LMM ROLLING ROLLS

Technology & Solution

辽冶矿产集团
LMM GROUP

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One stop solution for steel industry

Complete House of Rolling Rolls

辽冶矿产集团
LMM GROUP

LMM GROUP

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辽冶矿产集团 LMM GROUP

Company Profile

LIAONING MINERAL & METALLURGY GROUP CO., LTD (referred to as LMM GROUP) is a cross-industry, cross-regional, diversified and large-scale multinational corporation with strong international competitiveness centered on the five major sectors of iron and steel, metallurgy, intelligent research and development, food, and aviation. LMM GROUP overseas warehouses and branches have been successively established in the United States, Switzerland, Mexico, Germany, Iran, Turkey and other countries.

The products of LMM Group have been exported to more than 90 countries, countries & areas in America, Europe, Southeast Asia, Middle East, Africa, Asia etc, forms strong and core competitiveness in steelmaking, continuous casting, rolling areas to supply high value added, green, intelligent and one-stop solution and service to global customers in iron, steel, metallurgical industries etc.

Our production factory have two roll production lines with world leading advantages: One is for cast rolls with the annual capacity of 50,000 tons; the other is for forged rolls with the annual capacity of 5,000 tons. We have advanced production and testing equipment at home and abroad and professional research & development team. At present, the main products are: alloy indefinite chilled cast iron roll, alloy chilled cast iron roll, pearlitic & acicular nodular cast iron roll, high chrome cast iron roll, alloy cast steel roll, semi-steel roll, graphite steel roll, high chrome cast steel roll, high speed steel roll, forged roll and other more than 20 series of rolls, which are mainly used for roughing mill stand, Intermediate mill stand, finishing mill stand of wire, rod, strip, section steel, etc. Since its establishment.

Mission	Firmly stick to the material and spiritual happiness of all partners, and make unremitting efforts to continuously create green steel, healthy food and promote human and social development
Vision	Set an example for the steel and food industry, create a world-class brand, and become a happy home for strugglers to learn and grow
Values	Gratitude, Humility, Passion, Dreams
Spirit	Integrity, Professionalism, Collaboration, Innovation

Business Philosophy

- The time is always right to do what is right
- Honesty is the best policy
- True Love, Serious Job and Really Happiness
- Corporate credit means everything

02

TECHNICAL EQUIPMENT

All the melting furnaces are automatically controlled by PLC with very good working conditions, they are equipped with automatic alarm system and furnished with perfect equipment for eliminating smoke and dust. All the raw materials for smelting are strictly controlled, the chemical composition are precisely tested to ensure the qualified melting process. Thereby, the refining process shows also excellent results.

The company possesses 8 melting facilities, including an Electric Arc Furnace for steel melting of 30tons, 45/70tons LF-VD Furnaces, Electric Slag Remelting Furnaces (10tons and 15tons), and medium frequency Induction Melting Furnaces (5tons,10tons and20tons). These melting facilities in total can accomplish a daily smelting capacity of 120tons molten steel, 240tons of molten iron and 25tons of electric slag remelting.

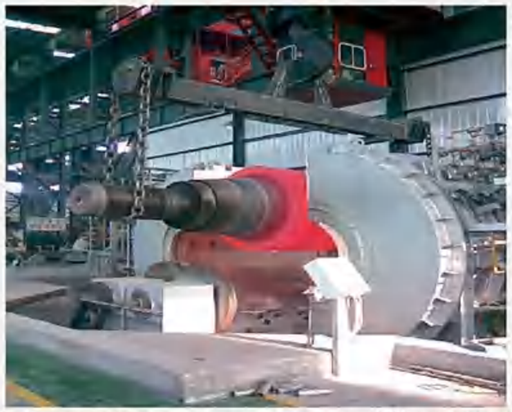
LMM GROUP has two sets of horizontal centrifugal casting machines, with the maximum centrifugal cast roll size of Dia.Φ 1400x3860mm Barrel Length. The centrifugal casting machines can realize the integration of spray coating and controlling the mould temperature. They are driven by hydraulic motor and operated steadily. The speed of rotation could reach 1500r/min, which can assure the technical requirement on gravity multiple accurately and confirm the best quality of working layer.

Forging Equipment

There is one set of 45MN Oil Hydraulic Press which can ensure the adequate ratio of forging reduction and deformation for forged rolls.

Heat Treatment Equipment

There are sixteen sets of car-type electric resistance furnaces and gas furnaces operating with high, medium and low temperature, two sets of differential heat treatment furnaces, one set of dual frequency induction quenching machine, two sets of spray quenching machines, one set of high-frequency hardening machine and two sets of deep freezing treatment troughs. All the furnaces are computer controlled, with the furnace temperature deviation less than 10 degree, which ensures very good uniformity of roll hardness.



Machining Equipment

There are 36sets of machining equipment, including CNC lathes, CNC grinders, and CNC double-sided milling machines. The machining range can be dia.80x1000-dia.1600x8000mm and precision ranges up to 0.003mm.

Testing Equipment

The company has the most advanced inspection and testing equipments such as X- ray Fluorescence Spectrometer, Plasma Emission Spectrometer, Optical Emission Spectrometer(OBLF), Hydrogen/Oxgen/Nitrogen Combined Analyzer (LECO), Carbon/Sulfur Analyzer for chemical analysis, and also has Scanning Electron Microscope, Metaloscope, Image Analyzer (Zeiss), Microhardness Tester, Universal Testing Machine, Impact Testing Machine, Analog and Digital Ultrasonic Testing Device, Magnetic Powder UT Tester, Stress Meter, Portable Leeb & Shore Hardness Tester, etc. All these instruments and equipments can guarantee the Quality Assurance effectively.

03

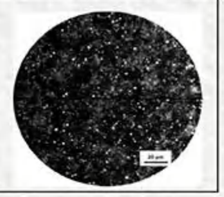
PRPDUCT SALES

For Cold Strip Mill

Chemical Composition

Grade	C	Si	Mn	Ni	Cr	Mo
Cr3%	0.6-1.0	0.3-0.6	0.2-0.5	0-0.8	2.5-3.5	0.2-0.5
Cr5%	0.5-0.9	0.3-0.8	0.2-0.5	0-0.8	4.5-5.5	0.2-0.8

Physical Properties

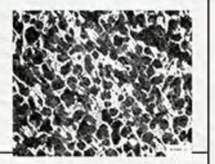
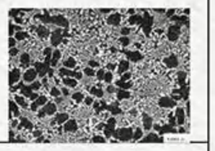
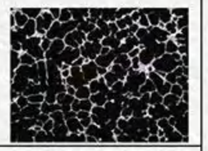
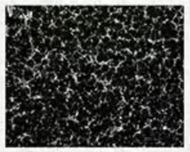
Grade	Barrel Hardness	Neck Hardness	Tensile Strength	Microstructure
	Shore D	Shore D	Mpa	
Cr3%	Work Roll：90-100 Intermediate Roll：75-85	35-50	≥950	
Cr5%	Work Roll：90-100 Intermediate Roll：75-85	35-50	≥1050	

For Hot Strip Mill

Chemical Composition

Grade	C	Si	Mn	Ni	Cr	Mo	V	W
ICDP Roll	2.9-3.6	0.6-1.5	0.4-1.2	3.01-4.8	1.0-2.0	0.2-2.0	0.2-2.0	0.0-2.0
HiCr Iron Roll	2.3-3.3	0.3-1.0	0.5-1.2	0.7-1.7	15.0-18.0	0.7-1.5	0.0-0.6	
HiCr Steel Roll	1.0-1.8	0.4-1.0	0.5-1.0	0.5-1.5	8.0-15.0	1.5-4.5		
HSS Roll	1.5-2.2	0.3-1.0	0.4-1.2	0.0-1.5	3.0-8.0	2.0-8.0	2.0-9.0	0.0-8.0

Physical Properties

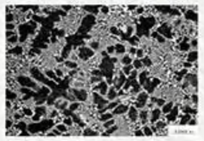
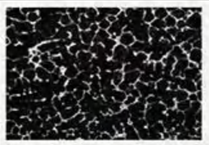
Grade	Barrel Hardness	Neck Hardness	Tensile Strength	Microstructure
	Shore D	Shore D	Mpa	
ICDP Roll	70-85	35-45	≥400	
HiCr Iron Roll	70-85	35-45	≥500	
HiCr Steel Roll	70-85	35-45	≥700	
HSS Roll	80-90	35-45	≥700	

For Plate Mill

Chemical Composition

Grade	C	Si	Mn	Ni	Cr	Mo	V	W
ICDP Roll	2.9-3.6	0.6-1.5	0.4-1.2	3.01-4.8	1.0-2.0	0.2-1.0		
HiCr Iron Roll	2.3-3.3	0.3-1.0	0.5-1.2	0.7-1.7	15.0-18.0	0.7-1.5	0.0-0.6	
HiCr Steel Roll	1.0-1.8	0.4-1.0	0.5-1.0	0.5-1.5	8.0-15.0	1.5-4.5		
HSS Roll	1.5-2.2	0.3-1.0	0.4-1.2	0.0-1.5	3.0-8.0	2.0-8.0	2.0-9.0	0.0-8.0

Physical Properties

Grade	Barrel Hardness	Neck Hardness	Tensile Strength	Microstructure
	Shore D	Shore D	Mpa	
ICDP Roll	65-80	35-45	≥400	
HiCr Iron Roll	65-80	35-45	≥500	
HiCr Steel Roll	65-80	35-45	≥700	

Cast Iron Rolls

- Alloy indefinite chilled cast iron rolls
- Alloy chilled cast iron rolls
- Alloy SG ductile cast iron rolls
- Pearlitic ductile cast iron rolls
- Bainite ductile cast iron rolls
- Centrifugal cast iron rolls

Cast Steel Rolls

- Alloy cast steel rolls
- Semi-steel rolls
- Graphite steel rolls
- High-chromium steel rolls
- High-speed steel rolls

Alloy indefinite chilled cast iron rolls

Chemical Analysis

Designation of rolls	Material code	C	Si	Mn	Ni	Cr	Mo
CrMo indefinite chilled cast iron roll	IC	3.1-3.4	0.6-0.9	0.5-1.0		0.7-1.1	0.2-0.6
NiCrMo indefinite chilled cast iron roll (Ⅰ)	IC Ⅰ	3.1-3.4	0.6-0.9	0.5-1.0	0.6-0.8	0.7-1.1	0.2-0.6
NiCrMo indefinite chilled cast iron roll (Ⅱ)	IC Ⅱ	3.1-3.4	0.6-1.0	0.5-1.0	2.2-2.8	0.7-1.1	0.2-0.6
NiCrMo indefinite chilled cast iron roll (Ⅲ)	IC Ⅲ	3.1-3.4	0.6-1.0	0.5-1.0	2.2-2.8	0.8-1.3	0.2-1.0
NiCrMo indefinite chilled cast iron roll (Ⅳ)	IC Ⅳ	3.1-3.4	0.6-1.0	0.5-1.0	3.1-4.3	1.0-1.3	0.2-1.0
NiCrMo indefinite chilled cast iron roll (Ⅴ)	IC Ⅴ	3.1-3.4	0.8-1.2	0.5-1.0	3.8-4.5	1.4-2.0	0.2-1.2

Physical Properties

Designation of rolls	Material code	Barrel hardness (HSD)	Neck hardness (HSD)	Tensile strength (Mpa)
CrMo indefinite chilled cast iron roll	IC	50-70	35-55	>160
NiCrMo indefinite chilled cast iron roll (Ⅰ)	IC Ⅰ	55-72	35-55	>160
NiCrMo indefinite chilled cast iron roll (Ⅱ)	IC Ⅱ	55-72	35-55	>160
NiCrMo indefinite chilled cast iron roll (Ⅲ)	IC Ⅲ	65-78	35-55	>350
NiCrMo indefinite chilled cast iron roll (Ⅳ)	IC Ⅳ	70-83	35-55	>350
NiCrMo indefinite chilled cast iron roll (Ⅴ)	IC Ⅴ	77-82	35-55	>350

Microstructure

Designation of rolls	Material code	Microstructure
CrMo indefinite chilled cast iron roll	IC	Pearlite+cementite+small percentage graphite
NiCrMo indefinite chilled cast iron roll (Ⅰ)	IC Ⅰ	Pearlite+cementite+small percentage graphite
NiCrMo indefinite chilled cast iron roll (Ⅱ)	IC Ⅱ	Fine pearlite+cementite+small percentage graphite
NiCrMo indefinite chilled cast iron roll (Ⅲ)	IC Ⅲ	Sorbite+cementite+small percentage graphite
NiCrMo indefinite chilled cast iron roll (Ⅳ)	IC Ⅳ	Sorbite tempered bainite+carbide+graphite+A small amount of martensite or bainite carbide+graphite
NiCrMo indefinite chilled cast iron roll (Ⅴ)	IC Ⅴ	Sorbite tempered bainite+carbide+graphite+A small amount of martensite or bainite carbide+graphite

Application

Designation of rolls	Material code	Application
CrMo indefinite chilled cast iron roll	IC	Section mill, bar mill, Intermediate and finishing stands of wire-rod mil
NiCrMo indefinite chilled cast iron roll (Ⅰ)	IC Ⅰ	Section mill, bar mill, intermediate and finishing stands of wire-rod mill
NiCrMo indefinite chilled cast iron roll (Ⅱ)	IC Ⅱ	Section mill, bar mill, intermediate and finishing stands of wire-rod mill
NiCrMo indefinite chilled cast iron roll (Ⅲ)	IC Ⅲ	Section mill, bar mill, intermediate and finishing stands of wire-rod mill
NiCrMo indefinite chilled cast iron roll (Ⅳ)	IC Ⅳ	Profile, rod and wire, narrow strip mill finishing stand, Plate, flat rack, strip finishing
NiCrMo indefinite chilled cast iron roll (Ⅴ)	IC Ⅴ	Plate, flat rack, strip finishing

Alloy chilled cast iron rolls

Chemical Analysis

Designation of rolls	Material code	C	S	Mn	Ni	Cr	Mo
NiCrMo chilled cast iron rolls (Ⅰ)	CC Ⅰ	3.00-3.40	0.30-0.80	0.20-1.00	0.50-1.00	0.20-0.60	0.20-0.60
NiCrMo chilled cast iron rolls (Ⅱ)	CC Ⅱ	3.00-3.40	0.30-0.80	0.20-1.00	1.10-2.00	0.30-1.20	0.20-0.60
NiCrMo chilled cast iron rolls (Ⅲ)	CC Ⅲ	3.00-3.40	0.30-0.80	0.20-1.00	2.10-3.00	0.50-1.50	0.20-0.60
NiCrMo chilled cast iron rolls (Ⅳ)	CC Ⅳ	3.00-3.40	0.30-0.80	0.20-1.00	3.10-4.00	0.50-1.70	0.20-0.60

Physical Properties

Designation of rolls	Material code	Barrel hardness (HSD)	Neck hardness (HSD)	Tensile strength (Mpa)
NiCrMo chilled cast iron rolls (Ⅰ)	CC Ⅰ	60-70	32-50	>150
NiCrMo chilled cast iron rolls (Ⅱ)	CC Ⅱ	62-75	35-52	>150
NiCrMo chilled cast iron rolls (Ⅲ)	CC Ⅲ	65-80	32-45	>350
NiCrMo chilled cast iron rolls (Ⅳ)	CC Ⅳ	70-85	32-45	>350

Microstructure

Designation of rolls	Material code	Microstructure
NiCrMo chilled cast iron rolls (Ⅰ)	CC Ⅰ	Pearlite+cementite
NiCrMo chilled cast iron rolls (Ⅱ)	CC Ⅱ	Fine pearlite+cementite
NiCrMo chilled cast iron rolls (Ⅲ)	CC Ⅲ	Fine pearlite+cementite
NiCrMo chilled cast iron rolls (Ⅳ)	CC Ⅳ	Sorbite+cementite

Application

Designatian ot rolls	Material code	Application
NiCrMo chilled cast iron rolls (Ⅰ)	CC Ⅰ	Section mill, bar mill, wire-rod mill narrow strip mill, finishing stand
NiCrMo chilled cast iron rolls (Ⅱ)	CC Ⅱ	Section mill, bar mill, wire-rod mil narrow strip mill, finishing stand
NiCrMo chilled cast iron rolls (Ⅲ)	CC Ⅲ	Section mill, bar mill, wire-rod mill narrow strip mill, finishing stand
NiCrMo chilled cast iron rolls (Ⅳ)	CC Ⅳ	Section mill, bar mill, wire-rod mill narrow strip mill, finishing stand

Alloy SG rolls

Chemical Analysis

Designation of rolls	Material code	C	Si	Mn	Ni	Cr	Mo	Mg
CrMo indefinite chilled SG cast iron rolls	SG Ⅱ	3.00-3.40	1.40-1.90	0.20-0.80		0.20-0.60	0.20-0.60	≥0.04
NiCrMo indefinite chilled SG cast iron rolls (Ⅰ)	SG Ⅳ	3.00-3.40	1.40-1.90	0.40-0.80	0.50-1.00	0.20-0.60	0.20-0.60	≥0.04
NiCrMo indefinite chilled SG cast iron rolls (Ⅱ)	SG Ⅴ	3.00-3.40	1.40-1.90	0.40-0.80	1.10-2.00	0.30-1.00	0.20-0.60	≥0.04

Physical Properties

Designation of rolls	Material code	Barel hardness (HSD)	Neck hardness (HSD)	Tensile strength (Mpa)
CrMo indefinite chilled SG cast iron rolls	SG Ⅱ	50-70	35-55	>320
NiCrMo indefinite chilled SG cast iron rolls (Ⅰ)	SG Ⅳ	55-70	35-55	>320
NiCrMo indefinite chilled SG cast iron rolls (Ⅱ)	SG Ⅴ	60-70	35-55	>320

Microstructure

Designation of rolls	Material code	Microstructure
CrMo indefinite chilled SG cast iron rolls	SG Ⅱ	Pearlite+cementite+small Graphite
NiCrMo indefinite chilled SG cast iron rolls (Ⅰ)	SG Ⅳ	Pearlite+cementite+small Graphite
NiCrMo indefinite chilled SG cast iron rolls (Ⅱ)	SG Ⅴ	Fine pearlite+cementite+small Graphite

Application

Designatian of rolls	Material code	Application
CrMo indefinite chilled SG cast iron rolls	SG Ⅱ	Profile, rod, wire and narrow strip mill thick in the rolling mill stand
NiCrMo indefinite chilled SG cast iron rolls (Ⅰ)	SG Ⅳ	Profie, rod, wire and narrow strip mill thick in the rolling mill stand
NiCrMo indefinite chilled SG cast iron rolls (Ⅱ)	SG Ⅴ	Profile, rod, wire and narrow strip mill thick in the roling mill stand

Pearlitic ductile cast iron rolls

Chemical Analysis

Designation of rolls	Material code	C	S	Mn	Ni	Cr	Mo	Mg
Pearlitic ductile cast iron roll (Ⅰ)	SGP Ⅰ	3.00-3.40	1.40-1.90	0.40-0.80	1.50-2.00	0.20-0.60	0.20-0.60	≥0.04
Pearlitic ductile cast iron roll (Ⅱ)	SGP Ⅱ	3.00-3.40	1.20-2.00	0.40-0.80	2.01-2.50	0.20-1.00	0.20-0.60	≥0.04
Pearlitic ductile cast iron roll (Ⅲ)	SGP Ⅲ	3.00-3.40	1.00-2.00	0.40-0.80	2.51-3.00	0.20-1.20	0.20-0.60	≥0.04

Physical Properties

Designation of rolls	Material code	Barrel hardness （HSD)	Neck hardness（HSD)	Tensile strength (Mpa)
Pearlitic ductile cast iron roll (Ⅰ)	SGP Ⅰ	45-55	35-55	>450
Pearlitic ductile cast iron roll (Ⅱ)	SGP Ⅱ	55-65	35-55	>450
Pearlitic ductile cast iron roll (Ⅲ)	SGP Ⅲ	62-72	35-55	>450

Microstructure

Designation of rolls	Material code	Microstructure
Pearlitic ductile cast iron roll (Ⅰ)	SGP Ⅰ	Pearlite+cementite+small Graphite
Pearlitic ductile cast iron roll (Ⅱ)	SGP Ⅱ	Pearlite+cementite+small Graphite
Pearlitic ductile cast iron roll (Ⅲ)	SGP Ⅲ	Globular pearlite+carbide+graphite or a small amount of pearlite+bainite+carbide+spherical graphite

Application

Designation of rolls	Material code	Application
Pearlitic ductile cast iron roll (Ⅰ)	SGP Ⅰ	Profile, rod, wire and narrow strip mill thick in the roling mill stand
Pearlitic ductile cast iron roll (Ⅱ)	SGP Ⅱ	Profile, rod, wire and narrow strip mill thick in the roling mill stand
Pearlitic ductile cast iron roll (Ⅲ)	SGP Ⅲ	Profile, rod, wire and narrow strip mill thick in the roling mill stand

Bainite ductile cast iron rolls

Chemical Analysis

Designation of rolls	Material code	C	Si	Mn	Ni	Cr	Mo	Mg
Bainite ductile cast iron roll Centrifugal (Ⅰ)	SGA Ⅰ	3.00-3.40	1.20-2.20	0.40-0.80	3.01-3.50	0.20-0.80	0.50-1.00	≥0.04
Bainite ductile cast iron roll Centrifugal (Ⅱ)	SGA Ⅱ	3.00-3.40	1.00-2.00	0.40-0.80	3.51-4.50	0.20-1.00	0.50-1.00	≥0.04

Physical Properties

Designation of rolls	Material code	Barrel hardness (HSD)	Neck hardness (HSD)	Tensile strength (Mpa)
Bainite ductile cast iron roll Centrifugal (Ⅰ)	SGA Ⅰ	55-78	32-45	>350
Bainite ductile cast iron roll Centrifugal (Ⅱ)	SGA Ⅱ	60-80	32-45	>350

Microstructure

Designation of rolls	Material code	Microstructure
Bainite ductile cast iron roll Centrifugal (Ⅰ)	SGA Ⅰ	Bainite+A small amount of martensite+Carbide+graphite
Bainite ductile cast iron roll Centrifugal (Ⅱ)	SGA Ⅱ	Bainite+A small amount of martensite+Carbide+graphite

Application

Designation of rolls	Material code	Application
Bainite ductile cast iron roll Centrifugal (Ⅰ)	SGA Ⅰ	Beam, bar, wire rod mill rough rolling, the rolling, pre-finishing mill stand; seamless steel pipe mill reducing rack set
Bainite ductile cast iron roll Centrifugal (Ⅱ)	SGA Ⅱ	Beam, bar, wire rod mill rough rolling, the rolling, pre-finishing mill stand;seamless steel pipe mill reducing rack set

Centrifugal cast iron rolls

Chemical Analysis

Designation of rolls	Material code	C	Si	Mn	Ni	Cr	Mo
Centrifugal cast iron roll Ⅰ	HCr Ⅰ	3.00-3.30	0.30-1.00	0.50-1.20	0.70-1.70	12.00-15.00	0.70-1.50
Centrifugal cast iron roll Ⅱ	HCr Ⅱ	3.00-3.30	0.30-1.00	0.50-1.20	0.70-1.70	15.01-18.00	0.70-1.50
Centrifugal cast iron roll Ⅲ	HCr Ⅲ	3.00-3.30	0.30-1.00	0.50-1.20	0.70-1.70	18.01-22.00	1.51-3.00

Physical Properties

Designation of rolls	Material code	Barrel hardness (HSD)	Neck hardness (HSD)	Tensile strength (Mpa)
Centrifugal cast iron roll Ⅰ	HCr Ⅰ	60-75	32-45	>350
Centrifugal cast iron roll Ⅱ	HCr Ⅱ	65-80	32-45	>350
Centrifugal cast iron roll Ⅲ	HCr Ⅲ	75-90	32-45	>350

Microstructure

Designation of rolls	Material code	Microstructure
Centrifugal cast iron roll Ⅰ	HCr Ⅰ	Bainite+carbide
Centrifugal cast iron roll Ⅱ	HCr Ⅱ	Bainite+carbide
Centrifugal cast iron roll Ⅲ	HCr Ⅲ	A small amount of bainite+martensite+carbide

Application

Designation of rolls	Material code	Application
Centrifugal cast iron roll (Ⅰ)	HCr Ⅰ	Beam, bar, wire rod mill finishing stand; Tropical rough rolling androlling and finishing work roll front; Wide plate mill work roll;
Centrifugal cast iron roll (Ⅱ)	HCr Ⅱ	Beam, bar, wire rod mill finishing stand; Tropical rough rolling androlling and finishing work roll front; Wide plate mill work roll;
Centrifugal cast iron roll (Ⅲ)	HCr Ⅲ	Beam, bar, wire rod mill finishing stand; Tropical rough rolling androlling and finishing work roll front; Wide plate mill work roll;

Alloy cast steel rolls

Chemical Analysis

Designation of rolls	Material code	C	Si	Mn	Ni	Cr	Mo
Zu60CMoMn	AS60	0.55-0.65	0.20-0.45	0.90-1.20		0.80-1.20	0.20-0.45
Zu60CrMoMnNi	AS60 Ⅰ	0.55-0.65	0.20-0.60	0.50-1.00	0.20-1.50	0.80-1.20	0.20-0.60
Zu65CrNiMo	AS65 Ⅰ	0.60-0.70	0.20-0.60	0.50-0.80	0.20-0.50	0.80-1.20	0.20-0.45
Zu70Mn	AS70	0.65-0.75	0.20-0.45	0.80-1.40			
Zu70Mn2	AS70 Ⅰ	0.65-0.75	0.20-0.45	1.40-1.80			
Zu70Mn2Mo	AS70 Ⅱ	0.65-0.75	0.20-0.45	1.40-1.80			0.20-0.45
Zu75CrMo	AS75	0.70-0.80	0.20-0.45	0.60-0.90		0.75-1.00	0.20-0.45
Zu75CrNiMnMo	AS75 Ⅰ	0.70-0.80	0.20-0.70	0.70-1.10	≥0.20	0.80-1.50	0.20-0.60

Physical Properties

Designation of rolls	Material code	Barrel hardness (HSD)	Neck hardness (HSD)	Tensile strength (Mpa)
Zu60CMoMn	AS60	35-50	≤45	>650
Zu60CrMoMnNi	AS60 Ⅰ	35-45	≤45	>750
Zu65CrNiMo	AS65 Ⅰ	35-45	≤45	>750
Zu70Mn	AS70	32-42	≤45	>650
Zu70Mn2	AS70 Ⅰ	35-45	≤45	>680
Zu70Mn2Mo	AS70 Ⅱ	35-45	≤45	>700
Zu75CrMo	AS75	35-50	≤45	>700
Zu75CrNiMnMo	AS75 Ⅰ	35-50	≤45	>800

Microstructure

Microstructure of working layer in the barrel: pearlite or tempered sorbite

Application

Designation of rolls	Material code	Application
Zu60CMoMn	AS60	Bar, wire, strip, steel roughing
Zu60CrMoMnNi	AS60 Ⅰ	Bar, wire, strip, steel roughing
Zu65CrNiMo	AS65 Ⅰ	Bar, wire, strip, steel roughing
Zu70Mn	AS70	Bar, wire, strip, steel roughing
Zu70Mn2	AS70 Ⅰ	Bar, wire, strip, steel roughing
Zu70Mn2Mo	AS70 Ⅱ	Bar, wire, strip, steel roughing
Zu75CrMo	AS75	Bar, wire, strip, steel rough rolling, narrow steel support roller
Zu75CrNiMnMo	AS75 Ⅰ	Bar, wire, strip, steel rough rolling, narrow steel support roller

Semi - steel rolls

Chemical Analysis

Designation of rolls	Material code	C	Si	Mr	Ni	Cr	Mo
ZuB140CrNiMo	AD140 Ⅰ	1.30-1.50	0.30-0.60	0.70-1.10	0.50-1.20	0.80-1.20	0.20-0.60
ZuB160CrNiMo	AD160 Ⅰ	1.50-1.70	0.30-0.60	0.80-1.30	≥0.20	0.80-2.00	0.20-0.60
ZuB180CrNiMo	AD180	1.70-1.90	0.30-0.80	0.60-1.10	0.20-2.00	0.80-1.50	0.20-0.60
ZuB190CrNiMo	AD190	1.80-2.00	0.30-0.80	0.60-1.20	1.00-2.00	1.50-3.50	0.20-0.50
ZuB200CrNiMo	AD200	1.90-2.10	0.30-0.80	0.80-1.20	0.60-2.50	0.60-2.00	0.20-0.80

Physical Properties

Designation of rolls	Material code	Barrel hardness （HSD）	Neck hardness （HSD）	Tensife strength （Mpa）
ZuB140CrNiMo	AD140 Ⅰ	35-50	≤60	500-800
ZuB160CrNiMo	AD160 Ⅰ	40-60	≤50	500-800
ZuB180CrNiMo	AD180	45-60	≤50	450-700
ZuB190CrNiMo	AD190	50-65	≤50	450-700
ZuB200CrNiMo	AD200	50-65	≤50	450-700

Microstructure

Pearlite+Carbide or fine pearlite+A small amount of bainite+Carbide

Application

Designation of rolls	Material code	Application
ZuB140CrNiMo	AD140 Ⅰ	Bar, wire, steel, strip rough rolling, the vertical roll
ZuB160CrNiMo	AD160 Ⅰ	Bar, wire, steel, crude and rolled strip, vertical roller, roll rings, support roller
ZuB180CrNiMo	AD180	Bar, wire, steel, crude and rolled strip, vertical roller, roll rings, support roller
ZuB190CrNiMo	AD190	Bar, wire, steel, crude and rolled strip, vertical roller, roll rings, support roller
ZuB200CrNiMo	AD200	Bar, wire, steel, crude and rolled strip, vertical roller, roll rings, support roller

Graphite steel rolls

Chemical Analysis

Designation of rolls	Material code	C	Si	Mn	Ni	Cr	Mo
ZuS140CrNiMo	GS140	1.30-1.50	1.30-1.60	0.50-0.80		0.40-0.70	0.20-0.50
ZuS160CrNiMo	GS160	1.50-1.70	0.80-1.50	0.60-1.00	0.20-1.00	0.50-1.50	0.20-0.80
ZuS190CrNiMo	GS190	1.80-2.00	0.80-1.50	0.60-1.00	0.60-2.20	0.50-2.00	0.20-0.80

Physical Properties

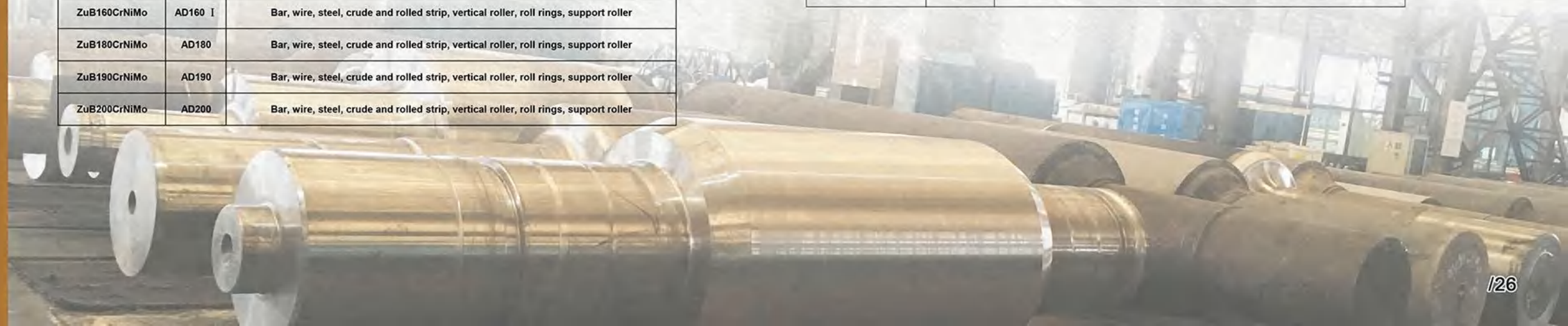
Designation of rolls	Material code	Barrel hardness (HSD)	Neck hardness (HSD)	Tensile strength (Mpa)
ZuS140CrNiMo	GS140	36-46	≤46	≥540
ZuS160CrNiMo	GS160	45-55	≤50	≥500
ZuS190CrNiMo	GS190	50-65	≤50	≥450

Microstructure

Pearlite+Spherical graphite+Carbide

Application

Designation of rolls	Material code	Application
ZuS140CrNiMo	GS140	Small and medium steel, thick wire rod mill, hot strip rough roll, roller universal rolling mill
ZuS160CrNiMo	GS160	Small and medium steel, thick wire rod mill, hot strip rough roll, roller universal rolling mill
ZuS190CrNiMo	GS190	Small and medium steel, thick wire rod mill, hot strip rough roll, roller universal rolling mill



High - Chromium steel rolls

Chemical Analysis

Designation of rolls	Material code	C	Si	Mn	Ni	Cr	Mo
CS	HCrS	1.00-1.80	0.40-1.00	0.50-1.00	8.00-15.00	0.50-1.50	1.50-4.50

Physical Properties

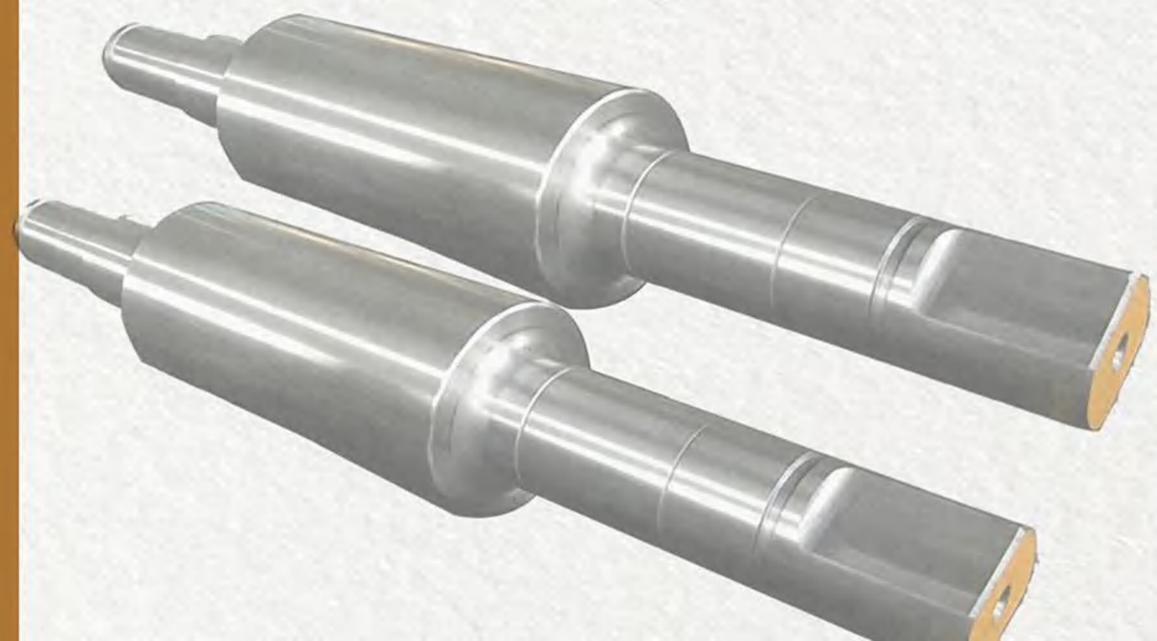
Designation of rolls	Material code	Barrel hardness (HSD)	Neck hardness (HSD)	Tensile strength (Mpa)
CS	HCrS	70-85	35-45	≥450

Microstructure

tempered martensite+carbide sorbite

Application

Designation of rolls	Material code	Application
CS	HCrS	Hot strip roughing and finishing work roll front, wide plate mill work roll; steel universal mill roll



High - speed steel rolls

Chemical Analysis

Designation of rolls	Material code	C	Si	Mn	Ni	Cr	Mo	V	W
HSS	HSS	1.50-2.20	0.30-1.00	0.40-1.20	0.00-1.50	3.00-8.00	2.00-8.00	2.00-9.00	0.00-2.00
S-HSS	S-HSS	0.60-1.20	0.80-1.50	0.50-1.00	0.20-1.20	3.00-9.00	2.00-5.00	0.40-3.00	0.00-3.00

Physical Properties

Designation of rolls	Material code	Barrel hardness (HSD)	Roll neck strength (Mpa)	Tensile strength (Mpa)
HSS	HSS	75-85	30-45	400-500
S-HSS	S-HSS	75-88	30-45	400-500

Microstructure

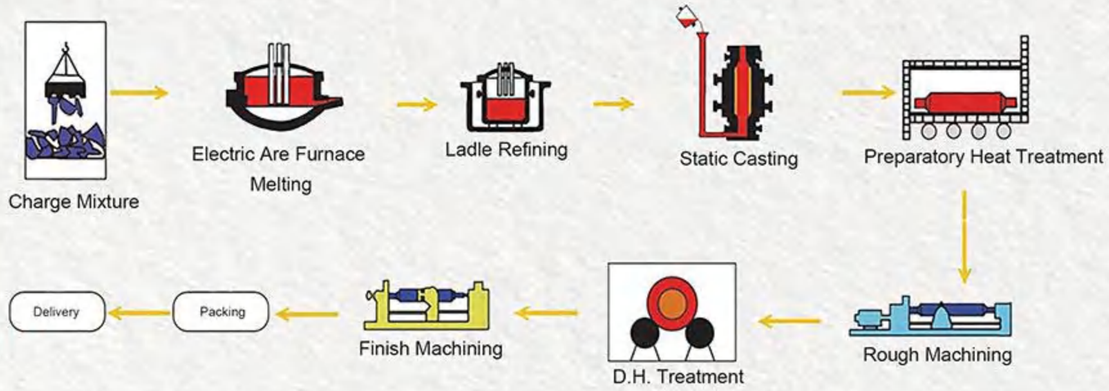
A small amount of tempered martensite+carbide+carbon

Application

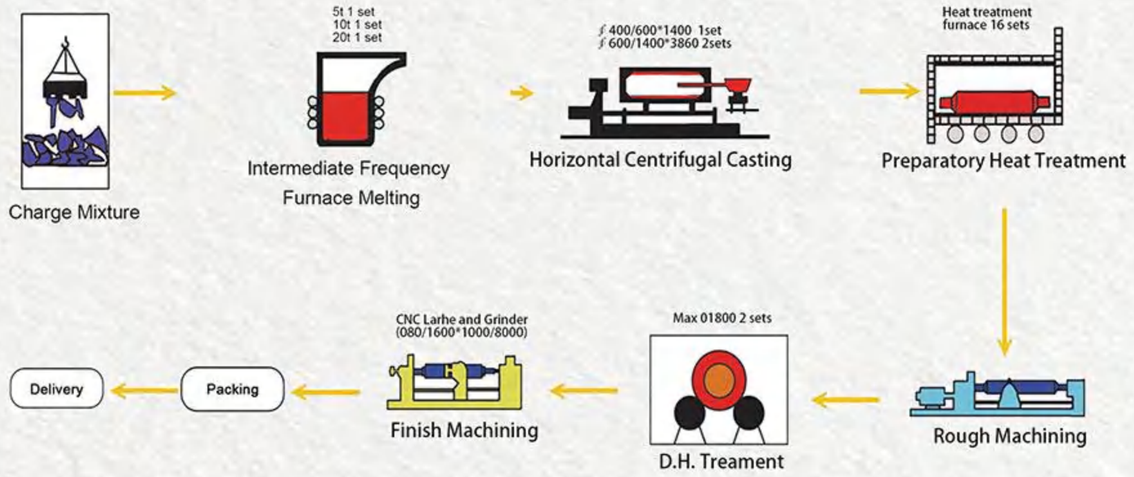
Designation of rolls	Material code	Applicalion
HSS	HSS	Rolled strip, bar finishing roller, high speed wire pre-finishing, steel roller universalrolling mill, wide plate mill work roll
S-HSS	S-HSS	Rough rolling hot strip mill work roll, cold rolled strip steel work roll, intermediate roll

	Specification	Material	Product code	Barrel hardness (HSD)
Finished frame mill roll, prefinished frame mill roll	Φ280-Φ550	High-performance high speed steel	LMM01	82-88
Cutting frame mill roll	Φ280-Φ550	High-performance segmentation high speed steel	LMM02	75-78
Pre-cutting frame mill roll	Φ280-Φ550	High-performance segmentation high speed steel	LMM03	78-81

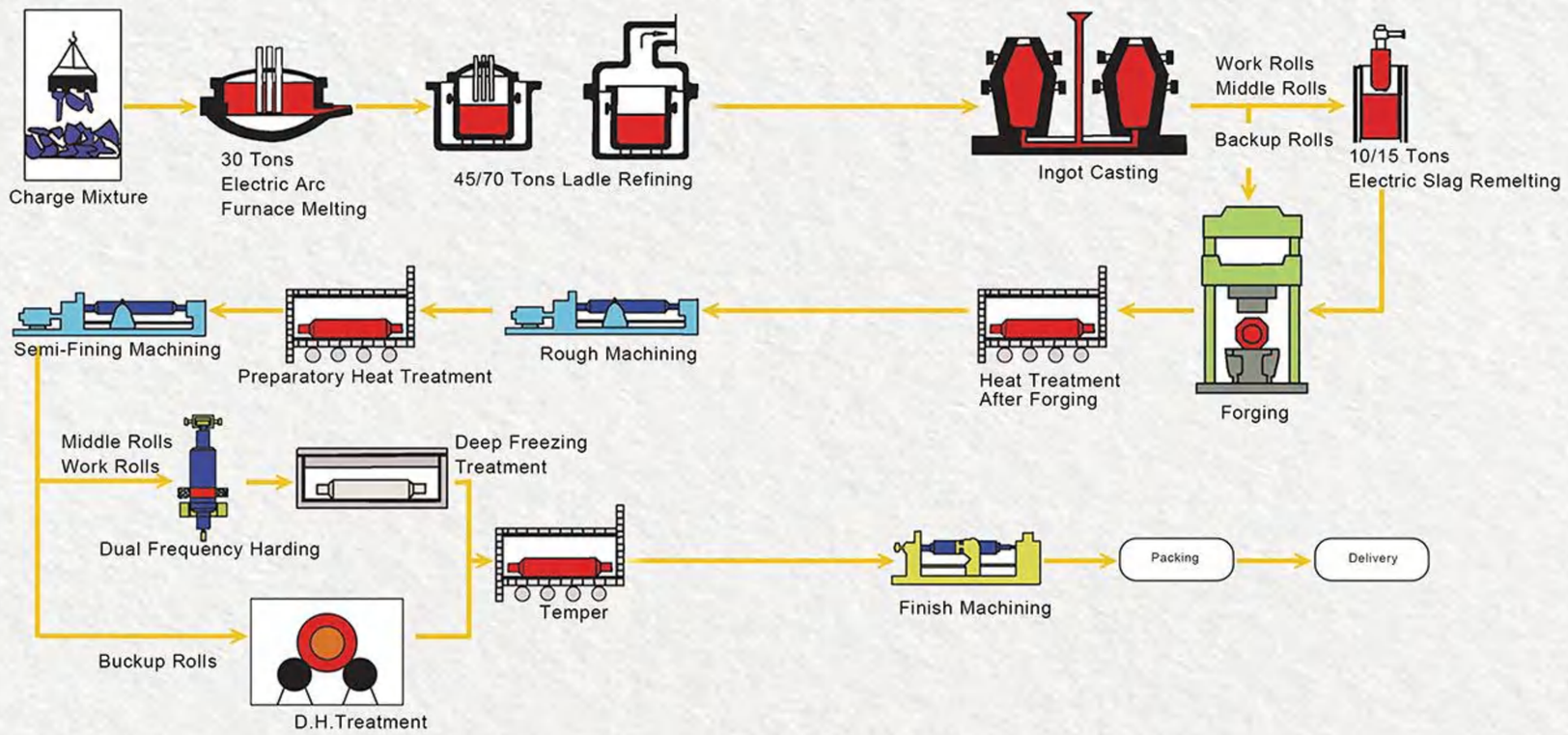
Static Cast Rolls



Centrifugal Cast Rolls



Forged Rolls



04

Quality Assurance

Quality Control

Raw Material

- Only work with 2-3 qualified long-term suppliers
- Each batch of raw material has quality certificate
- Acceptance test on receipt by our own laboratory
- Annual audit evaluation to all suppliers

Test & Inspection

- Well equipped chemical and physical labs
- Standard test and inspection procedures
- Records and samples are kept till roll scraped
- Final inspection done by QC Dept of third party

Manufacturing Process

- Advanced and mature process as shown previously
- Technical confirmation during Heat Treatment process
- Most of equipments are computer-controlled
- Standard operation guided by specified process cards
- Traceable operation records

Quality Staff

- Well-trained and certified
- Main technical staff and key workers are with over 20 years experience in roll industry

ISO9001
INTERNATIONAL QUALITY CERTIFICATION

Provide perfect technical support and after-sales service

MARKET NETWORK

With the globalization of the market strategy, information-based marketing system, high efficient and accurate market response, to promote market position. The products and projects of LMM Group have been exported to more than 90 countries and regions. Overseas warehouses and overseas branches have been successively established in the United States, Switzerland, Mexico, Germany, Iran, Turkey and other countries. No matter when and where, LMM has always uphold the concept of quality service, take the initiative to communicate with customers by heart, rapid response, know the customer needs, to provide value-added services to customers.

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