

95 YEARS OF RESPONDING TO CHALLENGES

THIS MONOGRAPH IS DEDICATED TO ALL THOSE WHOSE KNOWLEDGE, SKILLS AND ASPIRATIONS ARE WOVEN INTO THE 95-YEAR-LONG TRADITION.



GOŠA FOM a.d. is a well-known and reliable partner for the design, construction, assembly, commissioning and servicing of equipment and machinery in the fields of energy, metallurgy and mining.

Since its foundation, GOŠA FOM has undergone various stages of development.

It all began with the establishment of Jasenica Public Joint Stock Company in 1923, with Serbian and French capital, as a repair and construction workshop for railway materials and iron and wood structures.

In 1930, a workshop for the production of steel structures, bridges, and other facilities was established. In the period until 1950, a vast number of bridges and large quantities of structures for various purposes were produced.

An important stage in the further development was the period until 1965, which saw the consolidation of the production of steel structures, bridges, and manufacturing facilities, as well as the beginning of the production of cranes.

A very important phase in the factory's development, structuring, and mastering the design and production of equipment was the period from 1965 to 1977. In addition to the production of various bridges, GOŠA FOM mastered the manufacture and design of hydromechanical equipment and developed its range of cranes.

The period from 1978 to 1990 is considered very successful. GOŠA FOM became a major manufacturer of large-scale investment equipment, and launched the production of metallurgical, coke and mining equipment.

Cooperation was established with large international companies such as Takraf, Krupp, and Eickhoff. The production of gearboxes in cooperation with German firm Eickhoff began in this period. The procurement of new machinery and equipment marked a major modernization of production.

The events of the 1990s, the break up of Yugoslavia, the dissolution of the USSR, wars and sanctions contributed greatly to a decline in economic activity in Serbia.

Thanks to its personnel, GOŠA FOM managed to successfully overcome this period and independently research the markets of Russia and the former republics of the USSR. The company worked on perfecting its old designs, using the latest solutions in the field of electrical equipment, hydraulics, and computer technology. Complete products were designed independently in design bureaus.

Since the beginning of the 21st century, GOŠA FOM has mastered a large number of new products in various fields.

In the segment of coke machines, the company has developed designs for a new generation of machines with full automation for coke oven batteries.

The portfolio of open-pit coal mining equipment is very important in this period. Conveyors for tailings and coal transport, up to 2,000 mm wide, as well as drive groups and steel structures for excavators and spreaders, have been developed.



GOŠA FOM designs, manufactures and delivers various types of cranes. The company has designed and put into operation many types of cranes which have special purposes in addition to their general purpose. Out of the gantry, GOŠA FOM has developed grab type reloader cranes for different purposes.

The privatization of GOŠA FOM was crucial for the company's future. The management and employees took upon themselves a great obligation and responsibility and, in a consortium with Russian company Koks Kemerovo, won a tender in 2005 to become the majority owner of GOŠA FOM. Since then, about 12 million euros has been invested in the modernization of equipment and machines.

Today, GOŠA FOM is a modern, market-oriented and world-renowned company which, thanks to its own engineering, design, technological, and manufacturing know-how, meets the most stringent international criteria. The company possesses all the necessary certificates and licenses for conducting its business.

By channeling investments and personnel into continuous development aimed at mastering new products, and with great help and support from business partners, GOŠA FOM has shaped its current product portfolio.

Our many years of experience, modern technologies, and quality control at all stages of the production process serve to meet the needs and requirements of customers and guarantee the quality and reliability of products. At numeorus companies around the world, our equipment and machines represent a necessary precondition in the production process.

In the upcoming period, GOŠA FOM plans further investments in personnel, because it is only with high-quality staff that the company can seek to continue developing new products and survive on the market.

GOŠA FOM's objective is to become a powerful company with highly-developed engineering, and to invest in new equipment and the modernization of existing machines in the forthcoming period.

With its quality-oriented policy, GOSA FOM aims to be a socially responsible company and to continue investing, as it has so far, in sports, culture and other areas of significance for the local community and beyond.

> General Manager GOŠA FOM a.d.

Srdan Dimitrijević

stock company Goša Joint Equipment and Machinery Company - GOŠA FOM a.d. - is marking 95 years, nearly a century, of existence, work and development. In its long and rich history, the company has built thousands of facilities, machines and pieces of equipment, so it wouldn't be too much to say that there is hardly any production area in which GOŠA FOM has not in some way left its mark, or that our products are indirectly or directly connected to the lives of each of you. Hundreds of our bridges are crossed by millions of people, trains and cars every day around the world. At several hundred industrial facilities that we have built, millions of tons of iron, steel, aluminum, lead and zinc are produced, as well as thousands of cars, engines, tractors and many products necessary for everyday life. Our gates regulate the flow of water in numerous power plants, enabling the production of electricity, and they also help irrigate land and supply drinking water to millions of people. A thousand cranes produced at GOŠA FOM carry millions of tons or pieces of various goods. Hundreds of coke oven machines from GOŠA FOM churn out millions of tons of coke, as kilometers of belt conveyors transfer coal to thermal power plants and other consumers, and thousands of gearboxes manufactured at GOŠA FOM enable high-quality performance of thousands of machines. And that's not all.

Steel, water and coal are the three basic elements associated with the existence of GOŠA FOM.

Steel is the basic material the factory processes to produce very complex products.

GOŚA FOM has had a significant share in the building and equipping of dozens of metallurgical facilities that produce iron and steel in Serbia, Montenegro, FYR Macedonia, BiH, Russia, Ukraine, Kazakhstan, China, Brazil, Burma, Italy, Germany and South Africa.

GOŠA FOM is connected with water through bridges and equipment for hydroelectric power plants and dams. In its 95-year history, it has produced more than 300 bridges for roads and railroads of Serbia, the former Yugoslavia and the world. With its hydromechanical equipment, penstocks and cranes, GOŠA FOM has become a significant player in the construction of hydropower plants and dams in Serbia, Croatia, Romania, Peru, Algeria, Tunisia, Iran, Iraq, Ethiopia, Burma, etc.

Coal is the third element that features prominently in GOŠA FOM's past and present. The scope of engagement in this area is vast, both in the construction of open-pit and underground coal mining equipment and the building of coal transportation and storage facilities for mines, thermal power plants and coke plants.

A particular emphasis should be placed on complex coal coking machines. These machines are found at most coke plants in Russia, Ukraine, Kazakhstan, Brazil and other countries around the world. We can proudly say that GOŠA FOM has become a world-renowned manufacturer of coke machines.

It is apparent that GOŠA FOM has a very wide range of products, which has allowed it to adapt to reguirements and needs of the market and customers. It is precisely thanks to this strategy of production and development of factories that GOSA FOM has successfully weathered the most turbulent periods and economic crises and became a well-known and reliable partner for the design, construction, installation, commissioning and servicing of equipment and machinery in the fields of energy, metallurgy and coke and chemical production and mining.

This wide product range successfully survives on the global market thanks to the company's highly-skilled staff who keep pace with contemporary technical and technological achievements. Today, GOŠA FOM is a modern, market-oriented and world-renowned company which, thanks to its own engineering, design, technological and production know-how and skills, meets the most rigorous global criteria. Although the factory has changed its ownership structure a number of times over the past 95 years - from a joint stock company to a stateowned and socially-owned enterprise, to a joint stock company again - it has operated successfully every year. Today, the company is majority owned by 360 of its employees and former employees.

This monograph is a kind of guide to the history of the factory, explaining how GOŠA FOM has survived all these years.

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Име друштва, његов цяљ, седиште и трајање.

Члан 1.

Друштво "Јасеница" јесте акционарско в има за циљ оправку и конструкцију соаковредот жилезничког натерикција. гвоздене в дронне конструкције.

Члан 2.

Седните је Друштва у Београду, али оно ноже стварати за своје послове према потреби филијале и агентуре у унутрашности земље. У овон случају дужно је ила таношњах надлеоних власти протоколисати филијалу или агентуру, коју ствара.

Члан З.

Трајање Друштва "Јасенкца" утирђује се на (18) осанивает година. Ово се рачуна од дана оснивања. Али сно може и после тога времена вродумити рад за онолико орелева, за нолико одреде разовни годишњи збор анционара у счислу 4л. 68. закова о анционарским друштикка.

Ш. Главница, акције и акционари.

Члан 4.

Основник је капитал (6,000.000), нист жилиона динара, подељен на (500) пост стотина анција од го (10.000) дост киљала динара. Ова главнаца може бити повећана по

Ова главница може бити повећана по решењу збора акционара.

Јасеница а.д.

Joint stock company Jasenica was founded in 1923, with the aim of repairing and building all kinds of railway materials and iron and wood structures in general. The company's head office was in Belgrade, while the production facilities were located in Smederevska Palanka.

During the entire 1923, various activities were carried out related to the founding and structuring of the company. First, on February 23, the Ministry of Trade and Industry issued the approval of the Rulebook of the Company, and on May 16, the Management Board decided to launch the company's operations. On December 27, the Commercial Court in Belgrade made the launch of operations official.

Manufacturing plants, business premises and apartments were built during 1923, and production began on January 1 the following year.

From 1923 to 1949, the company operated under the name Jasenica a.d. and from 1950, under the name Goša with different variations: from Goša Factory of Railroad Cars and Iron Structures to Goša Holding Corporation a.d.



Smederevska Palanka and Goša are located 80 km south of Belgrade on the Belgrade-Niš-Athens-Istanbul railway line and 12 km away from the E75 motorway.

Over the years of progress and development, Jasenica a.d. became a large business system called Goša. In the 1990s, in its heyday, Goša Holding Corporation consisted of 27 companies in several cities of Yugoslavia. The largest and most successful company in the Goša system was Equipment and Machinery Company - GOŠA FOM.

During the 95 years of existence, the structure and the name of the factory have been changed several times. From 1924 to 1931, the production of iron structures and equipment took place in the plants of Jasenica a.d., and since 1931, the company started developing a separate facility called Mostogradnja. The Mostogradnja plant operated until 1966, and on

January 1, 1967, the company set up a metal structures and equipment operation (MKO). On May 8, 1970, it was renamed Equipment and Metal Structures Factory (OMK). At that time, the factory had all the technical and commercial services. From 1978, the factory was called Work Organization for Equipment and Metal Structures - RO OMK. It consisted of seven basic units (OOURs) and a working community. The seven OOURs were: Engineering, Parts of Equipment and Metal Structures, Equipment, Metal Structures, 7.July, Montaža and Metalac in Gnjilane. In 1980, the factory changed its name into Work Organization of Equipment for Energy, Metallurgy and Mining - RO EMIR. This lasted until December 14, 1989, when OOURs were abolished, and the company changed its name to GOŠA Equipment and Machinery Company GOŠA FOM, which it still carries.



1923–1949. Establishment and launch of operations





* Panorama of Jasenica a.d.

1923–1949. ∞



* The first welded bridge in Yugoslavia on the Timok River near Zaječar

In the early years, production was symbolic. Simple iron structures, trolleys and small railway wagons were manufactured from time to time.

A special hall for the production of iron structures - a bridge workshop - was built during 1930 and 1931. It was equipped with cranes, machines and tools for such production. It was planned to produce bridges, halls, reservoirs, cable cars and wagons for mines. The capacity was 1,200 tons of iron structures per year.

At that time, Jasenica a.d. had three plants: Bridge Construction, Wagon Construction and Aircraft Repair, as well as accompanying workshops. From 1931 to 1941, several bridges were produced at the Mostogradnja plant, the most important ones being the bridges on the Belgrade-Kraljevo-Skoplje, Priština-Peć, and Požarevac-Kučevo railway lines. Until 1937, the bridges were built with riveting technology.

In 1937, Jasenica a.d. Mostograd-

nja plant produced Yugoslavia's first welded bridge, on the Timok River near Zaječar. Welding was done by applying the manual metal arc welding procedure. In order to build the bridge by welding, the factory first had to obtain certificates from accredited institutions of Yugoslavia and Europe. It was a great achievement at the European level.

After that, Jasenica a.d. Mostogradnja built and installed several welded bridges: on the Metković-Ploče railway line, on the Velika Morava River, another one on Timok, and others. The record production was achieved in 1938, when a total of 1,310 tons was produced, of which: 764 tons of bridges, 260 tons roofs and columns, three cranes, 33.9 tons of iron reservoirs, 14 tons of iron welded pipes, 22 wagons, and two hangar gates.

In the overall output of Jasenica in 1938, the Mostogradnja plant had a share of 70%.



* Wagons for mines



* Reconstruction of demolished bridge on the Sava River in Belgrade

The period from 1931 to 1941 can be considered successful in mastering the production of iron (steel) structures and partially equipment, with workers undergoing special training for such production.

During the Second World War, from 1941 to 1944, the plant operated at a low capacity due to lack of demand and materials, but also workers. However, the most important thing is that the factory preserved its capacities during that period. It was



* Test assemby of Bogojevo Bridge on the Danube

not bombed, and it kept the existing machines and equipment.

Smederevska Palanka and Jasenica were liberated on October 10, 1944. After the end of the war, the entire country was being built and reconstructed, and Jasenica and Mostogradnja had a major role to play.

The most important tasks were the reconstruction of bridges as most of them had been demolished. The biggest job was the reconstruction of the railway bridge on the Sava River in Belgrade. The Mostogradnja plant was engaged on that job in 1944 and 1945. This was a great achievement as there was no machinery or tools. In the period from 1944 to 1946, twenty-one bridges were restored, and several new bridges were built, the largest of them being the Bogojevo bridge on the Danube.

In the liberated country, many new factories were built. Jasenica Plant Mostogradnja took part in the construction and installation of steel structures of many of them. In the period from 1945 to 1949, Jasenica Plant Mostogradnja produced 8,161 tons of bridges, 3,766 tons of manufacturing halls, 320 tons of cranes, 217 tons of reservoirs, 311 tons of penstocks, 332 tons of cable cars, and 3,614 units of mining wagons.

Major changes in the economy took place during this period, and from January 29, 1947, Jasenica a.d. was registered as a factory owned by FNRJ (Yugoslavia).



1950–1964. Period of stable production of steel structures and the mastering of crane production



* The Bridge on Sava River in Brankova Street in Belgrade

1950–1964. ¹¹



* The Bridge on Sittang River in Burma

On January 1, 1950 Jasenica a.d. was renamed Wagon and Railway Factory "Dragoslav Đorđević-Goša" after a national hero from the Second World War who was born in the vicinity of Smederevska Palanka, and worked in Jasenica a.d. in 1937 and 1938. Later on, the name Dragoslav Đorđević was left out, and only Goša remained - a name that has been around for 68 years now.

By decision of the state and party bodies of the Socialist Yugoslavia at that time, the ownership of industrial enterprises, wholesale and other state-owned companies was transferred to employees. The so-called workers' self-management was introduced. The highest management body at enterprises was the Workers' Council. Elections for the first Workers' Council in Goša were held on January 28, 1950.

The production of steel structures and equipment at Goša took place in the special plant called Mostogradnja, while the design and technical, commercial and other services were organized at the factory-wide level. Goša's production hall for bridges was built in 1930, and it spanned 4,400 m². In 1952 and 1953, it was expanded to an area of 10,350 m², and a large mounting site was set up next to it.

During this period, the Mostogradnja plant mainly produced steel bridges, steel structures for steelworks and production halls, cranes, cable cars, poles and penstocks. Steel bridges remained the most important product.

The most significant bridges produced in that period were railway bridges in Bihać, Vareš, Skoplje, Banja Luka, Obilić, a series of bridges on the Sarajevo-Ploče railway and a series of bridges for Indian and Burmese railways (20 bridges); road bridges Priboj on the Lim, Otočac, Trnje in Zagreb over the Sava River, and Brankov bridge over the Sava in Belgrade, Žabalj over the Tisa; railway-road bridges: the Pančevo bridge over the Danube in Belgrade, Senta over the Tisa, and a bridge in Burma over the Sitang River, as well as special bridges: Suspension bridge Goražde, the pontoon bridge in Pula, and the moving bridge in Sombor.

The bridge in Brankova Street in Belgrade was built in 1954 in co-operation with German company MAN.



* The road-railway bridge over Tisa river near Senta

The series of railway bridges for India and Burma and the large railway-road bridge on the Sittang River in Burma were produced in 1959 and 1960 and were the first direct export operations of the Mostogradnja Goša plant. Their total weight was about 3,000 tons. They were made under the supervision of English experts.

Another significant bridge is the road-railway bridge in Belgrade over the Danube towards Pančevo, weighing 1,700 tons, produced in



* The road-railway bridge in Belgrade over the Danube towards Pančevo

1961. The production of steel structures for ironworks and industrial halls was very important and was similar in scope to the production of bridges. The most important facilities were ironworks in Skoplje, Sisak, Nikšić, Smederevo, Zenica and Vareš and industrial halls for Zastava Kragujevac, Trepča, Aluminum Complex Titograd, Šamot Arandjelovac, Smithy Novi Travnik and others.

From 1954, the production of cranes was intensified. With the production of 14 cranes for Aluminum factory Ražine in Croatia in 1954, cranes became a significant product of Goša and they remain so to this day. From 1955 to 1964, twenty cranes were built for ironworks Ilijaš, three for Shipyard Belgrade, five for Radoje Dakić Titograd, as well as for FAP Priboj, Naftagas Zrenjanin, Beočin Cement Plant, Zastava Kragujevac, ironworks Ravne, the Kolubara mine, and Fagram in Smederevo.

Another significant product, which was manufactured only during this period, was the cable car for mines. The most important such mines were the Arandjelovac, Šuplja Stena, Beočin and Kolubara mines.

Several antenna pillars were also produced. The most important ones are the antenna towers on Mount Avala (Avala Tower) and Mount Ovčar.

A number of engineers and technicians and a large number of skilled workers were hired and trained in design and manufacturing.



* Ironworks Smederevo - hot rolling mill



1965–1977. Development of equipment design and production



* Hydroelectric power plant Đerdap

1965–1977. ¹⁰



* Gazela Bridge over Sava River on the motorway in Belgrade

This period was a very important stage in the factory's development and structuring, the development of the design and production of equipment, as well as in increasing the volume and value of output for the domestic market and export.

The development of new products, the increase in the volume of production, the strengthening of human resources, and the increase in the number of employees inevitably led to a change in the structure of Goša.

From 8 May 1970 Goša was called Industry of Railway and Road Vehicles, Equipment and Metal Structures Goša. It consisted of Factory of Equipment and Metal Structures, Factory of Railway and Road Vehicles, and Joint Services. The factories had all necessary services.

During this period, significant and large bridges were produced. The most important one is certainly the 460-meter Gazela Bridge over the Sava River on the motorway in Belgrade. The design, delivery and installation were performed by domestic companies. GOŠA FOM supplied the steel structure. The bridge was opened to traffic in 1971.

On the Belgrade-Bar railway, seven large bridges, with a total weight of about 5,000 tons, were delivered and installed between 1971 and 1973.



* The Mratinje Bridge at the Piva Hydrosystem-during assembly



* Bridge over Tara River on Belgrade-Bar railway

A particular emphasis should be placed on the Mratinje Bridge at the Piva Hydrosystem. GOŠA FOM designed, constructed and installed it independently between 1975 and 1977. This bridge, as the facility with the best-constructed metal structure in Yugoslavia, brought GOŠA FOM the European Convention for Structural Steelwork Award in 1977. Towards the end of this period, in 1976 and 1977, three large bridges were produced: the second half of the bridge in Brankova Street and the Railway Bridge,



* The Railway bridge in Belgrade



* The Pionir indoor sports arena in Belgrade

both across the Sava River in Belgrade, and the road bridge over the Sava near Sremska Mitrovica.

Under license from French company CEFM, four types of assembling-disassembling bridges were built in Belgrade, Titograd, Priština and Kostolac from 1975 to 1977.

The total weight of bridges produced in this period was about 16,500 tons.

Apart from bridges, GOŠA FOM also delivered steel structures for industrial and sports facilities.

The longest single girder roof racks were built into the roof of the Pionir indoor sports arena in Belgrade. **1965–1977.** ¹⁰



* Hydroelectric Power Plant "Bajina Bašta"

The production of hydromechanical equipment began in 1964 with the contracting of the construction and installation of equipment for the Potpeć Hydroelectric Power Plant on the Lim River and Hydroelectric Power Plant Bajina Bašta on the Drina River.

GOŠA FOM independently designed and manufactured the equipment for HPP Potpeć, while the equipment for HPP Bajina Bašta was produced in cooperation with renowned Austrian firm Waagner Bureau. A total of 1,160 tons of equipment was delivered for HPP Potpeć, while 3,060 tons was supplied to Bajina Bašta. HPP Potpeć was put into operation in 1967, and HPP Bajina Bašta in 1966 (1st phase) and 1968 (2nd phase).



* Hydroelectric Power Plant Potpeć



* Chira Piura dam in Peru



 Hydropower Plant Derdap – double hooked flat gate – upper section In trial assembly phase

In 1966 and 1967, GOŠA FOM manufactured equipment for a ship lock in Rangoon, Burma and gates for a dam in Čačak.

From 1968 to 1971, GOŠA FOM participated in the construction, production and installation of equipment at one of the largest hydropower plants in Europe - HPP Đerdap on the Danube, a joint hydroelectric power plant of Yugoslavia and Romania. The main designer of the hydromechanical equipment was Gidrostaljprojekt from the USSR, and the equipment was produced by firms from Yugoslavia and Romania. GOŠA FOM designed, produced and installed 3,140 tons of hydromechanical equipment for the Yugoslav side and 3,329 tons for the Romanian side. Work on double hooked flat gates, each weighing 475 tons (7 pieces), on the dam on the Romanian side was particularly complex and extensive.

During this period, GOŠA FOM continued contracting, designing and installing hydromechanical equipment. From 1970 to 1977, equipment was manufactured for the Wady Qattara dam in Libya, while segment gates were made for the Danube-Tisa-Danube (DTD) canal at Zlatica, Tomaševac, Opovo, Čenta, Pančevo, and the Pančevo ship lock, as well as a complete set of hydromechanical equipment for HPP Boali in Central African Republic, equipment for the Bou Heurtma dam in Tunisia. the Sezagong Dam in Burma, and pumped-storage HPP Čapljina in BiH.

The design, manufacture and installation of flat and radial gates and penstocks for the Chira Piura dam in Peru in 1975 and 1976 was also significant, as well as a complete set of hydromechanical equipment for HPP Uvac in 1976 and 1977.

This period was also characterized by a robust development of the crane portfolio. All types of cranes were designed and manufactured: bridge cranes, gantry cranes, semi-gantry cranes, port gantry cranes, shipbuilding cranes, and special-purpose cranes. GOŠA FOM delivered 90 bridge cranes, 19 gantry cranes, five port gantry cranes (with a boom) and four special cranes - a total of 118 cranes. **1965–1977.** 8



* Hydropower Plant Bajina Bašta - gantry crane with a capacity of 2 x 175 tons



Six cranes were built for hydropwer plants. HPP Bajina Bašta was supplied with three cranes - two bridge cranes and one gantry crane with a capacity of 2 x 175 tons on the machine hall, the largest crane ever built in Serbia at that time. GOŠA FOM also built two bridge cranes, with a capacity of 125 and 10 tons respectively, for HPP Uvac, and one gantry crane with a load capacity of 40 tons for the Đerdap hydroelectric power plant.

The shipyard in Jakarta, Indonesia, was supplied with nine bridge cranes and two port gantry cranes, while 18 bridge cranes were delivered and installed at the ironworks in Skoplje. Also, bridge cranes with a capacity of 80 tons were exported to the USSR - 10 for Tjazpromeksport and 14 for Mašinoimport.

Two port gantry cranes with a capacity of 20 and 7 tons, respectively, were designed, shipped and commissioned in Dar es Salaam, Tanzania, in 1973 and 1974. These cranes were manufactured in line British Standards.



* Crane for Tanzania

* Crane for Indonesia



* Gantry crane for Belgrade shipyard, 62 meters long, capacity 100 tons

A shipbuilding, gantry crane for the Belgrade shipyard, 62 meters long, with a capacity of 100 tons, which was put into operation in 1976, is also significant for this period.

With the production of hydromechanical equipment and cranes for HPP Potpeć, HPP Bajina Bašta, and especially for HPP Đerdap, as well as cranes for Burma, Tanzania, and the Belgrade shipyard, and other hydromechanical equipment and cranes, GOŠA FOM achieved great success and became a significant manufacturer of equipment at the European level. Over a short period of time, the bridge workshop for large metal structures developed into a powerful equipment factory. By participating in these projects, numerous engineers, technicians and skilled workers improved their knowledge and became well-established experts, creating a generation of experts who drove the development of the factory over the following three decades.



* Cranes, 3 + 30,4 + 8,5m, Lafarge BFC Beočin



1978–1990. Cooperation with large international companies, modernization of production and mastering new products



Excavator SRs1300 + VR



* Bevel helical gearbox GOŠA – Eickhoff



Coke pusher



* The President Tito in the third visit of "Goša" with managing authorities of Serbia and "Goša"

This period can be considered the golden age of GOŠA FOM. The modernized factory, with increased capacities and quality personnel, became a major producer of large investment equipment on the Yugoslav and global scale. It produced more equipment for foreign markets than it did for the domestic market, becoming a large exporter. GOŠA FOM mastered the production of metallurgical, coke, and mining equipment, and gearboxes, and it established cooperation with large international companies. A new factory for gearboxes was created in a joint venture with Eickhoff.

On December 16, 1952, November 25, 1970, and October 2, 1978, Goša was visited by the president of the SFR Yugoslavia, Josip Broz Tito, making Goša very proud as he rarely visited any company three times. In 1983, Goša won the AVNOJ Award,

the highest Yugoslav award that organizations and individuals received for outstanding results over a longer period of time.

On May 26, 1983, Goša celebrated its 60th anniversary in the presence of top state officials.

A special part of the ceremony was the commissioning of a newly built gearbox factory. The gearbox factory was built under a joint venture agreement between Goša and West German company Eickhoff (Bohum).

Channelling investments and personnel into continuous development and mastering new products, with invaluable assistance and support from business partners, Goša shaped its current product portfolio, which includes energy and mining equipment, coke and metallurgical equipment and machines, cranes, and gearboxes.





* Commissioning of a newly built geabox factory



* Planetary-worm gearbox CWFP-315, track drive



* Inner part of bevel-helical gearbox



* Cyclo-palloid toothing, Klingelnberg system

GOŠA FOM mastered the design and production of various types of gearboxes, most notably helical and bevel helical gearboxes of up to 1.500 kW, with a transmission ratio of i = 1 ... 630, planetary gearboxs of up to 100 kW and transmission ratio of up to 1.000, as well as turbo (high speed) gearboxes.

Gearboxes produced by GOŠA FOM are highly reliable, with minimal maintenance costs, a long service life, as well as a high specific power and an elegant appearance.

Tapered toothing is made using the Klingelnberg system with cyclo-paloidal geometry. They are cemented, hardened and finally treated with the HGP procedure.

Gearboxes are tested on the GOŠA FOM test stand.

All the revolving parts are bedded with antifriction bearings SKF or FAG.

State-of-the-art IPSEN and CER ovens are installed in the heat treatment plant, enabling the heat treatment of all the positions in the production program for which it is necessary.

IPSEN and CER ovens allow the application of the normalization process, cementation, stress relieving (low and high temperature), tempering and annealing (stabilizing and soft).





* IPSEN oven for toothed part cementation

1978–1990.



* Conical pair with cyclo-paloidal toothing



* Testing of gearboxes on the test stand

Mastering the design and production of the Goša-Eickhoff gearboxes helped raise the quality of GOŠA FOM to a higher level and paved the way for introducing new products and conquering new markets.

The modernization of production, especially heavy machinery, continued. The heavy machine hall was expanded in 1980, and a 100-ton bridge crane was produced and installed. New machines and tools were put into operation, most notably the horizontal drilling milling machine W250 H Škoda, the vertical lathe-karusel SKJ 50-100 for machining with maximum diameters of up to 10,000 millimeters, universal lathe SUT 200NR with a machining diameter of up to 2,000 millimeters and maximum work length of up to 10,000 millimeters, and cylindrical gear mill Z FWZ 3150/3, with a maximum work diameter for outer teeth milling of 4.150 millimeters and the module 50 millimeters.



* Horizontal boring drilling milling machine W 200HB CNC



* Vertical lathe-karusel SKJ 50-100



* Universal lathe SUT 200 NR



* Cylindrical gear mill ZFWZ 3150/3

GOŠA FOM continuously modernized production. In 1985, the first machine with CNC (numerical) control was put into operation. It was a gas cutting machine Sinumerik 5000, CNC, Soitab at the new adjustment workshop.

From 1986 to 1990, new machine tools with CNC control were put into operation, such as the SKIQ-20NC vertical lathe, horizontal drilling milling machine bohrwerk WHN 13.8B and WHN 13.8S and portal milling machines PG 160 CNC ILR. Also, machine tools with the classic control -spindle groove mill GF325N Wanderer and two horizontal drilling machines 160 Škoda and 180 ILR were put into operation. In 1989, GOŠA FOM opened a new heavy machining room, in which a horizontal drilling machine W200NC Škoda and horizontal frontal lathe DXP4 were installed, with maximum useful diameter up to 4.000 millimeters and maximum useful lenght of up to 15,000 millimeters.

The facility spanned 4,500 square meters, and with the use of cranes (2 + 2) with capacity of 100/25 tons, span of 26 meters and lifting height of 14 meters, the installation of the machines and equipment was carried out. The complete trial installation improved the quality of the product and shortened the time and installation costs. This was very important as GOŠA FOM did not manufacture serial products.



* Sinumerik 5000, CNC



* Vertical lathe SKIQ-20NC



* The new hall of heavy machining



* Horizontal frontal lathe DXP4

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The modernization of production continued at the gearboxes workshop, in which the machine for cyclopaloidal spiral conical toothing Klingelnberg, type AMK-855, was put into operation, where modules of 3.5 to 15.5 millimeters can be machined with the hard and soft process, spiral gear grinding machine Klingelnberg W800 for modules of 1 to 18 millimeters and diameters of up to 800 millimeters.



* Spiral gear grinding machine W800CNC



* Machine for cyclopaloidal spiral conical toothing AMK-855

Mining equipment was produced at Jasenica a.d. and in the early days of Goša. Mining wagons, cable cars and export pit towers were produced occasionally. A serious production of mining equipment began in the late eighties with the cooperation with well-known European companies in the field. The mining equipment which GOŠA FOM opted for was equipment for coal mining and transportation in underground and open pit mines.

Cooperation with German companies Klöckner-Becorit and Hemscheidt on the production of hydraulic shields was established in that area, and cooperation with the Eickhoff from Bohum, a world-renowned mining equipment manufacturer, began on the construction of coalplough machines and gearboxes. The result of this cooperation was a joint investment in the construction of the gearbox workshop Goša-Eickhoff in Smederevska Palanka.

Since the construction of several thermal power plants and the opening of coal mines with open pit exploitation had been planned in Serbia and Yugoslavia, the plant's management decided to begin a serious production of this equipment. These are the so-called ECS systems (excavator, belt conveyor, spreader). In Europe, there were only a few large manufacturers of these systems. In the production of mining equipment, GOŠA FOM participated as a subcontractor to foreign suppliers of such equipment (Krupp, Takraf, etc.).

GOŠA FOM decided to cooperate with Takraf from DR Germany on the production of the ECS system.



* Excavator SRs 1300 + VR, Dobro selo



* Drive station B1400 - Ćirikovac

An important year for the development of open-pit equipment was in 1982, when GOŠA FOM was contracted to produce two SRs1300 excavators and three spreaders A2Rs-B5500.55 for open pit mine Ćirikovac and Dobro selo in cooperation with supplier Takraf, which entrusted GOŠA FOM with the design of a complete hopper device.

Successful cooperation continued on new jobs. Takraf and GOŠA FOM jointly worked on the delivery of two excavators and one spreader for Kolubara field D and Suvodol. Gearboxes 'Goša - Eickhoff were used in drive groups.

In 1984, GOŠA FOM contracted the design, construction and delivery of a 13-kilometer conveyor system, 1,400 millimeters wide for coal transportation, and 1,600 millimeters for the transportation of tailings, for open-pit mine Ćirikovac.

The project was developed in cooperation with Eickhoff. All built-in gearboxes were type Goša - Eickhoff.

The crucial period for mastering the ECS system was between 1987 and 1990. Our company, together with Takraf, signed a contract for the delivery of three excavators SRs2000 + VT, one spreader A2Rs-B7200.1, and two spreaders A2Rs B8500.1 for open-pit mines Drmno, Tamnava -West Field, and Tamnava - East Field.

GOŠA FOM agreed to design all drive groups for excavator SRS2000 + VT, except bucket wheel drive, motion drive and rotating drive, and for spreaders A2Rs-B7200.1 and

A2Rs B8500.1. The design involved all drive groups and the steel structure of the reception part of the spreader.

In this way, the company became a participant in the implementation of the ECS system project with world-renowned companies such as Takraf, Krupp, and FAM. It also continued its own development of the design, manufacture and assembly of mining equipment, especially belt conveyors and gearboxes.

In 1990, GOŠA FOM completed an important stage in the modernization of production and the mastering of new products.

This helped create a basis for the further development of of production, improvement of existing products, and the development of new ones, as well as entering new markets.



* Excavator SRs2000 32/5 + VR, Drmno



* Spreader A2Rs-B7200, Drmno

The first major jobs in the field of coke and metallurgical equipment were agreed in 1976, and deliveries began in 1978. According to the documentation of the buyer from the USSR, the production and delivery of a coke pusher and a coke transfer car operating on coke oven batteries were contracted.

Between 1978, when the first delivery was made, and 1990, coke equipment was one of the company's most important product portfolios, and it remains so to this day. In this period, about 100 coke pushers and about 50 coke transfer cars were delivered to all leading coke plants in the USSR for coke ovens of 20.4-41.6 cubic meters.

In addition to coke machines, customers in the USSR were also supplied with:

- lifting device for dry coke quenching (6 units);
- fluid oven slag granulator with blast furnaces, 1 unit, installed in existing ovens as a smallsize plant;
- Machines for fireproof lining application for the "Orbit" steel mill pots (20 units);
- profile straightening machines (4 units) for sheet and profile rolling line;
- brick making machines (12 units);
- electric clay gun (12 units).

All machines had modern electrical and hydro drives. In the facilities of GOŠA FOM, a test assembly was carried out, and Goša - Eickhoff gearboxes were installed at the customers' plants.



* Coke pusher



* ORBIT machine for fireproof lining application to the steel mill pots



* Coke transfer car



* Profile straightening machine





* Hydrostatic pressure testing of the pipeline, RHPP "Bajina Bašta"

* HPP ''Čakovec'',radial gate with spillway captage

When it comes to the design and delivery of hydromechanical equipment, it is particularly important to highlight penstocks in terms of their quantity, the application of high-grade steel, and the method of production.

From 1978 to 1979, a complete set of hydromechanical equipment for pumped-storage HPP Bajina Bašta was produced, while a complete set of hydromechanical equipment, weighing 1,500 tons, was designed and delivered to hydropower plant Čakovec in Croatia in 1981 and 1982.

From 1978 to 1990, hydromechanical equipment was produced for multiple dams in Yugoslavia and abroad. The customers in Yugoslavia were TPP Nikola Tesla, Bovan, Ćelije, Vrhovo - Slovenia, while those abroad were AI Ibtissan, Tichy Haf, Isser Keddara and Beni Amrane - Algeria; Los Ejidos - Peru; Torogh Dam - Iran, Derbendi Khan.



* Radial gates on the dam Los Ejidos, Peru

When it comes to penstocks, the largest and most important was the penstock delivered for the pumped-storage Hydroelectric Power Plant Bajina Bašta in 1977 and 1980, and the Isser Keddara project in Algeria in 1987 and 1988.

The construction and installation of the penstock for HPP Bajina Bašta was a great technical and technological challenge. The penstock had a diameter of 4.8 to 6.3 meters, a wall thickness of 20 to 50 millimeters, a length of about 1,000 meters and a weight of about 3,000 tons. It was made of a high-quality microalloyed special Japanese steel, Sumiten 80. For the construction of the penstock, GOŠA FOM built a special factory in Perućac, next to the hydropower plant. The factory was supplied with all necessary machines and equipment. A special method of welding such material, with preheating and controlled cooling, was particularly complex. And the installation of the penstock was a great accomplishment. It was mounted in a tunnel on Mt. Tara at an angle of 45 degrees. With the construction of this penstock, GOŠA FOM gained a great international reference.

In Algeria, along with several other Yugoslav companies, GOŠA FOM took part in a large water supply project in the city of Algiers - Keddara II. The production of a penstock with a diameter of 2 meters, weighing about 20,000 tons, was entrusted to GOŠA FOM. A fully-equipped factory was built at the site, with machines and cranes for pipe production. The work was very extensive, the deadline very short, and the pipe production quite complex. GOSA FOM fulfilled the expectations of the customer on this iob as well.

During this period, several large thermal power plants were built in Serbia, and GOŠA FOM participated in these projects. It produced large amounts of steel structures for for TPP Nikola Tesla A and B and TPP Kosovo B. Also, a cooling water supply plant and two supply tanks and deaerators were built for thermal power plant Drmno (TPP Kostolac B).



* ТРР "Никола Тесла" В under construction



* TPP Drmno - Kostolac



* RHPP "Bajina Bašta" - gantry crane capacity of 2 x 250 tons in assembly

In this period, GOŠA FOM designed and manufactured cranes, delivering most of them to hydroelectric power plants and dams.

In 1977 and 1978, two gantry cranes were produced for RHPP Bajina Basta. A particular emphasis should be placed on the crane above the machine hall, with a capacity of 2 x 250 tons - the crane with the highest capacity in Serbia. In 1982 and 1983, hydropower plants Čakovec were supplied with two bridge cranes and two gantry cranes. From

1984 to 1989, ten bridge cranes and two gantry cranes were delivered for dams in Algeria, and two bridge cranes for dams in Tunisia.

A significant achievement for GOŠA FOM in the production of cranes was the design, delivery and installation of two floating cranes, one with a capacity of 100 tons, in 1980, and the other with a capacity of 50 tons, in 1990. The floating object was built by Shipyard Belgrade.

In total, 47 cranes were designed and delivered in this period.



* Floating Crane capacityof 100 tons



* HPP Čakovec Croatia, Gantry cranes capacity 2 x 15 tons



1991–2000. The years of perseverance



* Lifting device



* Gearbox for running wheel of excavator SRs 1300



* Coke transfer car

1991–2000. ³⁶

The events of the 1990s, the wars and disintegration of Yugoslavia, the disappearance of the USSR and the abolition of the socialist system in the countries of Eastern Europe led to the shrinking of the market and decline in economic activity in the Republic of Serbia. Industrial production dropped significantly and many companies found themselves in a difficult situation. The situation was particularly exacerbated by the economic embargo imposed on Serbia by the United Nations Security Council in 1992.

GOŠA FOM withstood this difficult period relativelly well thanks to the product portfolios that had been developed until then and capable staff. The volume of production was reduced, but stable. Although the conditions for getting and realizing jobs in this area were very tough, the factory managed to keep a good number of its customers. It retained the existing production portfolio and, in order to increase capacity utilization, developed a new one.

Hydromechanical equipment was designed and manufactured to a lesser extent, but even that was rather significant given the circumstances. Agreements for mini hydroelectric power plant Zrmanja in Croatia in 1992, the Sidi el Barak dam in Tunisia in 1997, HPP Đerdap in 1997, and the L`oued el Breck dam in Tunisia in 2000, were realized. The largest and most extensive job was the delivery of Hydromechanical equipment in 1995 for the Sullana dam in Peru - the third phase of a major project called Chira Piura. GOŠA FOM participated in all three phases. The delivery of hydromechanical equipment to HPP Tis Abay in Ethiopia in 1998 was also of great importance.

During this period, thermal power plant Kolubara B was built in Serbia, with GOŠA FOM delivering 4,000 tons of large steel structures in 1996-1998.







* Sullana Dam in Peru

* HPP Đerdap test assembly of flat gates of ship lock

* HPP Tis Abay, Ethiopia - the beginning of the penstock
In difficult conditions, GOŠA FOM independently investigated the market of the former USSR.

In 1994, a contract was signed with West Siberian Metallurgical Combine (ZSMK) from Novokuzneck for the delivery of one coke pusher of 30.2 m³ and five coke transfer cars. In 1998, a contract was signed with the same buyer for the production and delivery of two coke pushers of 41 m³, one lifting device and two electric clay guns (machines for closing the openings for liquid metal discharge from the oven).

The installation and commissioning of these machines was carried out for the first time under the supervision of GOŠA FOM experts. In this way, the buyer got better acquainted with the operation of the machines, while conditions for the exploitation of the machines were improved, and improvements to the machine designs were made possible.





* Lifting device, OAO ZSMK, Novokuzneck

* Coke pusher 30,2 m³, OAO ZSMK, Novokuzneck

A total of 200 gas extraction valves were delivered to the same buyer.

GOŠA FOM continued cooperation with NTMK in Nizhny Tagil, and in 1994, a contract was signed for the delivery of two electric clay guns, and in 1996, for two more, as well as spare parts for coke machines.



* Gases extraction valves OAO "ZSMK", Novokuzneck



* Machine for closing the openings on the oven (electric clay gun)

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The cooperation with OAO Koks - Kemerovo was extended. In 1996, a contract was signed for the manufacture and delivery of a coke transfer car on coke oven battery, of 30.2 m³, and in 1997, a contract for the production of a coal charging car, of 30.2 m³.

In 1994, a fluid oven slag granulator manufactured by GOŠA FOM was put into operation at AO Tulachermet in Tula. This procedure gives a 4-mm granulate, which is used in construction.

In 1998, GOŠA FOM, together with Moscow-based Institute Gipromez, contracted the production and delivery of fluid oven slag granulator (3 lines) for Tanshan Metallurgical Combine in the city of Tanshan. The company has become part of Hesteel Group - the largest steel producer in China, with an output of 63.8 million tons in 2016, which now owns the steelworks in Smederevo in Serbia as well.



* Coal charging car, 30,2 m³, OAO Koks,Kemerovo



* Coke transfer car 30,2 m³, OAO Koks, Kemerovo

In 1997, in cooperation with "Manesman Demag," a 1,200-ton conveyor line was delivered to the Hulet Hot aluminium plant in South Africa.



* Fluid oven slag granulator

In the same year, GOŠA FOM introduced a welding process of gas shielded welding with flux cored wire.



* Conveyor line for Hulet Hot

In 1991 and 1992, GOŠA FOM completed the delivery of parts of excavators and spreaders under a contract signed in 1988, together with Takraf. About 2,000 tons of equipment was delivered in this period.

From 1993 to 2000, there was a great demand for overhauls and spare parts in Serbia. A large number of drive groups with GOSA FOM gearboxes and spare parts for excavators, spreaders and conveyors were delivered to the Kostolac, Kolubara and Kosovo mines. These were very significant deliveries.



* Reconstruction of the destroyed Kovin bridge over the Danube river near Smederevo



* Varadin Bridge in Novi Sad

Cranes were also produced in this period. Six bridge cranes were delivered to the Pančevo Oil Refinery in 1992 and two in 1999. Two bridge cranes were delivered to the Sidi El Barak dam in Tunisia in 1997, and two more were shipped to IGP Sochi, Russia in 1993.

At the beginning of this period, in 1991, the delivery of the Limska Draga bridge in Istria in Croatia was completed.

Serbia was bombed from March to June 1999, resulting in the destruction of a large number of infrastructural, industrial and other facilities, as well as dozens of bridges. The factory was lucky not to be bombed.

At the end of 1999 and during 2000, an extensive reconstruction of infrastructural, commercial and other facilities began. GOŠA FOM was particularly engaged on bridge reconstruction projects, participating in the rebuilding of seven demolished bridges: the Grdelica railway bridge over the South Morava, two railway bridges on the railway Niš-Doljevac line ,called Pobine and Rudovci, two railway bridges on the Kraljevo-Kosovska Mitrovica railway line, called Lešak and Lučica, the Varvarin bridge over the Morava River, and road bridge Kovin over the Danube.

GOŠA FOM also took part in the construction of two new bridges to replace demolished ones over the Danube River in Novi Sad. These were the Varadin Rainbow road bridge and assembly and demountable railway bridge at the site of the Žeželj Bridge. All these jobs were completed in a record time from August to December 1999. For an outstanding effort on these projects, GOŠA FOM received the highest state decorations.

Later in 2003, GOŠA FOM produced and delivered 2,500 tons of steel structures for another new bridge in Novi Sad, built at the site of the demolished Sloboda bridge.

In addition to bridges, GOŠA FOM also participated in the reconstruction of numerous destroyed industrial and other facilities.

In order to fully utilize its capacities, experts from GOŠA FOM embarked on mastering new products, such as process equipment for the chemical, food and rubber industries, equipment for precious stone mining and processing, as well as for the oil industry and shipbuilding. During this period, several presses, pressure vessels, machines for stone extraction and processing, deep oil pumps (hooks), ship hatch covers, propellers, ship hoists, ship winches, etc. were produced and delivered. 1991–2000.

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It was very important that GOŠA FOM kept pace with contemporary trends in production all the time. With the development of manufacturing technology and the modernization of production using the latest achievements in the field of electrical equipment, hydraulics and computers, the company continued to improve existing coke machines, ore grab reloader cranes and metallurgical cranes, hydraulic clay guns, hydraulic taphole drills, manipulators and mining equipment. That was precisely what was necessary and crucial for landing new contracts in the new age.

In 1999, GOŠA FOM signed a new contract for the design, construction, delivery and supervision of assembly and adjustment of all facilities at metallurgical plant of OAO ZSMK in Novokuznetsk to new 35,5 m³ coking machines for coke battery no. 1. This agreement contributed greatly to the further development of coke

machines and the entire GOŠA FOM portfolio.

The design of equipment and facilities was in accordance with the standards and regulations EN, DIN, ISO, GOST, F.E.M., BSI, API (main project, implementation project, as built project).

GOŠA FOM improved the application of calculation and design software, such as Autocad, SOLID EDGE, STAAD, TOWER, FEMAP, NX on the Windows platform.

Designing was done by creating a 3D model from which 2D drawings were produced. This design method significantly improved the quality and enabled a faster production of technical documentation.

The images show a 3D model of the load bearing detail of motion drive of grab reloader crane and beam of traction crawler, as well as an analysis of its voltage state in the FE-MAP program.









From 1967 to 2000, since it started operating independently, GOŠA FOM had twelve general managers.



* General managers of GOŠA FOM Left to right: Andreja Arsenijević, Radoslav Bajić, Budimir Miladinović, Ljubivoje Cvetković, Tihoslav Tošić, Branislav Milanović, Srdan Dimitrijević, Momir Pavlićević, Dragiša Ilić, Milan Bekčić and Ljubisav Pavlović



2001–2009. Privatization, new coke machines, mining equipment and grab reloader cranes



* Coke oven battery



* Drive and return station



* Grab reloader crane



* Panorama of the factory GOŠA FOM

A new privatization law was passed in 2001. The Privatization Agency of the Government of the Republic of Serbia made a decision to privatize GOŠA FOM through a public tender. This was a great recognition for GOŠA FOM as only a handful companies in the metals and electrical industries in Serbia have been privatized through a public tender. The method of privatization of GOŠA FOM was determined on the basis of its size, business results, human resources, and production potentials.

Tendering for the privatization of GOŠA FOM was launched in March 2005, with 71,02% of the capital up for sale.

Among the bidders was the Consortium of 363 individuals together with Russian company OAO Koks -Kemerovo. The 363 idividuals were employed at GOŠA FOM, and OAO Koks - Kemerovo was a long-time buyer of equipment and machines produced by GOŠA FOM. The indivuduals held a majority in the Consortium.

The Privatization Agency decided to sell GOŠA FOM to the Consortium of indivuduals and Koks - Kemerovo. The sale contract was signed on September 9, 2005. In addition to paying the agreed price, the Consortium had very considerable obligations: to make investments in the following five years, to maintain the structure and scope of production, not to lay off workers over 3 years, and to provide sizable bank guarantees. At the first Shareholder Meeting on December 24, 2005, the Management Board and the Supervisory Board were elected. The Management Board appointed Srdan Dimitrijević as general manager, and Aleksandar Živković as his deputy. The consortium fulfilled all its obligations. and in 2010 it finally became the majority owner of GOŠA FOM.

The privatization of GOŠA FOM had been successfully completed, and the company continued to operate well. The factory's business was good even during the great global economic crisis. That period was marked by the launch of new products and expansion to new markets. It is important to note that starting from 1976, GOŠA FOM coke machines were manufactured and delivered to customers from the USSR according to the customer's documentation.

At the same time, the company developed designs of new coke machines used in modern coke plants around the world. GOŠA FOM developed its own coke oven machines for coke oven batteries ranging from 20 m³ to 51 m³, including coke pushers, coke transfer cars, coal charging cars, lifting devices for dry coke quenching, electrical and hydraulic locomotives, coke quenching cars and combined quenching, as well as other equipment.

New coke machines had numerous advantages, which allowed all operations to be performed with only one stop applying a reliable positioning system, of ± 5 mm. The use of frequency regulators on motion drives and planning and pushing drives enabled soft start and stop mechanisms through the desired speed of the electric motor. They were operated via a PLC device with reliable communication and automatic operation according to pre-set graphs, which enabled the comfortable work of the operator.

The maximum utilization of hydraulic drives enabled a longer life of coke batteries, which imporved environmental protection. A dust-free coke pushing system was installed in coke transfer cars.

In 1999, GOŠA FOM won a tender and signed a contract to design, produce, deliver and supervise the installation of two sets of coke machines, with oven volume of 35.5 m^3 , for the coke oven battery no. 1 at OJSC ZSMK in Novokuzneck. The batteries and coke machines were put into operation in 2005 and are still operating successfully. Screw feeders with hydraulic drives were applied to the coal charging car. Coke machines were completed with parts from the world's leading manufacturers, which, combined with the good designs, GOŠA FOM gearboxes, quality production, complete test assembly at GOŠA FOM, and responsible expert supervision, guaranteed reliable functioning.

On putting the coke battery into operation on December 24, 2005, the director of OAO ZSMK, Mr. A. B. Mokrinski said:



"I wish to thank all the participants in the realization of this important facility for the plant... and experts of the company GOŠA FOM a.d., Serbia, which delivered stateof-the-art coke machines. As long as there is development, and as long as it is being achieved - the complex has a future. "



("Metalurg Zapsiba")



* Coke pusher 35.6 m³, OAO ZS<mark>MK</mark>



* Coke transfer car, OAO ZSMK

2001–2009.



* Coal charging car 35,6 m³, OAO ZSMK



* Electric Locomotive

The acquired knowledge and experience in the design and production of coke machines and good references helped GOŠA FOM win tenders for JSC NLMK, CoB no. 1 for 2 sets in 2005 and CoB no. 2 for one set of coke machines in 2006.



* Coke pusher 23,7 m³ OAO NLMK, Lipeck



* Coke transfer car 23,7 m³ OAO NLMK, Lipeck

On the occasion of 50 years of coke production at NLMK, the company's newspaper wrote in August 2009:

"Coke battery no. 1 was put into operation on November 12, 2005, and the coke battery no. 2 in 2007. They are equipped with a device for dust-free coke production. It should be emphasized that the coke machines were designed and manufactured by the company Goša FOM a.d. (Serbia). They operate in semi-automatic mode, and are equipped with precise positioning, blocking by radio connection, modem connection, sensor control panel in the machine operator cabin. It accurately performs door opening and coke pushing operations with one stop.

Goša FOM also produced a coke quenching car with combined quenching.

Work has been launched on replacing a coal reloader crane at the open-air coal storage..."





* Test assembly of coke pusher in production hall of GOŠA FOM a.d.

In 2005, the successful production of coke machines for Severstal, CoB no. 3 with over volume of 21.6 m³ was consinued. During that year, two sets of coke machines and two lifting devices were delivered.

Screw feeders with variable speed and hydraulic drive had been applied on the coal charging car, which enabled the desired technology.



* Coke pusher, 21,6 m³, AOA Severstal



* Coke quenching car with combined coke quenching (underside and upside), 42,9 m³, OAO Koks, Kemerovo

A system for continuous extraction of flue gasses and dust above the oven, basket and machines was applied at the coke transfer cars.



* Coke transfer car, 21,6 m³, OAO Severstal

2001–2009.

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* Representatives of OAO Severstal at equipment handover in GOŠA FOM: Germanov B.E, Aranđelović I., Kolesov N.R., Krasuškin J.V. and Jovanović D.

The testing of drives and equipment and the quality control were carried out at production plants of GOŠA FOM in the presence of the customer's experts.



* Screw feeder

In 2006 for coke battery no. 3 with coke oven volume 42,9 m³ at Koks OJSC in Kemerovo GOŠA FOM got an order for two sets of Coke Oven Machines and definitely confirmed its position of reliable global producer of Coke Oven Machines.

On these coke machines (coke transfer car and coke pusher), a dust collection system was specifically installed. At Koks OJSC, in Kemerovo, dust-collection devices mounted on a coke pusher were used for the first time in Russia.



* Lifting device for dry coke quenching OAO Severstal



* Putting into operation of Coke Oven Battery no.3, 42,9 m3 , Koks OJSC, Kemerovo, in the foreground from left to right: Tuleev A.G., Zubitskij B.D., Dyakov S.N.



* A system for dust collection and coal dust cleaning during the removal of the coke battery door and the cleaning of the frame and door when pushing the coke. 42.9 m³. OAO Koks - Kemerovo

The crowning achievement when it comes to coke machines was a contract on the production and delivery of three sets of coke machines for Mittal Steel in Krivyi Righ, Ukraine, of 30,7 m³, in 2006. In all deliveries to customers, GOŠA FOM confirmed that it was a reliable partner providing worldclass quality of coke machines at competitive prices.



* Coke pusher, 30,7 m³, Mittal Steel, Krivyi Righ



* Coal charging car, 30,7 m³, Mittal Steel, Krivyi Righ



* Coke transfer car, 30,7 m³, Mittal Steel, Krivyi Righ



* Electrical-hydraulic locomotive, Mittal, Mittal Steel, Krivyi Righ

2001-2009.

Revival in crane production began in 2003, when GOŠA FOM manufactured the first gantry crane for the Russian market.



* Ore grab reloader crane capacity of 32 tons OAO NTMK, Niznyi Tagil

For OAO NTMK in Nizhny Tagil, GOŠA FOM designed, delivered and, under the supervision of its experts, put into operation in 2003 an ore grab reloader crane with a loading capacity of 32 tons, a capacity of 600 tons per hour, and a span of 31.8 + 76.2 + 6 meters, in accordance with ISO and GOST standards.

By applying cutting-edge technological achievements in crane production and the latest design software, GOŠA FOM optimized the steel structure and the weight of the crane. With the installation of the quality Goša-Eickhoff gearboxes and frequency-controlled drives with control via PLC and control of all operating parameters from the control center, with the possibility of automatic repetition of operations and the prevention of load swinging, a long-term and reliable operation of the cranes was achieved. It was also possible to regulate the optimum temperature in the operator's electric cabinets and cabin, as well as measure the distance traveled along the crane rail on both sides, preventing beveling. To check all parameters, reset points were placed at every 50 meters.

After the successful commissioning at OAO NTMK, GOŠA FOM delivered ore grab reloader cranes for the following metallurgical companies:

- in 2006 and 2007, two reloader cranes for Severstal;



* Grab reloader crane for coal, with a capacity of 32 tons, OAO Severstal, Cherepovec



* Grab reloader crane for coal with a capacity of 32 tons, OAO Aluminium Kazakhstan, Pavlodar

- in 2008 and 2009 - three reloader cranes for OAO NLMK;



* Grab reloader crane for coal with a capacity of 32 tons, OAO NLMK, Lipeck



- in 2012 - OAO Tulachermet Tula;

* Grab reloader crane for coal with a capacity of 32 tons, OAO Tulachermet, Tula

52 2001-2009.



* "I see everything from above."

After the successful commissioning of the ore and grab reloader crane in 2012, an article titled "New Building" was published on the website of Tulachermet. According to chief mechanic Vladimir Alekseevich Ribakov, Serbian company GOŠA FOM delivered a new-generation ore grab reloader crane.

It provides maximum automation of the technological process and comfortable working conditions for the operator who serves it. The crane has a capacity of 35 tons. Central lubrication is provided, as well as the heating of the mechanism with heaters for operation at low temperatures. Continuous starting up of the drives is regulated by frequency converters.

The primary control system PLC enables the control and operation of the crane mechanisms.

in 2012 - OAO NTMK, Nizhny Tagil.



Grab reloader crane for coal capacity of 32 tons, PAO MMK, Magnitogorsk

At the end of 2017, a grab reloader crane for coal, 42 + 67 + 36 meters, was put into operation at metallurgical complex PAO MMK.

On the website of PAO MMK, the following article was published on December 27, 2017:



"At the coal preparation facility of the coke and chemical plant of the Magnitogorsk metallurgical complex, a new grab reloader crane for the reloading of coal, produced by GOŠA FOM a.d. Serbia, was put into operation. The

M 10.00

new coal relaoder crane has a modern control system, which allows the maximum safety of personnel during use. It has a capacity of 700 tons of reloaded coal per hour.

The crane weighs 1,000 tons."



* Casting platform of the blast furnace, OAO NTMK, Nizhny Tagil



* Hydraulic clay gun





* Hydraulic taphole drill

With the production of electric clay guns, GOŠA FOM developed its own designs of modern machines with a hydraulic drive for servicing the casting platform of a blast furnace. In 2004, two sets of machines were delivered and put into operation at OAO NTMK in Nizhny Tagil:

- a machine for closing the casting hole with a refractory mass (hydraulic clay gun);
- a machine for opening of casting hole (hydraulic taphole drill);
- manipulator for lifting and removing the cover.

All machines have a hydraulic drive, and they operate at a technology complex, servicing a blast furnace.

The delivery also included a hydroelectric station and automatics.

Later on, in 2007 and 2010, two sets were delivered to the same company.

In 2006 and 2007, GOŠA FOM delivered two hydraulic taphole drills to metallurgical complex Ilva in Taranto, Italy.

Also, two hydraulic taphole drills were supplied for the AMEH project Eco Stahl in Eisenhitenstadt.

54 5001-2009.

At the beginning of the twenty-first century, GOŠA FOM continued to master the production of mining equipment. In addition to the manufacture of parts of excavators and spreaders, and spare parts produced in cooperation with major European companies, a special emphasis was placed on the development of own projects of conveyors with rubber belt up to 2,000 millimeters in width. The calculation, design, manufacture, testing, assembly and commissioning of such conveyors were performed according to the international standards DIN, EN, ISO and GOST, using the latest scientific and technological achievements in the production of mining equipment.

In this way, easy maintenance and, with the use of modern systems, comfortable operation with frequency controlled drives, remote control and control, and therefore reliability in operation and a long life of exploitation, were achieved.

In this period, GOŠA FOM produced significant quantities of equipment and spare parts for ECS systems for open pit mines Kolubara and Kostolac:

- - drive groups of 250 to 630 kilowatts;



* Drive group for conveyors

- return and drive drums for excavators, conveyors and spreaders;
- complete crawler drive for the drive station B1600;
- drive stations with crawler drive B1800, 3 units;
- drive station 4 x 315 kilowatts B1600;
- return station B1600, 1 unit;
- return stations B1800, 2 units.



* Drive station B1800 with connecting bridge, open pit mine Drmno



* Dump drive station B1600, Drmno

Thanks to the design, technology and development of its own devices, in 2006, GOŠA FOM, in a consortium with Takraf, won the tender for the design, construction, delivery and installation of transport systems B = 2,000 millimeters with a rubber belt L = 8.000 meters (V ECS system) with 5 drive stations 4 x 1.000 kilowatts.

These conveyors were successfully put into operation at Kostolac on July 18, 2009, and a final takeover certificate was obtained.



* Drive and reloading station B2000, Drmno



* Drive-dump station B2000, Drmno



* Conveyor B2000, Drmno

GOŠA FOM developed planetary gearboxes for the crawler drive for transport and belt tension:



* Planetary gearbox P = 45 kW, i = 865 for transport of drive station B2000



* Planetary gearbox for belt tension of drive station B200, P = 15 kW, i = 945



* Assembly of planetary gearbox power of 45 kW

2001–2009.



* HPP Đerdap, flat gate at the ship lock

Hydromechanical equipment was contracted, designed and delivered on a smaller scale, but was produced continuously, which allowed GOŠA FOM to keep the staff in this sector.

Hydromechanical equipment for dams in Tunisia was delivered: in 2004 for the Sficifa dam and in 2008 for the Gamgoum dam. Hydraulic equipment was also delivered for dams in Algeria: in 2008 for the Kassir dam, and in 2011 for the Ourkiss dam.

In Serbia, there was a constant demand for hydromechanical equip-

ment. In 2000, GOŠA FOM manufactured gates and ship locks for hydropwer plant HPP Djerdap, and in 2010 it delivered gates for the Rovni dam.

During this period, an overhaul of the electricty system was carried out, with the installation of an additional power cable for supplying a new substation, a gas measuring and regulating station, a compressor plant, and new technical gas tanks. Also, at the assembly site, a 50/15-ton gantry crane, which was designed and manufactured at GOŠA FOM, was put into operation.

The crane operates on the site, which serves for test assembly of GOŠA FOM's large-scale equipment.

To keep pace with increasingly stringent demands of the market in terms of manufacturing quality and guarantees of the anticorrosive protection of equipment that mainly operates in aggressive environments, but also environmental protection requirements, GOŠA FOM, as a socially responsible company, put into operation a plant for final anticorrosion protection. This helped improve product quality, reduce total costs in the anticorrosion protection process, and cut transportation costs. The reduction of waste matter by purification of air released into the atmosphere had a direct impact on environmental protection and increased workplace safety and health protection, as well as productivity, cost-effectiveness and profitability.



* Gantry crane with a capacity of 50/15 tons

The anticorrosion protection plant is located in a newly built modern facility spanning 3,200m², with two chambers each for sandblasting and painting, with a total width of 12.8 meters, and 25 meters long, which enable the treatment of largescale pieces.

Between the sandblasting chamber and the painting chamber is a free space of 30 meters for the transportation, rotation and preparation of work pieces for the sandblasting and painting process.



* Workshop for anticorrosion protection with an area of 3200 m²



* Paint booth 12,8x25 m in size

GOŠA FOM's strategy is continuous development, as it corresponds to the interests of business. In order to master the manufacture of ever more complex products, the company continuosly modernizes its design activites, but also production and production technology. In 2016, the bohrwerk BO 130 CNC, with the FANUC operating system, work bench dimensions of 1,000 x 1,350 millimeters, and a maximum work piece weight of 5 tons, was put into operation.



* BO 130 CNC



* TOS VHN 15 CNC



In 2017, a Bohrwerk VHN 15 CNC machine tool was put into operation. This is a modern horizontal-vertical milling machine, suitable for processing large work pieces such as casings, welded structures, castings, steel work pieces, with precise coordinate drilling, cutting and milling up to a maximum weight of 18 tons.

A work piece can be machined from all four sides with one clamping.

The machine is operated via a CNC control unit Simens SINUMERIK 840 D.



* TOS VHN 15 CNC



2010–2018. Continuing the production of modern cranes, mining equipment and coke machines



* Crane with tongs



* Ladle charging crane for handling of slag pots



* Drive station

Mechanical engineering is an industry where, in addition to production growth, it is necessary to manufacture world-class machinery and equipment, and which requires highly specialized personnel. It is necessary to continue on this path quickly and without stopping.

Following the successful modernization of the design, production, adjustment and commissioning of coal and ore grab reloader cranes, GOŠA FOM has continued the successful production of high-performance cranes for metallurgical companies. In 2010, a very successful period in the production of cranes began.

The cranes are designed and manufactured in accordance with ISO, DIN and GOST standards. Safety equipment required by the regulations in Russia is applied. The most important improvements to the cranes are:

- the optimization of the mass of the steel structure and equipment is achieved by using special computer software, while modern GOŠA FOM geraboxes are installed in all drives;
 - all drives have frequency control, and the whole process is controlled by PLC with the ability to operate from the cabin and automatically from a distance, and is controlled through the application of PLC. All drives have a power back up (kW) and cranes can work for a certain period of time with a half of the electric motor on each drive. The operating temperature of the crane can be up to + 80°C. The temperature in the cabin for electrical equipment and the operator is regulated by air conditioning devices, and there is always one serving as backup. On each side of the crane (at the free wheel) are the encoders for measuring the transit route. Along the rails on both sides, there are sensors which synchronize the encoders in case of beveling or slipping of the wheels. All cranes have a system of power recuperation in the network, which increases energy efficiency during operation.



* Tongs for crane capacity of 120 tons, PAO "NLMK", Lipeck

The fact that equipment installed is made by world-renowned producers, combined with quality manufacture, ensures reliable operation, longterm exploitation and easy control.

GOŠA FOM conducts tests of all manufactured cranes in accordance with the buyer's requirements and the regulations for obtaining use permit.

Thanks to the obtained references, GOŠA FOM won a tender at NLMK from Lipeck for the design, construction and delivery, with supervision over installation, of two cranes with tongs with a capacity of 120 tons, which were put into operation in 2010. Later, in 2011, 2012 and 2014, GOSA FOM delivered eight more bridge cranes with tongs and electromagnets of the same capacity, with a span of 34 meters, and in 2015, one bridge crane with tongs capacity of 110 tons. The delivered cranes with tongs are used for transporting steel slabs.



* Crane capacity of 80 tons on electromagnet traverse, PAO NLMK, Lipeck

For this company, GOŠA FOM has also built cranes with traverse and electromagnets, whose characteristic feature is that in the case

of power outage they can complete the launched operation using installed batteries.



* Crane with tongs capacity of 120 tons, PAO NLMK, Lipeck

In 2010, GOŠA FOM signed a contract with OAO NLMK to design, build and commission a ladle charging crane with a capacity of 230 + 50 tons for the handling of slag pots. After a successful testing of the delivered crane, five more such cranes were delivered to the same customer in 2011, 2013, and 2014.



* Ladle charging crane with a capacity of 230 + 50 tons, PAO NLMK, Lipeck

In the same period, five bridge cranes with a capacity of 100 tons, two cranes with capacity of 60 tons

and a slewing trolley, and one bridge crane with a capacity of 25 tons were delivered to OAO NLMK.



* Semi-gantry crane with a capacity of 80 tons at OAO NLMK, Lipeck



* Representative of PAO NLMK"A.J. Nenahov and representative of GOŠA FOM I. Aranđelović inspect a crane with a slewing trolley, with a capacity of 60 + 16 tons, during overhaul

GOŠA FOM continued a successful cooperation with the same company, and in 2015 it delivered a semi-gantry magnetic crane with a capacity of 80 tons and one bridge semi-gantry crane with a capacity of 60 tons, and contracted the construction and delivery of four bridge cranes with a capacity of 10 tons, 16 + 16 tons, 40 + 15 tons and 80/20 tons for the year 2018. In 2012, GOŠA FOM agreed the delivery of three cranes to OAO Severstal in Cherepovec. One of the cranes is with tongs and a slewing trolley with a capacity of 115 tons and a span of 34 meters. At the same time, a contract was signed with OAO Severstal for two bridge cranes with a slewing trolley, with a capacity of 70 tons and a span of 34 meters.



* Crane with tong, capacity 115 tons, PAO Severstal, Cherepovec

Following the successful commissioning of the aforementioned cranes, a piece titled "Cranes become smart" was published in Severstal's corporate news-paper on December 6, 2013:

"Instead of the old equipment, two cranes with magnets with a capacity of 70 tons and one with tongs with a capacity of 115 tons, produced by GOŠA FOM a.d., Serbia, have been installed. All the cranes have frequency control - continuous movement, stopping and braking. There is also an automatic blocking of the control system, which eliminates the *influence of the human factor. Cranes are becoming safe to the maximum.*

"It can be said that these are 'smart cranes,'" - says project manager Oleg Alhimovich.

Also, GOŠA FOM a.d. has delivered 4 bridge cranes with a capacity of 20 tons, one with a capacity of 50 tons and two with a capacity of 40 tons."





* Crane with tongs capacity of 115 tons

As part of the further cooperation with PAO Severstal, one ladle charging crane with a capacity of 180 + 63/20 tons was delivered in 2016. In cooperation with PAO Severstal, GOŠA FOM has delivered two cranes, a bridge crane with a grab capacity of 30 tons, and a port gantry crane 32/40 tons and a span 8/25/32, which can operate with a hook (swivelable with drive) and a grab.



Port gantry crane capacity of 32/40 tons, PAO Severstal, Cherepovec

66

2010-2018.

In 2016, a contract was signed with metallurgical company OAO MMKI from in Mariupol, Ukraine, for the delivery of two semi-gantry cranes with tongs with a capacity of 46 + 10 tons and a span of 32.7 meters. The cranes have been successfully put into operation.



* Semi-gantry crane with tongs, with a capacity of 46 + 10 tons, OAO MMKI, Mariupol



* Tongs 46 + 10 tons

2010–2018.

Due to the stringent customer requirements and the quality of the cranes in line with the latest safety regulations, the execution of these contracts solidified the status of our factory as a reliable manufacturer, which helped us win an international tender in 2018 and sign a contract with AO VMZ in Viksa to deliver an oven charging bridge crane, with capacity of 380/50/8 tons, and a ladle charging bridge crane, with a capacity of 300/80/8 tons.







* Test assembly of a crane 100/20t, Kaluga



* Operator cabin of crane with tongs capacity of 120t

Deliveries of modern coke machines to the markets of Russia, Kazakhstan and Brazil have continued.

During the design phase, the protection of the environment, reliability, safety and complete unmanned automation are taken into account.

In 2010, the delivery of two sets of coke machines for the coke oven battery no. 7, of 32.3 m^3 , was contracted with PAO Severstal.



* Coke pusher CoB no. 7



* Coke transfer car CoB no. 7



* Coal charging car CoB no.7



* Lifting device CoB no.7

For the replacement of old coke machines at PAO Severstal we delivered:

- three coke pushers;
- five lifting devices for dry coke quenching, with previously delivered eight lifting devices;
- two coal charging cars
- other equipment.

2010-2018. 0

In 2018, GOŠA FOM has completed the delivery of one set of coke machines for coke oven battery no. 4 (21.6 m³) to PAO Severstal in Cherepovec. The coke machines were

mounted under the supervision of GOŠA FOM specialists. GOŠA FOM specialists are currently conducting the adjustment of the automation and hydraulics.



* Coke pusher, 21,6 m³, PAO Severstal, Cherepovec



* Coal charging car, 21,6 m³, PAO Severstal, Cherepovec



* Coke transfer car, 21,6 m³, PAO Severstal, Cherepovec

In 2015, on the occasion of the 60th anniversary of PAO Severstal's successful work and business operations, GOŠA FOM was awarded a diploma titled "The Perfection" for constructive dialogue and mastering new types of products.



As proof that the customer is satisfied with the quality of the delivered coke machines and the constant innovations carried out



* Coke pusher, 37.8 m³, with dust extraction system, Usiminas, Brazil

by GOŠA FOM, PAO Severstal has signed a new contractfor the delivery of two coke transfer cars, of 30.2 m^3 and 32.3 m^3 , and one coal charging car, of 30.2 m^3 .

GOŠA FOM has continued to refine coke machinery designs and improve their quality. In 2011, a contract was signed with Concord Group from Dnipropetrovsk, Ukraine, for the delivery of coke machines to metallurgical company Usiminas, Ipatinga plant, Brazil - two coke pushers of 37.8 m³, two coke transfer cars of 37.8 m³, two electric locomotives, and two coke quenching cars.

In order to protect the environment, a system of continuous extraction of flue gases and dust above the oven door, baskets and a coke transfer car was envisaged. This system is connected to the collector via a trolley.



* Dust extraction system on Coke pusher, Usiminas, Brazil

These coke pushers have a specially developed dust extraction system for removing the door, cleaning the frame and doors, and pushing



* Coke transfer car 37,8 m³, Usiminas, Brazil

coke, while the electric locomotive has electrical drives with frequency regulation.



* Electric Locomotive, Usiminas, Brazil



* Operator cabin, Usiminas, Brazil

At GOŠA FOM's production facilities, complete trial assembly of all machines is performed, with the testing of electrical equipment and hydraulics, as well as all drives.





* Coke pusher

* Coke transfer car * Complete trial assembly in GOŠA FOM

The first GOŠA FOM coke machines for Karaganda Metallurgical Combine (which has been privatized by ArcelorMittal from Temirtau, Kazakhstan) were delivered in 1978. After a long time, ArcelorMittal started replacing coke machines that had completed their 40-year service life. In 2015, GOŠA FOM delivered and put intooperation a coke transfer car of 21.6 m³, continuing the tradition of supplying machines to this company.

After the successful commissioning, an article was published in the company newspaper:



"Goša will tell you, warm you up and cool you down." The new coke transfer car coksohimiki was given the name 'Goša.' The machine is fully automated. It has innovative featuressuch as positioning and video surveillance. Everything is at hand, everything is very compact and comfortable - for the winter, a stove is built into the cabin, and in the summer, it is cooled by an air conditioner.

As part of a planned renewal of coke machinery, GOŠA FOM delivered another coke transfer car of 21.6 m³ in 2017 and a coke pusher of

21.6 m³ in 2018, with GOŠA FOM experts supervising the installation of coke machines at the company.



* Coke pusher in assembly, AO ArcelorMittal - Temirtau, Kazakhstan



* Coke transfer car, 21.6 m³, AO ArcelorMittal - Temirtau, Kazakhstan
With a successful commissioning of the fifth ECS system at PK Kostolac and the reception of a final takeover certificate, GOŠA FOM gained an important reference that enabled it to be successful at most of the future tenders it took part in in Serbia, the region, and Russia.

From 2010 to 2016, GOŠA FOM

delivered five B2000 drive stations with a length of 2,800 meters, a tripper car, and return stations to Kostolac. All these drive stations are equipped with frequency controlled drives and a control cabin, and can be connected to a remote control system. The stations have been put into operation.



* Drive station B2000 at assembly site Drmno

GOŠA FOM designed and manufactured 15 special bevel helical gerboxes with a flange of 1,000 kilowatts and a transmission ratio of i = 17.267 for the drive groups of belt





* Gearbox "P = 1.000 kW" in trial assembly

These high power gearboxes (1,000 kW) work continuously, thus releasing a large amount of heat. For this reason, mineral oil resistant to high temperatures is used for lubrication, and temperatures during operation do not exceed 90°C. This



* Gearbox "P = 1.000 kW" installed on drive station B2000

is achieved with correct calculations and special cooling, with a particular attention paid to the construction of the casing with ribs and accurate and high-quality machining and assembly.

2010-2018.

In this period, GOŠA FOM also delivered 11 gearboxes (P = 1.000 kW) with a transmission ratio of i = 17,267, for the B2000 conveyor system in the C field at the Kolubara mines, as a subcontrcator to Polish company Kopex.

Kolubara was supplied with nineteen gearboxes (P = 1.000 kW) as spare parts for the B2000 drive stations - ten with a transmission ratio of 17,267 and nine with a transmission ratio of i = 17,198.

For the transport of the excavator produced for Kolubara by ThyssenKrupp and the spreader made by Sandvik, GOŠA FOM delivered planetary gearboxes of 75 kW, 90 kW, 95 kW, with transmission ratios of 615 and 846.





* Planetary gearbox for conveyor drive for Sandvik spreader

* Drive group R=450 kW for Sandvik spreader

In 2012, a B1400 conveyor system for the transportation of tailings was contracted for the Gacko mine in the Republic of Srpska. The contract covered the design, delivery and installation of four conveyors, 2,600 meters in length and with a capacity of 2.500 m^{3} /hour, four frequency-controlled drive stations equipped with gearboxes of 4 x 315 kW, four return stations, one loading car, and one hopper car.

The system's capacity was successfully verified and it was put into operation in 2013.



* Drive station B1400, Gacko



* Drive and return station B1400, Gacko



* Belt drive P = 315 kW, Gacko



* Hopper car B1400, Gacko



* Drive group, P = 110 kW, Ugljevik

In 2015, parts of the conveyor system with belt width B1000 were contracted for the Bogutovo Selo mine at Ugljevik in the Republic of Srpska: – drive station;

- drive groups for belt drive
 P = 110 kW, 3 units, tension
 drive group P = 30 kW with
 GOŠA FOM gearboxes;
- a drive, tension drum with a tensioning device;
- return station with return drum;
- slant joint.

The equipment was put into operation in 2016.



* Conveyor system B=1000 mm, RiTE Ugljevik - PK Bogutovo Selo - Bosnia and Herzegovina

As a result of previous contracts and obtained references, GOŠA FOM contracted:

1. A conveyor system for the expansion of the Drmno mine, a sixth ECS system, consisting of eight conveyors, for Chinese company CMEC, and four conveyors 5,000 m, all in 2015, and four conveyors of 7,050 m for EPS in 2017.

This conveyor system, 12,050 me-

ters long, with a capacity of 6,600 m³/h and a 2,000 millimeter belt, has an installed power of 24,000 kW and twenty-four 1,000 kW drives with GOŠA FOM gearboxes. The drive stations are designed to have four drives of 1.000 kW which enable the operation of a 3,250-meter conveyor. This conveyor system is remotely operated and controlled from a control center;



* Drive station B2000 at assembly site Drmno







* Drive drum Ø 1.500 mm



* Planetary gearbox P=45 kW, i=865



* Drive group for belt tensioning



* Return station B2000 at assembly site Drmno



* Drive station B2000 on assembly site "Drmno-East"

2. For a reconstruction of the ECS system at EPS Kostolac, three drive stations B2000 with a capacity of 6.600 m³/hour have been de-livered, with 12.000 kW of installed power, fitted with drive groups with

twelve GOŠA FOM gearboxes of 1.000 kW each, three return stations, three slant joints, a sliding car with a sliding platform, and a loading car. This contract was signed in 2017.





* Drive station B2000 in operation at Drmno

3. The distribution station for changing the coal export technology - EPS Kostolac. The station is mounted on crawlers with a belt of 1,800 millimeters, hopper drum telescoping of 10 meters, installed power of 4 x 6.300 kW, and frequency-controlled drives. This contract was signed in 2018.



GOŠA FOM has completed a project, and delivery is under way, of a rubber belt conveyor for the reception and preparation of raw materials (iron ore, coke, limestone, and lime ore) for the production of agglomerates for PAO MMK in Magnitogorsk.

The conveyor line consists of 21 conveyors with a total length of 5,000 meters, with individual lengths ranging from 12 to 592 meters. To transport raw materials to the storage facility (homogenization), 15 conveyors carry coke, iron, limestone, and lime minerals, and they, according to a pre-set program, transport them to an open warehouse to which the raw materials are deposited with a spreader on rails.

Prepared (homogenized) raw materials are transported by six conveyors to a plant for the production of agglomerates. The capacity of the conveyor is from 300 t/h to 1,800 t/h, depending on the raw material transported. Belts with linen and steel cables, 1,200 millimeters wide,were applied. The gearboxes for belt drive and tension drive were produced by GOŠA FOM.

The conveyors are included in the central control system, and they also have the possibility of independent control via built-in panels. Conveyors are designed according to the applicable GOST standards and with the use of DIN 22101-2011/2012 for calculation.



Besides technological improvements, the design department has also been developing in terms of expertise. Technical solutions for the existing production portfolios have been perfected with every new project. New products have been designed, including the slab turnover device, the slab pusher, and the universal slab mover. These machines are part of a technological process for slab manipulation at metallurgical companies. The slab turnover device is used to rotate slabs by 180° so that the lower side of a slab is accessible for inspection and cleaning. It is possible to rotate two slabs of 2,500-4,200 mm at the same time, or one slab of 4,200-12,000 mm.



* Slab turnover device, PAO NLMK, Lipeck

Two slab turover devices have been successfully operating at PAO NLMK since 2016 and 2017.

The slab pusher is intended for pushing slabs from the conveyor

rollers to the receiving shelves. The sections of the conveyor roller are an integral part of the roller system that transfers slabs into the slab storage.



* Slab pusher, PAO NLMK, Lipeck

80

A new contract was signed with PAO NLMK for the design and delivery of one 60-ton slab pusher and three sections of the conveyor rollers with drives and control equipment. The slab mover is intended for receiving slabs from a roller conveyor and their laying on a rotary table.



* Slap mover with a capacity of 80t

In recent years, the construction of mini hydropower plants has begun in Serbia, with a number of such facilities planned to be built in Serbia and neighboring countries in the coming years. GOŠA FOM delivered and installed the complete hydromechanical equipment at MHPP Vrgudinac in 2016, and at MHPP Crveni breg and MHPP Rekovići in 2018.



* MHPP Vrgudinac, radial gates on the dam



In the 95 years of successful work and development, GOŠA FOM has gained extensive experience in implementing projects in Serbia and abroad. Thanks to this experience, its development strategy, as well as the monitoring of customers' plans, GOŠA FOM has formed a vision of the future which involves the following:

- select and professionally train personnel for new challenges, thus ensuring long-term competitiveness, dynamic development, and the level of expertise required for fulfilling the most complex production tasks;
- constantly modernize products, improve the technology, renew the machine fleet, and increase product quality. This will lead to continuous development, which corresponds to long-term interests of business;
- research the market by systematically gathering information for the purposes of devel-

opment, the modernization of the existing product portfolio, and the launch of products in new markets;

 maintain constant communication with customers in order to create an atmosphere of mutual trust. Respect customers' opinions, accept their assessments and remarks, strengthen cooperation, and constantly follow the regulations and requirements of the buyer regarding the safety and protection of human beings and the environment.

Behind nearly a century of GOŠA FOM's existence is a great deal of effort and work, vast experience, as well as the desire to always go forward in winning new jobs and projects. Thanks to our seriousness and committment, we have survived all these years, and it has not always been easy. We were looking into the future, and every job and every challenge gave us strength for a new experience and the next step.

Therefore, the main motto of our company in the coming period will be: Do not forget the past, but look into the future.



We have been designing, producing, installing, training and connecting people, for 95 years now. We are trusted and reputable.







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95 YEARS OF RESPONDING TO CHALLENGES

Publisher:

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SUMMARY

This monograph "95 YEARS OF RESPOND-ING TO CHALLENGES" shows the brief history of "Jasenica" factory to GOŠA FOM in the period from 1923 to 2018. The reason for writing is the celebration of 95 years of successful work and business of the company GOŠA FOM, informing business partners and society about their success and development.

The book has 92 pages and more than 270 photos and is divided into seven chapters.

After the introductory article of Mr. Srdan Dimitrijević, General director, on the history, development and plans of GOŠA FOM, the establishment of the company "Jasenica" a.d. and its gradual development is briefly described.

The monograph is divided into periods with a short description of the acquisition of new products, the modernization of production, the development of personnel and the acquisition of new products. A special accent was placed on the relation towards security, the Customer and the market. From the title of the period are seen the most important details:

- 1. 1923-1949. The foundation and commencement of work
- 2. 1950-1964. The period of stable production of steel structures and the acquisition of the production of cranes
- 3. 1965-1977. Development of design and production of equipment
- 4. 1978-1990. Cooperation with large world companies, modernization of production and acquisition of new products
- 5. 1991-2000. Years of persistence
- 6. 2001-2009. Privatization, new coke machines, mining equipment and grab reloader cranes
- 7. 2010-2018. Continuation of production of modern cranes, mining equipment and coke machines

After a brief overview of GOŠA FOM look into the future, the medals and awards, customer ratings and Certificates held by GOŠA FOM are attached.

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