



ROLLS FOR ROLLING MILLS



The “Uralmashplant” Joint-Stock Company is the leading Russian supplier of plants and machinery for oil-and- gas production and mining sectors, as well as the iron and steel industry.

In the middle of 90ths, the “Uralmashplant” was included in OMZ – United Heavy Machinery (Uralmash – Izhora Group), and since 2007 it constitutes a part of the Machine-Building Corporation “Uralmash”.

Engineering, marketing and sales of equipment are organized on a product basis:

- Oil-and-gas Division: complete mobile, cluster, and stationary drilling rigs with capacity from 160t to 600t, sets of drilling equipment.



- Mining Equipment Division: mining shovels and draglines, grinding and crushing equipment, cement production machinery, etc.

- Metallurgical Equipment Division: sintering equipment, pelletizing plants, presses, blast furnace equipment, continuous casters, equipment for hot and cold rolling shops, rolls for rolling mills, etc.

- NPO VNIIMETMASH focuses on design and engineering of materials handling equipment: heavy-duty cranes for iron and steel companies, materials handling machinery for nuclear power plants, special- and general-purpose overhead travelling cranes.

We strive to become a world-class machine-building company, which will be able to fully meet the Customer's needs.

The “Uralmashplant” Joint-Stock Company has a complete production cycle: engineering, steel-making, welding, machining and assembly departments.



History

The first in the USSR rolls for hot-rolling mills were produced from ingots weighing up to 40 tons at Uralmashplant in 1934. The plant began producing large ingots, weighing 60 tons and more, in 1935-1936, which allowed to manufacture large backup rolls for rolling mills.

Because of exceptionally high requirements to the quality of metal used for production of cold mill rolls, re-tooling and modernization of the production plant were carried out by the 1940. Since then, rolls for cold-rolling mills have become an integral part of Uralmashplant's assortment.

Uralmashplant is rated among the leaders at the world's roll market due to renovated production capacities and state-of-the art technology:

- Ladle Furnace to refine the hot steel quality
- Klesid Unit to increase the hardening depth of cold mill rolls
- High-precision Roll-grinding Machines made by Herkules, Waldrich Siegen to significantly improve machining quality and accuracy
- Bell-type furnaces to reduce the residual stresses in rolls.

Based on these manufacturing facilities, the plant has mastered production of a new type of rolls with 3 to 5 percent Cr content, as well as higher content of alloying elements, which allows to make the service life of rolls 1.5 to 2 times longer.



Rolls for Hot-rolling Mills Specifications

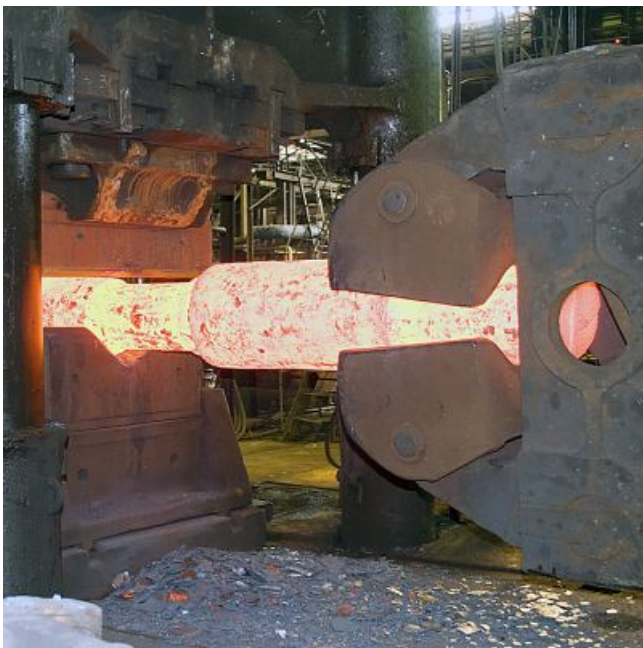
Roll type	Barrel size, mm		Material	Maximum barrel/ neck hardness	Maximum weight, t	
	Max. Dia.	Max. Length				
Work Rolls for Sheet Mills	1500	4500	50	187...229 ÍÀ	52	
			550	223...277 ÍÀ		
			600Í	229...285 ÍÀ		
			750Ì Ö	38...45 HSD		
			1500ÍÌ	321...363 ÍÀ		
Backup Rolls for Sheet Mills	1600	3030	600Í	207...255 ÍÀ	55	
			750Ì Ö, 7502Ì Ö 4505Ì Ö, 7503Ì Ö1	65...75 / 30...55 HSD 65...71 / 30...55 HSD		
Rolls for Blooming and Slabbing Mills	1700	2800	50	187...229 ÍÀ	55	
			500Í	223...277 ÍÀ		
			600Í	240...285 ÍÀ		
			750Ì Ö	229...285 ÍÀ		
			900Ì Ö	35...75 HSD		
Rolls for Billet Mills	1290	2060	50	187...229 ÍÀ	40	
			500Í	223...277 ÍÀ		
			600Í	255...302 ÍÀ		
Rolls for Rail-and- structural Mills	1565	2850	50	187...229 ÍÀ	22	
			550	223...277 ÍÀ		
			600Í	229...285 ÍÀ		
			750Ì Ö	277...321 ÍÀ		
			750Ì ÖÀ	35...45 HSD		
Rolls for Section and Bar Mills	1400	2300	45	143...179 ÍÀ	38	
			50	187...229 ÍÀ		
			500Í	223...277 ÍÀ		35
			600Í	269...302 ÍÀ		
			1500ÍÌ	380...410 ÍÀ		
			56NiCrMoV7	45...50 HSD		
Vertical rolls for sheet mills	1200	900	550	223...277 ÍÀ	10	
			500Í	235...286 ÍÀ		
			600Í	229...285 ÍÀ		
			1500ÍÌ	300...330 ÍÀ		
			750Ì ÖÀ	42...47 HSD		
Roll Sieves	1600	2400	600Í	265...300 ÍÀ	21	
			900Ö	55...65 HSD		
			50ÍÌ 2	50...60 HSD		
			1500ÍÌ	360...390 ÍÀ		
Rolls for Tubular Mills	875	1000	550	255...302 ÍÀ	6	
			500Í	233...277 ÍÀ		

Rolls for Cold-rolling Mills. Specifications

Roll type	Barrel size, mm		Material	Maximum barrel/ neck hardness	Maximum weight, t
	Max. Dia.	Max. Length			
Work Rolls for Rolling, Tempering and Reversing Mills	440-500,	2500	902, 9021 0, 802NÄ0, 803NÄ0, 65051 0N, Klesid unit hardening and 01 x-7001 unit hardening	95...102/45...55 HSD	7
	585-615				
	185-700	2800			10
Backup rolls for rolling, tempering and reversing mills	650-1600	4000	7501 0, 9000	70...75 / 30...55 HSD	55
			75021 0, 75031 0A		
Chevron rolls	400-1100	2000	45051 0, EBR 42 and others	70...75 / 30...55 HSD	25
Rollers	185-440	2800	340111, 450111, 3802131, 3802111, 4502111 0 and others	269...311 1Ä	5
			901,902,9021 0 and others	85...102 / 30...55 HSD	

Note

- If the roll net weight doesn't exceed 35 tons, for rolls with power current barrel hardening, the neck hardness may be within 45-55 HSD.
- For hardness testing, Brinell (HB), Shore (HSD, HSC), and Equotest testers (HLE, HLD, HLG) are available with Uralmashplant.
- After power current hardening the depth of the working surface is no less than:
 - Work rolls for Cold-rolling Mills of 9 1, 9 2, 9 2 , 8 2 steel grades – 22 mm; 8 3 – 30 mm
 - Backup rolls for Cold-rolling Mills of 90 , 75 , 75 2 steel grades – 50 mm; 75 3 – 55 mm; 45 5 , EBR 42 – 70 mm.
- Hardness variation along the roll barrel length is within 2-3 HSD for rolls hardened at the Klesid unit, and within 3-4 HSD for rolls hardened at the -700 unit.



Built-up (sleeved) backup rolls

Sleeves contribute to improvement of material utilization, since the material of sleeves is mostly consumed, and the roll shafts are used more than once. With roll shafts being re-used 3-5 times, the coefficient of material consumption for sleeved rolls is 2-5 times as low as for solid forged rolls.

A built-up (sleeved) roll consists of a steel shaft and a sleeve.

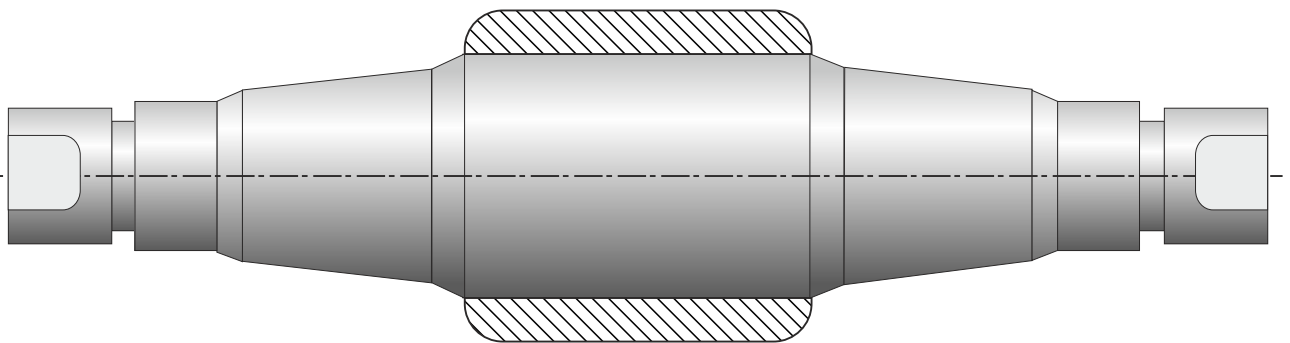
The fundamental advantage of built-up rolls is that sleeves of highly durable materials can be used.

Forged, and especially high-carbon cast structure, changing due to heat treatment and a large quantity of alloying element carbides, provides for high and uniform hardness and wear-resistance.

Longevity of sleeved rolls is 2-3 times as high as that of solid-forged rolls.

Design features

- The sleeve makes the working surface 2 or more times thicker
- Roll spindle can be used more than once



Guaranteed features of built-up (sleeved) backup rolls

- Required uniform hardness of the sleeve
- Reliability of sleeve fit on the shaft
- No tendency towards cracking or barrel spalling
- No metallurgical or structural defects
- Minimal level of residual stress
- No design flaws impairing the roll performance

Forged steel rolls for Hot-rolling Mills

Blooming, slabbing and breakdown mills, as well as roughing stands of section and structural mills require that the rolls endure high temperatures and heavy dynamic loads.

Solid-forged rolls made of carbon tool steels are characterized by high hardness and wear-resistance. Depending on the service conditions, heat checking resistance is provided by complex alloying using either chromium, molybdenum, or vanadium.

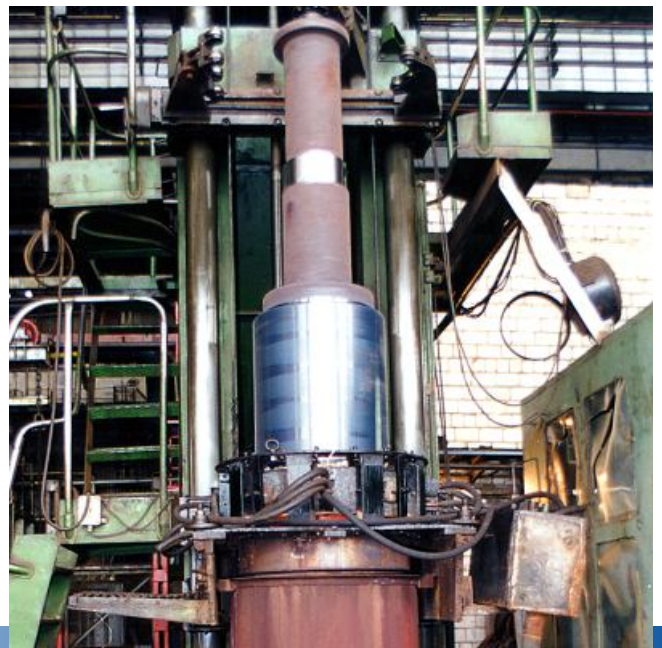
Design features

- Roll ends can be made in the form of tenons, flat (fork type), cylindrical (with splines or key grooves).



Guaranteed features of forged steel rolls for hot-rolling mills

- High wear-resistance
- Slight tendency towards heat checking
- High resistance to surface spalling, especially under conditions of high and unevenly distributed pressure on the roll barrel surface.



Solid-forged backup rolls for Cold- and Hot-rolling Mills

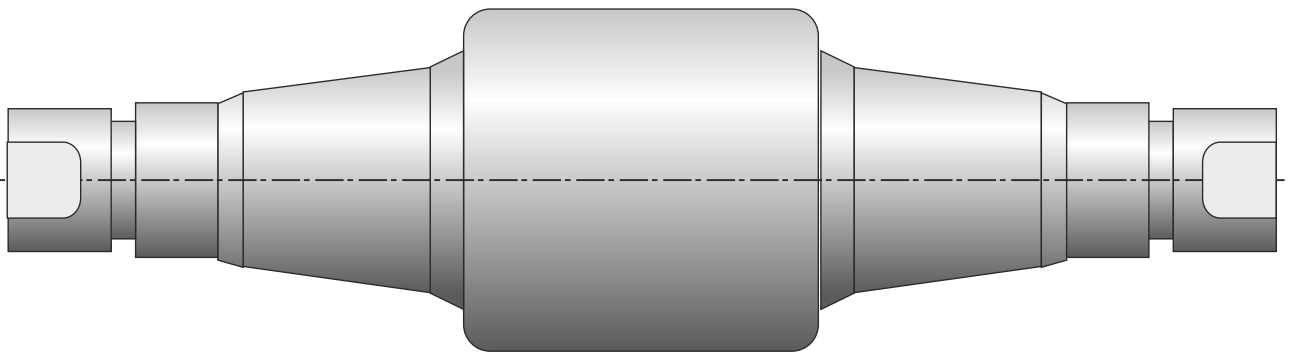
Rolls are the primary tool for shaping the material, setting the roll final dimensions, surface finish and mechanical properties.

Depending on the service conditions, the strength of backup rolls is achieved thanks to complex alloying using chromium, molybdenum, vanadium, etc.

The roll metal quality is inspected by means of ultrasonic flaw detectors at all main manufacturing stages.

Design features

- Carbon steels, high-carbon tool steels and alloyed steels are used to ensure high hardness and wear-resistance of rolls
- All backup rolls are made of vacuum degassed steel.



Guaranteed features of solid-forged backup rolls for cold- and hot-rolling mills

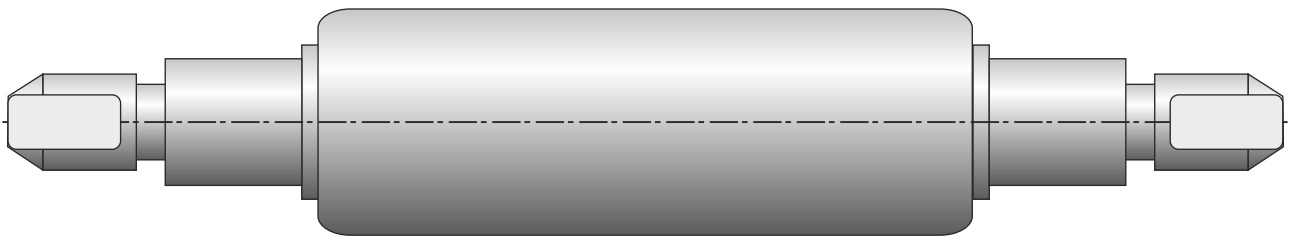
- High and uniform hardness after power current hardening (within 3–4 HSD over the barrel)
- Effective layer depth is min. 40–70mm over the radius
- High strength of the roll material combined with ductility
- No tendency towards cracking or barrel surface spalling
- Absence of metallurgical and structural defects
- Minimal level of residual stress
- No design flaws impairing the roll performance

Forged steel work rolls for Cold-rolling Mills

Work rolls for cold rolling are made of alloyed steels.

The complex of heat treatment provides for the necessary mechanical properties of the hardened layer due to creating a uniform fine-grain structure.

Final stabilizing heat treatment is intended to reduce and equalize the residual thermal stresses.



Guaranteed features of forged steel work rolls for cold rolling

- High and uniform hardness after hardening (within 3–4 HSD over the barrel)
- Effective layer depth over the radius (3% of roll diameter minimum)
- High thermal fatigue resistance during overall and local heat-up, increased heat resistance (high hardness is maintained for a long time under steady-state thermal conditions of the roll);
- Resistance to surface defects, cracking, lamination, scabbing, spalling, tearing, etc.
- High surface quality after heat treatment and machining
- Favourable distribution and minimal value of residual stresses after hardening and machining
- Absence of metallurgical defects and impurities
- Absence of flakes, coarse carbide clusters, carbide network, large-pattern acicular martensite and other macro- and microstructural defects
- Absence of machining defects

Quality control

Quality control during the roll manufacture is carried out at every stage of the workflow.

Main control operations

- Chemical composition of steel – by heat sampling
- Roll surface hardness – using the Brinell, Shore and Equotip Hardness testers;
- Roll material quality – visually, by means of ultrasonic and magnetic particle inspection
- Surface roughness – by means of comparison to the reference block, or employing the contact method using profilometer-profilograph SURFTEST
- Dimensional conformance – using universal and special means and methods of measuring.



Packing and preservation

Packing and preservation methods depend on the contract conditions and on the climatic zone where the rolls are going to be supplied, as well as on the transportation and storage conditions.

The items ready to be shipped are covered with a preservative coating – several layers of primer and enamel.

The roll necks are wrapped into anticorrosive paper with polyethylene coating and into waterproof paper.

After preservation the roll barrel and necks are covered with wooden bars or sheet rubber.

The covering is fixed with a steel band, which is locked.

At the customer's request, work rolls can be packed into wooden cases.

Preservation is valid for 6-12 months if the rolls are stored in a covered building in their transport package.

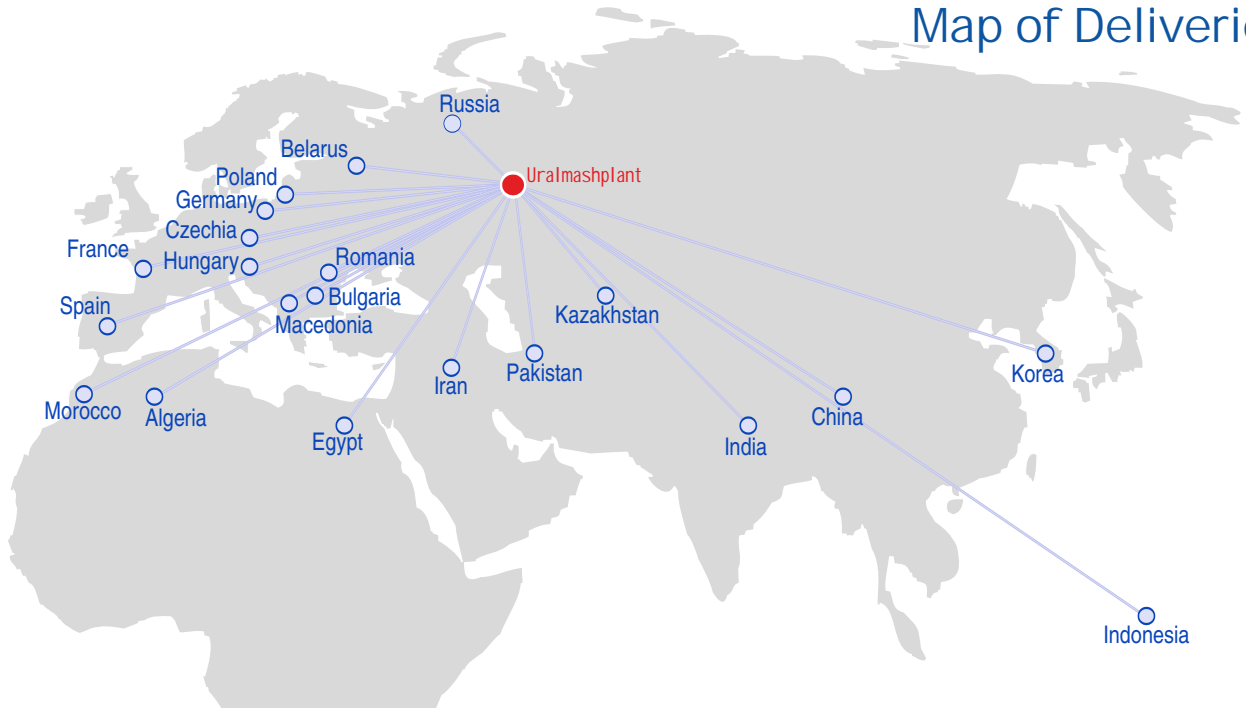
Storage and service

The rolls should be stored at a non-heated storage, on special shelves, resting on their necks.

Ageing or periodical low tempering is strongly recommended during roll operation life.



Map of Deliveries





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