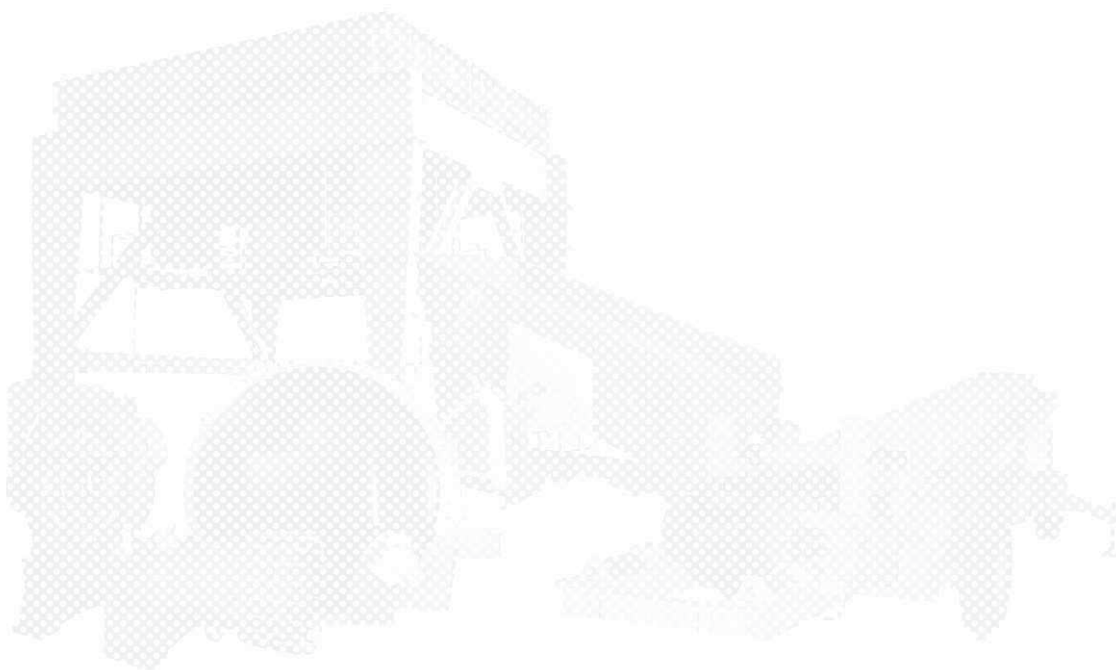


Technical Documentation



PROIZVODNI PROGRAM PRODUCTION PROGRAMME



Misija, Vizija, Ciljevi / Mision, Vision, Objectives

Svi proizvodi i usluge ATB FOD-a imaju za cilj pomoć našim korisnicima da postignu trajan uspeh. Mi razumemo potrebe naših korisnika i podstičemo naše ljudske resurse da od prve pruže najbolje od sebe tako da naši korisnici budu zadovoljni i imaju korist. Glavni oslonci u procesu ostvarivanja ciljeva vizije su unutrašnje rezerve i ljudski potencijal sa kojima raspolaže ATB FOD, koji će stvoriti pozitivan odnos svih zaposlenih prema postavljenim ciljevima.

Ekspanzija ATB FOD-a, raznovrsnost programa, investicije u proizvodnju i prateće segmente, ima za cilj da različito profilisanim korisnicima i partnerima, obezbedi kvalitetan proizvod i uslugu.

ATB FOD ima za cilj da bude prepoznatljiv znak, simbol kvaliteta, i takav identitet želi da zadrži. Za obezbeđenje ovoga, sistem mora da bude dinamičan uz konstantno ulaganje u razvoj i istraživanje i shvatanje potreba naših korisnika. Mi imamo za cilj da kvalitetom proizvoda i usluga obezbedimo stalan rast zadovoljstva naših kupaca.

All products and services provided by ATB FOD aim to help our users achieve permanent success. We understand the needs of our users and motivate our human resources to do their best the first time so that our users are satisfied and able to reap benefits. The main basis in the process of achieving vision objectives are internal reserves and human potential that is available to ATB FOD and that will create a positive attitude in all employees towards objectives that are set.

Growth of ATB FOD, diversity of the production range, investing in production and in accompanying segments, are aimed at providing quality product and service to users and partners of different profiles.

Aim of ATB FOD is to be a recognizable sign, a symbol of quality, and to maintain such identity. In order to ensure this, the system must be dynamic and investment must continuously be made in research and development and understanding the needs of our users must be assured. Our objective is to enable permanent increase in satisfaction of our customers by ensuring quality of our products and services.



Istorijat History

Istorijat / History

Počeci rada ATB FOD - a datiraju još od 1903. godine kada je krenula eksploatacija rude bakra u Boru. Postavljanjem topioničkih agregata i prvih flotacija i elektrolize bakra, dovele su do organizovanja odgovarajućih službi održavanja i Centralnih radionica Borskog rudnika.

Intenzivni razvoj i izgradnja novih postrojenja Borskog rudnika uslovljava da se Centralne radionice objedine i od njih formira Fabrika opreme i delova. Sve do 1970. godine FOD Bor se bavio održavanjem, proizvodnjom rezervnih delova i izvođenjem investicionih radova. Tada se postavlja osnovni koncept delatnosti i razvoja FOD - a. Naime, radi se intenzivno na razvoju i proizvodnji procesne opreme iz oblasti pripreme mineralnih sirovina. Takođe, intenzivno se radi na proširenju i izgradnji novih proizvodnih pogona koji predstavljaju bazu za ostvarivanje funkcije nosioca razvoja u oblasti mašinogradnje u rudarstvu, metalurgiji i hemiji.

U tom periodu FOD je razvio i počeo da proizvodi procesnu opremu za potrebe prerade mineralnih sirovina, kao što su flotacione mašine, hidrocikloni, horizontalne i vertikalne pumpe za transport hidromešavina, hidrodinamičke regulacione spojnice, zatim rudarsku opremu kao što su transportri za komadaste i praškaste materijale, vibro sita, jamske baterijske lokomotive i pneumatska i hidraulična bušuća kola. U oblasti termotehnike razvijani su razmenjivači toplote i hladnjaci raznih namena, a u oblasti elektrotehnike razvijana su elektrorazvodna postrojenja niskog i srednjeg napona. Takođe za potrebe zimskog turizma razvijeni su i ski liftovi i žičare.

Beginnings of work of ATB FOD date as far back as 1903 when exploitation of copper ore started in Bor. Setting up smelting aggregates and first flotation and copper electrolysis facilities lead to forming of suitable maintenance departments and Central workshops of the Bormine.

Intensive development and building of new facilities had entailed Central workshops to be merged and to constitute Equipment and parts factory (in Serbian: Fabrika opreme i delova). Until 1970 FOD Bor had been involved in maintenance, production of spare parts and carrying out investment works. Then, the basic concept of scope and development of FOD was set. Namely, intense work had been started on development and production of process equipment for preparation of raw materials. Also, there had been intense work on expanding and construction of new production units which represent a basis for realizing a role of a leader in development of mechanical construction in mining, metallurgy and chemistry.

In that period, FOD had developed and started producing process equipment for application in raw material processing, such as flotation machines, hydro cyclones, horizontal and vertical hydro mixture transportation pumps, variable speed fluid couplings, also mining equipment such as conveyers for piece materials and powder materials, vibro screens, pit wagons, and pneumatic and hydraulic drilling machines. In the branch of thermodynamics, heat exchangers were developed as well as coolers of various applications, and low and medium voltage electric distribution substations were developed for applications in electrical engineering. Also, ski lifts and cable systems were developed for applications in winter tourism.

Istorijat History

Istorijat / History

U toku svoje bogate istorije FOD je doživeo niz organizacionih i proizvodno-tehnoloških promena. Privatizovan je 2008. godine, kada je, pod imenom ATB FOD, postao član poslovnog sistema ATB Austrija i A-TEC INDUSTRIESAG grupe.

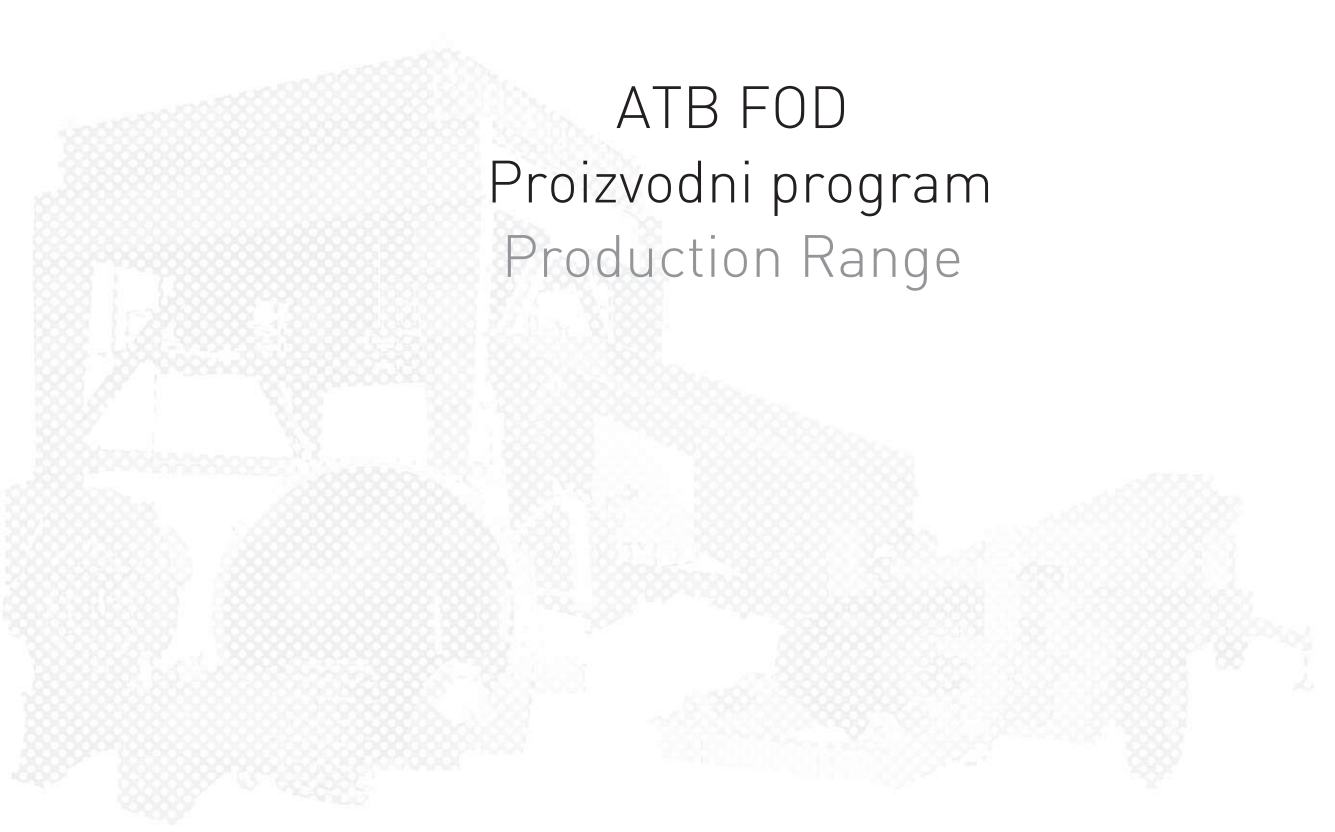
Danas ATB FOD proizvodi, isporučuje i montira procesnu elektro-mašinsku opremu za potrebe rudarstva i prerade mineralnih sirovina, sopstvene konstrukcije ili prema zahtevima kupaca.

Širok proizvodni program, internacionalni standardi, visok kvalitet i poslovni i sopstveni tehnički razvoj omogućuju bolju poziciju na tržištu za ATB FOD u narednom periodu.

In the course of its rich history, FOD had undergone a series of organizational and production/ techno-logical changes. It was privatized in 2008 under the name of ATB FOD, when it became a member of the business system of ATB Austria and A-TEC INDUSTRIESAG group.

Today, ATB FOD produces, supplies and installs electro mechanical process equipment for application in mining and raw material processing, and for meeting requirements of its own construction and requirements of its customers.

Extensive production range, application of international standards, assurance of high quality and business development as well as technical self-development enable a better positioning of ATB FOD in the market in the forthcoming period.



ATB FOD

Proizvodni program

Production Range

ATB FOD Proizvodni program / Production Range of ATB FOD

Proizvodni program

- Pumpe za transport hidromešavina
- Transporteri za transport komadnog i praškastog materijala (trakasti, člankasti i pneumatski)
- Vibrosita i vibrotransporteri
- Oprema za pripremu mineralnih sirovina
- Sistemi za otprašivanje
- Razmenjivači toplote
- Uređaji za stresanje prašine (mehanički, pneumatski)
- Mašinska oprema za hidroelektrane
- Elektro oprema (nisko i srednjenaponska)
- Usluge remonta električnih mašina
- Inženjering
- Usluge
 - Izrada opreme i rezervnih delova
 - Elektromašinske montaže

ATB FOD plasira svoje proizvode i usluge u oblasti: rudarstva, metalurgije, cementne industrije, energetike, vodoprivrede, itd.

ATB FOD se specijalizovao za proizvodnju: sistema za transport rasutih materijala u rudarstvu i cementnoj industriji, mašinske opreme za mini hidroelektrane, elektro opreme niskog i srednjeg napona i dr.

Production range

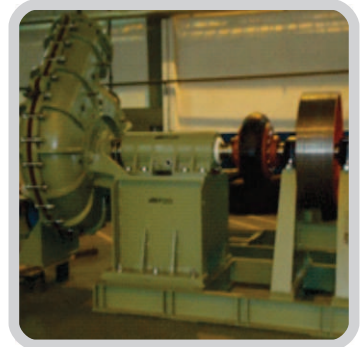
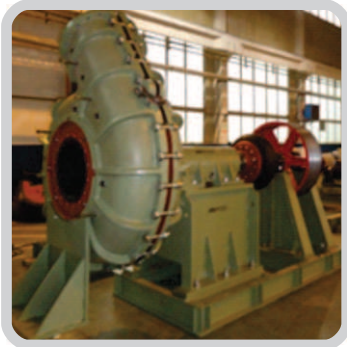
- Hydro mixture transportation pumps u Slurry pumps
- Conveyors for transportation of piece materials and powder materials (belt conveyors, apron conveyors and pneumatic conveyors)
- Vibro screens and vibro conveyors
- Equipment for preparation of raw materials
- Dedusting systems
- Heat exchangers
- Rapping systems (mechanical, pneumatic)
- Mechanical equipment for hydropower plants
- Electric equipment (low voltage and medium voltage)
- Services of overhauling electric machines
- Engineering
- Services
 - Fabrication of equipment and spare parts
 - Electromechanical installation

ATB FOD markets its products and services in application areas of: mining, metallurgy, cement industry, energetics, waterpower engineering, etc.

ATB FOD has specialized in production of: bulk material conveying systems in mining and cement industry, mechanical equipment for mini hydro-power plants, low voltage and medium voltage electric equipment etc.

Pumpe za hidromešavine Slurry Pumps

4



Pumpe za hidromešavine / Slurry Pumps

Pumpe za hidromešavine tipa HPH0 i HPHZ namenjene su transportu jako abrazivnih hidromešavina.

Izrađuju se u više veličina pokrivajući opseg rada:

$Q = 0.005 - 0.9 \text{ m}^3/\text{s}$
 $H = 5.0 - 45.0 \text{ mVS}$

Slurry pump types HPH0 and HPHZ are intended for highly abrasive slurries transportation.

Product sizes offer operating range:

$Q = 0.005 - 0.9 \text{ m}^3/\text{s}$
 $H = 5.0 - 45.0 \text{ mVS}$

Vertikalne pumpe za hidromešavine VPH.

Izrađuju se u više veličina pokrivajući opseg rada:

$Q = 0.001 - 0.07 \text{ m}^3/\text{s}$
 $H = 8.0 - 30.0 \text{ m}$

Vertical slurry pump type VPH.

Product sizes offer operating range:

$Q = 0.001 - 0.07 \text{ m}^3/\text{s}$
 $H = 8.0 - 30.0 \text{ m}$



Transporteri Conveyors



Transporteri / Conveyors

ATB FOD je kompetentan partner u projektovanju, proizvodnji i montaži opreme za rudarstvo, rasute terete i pripremu mineralnih sirovina i sistema namenjenih zadovoljavanju specifičnih potreba naših klijenata u pogledu projektnih rokova, kapaciteta i karakteristika materijala i lakoće održavanja.

ATB FOD rešenja za kvalitetan kontinualni transport rasutih materijala su:

Trakasti transporteri za lake i srednje teške uslove, **PBC serija PBC500 do PBC1400**, stacionarni transporteri u procesnoj industriji, kapacitet do 800 tona na čas, grabuljasti transporter za uklanjanje strešenog materijala sa povratne grane, bubnjevi sa gumenim oblogama, niska emisija prašine na utovarnim mestima.

MBC serija MBC500 do MBC1200, mobilni transporteri namenjeni skladiranju, kamenolomima, procesiranju šljake itd., koji su laki, pogodni za manipulaciju, sa motoreduktorima nasadenim na vratilo pogonskog bubnja i efikasnim brisačima gumene trake.

ATB FOD is a competent partner in design, manufacturing and installing of mining, bulk materials handling and mineral processing equipment and systems intended to fit our clients' specific needs considering project schedules, material flow rates and characteristics and ease of maintenance.

ATB FOD solutions for quality continual bulk materials conveying are:

Belt conveyors for light and middle range applications, **PBC series PBC500 to PBC1400**, stationary conveyors in processing industry, capacity up to 800tph, spillage conveyor for carry-back material removing, lagged pulleys, low dust emission at loading points.

MBC series MBC500 to MBC1200, portable conveyors intended for stockyards, quarries, slag processing etc., which are light, easy to handle and with shaft mounted geared motors and efficient belt cleaners.



Transporteri Conveyors

6



Transporteri / Conveyors

Veliki transportni sistemi, sa širinom trake od 1000mm do 1800mm, kapaciteta do 5000 kubnih metara na čas, sa pretovarnim kolicima i odlagačem.

Visokonagibni transporteri

Transporteri sa lancem kao vučnim elementom

Trakaste hranilice

Člankaste hranilice, širina noseće ploče do 2400mm, kapacitet do 3500 tona na čas pri usponu od 23 stepena.

Pločaste hranilice

Vibro-hranilice

PROJEKTOVANO I PROIZVEDENO DA BUDE:

- BEZBEDNO
- ROBUSTNO
- POUZDANO
- PROGRAMABILNO
- PODESIVO
- LAKO ZA ODRŽAVANJE

NAŠE USLUGE:

- BEZBEDNO
- TEHNIČKA PODRŠKA PRI FORMIRANJU PONUDE I PROJEKTOVANJU
- PROGRAMIRANJE
- PUŠTANJE U RAD
- POST-PRODAJNA USLUGA

Overland conveying systems, belt width ranging from 1000 to 1800mm, capacity up to 5000m³, with tripper car and spreader.

High angle conveyors

Chain conveyors

Belt feeders

Apron feeders, pan width up to 2400mm, capacity up to 3500tph at 23°.

Plate feeders

Vibrating feeders

DESIGNED AND MANUFACTURED TO BE:

- SAFE
- STURDY
- RELIABLE
- PROGRAMMABLE
- ADJUSTABLE
- EASY FOR MAINTENANCE

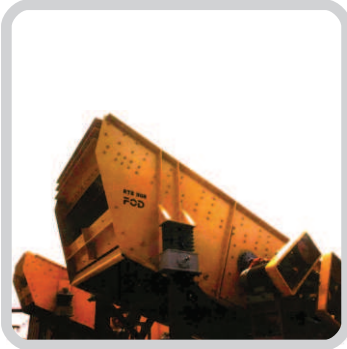
OUR SERVICES:

- TAKING PART IN TENDER AND PROJECT PHASE
- PROGRAMMING
- COMMISSIONING
- AFTER-SALE SERVICE



Vibrosita i Vibrododavači

Vibrating Screens & Vibrating Feeders



Vibrosita / Vibrating Screens

Vibrosita sa jednom, dve ili tri sejne površine namenjena su prvenstveno za prosejavanje izdrobljenog materijala (rude).

Veličina (mm):	1000X3000 - 2400x6000
Pov. sejanja (m ²):	3 - 14,4
Pogon (kW):	5,5 - 2x22

Vibrating screens with one, two or three desks are intended primarily for screening of crushed material (ore).

Size (mm):	1000X3000 - 2400x6000
Screen area (m ²):	3 - 14,4
Drive (kW):	5,5 - 2x22



Vibrododavači sa dva vibromotora se koriste za izvlačenje i transport rastresitog materijala iz skladišnih bunkera.

Veličina (mm):	400x2000 - 1200x4000
Pogon (kW):	2x0,5 - 2x2,5

Vibrating feeders with two vibration motors are used for extracting and conveying of bulk material from storage bins.

Size (mm):	400x2000 - 1200x4000
Drive (kW):	2x0,5 - 2x2,5

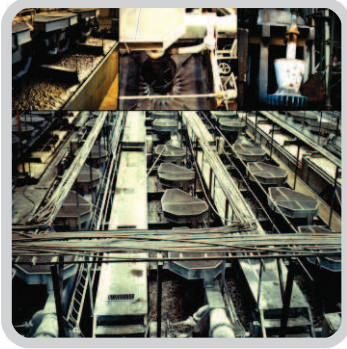
NAŠA OPREMA JE:
VISOKOG UČINKA
ZA TEŠKE RADNE USLOVE
POUZDANA
POGODNA ZA ODRŽAVANJE



OUR EQUIPMENT IS:
HIGH CAPACITY
HEAVY DUTY
RELIABLE
EASY TO SERVICE

Oprema za pripremu mineralnih sirovina (Flotacione mašine, Kondicioneri, Zgušnjivači, Hidrocikloni)

Mineral Processing Equipment (Flotation machines, Conditioners, Thickeners, Hydrocyclones)



Oprema za pripremu mineralnih sirovina / Mineral Processing Equipment

ATB FOD je specijalizovan za proizvodnju opreme za pripremu mineralnih sirovina.

- **Flotaciona mašina**, pneumomehanička otvorenog toka, koristi se za osnovno flotiranje i prečišćavanje u postupku flotiranja. Ovaj tip flotacione mašine radi na principu vertikalne cirkulacije pulpe. Flotacione ćelije rade se u osam veličina: 0.085m³ (poluindustrijska); 0.34m³; 0.71m³; 1.4m³; 2.8m³; 5.1m³; 8.5m³; 14.2m³
- **Kondicioner**, zapremine od 0,5 do 270m³, sa pogonom u dve varijante, snage 0,75 do 45 kW, sa mogućnošću ugradnje centralne cevi za slučaj preliva na nivou slobodne površine pulpe, sa radnim kolom koje poseduje donji protok u 14 veličina, prečnika od 0,25 do 3 m.
- **Zgušnjivač**, pogon je elektromotorni, a za zgušnjivače prečnika 15- 40 m može se upotrebiti i hidraulički pogon. Celokupan rad obavlja se automatski. Rad i položaj grabulja kontroliše se sa komandnog pulta. Prečnik zgušnjivača: 6, 10, 15, 20, 25, 30, 35, 40m ili bilo koji drugi po posebnom zahtevu. Snaga motora: 1 - 11(kW). Snaga pogona dizanja: 0,75 - 2,2 (kW).
- **Hidrociklon**: HF-150, HF-250, HF350, HF500 i HF700. U zavisnosti od karakteristike pulpe (hidromešavine) moguće su promene radnih karakteristika hidrociklona (ulaz, preliv, otvor za pesak) bez promene ugradbenih dimenzija. Prema tehnološkim zahtevima HF hidrociklone isporučujemo kao posebne proizvodne jedinice ili ugrađene u sopstvene hidrociklonske baterije.

ATB FOD is specialised in the production of mineral processing equipment.

- **Flotation Machine**, the Open-Flow Pneumatic-Mechanical, is used in the rougher flotation and cleaning operations of the flotation process. This type of the flotation machine operates on the principle of vertical circulation of the pulp. The flotation cells are made in eight sizes: 0.085m³ (pilot plant scale); 0.34m³; 0.71m³; 1.4m³; 2.8m³; 5.1m³; 8.5m³; 14.2m³.
- **Conditioner**, with volume from 0,5 to 270m³, with electric motor in two versions 0,75 to 45 kW, with possibility of fitting a central pipe for the event of overflow at the level of the pulp free surfaces, with impeller in 14 sizes, diameter of 0,25 to 3m.
- **Thickener**, the drive unit is electric motor, although the thickeners of 15- 40 m in diameter can use hydraulic driving unit. The entire operation is performed automatically. The operation and position of rakes are controlled from the control desk. The diameter of the thickeners: 6, 10, 15, 20, 25, 30, 35, 40m, or any other diameter to specific request. Electric motor output: 1-11 (kW). Lifting device drive unit output: 0,75-2,2 (kW).
- **Hydrocyclone**: HF-150, HF-250, HF350, HF500 and HF700. Depending on the pulp characteristics (hydro mixtures), it is possible to make alteration of all operating characteristics of the hydrocyclones (feed, overflow, apex opening) without any change of fitting dimensions. According to technological requirements, the HF-hydrocyclones are supplied as separate production units or built into our own hydrocyclone banks.



Oprema za sisteme za otprašivanje

Dedusting Systems Equipment



Oprema za sisteme za otprašivanje / Dedusting Systems Equipment

ATB FOD je specijalizovan za proizvodnju opreme za sisteme za otprašivanje

- **Mokri odvajač prašine, M22** za rad koristi kombinovano dejstvo centrifugalnih sila i potpunog mešanja vode i zaprašenog vazduha. Voda iz levka se neprekidno koristi, a pošto je njeno kretanje izazvano strujom vazduha za rad otprašivača nije potrebna ni pumpa ni poseban raspršivač. M22 se radi u dve veličine protoka zaprašenog vazduha: 20400÷34000 i 34000÷61200 (m³/h).
- **Patronski filter** je za visok stepen prečišćavanja suvim postupkom. Česta upotreba u metalurgiji i industriji građevinskog materijala, otprašivanje u livnici i metaloprerađivačkoj industriji. Čišćenje uložaka je impulsno, čije trajanje i učestalost zavisi od koncentracije prašine. Kapacitet 4000÷52000(m³/h).
- **Vrećasti filter**, sa pneumatskim otresanjem vreća je potpuno automatski, sa visokim stepenom otprašivanja. Otresanje vreća se obavlja red po red. Nema mehanizama niti habajućih delova. Jednostavan je nadzor i održavanje. Moguće je regulisati ciklus otresanja vreća, čime se omogućava prilagodavanje filtera različitim opterećenjima.
- **Ciklon**, ima široku primenu u otprašivanju industrijskih objekata u koje se ugrađuje kao samostalni otprašivač ili u kombinacijama sa ostalim suvim i mokrim odvajačima kao predodvajač. Radi se u više tipova, pojedinačne veličine protoka 60÷10000 (m³/h), ili u baterijama do 140000(m³/h), zavisno od veličine i granulometrijskog sastava prašine.
- **Cevovod neočišćenog vazduha**
- **Cevovod očišćenog vazduha**
- **Zasun za regulaciju protoka vazduha u sistemu otprašivanja...**

ATB FOD is specialised in the production of dedusting systems equipment.

- **Wet deduster, M22** operates by combined actions of centrifugal forces and thorough mixing of water and dust-loaded air. The water from the funnel is continuously used; since its movement is caused by air current, the deduster operation requires no pump nor separate nozzle. Available in two sizes, capacity: 20400 ÷ 34000 or 34000 ÷ 61200(m³/h).
- **Dust collector** offer solving dust collection problems in cases where there are large fluctuations of dust concentration, the most demanding air cleaning by dry procedure. Frequent use for dust collection in metallurgy and industry of construction materials, dust collection in casting of metals and metal processing industry. Filter inserts are cleaned in impulses, duration and frequency of which is set in accordance with the concentration of dust. Capacity 4000÷52000(m³/h).
- **Bag filter**, with pneumatic cleaning of bags is completely automatic, heavy duty, dust removing unit. Bags are cleaning-shaking row by row. There is no mechanism or wearing parts. Easy control and maintenance. Possibility of adjustment of bag cleaning cycles enables also adjustment of filters to various loads.
- **Cyclone** have a wide range of application in dust removing in industrial plants. It can be installed as an individual dust separator or in combination with other dry and wet separators as pre-separator. Available in several types and sizes of individual capacity 60 ÷ 10000(m³/h) or in the banks of up to 140 000 (m³/h), depending on the size and granulometric structure of dust.
- **Dirty air ducts**
- **Clean air ducts**
- **Air flow control gates...**



Razmenjivači toplote

Heat Exchangers

10



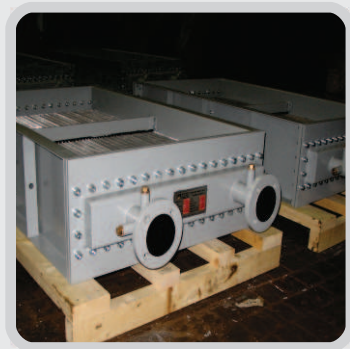
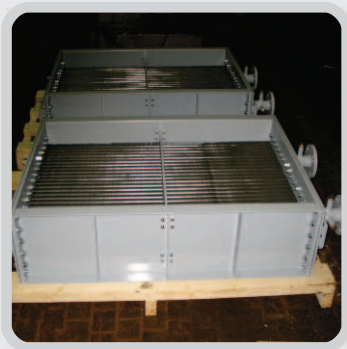
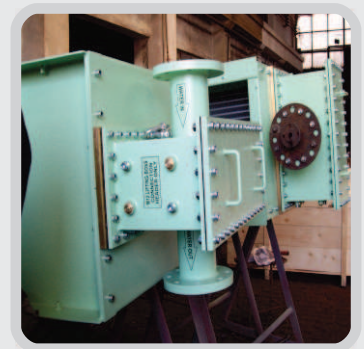
Razmenjivači toplote / Heat Exchangers

RAZMENJIVAČI TOPLOTE

- RAZMENJIVAČI TOPLOTE SISTEMA ZA GREJANJE
- HLADNJACI VODA-VODA ZA HIDROCENTRALE
- HLADNJACI VODA-VAZDUH ZA HIDROCENTRALE
- HLADNJACI VAZDUHA VISOKONAPONSKIH ELEKTROMOTORA

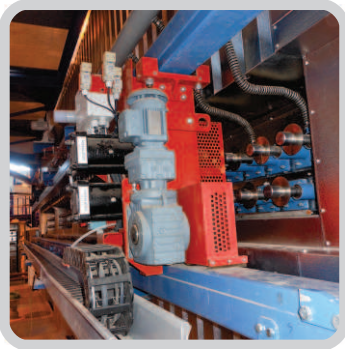
HEAT EXCHANGERS

- HEATING SYSTEMS HEAT EXCHANGERS
- WATER-WATER HEAT EXCHANGERS FOR HYDROELECTRIC POWER PLANTS
- WATER-AIR HEAT EXCHANGERS FOR HYDROELECTRIC POWER PLANTS
- AIR-COOLERS FOR HIGH VOLTAGE ELECTROMOTORS



Uređaji za stresanje prašine (pneumatski sistem stresanja) Pneumatic Rapping System

11



Uređaji za stresanje prašine CPRS / Pneumatic Rapping System

Pneumatski sistem stresanja je ekonomična, potpuno automatska i upravljiva oprema namenjena za čišćenje zavešenih snopova cevi u horizontalnim kotlovskim prolazima. Samohodna kolica, opremljena pneumatskim cilindrima, putuju od jedne do druge udarne tačke. Vibracije cevnih snopova izazvane udarcima uklanjaju naslage sa njihovih površina. Vazdušno zaptivanje vodica udarnih šipki je deo sistema.

PROJEKTOVANO I PROIZVEDENO DA BUDE:

- BEZBEDNO
- ROBUSTNO
- POUZDANO
- PROGRAMABILNO
- PODESIVO
- LAKO ZA ODRŽAVANJE

TEHNIČKE KARAKTERISTIKE :

Napajanje energijom : 230/400V , 230/690V , 3Ph , 50Hz

Potrošnja vazduha : do 51 NI/po udarcu pri 5,5 bar

Energija udarca : do 250 J na 5,5 bar

NAŠE USLUGE:

- TEHNIČKA PODRŠKA PRI FORMIRANJU PONUDE I PROJEKTOVANJU
- PROGRAMIRANJE
- PUŠTANJE U RAD
- POST-PRODAJNA USLUGA

The pneumatic rapping system is an economical, totally automatic and controllable equipment, intended for cleaning of suspended pipes' bundles in horizontal boiler passes. The self-propelled car, geared with pneumatic cylinders, travels from one strike-point to the other. The vibrations of pipes' bundles induced by rapping remove deposits from their surfaces.

The air sealing of strike-rods' guides is part of the system.

DESIGNED AND MANUFACTURED TO BE:

- SAFE
- STURDY
- RELIABLE
- PROGRAMMABLE
- AdJUSTABLE
- EASY FOR MAINTENANCE

TECHNICAL CARRACTERISTICS:

POWER SUPPLY: 230/400V, 230/690V, 3Ph, 50Hz

AIR CONSUMPTION: Up to 51 NI/per strike at 5,5 bar

IMPACT ENERGY: Up to 250 J at 5,5 bar

OUR SERVICES:-

- TAKING PART IN TENDER AND PROJECT PHASE
- PROGRAMMING
- COMMISSIONING
- AFTER-SALE SERVICE



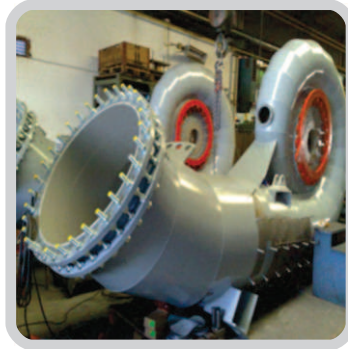
Mašinska oprema za hidroelektrane

Mechanical Equipment for Hydropower Plants

Fransisove turbine

Francis Turbines

12



Fransisove turbine / Francis Turbines

- Spirarno kućište
- Donji prsten
- Prsten do generatora
- Regulacioni prsten
- Poluga lopatice
- Čaure regulacionih lopatica
- Mehanizam sprovodnih lopatica
- Zaptivka vratila

Izrađuju se za turbine snage do **12500 kW**

- Spiral Casing
- Bottom Ring
- Cover Generator Side
- Regulating Ring
- Guide Vane Lever
- Bushing for Guide Vane
- Guide Vane Mechanism-Assembly
- Shaft Seal-Assembly

Fabricated for turbine power up to **12500 kW**



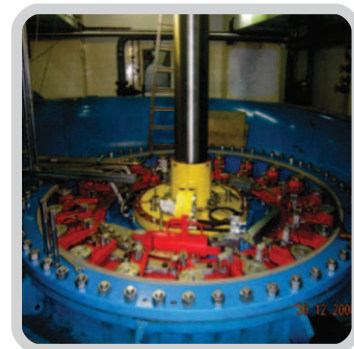
Mašinska oprema za hidroelektrane

Mechanical Equipment for Hydropower Plants

Kaplanove turbine

Kaplan Turbines

13



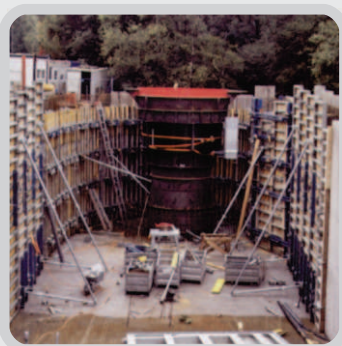
Kaplanove turbine / Kaplan Turbines

- Spoljni poklopac
- Unutrašnji poklopac
- Protočni donji prsten
- Stabilni prsten
- Mehanizam regulacionih lopatica
- Regulacioni prsten
- Poluga regulacionih lopaticice
- Čaure regulacionih lopatica
- Poklopac ležaja

Izrađuju se za turbine snage do **5000 kW**

- Outer Head Cover
- Inner Head Cover
- Discharge Bottom Ring
- Stay Vane Ring
- Wicket Gates Mechanism-Assembly
- Regulating Ring
- Guide Vane Lever
- Bushing for Guide Vane
- Bearing Cover

Fabricated for turbine power up to **5000 kW**



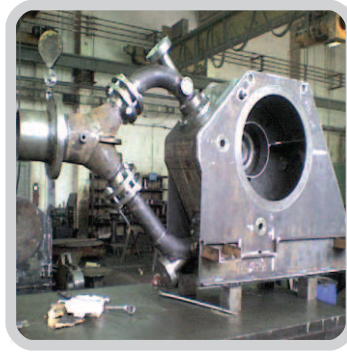
Mašinska oprema za hidroelektrane

Mechanical Equipment for Hydropower Plants

Peltonove turbine

Pelton Turbines

14



Peltonove turbine / Pelton Turbines

- Kućište turbine
- Bifurkaciona cev
- Prelazna cev
- Poprečni umetak
- Koplje

Izrađuju se za turbine snage do **6000 kW**

- Turbine Casing
- Bifurcation Pipe
- Disassembling Pipe
- Crossing Insert
- Spear

Fabricated for turbine power up to **6000 kW**



Mašinska oprema za hidroelektrane

Mechanical Equipment for Hydropower Plants

Cevne turbine

Bulb Turbines

15



Cevne turbine / Bulb Turbines

- Kućište turbine
- Unutrašnji protočni konus
- Spoljni protočni konus
- Protočni prsten
- Mehanizam regulacionih lopatica
- Regulacioni prsten
- Poluga regulacionih lopaticice
- Distribucioni konus

Izrađuju se za turbine snage do **3600 kW**

- Outer Turbine Casing
- Inner Gate Barrel
- Outer Gate Barrel
- Discharge Ring
- Wicket Gates Mechanism-Assembly
- Regulating Ring
- Guide Vane Lever
- Distributor Cone

Fabricated for turbine power up to **3600 kW**



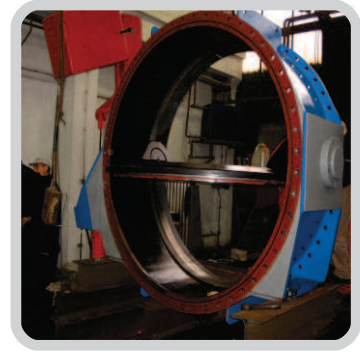
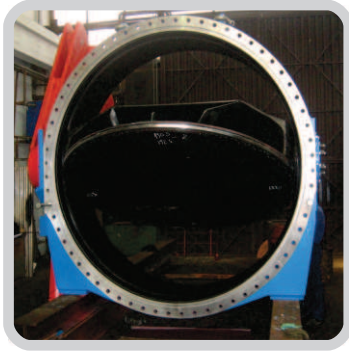
Mašinska oprema za hidroelektrane

Mechanical Equipment for Hydropower Plants

Leptirasti predturbinski zatvarači

Butterfly Valve

16



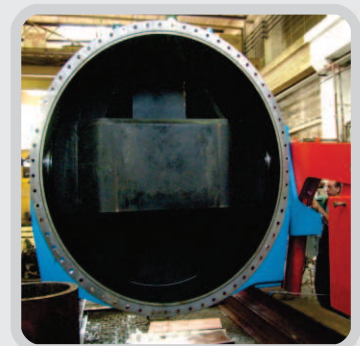
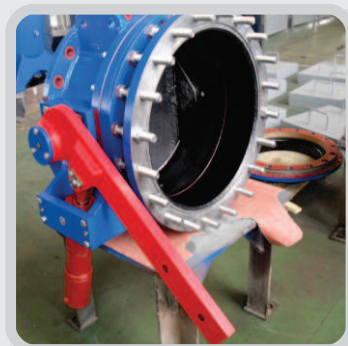
Leptirasti predturbinski zatvarači / Butterfly Valve

Leptirasti predturbinski zatvarači

- dijametar: 0.6- 3.00 m.
- pritisak: 10.3 MPa – 1 MPa

Butterfly Valve

- diameter: 0.6- 3.00 m.
- pressure: 0.3 MPa – 1 MPa



Mašinska oprema za hidroelektrane

Mechanical Equipment for Hydropower Plants

Izrada delova

Fabrication of Parts

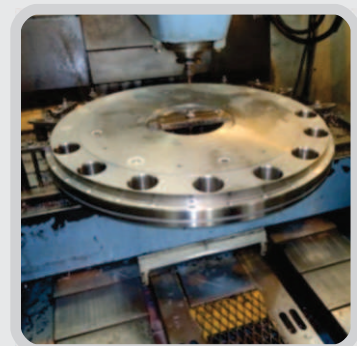
17



Izrada delova / Fabrication of Parts

- Protočni prsten
- Distributivni konus
- Kućište turbine
- Čaure regulacionih lopatica
- Koplje
- Poklopac na strani generatora
- Sifoni

- Discharge Ring
- Distributor Cone
- Turbine Housing
- Guide Vane Bushes
- Spear
- Generator Side Cover
- Draft tubes



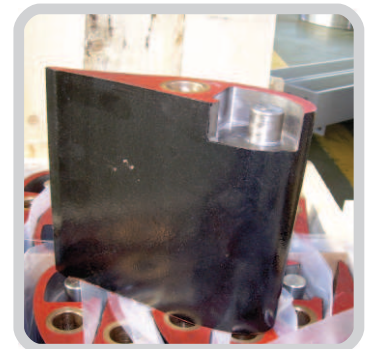
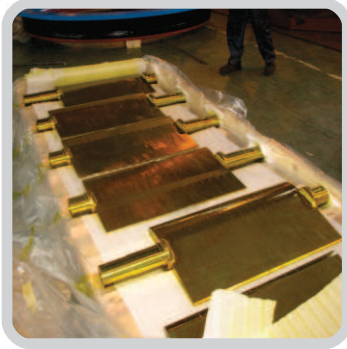
Mašinska oprema za hidroelektrane

Mechanical Equipment for Hydropower Plants

Lopatice Sprovodnog Aparata

Guide Vanes

18



Lopatice sprovodnog aparata / Guide Vanes

Lopatice sprovodnog aparata za:

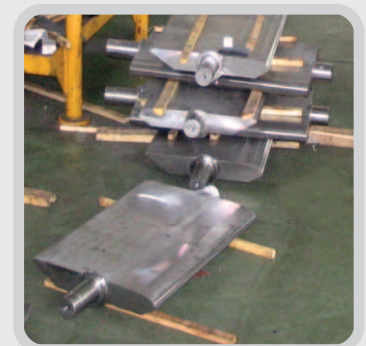
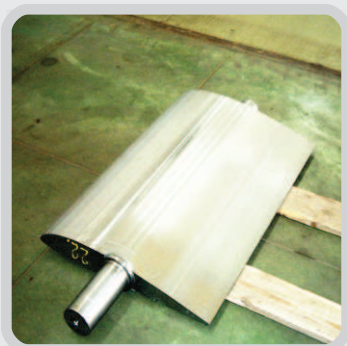
- Francisove turbine
- Kaplanove turbine
- Kaplan cevne turbine

Lopatice su odlivene od martenzitnog hromovog čelika (GX4CrNi13-4). Završna obrada izvodi se na numeričkim mašinama primenjujući CNC struganje i 4 ½ osnu glodačku obradu.

Guide vane for:

- Francis Turbines
- Kaplan Turbines
- Kaplan Bulb Turbines

Guide Vanes are low-carbon martensitic chrom steel (GX4CrNi 13-4) castings. Final machining on CNC Lathe and CNC 4 ½-axis milling machine.



Elektro oprema

Electrical Equipment

Niskonaponska oprema

Low Voltage Equipment

19



Elektro oprema za niski napon / Low Voltage Equipment

IZRADA:

- Kasetiranih izvlačivih i fiksnih niskonaponskih ormara
- Razvodnih baterija za osvetljenje i gradilište
- Komandnih pultova sa sinoptikom
- Svih razvodnih ormara niskog napona, po porudžbini
- Šemiranje svih vrsta razvodnih ormara i postrojenja

PRODUCTION OF :

- Cassette mounted withdrawl and fixed low voltage switchgears
- Power distribution units for lighting and construction site
- Benchboards with synoptics panels
- All kinds of low voltage distribution switchgears per customer's specifications
- Layout of all kinds of switchgears and plants



Elektro oprema

Electrical Equipment

Srednjenaponska oprema

Medium Voltage Equipment

20



Elektro oprema za srednji napon / Medium Voltage Equipment

IZRADA:

- Srednje naponskih razvodnih ormani sa fiksnim i izvlačivim ćelijama
- Pokretnih limenih trafostanica, kao i tipskih distributivnih betonskih trafo stanica
- Svih razvodnih ormara srednjeg napona, po porudžbini
- Izrade retrofit rešenja za zamenu stare SN opreme novom

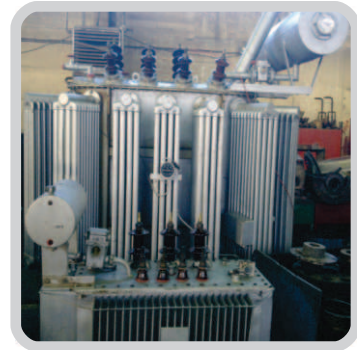
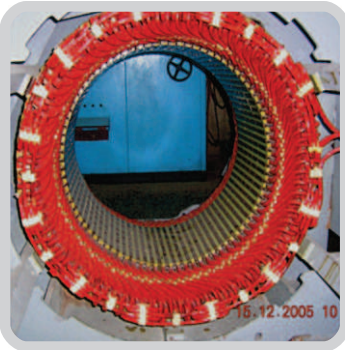
PRODUCTION OF :

- Medium voltage distribution switchgears with fixed and withdrawl cells
- Mobile steel-container transformer stations and standardized concrete distribution transformer stations
- All kinds of medium voltage switchgears per customer's specifications
- Retrofit / replacement of old MV equipment



Usluge remonta električnih mašina Electric Machinery Overhauling Services

21



Usluge remonta električnih mašina / Electric Machinery Overhauling Services

ATB FOD usluge remonta uključuju, ali se ne ograničavaju na sledeće:

- Servisiranje i popravka visoko naponskih asinhronih elektromotora do 10 kV i snage 3 MW
- Servisiranje i popravka jednosmernih motora i generatora
- Servisiranje i popravka nisko naponskih motora svih snaga
- Servisiranje i popravka vučnih motora koji se koriste u rudarstvu za teška vozila do 200 t
- Servisiranje i popravka transformatora do napona 35 kV, snage do 12,5 MVA
- Dinamičko balansiranje rotacionih masa prečnika do 3000 mm, dužine do 5000 mm i mase do 7000 kg u našoj radionici ili na terenu
- Premotavanje rotora i statora do 4 MW i napona do 6 kV u svim klasama izolacije.
- Premotavanje suvih i uljnih transformatora do 2,5 MVA i napona do 35 kV u svim klasama izolacije.
- Merenje i testiranje transformatora i električnih mašina na praznom hodu.
- Testiranje dielektrika svih izolacionih materijala i trafo ulja (testiranje naponom do 100 KV)
- Dinamičko uravnoteženje rotacionih delova i merenje vibracija za vreme rada.
- Preventivno održavanje i revitalizacija elektrotermičkih uređaja.

ATB FOD repair services include, but are not limited to the following:

- Servicing and repairing of high voltage asynchronous electric motors up to 10kV and 3 MW
- Servicing and repairing of DC motors and generators
- Servicing and repairing of low voltage electric motors of all powers
- Servicing of heavy vehicle traction motors up to 200 t used in mining
- Servicing and repairing of transformers up to 35 kV and 12,5 MVA
- Dynamical balancing of rotating parts up to diameter 3000 mm, length 5000 mm, mass 7000 kg in our workshop or in situ
- Rewinding of rotors and stators up to 4 MW and 6 kV in all classes of insulation
- Rewinding of dry and oil transformers up to 2,5 MVA, 35 kV in all classes of insulation
- Measuring and testing of transformers and electrical machines in idle regime
- Dielectric test of insulation and transformer oil (test voltage up to 100 KV)
- On-line dynamic balancing of rotating parts and vibration measurement
- Preventive maintenance and refurbishment of thermoelectric devices



Usluge Services

Elektro montaža Electrical Installation

22



Elektro montaža / Electrical Installation

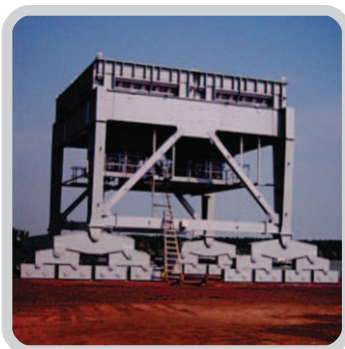
- Elektro instalacije u rudarstvu, metalurškim postrojenjima, cementarama i krečanama, termoelektranama, na transportnim sistema, objektima vodovoda i kanalizacije,
- Montaža, funkcionalno ispitivanje, puštanje u rad i održavanje energetskih postrojenja i trafostanica srednjeg napona,
- Montaža podzemnih naponskih mreža do naponskog nivoa 35 kV,
- Instalacija i funkcionalna proba merne regulacione opreme za sve vrste postrojenja,
- Izrada kablovskih glava spojnica na kablovima do naponskog nivoa 35 kV.

- Electrical installations in mining, metalurgy, cement and lime plants, power plants, conveying systems, water supply and sewage
- Assembling, testing, start-up and maintenance of power facilities and medium voltage transformer stations
- Installations of underground power transmissions up to 35kV
- Installation and testing of measurement and control equipment
- Manufacturing of cable couplers up to 35kV.



Usluge / Services Montaža i sklapanje mašinske opreme i instalacija Erection, Assembling and Installation of Mechanical Equipment

23



Montaža mašinske opreme / Assembling of Mechanical Equipment

ATB FOD u svojim specijalizovanim delovima nudi sledeće usluge montaže:

- Montaža čeličnih konstrukcija
- Montaža cevnih razvoda (vodosnabdevanje, toplovodi, gasovodi i dr.)
- Montaža i održavanje opreme u rudarstvu
- Montaža i održavanje opreme u metalurškim postrojenjima
- Montaža i održavanje opreme u hemijskoj i prehrambenoj industriji
- Montaža i održavanje opreme u cementarama i krečanama
- Montaža i održavanje opreme u termoelektranama
- Montaža i održavanje transportnih sistema, ski-liftova i žičara (mašinsko i elektro)
- Sve vrste zavarivačkih radova (elektro, CO₂, argon, autogeno)
- Zaštita od korozije kompletne opreme i konstrukcije raznim vrstama premaza uz peskarenje, mašinsko i ručno čišćenje

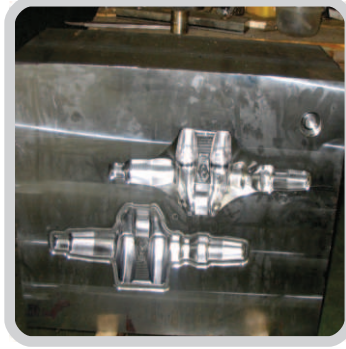
Servicing Erection, Assembling And Installation Of Mechanical Equipment

- Steel structures erection
- Pipelines erection (water supply, hot water pipelines, gas ducts etc.)
- Erection, assembling and maintenance of mining equipment
- Erection, assembling and maintenance of metallurgical equipment
- Erection, assembling and maintenance in chemical and food industry
- Erection, assembling and maintenance in cement plants
- Erection, assembling and maintenance in lime production plants
- Erection, assembling and maintenance of equipment in thermoelectricity power plants, pressure vessels
- Erection, assembling and maintenance of conveying systems, ski tows and ropeways
- Welding (electric arc, CO₂, argon, torch)
- Anticorrosion protection of equipment and structures



Usluge Services

Izrada opreme i rezervnih delova Equipment and Spare Parts Manufacturing



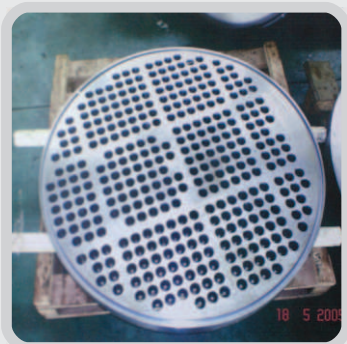
Izrada opreme i rezervnih delova / Equipment and Spare Parts Manufacturing

ATB FOD-usluge u radionicama odeljka Izrada opreme i rezervnih delova su:

- OBRADA NA 4,5-OSNIM CNC MAŠINAMA
- MEHANIČKA OBRADA
- BRAVARSKI RADOVI
- IZRADA ČELIČNIH KONSTRUKCIJA
- TERMIČKA OBRADA
- MODELARSKO STOLARSKI RADOVI
- GALVANSKA OBRADA

ATB FOD services in the Division of the Manufacturing of Equipment and Parts workshops are:

- 4.5-AXIS CNC MACHINING&MILLING
- MECHANICAL MACHINING
- METALWORKING
- STEEL STRUCTURES
- HEAT TREATMENT
- WOODWORK WOOD MODELS FOR METAL CASTING



Usluge Services

Elektrotehnička merenja Electrical Measurements

25



Elektrotehnička merenja / Electrical Measurements

- Pregled, remont, ispitivanje i podešavanja zaštite u trafo stanicama srednjeg napona
- Pregled i ispitivanje električne instalacije
- Pregled i ispitivanje gromobranske instalacije
- Merenje otpornosti izolacije energetskih kablova, energetskih transformatora i motora
- Merenje otpornosti namotaja motora i transformatora
- Merenje specifičnog otpora tla
- Određivanje dielektrične čvrstoće izolacionih ulja
- Iznalaženje mesta kvarova na kablovima i vodovima (zemljospoj, kratak spoj i prekid voda)
- Inspection, overhaul, testing and adjusting of medium voltage transformer stations protection
- Inspection and testing of electrical installations
- Inspection and testing of lightning arresting systems
- Insulation resistance measuring of power cables, transformers and motors
- Motor and transformer winding resistance measurement
- Ground resistance measurement
- Measurement of the dielectric strength of insulating oil
- Fault location on cables and transmission lines (insulation nicks, short circuits and breaks)



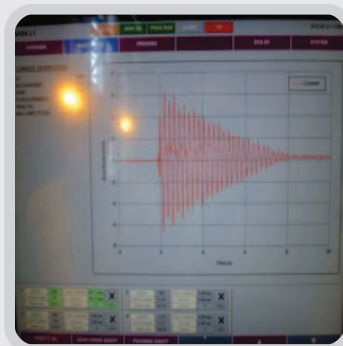
Elektroinženjering Electrical Engineering

26



Elektroinženjering / Electrical Engineering

- Velika licenca za projekte upravljanja elektromotornim pogonima – automatika, merenje i regulacija za objekte bazne i preradivačke hemijske industrije, objekte crne i obojene metalurgije, objekte za preradu kože i krzna, objekte za preradu kaučuka, objekte za proizvodnju celuloze i papira i objekte za preradu nemetalnih minerala.
 - Licence za projektovanje i izvođenje elektroenergetskih instalacija I to:
 - 350 – Projektovanje elektroenergetskih instalacija niskog i srednjeg napona
 - 352 – Projektovanje upravljanja elektromotornim pogonima – automatika, merenje I regulacija
 - 450 – Izvođenje radova elektroenergetskih instalacija niskog i srednjeg napona
 - 453 – Izvođenje radova telekomunikacionih mreža i sistema
 - 850 - Odgovorni izvođač elektroenergetskih radova niskog napona u zgradama (objektima)
 - Posedovanje softvera za izradu elektro šema EPLAN P8 – v 1.8 SP1 (compact i profesional licenca)
 - Poslovne-tehnička saradnja sa Schneider Electricom – zvanični Panel Builder.
 - Izrada tehničke i projektne dokumentacije objekata I uređaja. Izrada PLC programa za PLC tipa: Quantum, Twido – Schnieder Electric i svih tipova PLCa – Omron.
 - Izrada svih vrsta tenderskih dokumentacija.
 - Upravljanje projektima, udeo u proizvodnji opreme i učestvovanje u puštanju.
- Design of the low and medium voltage electro-energetic installations
 - Design of the electric motors drives control
 - Performing low and medium voltage electro-energetic installations
 - Performing telecommunication networks and systems installations
 - Performing low voltage electro-energetic installations in closed objects
 - Electrical Design Layout Software ePLAN P8 – v 1.8 SP1 (compact and professional)
 - Business and technical cooperation with Schnieder Electricom – official Panel Builder.
 - Design and technical documentation for objects and equipment.
 - Software engineering for PLC of the type: Quantum, Twido – Schnieder Electric and all Omron types.
 - All types of bidding documentation.
 - Project management, taking part in production, commissioning and run-in of equipment and systems.



Mašinski inženjering Mechanical Engineering

27



Mašinski inženjering / Mechanical Engineering

ATB FOD d.o.o. je kompetentan partner u projektovanju industrijske opreme i kompletnih sistema.

- Naglasak pri projektovanju je na efikasnosti i pouzdanosti uz nisku cenu eksploatacije.
- Naš centar u Boru je potpuno opremljen za ostvarenje projekata po principu ključ-u-ruke i projekata prilagođenih posebnim industrijskim zahtevima.
- Praćenje proizvodnje opreme i učestvovanje u puštanju (vođenje projekata)

Licence:

Π040M3 – projekti transportnih sredstava, skladišta i mašinskih konstrukcija i tehnologije za objekte bazne i prerađivačke hemijske industrije, objekte crne i obojene metalurgije, objekte za preradu kože i krzna, objekte za preradu kaučuka, objekte za proizvodnju celuloze i papira i objekte za preradu nemetalnih minerala

333 – odgovorni projektant transportnih sredstava, skladišta i mašinskih konstrukcija i tehnologije

434 – odgovorni izvođač radova transportnih sredstava, skladišta i mašinskih konstrukcija i tehnologije

330 – odgovorni projektant termotehnike, termoenetike, procesne i gasne tehnike

430 – odgovorni izvođač termotehnike, termoenetike, procesne i gasne tehnike

ATB FOD is a competent partner in design, manufacturing, installing and erection of industrial equipment and systems

- Emphasis in design and manufacturing is placed on efficiency and reliability at a low operating cost.
- Our head office in Bor is fully equipped to provide turn key projects and customized products and services to the industry.
- Mining&Metallurgy, Cement Industry, Chemical Industry, Power Industry
- Engineering, Planning, Consulting, Supervisor Services, Commissioning

CAD/CAM/CAE software:

- SolidWorks Professional
- I-DEAS MasterSeries



Oprema pod pritiskom Pressure Equipment

28



Oprema pod pritiskom / Pressure Equipment

OPREMA POD PRITISKOM

Proizvodni program ATB-FOD obuhvata proizvode i opremu za procesnu industriju, energetska postrojenja i opremu za skladištenje gasovitih i tečnih materijala.

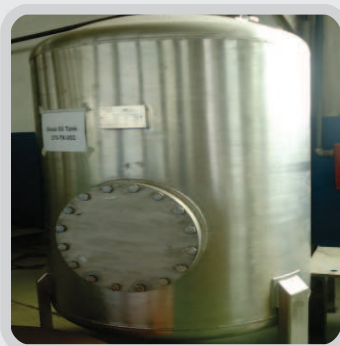
Opremu izrađujemo prema dokumentaciji i tehnologiji koju obezbeđuje stručni kadar, koristeći savremene mašine.

Kao proizvođač opreme pod pritiskom, prema Pravilniku o tehničkim zahtevima za opremu pod pritiskom ("Sl. glasnik RS" br. 87/2011; PED 97/23/EC), ATB-FOD poseduje certifikate ISO 9001, ISO 14001, ISO 18001, ISO 3834-2 kao i svedočanstva i uverenja i ateste izdate od naših i stranih institucija.

PRESSURE EQUIPMENT

ATB FOD production program includes products and equipment for process industry, power plants and storage of gasses and liquids. We make equipment according to documentation and technology created by experts using contemporary manufacturing machines.

As a pressure equipment manufacturer, ATB FOD is certified in accordance with the Manual on technical requirements for pressure equipment, in serbian: Pravilnik o tehničkim zahtevima za opremu pod pritiskom ("Sl. Glasnik RS" br. 87/2011; PED 97/23/EC) and has certificates for ISO 9001, ISO 14001, ISO 18001, ISO 3834-2 and other required testimonies, certifications and attests issued by domestic and foreign institutions.



Kontakti / Contact

ATB FOD DOO BOR

Đorđa Vajferta 16

19210 Bor

Srbija

<http://www.atb-motors.com>, www.fod.co.rs

Prodaja / Sales department:

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