

IZHORSKIYE ZAVODY'S METALLURGICAL COMPLEX



Izhorskiye zavody's metallurgical complex is one of the leaders on the Russian and CIS markets due to a unique combination of technological capabilities, research potential and long-term experience in the manufacturing of metallurgical semi-finished products.



Izhorskiye zavody's metallurgical complex is one of the leading Russian manufacturers of metallurgical semi-finished products for various branches of industry.

The unique complex of manufacturing facilities, technologies and know-how allows the following:

- cast forging ingots with the weight up to 360 t, in particular, in vacuum – from 15.3 t to 360 t;
- cast ingots of electroslag remelting with the weight up to 63 t;
- cast ingots of vacuum arc remelting with the weight up to 41.1 t;
- manufacture forgings with the weight up to 230 t, forged shafts with the length up to 21 m, forged shells with the diameter up to 5.5 m;
- manufacture big-sized two-layer and three-layer sheets and plates up to 450 mm;
- manufacture steel castings with the weight from 150 kg to 145 t;
- perform final thermal treatment;
- carry out machining of blanks with the diameter up to 5.5 m and shafts with the length up to 23 m;
- execute all types of non-destructive testing, any analysis of the composition, structure, properties of products in accordance with Russian standards and national standards of customers' companies

PRODUCTION OF SPECIAL STEELS

OMZ-SpecialSteels is one of the leading Russian manufacturers of metallurgical blanks for various branches of industry from its own metal. The company manufactures metallurgical semi-finished products from steels with special properties, e.g. corrosion-resistant, heat-resistant, highly alloyed, radiation-resistant.



TECHNOLOGICAL CAPABILITIES



OMZ-SpecialSteels metallurgical capabilities include steel-making and forging productions. Steel casting is performed in electrical steel-making furnaces. The steel quality is guaranteed by using secondary metallurgy in steel vacuum refining plants as well as by using electroslag and vacuum arc remelting.

Steel-making production

- Steel casting is carried out in the steel-melting furnace EAF-120 with the capacity of 120 tons.
- Steel-making facilities are equipped with liquid steel refining plants and degassing Ladle Furnace Plants (ASEA-SKF) with ladle capacity of 70 tons and 150 tons.
- Steel casting into moulds is performed from the top and from the bottom; in which case, the weight of forging ingots is 3-360 tons, plate ingots – 5-35 tons as well as in six vacuum chambers with the capacity from 60 tons to 520 tons.
- Metallurgical manufacture has electroslag (ESR) and vacuum arc (VAR) remelting furnaces allowing to pour ingots with the weight from 14 tons to 63 tons (ES) and from 13 tons to 41.1 tons (VA) for making products of superior quality.

Forge-and-press production has a broad spectrum of forging equipment provided with forging cranes and manipulators of the corresponding carrying capacity.

- Manufacture of forgings of large weight and dimensional characteristics with the weight up to 230 t and diameter up to 5.5 m is performed at the Russian biggest automated forging complex (AKK-12000) with the force of 12000 tf.
- Manufacture of forgings with the weight up to 60 t is carried out at the automated forging complex including a press with the force of 6000 tf.
- Manufacture of forgings with the weight up to 16 t is performed at the press of 3200 tf, with the weight up to 3 t – at the press of 1250 tf.

Heat treatment equipment allows to obtain the metal structure providing high operating characteristics of products.

- Heat treatment of blanks is carried out in heat treatment open gas chamber furnaces, car-type furnaces with carrying capacity up to 800 tons.

Overall dimensions of furnaces:

width

from 2500 to 6000 mm,

length

from 5200 to 21000 mm.

Quenching is carried out into water and into oil.

- Heat treatment is also carried out in the vertical position in electrical shaft furnaces.
- Overall dimensions of furnaces:

depth

up to 26000 mm;

diameter

up to 3000 mm.

Quenching is performed into water and into oil. The depth of vertical quenching tanks is up to 30000 mm.

Blank machining is performed as follows:

- The machining of blanks with the diameter up to 12500 mm, height up to 5000 mm and weight up to 200 t is carried out in vertical boring mills.
- The capabilities of thread-turning equipment allows to perform machining of blanks with the diameter up to 3000 mm, length up to 22000 mm, weight up to 230 t.
- Deep drilling machines with carrying capacity up to 400 t allow to make central holes with the diameter from 55 mm to 2000 mm, depth up to 25000 mm.

The machining shops have in their disposal a park of sheet flatter and dressing, as well as a site for assembling and welding of multilayer packets for manufacturing metal-clad plates.

PRODUCTS

The range of products manufactured by OMZ-SpecialSteels includes nuclear shells and blanks for NPPs; shells for pressure vessels, generator rotor shafts, turbine rotor shafts, pipe moulds for centrifugal casting, blanks for backup rolls and sleeves, knives: die tooling, plates, pipe blanks, propeller shafts, intermediate shafts, thrust shafts, stern shafts; rudder heads, forged bars, shafts (smooth and with protrusions), shafts for cement industry, blanks for paper, automotive mining industries and machine-building, etc.



REFERENCE LIST



Enterprise specialists have accumulated a vast practical experience in the development of engineering processes for manufacture of metallurgical blanks according to the strictest customers' specifications, Russian and foreign standards.

The range of steel grades being cast exceeds 300 positions from various classes:

structural steels

- carbon quality steels
- low-alloy steels
- alloyed steels

instrumental steels

- die steels
- roll steels

steels and alloys

- corrosion-resistant
- heat-resistant
- high-temperature
- wear-resistant

OMZ-SpecialSteels has experience in manufacturing products according to such standards as ASTM, JIS, DIN, NFA, BS, etc.

Customer	Country	Type of equipment	Steel grade	Year of supply
Izhorskiye zavody OJSC	Russia	Shells and flats (including double-layer) for NPPs	15Cr2NiMoVA, 10MnNi2MoVA, 08(12)Cr18Ni10Ti (VA), 22K (ES), 09Mn2Si (ES)	2002-2011
PO Sevmash OJSC	Russia	Forgings for ship-building and flats	Special steels	2002-2011
TsS Zvyozdochka OJSC	Russia	Forgings for ship-building and flats	Special steels	2002-2011
Admiralteyskiye verfi (Admiralty Shipyards) OJSC	Russia	Forgings for ship-building and flats	Special steels	2002-2011
Power Machines OJSC	Russia	Rotor blanks, hydro shafts, flats	26CrNi3Mo2VA, 20MnSi, 15Cr1Mo1V, 38CrNi1MoA, 34CrNi3MoA, 30CrNi3Mo1VA, 12MoCr, 15Cr1MoV, 06Cr12Ni3Cu	2002-2011
VSMPO-AVISMA Corporation OJSC	Russia	Die cubes	5CrNiMo, 4Cr5MoVSi	2002-2011
Harbin Turbine Co., Ltd.	China	Turbine rotor blanks	30CrNi4MoV	2006-2010
Welspun Power & Steel Ltd.	India	Backup rolls	75Cr2MoNiV	2007-2011
ThyssenKrupp	France	Blanks for parts in the field of general mechanical engineering, ship-building and metallurgy	56CrNiMo6, 42CrMo4, 75Cr2MoNiV	2006-2010
ABB	Finland	Blanks for parts in the field of power engineering	42CrMo4V, S355J2G3	2005-2011
ZIO-Podol'sk OJSC	Russia	Blanks for tube sheets and flats	22K (ES), 10Cr2Mo	2002-2011
Dongfang Turbine Co., Ltd	China	Turbine rotor blanks	30CrNi4MoV	2007-2009
SAINT-GOBAIN PAM, Metaltemple Aquitaine	France	Mould blanks	21CrMo10	2007-2011
Hyundai Steel	South Korea	Backup rolls	75Cr2MoNiV	2010

PRODUCTS



FORGINGS FOR NPP AND PETROCHEMISTRY

Types of products	Steel grades	Weight, t Overall dimensions, mm
Blanks for NPP	15Cr2NiMoVA, 26CrNi3Mo2VA, 06Cr12Ni3Cu, 22K (ES), 22K (VA), 12MnSi, 08(12)Cr18Ni10Ti, 14Cr17Ni2, CrNi32Ti (VA), 30CrNiMo8V, 10MnNi2MoVA, 20Cr13, 30Cr13, etc.	forgings - from 0.05 to 200 tube sheet cross-section - up to 650
Shells for NPP and petrochemistry		ingots – up to 360 shells: diameter – up to 5 580 height – up to 3900

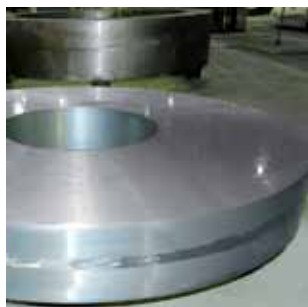
FORGINGS FOR POWER ENGINEERING

Types of products	Steel grades	Weight, t Overall dimensions, mm
Generator rotor shafts	38XNi3MoVA, 35CrNi3MoVA, 34CrNi1MoA, 26CrNi4MoVA, 26NiCrMoV115, etc.	ingots – up to 360 forgings – up to 90 body diameter – up to 1200
Turbine rotor shafts for high-pressure, intermediate-pressure and low-pressure cylinders	25Cr1Mo1VA, 30CrNi3Mo1VA, 26CrNi3Mo2VA, 23CrMoNiW88, etc.	ingots – up to 290 forgings – up to 90 body diameter – up to 2000
Blanks for gas turbines (shafts of compressors and rotors, discs, tie-rods, etc.)	26CrNi3Mo2VNA, 15Mo3, 26NiCrMoV145, 26NiCrMoV115, etc.	forgings – up to 100 shaft diameter – up to 1200
Forgings for hydro power engineering (hydro shafts - welded and solid-forged, belts, etc.)	20MnSi; 40; 06Cr12Ni3Cu, etc.	forgings – up to 150 outer diameter of shafts – up to 3000; internal diameter of shafts - up to 1750
Blanks for gas compressor plants (shafts, covers, cylinders, flanges, etc.)	25, 15Cr1Mo1V, 15Cr2NiMoVA, 38CrNi3MoVA, 10MnNi2MoVA, 09Mn2Si (ES), 34CrNi1MoA, 14Cr2MnMoB, 25Cr1Mo1V, etc.	

FORGINGS FOR SHIP-BUILDING

Types of products	Steel grades	Weight, t Overall dimensions, mm
Propeller shafts, forgings	38CrNi3MoVA, 14Cr17Ni2, 40CrNi2MoA, 38Cr2Ni2MoA, 08Cr10Ni20Ti2, 08-12Cr18Ni10Ti, St35, 07Cr16Ni4Nb, 40CrNi, 38CrMo, 34CrNiMo6, 42CrMo4, Ck50Mod and special grades; SEW; DNV, LR, GL, BV, RSRS, RR, 08Cr10Ni20Ti2.	forgings – up to 80 length - up to 18000

FORGED PRODUCTS



FORGINGS FOR METALLURGY

Types of products	Steel grades	Weight, t Overall dimensions, mm
Die blanks (rams, matrixes, punches, bolsters)	5CrNiMo, 4Cr5MoVSi, 56NiCrMoV7	ingots – up to 120 forgings – up to 80 thickness - from 140 to 800 width - from 350 to 3500
Plate blanks	56NiCrMoV7, 42CrMo4	forgings - from 1 to 5 height - from 180 to 600 width - from 200 to 1250 length - from 2200 to 8900
Blanks of forming rolls, reeling rolls, forging rollers, rollers of straightening machines	60CrNi, 50, 75CrMoV	ingots – up to 360 body diameter – up to 2210
Pipe blanks	20, 09Mn2Si, 15MnSi, 12Cr1MoV, 15Cr1Mo1V, etc.	blanks - from 1 to 5 diameter - from 150 to 650
Moulds for centrifugal casting of pipes	21CrMo10, 18CDV4, 21CrMo10Mod, 16CrMoNi	ingots – up to 290 forgings – up to 175 internal diameter – from 300 to 2000 length - from 2500 to 10000
Blanks of forming roll shrouds, couplings	150CrNiMo	ingots – from 5 to 18.5 outer diameter – from 500 to 1500 internal diameter – from 200 to 800 height – from 350 to 650
Blanks of guide columns and sleeves, blanks of knives	42CrMo4, S355J2, etc.	forgings – up to 150 length – up to 20500

FORGINGS FOR GENERAL MECHANICAL ENGINEERING

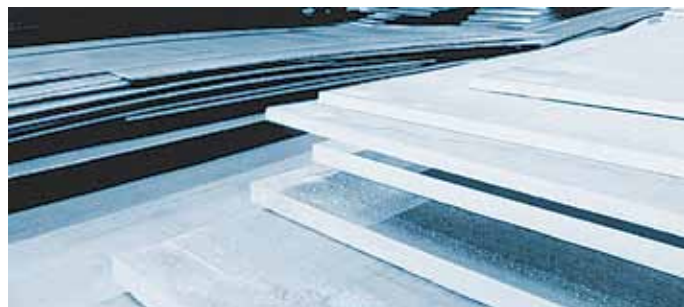
Types of products	Steel grades	Weight, t Overall dimensions, mm
Forged bars (shafts) - smooth and with protrusions, plates	SK45; St-52.3; 42CrMo4; 35NCD16; 18CrNiMo7-6; 100Cr6; 90MnCrV; 34CrNiMo6; AISI 4140; AISI 4130, etc.	forgings – up to 80 shaft diameter – up to 1000 length – up to 12000 plate thickness – up to 800
Forgings for paper, automotive, mining industries and machine-tool building	carbon, alloyed, stainless	ingots – up to 150 shaft length - up to 23000 outer diameter of cylinders - up to 1500 disc diameter - up to 4000
Forgings of calendar rolls	carbon, alloyed, stainless	ingots – up to 180 forgings – up to 60 outer diameter - up to 1500 internal diameter - up to 1200 length - up to 10000

PRODUCTS

OMZ-SpecialSteels manufactures hot rolled flats and plates for various purposes: for vessels and pipelines, ships and marine drilling platforms, NPP equipment, etc. The company has a vast experience in manufacturing of large-size two-layer and three-layer sheets and plates for critical purpose products.



FLATS



SHEETS AND PLATES

Description of products	Steel grade	Thickness, mm	Width, m	Length, m	Maximum weight, t
Carbon and low-alloyed steels	St.3 – St.5, St.20 – St.40, 22K, 22K-Sh, 22K-VD, 09Mn2Si, 15MnSi, 10-15CrSiNiCu, etc.	10- 450	1.5- 4.6	6 – 12.0	up to 70
Alloyed steels	10MnNi2MoVA, 15Cr2NiMoVA, 12CrMo, 12MoCr, 16MnNiMoA, 15Cr5Mo, 12Cr1MoV, 15Cr1Mo1V, etc.	10- 450	1.5- 4.6	6 – 12.0	up to 70
Special steels for ship-building	AB, 10MnNiNb, etc.	10-300	1.5-3.7	up to 11	up to 50
Stainless steels	08Cr18Ni10Ti, 12Cr18Ni10Ti, 06Cr12Ni3Cu, 20Cr13, 30Cr13, 08Cr13, 10Cr17Ni3Mo2Ti, 10Cr17Ni3Mo3Ti, etc.	10- 250	1.5 – 3.2	4-12.0	up to 50
Titanium alloys	PT-3V, 5V, VT1-00, etc.	20- 160	1.5- 2.5	6 – 9	up to 5.5

Two-layer sheets are manufactured according to own technology by the method of rolling of non-symmetric packets and are used in various industry branches.

Oil and gas complex, chemical industry:

- vessels and pipelines for aggressive media being operated at normal and high values of temperature and pressure
- vessels and pipelines being operated at low values of ambient temperature

Nuclear power engineering:

hydro vessels of emergency cooling system and other equipment

Oil and gas extraction industry:

sheathing of the ice belt of marine drilling platforms

TWO-LAYER AND THREE-LAYER SHEETS

Description of product	Thickness range, mm
Steel - flat, hot-rolled, two-layer, corrosion-resistant	8-120
Two-layer sheets for manufacture of pressure vessels from steel grades of 22K, 12CrMo, 09Mn2Si	8-150
Two-layer sheets from steel grades of 09Mn2Si+08Cr18Ni10Ti (12Cr18Ni10Ti) with thickness of 10-11 mm	10-11
Two-layer sheets for objects being under supervision of Russian Sea Register of Shipping (09CrNi3MoCu+08Cr18Ni10Ti)	20-50
Two-layer sheets from steel grades of 22K+08Cr18Ni10Ti	8-125
Two-layer sheets for objects being under supervision of Gosatomnadzor, Russian Sea Register of Shipping (F36SZ+08Cr18Ni10Ti)	20-50
Two-layer and three-layer sheets from steel grades of 09CrNi3MoCu+08Cr18Ni10Ti (AB2-P), 08Cr18Ni10Ti+09CrNi3MoCu+08Cr18Ni10Ti (AB2-T)	20-60
Two-layer sheets for objects being under construction and supervision of Russian Sea Register of Shipping from steel grades of F36SZ+316L, F36SZ+317L	20-50

FOUNDRY

OMZ-Foundry specialises in manufacturing castings for power engineering, petrochemical and gas sectors, production of metallurgical equipment, ship-building, mining and other industry branches.



PRODUCTS



The technologies for manufacturing castings being unique by weight, overall dimensions and technical requirements have been mastered in the foundry complex, such as hull castings for biggest domestic tankers, nuclear ships and navy ships; castings for steam, gas and hydro turbines, rolling mills, forge-and-press equipment, etc.

Shaped steel-making complex has the following productions:

- model
- steel-making
- moulding-pouring
- mixture-preparation
- cleaning
- heat treatment and finishing operations

CASTING NOMENCLATURE

Purpose	Product types	Steel grades
Power engineering	Castings for hydro turbines: runner casings, rims, hubs, blades. Castings for steam and gas turbines.	Carbon, alloyed, stainless
Heavy mechanical engineering and equipment for metallurgy	Bed plates for presses and rolling mills, traverses, press cylinders, anvils, gear-box casings, shrouds, castings of gear transmissions, dies, rigging, etc.	Carbon, alloyed
	Parts for furnace valves	Fireproof and fire-resistant
Petrochemistry and gas extraction industry	Parts for shutoff and fountain valves, casings of pumps, compressors and turbochargers, heavy industrial shutoff valves, etc.	Carbon, alloyed
Mining equipment	Castings for big-sized quarry excavators and drilling machines: bottoms, walls and teeth of buckets, caterpillar links, frames, rims, housings of gear-boxes, bearings, hinged arms, etc.	Carbon, alloyed, high-manganous
Crushing equipment	Case-shaped castings. Conic armour-plating, crushing plates, lining armour-plating, etc.	
Ship-building	Case-shaped castings: stern-frames, stems, mortars, hubs, propeller brackets, castings of pre-fabricated and solid-cast propellers, etc.	Carbon, alloyed, stainless

Process capacities of the foundry complex provide a full cycle of manufacture of steel castings including design and manufacture of pattern equipment.

The process and lift-and-carry equipment available allows to manufacture steel castings with the weight from 150 kg to 145 tons with the following overall dimensions: height – up to 4000 mm, width (diameter) – up to 6200 mm, length – up to 12000 mm.

At the customer's request, the castings manufactured can be subjected to provisional machining and non-destructive types of testing, namely: ultrasonic testing, radiographic testing, magnetic power flaw detection, capillary flaw detection

QUALITY STRATEGY



Izhorskiye zavody's metallurgical enterprises carry out strict quality control of output products, e.g. specified steel pouring parameters, forging and heat treatment conditions, chemical analysis, mechanical properties, macro- and microstructure of steel.



The quality management system of OMZ-SpecialSteels and OMZ-Foundry metallurgy enterprises complies with the requirements of ISO 9001:2008 standard.

- The production of metallurgical blanks at OMZ-SpecialSteels has been certified by Lloyd's Register (LR, United Kingdom), Bureau Veritas (BV, France), Det Norske Veritas (DNV, Norway), American Bureau of Shipping (ABS, USA), Germanischer Lloyd (GL, Germany), Registro Italiano Navale (RINA, Italy), Russian Sea Register of Shipping (RSRS, Russia), Russian River Register (RRR, Russia).
- The production of steel castings at OMZ-Foundry has been certified by Bureau Veritas (BV, France), Lloyd's Register (United Kingdom), DNV (Norway), Russian Sea Register of Shipping, Russian River Register.

The products are manufactured according to GOST, OST, special specifications as well as customer firms' national standards.

The inspection and testing of output products are performed by the Izhorskiye zavody's Research Centre (RC) and Central Laboratory of Non-Destructive Testing Methods (CLNDTM). The laboratories have been certified for conduction of all types of destructive and non-destructive methods of inspection and testing.

The determination of chemical composition of materials is carried out on spectrometers manufactured by Phillips and ARL. The radiographic testing equipment provides X-raying of forgings and castings with the thickness up to 300 mm. For X-raying, linear accelerators with 4.5 MeV and 8.0 MeV and X-ray accelerators from 50 kV to 420 kV are used.

The capabilities of equipment for ultrasonic testing allow to perform testing of forgings and castings with the thickness up to 1000 mm. Testing is based on the use of flaw detectors and converters manufactured by Sona test and Krautkramer.

The technology and equipment for magnetic powder testing ensure meeting the requirements set forth in Article A 275-86 of ASTM standard.

In capillary testing methods, the water-washable flaw detection compounds are used, designed for detection of discontinuity flaws with opening up to 7 microns.

The physical and mechanical as well as process properties of moulding and core sand mixtures are determined on instruments manufactured by Diter, G. Fisher, etc.

The manufacture of products for NPP has been licensed by the Federal service for ecological, technological and nuclear supervision.