



MARKET NOVELTY: Longwall Shearer CLS450

FROM FAIR TO FAIR: EVENTS OF THE YEAR POWERED LONGWALL COMPLEXES BASED ON CLS450 EXPORT SUPPLIES OF CORUM 2016-2017



300 m SPTs230-21 and 30 m SPTs230-63 for Sadkinskaya Mine



Corum supplied

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Corporate edition for Corum clients Digest. SPECIAL EDITION

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DIRECT SPEECH

Dear partners

We dedicate this special digest to the 128th anniversary of our company, because birthday is an occasion to sum up how we lived for another year. With the main events of the Corum company, which occurred during this period, we want to introduce you on the pages of our digest.

The export line took the precedence in 2016. These are mainly Russia and Kazakhstan. We have supplied and keep supplying roadheaders, armored face conveyors, transformer substations, mine transport and hoisting equipment to the external markets.

We have manufactured 4 roadheading machines KPD for ArcelorMittal Termitau and 32 substations KTPV for Kazzinc. Our longwall equipment and drill loaders BPR are operated by South Coal Company, Donugol and DTEK mine in the Rostov region. This allowed us to increase the export share to 21 %, and we are planning to raise it more this year. The projects of Corum Shahtspetsstroy Division have become the company's key direction. Vertical mine shafts at Nui Beo Mine in Vietnam have been constructed and reinforced. The gypsum mining using roadheader KPD has been mastered for Siniat. The main new-generation fan has been installed at the Zaporizhzhya Iron Ore Integrated Works.

Since 2016 the company has launched new lines in turn-key maintenance of the underground equipment. Our specialists carry out overhauls and large module repairs at the company's enterprises, and also perform maintenance and emergency recovery works directly at the clients' sites. We conduct training for our clients on equipment operation on site and remotely. Having reduced the repair periods thrice, we decrease the number of downtimes for our clients and thereby increase their production volumes.

During our work on this digest, our company celebrated it's birthday – the 128th anniversary of our first enterprise. Our experience in manufacturing equipment for complex geological conditions has been gained for 125 years. Today we can offer each of our clients the comprehensive solutions of any complexity that are developed with consideration of production specifics.

I would like to note that Corum Group works in a stable political and economic environment. This is confirmed by maintaining public order in the cities, developing the domestic market of Ukraine, and increase of GDP and export potential.



Our plants Corum Svet Shakhtyora in Kharkov and Corum Druzhkovka Machine-Building Plant in Druzhkovka increase their production capacities, hire and train the personnel due to increasing number of orders. Between 2016 and 2017, our enterprises and the central office of Corum in Kiev were visited by the delegations from Kazakhstan, Russia, Estonia, and Iran and this proved again the stability and safety in the country.

In 2016 our company achieved positive financial results: as compared to 2015, the consolidated proceeds increased by 18.9 % and the volume of concluded contracts increased by 32 %. All that became possible due to talent and professionalism of our engineers, commitment and high qualification of workers and, certainly, your trust, our dear clients. As a reliable partner, Corum is always ready to help you to achieve the set goals.

EXPORT SUPPLIES IN 2016-2017



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EXPORT SUPPLIES IN 2016-2017





New mine birth

The Corum Group project on the construction of vertical shaft s at Nui Beo Mine located in Quang Ninh coal basin (Vietnam) under the contract with Vinacomin, a Vietnamese corporation, is about to

be completed.

Corum sank two vertical shafts with an inner diameter of 6 m, to a depth of 417 m and 389 m and installed equipment in a vertical shaft of the Nui Beo Mine, Vietnam, anchored buntons (load-bearing beams) to the concrete support using the technology of HILTI.

"Upon the shaft sinking completion, the issue of their anchoring design arose", Alexey Zhytnik, Director of Corum Shahtspetsstroy says. "Out of the well-known



methods for fastening ends of the load-bearing beams, their seating in holes became the most popular. However, this is a long-term and time-consum-

ing operation, which is often performed manually. Further concreting of dividers in notches does not exclude water penetration that causes their loosening in the

period of operation of the skip hoist. Based on the specific operating conditions, service life of the mine shaft and construction budget, specialists of the Corum mine construction division chose the most reliable and easy-to-manufacture structure: fastening of load-bearing beams (buntons) to the shaft walling with HIT-RE 500 chemical anchors and HIT-V steel studs using the HILTI technology. The domestic and foreign experience in using such structures is limited, so our engineers developed the installation method from scratch. The main diffi culty in reinforcement operations was their high accuracy. All steel structures must be interconnected; the deviation of structures in the vertical plane must not exceed 10 mm along the entire length of the shaft, and the allowable deviation of adjacent layers in the horizontal plane is 15 mm. That's why our specialists were the only ones engaged in the installation operations, while Vietnamese mine build-



ers were engaged in drilling and auxiliary operations.

"Our experience allows us to compete with the global leading mining companies. Mining is the strength of Corum, which sets the company apart from others.

Someone can build, someone can design, and omeone is only a manufacturer of equipment for mine construction and mining," Mikhail Potapov, Marketing and Sales Director of Corum Group says.



Corum Shahtspetsstroy is able not only to design and build a turnkey mine, but also to ensure high production efficiency using its own equipment. Today, Corum Shahtspetsstroy is planning to start implementing a number of projects in Kazakhstan, including sinking vertical shafts.

Meeting in Norilsk

In April the Corum representatives participated in XVI Expo «Metallurgy. Mining. Production Automation. Equipment and New Technologies. Norilsk 2017».

Dmitry Vorozhtsov, Director of Corum Rus, Sergey Podolyan, Head of Electrical Equipment Department, Denis Semenov, Head of Sales Territory, and Renat Burkhanayev, Business Development Manager, held a number of meetings at the fair with representatives of Norilskshahtstroy, Zapoliarnaya Construction Company, Norilsk Nickel.

Sergey Podolyan made a presentation on updated explosionproof substations at the conference held within the framework of the fair.

Equipment manufactured by our company is successfully operated by many mines, therefore, all the product lines represented, namely stationary and electrical equipment, mine transport, and the possibility for updating centrifugal main fans and hoisting equipment stirred a keen interest of mechanical and power engineers. The meeting resulted in a



discussion of the state of equipment used by mining companies and prospects for further cooperation between our companies.

EVENTS OF THE YEAR

Corum finishes the construction of the next generation main fan unit for Zaporizhzhya Iron Ore Integrated Works

Our company is constructing a new main fan equipped with two axial double-stage high-head fans VO-42,5R3. They will ensure better air supply to the mine system thanks to the up-to-date aerodynamic scheme.



A new main fan was designed to replace the old one, which has been used for more than twenty years. The fan installation will allow for increasing the production output by 1.5 times due to slicing new workings on the lower levels. «Our company supervises all the operations, including the building appearance and territory improvement,» says Alexey Zhytnik, Director of Corum Shahtspetsstroy, «since we are implementing the project on a turn-key basis. Hence, we must satisfy all the wishes of the client. Moreover, all the issues must comply with the rules and regulations for construction of such facilities.» The main difficulties in implementing the project were related to the continuous correction of design solutions inherent in all the pilot projects, as the customer placed new requirements, wanted better results than those initially set, and Corum Group specialists found ways to achieve them. «This project has given us considerable experience,» comments Mikhail Potapov, Marketing and Sales Director. «When we complete the installation at ZIOIW, we shall be able to install fans at any mine, since we shall understand all the difficulties that we will face from the very beginning.

This means that we shall be able to find optimum solutions in advance. Some potential foreign clients have already expressed their interest.»

Principal differences between the old and new fans at ZIOIW

	Existing fan VTsD-31.5M	New fan VO-42,5R3 manufactured by Corum Group
Impeller diameter, mm	3150	4260
Air supply, m ³ /s		
- rated	200	500
- within working zone	35305	150950
Static pressure, Pa		
- rated	4950	7000
- within working zone	5005100	25009000
Electric drive motor power, kW	1600	2600

Fans VO-R3

VO-R3 Series are single-stage reversible high-speed fans speed of 130-160 m/s. The single-stage fan series includes VO-21R3, VO-22R3, VO-25R3, VO-27R3, VO-30R3, VO-32R3, VO-34R3, VO-36R3, VO-38R3, VO-40R3, VO- 42.5R3, VO-48R3, VO-54R3 and VO-58R3 with an impeller diameter from 2,100 mm to 5,800 mm.

As against the VTsD-31,5M fan operated at ZIOIW, the new fan with a tip VO-42,5R3 has an automated control system and anti-corrosive coating of the flow part. Its operation is regulated not by a guide, but by changing the electric drive rotation speed, motor speed and impeller blade angles.



LONGWALL SHEARERS

Company's novelty: Five main facts about CLS450

Corum has created and launched a new product to the market – next generation CLS450 shearer.



The idea to create a new hightech shearer for seams of 1 to 2.4 m thick, with main units above the conveyor and frequency converter regulating the feed speed, located in the main frame, appeared in the company in 2013. This machine is designed to replace the line of older generation of shearers (RKU, KSh1KGU, and GSh) and compete with similar models manufactured by foreign companies.



Anatoly Korolchuk, Shearer Sales and Development Manager

«The shearer length with installed

electrical equipment along the axes of the cutting tool is 8.3 m, which is less than for similar shearers of the nearest competitors. This feature allowed us to provide improved flexibility for coal seams and stable operation in the variable seam hypsometry. This has a positive effect on the reduction of coal-cutting with stone for rock walls and allows the client to get a «clean coal» with minimum rock content. We examined the operation of the shearer CLS450 in plant conditions using the variable seam geometry by inclining intentionally the conveyor vertically and horizontally. Our shearer coped with this task excellently.»

On the fifth of May, DTEK put in operation longwall face No. 9 of the Dobropilska Mine. The longwall complex came with our CLS450 shearer.

Company's engineers designed the shearer CLS450 in close cooperation with miners; their requests and remarks were considered at all the design stages.

A working group composed of Corum and DTEK specialists was created. The joint work resulted in a product, which can be used in mines with complex mining and geological conditions.

FEATURES OF CLS450 SHEARER

The CLS450 shearer is modular, with all the main elements located in the support frame. This design ensures easy access for servicing the shearer and facilitates its installation and removal. The feed unit is unified and can be used in the right and left versions.

"The CLS450 shearer can be associated with existing equipment manufactured by domestic or foreign companies", Aleksandr Dyatlov, Chief Production Officer says. "This advantage was immediately appreciated by miners, who visited the shearer demonstration area at Corum Svet Shakhtyora Plant. "The frequency converter is located "on board" of the shearer, which made it possible to reduce the number of cables required for its operation.



Five facts about CLS450

DESIGNED FOR COMPLEX GEOLOGICAL CONDITIONS:

it is used for thin seams of strong coal, with rock interlayers and variable seam gypsometry.

CAPACITY: 8,0-14,8 t/min.

WIDE RANGE OF COAL SEAM EXTRACTION:

1,0-2,4 m.

UP-TO-DATE CONTROL SYSTEM:

- diagnostics and control of main unit condition, display of process and diagnostic data;
- special software to monitor cutting and feed drives with further automatic selection of feed rate;
- data on the shearer operation are displayed on the screen of the mine dispatcher on the surface.

CONVENIENT AND SAFE MAINTENANCE:

modular design ensures easy access to the shearer elements.



Aleksandr Dyatlov, Chief Production Officer

"All the design works, including the develop-

ment of a 3D model, strength calculation, and design documentation preparation were carried out by the New Products Division of Production Directorate. Svet Shakhtyora manufactured the shearer at a high engineering level within rather short terms."

This design makes purchase of additional roadway equipment optional.

POWERED FACE COMPLEX FOR THIN SEAMS WITH A THICKNESS OF 1.05–1.5 M CLS450 + SPTS230 (270/800) + DT 07/15

- Average daily output 2.000...5.000 tons;
- Costs for spare parts – USD 175 thous. per year;
- EAC/mining USD 1.85 per ton

SHEARER CLS450

Mined thickness - 1.05...2.4 m Capacity - up to 15 t/min Max feed rate - up to 20 m/min Traction force - 250 kN Total drive power - 452 kW Nominal diameter of cutting tool - 1.000-1.250 mm Nominal operating range of cutting tool - 600-1.000 mm Feed type - chainless, with VFD Shearer weight no more than 25 tons

ARMORED FACE CONVEYOR SPTS230 (270/800)

Supply length – up to 350 m Installed power – up to 3x400 kW Main drive discharge type – frontal, lateral Round-link chain pitch – 34x126 Shearer feed type – rail Height of pan walls – 270 mm Length along pan wall – 1.500 mm Width of pan walls (inner) – 800 mm Service life – up to 10 mln tons



POWERED ROOF SUPPORT DT 07/15

Allowable dip angles of seams: along the strike – 10° to the dip and to the rise – 35° Support unit resistance – 3.500-4.300 kN Specific resistance per 1 m² of supported area – 520-620 kN/m² Hydraulic extension factor – 2.1 Shifting effort: of support unit – 230 kN, of conveyor – 392 kN Installation distance – 0.6-0.8 m Roof overlapping coefficient – 0.9 Overall dimensions of support: – height min-max – 700-1.500 mm – width – 1.440 mm – support weight – 10.2 tons



LONGWALL EQUIPMENT

POWERED FACE COMPLEX FOR THIN SEAMS WITH A THICKNESS OF 1.05–1.9 M CLS450 + SPTS230 (270/800) + DTR 08/19

- Average daily output –
 2.000...6.000 tons;
- Costs for spare parts –
 USD 180 thous. per year;



• EAC/mining – USD 1.95 per ton

LONGWALL SHEARER CLS450

Mined thickness – 1.05...2.4 m Capacity – up to 15 t/min Max feed rate – up to 20 m/min Traction force – 250 kN Total drive power – 452 kW Nominal diameter of cutting tool – 1.000–1.250 mm Nominal operating range of cutting tool – 600–1.000 mm Feed type – chainless, with VFD Shearer weight – no more than 25 tons

ARMORED FACE CONVEYOR SPTS230 (H225)

Supply length – up to 350 m Installed power – up to 3x85/250 kW Installed power – up to 3x85/250 kW Main drive discharge type – frontal, lateral Round-link chain pitch – 30x108 Shearer feed type – rail Height of pan walls – 225 mm Length along pan wall – 1,500 mm Width of pan walls (inner) – 800 mm Service life – up to 5 mln tons



POWERED ROOF SUPPORT DTR 08/19

Allowable dip angles of seams: along the strike –10° to the dip and to the rise – 35° Specific resistance per 1 m² of supported area – 600-700 kN/m² Support unit resistance – 3.860-4.620 kN Hydraulic extension factor – 2.3 Shifting effort: of support unit – 492 kN, of conveyor – 290 kN Installation distance – 0.6-0.8 m Roof overlapping coefficient – 0.9 Overall dimensions of support: – height min-max – 800-1.900 mm, – width – 1.440 mm, – support weight – 11.2 tons

Two new UKD200-500 shearers were manufactured by the company for DTEK mines

In May, a UKD200-500 shearer was delivered to the assembly floor of Corum Svet Shakhtyora.

The shearer will be operated by Pavlogradska Mine, DTEK Pavlogradugol, along with the SPTs271M armored face conveyor, which was also manufactured by Corum Svet Shakhtyora last December. Another UKD200-500 shearer was supplied by our company in December 2016 to Dniprovska Mine being a part of the same Mine Office. As against the pre-manufactured shearers of this type, the UKD200-500 shearer has some improvements. It has a symmetrical cutting section. The cutting motor power is increased to 250 kW in contrast to the UKD200-400 shearer, where it is 200 kW. The operating pressure in the hydraulic system is reduced, and this increases the reliability of its components. Enlarged gear reduction units improve the transmission and ensure individual control of the current load on each motor. The manufacture of shearers by Corum Svet Shakhtyora spins up, and the demand for UKD200-500 is growing – this is the seventh shearer of this model manufactured for DTEK Pavlogradugol.

Specifications

Applicability for mined thickness – 0.85...1.5 m

Capacity - up to 6 t/min

Max feed rate – up to 6 m/min Traction force – 300 kN

Total drive power – 597.5 kW (including VSPK 2x75 kW)

Nominal diameter of cutting tool – 800–1,000 mm

Nominal operating width of cutting tool – 800 mm

Feed type – VSPK (chainless) Shearer weight – no more than 15 t



POWERED ROOF SUPPORTS

Druzhkovka: is notable for it's roof supports

New and overhauled roof supports will be supplied to clients of Druzhkovka Machine-Building Plant.

A hundred sections of 1KD90 roof supports will be manufactured by Corum Druzhkovkda Machine-Building Plant in the near future for miners of Heroiev Kosmosa Mine, DTEK Pavlogradugol.

"Roof supports are one of the main products of our enterprise," Tatiana Kalugina, Director of the plant says. "1KD90 in this special version was manufactured by us before, and it received high scores from Pavlograd miners."

For the same mine, the Druzhkovka plant team repaired 102 units of this model in March and 65 in May. 167 units of the powered 3KD90T roof support were overhauled for Dobropolskaya miners.

This April, Sadkinskaya Mine Office successfully commissioned the new, substantially improved end units of the 3KD90T roof support. Upon the client's request, a hydraulic prop with an operating diameter of 260 mm instead of 200 mm is used; the strength of the arm steel structure, canopies and basement is increased, which makes it possible to increase the load-bearing capacity of the support by 1.7 times. The design solutions that include the use of strong materials ensure high reliability of equipment



The Kamensk-Shakhtinsky machine builders in Rostov region, where our specialized repair site is located, are not lagging behind the Druzhkovka plant team in repairs. Southern Branch Office of Corum Rus repairs 162 2KD90T roof supports for Obukhovskoye Mine Office today. This support is designed for thin seams with a thickness of 1.1–1.5 m, with hard-tocollapse heavy roofs. The load-bearing capacity is over 800 kN/m².

FEEDBACK

It's so nice to receive warm feedback from clients about our products. It was handed over to our editorial staff by Sergey Kurbatov, Director of Corum Kazakhstan, visited Kostenko Mine of ArcelorMittal Temirtau Coal Division in autumn to monitor the supplied products. The miners noted a number of advantages of our 138 telescopic props (in particular, high quality of chromeplated outer and inner faces). They also appreciated the convenience and reliability of transport rings. According to the miners, this is very important when installing our hydraulic props. The miners said that props withstand reliably the rock pressure throughout the face. It is good to work with new equipment as it reduces the number and duration of downtimes. The repair will be completed in August 2017.

Our well-proven roof supports used by miners in the Rostov region are characterized by reliability, high service a life and a number of unique design solutions.



Igor Vasserman, Roof Support Sales and Development Manager

One of such patented

engineering solutions is the special design of pressure arms with high compression force. This increases the safety level, and minimizes the risk of roof collapse during work in extreme conditions and geological faults.





ARMORED FACE CONVEYORS

Face and transport equipment to Sadkinskaya miners

The company supplied a <u>300 m portable armored</u> <u>face conveyor SPTs230-21</u> <u>and a 30 m stage</u> <u>loader SPTs230-63</u> <u>complete with 3KD90TK</u> <u>roof support to the</u> <u>Sadkinskaya Mine.</u>

Last August, the assembly floor of our Kharkov Corum Svet Shakhtyora Plant looked more like an exhibition center than a conventional production facility, due to a great variety of new equipment assembled in one place, visiting delegations and photographers. Participants from the Rostov region were the first to visit.

Representatives of Sadkinskoye Mine Office, South Coal Company arrived to accept face and transport equipment ordered at Corum not for the first time.



There, they were presented a 300 m portable armored face conveyor SPTs230-21 and a 30 m stage loader SPTs230-63 complete with roof supports 3KD90TK. White and orange freshly-painted machines with glinting black chains looked majestic.

Conveyors were designed in close cooperation between the specialists of Corum Svet Shakhtyora and Sadkinskoye Mine Office, with due consideration of the geological conditions in longwall face No. 109. As a part of powered units, SPTs230-21 is designed to operate in production faces with a seam thickness of 1.35 m and above, in mines of any gas and dust hazard category," says Georgy Fenin, AFC Sales and Development Manager. "The total drive power reaches 1 MW (3x315 kW) and the service life of conveyors exceeds 6 mln tons of reloaded rock."

The daily capacity of the stage loader conveyor SPTs230-63 is 7-8 thousand tons of rock. It's drive is equipped with an own-produced double-reduction right-angle reduction gear unit









with a 160 kW motor manufactured by Damel (Poland). The traction unit is based on a round-link chain with a pitch of 30x108 mm, manufactured by Becker Prunte (Germany). Our second production facility – Corum Druzhkovka Mashing-Building Plant manufactured the units of powered roof supports 3KD90TK 11/22.

This is an improved support with increased load-bearing capacity indicators. Our roof supports undergo the entire cycle of factory testing using unique stand equipment. According to the Director of Sadkinskoye Mine Office Yury Zuyev, the cooperation with Corum enterprises has been lasting for about 20 years, and SPTs-230 is ordered for the fourth time.

Representatives of Donugol, DTEK, Metinvest, EICKHOFF, power engineers of Ukrainian coal companies visited the plant, and even the Kharkov job fair was held there. The guests had luck to see other equipment: transformer substations and roadcutter system KNF, which were waiting for time to be supplied to their owners. A drill loader BPR was on the top.

All items could be touched and launched. Engineers answered all the questions regarding the equipment of interest. Corum Svet Shakhtyora always welcomes its visitors, whether they are lead managers of coal companies, student assistants or little visitors - children of employees. We are always ready to show how we work. After all, the phrase "hear twice" does not substitute the things observed. It cannot substitute "press the button, start". It does not substitute the glint in the eyes of the Director, Aleksandr Kovalchuk, and plant workers talking about their equipment.

Specifications of SPTs230-21

Applicability by extracted seam thickness – 1.15...3.5 m

Delivery length – up to 350 m

Installed power – up to 3x400 kW

Main drive discharge type – frontal, lateral

Shearer feed type – rack

Rack wall length – 1,500 mm

Rack wall width (inner) – 800 mm

Medium plate thickness – 40 mm (HARDOX 500)

Service life – 12 mln tons

Options: complete with motors and frequency converters (assurance of infinitely adjustable chain velocity)

"Here are our shearers... conveyors..." Haven't you visited Corum Svet Shakhtyora yet?

Donugol miners received the SPTs271M conveyor from Corum

In autumn 2016 Corum Svet Shakhtyora supplied an armored face conveyor SPTs271M to miners of Sherlovskaya-Naklonnaya Mine, Donugol Mining Company.

The 300-meter conveyor is designed to work together with the powered roof support 2KD90T and shearer KGS245N. During manufacture, the machine-builders fulfilled all the wishes of the customers: the fastening points for the feeder of the shearer were strengthened, special attachments and special stars were made in the drives. The pan is made of high-strength Swedish steel HARDOX 450, which allows providing a service life of more than 1 million tons.





Dmitry Vorozhtsov, Director of Corum Rus

"Engineering support to our equipment is also rendered after its delivery to a client.

The employees of Corum Production Directorate supervised the operation of equipment and gave additional recommendations for its operation last November. They also discussed the operation results with managers of Donugol Mining Company at the technical committee meeting. A few days later, they performed the designer supervision of the powered roof support 09DT and longwall stage loader SPTs230-71 in longwall face № 28 at Obukhovskoye Mine Office."

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Aleksandr Kovalchuk,

Director of Corum Svet Shakhtyora Plant

"Equipment was manufactured within extremely short terms and with declared quality. The order

placement at our plant was preceded by personal acquaintance of Donugol Mining Company representatives with manufacturing conditions at Corum Svet Shakhtyora and our engineers."



ARMORED FACE CONVEYORS

The 200th order for the conveyor SP251 was put in operation by Corum Svet Shakhtyora

The 200th 250 m armored face conveyor SP251 will be manufactured by Kharkov employees for longwall face 3017 of the Obukhovskaya Mine.





eugol in April."

Georgy Fenin, AFC Sales and Development Manager

"This is not the first order of SP251 since last June. Its predecessor, the 199th conveyor, was a 290 m conveyor for Pioneer Mine, DTEK DobropolyThis model has been produced in series by the company for 12 years, and the company managed to gain popularity in this period due to its reliability, high output capacity, and easy operation, and maintenance. The anniversary conveyor equipment uses wear-resistant sheets of steel HARDOX-450, drive units with two-speed motors and traction chain manufactured by the leading European vendors. The detachable equipment construction was specially designed with due consideration of the seam occurrence geology, powered roof support and shearer construction applied in the longwall face № 3017. This order is special for us - anniversary. Here, we have traditionally applied an individual approach to the design and interconnection of longwall equipment, which allows our clients to use the full potential of the complex reliability

and capacity. Since last June, we have designed and manufactured 11 face and 5 gate-end conveyors, five of which were designed for thin seams (type SP251).

At the end of last year, Corum Svet Shakhtyora manufactured an armored face conveyor SP251.13 of the same length as for Samsonovskaya-Zapadnaya Mine, Krasnodonugol, Metinvest. This conveyor is part of a powered complex consisting of the repaired shearer 1K101U and roof support 2KD90T, and it is designed for operation in extreme mining and geological conditions of the gashazardous seam of 0.9 to 1.2 m thick, with a capacity of up to 2,500 tons of coal per day. Completing with three drive units BP250KTs with a total power of 600 kW (N = $3 \times 65 / 200$ kW), manufactured by Damel, and a chain with



Twins for Obukhovskoye Mining Office

Corum Svet Shakhtyora started production of the order for Dalnyaya and Obukhovskaya Mines, Obukhovskoye Mine Office. The twins – conveyor stage loaders SP250-12 with a length of 150 m – will be manufactured by Kharkov employees within 75 days. The equipment will be used to roadhead the air roadway at 500 m level.

LONGWALL EQUIPMENT



Aleksandr Kovalchuk,

Director of Corum Svet Shakhtyora Plant

"In 2009, upon the request of Yubileynaya Mine miners, a drive for the conveyor SP251 was designed using a twospeed motor 65/200 kW. This allowed to increase the chain speed and the conveyor capacity by 36 %. Today, SP251 conveyors in this configuration are produced in series and are widely used at mines of DTEK Pavlogradugol and DTEK Dobropolyeugol."

a pitch of 24x86 mm, manufactured by Fasing, makes it possible to achieve the planned production volumes in the most efficient and safest manner.

And this winter, the miners of DTEK Pavlogradugol received such conveyor ahead of schedule. "We shall do our best if necessary," resolved the Svet Shakhtyora employees and kept their promise. They manufactured a 290 m conveyor SP251 for the Stepnaya Mine, Pershotravenskoye Mine Office a month before the deadline. To operate in longwall face 128 together with a shearer KA200 and roof support KD80, it is equipped with drives power N = 2 x 65 / 200 kW.

Approximately at the same time, conveyor equipment was supplied to miners of DTEK, Dobropolyeugol. A 250 m armored face conveyor SP251.13 and a 80 m conveyor stage loader SP251.15 were manufactured by Corum Svet Shakhtyora this winter for Dobropolskaya Mine, DTEK Dobropolyeugol. The conveyor SP251.13 and the loader SP251.15 are complete with interchangeable drive units BPK160 (with a motor 110 kW and a hydraulic coupling for smooth start). The loader is equipped with a rotary crusher DShM driwe power N = 1×55 kW, which makes it possible to obtain uniform coal fractions. This ensures stable operation of belt conveyors for coal conveyance to the main shaft.

"This is the fourth conveyor stage loader of this type, which will be operated by DTEK Dobropolyeugol mines," the client's representatives said. "It's use enables decreasing the time of face equipment relocation together with a power train, increasing the load on the production face and volume of mined coal." The new equipment is operated along with the shearer RKU10 overhauled by Corum Svet Shakhtyora and powered roof support 3KD90T repaired by Corum Druzhkovsky Machine-Building Plant. "As a result, our partners received a powered longwall complex composed completely of own produced equipment," Aleksandr Dyatlov, Chief Production Officer summed it up.



Unique conveyor SP271M for Dolzhanskaya Kapitalnaya

Corum Svet Shakhtyora manufactured this conveyor model at the end of 2016 for Dolzhanskaya-Kapitalnaya Mine of Sverdlovskoye Mine Office, DTEK. It is unique for its unusual length of 360 m. Production faces of such length are rare in mines of Ukraine and other countries. The conveyor weight exceeds 450 tons.

It is operated with two shearers KSh1KGU with rack feed, which were overhauled at Corum Svet Shakhtyora. The mining and geological conditions of the seam of 1.07-1.35 m thick, for which the conveyor was manufactured, are characterized by high abrasiveness of the rock. The pan, therefore, has a special version, with a long service life making at least 1 mln tons of anthracite.

A new conveyor for the Ternovskaya Mine

An armored face conveyor SPTs271M-06.25 with a length of 225 m was manufactured by Corum Svet Shakhtyora for the Ternovskaya Mine of Pavlogradskoye Mine Office, DTEK, in November. A pan was manufactured using special reinforced H230 mm profile with a working bottom of 30 mm thick. Conveyor drives are complete with own-produced gearboxes BP250KTS and Damel engines 65/200 kW. The conveyor is designed for operation in longwall face № 318 together with powered roof support 1KD80 and shearer UKD200-500.



Aleksandr Dyatlov, Chief Production Officer

"Corum Svet Shakhtyora has been

manufacturing conveyors SPTs271M since 2001. They are popular among miners due to the long service life and reliable operation of the pan. Today, a 26x92 m chain (24x86 m before) is used in the traction unit."



The demand for KPD grows

Last year our company entered into an agreement for supply of four roadheaders KPD to the key client – ArcelorMittal Temirtau. This year, the main consumer of KPD is DTEK.

ArcelorMittal Temirtau miners have already got to know our equipment, as two KPD roadheaders were supplied in 2012 and 2013 to Kazakhstanskaya Mine. The staff of Corum Svet Shakhtyora in cooperation with Corum Druzhkovka Machine-Building Plant planned to manufacture new machines within extremely short terms. And the factory workers managed to do this. On the 29th of October, Petr Romanovich, Deputy Director for Tunneling of the Kazakhstanskava Mine, and Andrey Kryukov, Principal Mechanical Engineer of the same mine, arrived to accept the first finished roadheader. They were welcomed by Aleksandr Udovichenko, Head of Tunneling Equipment Division, Vadim Dergousov, Principal Engineer of Corum Svet Shakhtyora, and other factory workers.

The KPD roadheader is a selfpropelled caterpillar machine with an arrow-shaped telescopic cutting tool and radial bits, feeder, and open armored face conveyor. It is designed to cut and load rock when constructing arc, trapezoidal and rectangular roadways with a cross section of 11 to 30 sq. m, in

- roadheader weight 42 t
- cutting tool motor
 power 132 kW
- length 12.5 m
- speed 7 m/min
- remote control in radio and wire modes



mines razarous with gas and dust.

"The feature of this series of KPD roadheaders is the support installer available, which facilitates and accelerates considerably arch support



installation," Aleksandr Udovichenko, Head of Tunneling Equipment Department says. These roadheaders

are equipped with an improved feeder with an elongated table and large diameter stars, which allow to increasing the loading efficiency and speed. In addition, an up-to-date water cooling radiator manufactured by foreign companies is installed in the roadheader hydraulic system. The supply set includes a 20 m belt loader and a set of small tools and equipment.

Petr Romanovich recalled how he accepted our first KPD roadheader at the Kazakhstanskaya Mine and that his mine was the leader in the AMT Coal Division. This made miners apply advanced process solutions. He commended good illumination of our KPD, support lifter, undercarriages, cooling system, and cutting tool system operation. He expressed confidence in gratitude of his company employees to safe operation. His colleague spoke well about the work of our machine builders and said that they really take care of Karaganda miners, their comfort and safety.



Here, at the plant, he started thinking about the person to operate our KPD roadheader. According to Andrey Kryukov, the new equipment can be used with the most responsible miners only.

The last of four ordered KPD roadheaders was delivered to Kazakhstan miners this January. The roadheaders are operated at the Kazakhstanskaya, Abayskaya, and Kostenko Mines.

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On the 28th of April, the KPD roadheader was supplied to the Stepnaya Mine of Pershotravenskoye Mine Office, DTEK Pavlogradugol. This is the 81th KPD roadheader manufactured by our company.

Corum Svet Shakhtyora manufactured the first arrowshaped telescopic cutting tool with the longitudinal-axial cutting bit. This ensures efficient cutting of the rock at a large distance. The plant manufactured only roadheaders with the transverse cutting bit before. One more feature of the roadheader design is the increased strength of the cutting tool suspension unit, which allows for reducing loads on the drive and steel structures, and also enhancing their durability. The support delivery table with loading stars ensures high capacity at a working width of up to 3.2 m. The conveyor is equipped with a turning section with increased reliability that eliminates the use of flexible sheets.

According to Aleksandr Udovichenko, Head of Tunneling Equipment Department, this is the second KPD roadheader to operate at the Stepnaya Mine. The first roadheader has been in operation here since 2012, and it has a good reputation. Today, miners and machine builders discuss the terms of future supplies of this model.

Drill loaders for Don miners



Last August Corum Svet Shakhtyora completed the manufacture of a drill loader BPR-02 for Obukhovskoye Mine Office. It was made in the loading version, i. e. without a drilling module.

A BPR drill-loader is used to construct and inclined mine workings and blasting in mines hazarous with gas and dust, followed by mined rock loading into mine vehicles. The machine is equipped with a hydraulic drive of caterpillar trucks. The workstation is equipped with electric and hydraulic control panels. The design of the loading unit ensures high reliability of this unit and generating a large force of arms. The machine has an hydraulic system.

This is the third order for BPR by the Obukhovskaya Mine. The

company supplied such machines to miners in 2012 and 2014 years.

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This April, a similar machine was manufactured in series and completed with a drilling module to operate at the Sherlovskaya-Naklonnaya Mine, Donugol Mining Company. BPR, serial number 19, is the first machine of this type at this coal enterprise. Without waiting for completion of works, our partners came to see the machine assembly progress as per their order, and were pleased with what they saw.

We saw our KNF on TV!

In autumn DTEK miners accepted our KNF roadcutter system, and in winter its successful operation was shown on one of the central television channels. The miners, who prepared it for the new longwall face at the Stashkova Mine, DTEK Pavlogradugol, told journalists how our KNF saves 30 % of time required for such works. The company launched this system at the market in 2015. While preparing the second machine, the designers took into account all the comments received from the miners of Pershotravenskoye Mine Office resulted from the first KNF operation. And you can still watch the video on our website.



32 transformer substations were supplied by Corum to Kazzinc in 2016–2017.

Kazzinc purchases transformer substations manufactured by Corum annually, as they saw the true value of their safe and easy operation, power saving and other advantages.



The first lot of five transformer substations KTPV-400/6-0.4 was manufactured by Corum Svet Shakhtyora and supplied to Kazzinc, a large Kazakhstan zinc producer, last June. In total 30 substations KTPV-400 and 2 substations KTPV-250 were manufactured. Our transformer substations meet latest requirements for safety and energy efficiency, have a long service life and covered by 36 months warranty. Substations for this order were painted according to the European scheme, which increases their safety and eliminates incorrect actions of maintenance personnel.

Last year two KTPV-250 transformer substations were manufactured for the Marganetsky GOK and one transformer

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substation of the same model was manufactured for Stepnaya Mine, DTEK.

Three transformer substations KTPV-400 were delivered to Ojamaa, an Estonian mine, VKG KAEVANDUSED OÜ. In 2017 the supplies were made to Marganetsky

GOK and Yubileynaya Mine, DTEK Pavlogradugol.

Corum and Evrazruda entered into an agreement recently for suppling mine explosion-proof model of KTPV-630 for the Gorno-Shorsky mine. At Ugol Rossii & Mining 2016, our KTPV-D substation won the bronze medal and the Grand Prix of the contest "The Best Exhibit", outrunning the products of the competitors from the Czech Republic, Germany and China. Transformer substations are manufactured by Corum Svet Shakhtyora in Kharkov and at the production site of the Southern Branch of Corum Rus in Kamensk-Shakhtinsky, Rostov region. Today they are manufactured mainly for Kazakhstan, Russia, Estonia, and Ukraine.



Sergey Podolyan, Head of Electrical Equipment Department

"The company has been manufacturing transformer substations since 1961, and none of the USSR, and later the CIS companies manufactured them until 2003. We are still experts in this segment. Our cooperation with Kazzinc enterprises lasts for more than half a century. In particular, we have manufactured more than 80 KTPV substations for the client's mines since 2001. Before that, we supplied the older models."

New generation substation – to Vorkutaugol



Upon the request of Vorkutaugol, our engineers designed a new protection and control system for KTPV-D substations. As against commercial KTPV substations, new generation substations include vacuum switching equipment and protection and control microprocessors in HV and LV switchgears. This ensures safety due to fast response of equipment to any possible emergencies, reduces the impact of maintenance personnel on the electrical equipment, and simplifies and increases process control by mine personnel and mine dispatcher. Switching equipment in switchgears of new substations has a considerably longer service life: low voltage switchgears – 9 times, high voltage switchgears – 50 times. Protection functions are expanded. It is possible not only to monitor the main operating parameters, but also control the substation remotely. Electric power consumption is recorded technically.



Mine electric locomotives for Vorkuta miners

Th ree electric locomotives AM8D-900 were supplied by our company to Vorkutaugol owned by Severstal, a Russian company, last July. Our companies have entered into an agreement for supply three more electric locomotives of this model this year.

Electric locomotive AM8D-900 is a biaxial locomotive with individual frame suspension and one cab. It is designed to transport trains of cars on underground narrow gauge railways in main haulage gates in mines hazarous with gas and dust, where electric locomotives of the mine version with increased reliability and mine explosion-proof design are permitted. Our electric locomotives, which were supplied in the past years, are operated successfully at Kirov and Rasvumchorrsky mines of PhosAgro.



Cars for Lukoil from Druzhkovka

366 cars for the oil producer Lukoil manufactured by Corum Druzhkovka Machine-Building Plant. They will be used at Yareganeft Mining Office (Komi Republic).

The contract provides for supplied 330 mine freight cars VG1.3-600-1.6, as well as 34 timber cars VL-6 and 2 VLG-12 cars.

Mine freight cars models VG (VG1.0, VG1.2, VG1.3, VG1.4, VG1.6, VG2.5, VG3.3, VI1.5, VI2.0, VG4.5, VG4.5U) with a capacity of 1.0 to 4.5 m³, with solid bodies, intended to transport the rock and materials through underground workings and coal and ore mine sites.

Timber cars VL-6 are intended for were timber transportation through horizontal workings and mine sites. These are new products manufactured by the plant. Cars VLG-12 are intended for personnel transportation through mine workings.

ELECTRIC LOCOMOTIVE AMD8D

Weight – 8.8 t Length - 4,515 mm Rigid wheel base – 1,200 mm Gage - 550, 600, 750, 900 mm Motor power - 2x14 (2x13) kW Min performance radius - 8 m Hour operation mode: speed - 2.2 m/s (8.0 km/h), traction force - 18 kN Long-term mode indicators: speed - 3.4 m/s (12.0 km/h), traction force - 8.5 kN Design speed - 3.9 m/s (14.0 km/h) Clearance – no less than 100 mm Wheel rim diameter – 680 mm

New type of cars for ArcelorMittal Temirtau

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Corum Druzhkovka Machine-Building Plant started manufacturing 200 bottomdump cars VSh8-900 for ArcelorMittal Temirtau (Kazakhstan). A car VSh8-900 with a capacity of 3.12 m3 is intended for rock transportation through underground workings and coal mine sites. The bottom section of the car VSh8-900 is composed of three bottoms opened perpendicular to the longitudinal axis of the car. Moreover, each bottom leans against the previous and opens independently, in succession, one after another when the first bottom is unlatched.

MAIN FANS

Main fans for our key clients

Last year the Druzhkovka plant as part of our company manufactured a fan unit VRTsD-4.5 for Dnerpovskaya Mine, DTEK Pavlogradugol. This year the plant has started manufacturing an axial fan VOD-30M2 for Inguletskiy GOK.



Centrifugal fans VRTsD-4.5SM (as well as VTsD-47.5UM, VTsD-42.5, VTsD-31.5 M2 and VTs-31.5M2 manufactured by the company) are designed for main ventilation of coal and ore mines. They may also be used in ventilation systems of metallurgical, chemical, textile and other enterprises, for example, in blast furnace, casting, rolling and other floors. The company supplies them with a set of revers and air flow switch (KSRP) and without it. The flow end of the fan has a polymer wear-resistant



anticorrosive coating to extend its service life.

Impeller blades are filled with polyurethane foam, which prevents moisture accumulation in their cavities. Inlet boxes with railings and stair ensure safe access to the impeller and devices to remove water and rock accumulated in the lower section of boxes. An automated bearing lubrication system with automatic oil heating and cooling displays all the required parameters on the operator's control panel.



Anton Zaytsev, Head of Stationary Equipment Department

«The fan VOD-30V2 will replace the exhausted fan at Inguletskiy GOK. Equipment will be installed on the old

foundation. The improved design of the fan will ensure the connection to ventilation ducts with the lowest costs. The delivery term is autumn 2017.»

Improved fan VRTsD-4.5SM

Max rotation speed – 500 min⁻¹. Head: rated – 400 m³/s, within working zone – 125...593 m³/s Static pressure: rated – 7.500 Pa, within working zone –3.500...9.400 Pa Max static effi ciency factor – 0.86 Drive motor power – 3.800 kW

Axial two-stage fan VOD-30M2

Max rotation speed 500 min⁻¹ Head: rated125 m³/s, within working zone 50...225 m³/s Static pressure: rated 2.500 Pa, within working zone 800...3.000 Pa Max static effi ciency factor 0.8 Drive motor power 800 kW

The VOD-30M2 model is also designed for main ventilation of mines and open pits, and can be used at metallurgical, chemical and other plants to move the air and non-aggressive gases.

VOD Fans are manufactured both in the reversible version and with a set of KSRP and without it. The floor end of the fan can have a polymer wear-resistant anticorrosive coating upon the client's request. An antistall unit ensures stable operation within a wide range of tasks. A possibility for the fan installation on existing foundations of old fans reduces installation costs.



From Druzhkovka to Vorkuta

Our sheaves passed more than three and a half thousand kilometers, forty-three cities and towns before they reached their owners – miners of Zapolyarnaya, Vorkutaugol.

Last year, Corum Druzhkovka Machine-Building Plant manufactured five hoisting sheaves ShK2.5 and KShF4 with a rim diameter of 2.5 and 4 m. They are used for cyclic maintenance, guidance of steel main ropes of a double-drum cage hoister. The equipment is designed for operation in the Far North conditions. Sheaves will be installed on the headframe of the ventilation shaft No. 4 at the Zapolyarnaya-2 Mine.

"Special heat-resistant Becoplast KShF4 liner (Germany) is installed on the formed sheave rim. It ensures the required coefficient of friction between the rope and the pulley rim," Evgeny Petrov, a lead specialist in stationary equipment sales and development, says. " As far as this lining material is resistant to abrasion, it protects the hoisting rope against early wear. The ShK-2.5 sheave was designed especially for the shaft in accordance with the dimensions of the under-sheave area in the new headframe."

Our sheaves are not uncommon for Russian and domestic mines. This is proved by a number of supplies to large mining companies.

• The largest hoisting sheave Sh6A with a rim diameter of 6 m was supplied by the company to Norilsk Nickel this winter along with two four-meter pulleys Sh4A. They were especially manufactured for mining copper and nickel ores and can be operated in the Subarctic climate at temperatures of -45 to +45 °C. Sh4A sheaves are intended to guide and maintain hoisting ropes of the double-drum hoister in the downcast shaft of Taymyrsky mine,



which is one of the deepest mines. On the Eurasian continent. Due to the ore body occurrence features, mining is performed from a depth of 1.450 m from the surface. The Sh6A pulley coated with anticorrosive polyurethane enamel is designed for operation at the outdoor site of the 50 m headframe at Zapolyarny mine.

• A contract for delivering a headframe sheave by our company to Severny Kuzbass was concluded directly at the fair Ugol Rossii & Mining. Druzhkovka plant workers started works immediately.

• One more Sh4 sheave was manufactured last summer by the order of Uralkaliy for its operation at SKRU-2 in Solikamsk. To extend the service life of the sheave under the potassium mine conditions, it was coated with epoxy material Hempadur Multi-Strength GF35870.

 4 ShPK+1120 sheaves and 4 ShK-2.3 sheaves were manufactured by our company to reequip the headframe at Gremyachinsky GOK of Eurochem-VolgaKaliy. Notwithstanding the small dimensions and weight (1 t), ShPK-1120 sheave can withstand a load of 70 t. The equipment is coated with abrasion-resistant enamel Hempadur.





New product – deflection sheave



Corum Druzhkovka Machine-Building Plant manufactured a deflection sheave of split type and new design for the Heroev Kosmosa Mine, DTEK Pavlogradugol.

A 14 t sheaves is an integral part of a four-rope hoisting machine CSh5x4. It ensures the required angle of the traction sheave by head ropes. It is also designed to maintain the set distance between axes of suspended hoisting vessels. In structural relation, the sheave is the assembly of individual sheaves with a diameter of 3 m, mounted on the same shaft. Each of them freely rotates in relation to the other sheaves in the assembly and receives the load from one rope. Sheaves rims are lined with Becoplast heat-resistant lining (Germany).

The new design ensures the performance of the hoisting machine and the sheave itself under conditions of increased vibration. The new method for liner installation and fixation on the rim enables installation during one repair shift, thereby reducing operating costs.

The modular design of each sheave and bearing units allows for replacing sliding sleeves or repairing a single pulley directly on site – without demounting and disassembly of the entire construction.

Similar sheaves with a diameter of 2 and 4 m can be manufactured for multi-rope machines MK and TsSh.

New skipes for miners of Far North and Donbass

<u>Corum Druzhkovka Machine-Building Plant manufactures</u> <u>mine skips of individual design.</u>



A SN15-223-1.1 mine skip with a fixed body is designed especially for Zapolyarnaya Mine. The loading space is 14 m³ of loaded rock. It is completed with a suspension unit UPS30-04. The lower section of the body, gate and tray are lined with steel sheet Hardox 6 and 10 mm thick.

Corum Druzhkovka Machine-Building Plant manufactured two skips R-474 with deflection body for Belozerskoye ALC.

Another coal skip with a lifting capacity of 13 t was designed especially for DTEK Pavlogradugol. Our engineers got to know the operation of the similar unit at Dneprovskaya Mine and developed a new model with enhanced functionality. The skip walls are equipped with removable liner sheets of stainless steel; the design of the bottom and lower beam has been changed. The body has additional hinged folding doors in case of emergency transportation of miners to the surface. Special process windows allow fixing the skip in the shaft while replacing a rope, and a new reinforced rubber

construction of the umbrella diverts coal spills.

A skip with a tipping body SO1.5 with a capacity of 1.5 m^3 was manufactured for Obukhovskove Mine Office. It is intended for coal spill, rock, dirt collection and transportation to the location of unloading from the lower section of the shaft through an inclined roadway with a dip angle of 70° . Our designers studied the principle and conditions of the skip operation, analyzed all the disadvantages of the similar unit and discussed this with the clients specifying the new equipment type. The new design unifies bearing units of wheelpairs, which makes it possible to use units of another wheeled mine transport.

Our engineers also increased the reliability of the body. To ensure additional strength of a weld riveted frame, a number of special inserts were installed. Pressure springs make the skip unloading smoother and the process itself failure-free.

In total 7 skips with various capacities were manufactured in 2016.

Integrated supplies

The Company has carried out the entire set of comprehensive supplies of the hoisting equipment to its clients.



A parachute PTKA20, suspension UP20 and suspension for skips UPS12.5 were included into the set of equipment for the Abayskaya and Tentekskaya Mines, ArcelorMittal Temirtau.

A PTKA parachute is a safety device intended to catch and brake smoothly a cage in the shaft in case of a hoisting rope breakage. A special parachute catcher is installed on the cage roof, which actuates in case of the rope breakage. It holds the cage by gripping its braking ropes suspended throughout the length of the shaft. The parachute is used to connect the hoisting rope to the cage. UPS12.5 connects the hoisting rope to a skip of the singlerope vertical hoister. The feature of this unit is a wedge KD socket for two-sided rope gripping, which is characterized by reliable and easy operation.

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Cages 1NOV330, 1NOV255 and 1NOV400, as well as parachutes and suspension units were manufactured by Corum Druzhkovka Machine-Building Plant for the Obukhovskaya and Dalnyaya Mine, DTEK.

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A set of hoisting equipment composed of a mine skip SU6.3, cage 2KO, parachute PTKA20, and suspension unit UP was manufactured for Tsentralny GOK, Metinvest.

A mine skip SU6.3 with a deflection body, with a max lifting capacity of 17 t is intended to transport magnetite quartz to the surface.



This is a strong rock with high abrasive properties, which makes load-bearing walls of the body and swinging-telescopic bottom of the skip to be lined with removable sheets of Gadfild steel.

To move in box conductors of the vertical shaft, roller slides are installed in the upper and lower sections of the skip frame. To fasten a hoisting rope to the skip beam, a socket 4KKB is included into the set.

A two-floor cage 2KO-3.1-8.5 is intended to transport personnel, loaded cars, equipment and auxiliary materials in the vertical shaft. The construction reinforced with the special material can transport a load weighing 8.5 t. The area of two floors is sufficient for simultaneous transportation of 38 persons. The cage is equipped with Raduga radio communication system for communication with the hoister operator.

The cage is equipped with a mine parachute PTKA-20 and suspension unit UP20.

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