



BUDERUS EDELSTAHL - SPECIALIZED ON YOU

PRODUCTS OIL & GAS Industry

Buderus Edelstahl GmbH
www.buderus-steel.com

Our Plant



- 1 Steel mill
- 2 Open-die forge
- 3 Hot rolling mill
- 4 Cold rolling mill
- 5 Closed-die forge
- 6 Heat treatment
- 7 Machine shop
- 8 Bar stockholding

Buderus Steel Grades for Oil & Gas Applications

AISI	ASTM	DIN / EN	C	Si	Mn	Cr	Mo	Ni	V
Low-Alloyed Steel Grades									
4130 (MOD)	ASTM A29	1.7220 34 CrMo 4	0.28	0.15	0.40	0.80	0.15	-	-
			0.33	0.35	0.60 (0.80)	1.10 (1.20)	0.25 (0.35)	-	-
4140 (MOD)	ASTM A29	1.7225 42 CrMo 4	0.38	0.15	0.75	0.80	0.15	-	-
			0.43 (0.45)	0.35	1.00 (1.10)	1.10 (1.20)	0.25 (0.35)	-	-
4145 (MOD)	ASTM A29	1.7228 50 CrMo 4	0.43 (0.42)	0.15	0.75	0.80	0.15	-	-
			0.48 (0.49)	0.35 (0.50)	1.00 (1.30)	1.10 (1.35)	0.25 (0.45)	-	-
4340	ASTM A29	1.6565 40 NiCrMo 6	0.38	0.15	0.60	0.70	0.20	1.65	-
			0.43	0.35	0.80	0.90	0.30	2.00	-
8620	ASTM A29	1.6523 20 NiCrMo 2-2	0.18	0.15	0.70	0.40	0.15	0.40	-
			0.23	0.35	0.90	0.60	0.25	0.70	-
Specialty Steel Grades									
8630 (MOD)	ASTM A29	1.6545 30 NiCrMo 2-2	0.28 (0.25)	0.15	0.70	0.40	0.15	0.40	-
			0.33	0.35 (0.45)	0.90 (1.10)	0.60 (1.50)	0.25 (0.65)	0.70 (1.00)	-
F22 (V)	ASTM A182	1.7380 10 CrMo 9-10	0.05 (0.11)	max.	0.30	2.00	0.87 (0.90)	max.	(0.25)
			0.15	0.50 (0.10)	0.60	2.50	1.13 (1.10)	0.50 (0.25)	(0.35)
4330 (MOD)	ASTM A646	1.6932 28 NiCrMoV 8-5	0.28	0.20	0.75	0.70	0.35	1.65	0.05
			0.33	0.35	1.00	0.95	0.50	2.00	0.10
4330V MOD. EFFICIENT	ASTM A723	1.6943 32 NiCrMoV 12-3	0.28	max.	0.60	0.80	0.45	1.65	0.05
			0.34	0.35	0.80	1.10	0.60	3.00	0.15
4330V MOD. PREMIUM	ASTM A723	1.6959 35 NiCrMoV 12-5	0.30	max.	0.50	1.30	0.45	3.00	0.10
			0.35	0.35	0.70	1.50	0.60	3.50	0.20
Martensitic Stainless Steel Grades									
F6NM	ASTM A182	1.4313 X3 CrNiMo 13-4	max.	max.	0.50	11.50	0.50	3.50	-
			0.05	0.60	1.00	14.00	1.00	5.50	-
410	ASTM A473	1.4006 X12 Cr 13	max.	max.	max.	11.50	-	max.	-
			0.15	1.00	1.00	13.50	-	0.75	-
420	ASTM A473	1.4021 X20 Cr 13	min.	max.	max.	12.00	-	-	-
			0.15	1.00	1.00	14.00	-	-	-

other steel grades and further modified chemistries are available on request

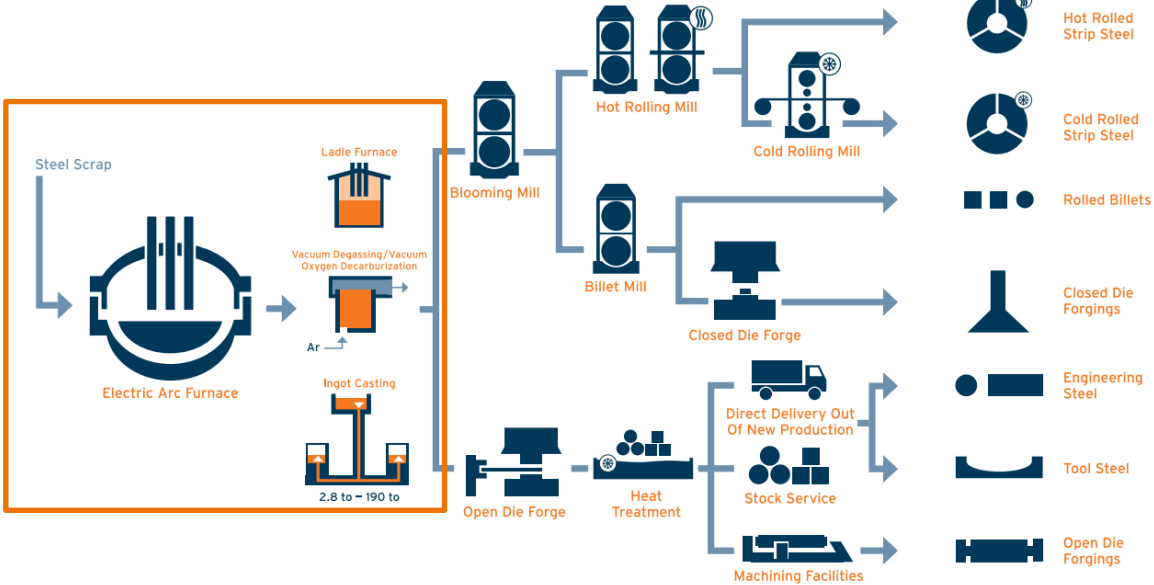
Our Production Process

OUR PRODUCTION PROCESS

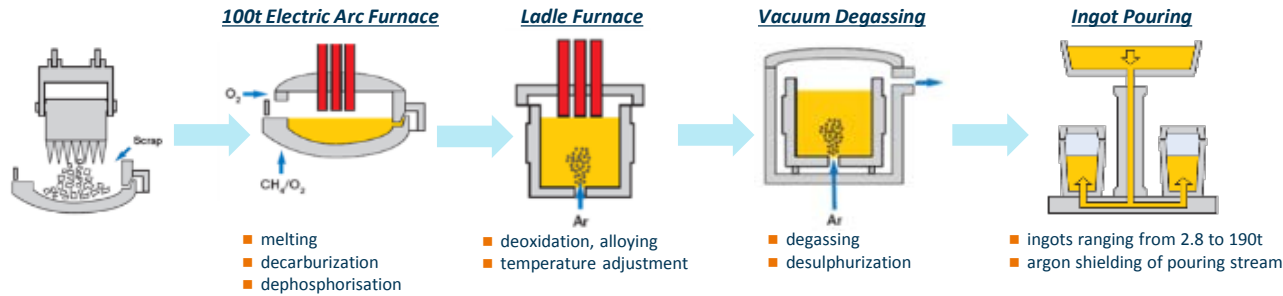
STEEL PRODUCTION

FORMING

PRODUCTS



Melting, Refining & Ingot Pouring Process



- Alloying and deoxidation in ladle furnace (fully Si/Al-killed or VCD steels)
- Homogenization of temperature and chemical composition by Argon rinsing
- Vacuum Degassing (VD) for all carbon and low-alloyed steel grades
- Vacuum Oxygen Decarburization (VOD) for low carbon stainless steel grades (Super 13%-Cr, F91, F6NM etc.)
- Inclusion modification (controlled calcium treatment) to enhance transverse ductility and toughness
- Extremely low content of non-metallic inclusions
- Sulphur contents $\leq 0.002\%$
- Pouring of double melt ingots ($\geq 140t$) from two separate ladles

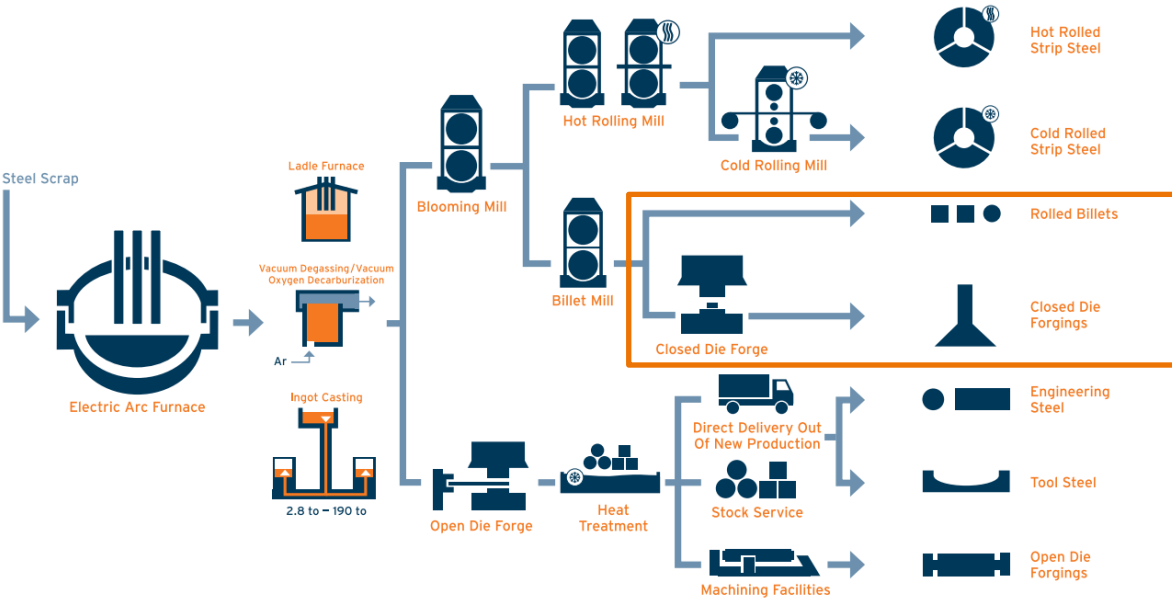
Closed Die Forgings

OUR PRODUCTION PROCESS

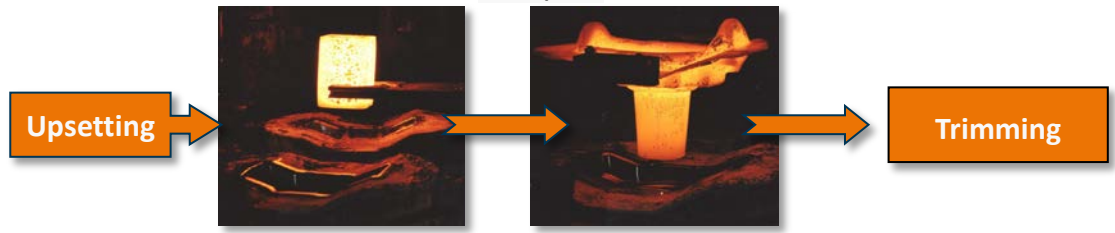
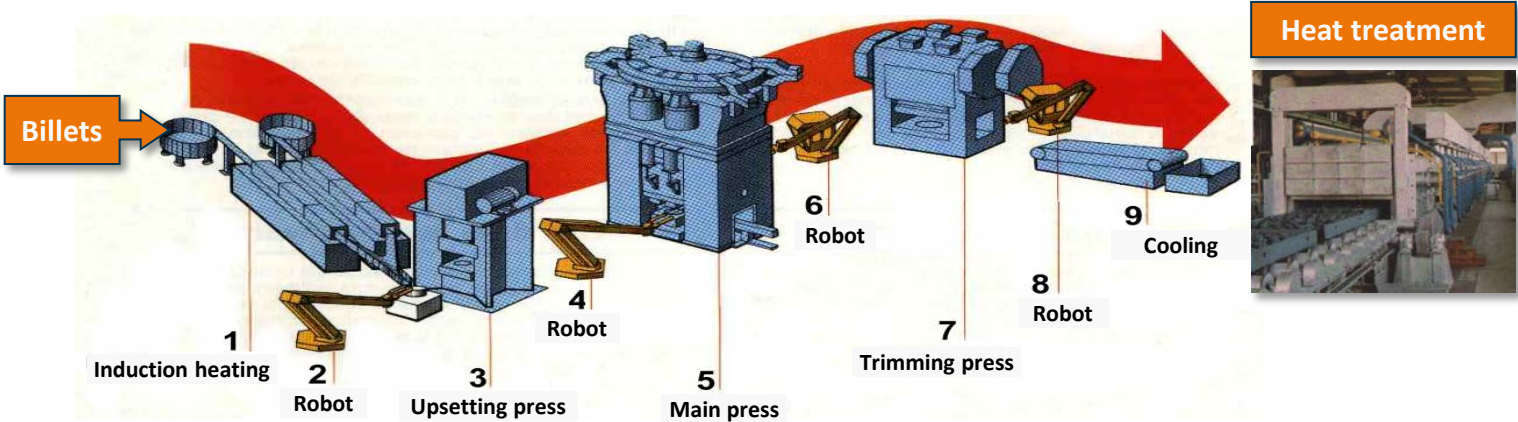
STEEL PRODUCTION

FORMING

PRODUCTS



Closed Die Forging Process



Closed Die Forging: Production



Induction heating [t/h]	Preforming press [to]	Main forging press [to]	Deburring press [to]	Robots [pcs]	Piece-weight [kg]
2	205	2,500	315	1	2 – 10
3.2	500	3,500	500	1	4 – 20
3.2	630	4,500	500	1	6 – 30
3.2	800	6,300	1,000	1	8 – 45
2 x 4.2	1,600	8,000	1,200	9	10 – 80
2 x 3.2	1,200	10,000	1,000	5	20 – 220

Heat-treatment-shop



High temperature furnace (HTF, downstairs) and low temperature furnace (LTF, upstairs), quenching bath in front

- Fully automatized heat-treatment process
- 5 high temperature furnaces
- 5 low temperature furnaces with atmosphere cooling
- 1 Polymer-quenching-bath
- Process linked with SAP

Types of heat-treatment

- normalization (+N)
- quenched and tempered process (+QT)
- Iso-thermal annealing (FP)

Products for Oil & Gas Industry

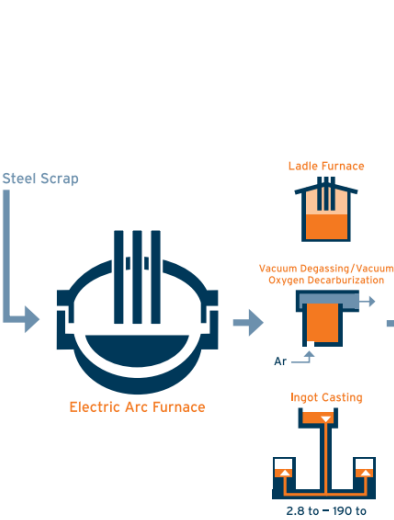
- Drill Bits (legs and cones)
- Valves
- Flanges
- Wing-nuts
- Bodies
- Plug-Valves
- Pockets for Gas lifting
- Laterals
- Clamp Connectors



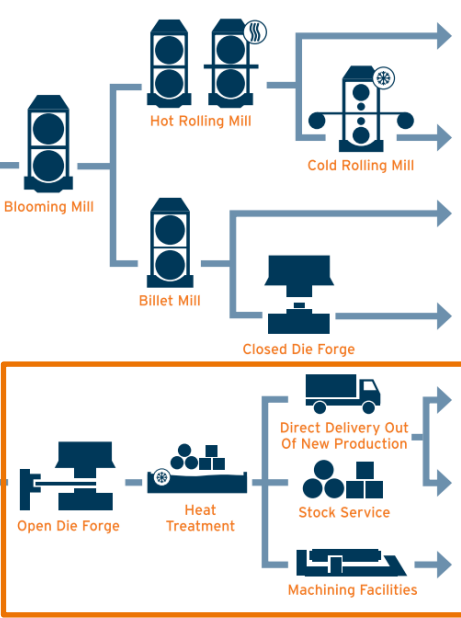
Open Die Forgings

OUR PRODUCTION PROCESS

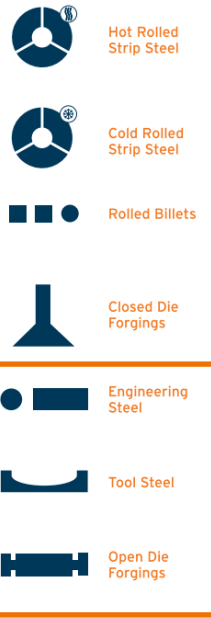
STEEL PRODUCTION



FORMING



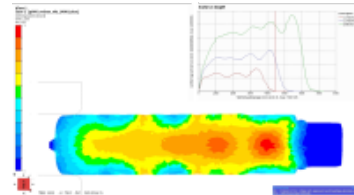
PRODUCTS



Forging & Heat Treatment

Forging

- Forging presses with 20MN, 50MN and 80/100 MN press force
- Hollow forging, stretching, upsetting, disc forgings up to a maximum diameter of approximately 4,000mm
- Flame cutting up to a diameter of 2,000mm
- 20x forging furnaces; maximum width: 4,000mm
- Finite Element Method calculation of forging processes to ensure closure of all internal voids caused by shrinkage during solidification of the ingot



Heat Treatment

- 6x vertical furnaces (max. length: 11,400mm, max . weight: 56 tons)
- 1x vertical water-/ oil quenching tank each
- 30x horizontal batch-type furnaces (max. length: 20,000mm)
- 2x horizontal water quenching tanks, 1x oil-I polymer quenching tank each (max. length: 15,000mm)
- 5 continuous furnaces with 2x water quenching tanks (optional: polymer quenching for certain Oil & Gas Applications)
- Furnace calibration and pyrometry acc. AMS 2750E I API 6A Annex M for Oil & Gas Applications

Machining & Quality Control

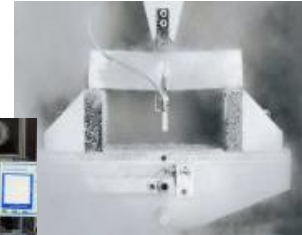


Machining

- Forging weights up to 120 tons
- Machined delivery weights up to 90 tons
- Numerically controlled horizontal lathes, max. \varnothing 2,100mm, max. length: 17,000mm
- Vertical turning lathes, max. \varnothing 3,300mm, max. height: 2,000mm
- Deep-hole drilling up to a maximum length of 13,000mm
- Horizontal bore- and cylinder honing machine
- Boring and milling operations (including extraction of core samples)
- Saw cutting up to 2,000 x 2,000mm

Quality Assurance

- Certified according to ISO 9001, ISO 14001, ISO 50001, ISO TS 16949 by LRQA
- Health and safety management system acc. OHSAS 18001
- Chemical analysis in laboratory fully certified acc. ISO / IEC 17025
- Mechanical- and metallographic laboratories fully certified acc. ISO / IEC 17025
- Level III and level II NDT-inspectors qualified acc. EN 473, ISO 971 and SNT-TC-1A
- Manual-, mechanized- and automated ultrasonic inspection
- Dye penetrant testing / magnetic particle testing
- 3.1- / 3.2-inspections / approved by: LRS, DNV, ABS, TÜV, GL, BV, etc.
- Approvals for the production of pressure equipment acc. PED 97/23/EC

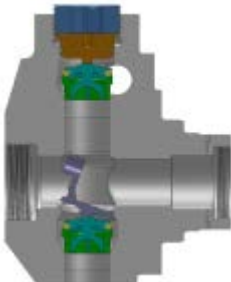


Products for Oil & Gas Applications

Barstock (round, square, rectangular) for Christmas Trees, Wellheads, Valves, Downhole Tools, etc.



Forgings for Subsea Blowout Preventer



Fluid End Forgings (Monoblock) for High-Pressure pumps

Your Contact for Buderus Edelstahl GmbH

Open Die Forging / Special Steel

Michael Hammer
Head of Sales
Buderusstrasse 25
D-35576 Wetzlar
Phone +49 (0)6441 374-2597
Fax +49 (0)6441 374-2763
Mobile +49 (0)177 8952139
michael.hammer@buderus-steel.com

Closed Die Forging

Marion Brückel-Grimm
Sales Manager Mining/Oil & Gas
Buderusstrasse 25
D-35576 Wetzlar
Phone +49 (0)6441 374-4092
Fax +49 (0)6441 374-4571
Mobile +49 (0)171 5572034
marion.brueckel-grimm@buderus-steel.com