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LIBYAN IRON AND STEEL COMPANY

LISCO Products Catalogue

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CONTENTS

INTRODUCTION

Since 1989 the Libyan Iron & Steel Co. (LISCO) has produced 22 million tonnes of finished steel products which had been marketed in the domestic, regional & international markets ,the products has been recognized for its high quality , competitive price & suitability for end use.

This Catalogue describes LISCO main products namely technical specifications and end uses in addition to production methods & technologies used , the products cover wide range of applications including structural steels where bars , rods , sections & wire products are used , where as flat products are used in a diverse down stream industries namely transportation vehicles, white goods ,machinery , hollow sections, pipes , tubes & gas cylinders

This is the 3rd edition of LISCO main products catalogue which contains many changes to the technical specifications namely unification of European standards under EN, and the issue of the relevant EN 10025 relevant to most LISCO products which is also amended in 2004 from one issue to 6 parts.

The EN 10025 issue comprises 6 parts covering carbon steel and HSLA steels & themo-mechnically treated steels& cold forming steels.

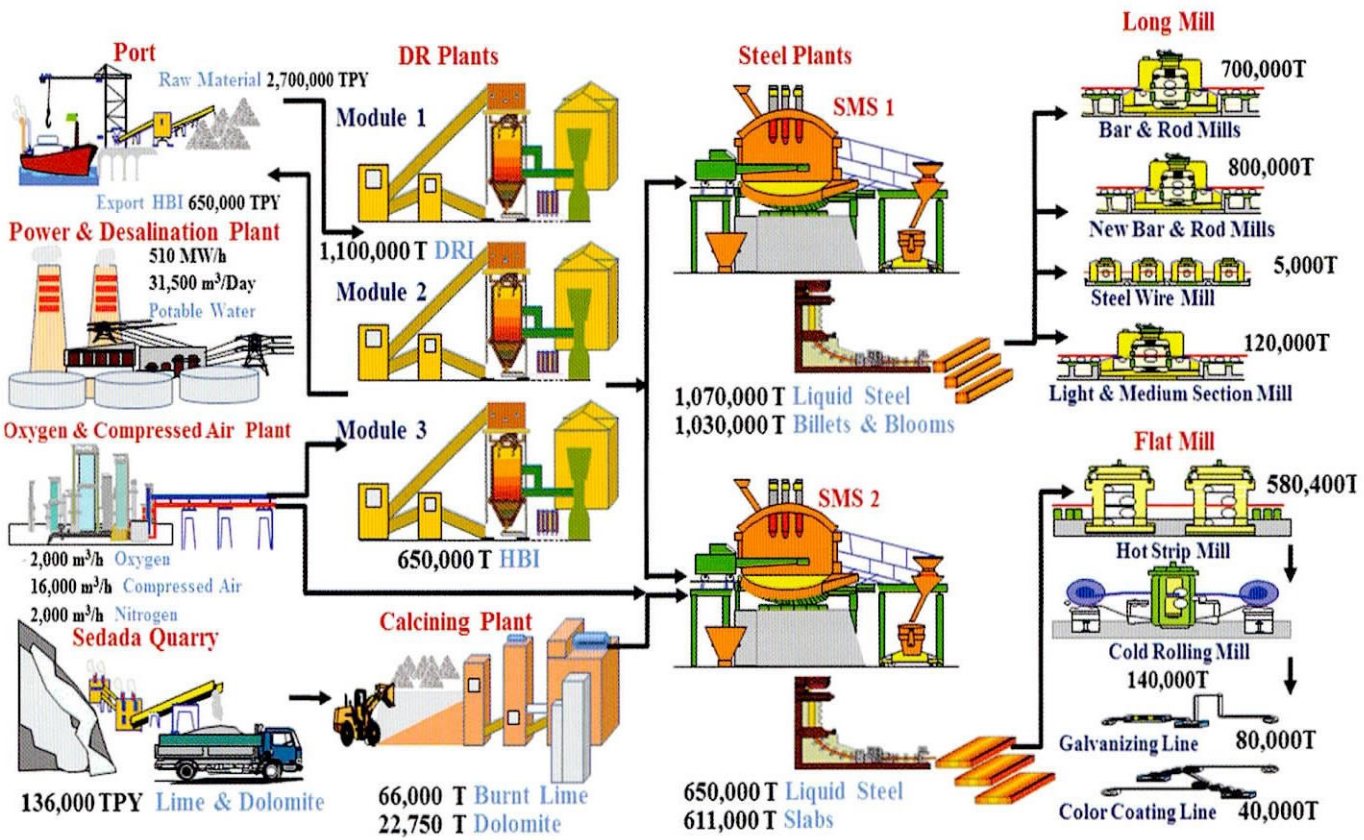
A number of EN specifications were also canceled namely EN 10113 ,EN 10155 & EN 10137 and became part of the new EN 10025 (6 parts), the hot dip galvanized steel strip EN specifications EN 10142 & EN 10147 were made into one specification EN 10346 , Also color coated steel strip specifications 10169-1,10169-2,10169-3 were made into one specification EN 10169.

New products are also listed in this catalogue including TMT rebars sizes 8 to 40 mm produced in the new Bar Mill 2 ,and IPE sections & new section sizes.

LISCO MILESTONES

- 1979 Laying the Foundation Stone for Misrata Steel Complex (MSC).
- 1988 Start of commercial operation of first MSC plant (Bar & Rod mill).
- 1989 Official inauguration of MSC.
- 1991 Commercial operation of MSC Plants & declaring LISCO a public company
- 1997 Commercial operation of first expansion project (HBI Module).
- 1998 Commercial operation of new rod Mill, Galvanizing & Color Coating Lines
- 2004 Preparing the feasibility studies for the MP expansion projects .
- 2005 Start of SMS-1 expansion project.
- 2006 Updating the Feasibility Studies for expansion Master Plan .
- 2008 Start implementation of Phase 1 of MP expansion projects.
- 2012 Restarting production of LISCO plants after Feb 2011 events
- 2014 Start Commissioning of MP projects (NG Treatment Station)
- 2017 Start Commissioning of MP projects (new bar mill, RO plant)
- 2018 start production of new bar mill 2

LISCO PRODUCTION & AUXILIARY FACILITIES



QUALITY CONTROL

The Quality Control department is the entity responsible for managing all quality assurance & quality control tasks through its organizational functions and facilities, which comprises:

AREA LABORATORIES

- **Steel Melt Shops & DR Plants Laboratories**

Chemical Analysis & Physical Tests of molten steel ,billets ,blooms ,slabs, sponge iron ,HBI, lime stone & dolomite , burnt lime & dolomite, & Byproducts

- **Long Mills Laboratories**

For testing products of Bar & Rod Mill 1 , Bar Mill 2,Section Mill, Wire Mill. Where the following tests are conducted: Sample preparation, Mechanical testing (Tensile, bend & hardness) & metallography tests.

- **Flat Mills Laboratories**

For product testing of hot strip mill, cold strip mill, hot dip-galvanizing & color coating lines comprising:
Sample preparation, mechanical testing of sheet products (Tensile, bend , hardness, cupping ,drawing), Metallography test, galvanized & coated products coating layer tests, Chemical tests of pickling acid & emulsion

QUALITY CONTROL

CENTRAL LABORATORY

Extensive testing of all raw materials, steel products & failure analysis tests of products & machine parts ,Its also where issuance of Quality & Test Certificates & test machines calibration activities are conducted.

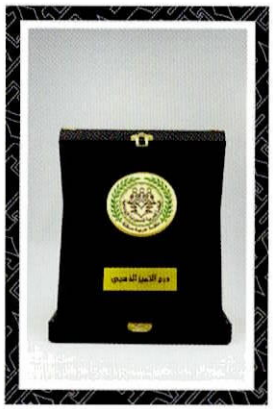
- Chemical & physical tests of steels, iron ore, lime stone & dolomite , burnt lime & dolomite & byproducts .
- Ferro-alloys, refractory materials .
- Mechanical testing of steel products (Tensile test, bend test, Impact test, cupping tests , surface roughness) .
- Metallography tests .
- Hardness tests .
- Heat treatment .
- Non-Destructive testing .

AWARDS & CERTIFICATIONS

Since the start of commercial operation and the introduction of LISCO products to regional & international steel markets in recognition of its exceptional product quality LISCO has won many prestigious international prizes and awards from renowned international institutions :

- International Golden Star Award for Quality in 1999
- International New Millennium Award for Commercial Excellence 2001
- International Golden Millennium Award for Quality Excellency 2002
- ISO 9001 Certification TQM in 2002/2008
- Latin America Technical Award for Quality & Best Trademark 2002
- The 14th International Award for Industrial &AuxiliaryStructures 2002
- International New Millennium Award for Best Trademark 2001
- International Royal Award for Exceptional Performance & Excellence in Quality 2003
- ISO 14001 Certification for Environmental management 2008
- ISO 18001 Certification for Industrial health & safety management 2009
- Global Green Award for Environmental Achievement & Sustainability Practices 2014
- Exceptional Leadership in Crisis Award 2017

LISCO AWARDS & CERTIFICATIONS



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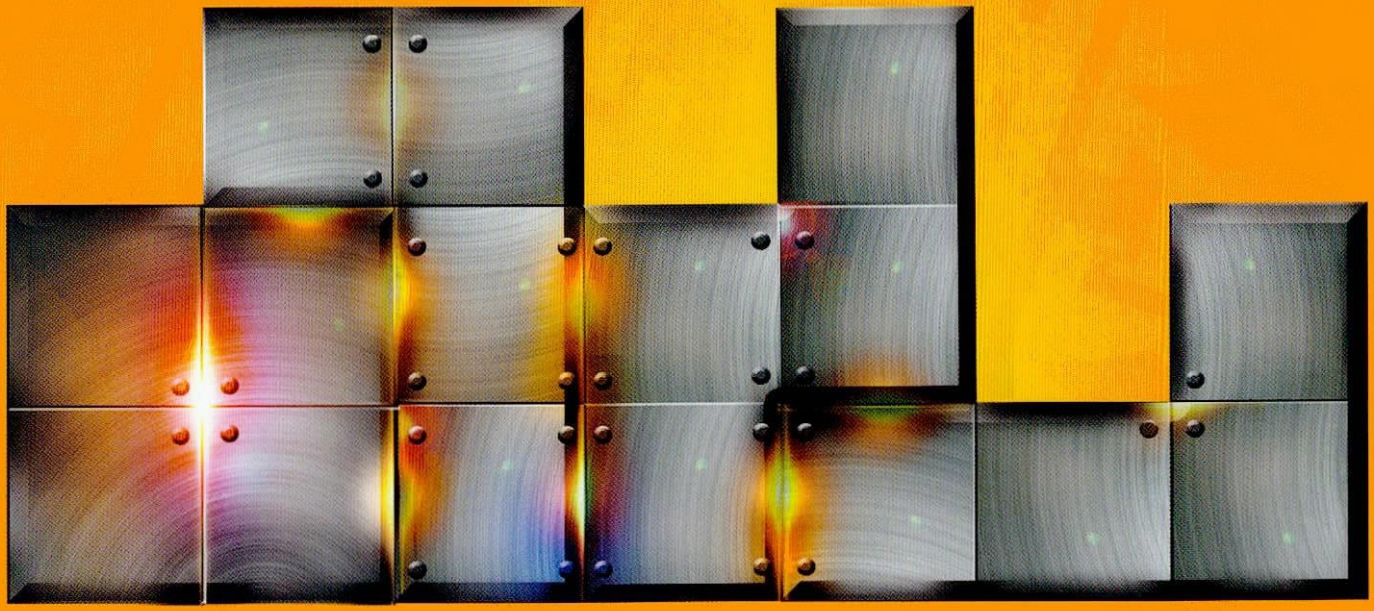
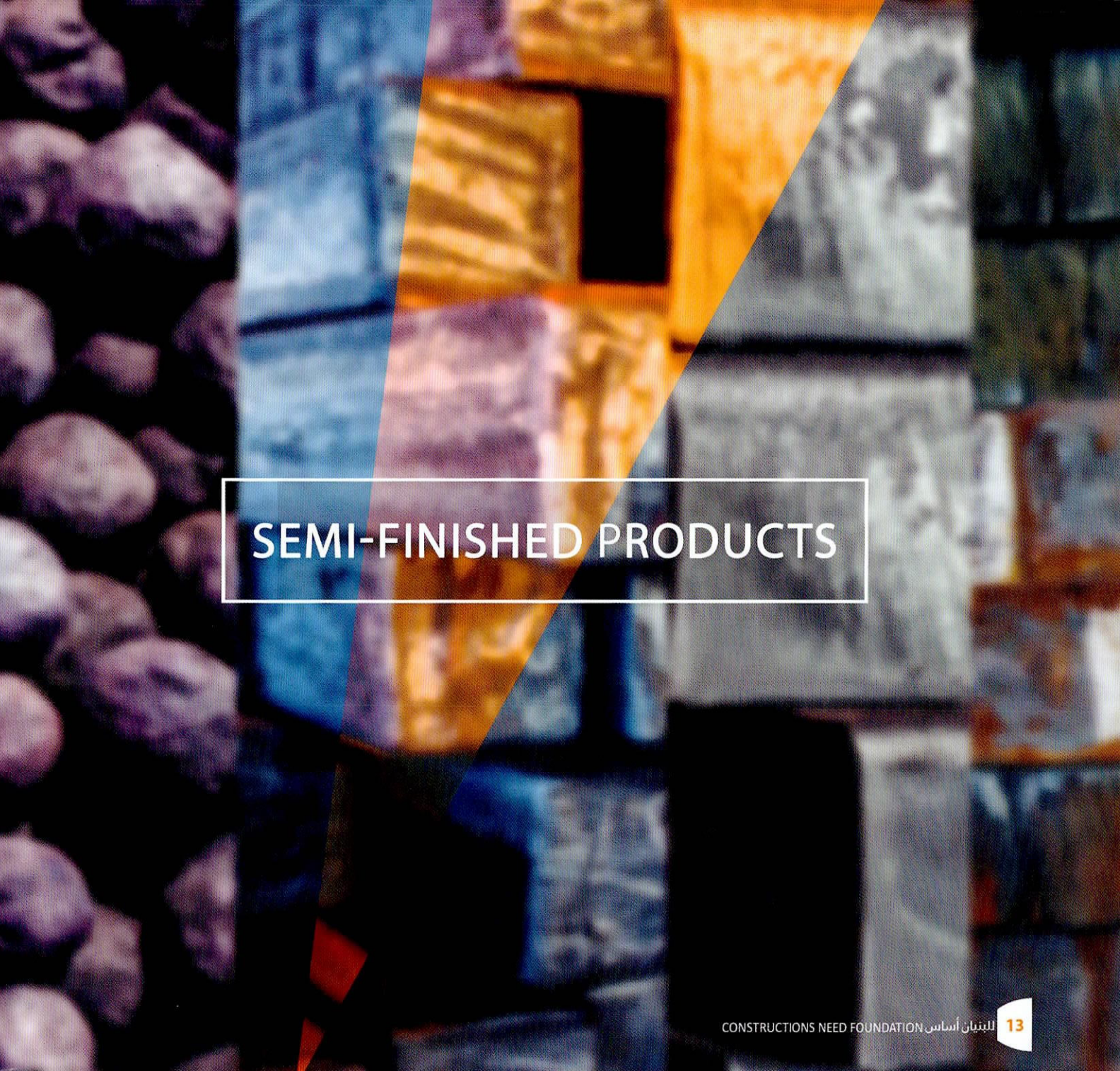
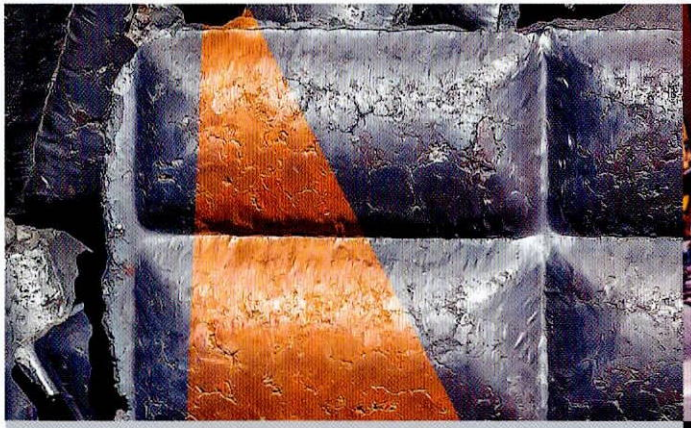




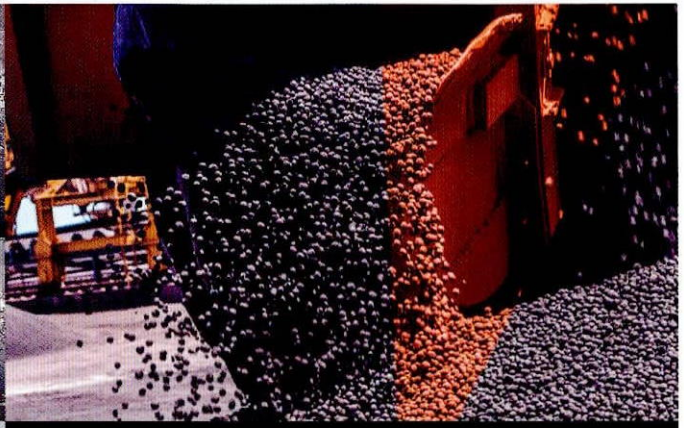
SEMI-FINISHED PRODUCTS

SPONGE IRON : DRI & HBI

The sponge iron is produced in two forms, DRI (Directly reduced iron) pellets & HBI (Hot briquetted iron) briquettes by Midrex direct reduction technology using high quality hematite iron ore , the sponge iron is the main input material for the production of liquid steel by the EAF process.



HBI (HOT BRIQUETTED IRON)



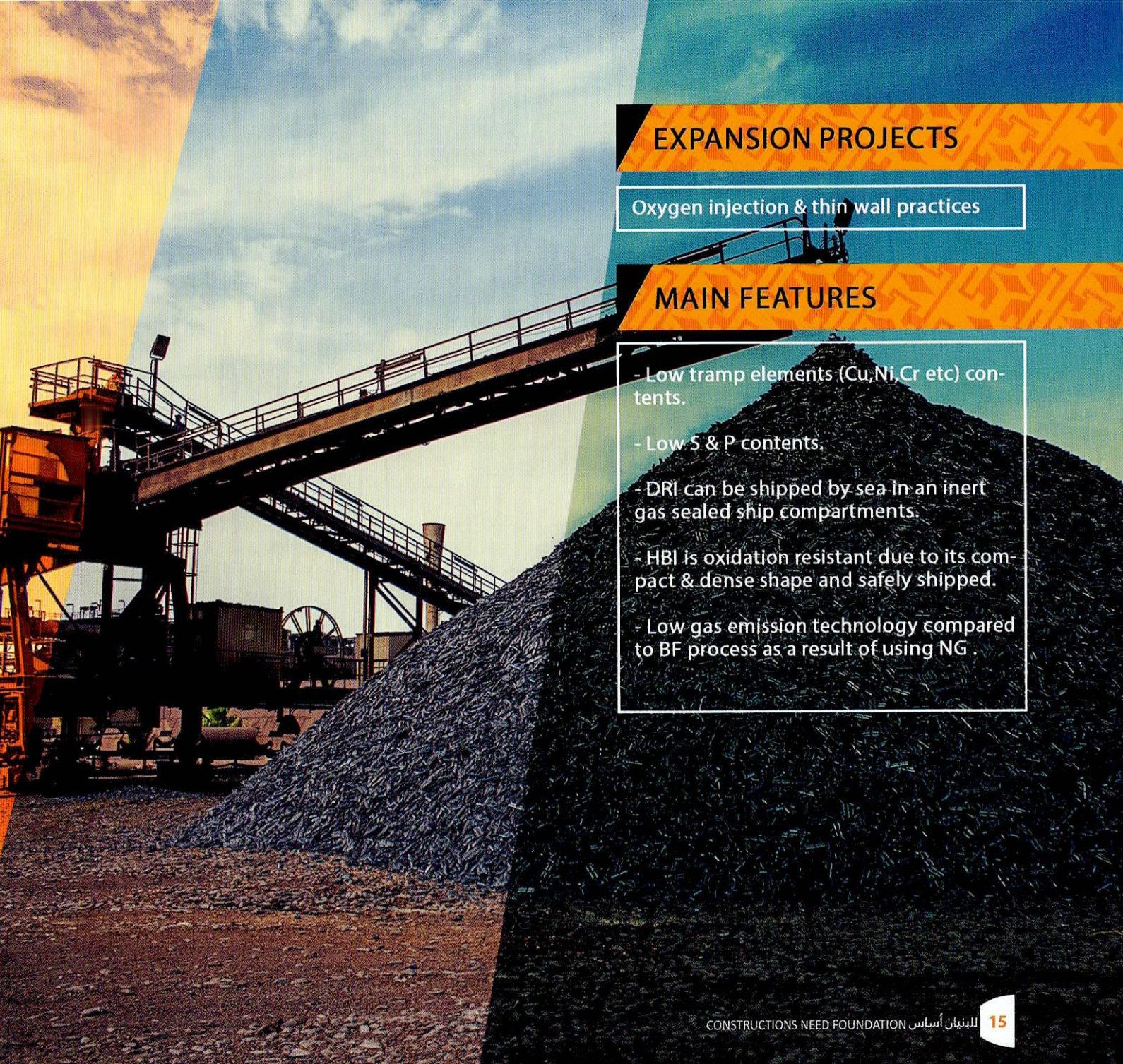
DRI (DIRECTLY REDUCED IRON)

PRODUCTION TECHNOLOGY

Midrex Direct Reduction Process

MAIN CONTRACTOR

Main Contractor: Models 1&2 (Produce DRI Pellets) the Germen Co. Kurf & the Austrian Co. Voist Alpine
Model 3 (Produce HBI)the Austrian Co. Voist Alpine



EXPANSION PROJECTS

Oxygen injection & thin wall practices

MAIN FEATURES

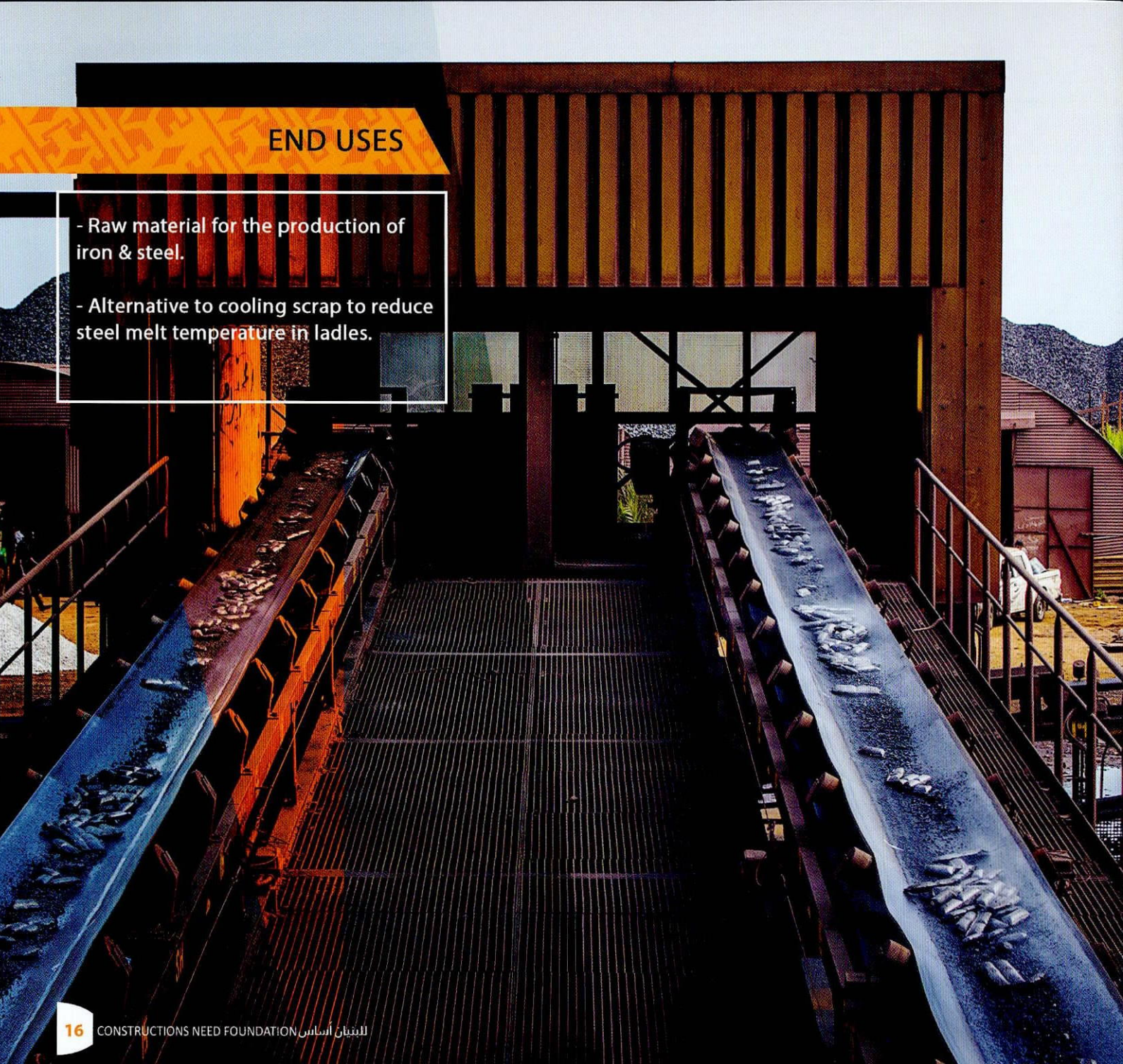
- Low tramp elements (Cu,Ni,Cr etc) contents.

- Low S & P contents.

- DRI can be shipped by sea in an inert gas sealed ship compartments.

- HBI is oxidation resistant due to its compact & dense shape and safely shipped.

- Low gas emission technology compared to BF process as a result of using NG .



END USES

- Raw material for the production of iron & steel.

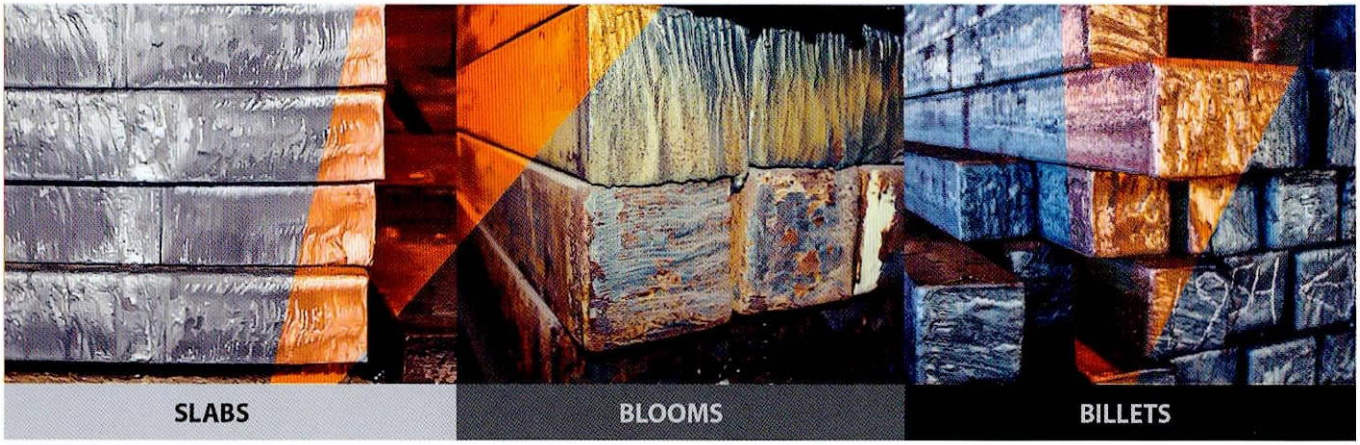
- Alternative to cooling scrap to reduce steel melt temperature in ladles.

TECHNICAL SPECIFICATION OF SPONGE IRON

TYPE OF SPONGE IRON	% Fe Total Min	% Fe Metallic Min	% Metalli-zation min	% C AVE	% P MAX	% S MAX	% Gangue MAX (SiO2 + Al2O3 + CaO + MgO)	SIZE MM	SPECIFIC GRAVITY G/CM3	BULK DENSITY T/M3
DRI	91	84	92	1.50	0.045	0.03	5	8 -16	3.4 – 3.6	1.6 – 1.8
HBI	91	84	92	0.85	0.045	0.03	5	32×48×106	4.9 - 5.3	2.6 – 2.8

BILLETS , BLOOMS & SLABS

These semis are produced in the two steel melt shops 1 & 2 , where billets & blooms are produced in SMS1 and the slabs are produced in the SMS2 They are the main input materials for the rod,bar, section & hot strip mills, and cover wide range of steel grades namely low, medium and high C steels in addition to HSLA steels.



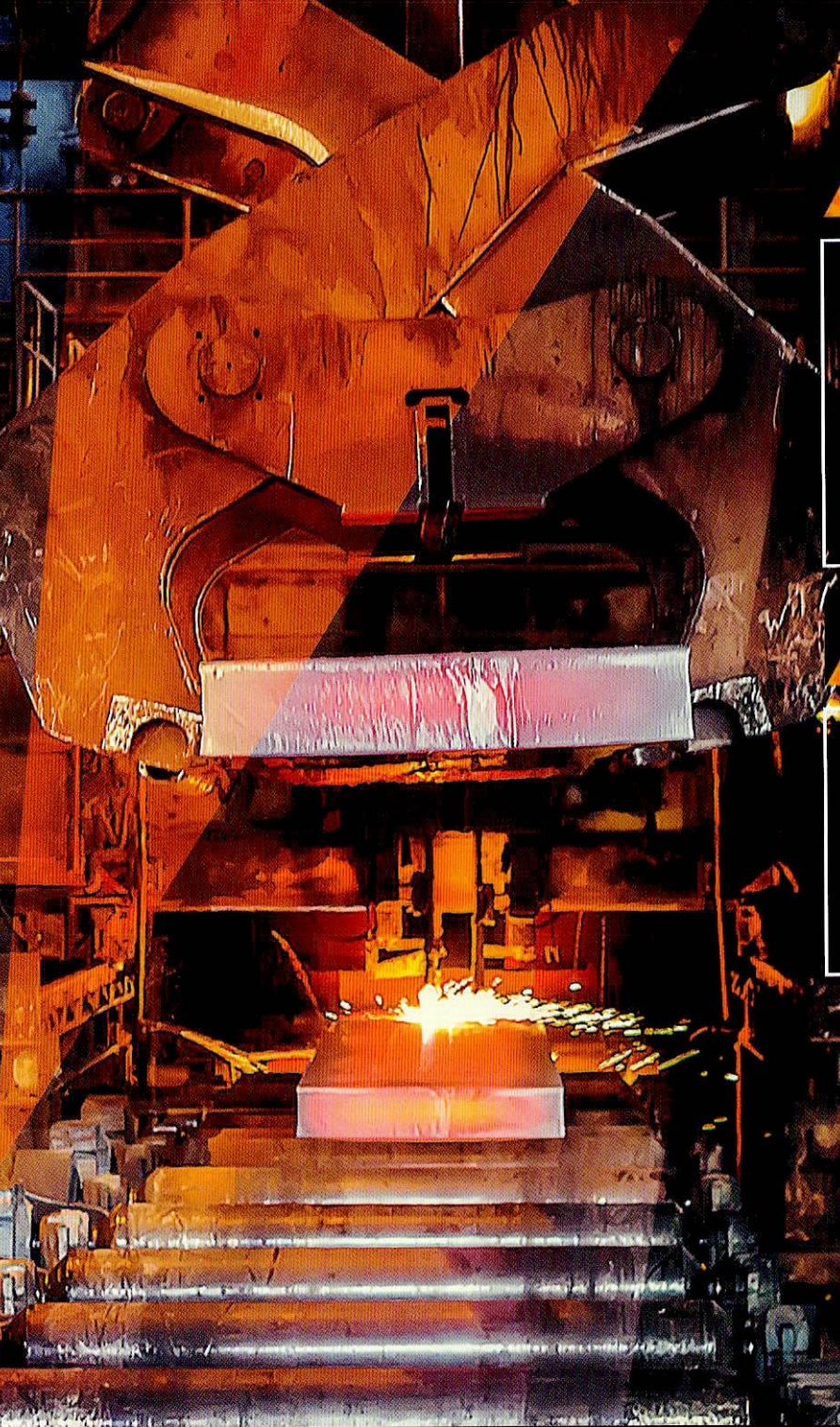
PRODUCTION TECHNOLOGY

Electric Arc Furnace (EAF) & Continuous Casting Process

MAIN CONTRACTOR

SMS 1 German Korf Co.& Austrian Voist Alpine Co

SMS 2 German Krup Co. & Austrian Voist Alpine Co



EXPANSION PROJECTS

- Upgrading SMS1 to produce 1.03 mtpy of billets by installing:

- EAF(Oxy & C injection – EBT).

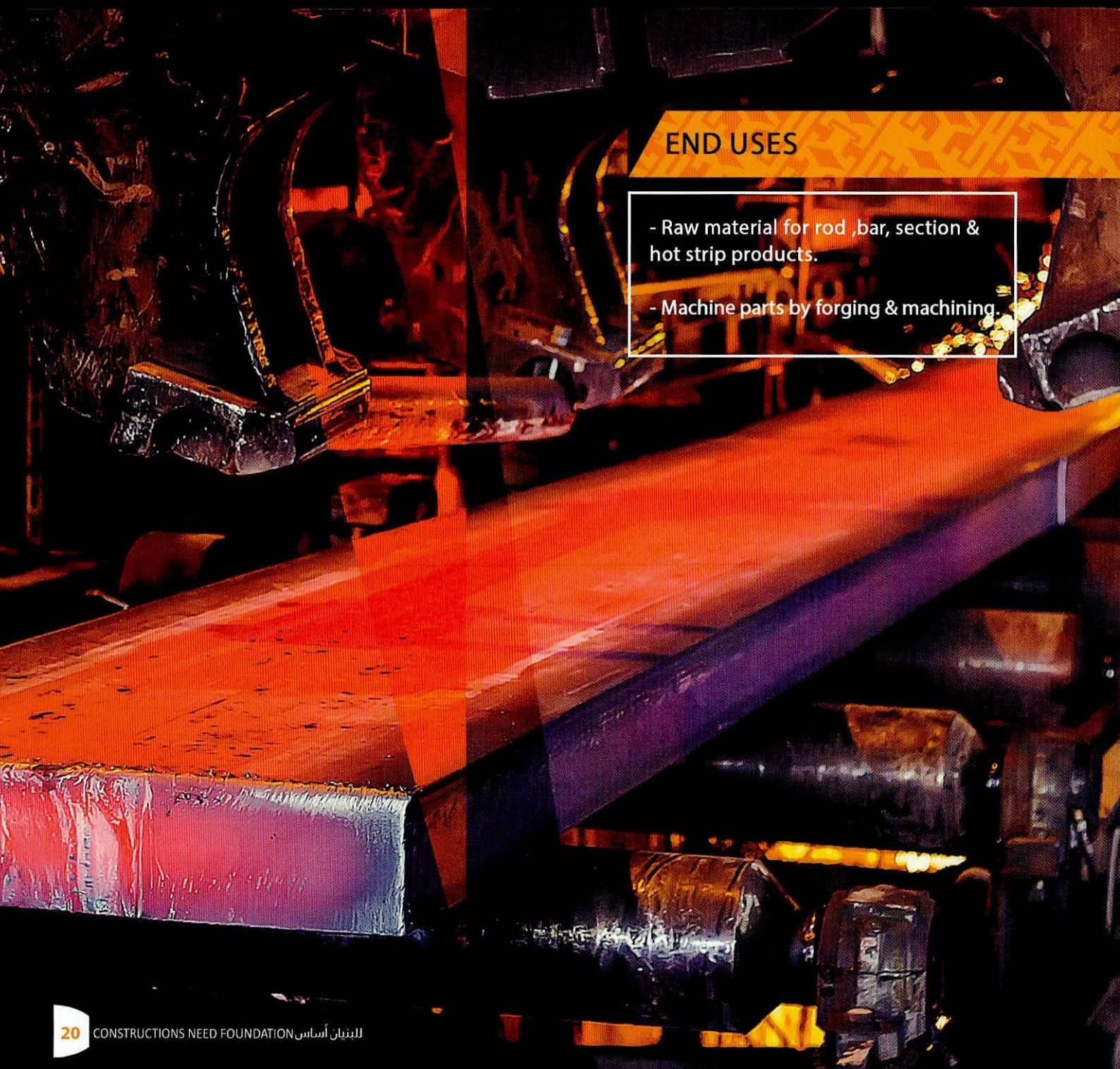
- New ladle furnace.

- CCM Revamping (High speed casting).

MAIN FEATURES

- Uniform chemical & microstructural constituents.

- Clean low tramp elements steels due to the use of high quality sponge iron as raw material.



END USES

- Raw material for rod ,bar, section & hot strip products.

- Machine parts by forging & machining.

SEMI-FINISHED PRODUCTS

TECHNICAL SPECIFICATIONS

SEMIS	SECTION DIMENSIONS (MM)	LENGTH (M)	WT./M (T/M)	SPECIFICATIONS	DIMENSIONAL DEVIATION	TWIST (MAX)	STRAIGHT-NESS (MM) MAX	DIAGONAL DEVIATION
BILLETS	122 × 122 130 × 130	4 - 12	0.115	-AISI 1008 - 1074 -HSLA -EN 10025(1-6)	SECTION AREA ± 2 % LENGTH ± 50	1°/M OR 8°/12M	5 / M OR 30 / 12M	2 %
BLOOMS	150 × 150 175 × 175 200 × 200	4 - 12	0.177 0.240 0.314	-AISI 1008 - 1074 -HSLA -EN 10025 (1-6)	SECTION AREA ± 2 % LENGTH ± 50	1°/M OR 8°/12M	5 /M	2 %
SLABS	THICKNESS 160 & 190 WIDTH 630 – 1550	6 – 12	0.8 -2.3	-AISI 1008 - 1023 - HSLA	LENGTH ± 50 WIDTH ± 5 T ± 2.5 BULGE ± 2.0	—	50 /6M	2.5 %

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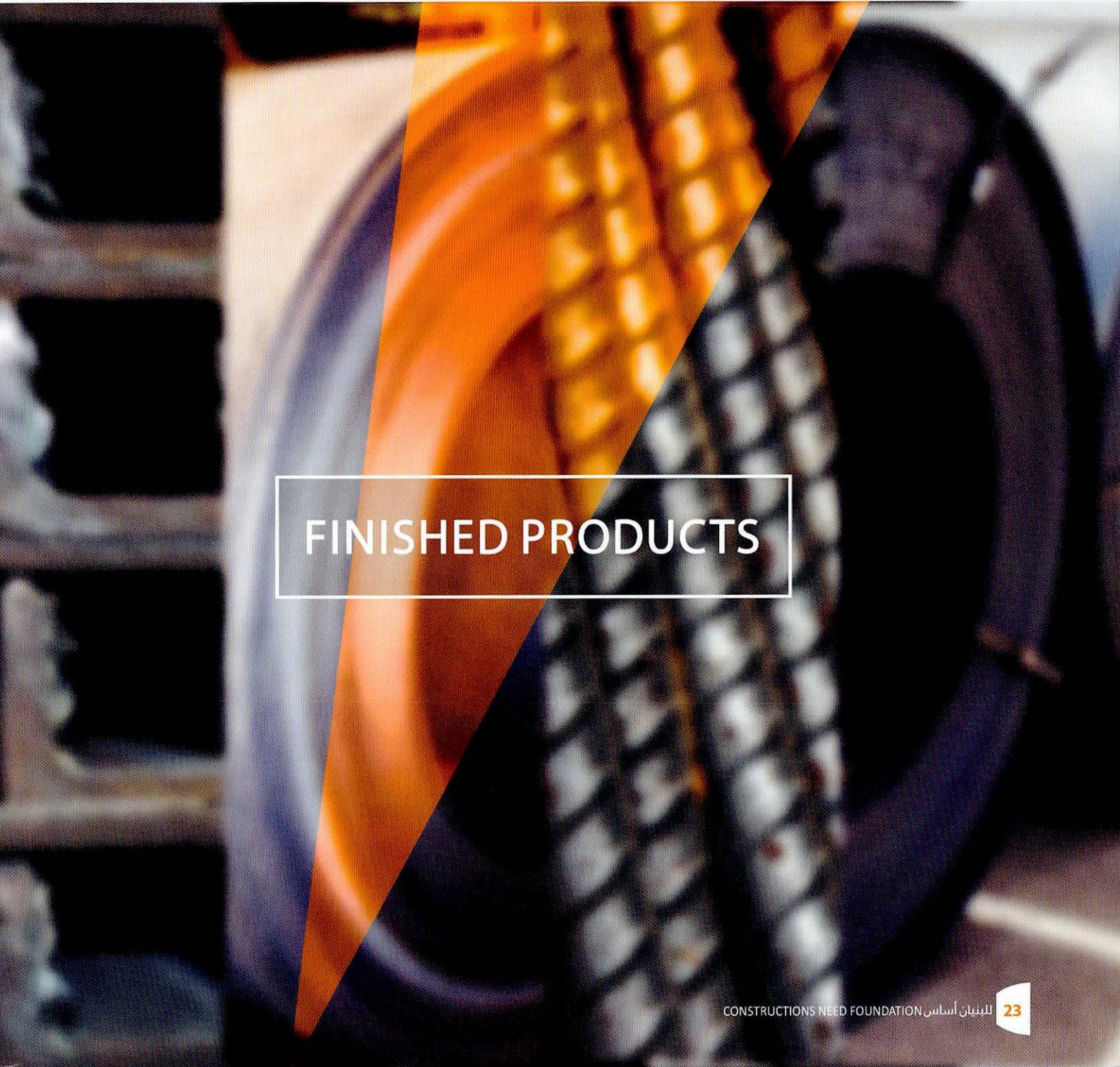
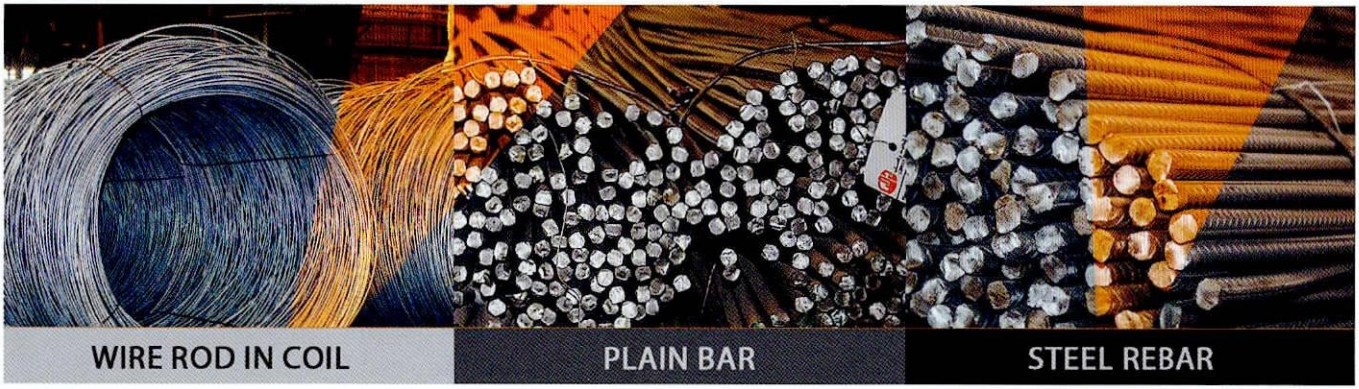

FINISHED PRODUCTS

BARS & RODS

These products comprises round & deformed bars & rods ,bar sizes range from 8 to 40 mm , rods ranging from 5.5 to 12 mm.
Most of these products are used for structural purposes in concrete reinforcement and general engineering applications & wire products, these products classified according to their mechanical properties (Low , medium & High strength) and cover low , medium , high carbon & low alloy steel grades.



WIRE ROD IN COIL | PLAIN BAR | STEEL REBAR

PRODUCTION PROCESS

- Bars are produced by hot rolling in a tandem mill in 3 stages , then air cooling on cooling bed ,whereas the Bar Mill2 has TMT zone where bars are subjected to high cooling rate with water jets to produce high strength rebars (temper-core).
- Rods are produced by hot rolling in 4 stages roughing ,intermediate , finishing & mo-no-block,followed by water cooling zone then coil forming by laying head where rod rings are laid on roller conveyor (Stelmor type) to be air cooled by air blower.

STEEL REBAR IDENTIFICATION MARK

EXPANSION PROJECTS

- Bar Mill 2 with a design capacity of 800000 tpy of rebar sizes 8 to 40 mm.

- Upgrading the wire rod mill to raise production capacity to 300 000 tpy.

- Upgrading the control systems of the bar mill 1.

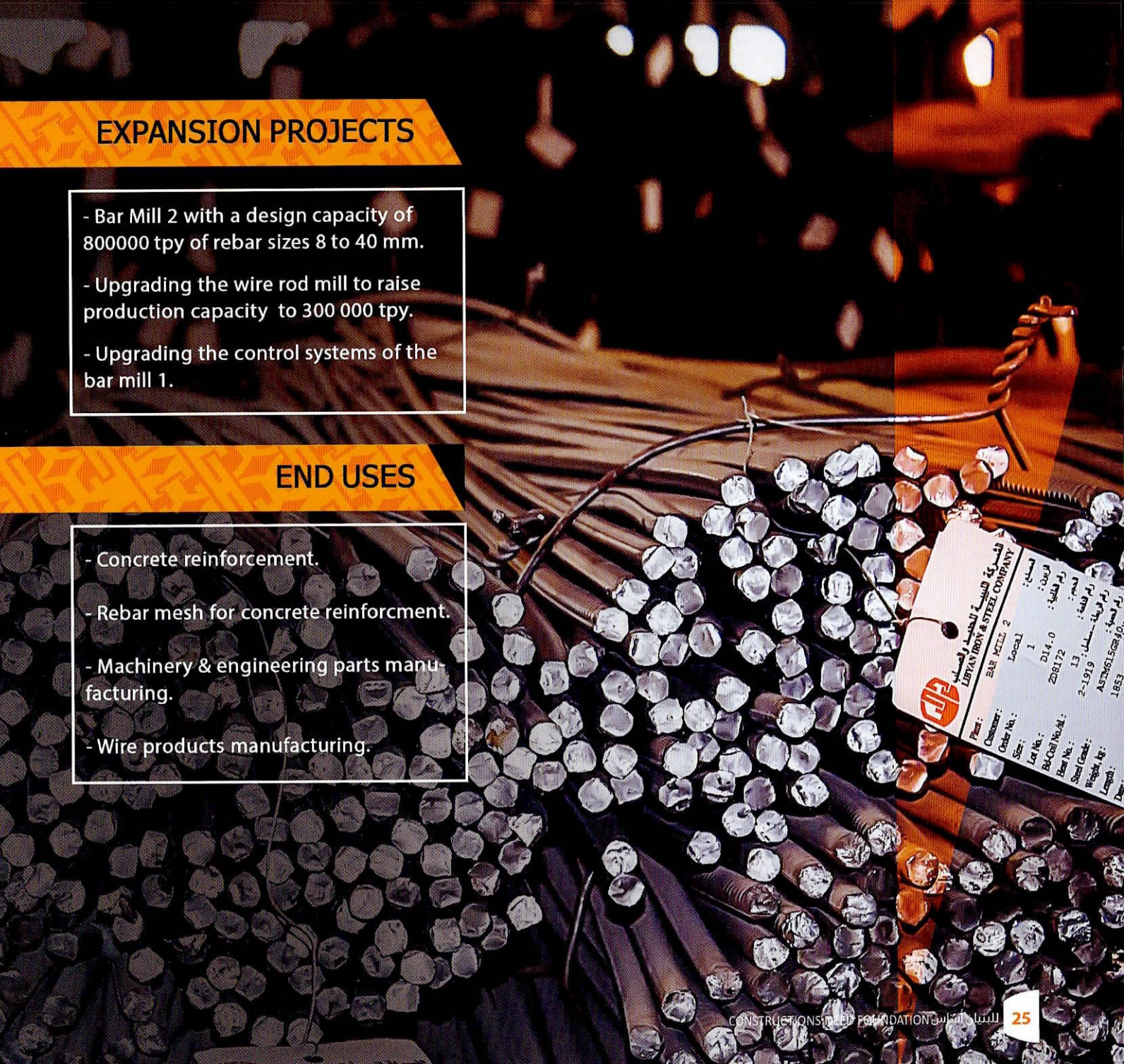
END USES

- Concrete reinforcement.

- Rebar mesh for concrete reinforcment.

- Machinery & engineering parts manufacturing.

- Wire products manufacturing.



TECHNICAL SPECIFICATIONS

Bars & Rods for Structural Purposes

PRODUCT TYPE	TECHNICAL SPECIFICATION	SIZES (MM)	CHEMICAL COMPOSITION % (LADLE ANALYSIS)MAX					MECHANICAL PROPERTIES (MIN)			DIMENSIONAL SPECIFICATIONS
			C	Si	Mn	P	S	YS N/MM2	TS N/MM2	% EL	
WIRE ROD	AISI 1008-1018 ASTM A 510 EN 10025 S 235 : EN 16120-2	5.5 - 12	0.20	0.20	0.60	0.04	0.04	235	340	25	EN 10017 ISO 16124
MEDIUM STRENGTH	ASTM A615 G 40 : RB 300 : ISO 6935	6 - 12	0.35	0.30	0.90	0.05	0.05	300	400	16	DIN 488-2 EN 10080 ASTM A615
		16 - 40	0.35	0.30	1.20	0.05	0.05	300	400	16	
HIGH STRENGTH	RB 400 :ISO 6935-2	6 - 12	0.35	0.30	1.00	0.05	0.05	400	550	14	
	G 60 : ASTM A 615	12 - 40	0.40	0.40	1.50	0.05	0.05	420	620	9	
HIGH STRENGTH WELDABLE	460 : BS 4449/1997 500 : DIN 488-1 G 60 : ASTM A706	8 - 40	0.22	0.40	1.50	0.05	0.05	500	550	10	

TECHNICAL SPECIFICATIONS

Bars & Rods for Engineering Purposes

STEEL TYPE	TECHNICAL SPECIFICATION	SIZES (MM)	CHEMICAL COMPOSITION (% LADLE ANALYSIS MAX) MAX					MECHANICAL PROPERTIES (MIN)			DIMENSIONAL SPECIFICATIONS
			C	Si	Mn	P	S	YS N/MM2	TS N/MM2	% EL	
MILD STEEL	-EN 10025-2: E295 - AISI :1023 -1030	6 - 40	0.30	0.30	1.00	0.05	0.04	295	470	19	EN 10060
MEDIUM CARBON STEEL	-EN 10025-2: E336 - AISI :1035-1045		0.50	0.30	1.20	0.05	0.04	336	570	15	
HIGH CARBON STEEL	-EN 10025-2:E360 -AISI :1050-1070		0.70	0.30	1.20	0.05	0.04	360	670	10	

Note : Bar length 6 -12 m

WIRE PRODUCTS

These products comprises 3 categories black, annealed ,galvanized & coated wires.the black wire is the input material for production of all wire products (heat treated ,galvanized & coated wires).
The wire products are initially drawn from low carbon steel rod in stages through drawing dies then heat treated by process annealing in batch annealing furnaces to soften the structure.

COATED WIRES | GALVANIZED WIRES | BLACK WIRES

PRODUCTION PROCESS

Wire drawing of rods in wire drawing mill using oil lubricated dies to produce black wire / Heat treatment by batch annealing process of wire coils / Hot dip galvanizing / PVC coated wire

MAIN CONTRACTOR

Italian Co. Techint

MAIN FEATURES

- Good mechanical properties & surface quality.
- Wide range of end uses.
- Produced from high quality steel (low Cu,Ni,Cr & P/S).

END USES

- Tying wire.
- Fence wire.
- Mesh baskets (Gabion).
- Wire mesh for concrete reinforcement.

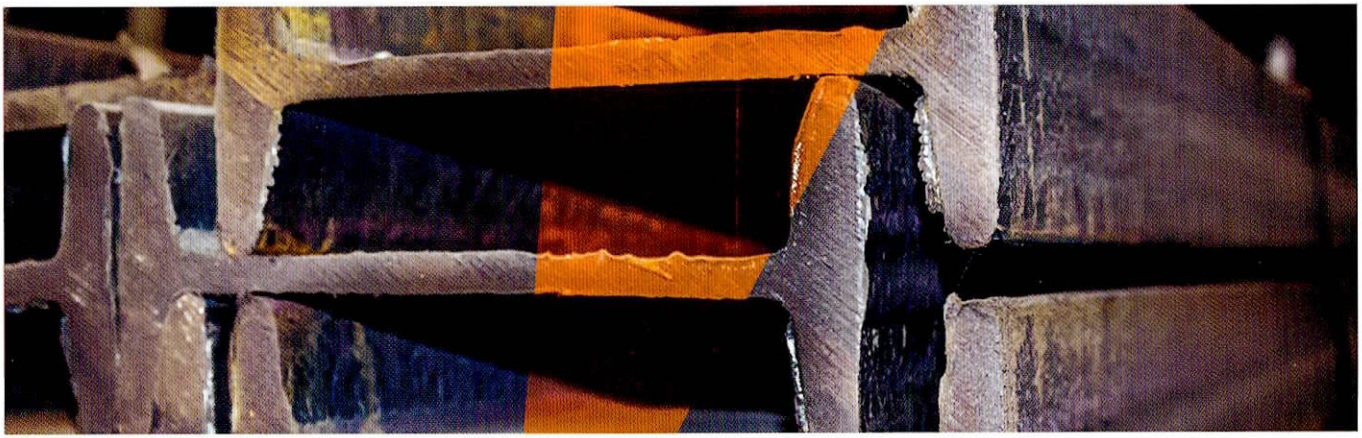
TECHNICAL SPECIFICATIONS

Wire Products

PRODUCT	DIAMETER (MM)	MECHANICAL PROPERTIES		SPECIFICATIONS	
		TS N/MM2	%EL MIN	TECHNICAL	DIMENSIONAL
BLACK WIRE	1.6 - 4.o	500 - 850	_	AISI 1008 – 1020 EN 10223-3 EN 10244-1/2 EN 10245-1/2	EN 10218-2
ANNEALED WIRE	0.8 - 1.2	350 - 500	10		
GALVANIZED WIRE	0.8 - 4.o				
PVC COATED WIRE	1.6 - 2.5				

HOT ROLLED LIGHT & MEDIUM SECTIONS

These products cover wide range of sections (I-beams ,channels, equal angles & flats), in addition to new IPE section , these products are classified according to mechanical properties



PRODUCTION PROCESS

The sections are produced by hot rolling of billets & blooms (120 to 200 mm size section) in a cross-country type mill in 3 stages roughing ,intermediate & finishing followed by natural air cooling ,cutting to length then straightening .

MAIN CONTRACTOR

JAPANESE CO. KOBE STEEL

EXPANSION PROJECTS

- Installation of new universal stand to produce new section products namely IPE & additional IPN sizes.

MAIN FEATURES

- High quality steel with low impurities content (P,S).
- Good weldability.
- Diverse end use.
- Easy to assemble , disassemble & fabricate.

END USES

- Steel Structures.
- Ship structures.
- Pedestrian bridges & crossovers.

TECHNICAL SPECIFICATIONS

Section Products, Types, Dimensions & Dimensional Specifications

Section Type	Equal Angles	Channels	Beams		Flats
			IPN	IPE	
Section Dimensions	75×75×t (6 ,7, 8, 10) 100×100×t (8 , 10 , 12 , 14 , 16) 120×120×t (11 , 12 , 13 , 15)	80×45×6 100×50×6 120×55×7 140×60×7 160×65×7.5 180×70×8 200×75×8.5	100×50×4.5 120×58×5.1 140×66×5.7 160×74×6.3 180×82×6.9 200×90×7.5	100×55×4.1 120×64×4.4 140×73×4.7 160×82×5.0 180×91×5.3 200×100×5.6	100×10 175×15 200×20
Dimensional Specifications	EN 10056-2	EN 10279	EN 10024	EN 10034	EN 10058

TECHNICAL SPECIFICATIONS

Hot Rolled Sections

Steel Grade	Equivalent Steel Grades (EN 10025-2)	Chemical Composition (% Ladle Analysis)max						Mechanical Properties (min)			
		C	Si	Mn	P	S	N	YS N/mm2	TS N/mm2	% El	Bend Test 180° (t)
235	S 235 (JR,J0,J2)	0.17	0.30	0.60	0.05	0.04	0.009	235	340 / 470	24	1
275	S 275 (JR,J0,J2)	0.21	0.30	0.90	0.05	0.04	0.009	275	410 / 560	20	2.5
355	S 355 (JR,J0,J2)	0.21	0.50	1.5	0.05	0.04	0.009	355	340 / 630	18	3

*Si content by agreement with the customer, ** N content not required when N fixing elements (Al,V, Nb & Ti) are added

Note: These products are suitable for hot dip galvanizing as per EN10025 – Class 3

HOT ROLLED COILS & SHEETS

Due to the wide range of end uses of these products, they are classified according to chemical composition & mechanical properties, They comprises 3 categories as per end uses:

- Hot rolled coil & sheets for general structural purposes
- Hot rolled coil & sheets of high strength, fine grained weldable steel
- Hot rolled coil & sheets for cold forming (eg for gas cylinders & auto structural parts)

HOT ROLLED SHEETS

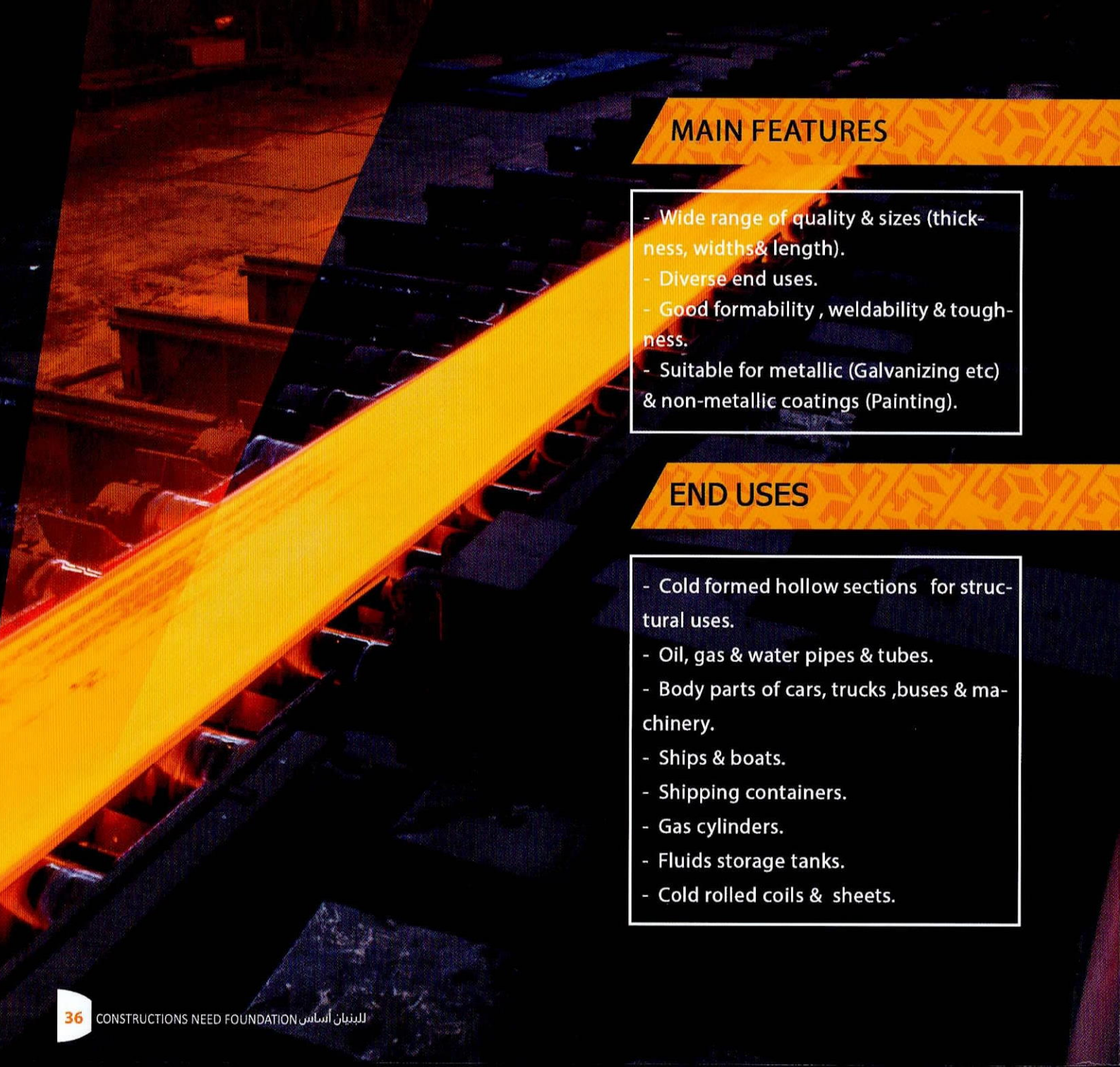
HOT ROLLED COILS

PRODUCTION PROCESS

The coils are produced by hot rolling in a semi continuous rolling mill starting with heating of the slabs to 1200 °C reheating furnaces, followed by descaling prior to rolling in 2 stages, starting with a stand reversing roughing mill where LLING IS DONE IN rolling is done in multiple passes followed by descaling prior to entering 6 stand finishing mill, the rolled stock then water cooled to achieve the desired properties on laminar cooling roller table prior to coiling.

MAIN CONTRACTOR

Austrian Co. Voist Alpine



MAIN FEATURES

- Wide range of quality & sizes (thickness, widths& length).
- Diverse end uses.
- Good formability , weldability & toughness.
- Suitable for metallic (Galvanizing etc) & non-metallic coatings (Painting).

END USES

- Cold formed hollow sections for structural uses.
- Oil, gas & water pipes & tubes.
- Body parts of cars, trucks ,buses & machinery.
- Ships & boats.
- Shipping containers.
- Gas cylinders.
- Fluids storage tanks.
- Cold rolled coils & sheets.

TYPES , DIMENSIONS & SPECIFICATIONS

Product Type	Thickness (mm)	Width (mm)	Length (mm)	Coil Inner Diameter (mm)	Coil Outer Diameter	Wt (t)	Technical Specification				Tolerance Specification
							AISI	EN	ASTM	API-5L	
Coils	2.0 / 12.7	600 / 1525	——	760	950 - 2000	14	1008 to 1023	EN 10026 (1-6)	A 570	GR.A GR.B X42 X46 X52 X60	EN10051
Pickled Coils	2.0 / 6.0	600 / 1270			800 - 2000	12 / 25			A 283		EN10029
Sheets	2.0 / 12.7	600 / 1525	1500 / 6000	——	——	10					

TECHNICAL SPECIFICATIONS

- Hot Rolled Coils for General Structural Purposes

Chemical Composition

Steel Grade	Chemical Composition (% Ladle Analysis)						Equivalent International Specification EN 10025-2
	C max	*Si max	Mn max	P max	S max	Al min	
HS 235	0.17	0.40	0.90	0.04	0.03	0.02	S 235
HS 275	0.18	0.40	1.2	0.04	0.03	0.02	S 275
HS 355	0.20	0.40	1.50	0.04	0.03	0.02	S 355

For Coils intended for hot dip galvanizing: Si content ≤ 0.03%(Class 1) or 0.14%≤ Si ≤ 0.25% (Class 3)

TECHNICAL SPECIFICATIONS

Mechanical Properties

Steel Grade	*Mechanical Properties							Equivalent International Std
	Yield Strength (N/mm2) min	Tensile Strength (N/mm2)	% El min		Charpy Test (J) At Temp°C min			
			3mm>	3mm≤	+ 20 (JR)	0 (JO)	- 20 (J2)	EN 10025-2
HS 235	235	360 - 510	19	24	27	27	27	S 235
HS 275	275	430 - 580	17	21	27	27	27	S 275
HS 355	355	510 - 680	16	20	27	27	27	S 355

*Samples are 90° to rolling direction

TECHNICAL SPECIFICATIONS

- Hot rolled coil & sheets of high strength, fine-grained weldable Structural steel

This type of special purpose sheets characterized by their high toughness and strength and good weldability as a result of their chemical composition (micro alloying with V& Nb) and processing method (Controlled rolling or TMT)

Chemical Composition

Steel Grade	Chemical Composition (Ladle Analysis %)							Equivalent International Std EN 10025-3 EN 10025-4
	C max	Si max	Mn	P max	S max	Al min	Nb/V max	
HS 235 FG	0.18 / 0.13	0.4	0.6 - 1.5	0.03	0.02	0.02	0.05 / 0.1	S 275 N / S 275 M
HS 350 FG	0.20 / 0.14		1.0 - 1.6					S 355 N / S 355 M
HS 420 FG	0.20 / 0.16						0.05 / 0.15	S 420 N / S 420 M
HS 460 FG	0.20 / 0.16							S 460 N / S 460 M

TECHNICAL SPECIFICATIONS

Mechanical Properties

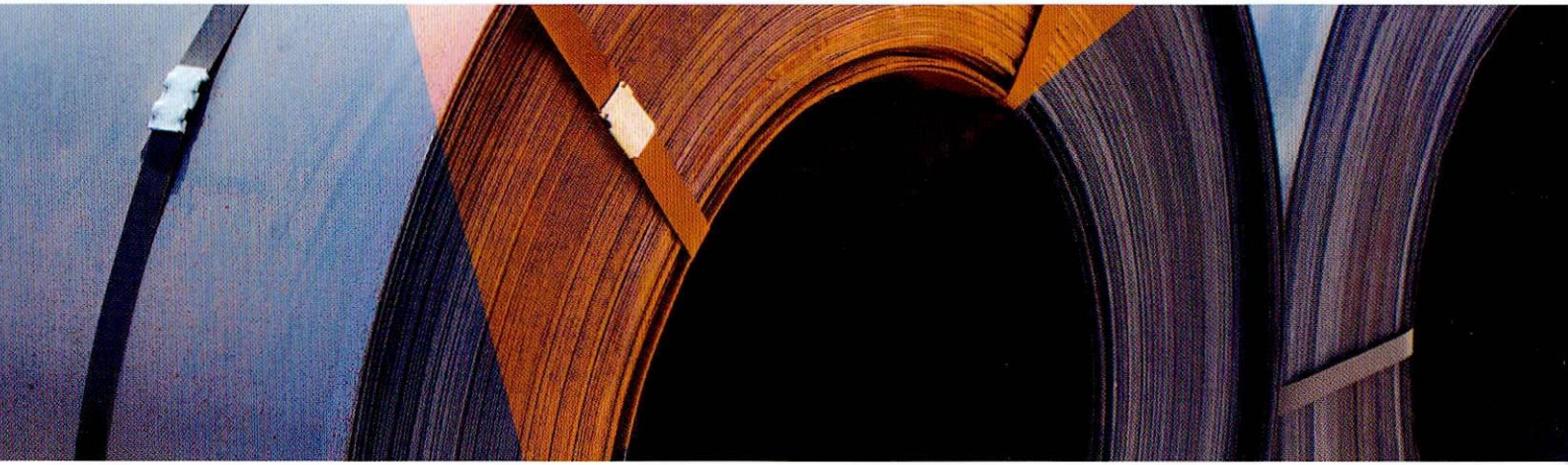
Steel Grade	*Mechanical Properties						Equivalent International Std EN 10025-3 EN 10025-4
	Yield Strength (N/mm2) min	Tensile Strength (N/mm2)	% El	Charpy Test At Temp°C (J) min			
				+ 20 (JR)	0 (JO)	- 20 (J2)	
HS 275 FG	275	370 - 510	24	55	47	40	S 275 N / S 275 M
HS 355 FG	355	470 - 680	22	55	47	40	S 355 N / S 355 M
HS 420 FG	420	520 - 680	19	55	47	40	S 420 N / S 420 M
HS 460 FG	460	540 - 720	17	55	47	40	S 460 N / S 460 M

*Note : Test samples are longitudinal to rolling direction, Grain size number 6 min as per (EN ISO 643)

TECHNICAL SPECIFICATIONS

Hot Rolled Coil & Sheets for Deep Drawing Purposes

Steel Grade	Chemical Composition (% Ladle Analysis)						Mechanical Properties			Equivalent International Std
	C max	Si max	Mn max	P max	S max	Total Al min	YS (N/mm2) max	TS (N/mm2) max	% El min	
HS 10	0.10	0.03	0.40	0.04	0.03	0.02	320	420	28	EN 1011:1 DD12 DD13
HS 8	0.08	0.03	0.30	0.04	0.03		300	400	30	



TECHNICAL SPECIFICATION

Hot rolled coils & Sheets of high strength steel grades for cold forming & gas cylinders

Steel Grades	Chemical Composition (% Ladle Analysis)							Mechanical Properties				Equivalent International Std
	C max	Si max	Mn max	P max	S max	Total Al min	Others max	YS (N/mm2) min	TS (N/mm2)	% El min <3mm	% El min ≥3mm	
High Strength for Cold Forming	0.12	0.40	1.3	0.03	0.02	0.02	Nb 0.05 V 0.15 Ti 0.03	315	390-510	20	24	EN 10149-2: S315 MC S355 MC S420 MC
			1.5					355	430-550	19	23	
			1.5					420	480-620	16	19	
Gas Cylinders steel	0.16	0.20	0.3-0.8	0.025	0.015	0.02	Nb 0.05	245	360-450	26	34	EN 10120: P01,P02, P03
	0.19	0.20	0.7-1.0					310	460-550	21	28	

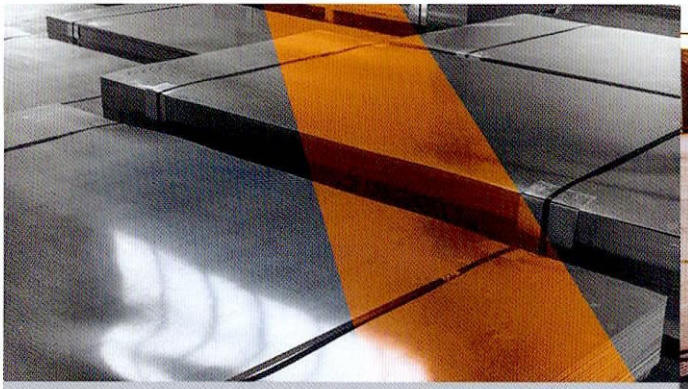
TECHNICAL SPECIFICATION

Hot Rolled Coils & Sheets for Welded Water, Oil & Gas Pipes

Product Type	Chemical Composition (Ladle Analysis %)							Mechanical Properties			Equivalent International Std
	C max	Si max	Mn max	P max	S max	Total Al min	Nb/V max	YS (N/mm2) min	TS (N/mm2) min	% El min	
Water Pipes	0.17	0.3	0.90	0.04	0.03	0.02	____	235	360	20	-EN 10224: L235 -ASTM A53: Grade A
Oil & Gas Pipes	0.15	0.4	1.30	0.04	0.03	0.02	Nb 0.05 V 0.15	245	415	22	API - 5L: X46, X42 ,GB EN 10208-2: L245 MB L290 MB
								290	415	21	
								320	435	20	
	0.12	0.4	1.50	0.04	0.03	0.02		360	460	22	API - 5L: X52, X60 EN 10208-2: L360 MB L415 MB
								415	520	20	

COLD ROLLED COILS , SHEETS & SLIT STRIPS

This cold rolled flat products are characterized by their high cold formability & low carbon contents, the cold rolled coils are heat treated (Process Annealing) to impart optimum forming properties and classified according to their chemical composition and mechanical properties



COLD ROLLED SHEETS

COLD ROLLED COILS

PRODUCTION PROCESS

The production process comprises multiple lines:

Pickling of hot rolled coils / Cold rolling in a reversing stand / Rewinding to adjust coil tension / Batch annealing in hood type gas annealing furnace with N as seal gas / Temper mill to improve surface quality of the coil / Slitting line to longitudinally cut the coil to narrower coils / Cold shearing line to cut coils to sheets, the mill has an acid regeneration plant to recycle and treat the spent pickling line acid.

MAIN CONTRACTOR

Voist Alpine of Austria

EXPANSION PROJECTS

- A new 2 stand reversing mill with an annual design capacity of 200,000 tpy.
- Upgrading existing Pickling line to an annual design capacity of 310,000 tpy.
- Upgrading annealing line.

END USES

- Outer & inner car and truck body parts.
- White goods parts.
- Steel Furniture.
- Cold formed sections.
- Tin containers.
- Storage tanks, pipes & tubes.

MAIN FEATURES

- Wide range of quality & sizes (thickness, widths & length).

- Diverse end uses.

- Good formability ,weldability.

- Suitable for metallic (Galvanizing etc) & non-metallic coatings (Painting).

TECHNICAL SPECIFICATION

Cold Rolled Products Types & Dimensions

Product Type	Thickness (mm)	Width (mm)	Length (mm)	Coil Inner Diameter (mm)	Coil Outer Diameter	Wt (t)	Technical Specification			Tolerance Specification
							AISI	EN 10130	ASTM	
Coils	0.4 / 3.2	1270/ 6000	—	610	1500	10	1006 to 1015	DC 01 DC 02 DC 03 DC 04	A 619 DQ A 620 DDQ	EN 10051 EN 10140
Sheets			1000 / 4000	—	—	2-10				
Slit Coils	0.4 / 2.5	min80	—	610	1500	—				

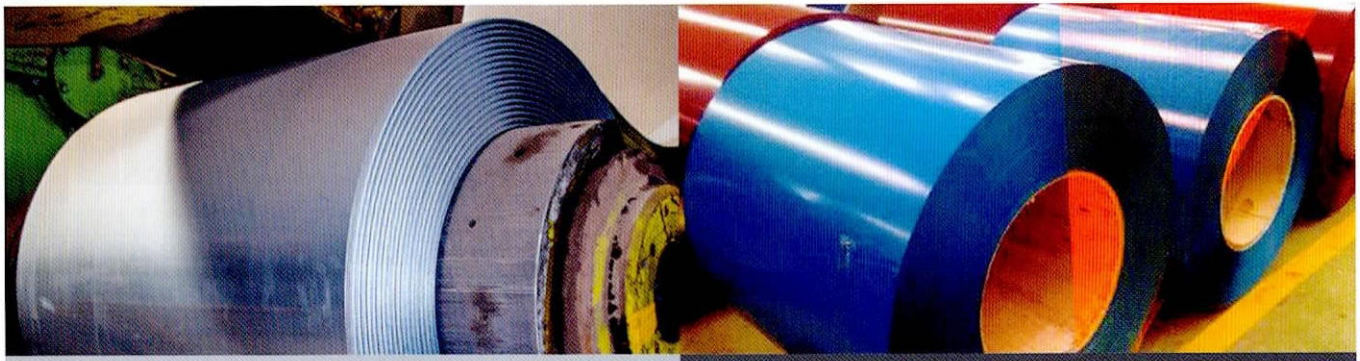
TECHNICAL SPECIFICATION

Chemical Composition & Mechanical Properties Requirements of Cold rolled Coils & Sheets

Product Type & Steel Grade	Chemical Composition (Ladle Analysis %)						Mechanical Properties									Equivalent Intern Std
							YS (N/mm2) min	TS (N/mm2)	% El min		Hardness max		Cupping Test min (for t in mm)			
	C max	Si max	Mn max	P max	S max	Total Al min			GL 80mm	GL 50mm	HRB	HRN - 30	0.5	1.0	1.5	2.0	
General Purpose CS 12	0.12	0.20	0.60	0.04	0.04	0.01	215	350 to 510	20	22	—	—	—	—	—	—	EN 10130 EN 10139 DC 01 DC 03 DC 04
Deep Drawing CS 10	0.10	0.03	0.30	0.04	0.04	0.02	280	270 to 410	28	30	65	60	8.8	9.8	10.5	11.1	
Extra Deep drawing CS 8	0.08	0.03	0.25	0.03	0.03	0.02	240	270 to 370	34	36	55	53	9.5	10.5	11	11.8	

GALVANIZED & COLOR COATED COILS & SHEETS

These coated flat products are produced by hot dip galvanizing of mainly cold rolled coils followed by color coating color coated coils can also be produced directly from cold rolled coils



GALVANIZED COILS | COLOR COATED COILS

PRODUCTION PROCESS

The cold or pickled hot coils are first annealed in a continues annealing furnace followed by hot dipping in a molten zinc bath at 460 °C, then it can be dispatched as galvanized product or color coated in the color coating line, A chromate type protective coating is used to protect galvanized coils

MAIN CONTRACTOR

Morocco Pipe Company of Morocco by license from French Company Stein Heurtey

MAIN FEATURES

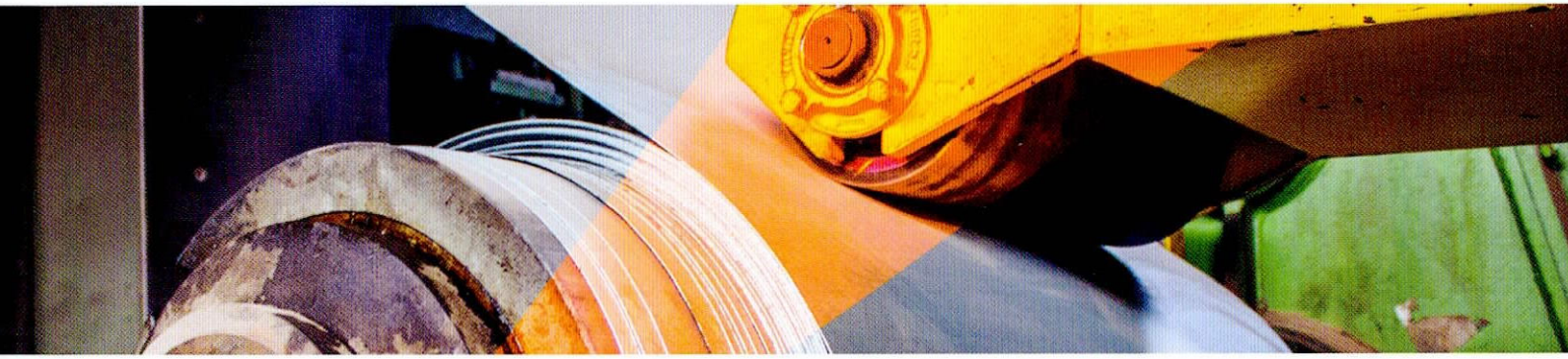
- Wide range of quality , sizes (thickness, widths & length)&coating colors.
- Diverse end uses.
- Good formability.

END USES

- Corrugated sheet.
- White goods parts.
- Steel Furniture.
- Structural Sections.

TYPES, DIMENSIONS & TECHNICAL SPECIFICATIONS

Product Type	Thickness (mm)	Width (mm)	Length (mm)	Coil Inner Diameter (mm)	Coil Outer Diameter	Wt (t)	Coating Wt(g/m^2)	Tolerance Specification
Galvanized Coils	0.40 / 2.0	600 / 1270	____	508 or 610	1500 max	12 max	80 - 450	EN 10143
Galvanized Sheets	0.40 / 2.0	570 / 1270	1000 / 4000	____	____	10/2 max		



TECHNICAL SPECIFICATION

Galvanized Coils & Sheets

Product Type	Product Grade	Mechanical Properties							Zinc Coating Weight (g/m2)	Equivalent International Std
		YS (N/mm2)	TS (N/mm2)	% El min	Bend Test	Cupping Test min (for t in mm)				
						0.5	1.0	2.0		
General Structural	SG 1	min 250	500	350	18	t1	—		80 - 450	EN 10147: S250GD+Z S280GD+Z S320GD+Z EN 10346: S250GD+Z S280GD+Z S320GD+Z S350GD+Z
Cold Forming	SG 2	max 300	420	300	26	Contact	—		80 - 350	EN 10346: DX51D+Z/ZF 2D+Z/Z
Cold Forming	SG 3	max 260	380	280	30	Contact	7.4	9.4	10.5	80 - 270

TYPES, DIMENSIONS & TECHNICAL SPECIFICATIONS

Color Coated Coil & Sheets

This Pre-painted product could have a a galvanized or cold rolled substrate, there are 3 types of coating normal , plastic & Cladding

Product Type	Thickness (mm)	Width (mm)	Length (mm)	Coil Inner Diameter (mm)	Coil Outer Diameter	Wt (t)	Tech Spec	Zinc Coating Weight (g/m2)	Color Coating Thickness (µ)			Tolerance St
									Normal	Plastic	Clad	
Color Coated Coils (Galvanized & non - galvanized)	0.4-1.50	600 - 1270	—	508 610	1500	12	EN 10169	80-450	20-30	200-300	200	EN 10143
Color Coated Sheets (Galvanized & non - galvanized)	0.4-1.50	600 - 1270	1000 - 4000	—	—	2-10						

PRODUCT TEST CERTIFICATES

Product Test Certificates are issued by LISCO Quality Control Department as per EN 10168 for Steel Products Inspection Documents & the detailed EN 10204 for types of quality test certificates

ENQUIRIES & CONTACT

LOCAL MARKETING DEPARTMENT

local_marketing@libyansteel.com

CONTACT NUMBERS

00218 51 272 47 41

00218 91 322 73 11

EXPORT SALES DEPARTMENT

fmarketing@libyansteel.com

www.libyansteel.com

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