbass. In mid-2019, the company exported hydraulics to the Berezovskaya and Pervomaisky mines.

300 HYDRAULIC PROPS WERE ORDERED BY BEREZOVSKAYA MINE IN ONE YEAR

The expansion of Corum Group hydraulics in Kuzbass began with the order of the Berezovskaya mine: 20 hydraulic props and 40 rams. Almost immediately after receiving the first order, the second followed – dedicated to commission a new longwall at the Berezovskaya mine: 160 hydraulic props, 110 rams and 50 auxiliary jacks.

By the beginning of 2020, the Berezovskaya mine had already tested the quality of the Corum Group hydraulic equipment. Refusing the offers of Polish, Chinese and Russian manufacturers, Berezovskaya orders from Corum Group, a trusted supplier, a new

batch of hydraulic props – 140 pieces. A new order will be made by the summer of 2020.

For convenience of working with a client, Corum Group created a consignment warehouse in the very centre of Kuzbass. The warehouse was located on the basis of the Corum Group repair and service centre in Novokuznetsk (more information about the RSC – at page 30), the services of which the client has already tested. They restored the operability of 10 sections of powered roof support with a complete replacement of hydraulic equipment. It is convenient to have a warehouse and a service nearby.

CORUM GROUP HYDRAULIC PROPS REPLACE GERMAN EQUIPMENT

Corum Group installed hydraulics for the roof support section of DBT (Germany). This will allow the Pervomaisky miners to continue to work out their only longwall with plough complex. The reliability of the power hydraulics of Corum Group largely determines the efficiency of the entire mine.

Corum Group produced and shipped 120 hydraulic props in March 2020. The package includes service maintenance of equipment during the warranty and post-warranty period.

Corum Group – is the supplier of power hydraulics to coal enterprises of Ukraine, Russia and Poland.

Competently



Mikhail LYSENKO

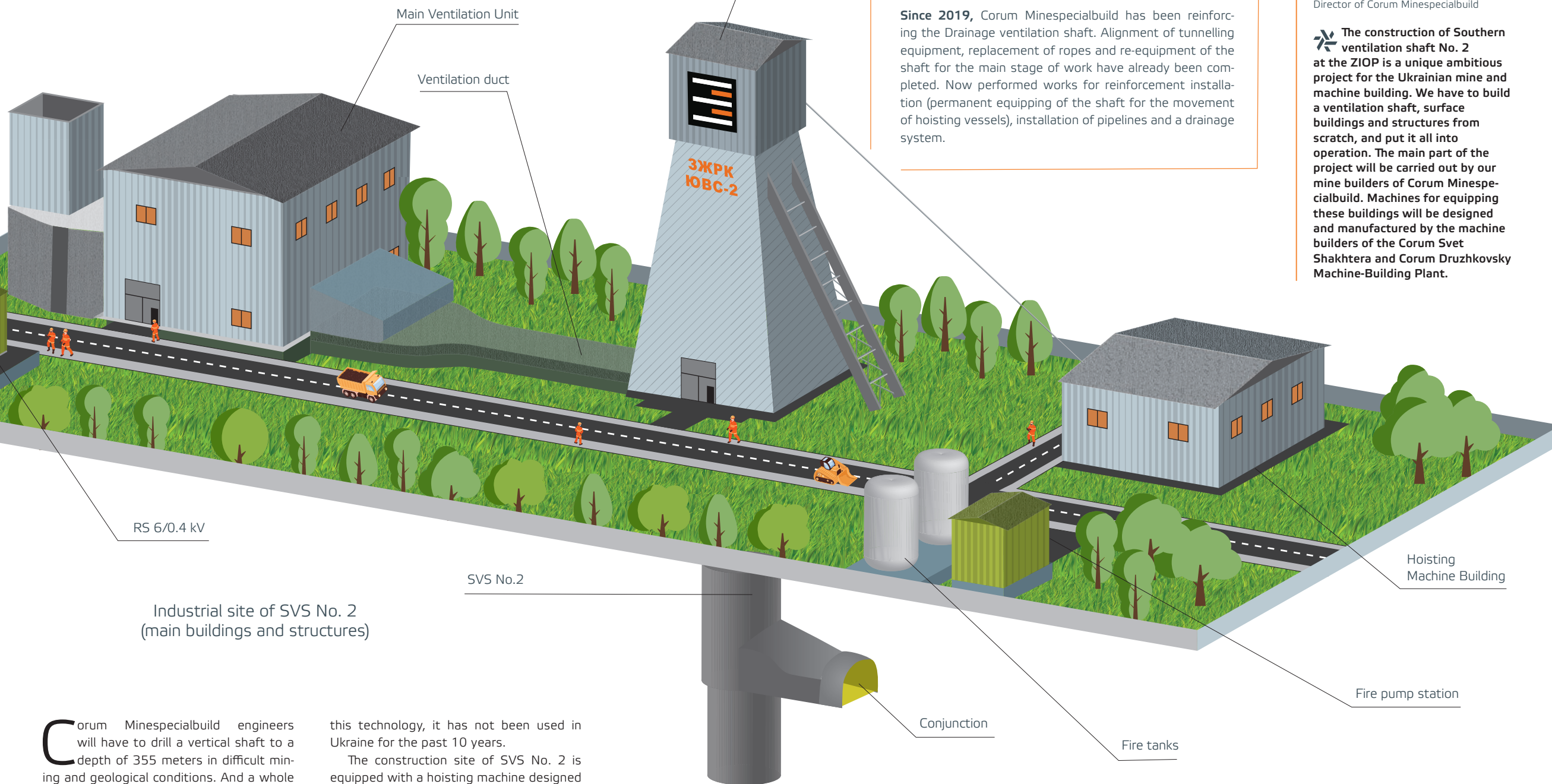
Corum Group Project Manager

A combination of factors provides high reliability and life time of Corum Group hydraulics: more than 50 years of experience in the production of power hydraulics, the qualifications of design engineers, the German precision of turning machining centres in our plant, corrosion protection with two-layer chrome plating and the use of seals from leading manufacturers. To confirm the quality of products in accordance with the requirements of Eurostandard EN 1804-2, we conduct tests of hydraulic cylinders at a specialized stand with a load of 1.25 times of the maximum operating force of the hydraulic cylinder.



CORUM MINESPECIALBUILD WILL CONSTRUCT A NEW MINE FOR ZAPORIZHZHYA IRON ORE PLANT

Green field. This is exactly how today looks like the site for the construction of the Southern ventilation shaft No. 2 (SVS No. 2) for the Zaporizhzhya Iron Ore Plant (ZIOF). After 3 and a half years, a new mine with a whole complex of surface structures will be built at this place, from scratch by the Corum Minespecialbuild workers.



**Volodymyr
KRASNOBAEV**

project manager of ZIOF Southern ventilation shaft No. 2 construction

Construction of the Southern ventilation shaft No. 2 – is a complex, multi-stage project. Corum Minespecialbuild successfully completed similar projects in Vietnam several years ago. Now we can apply this experience in Ukraine. Construction will be in difficult geological conditions. To implement this project at Zaporizhzhya iron ore plant will require us to mobilize huge resources: people, equipment, finance, and also a lot of energy and strength. We are ready to face this challenge!

Competently

Corum Minespecialbuild engineers will have to drill a vertical shaft to a depth of 355 meters in difficult mining and geological conditions. And a whole complex of structures of the SVS No. 2 will be built around it: a headframe with a mine building, a main fan unit with a building and ventilation duct, a hoisting machine with a building, fire tanks with a pump station.

Corum will use a special method of sinking for the construction of the shaft – “soil freezing”. This will help to cement unstable and flooded rock in order to begin underground works. Due to the complexity of

this technology, it has not been used in Ukraine for the past 10 years.

The construction site of SVS No. 2 is equipped with a hoisting machine designed by Corum engineers. Its design will correspond to modern trends: the power part will be implemented on the basis of a variable frequency drive, and the disk type brake system. The machine-builders of Corum Druzhkovsky Machine-Building Plant will produce hoisting equipment.

The hoisting machine for SVS No.2 will be of a dual purpose. During the sinking of the vertical shaft, it will be used to lift the

FROM THE HISTORY OF COOPERATION BETWEEN CORUM AND ZIOP

2014-2016. The turn-key project for the construction of the Northern ventilation shaft was completed by Corum for the ZIOP: design, construction and installation works using equipment manufactured by Corum Group.

Since 2019, Corum Minespecialbuild has been reinforcing the Drainage ventilation shaft. Alignment of tunnelling equipment, replacement of ropes and re-equipment of the shaft for the main stage of work have already been completed. Now performed works for reinforcement installation (permanent equipping of the shaft for the movement of hoisting vessels), installation of pipelines and a drainage system.

Competently



Oleksii ZHYTNIK

Director of Corum Minespecialbuild

The construction of Southern ventilation shaft No. 2 at the ZIOP is a unique ambitious project for the Ukrainian mine and machine building. We have to build a ventilation shaft, surface buildings and structures from scratch, and put it all into operation. The main part of the project will be carried out by our mine builders of Corum Minespecialbuild. Machines for equipping these buildings will be designed and manufactured by the machine builders of the Corum Svet Shakhtera and Corum Druzhkovsky Machine-Building Plant.

rock, lowering / lifting people and materials. Then it will be re-equipped for continuous operation at the mine. The customer will receive hoisting equipment adapted to the needs and conditions of the plant together with the machine.

At the moment, assessment work has been carried out, a draft of preparatory work has been developed. Our team is preparing for the project implementation phase. Preparatory work began in the spring of 2020. Construction, in fact, will begin this autumn.

SVS No. 2 will allow the ZIOP to mine reserves of the Pereverzevsky iron ore deposit (estimated reserves – more than 350 million tons). This will ensure the stable operation of the plant for several decades to come.



Client Feedback

**Roman SACHKO**

chief engineer of Pokrovskoye Mine Administration

“ We have been cooperating with Corum Minespecialbuild for more than two years. Their roadheading teams help to implement the plans of the Pokrovskoye Mine Administration. In the first four months of 2020 only, our colleagues prepared 1822 m and re-built 93 m of mine tunnels, and during the entire period of cooperation, more than 6.3 km of mine tunnels have been prepared. This is an excellent result, and we are pleased with its quality!



THE RATE OF TUNNELS PREPARATION INCREASED THREE TIMES AT THE POKROVSKOYE MINE ADMINISTRATION

More than 1.8 thousand* meters of mine tunnels were prepared by the mine builders of Corum Minespecialbuild for Pokrovskoye Mine Administration in four months. For comparison, this length is equal to the length of the Kyiv Paton Bridge, which connects the left and right banks of the Dnieper.

Before, one our team prepared 1.8 thousand meters in a year, and now three our teams achieved this result in four months” said Viktor Yaroshenko, head of the Corum Minespecialbuild department.

In 2018, when the project of tunnels construction at Pokrovskoye Mine Administration just started, one team of mine builders of Corum Minespecialbuild was involved. Now their number has increased to three

teams – more than 300 people. During roadheading at the Pokrovskoye Mine Administration, the work rate of our teams reaches up to 10 meters per day.

Over the two years of operation at the Pokrovskoye Mine Administration, the Corum Minespecialbuild workers have prepared more than 6 km of underground tunnels.

* Data relevant as of May 2020.

CORUM MINESPECIALBUILD EMPLOYEES PERFORMED COUNTER BREAKTHROUGH

In autumn, 2019, at a depth of more than 700 meters, the mine builders of Corum Minespecialbuild met with a team of roadheaders of the Pokrovskoye mine administration. For four months they were tunnelling towards each other, as the French and British had once built a tunnel under La Manche.

The Corum Minespecialbuild team mined 536 meters up to the breakthrough. The same length Mine administration roadheaded towards them. The tunnels of more than 1 km length (its official name is the main conveyor drift of the 708 m horizon) has become part of an underground conveyor chain for transporting rock mass from block No. 10 to the main shaft and further to the concentration plant. The main conveyor drift belongs to the permanent category with a service life of 20 years or more. Therefore, special requirements were imposed on its construction for the quality of reinforcements and compliance with a given direction. Corum Minespecialbuild engineers coped with this task perfectly.



TURN-KEY PROJECT FOR VORKUTAUGOL IS IMPLEMENTED BY CORUM

Corum Group turn-key project for the Vorkutaugol company started with the reactivation of the 900-meter ventilation shaft No. 4, which is located at the Komsomolskaya mine. The restoration of this facility will give a coal mine in the Subarctic a second life: it will ensure the issuance of an outgoing stream of air, the descent and ascent of miners, equipment and materials. Engineers of Corum Minespecialbuild will complete all works in Vorkuta by mid-2021.

**Dmitriy TORUBALKO**

Production Planning and Organization Manager, Corum Minespecialbuild

Restoration of shafts is half the price than building new ones. Today we can say without hesitation: Corum Minespecialbuild has enough experience, including international, in rebuilding existing and sinking new shafts up to 1000 m deep. Taking into account parameters of each client, we can offer an economic feasibility and optimal solutions for reactivation or sinking new shafts.



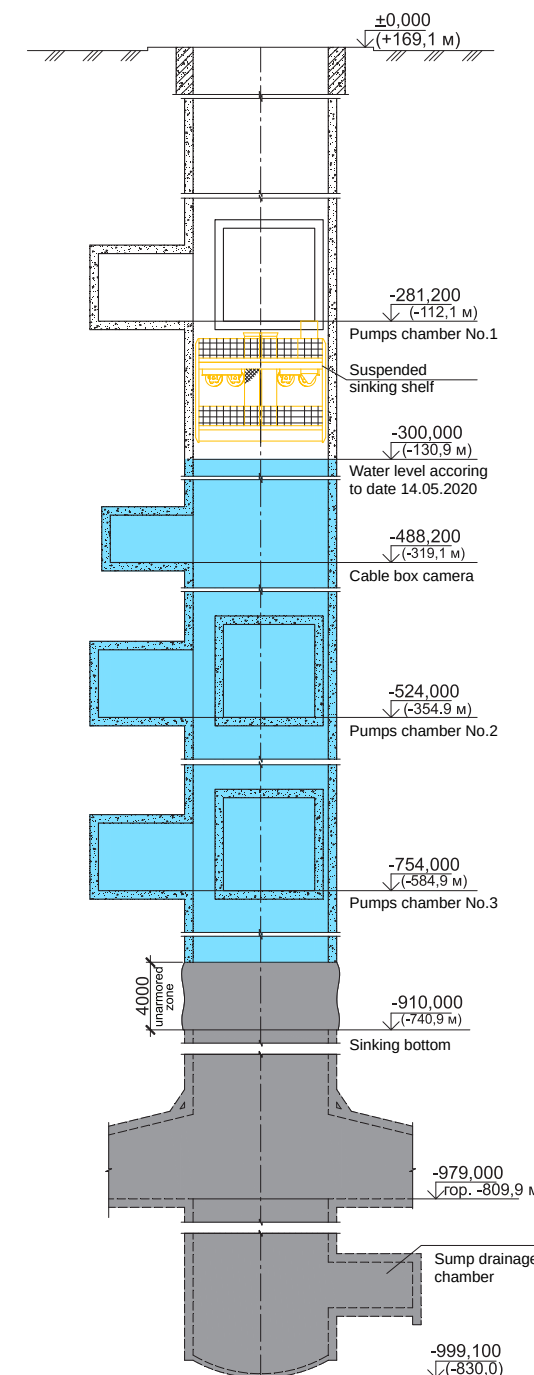
Equipment, water pumping and additional sinking – are three main stages of restoration of the ventilation shaft No. 4. miners of Corum Minespecialbuild have already mounted a suspended tunnelling stage. It serves as a platform for placing pumps and other equipment that is necessary for pumping water from a flooded shaft.

For pumping to a level of 999 m, miners use several series-installed pumps, or the so-called stepwise drainage. Water is pumped at the surface with the help of these pumps. Currently, the second stage of pumps is being mounted. There will be four similar stages in total.

Works on the mine shaft drainage will last until the end of July 2020. After the miners will pump out the rest of the water from the shaft, the next stage of work will begin – additional sinking. They have to deepen the mine shaft by 99.1 m – to the horizon 999.1 m.

In 2018, when Corum Minespecialbuild started to implement this project, the ventilation shaft was a concrete “glass” with a depth of 900 m, of which 885 m were filled with water. During this time, miners equipped the industrial site with a set of mining equipment “from scratch” and pumped out more than 45 thousand m³ of water. This volume would be enough to fill 18 Olympic pools.

Corum Group implements the project for Vorkutaugol in two stages: Corum Minespecialbuild workers will restore the operation of shaft, and the Corum Druzhkovsky Machine-Building Plant mechanical engineers will manufacture a powerful Ts-3,5x2,4 hoisting machine (for detailed information about the hoist machine please ref. to page 22). Miners will receive the facility ready for operation in 2022.



CHARACTERISTICS OF THE FACILITY AT THE KOMSOMOLSKAYA MINE

for sudden release of coal and gas	mine is classified as dangerous
diameter	8 m
depth	999.1 m
reinforcement	cable type
sinking method	blasthole drilling

CORUM GROUP – THIN SEAMS MINING EXPERT

The “layers” of the coal pie are getting thinner. This trend has been observed for several years in Ukraine and in the western regions of Russia. It is predicted that this cannot be avoided by other coal deposits on the planet. This means that sooner or later, the mines will be forced to look for solutions for “black gold” extraction from thin-thickness seams.

There is a small amount of engineering companies in the world that produce equipment for mining seams with a thickness of 1-1.5 meters. And Corum Group is among them. Today, 90% of the operating longwalls of DTEK Energo, the largest private energy company in Ukraine, have the longwall equipment of our company. This machinery helped the miners to extract 24.5 million tons of coal in 2019. Coal with the lowest possible ash content, and hence with minimal washing costs. This gives the client an obvious economic effect throughout the entire period of the company's existence.

**At least
4-7%**

lower is the ash content of coal mined using Corum Group shearer equipment than that obtained using machines from other well-known machine-building companies.

**0,95-
1,05 meters**

is the thickness of the seam, which mainly operates Corum Group longwall equipment in the mines of DTEK Energo. This is comparable to a height of child aged 1-3 years.

1,00
0,75
0,50
0,25

**2.5-3.5
thousand
tons**

daily rate of coal production using the Corum Group longwall equipment at DTEK Energo mines. Restrictions on production are caused by gas factor.

Competently



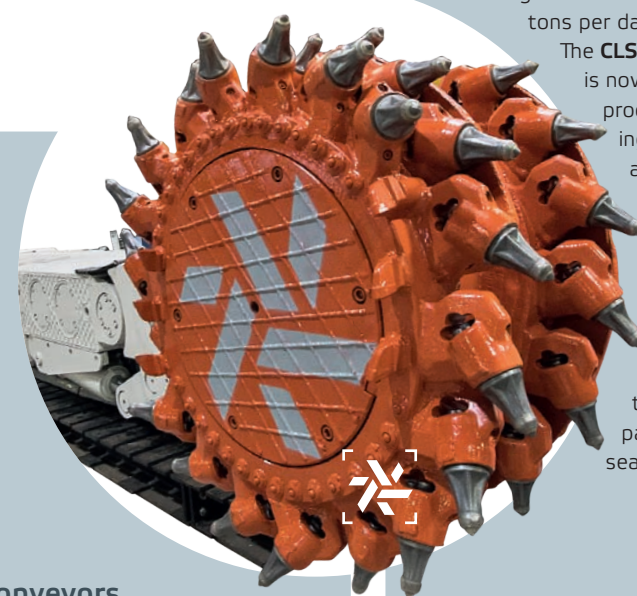
Oleg NESTERENKO

Director of Corum Trading company

Imagine that you have a one meter thickness seam. The supplier offers you a shearer with an output capacity of more than 1 m for its mining. What will happen? When cutting a meter thick seam with this machine, you extract not only coal, but also a waste rock. And the more rock you cut, the more you bear an extra cost of transporting and washing coal. These are additional costs for the coal company. This means that the cost of coal is higher and the product becomes not competitively capable in the market. Another thing is with a machine that is designed and manufactured to the characteristics of your mine. It allows producing coal with low ash content, avoiding additional costs for transportation, separating and utilizing the rock, mining productivity is increased, and the output is pure “black gold”.

INNOVATIVE EQUIPMENT OF CORUM GROUP FOR THIN SEAMS

90% of the DTEK Energo mining equipment fleet consists of Corum Group longwall equipment. Each machine was developed for the mining and geological longwall conditions and client needs. Our company has paid considerable attention to methods of digitalization and the possibilities of integration into digital mine systems. An individual approach is the basis of our long-term and mutually beneficial cooperation.



Shearers

DTEK Pavlogradugol miners use **KA200, UKD200-500** shearers for mining thin seams (0.71-1.2 m). Our mechanical engineers designed **KA200** shearer with drum-type cutting tools for the specific conditions of DTEK Pavlogradugol. These machines, working in seams of 0.95-1.05 m thickness, provide minimum ash content values and a high grade coal. At DTEK Dobropolyeugol, **CLS450** shearers have proven themselves well, they can also operate at a minimum seams thickness of 1.2 m. Due to the gas limits factor, production at DTEK mines is in the range of 2.5-3.5 thousand tons per day.

The **CLS550P** shearer is now preparing for production testing. It will be a machine with classical cutting tools and a frequency-controlled chainless feed drive, allowing to work out particularly thin seams.

Conveyors

Armored face conveyor **SP251** has no analogues in the world. It fits the longwall complex with the shearer and roof support. This allows mining out particularly thin seams.

Corum Group engineers are constantly upgrading this machine: they equip it with modern electrical equipment, a traction unit. We use wear-resistant materials for its production. This optimizes the cost of its maintenance.

The **SP251, SPTs271** conveyors operate as part of the longwall complexes along with shearers and roof supports at the DTEK Pavlogradugol and Dobropolyeugol mines.

Powered roof supports

Roof supports of Corum Group **KD80, KD90, KD90T, O9DT, DM** successfully operate as part of longwall complexes at the DTEK Pavlogradugol and Dobropolyeugol mines. These machines fully comply with modern requirements: they provide safety and convenience for staff, high reliability, effectively control the roof. Their life time is designed for 25 years or more.



Competently



Oleksandr DYATLOV

Production and Technical Development Director of Corum Group

Serious attention is now being paid to questions of digitalization and the possibilities of integration into digital systems of mines and ore mines. Our equipment has already implemented a visualization and monitoring system for the main assemblies. The system diagnoses the technical condition of the shearer, records information about the loads and malfunctions of the system for the last 6 months of operation. Visualization of technical data is displayed in a screen located at the surface of the mine. We improve our machines constantly in terms of performance, safety and potential.



Corum Group has experience in supplying equipment for thin seams to other enterprises in Ukraine and Russia. For example, armored face conveyors and powered roof supports used in the Donugol company. UKD400 shearer was supplied to the Zamchalovskaya mine.



The most effective longwall equipment of Corum Group was used by the 1/3 Novogradovskaya mine, Krasnolimanskaya mine, Yuzhnodonbasskaya No. 1 mine, mine named after Zasyadko. The main factor for the success of our equipment is the minimum mined range. This reduces ash content while maintaining safety and performance.



CONVEYOR SP326 WORKS ONE FOR SEVEN



The miners began to unload the rock 2.5 times faster at the Osinnikovskaya mine (EVRAZ). This result was achieved using the unique Corum Group conveyor – SP326.

Conveyor SP326-90.11.3 is the only variation of Corum scraper conveyors that dehydrates and transports flooded rock mass from the sump (lower part of the mine shaft). Corum equipment has proven its effectiveness since the first months of operation. This exclusive development of Corum Group designers is able to replace seven 30-meter conveyors of UKST type, which were actively used at coal enterprises of Russia at the end of the last century.

The total length of SP326 conveyor for the Osinnikovskaya mine is 231 m. Of these, 198 m are located at an angle of 21°. The suspension – coal mixed with mine water is passed by it through two specially designed and installed pans with a slotted screen and loses excess moisture. The remaining 33 m the rock moves parallel to the surface. This ensures its load into the mine cars with a volume of 2.6 m³. A conveyor can fill up to seven of these mine cars combined into one bundle.

Until recently, all this hard work was done by miners. They manually cleaned the sump – a deepening under the skip: loaded the suspension into mine cars and transported it to the surface. Due to the nature of the transportation chain, only one mine car was loaded per cycle. It was not rational to hire extra personnel for these needs, thus the labour of the main mining workers was used to it. Due to this, the process became even less effective.

In July 2019, SP326-90.11.3 was put into operation at the Osinnikovskaya mine. The use of this equipment increased efficiency by 2.5 times due to the mechanization of work and increased production safety.

Competently



Vitalii SENICHKIN

Corum Group Longwall Equipment Manager

More than 90% of the metal structures of SP326 were designed and manufactured by Corum Group engineers specifically for this conveyor loader. It meets all the technical requirements: low speed of transportation – up to 0.15 m per second, installation of two special pans with slotted screens in the lower inclined part of the conveyor. All this provides dehydration of the rock mass and its loading into mine cars. An individual approach has helped to effectively solve the client's problem and achieve a high rate.



FIRST MILLION TONS OF COAL MINED WITH CORUM EQUIPMENT IN KAZAKHSTAN



Competently



Sergey KURBATOV

Director of Corum Kazakhstan trading company

Corum and ArcelorMittal Temirtau are reliable partners for many years. The coal mine faces are equipped not only with our company's pans, but also with electrical equipment, power hydraulics, belt conveyors, mine transport, mine cars and roadheaders, hoisting equipment and main ventilation fans. The equipment is designed specific for ArcelorMittal Temirtau. Corum equipment helps our partner to conquer new production peaks. We are pleased to be a part of these achievements.



The first million tons of coal was hoisted to the surface by miners of the mine named after I.A. Kostenko ("ArcelorMittal Temirtau") in Karaganda. The pan SPTs230, produced by Corum machine builders, helped them to do that.

Corum engineers designed the SPTs230 pan with 270th cast sidewall specifically for the Kostenko mine, the largest coal-mining enterprise in the coal department of ArcelorMittal Temirtau.

This equipment has been operated at a mine in Kazakhstan since 2018. The length of the conveyor was 196.5 m (the longest conveyor with such sidewall Corum produced for Sadkinskoye Mine Administration, 2018), which made it possible to optimize the client's labour costs for moving coal out of the face. First, Corum equipment worked as part of longwall complex in longwall 43K3-v and then in second longwall – 41K2-v. The total reserves of two longwalls are more than 1.2 million tons of coal. After finishing second longwall mining in August, SPTs230 will continue its operation in the next face of the Kostenko mine.

Reliable Corum equipment increases efficiency of the enterprise and creates a safe working environment for miners

POKROVSKOE MINE ADMINISTRATION: CORUM EQUIPMENT WORKS EQUAL TO EUROPEAN MANUFACTURERS' EQUIPMENT

Pokrovskoye Mine Administration – the largest producer of coking coal in Ukraine – has set a course for import substitution. The first step – Czech conveyor SZK-228/800 (T-Machinery) was equipped with Corum Group pan.

The first order – 20 sections. Corum Group produced on the basis of the German special section H = 225 mm. The main and lower bottoms were made of high-strength and wear-resistant grade Hardox steel. Thanks to the grooves and protrusions in the bottom, together with the connecting elements, they provided a strong and reliable fastening of the pans. This made it possible to increase the load of at least 2000 kN per one connecting element. The customer was pleased with the operation of Corum Group equipment.

Since 2017, Pokrovskoye Mine Administration annually orders longwall sets from Corum Group. Three of them are already under operation in the mine, the fourth is currently under production at Corum Svet Shakhtera Plant

Pan sections of 260/852 and 228/800 types are reliable products with a long life time that work in the Pokrovskoye Mine Administration equipment fleet equal to European products.



CORUM GROUP IS READY FOR MASS PRODUCTION OF RH160 ROADHEADER

The new generation of roadheader with roof-bolter has already interested mining companies in Ukraine and abroad.

The miners of the Yubileinaya mine (DTEK Energo) tunnelled 870 linear meters with the RH160 roadheader. They installed more than 6 thousand metal anchors with help of roof-bolter. This is the result of a seven-month testing of RH160 roadheader with roof-bolter, produced by Corum Group.

The prototype of roof-bolter was tested in tunnel of an arched shape, a cross-section of roadheading is 19.5 m², a cross section after lining installation – 17.7 m². The support method is frame-anchor with a pitch of lining of 0.7 m. The anchoring was made by the installation of seven metal anchors 2.4 m long per 1 linear meter in the mine roof with a radial pattern.

Results achieved by the RH160 roadheader at this stage of work: maximum daily productivity during tunnelling – 6.3 m, maximum productivity per shift during tunnelling – 2.8 m, maximum daily productivity for installing anchors – 63 anchors, and the maximum productivity for installing anchors per shift – 28 anchors.



Video of RH160 roadheader with roof-bolter presentation watch after scan QR code.

RH160 roadheader roof-bolter has an undeniable advantage over the MQT manual pneumatic drilling rig. The use of the RH160 roof bolter when performing anchor fastening operations shortens the entire cycle of tunnelling 0.7 linear meters for 18 minutes. A simple calculation shows that the time save is 54 minutes per shift, and 162 minutes per day (2.7 hours). This time is enough to complete another full cycle.

In monthly terms, the indicator looks even more impressive – 21 linear meters or 15% of the monthly plan.

In addition to production efficiency, the following factors cannot be ignored. First of all, the safety of anchoring due to the fact that the worker stays in the lined space.

And secondly, the mechanisation of the anchoring process, in which the heavy labour of personnel is completely eliminated due to remote control of roof-bolter.

After completing the tests, the RH160 roadheader continues to fulfil production plans at the Yubileinaya mine, and we, in turn, improve the equipment and roof-bolter in order to expand the scope of application. We have big plans for RH160 to conquer the local and global market, because this is really a unique design that can lay the foundation for a new generation of medium-heavy class roadheaders.

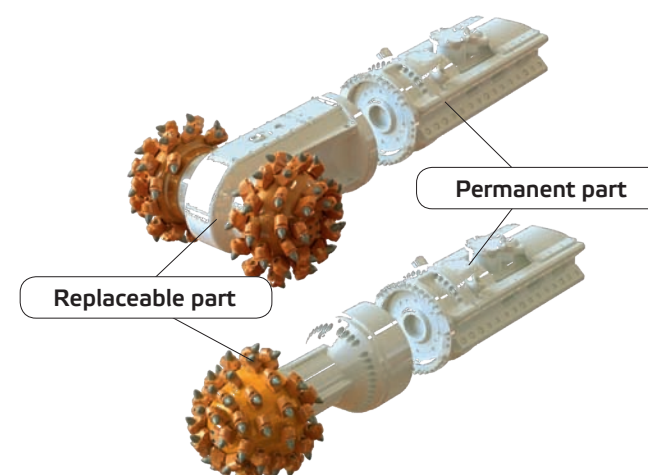
HISTORICAL BACKGROUND

A medium class roadheader RH160 with roof-bolter has become a real challenge for Corum Group designers. Especially demand that a minimum production cross section of 13 m² is required for the operation without roof-bolter. And the DTEK Energo miners needed roadheader, which was also equipped with roof-bolter. And all this should fit into cross-section of 15 m².

The second task that had to be solved was to ensure that the drilling unit did not limit roadheader main function – destruction of the rock mass. After finishing face cutting, roof-bolter had to be moved

KEY FEATURES OF RH160 ROADHEADER

Cutting tool drive power	160 kW
Strength of mined rocks	up to 110 MPa
Cross section of tunnels	from 13 to 35 m ²
Tunnel inclination angle	±18°
Soil pressure	0.14 MPa
Diameter of cutting crowns	1050 mm
Operating pressure in roadheader hydraulic system	250 MPa
Drive of feeder loading stars	gearless hydraulic
Crawlers drive gear motor	planetary hydraulic
Roadheader control	remote
Roadheader weight	
without roof-bolter	62 t
with roof-bolter	67 t
Drill rod diameter	(S22) 22 mm
Technical drilling speed	48 m per hour
Feed force	no less than 10 kN
Maximum torque	305 kN
Drill bit type	hydraulic, rotational



RH160 can be equipped with gearbox of both transverse and longitudinally axial type of cutting crowns.

into the working face for drilling holes and installing anchors, and then return to its original position for the next cycle. To ensure the ability of the roadheader to operate in such small dimensions, the engineers designed it with minimal gaps and a dense packaging.

After all the customer's wishes have been considered and implemented, the machine builders have actually produced a new product. The new roadheader was

handed over to the customer in 2019 for industrial tests at the Yubileinaya mine, which is part of the Pershotravenskoye Mine Administration (DTEK Pavlogradugol).

The receipt of a gold medal in the nomination "Design and implementation of new process equipment for coal industry" at the international exhibition "Ugol Rossii and Mining – 2019" was the recognition of RH160 in mining market.



Competently



Alexandr UDOVICHENKO

Corum Group Tunnelling Equipment Manager

Engineers of our company designed roof-bolter from scratch. It has no analogues in Ukraine mining equipment market. Corum engineers are constantly on the lookout for effective solutions to give miners new opportunities to increase the pace of tunnelling and mining. This is important in order to guarantee the profitability of our customers' business, the safety and malfunction-free operation of miners.

Client Feedback



Oleg BELOUSOV

Chief Engineer of Pershotravenskoye Mine Administration

This roadheader was specially made for us by colleagues from Corum Group. The main advantage of RH160 is a unique anchor installation unit, which increases the safety of the operator and at the same time is easy to control. Corum customer service monitors the condition of the equipment on a daily basis, quickly corrects problems that arise, listens to the opinion of miners on how to improve roadheader.





BPR RECORD 270 LINEAR METERS PER MONTH DURING TUNNELS PREPARATION AT THE SHERLOVSKAYA-NAKLONNAYA

The record-breaking pace of the preliminary tunnelling by drilling and blasting in July 2019 was achieved by miners with help of BPR – Corum Group drilling and loading machine.

SPECIFICATIONS OF CORUM GROUP DRILLING AND LOADING MACHINE

BPR weight	18 t
Cross section of tunnels	from 8 m ²
Tunnel inclination angle	from +12° up to -18°
Drilling area	height 4.5 m width 5.5 m
Strength of drilled rocks	
rotary drill bit	G _{compr} ≤112 MPa
shock-rotary drill bit	G _{compr} ≤224 MPa

By this time, BPR operating time was 2,000 linear meters without overhaul. This confirms the increase in the machine life time, declared by the manufacturer, by 25%. Corum engineers are constantly working to improve equipment to increase reliability and lifetime, ease of operation and maintenance.

During production of BPR, Corum Group engineers introduced a number of design solutions, the advantages of which were already confirmed by miners. For separate control of operations for drilling holes and clear the destroyed rock mass, the machine was equipped with two independent oil stations. This reduces energy consumption and increases pump life.

Today BPR machine has a very high technical level in terms of design solutions, materials used and modern components. A gear reducer with a 30 kW drive and mechanical synchronization of the loading legs allows developing high force on them. Which improves loading performance. Reinforcing the scraper conveyor with strips of wear-resistant steel 2-3 times prolongs its service life. To increase safety during clearing the rock mass, a stationary working place for the driver is arranged in the machine.

Equipment fleet of Sherlovskaya-Naklonnaya mine (Donugol company) includes five Corum Group drilling and loading machines. In total, our company produced 25 BPR drilling and loading machines. In 2020, two new BPR machines will begin to operate at Obukhovskoye Mine Administration (DTEK Energo).

Client Feedback



Donugol Company

“The use of drilling and loading machines is appropriate taking into account the mining and geological characteristics of the Sherlovskaya-Naklonnaya mine. Operating conditions – tunnel cross-section of 14.6 m², cut rocks (60-65% of the face area) with a strength of f = 5-7 according to the prof. Protodyakonov scale, in some areas, the sandstone strength reached f = 10. All Corum BPR machines allow to achieve planned performance indicators and ensure the safety of work in the face.”



Competently



Andrey GENSIROVSKIY

Corum Group Tunnelling Equipment
Main Specialist

✦ BPR machine is a self-moving caterpillar truck with a drilling unit, a loading table with a pair of loading legs and a scraper conveyor. This equipment is intended for loading rock mass destroyed by a blasting method into a belt conveyor, into mine cars or other mine transport when preparing horizontal and inclined tunnels in mines hazardous by gas and dust. As a rule, BPR are used on particularly strong rocks requiring destruction by the drill-and-blast method, in those conditions where the use of roadheaders is ineffective. Loading speed of 3 m³/min and drilling speed of 48 m/h allow miners to achieve high production rates.



THE PREPARATION OF A LONGWALL WITH THE FRONTAL COMPLEX KNF IS 30% FASTER



Frontal cutting complex KNF is a unique design of Corum engineers for thin seams, which reduces the time of longwall preparation by 30%. There are only three such complexes in Ukraine, and they are used at DTEK Energo mines.

Complex KNF is the first of its kind tunnel complex in CIS. It is designed to prepare tunnels of a rectangular cross section in low-thickness seams – up to 2 m. The process of cutting in complicated geological conditions is fully automated. High productivity – up to 1.5 tons

per minute – allows to increase the speed of mine tunnels preparation up to 10 m per day. This speeds up the launch of longwall face for coal mining from thin seams by 30%. On average, miners save on the preparation of one longwall about entire month with this equipment.

KNF complex includes cutting shearer, roof support, corner conveyor and stage loader that enable miners to prepare the mounting room and put new longwall into operation as quickly and safe as possible.

The use of KNF allows us to solve two main problems – the construction of mounting rooms for installation of longwall complexes and mining of low-tech reserves of coal seams or barriers for various purposes. In both cases, KNF has a number of competitive advantages over existing technologies.

Corum Group began developing KNF in 2013 according to the order of DTEK Energo. In total, three KNF complexes were shipped to DTEK Pavlogradugol mines. Now there are two more KNF in production for DTEK Pavlogradugol and DTEK Dobropolyeugol. They will be manufactured and delivered to miners by the end of the summer 2020.



Competently



Oleg BONDARENKO

Senior Key Account Manager,
Corum Trading

✦ KNF complex prepares installation rooms for longwall complexes, and solves the problems of mining low-tech coal reserves as well. The use of roadheaders for these purposes creates a number of difficulties and leads to additional time and material resources consumption. Due to its mobility, KNF complex is the optimal solution for these tasks.

Corum Group is already designing KNF complex with increased cutting drives power, increased productivity and lifetime indicators. This will expand the scope of the complex application in terms of the strength of mined rock up to 100 MPa.

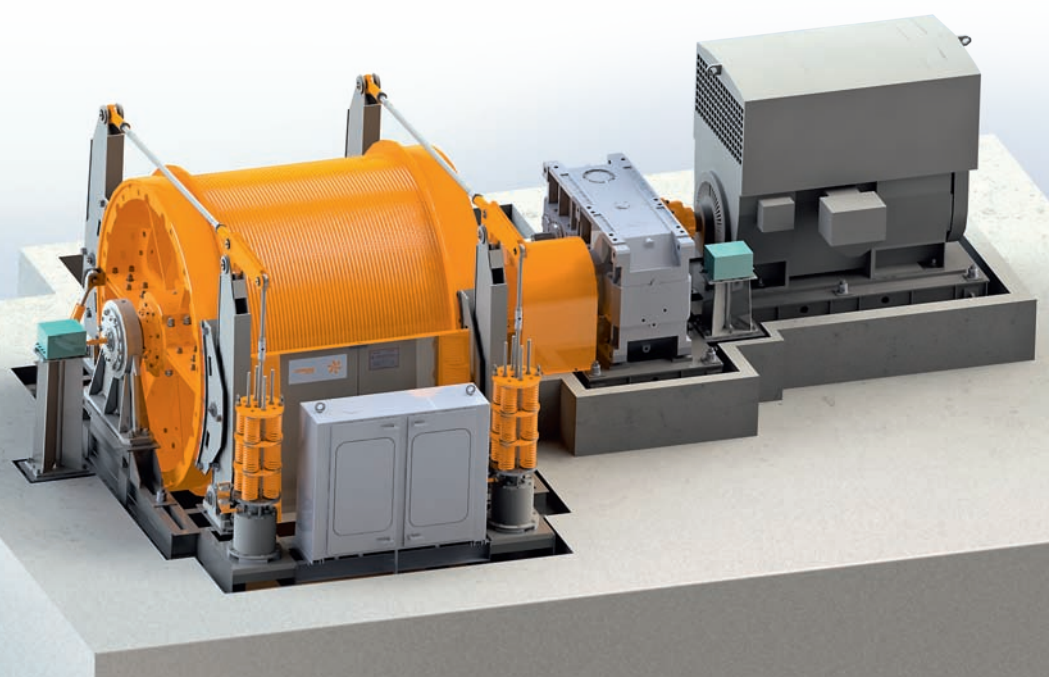
Client Feedback



Ruslan KHAVRENKOV

Director of Pershotravenskoye Mine
Administration (DTEK Pavlogradugol)

“We became the owners of the first KNF in Ukraine. Since 2014, with its help, the miners have passed 3440 linear meters and destroyed 32 thousand m³ of rock mass. KNF impeccably proved itself in preparation of mounting rooms – cut more than 15 tunnels with a width of 6.2 m, a height of 1.5 m and a length from 175 to 285 m. This gave us the opportunity to commission longwall in the planned time, with minimal installation and costs of preparatory work. With the support of Ukrainian machine builders, we are increasing coal production, strengthening the energy independence of our country.”



Competently

**Evgeny PETROV**

Corum Group Infrastructure Equipment Manager

 Ts-3x2.2AR is a project that combines all the best: the advanced engineering design of our company, the best equipment of the Ukrainian manufacturer and foreign components from Japan, Italy, Belgium and Germany. All this together allows us to produce reliable equipment that will meet the high requirements of the customer.

SAFETY DURING HOISTING MACHINE-BUILDERS DESIGNED TS3X2.2AR FOR POKROVSKOYE MINE ADMINISTRATION

In order to equip the ventilation shaft VS No.3, the Pokrovskoye mine administration ordered the project design and production of the Ts-3x2.2AR hoisting machine from Corum Group.

The emergency exit – ventilation shaft No.3 – has to be equipped with a reliable hoisting machine, because the safety of miners comes first.

Corum Group will deliver the Ts-3x2.2AR to the customer in July 2020, and this au-

turn hoisting machine will be installed and put into operation. The assembly of the machine, installation, commissioning of all systems, instructing miners on maintenance and training will be carried out by Corum Group specialists.

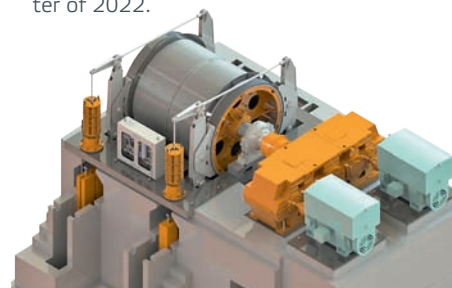
CORUM PERFORMS TURN-KEY PROJECT FOR VORKUTAUGOL

Corum Group will equip the ventilation shaft No.4 of the Komsomolskaya mine with a Ts-3.5x2.4 hoisting machine. This will become part of the implementation of turn-key project for the largest mining enterprise of the Russian Federation – Vorkutaugol.

Hoisting equipment will be installed at Komsomolskaya mine after Corum Mine-specialbuild will complete restoration and construction of ventilation shaft No.4. With new hoisting machine miners will be able to descend into longwall to a depth of almost 1 km and return back to the surface.

Ts-3.5x2.4 – is one of the most dimensional drum-type machines produced by Corum Group. The weight of its mechani-

cal part is 100 tons. The supply of this equipment is planned for the first quarter of 2022.



14 tones! It is a weight that Ts-3x2.2AR can lift from a depth of almost 1 km. To do this, hoisting machine was equipped with a gear drive and an electric motor of 800 kW and a drum with 3 m diameter. Also, Corum Group mechanical engineers will install a radial brake system, a pneumatic panel and an air supply system for the equipment. The manufacturer will supply the Ts-3x2.2AR with a modern control system, radio communications, shaft alarm, equipment for power supply and controlling the electric motor. These are very important components in a hoisting machine in view of the crucial function that a technic has to perform – to raise miners to the surface in case of an accident or malfunction of the main hoisting machine.



DEMAND FOR DIVERSE SKIPS



The geometric capacity of the skip body, m³

11 skips were launched into production at Corum Druzhkovsky Machine-Building Plant in 2019. This is an ultimate record for Corum Group plant.

Orders are very diverse, designed for the individual needs of each client: skips with a tilting body, with a sector and valve shutter, with a tipping body. From the smallest ore skips SO-2.5 to a real coal giant SNMP35.

The smallest ore skip produced by Corum Druzhkovsky Machine-Building Plant is SO-2.5. It was made for the KMaruda Plant. Dimensions of SO-2.5 in height – three human height. It moves 5 tons of ore at a time. For the first time, Corum engineers equipped the SO-2.5 with individual

spring-loaded roller guides. A similar solution was applied on another skip – coal SN20 for Vorgashorskaya mine.

Giant of the hoisting equipment – SNMP35. This skip is 4 meters above a typical five-floor building. SNMP35 lifts 34 tons of coal to the surface at a time. This is almost three and a half times more than the average skip performance. New equipment will replace previous one, which has worn out and will be utilised. The last time such a skip was produced at Druzhkovsky plant for the Pokrovskoye mine administration was 10 years ago.

For most skips, suspension devices were made as well. It is always more convenient for the customer to work with one manufacturer. This ensures geometric and structural linking of products.

Already in 2020, with the help of new skips of the Corum Group, minerals will be hoisted to the surface at seven coal and iron ore enterprises in Ukraine and Russia.

Competently

**Tatiana KALUGINA**

Director of "Corum Druzhkovsky Machine Building Plant"

 For the first time, seven of the eleven skips contracted in 2019 were manufactured by our factory. It was a challenge for our production facilities, engineering and team, but we successfully managed. Such experience allowed the company to expand its product portfolio of hoisting equipment and enter the market with new offers for customers – coal and mining enterprises. At the same time, our company maintains the principle of Corum – an individual approach to each client.



Client Feedback

**Nikolay FOMIN**

Head of Stationary Equipment Department, DTEK Energo

“ 13 units of skips of various configurations and purposes have been purchased in full accordance with technical requirements and make constructive proposals for design adjustment. Regarding the supply of hoisting equipment, Corum are the undisputed experts and market leaders.

GIANT SHEAVE FOR KAZZINC

THE MANUFACTURER GUARANTEES A 2.5-FOLD REDUCTION IN RUNOUT OF THE RIM



The leader in the production of zinc, gold, non-ferrous and rare earth metals, "Kazzinc" ordered from Corum Group a headframe sheave H336-2 with a stamped rim – the largest in the company's product portfolio.

Its overall dimensions: 6 m in diameter, weight – 14.5 tons. It is able to withstand a load of 404 tons. Not every machine-building enterprise can make such a heavyweight; Corum Group has the appropriate production capacity and experience.

The value of measuring the quality of the assembly and operation of sheave is the individual radial and end runout of the sheave rim. The serial model H336-2 has one rim runout, and the runout for Kazzinc will be 2.5 times smaller. This required the development of special technology for manufacturing equipment, which will tighten control over the equipment assembly.

For this purpose, Corum Group specialists will be present during the assembly of this type of hoisting equipment (the sheave will be delivered disassembled), its installation, commissioning and start-up for the first time. This will allow the manufacturer to verify the correct assembly and additionally instruct Kazzinc employees on further maintenance of the equipment.

In 2019, Corum Group manufactured two units of the same giant sheaves H336-2 for another ore enterprise in Ukraine – ArcelorMittal Kryvyi Rih. Hoisting equipment manufactured by our company is in demand: last year Corum concluded several contracts for the production of 10 sheaves of various sizes – with rim diameters from 0.63 m to 6 m.

SPECIFICATIONS OF H336-2 SHEAVE

Rim diameter	356 mm
Max load	404 t
Sheave weight	14.5 t
Rope diameter	61.5 mm

Competently



Sergey ASTAPENKOV

Corum Group Lead Design Engineer

Sheave is supplied with SKF bearings (Sweden) on the shrink sleeve, has expanded set of tools and accessories, includes personnel training, installation supervision, joint commissioning and, of course, manufacturer control of equipment work.



CORUM WILL PRODUCE CAGE FOR ABAZINSKY MINE

To equip the main and cage shafts of its mines, the Abazinsky Mine ordered a set of hoisting equipment from Corum Group: non-tilt cages 1NOV450-17 and 1NOV450-2.5, PTKA parachutes and suspension devices for each cage. Corum engineers will manufacture and ship the entire order to the customer by the end of 2020.

Cages 1NOV450-17 and 1NOV450-2.5 differ from serial analogues by increased belt length of 4.5 m. This "extension" allows placing more mine employees inside the cage, more cargo in one ascent/descent. Both cages are designed to work on a single-rope hoist.

Cage 1NOV450-17 is used to transport people and cargos. Its maximum load capacity is 17 tons. The cage is able to withstand such a weight due to the welded-riveted construction of a heavy duty frame and reinforced supporting vertical racks. In this order, the 1NOV450-17 cage has an atypical design: it was equipped with unusual stoppers for the VB-4.0 mine car. Massive

lever automatic design with manual control will ensure reliable fixation of mine car with a load of 12 tons.

Cage 1NOV450-2.5 is designed to serve only people. Its design is close to cargo-human, but made without stoppers and with a lightweight frame. If the 1NOV450-17 cage will be delivered to the customer entirely assembled, then the human cage will be disassembled into elements for delivery. Assembling at the customer's place will be carried out by modular scheme with clean bolts and with a minimum amount of welding work.

Cages will deliver people and cargo to the surface from a depth of more than 700 m: 785 m (1NOV450-17) and 714 m (1NOV450-2.5). Rail guides that are installed on the frame of each cage will help them move freely along the shaft with high speed.

Earlier, Corum supplied PTKA30 parachute to the Abazinsky mine for a cargo-human cage, and in 2019 manufactured two skips with a tilted SO6.4 body equipped with suspension devices UPS30.

Over the past decade, Corum Group has been increasingly supplying equipment to enterprises that mine ore. The successful fulfilment of these orders and the development of new products demonstrate the potential of our machine builders, as well as open up perspectives for cooperation with other ore enterprises.

Competently



Valery KRUPITSKY

Head of Product Development Department, Corum Group

The Abazinsky Mine ordered six full-fledged products from our company working together – this is turn-key supply. In this format, it is always beneficial for the customer to work with one manufacturer. Indeed, in products that were designed and manufactured by one plant, coordination and interaction of all components of this equipment will be ensured. This ensures the stable operation of hoisting equipment and safety of people and cargos movement.





INNOVATIVE KTPV-DV-630 CORUM GROUP INTRODUCES LATEST SUBSTATION DESIGN

The Corum Group manufactured a batch of new generation transformer substations KTPV-DV-630 for Belaruskali, one of the world's largest producers of potash mineral fertilizers. 16 units of innovative equipment will be installed at Petrikovsky mining and processing complex.

Transformer substation KTPV-DV-630 will reduce power losses in the network with a voltage of 10 kV, increase the capacity of power lines and reduce the cost of laying cables in underground tunnels. This will ensure the stable operation of the equipment that is powered by transformer substations.

KTPV-DV-630 is the latest design of Corum Group electrical equipment. 80% of the assemblies have new R&D design

solutions, and insulation strength was increased.

For the production of new generation transformer substations, Corum Group invested in the creation and equipping of a new workshop for cutting transformer steel: a new boring machine from VARNSDORF was purchased to manufacture body parts. This improved the quality of products and made production less dependent on external contractors.

Belarusian colleagues order equipment from Corum Group since 2001. In total, Ukrainian machine builders have delivered to the Republic of Belarus more than 380 transformer substations of the KTPV type. 16 innovative substations KTPV-DV-630 were shipped to customer in May.



Remote video testing of equipment:
Corum Group organised on-line substations acceptance tests for Belaruskali.

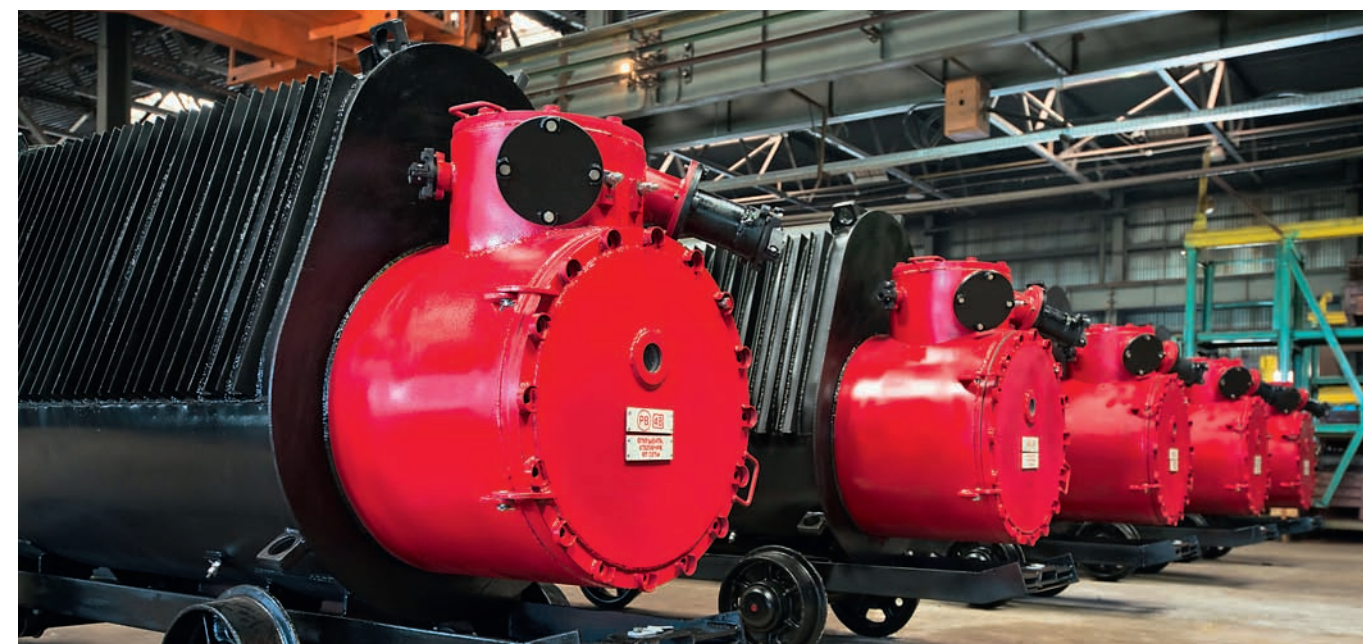
Competently



Denis AZAROV

Head of Corum Group Representative Office in the Republic of Belarus

Hard times are an occasion to rethink the usual approaches to work and look for new solutions. For the first time our company held on-line presentation and delivery of equipment to a foreign client. Usually it happens at the factory. We are always happy to meet with partners, but during quarantine trips were prohibited. Customers were able to test the launch of equipment on-line, without visiting our company.



SUBSTATIONS OF A NEW TYPE FOR ORE MINES THE FIRST SAMPLES OF KTPRN-630 WILL BE TESTED AT KAZZINC

The largest metallurgical company in Kazakhstan – Kazzinc – ordered a batch of new type transformer substations KTPRN-630/6-0.4 from Corum Group.

In 2019 Kazzinc purchased 14 transformer substations of the KTPV type from Corum Group. At the beginning of this year, client placed an order for 4 transformer substations KTPRN-630/6-0.4. Delivery time is the summer 2020. KTPRN substations will serve at least 20 years.

Competently



Sergey PODOLYAN

Corum Group Electric Equipment Manager

Compared to KTPV substations, KTPRN type substations have less weight and cost. This is achieved by reducing costs in the manufacture of body in RN version – normal iron mine (non-explosion-proof) and its certification in expert organizations during production. The use of substations like KTPRN in mines that are not hazardous in gas and dust will allow consumers to optimize investment budgets using reliable, energy-saving and safe equipment.



KEY FEATURES OF KTPRN-630 SUBSTATION

Rated power	630 kVA
Frequency	50 Hz
Rated higher voltage (HV)	6 or 10 kV
Adjustment method and range of voltage	– ±5%
Rated lower voltage (LV)	0.4 or 0.69/0.4 or 1.2/0.69 kV
Scheme and connection group of power transformer windings	Y/Δ-11 or Y/Y-0
Short-circuit voltage, normalized to temperature	115°C, – 3.5%
Power transformer short-circuit loss, normalized to temperature	115 °C
(when PV-100%)	5.16 kW
Idle current	1.1%
Power transformer idle loss	1.85 kW

This is a new generation of equipment. It was designed specifically for mining enterprises that are not hazardous in gas and dust. The absence of explosion protection means and the simplified body design are the fundamental differences between KTPRN type substations and KTPV type explosion-proof substations, the production of which our company has been specializing in since 1961.

Corum Group has developed a line of substations of the KTPRN type with a capacity of 100-1250 kVA with the highest voltage of 6 or 10 kV. There are versions with several protected low-voltage taps and a module for powering the lighting and automation lines. Now you can quickly adapt the design of substations to the individual requirements of consumers.

KTPRN-630/6-0.4 are intended for power supply of current collectors with three-phase alternating current with a frequency of 50 Hz. They also provide protection against currents leakage, maximum current protection of low voltage lines.



**Alexander
MIROSHNICHENKO**
Director of Corum Repair

Competently

✦ One of the advantages of our service support is localization in close proximity to the client's facilities. For example, Pokrovskoye Mine Administration is located at a distance of 40 km from us. This means that our on-call specialists can arrive at mine within one hour. For comparison: in large cities, such as Kiev, even emergency medical services can not always come to a patient so quickly. Localization of service personnel can be directly at the customer's site. For example, during the installation, commissioning and putting in operation of the complex, we shared with our colleagues one working room at the Pokrovskoye Mine Administration for the operational organization of work. This example is not the only one.

A key tool for customer support is the qualified technical assistance of the call centre 24/7. Thanks to this service, it is possible to solve a number of issues, in particular, to provide consulting assistance remotely. For this, it is enough for the parties to have one diagnostic assessment checklist of the "patient" in front of the eyes.

Such a package of timely technical support reduces production downtime, increases the coefficient of technical availability of equipment and extends the life of mining equipment. This makes customer business more efficient and safer.



CORUM REPAIR: WE ARE RESPONSIBLE FOR OUR EQUIPMENT

✦ Corum Repair is a service division of Corum Group. Its specialists mount mining equipment at the client's facility, provide service and technical support, thereby increasing operating efficiency and extending its service life. That is how it works, let's take a look at the example of the Pokrovskoye Mine Administration

HOW OUR SPECIALISTS CONNECTED ROOF SUPPORTS WITH IMPORTED EQUIPMENT

Corum Group supplied 200 sections of powered roof support DT-08/18 to the Pokrovskoye mine administration in 2018. The 14th longwall in block No. 10 was equipped with this set. The new longwall set helped the miners to mine coal in difficult geological conditions, with a constantly changing thickness 1.25 m to 1.75 m, with an average mineable seam thickness of 1.47 m. Moreover, the design of this powered roof support ensures the stable operation of longwall complex with a mined thickness of 1.1 m when connecting it to other equipment.

Roof support DT-08/18 was designed by Corum Group to meet the needs of the customer. The main design features of this equipment are

hard canopy and a separate double-hulled base with a specific design lifting mechanism. Corrosion-resistant coating of power hydraulics working surfaces and modern Hallite polyurethane seals ensure reliable equipment operation. The unique design of base lifting mechanism and the optimization of the kinematic diagram ensured overcoming disturbances in the soil and working in conditions of a hard-to-collapse roof.

A shearer and AFC of European manufacturers need to work in a longwall complex with powered roof support DT-08/18, produced by Corum. Our engineers performed professional connection of longwall equipment into one complex to work efficiently.

SERVICE IN 60 DAYS INSTALLATION, START-UP AND PROGRESS

From the first days, the specialists of Corum Repair regional service site No.2 accompanied the installation and commissioning of 200 sections roof support DT-08/18 in the 14th southern longwall of Pokrovskoye Mine Administration.

This minimized the mistakes made by the miners during the installation of the longwall complex. At the time of putting into operation, the necessary stock of spare parts was organized at the mine and at the consignment warehouse.

Within 60 days from the date of longwall putting into operation, four Corum Repair specialists daily provided support for the scheduled maintenance and operation of the delivered equipment. During this time, they organized monitoring system of the technical condition of the equipment and the quality of the working fluid. They created planning for the maintenance of this complex as well. As a result, a more rational use of consumables was achieved at the mine and reduced scheduled maintenance time.

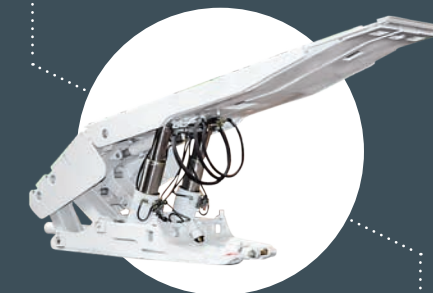
To record the performed technical work and the consumption of spare parts and materials during equipment maintenance, Corum Repair specialists introduced an electronic form. It allows implementing remote work in one document for all participants in the process.

WHAT KIND OF SERVICE SUPPORT WAS PROVIDED FOR POKROVSKOYE MINE ADMINISTRATION

✦ Engineering support of installation and commissioning of equipment in the longwall.

✦ 60 days of daily maintenance, scheduled maintenance and operation of the powered roof support DT-08/18 since the moment of commissioning.

✦ Four service specialists at Corum Repair regional service site No.2 handled the maintenance of 200 sections during mining of field section with high rock pressure.



✦ We have implemented an electronic form for recording all technical changes and accounting consumables. It is available to each interested participant of the process through Google Docs.

✦ We organized an emergency warehouse of spare parts directly at the facility. Consignment warehouse – next to the client, at a distance of 40 km.

✦ Service technical support with 24/7 call centre.

During the contract with Pokrovskoye Mine Administration, the leading specialist in the operation of Corum Repair equipment was assigned to the support of the DT-08/18 roof support complex. His functions included the organization of after-sales monitoring and equipment support.

Continuously, all our customers have access to 24/7 call centre technical support. It serves primarily for emergency service response, as well as for the organization of specialized assistance in the operation of mining equipment with the involvement of leading Corum engineers.



Competently



**Dmitry
VOROZHTSOV**

Director of Corum Rus trading
company

 Corum repair and service centre in Novokuznetsk was originally created to service Corum equipment operated by our customers – coal enterprises at Kuzbass. But today we are not limited to this. Among requests of our customers, we have expanded the list of services and now repairing, including equipment of other manufacturers. Production capacities of workshop and experience of our repair and service department employees allow us to take this step towards our customers. I am sure that both parties will benefit from this: both RSC and clients.

CORUM REPAIR AND SERVICE CENTRE EQUIPMENT MAINTENANCE BECAME EASY TO GET FOR KUZBASS CLIENTS



The opening of the Corum repair and service centre (RSC) in Kuzbass made it possible to shorten the term for warranty repairs by several times, as well as significantly expand the list of services provided to clients in this region. Now, Corum service repair, replacement of component parts and restoration of equipment is performed not only in the Rostov region, but also in the heart of the region – Novokuznetsk.

Corum repair and service centre in Novokuznetsk with an area of 600 m² was equipped with necessary welding, metalworking, mechanical assembly, metal turning equipment and etc. The list of operations of the workshop includes cutting of metal sheets and manufacturing metal structures as well.

Corum repair and service team works both in the workshop and on site. On site the workers carry out mechanic and commissioning work, advise on the equipment operation.

Corum repair and service centre has become a consignment warehouse, which stores a stock of components delivered from Corum manufacturing plants. This made possible to significantly reduce the time for the clients supply with spare parts and components in the region.

RSC started operation in the middle of 2019. During this time, the centre repaired a dozen of powered roof support sections, upgraded two transformer substations with the replacement of control electronics, and restored 10 mine cars VG-3,3. In less than a year, service department completed, apart from small ones, up to 10 large orders, mastering also the nomenclature of other manufacturers.

In 2020, the RSC plans to purchase additional new equipment: a thermal cutting machine, testing stands for power hydraulics, welding semi-automatic devices, a screw-cutting lathe, etc. This retrofitting of the RSC will expand the range of services provided, refuse the subcontractors services, reduce the time for repairs and improve their quality by monitoring each operation in the workshop by the company's own personnel.

CORUM GROUP

Runs mobile app for customers

The app is already available at Android smartphones,
and at iOS platform will appear in autumn

Images will come to life in three steps:

1. Download the app to your smartphone using Google Play or Apple Store.

2. Point your smartphone at the photo in this digest with a special icon  Choose any flat surface.

3. A three-dimensional image of the equipment will appear at the screen. It can be viewed from all sides, main units can be controlled, as well as it can be exploded into components to look into the heart of Corum machines.

DM roof support, CLS450
longwall shearer and RH160
roadheader will be available in
the AR format.



Download
Corum AR app from
Google Play Market



www.corum.com

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