KGHM ZANAM

Higher safety standard

MACHINERY AND EQUIPMENT FOR MINING

TABLE OF CONTENTS

ABOUT US

KGHM ZANAM S.A.
is one of the leading manufacturers of machinery and equipment for the mining industry in Poland. The Company supplies equipment for handling systems, transportation units, stone mining and open cast mines. We also play a significant role as a manufacturer of iron and steel castings.

Company's current range includes such categories of products and services as mining machinery, conveyor belts, crushers, steel structures, castings, mining bolts, flotation machines, shaft equipment, servicing, repairs and production maintenance. For many years, the company has been the main supplier of mining machinery and equipment for mines and plants of the Capital Group of KGHM Polska Miedź S.A. It also provides equipment and services to other underground mining facilities in Poland like salt, zinc, lead, gypsum and anhydrite mines.

KGHM ZANAM sells its products to its clients oversees. Based on a number of service agreements, the Company provides professional service and technical support to safeguard production and maintenance of machinery in mining plants. The plant continues to expand its international distribution network. In addition, it is possible to adapt the machines to different operating conditions in terms of their design and equipment.

LOADERS

KGHM ZANAM offers a wide range of loaders sized to fit mine workings of different cross-sections. While the latest loader models meet stringent emission standards, they are supplied with intelligent monitoring and diagnostic systems and are ready for the implementation of remote control on them.

ARTICULATED WHEEL LOADERS

The articulated wheel loaders manufactured by KGHM ZANAM S.A. are intended for loading and carrying excavated material from mine faces in underground mines excavating metal ore and mineral resources. They can form an autonomous haulage system in mines or be used with other transporting machines, e.g. haul trucks.

The machines come with a closed capsule-type operator protection structure which protects him against crushing when hit by rocks carrying an energy of 60 kJ. Depending on the version, the loader bucket capacity ranges from 1.6 m^3 to 12.0 m^3, with a nominal lifting capacity of 30 kN to 172 kN.

The height of the machines is 1.50 m to 2.7 m so they are suitable for mine workings with a minimum height of 1.7 m. The loaders are designed to work in mine workings with longitudinal grades of 13-15° and transverse grades of 5-8°.

Selected models are equipped with intelligent monitoring and diagnostic systems which analyse the data flowing from assemblies of a loader on an ongoing basis. The machines can be fitted with central lubrication system and hydraulic stabilisation of the boom. To provide ergonomic and comfortable working conditions, air-conditioning systems can be installed in the cabs. Depending on a client's preferences, the steering system controlled with joysticks is also possible. Optionally, a weighing system for transported material, vision system, collision protection system and a remote-activated fire system can also be installed.

We develop individual machine designs and equipment tailored to the operating conditions and client requirements. For the 800, 900 and 1000 Loader series, a bucket with a withdrawable partition is available as an option. For some of the 400 and 700 Loaders, a quick-release coupling is available as an option to attach interchangeable accessories in the operating system.

Table

		LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	TOTAL WEIGHT [kg]	BUCKET CAPACITY [m³]	LIFTING CAPACITY [t]	COMBUSTION ENGINE POWER [kW]	EXHAUST EMISSION [Stage]
300 SERIES	LKP-0301	7540	1760	2090	11200	1,6	3	84	Stage 2
	LKP-0301A	7540	1760	1750	10300	1,6	3	84	Stage 2
400 SERIES	ŁK-1M	8800	2430	2200	15000	2,0	4	86,5	Stage 3A
	LKP-0403D	8700	2780	1750/1800	14800	2,0	4	93	Stage 2
	LKP-0405	8800	2400	2200	15100	2,0	4	91	Stage 3A
	LKP-0406	7870	1800	2100	15400	1,5	4	90	Stage 3A
700 SERIES	LKP-0701	8750	2550	2400	19500	3,5	6,8	160	Stage 3A
	LKP-0703	9000	2800	2500	20500	3,3	6,8	168	Stage 5
800 SERIES	LKP-0805 C version	9970	3030	1800/2100	26800	3,5	8	138	Stage 2
900 SERIES	LKP-0900B	10300	3300	1500/1750	28000	3,8/4,2	9	181	Stage 3A
	LKP-0903	10600	3150	1750/2100	29500	4,0/4,5/4,6	9	181	Stage 3A
1000 SERIES	LKP-1001	10140	3000	1750	29500	4,6	10	200	Stage 5
	LKP-1001M*	9840	2590	2320	21200	3,3	10	200	Stage 5
1700 SERIES	LKP-1701	11400	3305	2370	46500	8,6	17,2	330	Stage 4
	LKP-1701M*	11400	3060	2700	46500	8,6	17,2	330	Stage 5

*design phase

length	width	height	combustion engine power	exhaust emission	lifting capacity
7540–11400 [mm]	**1760–3060 [mm]**	**1500–2700 [mm]**	**84–330 [kW]**	**2–5 [Stage]**	**3,0–17,2 [t]**

HAUL TRUCKS

	LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	TOTAL WEIGHT [kg]	LOAD BOX CAPACITY [m³]	MAXIMUM PAYLOAD [t]	COMBUSTION ENGINE POWER [kW]	EXHAUST EMISSION [Stage]
CB4P-24K	10300	3450	1900/2000/2200	25800	13,5	24	172	Stage 2
CB4-20TB	10300	3350	1900/2000/2100	26000	11,1	20	149	Stage 3B
CB4-24TB	10520	3650	1900/2000/2100	27500	13,5	24	179	Stage 3B

The low-profile haul trucks manufactured by KGHM ZANAM are designed to work in relatively low mine workings. A good stability of the trucks and properly selected drive systems enable work in mine workings with longitudinal grades (in the direction of travel) of up to 8° and in mine workings with transverse grades of up to 5°.

length	width	height	combustion engine power	exhaust emission
10300–10520 [mm]	**3350–3650 [mm]**	**1900/2000/2100–2200 [mm]**	**149–179 [kW]**	**3A–3B [Stage]**

HAUL TRUCKS

The haul trucks manufactured by KGHM ZANAM are designed for hauling excavated material from mining faces to department transfer stations in mineral ore mines not determined as methane explosion zones

The trucks are equipped with a special push-out unloading system, where the hauled cargo is discharged from the load box by a sliding wall and a moving box. This unloading system guarantees that not even small amounts of excavated material are left in the cargo space. A fixed truck height retained throughout the unloading process means that higher drifts at the handling stations are not required. The trucks boast high manoeuvrability, which increases the efficiency of haulage in narrow mine drifts. The CB4-20TB and CB4-24TB “4×4” trucks feature the so-called additive drive system. This is an optional system fitted with additional hydraulic motors mounted on hubs. When traction is lost, an operator of the machine can switch the additional drive on by transmitting torque to the hubs.

DRILLING AND ROOF-BOLTING TRUCKS

Self-propelled drilling and roof-bolting trucks manufactured by KGHM ZANAM are essential to prepare a mine face for blasting and protect an exposed roof with roof-bolting. Powerful working tools enable you to efficiently make holes of desired diameter and length.

SELF-PROPELLED DRILLING AND ROOF-BOLTING TRUCKS

Self-propelled drilling and roof-bolting trucks are single-station, single-boom machines designed for drilling blast holes (drills) and insert expansion anchors and adhesive anchors (roof bolt inserter) in underground workings of non-methane mines where non-ferrous metal ores and/or mineral resources are extracted.

The drill working system is equipped with a telescopic boom and a drilling frame. The drilling frame allows blast holes to be drilled with a min. length of 1,900 mm and hole diameters between Ø28 mm and Ø64 mm depending on a rod used. The roof bolt inserter working system is equipped with a telescopic boom and a bolting turret. Depending on the type of a bolting turret, installing expansion anchors and adhesive anchors with lengths within 1.6-2.6 m is possible. The turret can come with a rotary or rotary hammer drill. The drilling and roof-bolting trucks feature a cab which prevents an operator sitting at the workplace inside from being crushed in the event of a vertical impact with energy of up to 60 kJ on the machine. Good stability and a properly selected drive system allows for using the machine for extraction in mine voids with longitudinal grades (in the direction of travel) of up to 15° and mine voids with transverse grades of up to 8°.

Table

		LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	TOTAL WEIGHT [kg]	HOLE LENGTH [mm]	BOLT LENGTH [m]	HOLE DIAMETER [mm]	COMBUSTION ENGINE POWER [kW]	EXHAUST EMISSION [Stage]
SWW	SWW-1HS with RRW frame	13900	2560	2000	18000	3200 (most often 4450)	-	28–64	93	
	SWW-1HS with RT-1 frame	12000	2560	2000	18800	2900/1900	-	28–64	93	
	SWW-1/1H	11400	2500	2200/2800	17700	3200–4450	-	28–38	93	
	WIR-170	13500	2300	1700/2000	19800	3210	-	28–104	100	Stage 3A
SWK	SWK-1HS	12160	2560	2000	18000	-	1,6–2,2	28–38	93	
	SWKN-1/1A	11100	2000	1750	14700	-	1,6–1,8	28–38	74	
	SWKN-1/1C	11200	2000	2000	14700	-	1,6–1,8	28–38	74	
	KOT-170	11700	2300	1700/2000	19900	-	1,6–1,8	28–38	100	Stage 3A

length

11100–13900 [mm]

width

2000–2560 [mm]

height

1700–2800 [mm]

engine power

74–100 [kW]

hole diameter

28–104 [mm]

BLASTER TRUCKS

Blaster trucks manufactured by KGHM ZANAM improve the process of blast hole loading and thus shorten the time spent by the crew at mine faces with high risk of afterbursts. The latest models come with two independent power supplies (battery and diesel).

BLASTER TRUCKS

The WS-151, WS-171 and WS 172 blaster trucks are self-propelled mining machines on tyre chassis, designed for the following applications in underground, non-methane mining plants where metal ores are extracted, and in mining plants where minerals other than hard coal are extracted:

- manufacturing emulsion explosive materials and loading it mechanically into blast holes
- carrying unarmed explosive materials, detonation cords and/or fuses
- carrying two persons (blasters) apart from a truck operator
- lifting two persons (blasters) on a mobile platform for blast holes loading (WS-171 and WS-172)

The WS-151, WS-171 and WS-172 blaster trucks are equipped with an operator's cab on the tractor and a compartment on a platform designed to carry two blasters. The protective structures of the operator's workstation and the blaster compartment meet the requirements of the European standards for structures protecting operators against FOPS (Falling Object Protective Structures). The protective structures are capable of resisting dynamic loading of up to 60 kJ.

A good stability of the trucks ensures drivability, both straight and turning towards the tractor and towards the platform, in mine workings with longitudinal grades (in the direction of travel) of up to 15° and with transverse grades (in the direction perpendicular to travel) of up to 8°. The operating systems of the WS-151 and WS-171 blaster trucks are supplied from two alternative sources, i.e. hydraulic pumps driven by the truck combustion engine or by a 500 V electric motor, where power is supplied from the mine electric network.

	LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	TOTAL WEIGHT [kg]	COMBUSTION ENGINE POWER [kW]	EXHAUST EMISSION [Stage]	OTHER CRUCIAL DATA
WS-151	8600	3150	1500	17800	100	Stage 3A	
WS-171	9760	2750	1700	18900	100	Stage 3A	Work platform for working at heights
WS-172	9600	2700	1800	22800	115	Stage 3B	Work platform for working at heights

The working system of the WS-172 type is powered by hydraulic pumps driven by the combustion engine and electric energy from batteries mounted on the truck. The innovative battery drive of the operating system and the new basket design enable blasters to instantly load blast holes after entering the mine face, which also protects them from cave-ins. Using battery power instead of a combustion engine maintains zero fume and heat emissions into the environment. The machine also has a comfortable operator's cab, emulsion matrix hose reel and a display for the parameters of the drive and operating systems.

length	width	height	combustion engine power	exhaust emission
8600–9760 [mm]	**2700–3150 [mm]**	**1500–1800 [mm]**	**100–115 [kW]**	**3A–3B [Stage]**

AUXILIARY TRUCKS

The auxiliary trucks manufactured by KGHM ZANAM are used for assisting core production operations. A good design and good manoeuvrability of the auxiliary trucks ensure easy access to mine faces they are used e.g. to remove rock overhangs, refuel machines and sprinkle mine faces.

SELF-PROPELLED FUEL AND LUBRICATION TRUCKS

The self-propelled fuel and lubrication trucks are designed to be operated in mines for supplying self-propelled mining machines with fuels, oils and greases. Oil and fuel is supplied by pumps with an electric drive, where the power to drive the pumps is taken from vehicle starter batteries, or a hydraulic drive. The operator's work is facilitated by spring hose reels. Oils and fuels are distributed by their respective pump units with flow meters. It is possible to use tanks with different capacities according to individual client requirements.

	LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	TOTAL WEIGHT [kg]	TOTAL TANK CAPACITY [dm³]	COMBUSTION ENGINE POWER [kW]
SWPS-3	8560	2400	2200	15500	5000	84
SWPS-4A	8800	2350	2200	14300	4200	93

length

8560–8800 [mm]

width

2350–2400 [mm]

height

2200 [mm]

tank capacity

4200– 5000 [dm³]

SELF-PROPELLED DRAINING AND SPRINKLING TRUCKS

The SWOZN-1 self-propelled draining and sprinkling truck is designed for water carrying, draining and sprinkling mining faces, haulage roads and mine workings, in underground workings of non-methane mining plants where metal ores are extracted, and in mining plants where minerals other than hard coal and metal ores are extracted. The SWOZN-1 truck features a cab which prevents an operator sitting at the workplace inside from being crushed in the event of a vertical impact with energy of up to 60 kJ on the machine. A good stability and properly selected drive system enable to operate this machine in mine workings with longitudinal grades (in the direction of travel) of up to 15° and in mine workings with transverse grades of up to 8°. It is fitted with a tank with a capacity of 2,200 dm^3 for a standard option tank, or 2,600 dm^3 for an enlarged tank, and a pump enabling suction of water from a max. depth of 6 m. The sprinkler system operates at a distance of up to 25 m.

	LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	TOTAL WEIGHT [kg]	TOTAL TANK CAPACITY [dm³]	COMBUSTION ENGINE POWER [kW]
SWOZN-1	9500	2500	1780/1830	13900	2200	93

length	width	height	tank capacity
9500 [mm]	**2500 [mm]**	**1780/1830 [mm]**	**2200 [dm³]**

SELF-PROPELLED RIPPING TRUCKS

The self-propelled ripping trucks are designed for ripping overhangs and sidewalls of mine faces and workings in non-methane underground ore and mineral mines. Their principle of operation is to drive the whole truck moderately forward at the ripping site, using the energy from machine movement and the towing power of the drive system. The high manoeuvrability and durability of the machine ensure high efficiency of the work performed. Depending on the individual user needs, it is possible to install extension booms with lengths from 4.50 m to 6.25 m and claws with widths from 0.8 m to 2.6 m.

	LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	TOTAL WEIGHT [kg]	BOOM LENGTH [m]	CLAW WIDTH [m]	COMBUSTION ENGINE POWER [kW]	EXHAUST EMISSION [Stage]
SWB-2N/Z	12600	3050	1800/2100	25000	6,00	1,6	138	Stage 2
SWB-900B	10300	3300	1500	24800	3,05	2,6	181	Stage 3A
SWB-702	12000	2530	2500	24200	6,25	0,8	168	Stage 4

TRANSPORT TRUCKS

The self-propelled transport trucks manufactured by KGHM ZANAM are used for transporting underground workers and selected materials. Efficient drive systems and high manoeuvrability enable safe transportation of up to a dozen or so employees to mining work zones.

SELF-PROPELLED TRANSPORT TRUCKS

The SWT self-propelled transport trucks are designed for various types of transportation and installation work in mines. The Toyota Land Cruiser design-based trucks are used to carry people, blast and other materials, and to tow trailers (e.g. portable compressor) in underground workings of non-methane mining plants where metal ores are extracted, and in mining plants where minerals other than hard coal and metal ores are extracted. The vehicles are suitable for transporting a dozen or so people while powered by naturally aspirated diesel engines. Driving safety and comfort in difficult underground conditions are enhanced by headlamps illuminating turns, wider front wheel track and springs in suspension, characteristic of off-road vehicles. In addition to the standard disc brakes, leak-proof wet disc brakes are used. The cables are oil-resistant, whereas the electrical system and programmable logic controller are defined by durability and high resistance to harmful working conditions and higher temperatures. Some of the mechanical parts are reinforced and sensitive components are provided with protections, which translates into longer service life thus directly reducing operation costs.

The other self-propelled transporting trucks enable transportation of parts with a possibility of mechanical unloading by means of a mechanical crane. Additionally, seats for carrying maintenance groups are installed under the height-adjustable protective canopy. The platform is provided with a metalworking bench vise. Welding works are possible thanks to a welding machine with hydraulic drive installed on the tractor. An integrated air compressor can be used to drive various types of pneumatic tools for pumping wheels, etc. While the trucks are equipped with a hydraulic quick coupler to drive a selected hydraulic receiver, they can also be adapted to carry cylinders of compressed technical gases.

	NUMBER OF SEATS	LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	DRIVE	PERMISSIBLE PAYLOAD [kg]	CLEARANCE [mm]	APPROACH AND DEPARTURE ANGLES FRONT/REAR	FORDING DEPTH [mm]	ENGINE TYPE	MAX. POWER --------- MAX. TORQUE	BRAKE SYSTEM
SWT ROBUST M10	10	5650	2025	1880-2130*	4x4	1000	210/240**	30º/16º	700	four-stroke, diesel, Six-in-line engine 4,164 cm³	96 kW @ 3800 rpm --------- 285 Nm @ 2200 rpm	WET
SWT ROBUST S10	10	5650	2025	1880-2130*	4x4	1000	210/240**	30º/16º	700			DRY, disc front/rear
SWT ROBUST M14 M	14	5950	2025	1880-2130*	4x4	1400	210/240**	30º/14º	700			WET
SWT ROBUST M14	14	5950	2025	1880-2130*	4x4	1400	210/240**	30º/14º	700			WET
SWT ROBUST S14	14	5950	2025	1880-2130*	4x4	1400	210/240**	30º/14º	700			DRY, disc front/rear

length
5650–5950 [mm]

width
2025 [mm]

height
1880-2130* [mm]

number of seats
10–14

* depending on the vehicle version (low 1880 / high 2130) and the tyres used (225/75R16 or 235/85R16)
** depending on the tyres used (225/75R16 or 235/85R16)

	LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	TOTAL WEIGHT [kg]	COMBUSTION ENGINE POWER [kW]	PLATFORM
SWT-3	9900	2400	2200	12500	84	carrying people, number of seats: 25, carrying materials with max. weight of up to 3,500 kg
SWT-3D	9850	2400	2200	13000	84	carrying materials with lengths of up to 4.8 m and max. weights of up to 3,000 kg
SWT-3K	8100	2400	2200	12000	84	carrying dangerous and explosive materials, carrying loads with lengths of up to 2.4 m and max. weights of up to 3,500 kg, additional guard station
SWT-3O	7500	2400	2200	13000	84	carrying oils and fuels, tank capacity is 2 × 1,200 litres, dispensing fuel with internal combustion engine running
SWT-3S	9900	2400	2200	12500	84	carrying loads with lengths of up to 4 m and a maximum weight of up to 3,000 kg, possibility of loading and unloading with a hydraulic articulated crane with a maximum lifting capacity of 998 kg; possibility of welding work with a maximum welding current of 400 A
SWT-3T	8700	2400	2200	13500	84	carrying cylinders with technical gases, capacity of up to 16 cylinders

length
7500–9900 [mm]

width
2400 [mm]

height
2200 [mm]

engine power
84 [kW]

STATIONARY CRUSHERS

KGHM ZANAM offers products for crushing both materials with low and medium susceptibility to shredding and products used for crushing the toughest rocks. The crushing implements are characterized by high efficiency and possibility of precise adjustment of the crushing degree.

JAW CRUSHING UNITS

The jaw crushing units are designed for crushing materials using a compressive strength of up to 300 MPa, typically, basalt, granite, amphibiolite, gneiss, quartzite, limestone, dolomites and construction waste. The impact crushing units are designed for crushing mineral materials and construction waste of high and medium hardness, susceptible to impact crushing, e.g. granite, dolomite, limestone. The impact crushers can also be used to recycle road and construction waste materials such as: concrete, demolition debris, asphalt concrete, etc. The resulting aggregate is characterized by high cubicity. KGHM ZANAM offers crushing sets in sliding or stationary design versions, and in sets tailored to individual customer needs (options include magnetic separator, sprinkler system, automatic lubrication system, etc.). Designing load-bearing structures of crushers to suit individual customer requirements is possible.

max. dimension of the feed

500–900 [mm]

crushing capacity

40–110 [m³/h]

Technical data of jaw crushers

*Crushing capacity depends on the type of material to be crushed and the size of the feed

	CRUSHING CAPACITY [m³/h]	MAX. DIMENSION OF THE FEED [mm]	GAP CONTROL RANGE [mm]	WEIGHT [Mg]	COMMENTS
KDSN 130/75E	Up to 110	900	50-145	32,0	Sliding jaw crusher set with electric drive for all units. Supply voltage 400 V / electric motor 110 kW
KMS 100/55E	Up to 60	500	40-105	22,5	Sliding jaw crusher set with electric drive for all units. Supply voltage 400 V / electric motor 90 kW

Technical data of impact crushers

*Crushing capacity depends on the type of material to be crushed and the size of the feed

	CRUSHING CAPACITY [m³/h]	MAX. DIMENSION OF THE FEED [mm]	DEGREE OF CRUSHING	WEIGHT [Mg]	COMMENTS
KMU 100/110	60	500	1:10-1:50	26,0	Sliding impact crusher set with electric drive for all units. Supply voltage 400 V / electric motor 110 kW
KKL 100E	Up to 60	500	1:10-1:50	28,0	Container set with electric drive for all units. Supply voltage 400V
KKL 50E	40	500	1:10-1:50	21,5	Container set with electric drive for all units. Supply voltage 400V
KDU 120/130E	Up to 110	900	1:10-1:50	26,0	Sliding crusher set with electric drive for all units. Supply voltage 400 V / electric motor 132 kW

Technical data for mining industry crushers

*Crushing capacity depends on the type of material to be crushed and the size of the feed

	CRUSHING CAPACITY [m³/h]	MAX. DIMENSION OF THE FEED [mm]	DEGREE OF CRUSHING	COMBUSTION ENGINE POWER [kW]	WEIGHT [Mg]	COMMENTS
KKL 50GE/KKL 50E	Up to 50	500	1:10-1:50	-	21	Container set with electric drive for all modules. Supply voltage 500 V (GE or the mining version) or 400 V (E for surface version)

BAND CONVEYOR HAULAGE SYSTEMS

The belt conveyor haulage systems manufactured by KGHM ZANAM are one of the most effective means of transporting the excavated material in underground conditions. Over 170 km of the KGHM ZANAM conveyor routes are operated in the mines where copper ore is extracted. The company is constantly implementing solutions that reduce costs and automate the processes of belt transport.

BAND CONVEYOR HAULAGE SYSTEMS

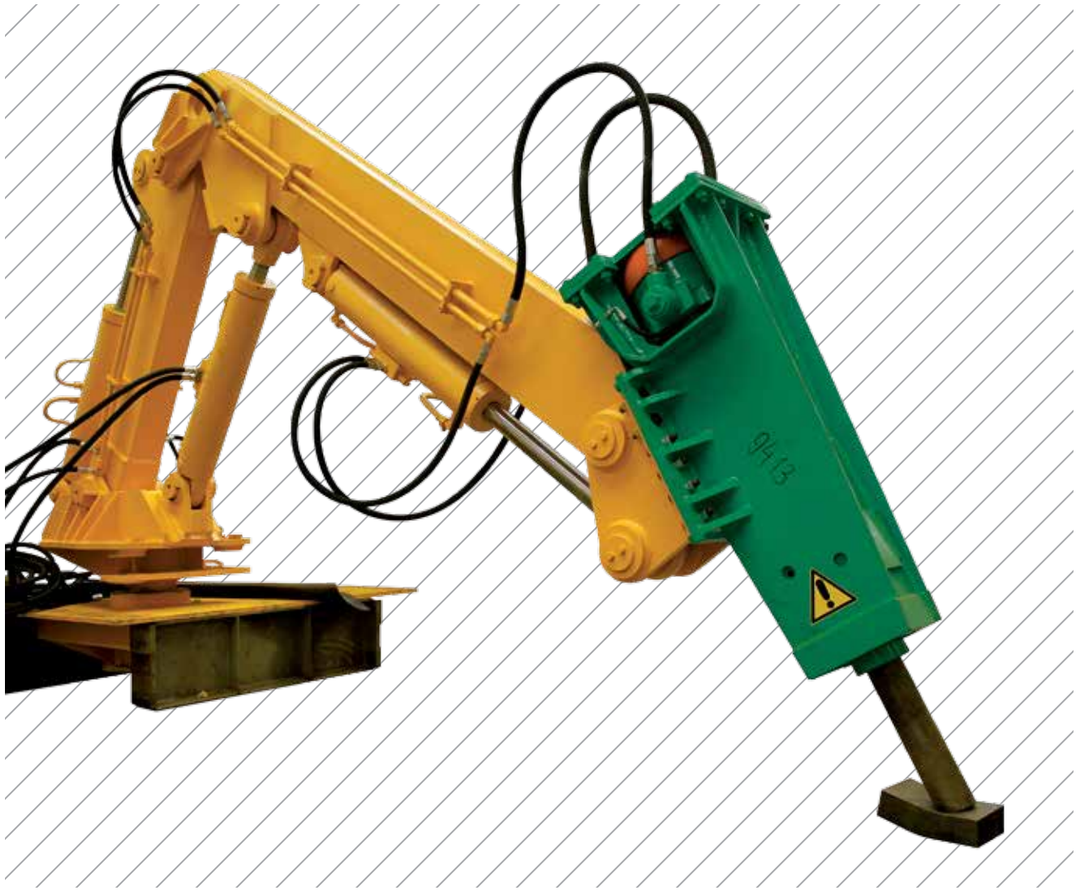
The band conveyor haulage systems are used for the horizontal transport of excavated material in underground, non-methane hard rock mines. The excavated material hauled and crushed at transfer stations is portioned on a belt conveyor by means of a chute and then transported (directly or by rail) to mining shafts or retention tanks in a department.

Among the belt conveyor haulage systems manufactured by KGHM ZANAM include belt conveyors with tower tensioning, conveyors with follow-up tensioning and belt conveyors with winch tensioning.

CONVEYOR TYPE	LEGMET 800	LEGMET 1000	LEGMET 1000/160	LEGMET 1200/160	LEGMET 1200/320	LEGMET 1000/250	LEGMET 1200/250	LEGMET 1400/320
BAND WIDTH [mm]	800	1000	1000	1200	1200	1000	1200	1400
DRIVE STATION POWER [kW]	2-3 x 110	2-3 x 110	1-3 x 160	2-4 x160	3- 4 x 320	2–4 x 250	2–4 x 250	3- 4 x 320
BELT VELOCITY [m/s]	2,0 2,5	2,0 2,5	2,0 2,5	2,0 2,5	2,5	2,5	2,5	2,5
CONVEYING CAPACITY [T/H] FOR γ=1,7t/m³ Kz=0,8	900	1100	1100 - 1700	1500 - 2000	1500 - 2500	1500 - 2000	1500 - 2500	2000 - 2500
MAX. LENGTH [M] FOR 0° GRADE OF THE CONVEYOR ROUTE	1000	1500	2000	2000	3000	3000	3000	3000
CONVEYOR GRADE (min/max)	-5 / +5	-5 / +5	-5 / +5	-5 / +5	-5 / +5	-5 / +5	-5 / +5	-5 / +5

ROCK BREAKERS

KGHM ZANAM's rock breaking machines play an important role in the crushing process and reduces the costs of material to be hauled. The company offers also remote-controlled devices, which translates into greater efficiency and safety for the operator. Development work is underway towards complete automation of the crushing process at the transfer stations.



ROCK BREAKERS

The implements for breaking rocks are integrated equipment of transfer stations. The transfer stations play an important role in carrying excavated material to the surface, as it is here that material is handled from tyre transport onto belt conveyors. The excavated material hauled to these stations has typically different gradations – from grains of 1 mm in diameter to rocks of several cubic metres in volume. The stationary equipment for crushing solids with the use of hydraulic impact hammers reduces the size of excavated material so that it can fall through the mesh of the grate, while the risk of damaging the conveyor is diminished.

		MINE WORKINGS PARAMETERS			CRUSHING IMPLEMENT SPECIFICATIONS			HYDRAULIC HAMMER PARAMETERS
	CONTROLLER TYPE	HEIGHT [mm]	WIDTH [mm]	LENGTH [mm]	BOOM RANGE [mm]	BOOM SWIVEL ANGLE [o]	TOTAL WEIGHT [kg]	IMPACT ENERGY [J]
URB/ KLIM	local	min. 5000	min. 6000	min. 10000	4700	±40	approx. 7000	up to 1900
URB/ ZS-1R	remote	min. 5000	min. 6000	min. 10000	4700	±40	approx. 7000	up to 1900

impact energy	controller type	controller type
1900 [J]	local	remote

CASTINGS

KGHM ZANAM manufactures a wide range of castings, offering low-to-medium volume or single-unit production. Heat treatment of castings is carried out in modern and fully automated furnaces. The manufactured products show durability and resistance to abrasion.

KGHM ZANAM Foundry Branch regularly offers cast steel and cast iron castings manufactured in several product groups, e.g.:

- castings for jaw, cone, impact and hammer crushers
- castings for mills used in the processing of metal ores, mineral resources, hard coal and brown coal (linings, armour plates, perforated plates, vents, feeds, pin caps, beaters, shields, and others)
- teeth and links for track chains in excavators and loaders
- castings for mining backfill accessories (pipes, elbows, tees)
- components for heavy-duty machines (joints, brake bodies, hubs)
- castings of anode plates and casting dies
- castings for haul trucks and conveyors
- other castings as per Client's specifications

The KGHM ZANAM Foundry completes purchase orders for many areas of industry, such as rock handling, mining, metallurgy, chemical, electrical power, machinery, transport and railway sectors.

The production profile includes about 2,000 product items per year, made with ca. 50 grades of cast steel and cast iron, ranging from 5 kg to 5 tonnes. Such a large volume of products available allows us to meet the expectations, requirements and needs of even small individual clients. The foundry has the necessary production potential as well as the technological background enabling the complex processing of purchase orders at every production stage, namely:

- process engineering design
- manufacture or adaptation of foundry models
- casting
- heat treatment
- machining
- testing on the finished product

The foundry has implemented a quality assurance systems integrating PN-EN ISO 9001:2015-10, PN-EN ISO 14001:2015-09 and PN-ISO 45001:2018-06. Experienced staff, modern technical facilities and certificates ensure high quality of our castings.

CAST STEEL CASTINGS

The foundry specialises in manufacturing castings with cast steel produced according to national and European standards. Steel grades made according to our internal specifications are also produced. Our range features grades of structural carbon steel, structural alloy steel and cast steel for quenching and tempering with increased strength and abrasion resistance. High-manganese wear-resistant cast steel, whose high quality ensures long life of the spare parts manufactured for machines used in the rock handling sector, forms a sizeable part of the production.

Alloys with chemical composition and properties according to individual orders and needs can also be produced on request.

All cast steel castings undergo heat treatment processes in modern, fully automated furnaces (standardisation, annealing, quenching, tempering and others).

The following types of castings are available:

- structural carbon cast steel
- structural alloy cast steel
- cast steel for quenching and tempering with increased strength and abrasion resistance, manufactured in accordance with national and European standards
- high-temperature creep-resistant cast steel

Cast steel castings are produced in a wide weight range, depending on the batch and type of moulding:

- low-volume and medium-volume production in machine moulds from 5 kg to 100 kg
- single-unit production in manual moulding from 15 kg to 4,500 kg

CAST IRON CASTINGS

The Foundry Department offers castings made of grey and ductile cast iron, which is included in both national and European standards. Producing these cast irons with the technology of electric arc furnaces enables us to obtain metals of the highest quality, required chemical composition, properties and structure, which even most demanding clients appreciate. The following types of castings are available:

- gray cast iron
- ductile cast iron
- alloy cast iron

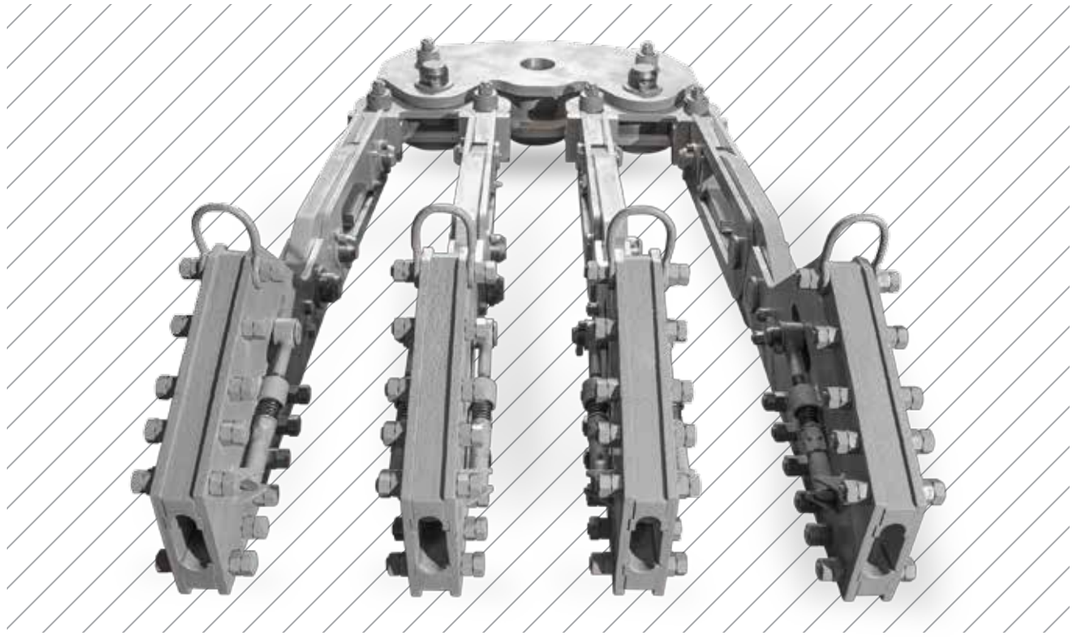
Cast iron castings can undergo heat treatment processes according to clients' requirements and needs.

Depending on the batch size and the type of moulding, the weight range of cast iron castings produced is as follows:

- low-volume and medium-volume production in machine moulds from 3 kg to 60 kg, for gray and ductile cast iron
- single-unit production in manual moulding from 10 kg to 5,000 kg, for gray cast iron, and from 10 kg to 1,500 kg, for ductile iron

STEEL STRUCTURES

KGHM ZANAM manufactures steel structures used in vertical transportation to add to a wide range of machines and equipment for horizontal transportation. The Company's products are successfully used in drawing shafts and material and staff travel shafts. KGHM ZANAM also provides comprehensive anti-corrosion protection for its steel structures.



KGHM ZANAM S.A. has been renowned for manufacturing large welded steel structures for many years. Hoisting skips, hoisting cages and shaft suspending systems are few examples of steel structures we offer. The experience of our staff, our technological potential, as well as approvals and certificates ensure high quality of the manufactured structures. The products are covered by servicing agreements.

PRODUCTION OF STEEL STRUCTURES – THE TECHNOLOGY

The technological operations can be divided into the following phases:

- pre-treatment
- folding and bonding
- machining
- heat treatment
- machine and equipment assembly
- corrosion protection

1. PRE-TREATMENT

1.1. CLEANING

Cleaning of 2500 × 6000 mm and 2500 × 12000 mm sheets on pass-through casting cleaning plants. Cleaning of 12 × 5 × 5 [m] structures in a shot blast cleaner.
Surface cleanliness obtained following shot blasting as per PN- IS 8501-1: Sa21.

1.2. CUTTING

The production of our structures involves cutting of bars, pipes, sections and closed profiles on automatic belt cutting-off machines. The maximum diameter of the cut at right angles is Ø330 mm and the maximum dimension of the cut profile is 330 × 510 mm.

Cutting profile shapes and sheet metal of up to 25 mm thick on guillotine shears.

Gas cutting of carbon steel sheets with a thickness of up to 200 mm and dimensions of 2500 × 6000 mm on CNC thermal cutters. Plasma cutting of alloy steel and non-ferrous metal sheets with a thickness of up to 15 mm and dimensions of 4000 mm × 6000 mm on a CNC thermal cutter.

Semi-automatic gas cutting of metal sheets of up to 100 mm thick, chamfering on straight sections of metal sheets.

1.3. PLASTIC FORMING

Bending on a cornice brake with a nominal pressure from 250 to 600 Mg.

Eccentric and hydraulic presses with pressures from 25 to 160 Mg and from 25 to 250 Mg, respectively, are used to straighten work pieces and sheet metal.

The company also offers roller circle bending for metal sheets with a thickness of up to 30 mm and a width of up to 3000 mm.

2. WELDING STEEL STRUCTURES

2.1. WELDING METHODS

Arc welding methods used:

- manual metal arc welding (MMA)
- semi-automatic metal inert gas/metal active gas welding (MIG/MAG)
- tungsten inert gas welding (TIG)
- submerged arc welding

The following materials are welded:

- carbon steels
- low alloy steels with increased strength and wear resistance
- high-alloy, stainless and acid resistant steels

Welding stress relieving by:

- heat treatment of metals
- vibration annealing

The welded structures are manufactured in accordance with the following certificates and standards:

- Certificate of Qualification of Group I of Large Plants, as per PN-M-69009 (confirming class 1, 2 and 3 for manufacture of structures, as per PN-M-69008)
- Certification as per DIN EN IS0 3834-2 (confirming the welding quality system in full scope)
- Certificate as per EN 1090-2 (confirming manufacture of steel construction structures of up to class EXC3)
- Certificate as per EN 1090-1 (confirming the approval of the FPC: FACTORY PRODUCTION CONTROL)

2.2. WELD MONITORING, TEST METHODS

Non-destructive:

- visual (VT)
- penetrative (PT)
- magnetic-powder (MT)
- ultrasonic (UT)
- radiographic (RT)

Destructive tests for sample or inspection welds (mechanical properties tests):

- static tension of the weld
- weld bending
- impact strength of the weld
- weld breaking
- hardness

Checks:

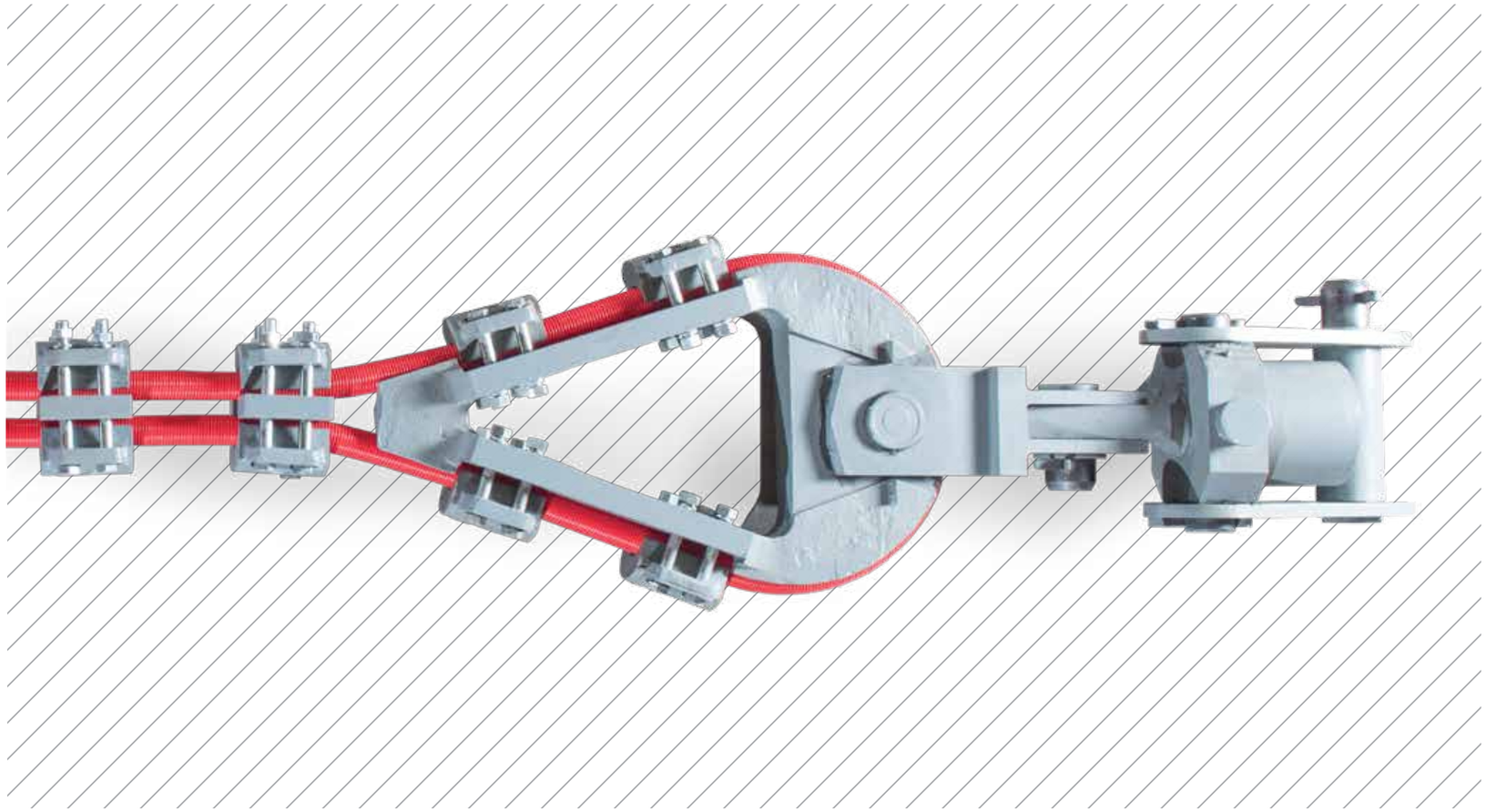
- steel chemical composition
- steel weldability

2.3. THERMAL TREATMENT

- standardisation
- stress relief annealing

We use modern welding equipment for the manufacture of steel structures, e.g.:

- “FRONIUS” TPS 4000 and TPS 5000 semi-automatic welding machines
- “ESAB” column-and-boom manipulator for submerged arc welding with longitudinal and circumferential welds on tanks and pipes
- automatic unit for hole regeneration (overlay welding) Ø 30 /mm/ to Ø 600 /mm/, length max. 500 /mm/



3. MACHINING OF STRUCTURES

The structures are machined on vertical and universal milling machines, both conventional and CNC, as well as planner milling machines. Workbench dimensions are 1,250 × 4,000 mm. Machining maximum width is 1,250 mm. Machining maximum height is 1,250 mm.

Machining on conventional drill and milling machines with rotary workbench and spindle diameter of up to Ø160 mm, with electronic position reading. Maximum boring diameter is Ø1,000 mm.

Machining on plate drill and milling machines (two plate drill and milling machines with spindles directed towards each other) with spindle diameters of Ø115, and electronic position readings, and the CNC models with spindle diameters of Ø130. Maximum boring diameter is Ø1,000 mm.

4. CORROSION PROTECTION

4.1. PAINTING

Painting machines, welded structures and work pieces in chamber dryers with dimensions of 6 × 16 × 5 m and 5 × 6 × 5 m. Hydrodynamic and pneumatic coating with one-component and two-component paints. Sets of paints used are three-coat paints (primer, intermediate coat and topcoat) or as per client's request. Total thickness of paint coating on steel structure is 140-160 µm.

4.2. ZINGA GALVANISING

This solution is used to provide an independent protective coating for various types of steel structures, e.g. bridge structures, road safety barriers, containers or skips, mast towers, silos, heavy equipment chassis, construction machinery, freight wagons, culverts and many others.

MINING BOLTS

load capacity

100 [kN]

bolt rod length

600÷3000; 640÷3270 [mm]

KGHM ZANAM mining bolts are used in roof bolting to ensure the stability of the roof in the mine workings of mining plants where non-ferrous metal ore is extracted. As an integral piece of equipment on roof-bolting trucks, expansion and adhesive mining bolts ensure adequate load-bearing capacity.

Mining bolts are an important part of the KGHM ZANAM S.A. product range. The bolts are divided into two main product groups:

- expansion bolts, composed of a rod, head and a washer
- adhesive bolts, composed of a rod, nut and a washer

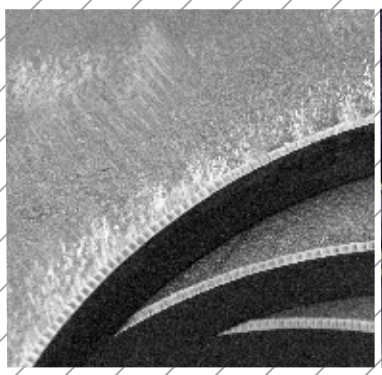
The user can choose the shape and type of the washer for both product groups. The above housing components are also offered separately, apart from the set. The bolt rods are available in dimensions from 0.6 to 3.2 m and made of a rod with a diameter of 18 mm.

The manufactured roofing bolts are mainly used for roof dressing in underground mines, whereas the shorter roofing bolts are used as an auxiliary in transport tunnels.

Product modifications within a prototype process is also available.

Basic parameters

	HEAD DIAMETER [mm]	BOLT ROD DIAMETER [mm]	THREAD DIAMETER	LENGTH OF THREADED PART NORMAL/DUAL [mm]	BOLT ROD LENGTHJ [mm]	WORKING LOAD CAPACITY AT PULL-OUT UP TO 10 MM [kN]
JAW EXPANSION BOLTS	ø36±1	ø18	M 20	100/170	600÷3000	100
SLEEVE EXPANSION BOLTS	ø25±0,3	ø18	M 18	65/65	600÷3000	100
ADHESIVE BOLTS	-	ø18	M 20	150	640÷3270	100



KGHM ZANAM S.A.

ul. Kopalniana 7, 59-101 Polkowice
www.kghmzanam.com

tel. +48 76 84 70 905, fax +48 76 84 71 100
email: sekretariat@kghmzanam.com