

Since 1956 the reliable partner of Oil & Gas equipment manufacturers





Open die forgings and seamless rolled rings for Oil & Gas

FOMAS Group manufactures open die forgings and seamlessOur added value is to provide turnkey solutions, from forgingrolled rings, for the following Oil & Gas applications:and ring rolling to the finished machined part.

- Offshore
- Subsea
- Onshore

Our decades of experience in the manufacturing of industrial components have made us an essential partner to our clients: our network of 8 production sites, strategically located across the globe (from America to Asia), allows the delivery of high integrity forgings to all our customers' worldwide locations with excellent lead times.

We share know-how within the FOMAS Group, optimizing processes and materials, minimizing cost, and maximizing product quality. Starting from a thorough analysis of the customer's design, then engineering the production of contour forgings close to net shape up to the finished part.

All the required machining processes such as milling, lathemachining, drilling, sawing and others can be carried within our manufacturing units.

Open die forgings and ring rolling

PRESSURE CONTROL

- Blow Out Preventer "BOP"
- Annular BOP
- Spool body/Master Valve Block
- Spool body/Master Valve Block connectors
- Xmas tree components: casing hanger, wellhead housing



TUBULAR CONNECTION

- Riser flange joint
- Pin/box connector
- Tensioning joint ring
- Flange
- Clamp

- TURBOMACHINES
- Pump & compressor casing and cover
- Pump & compressor shaft
- Pump & compressor impeller
- Compressor wheel

VALVE

- Closure
- Ball
- Body (top entry included)
- Seal ring







STRUCTURE

- Turret swivel core (FPSO)
- Swivel inner and outer ring (FPSO)
- Top plate (FPSO)
- Turret rail (FPSO)
- Mooring system/anchoring rod



TURBINES (E.G. AERODERIVATIVE)

- Turbine casing and cover
- Turbine shaft
- Turbine wheel

PROCESS EQUIPMENT

(REACTOR, HEAT EXCHANGER)

- Cylindrical sheel
- Sheel cover
- Tube plate
- Nozzle/shell junction ring
- Transition ring• Turbine wheel











MATERIALS - Special steels, nickel and titanium alloys

ONE STOP SHOP

FOMAS Group capabilities allow to supply goods in different delivery conditions from raw/heat treated to rough machined, from pre-cladded/cladded to coated depending from the level of vertical integration required by the Customer. This business model allows to optimize the overall supply

chain, providing an exclusive point of contact and assures the shortest possible response time to market requirements.

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Austenitic
A182 304/304H
A182 F316
A182 F316 LN
A182 FXM 11-19
A182 F347
A182 F321
A182 F44
A182 F49
Super-alloys
Inconel 625
Inconel 718
Inconel 825
Incoloy 800/800H
A286
Nitronic 263
Hastelloy X
Waspalloy
Carbon and Low Alloy Steels

Carbon and Low Alloy Steels	
A105	
A350 LF2	
A350 LF3	
A350 L52	
A350 L60	
A350 L65	
A350 L70	
 A182 F11	
A182 F22	
A707 L5/3W	
AISI 4130	
AISI 4140	
AISI 8630	

Duplex & Superduplex	
A182 F51	
A182 F53	
A182 F55	
A182 F61	

Martensitic	
17-4PH	
15-5PH	
F6A	
F6NM	
F91	
F92	

Aluminium	
Series 7XXX	
Series 2XXX	
Series 5XXX	
Titanium	
Grade 2 and 5	



References

AKER SOLUTIONS

Main Components	Materials
Spool body/Master valve block	F22
Annulus wing block	8630
Outer sleeve connector	
Unlock ring connector	
Lower body connector	
Top support ring connector	

CAMERON

Main Components	Materials
Bop (single, double, triple)	F22
Bop (annular)	4130
Riser flanges	4140
Top Plate, Piston, Body,	
Upper and Lower Housing,	
Bonnet,	
Collect Segments,	
Clamp	
Diverter	
Manifold	
Valve	
Closure	LF2/A105
Ball	F60/F65
Body	F51/F55
Seal ring	In625/718

ONE SUB SEA

Main Components	Materials
Spool body/Master valve block	F22









BAKER HUGHES (VETCO GRAY)

Main Components	Materials
Bop (single, double, triple)	F22
Bop (annular)	8630
Subsea wellhead	4130
Tension ring	

FMC

Main Components	Materials
Xmas tree	F22
Spool body	8630
Caisson separator booster	

NATIONAL OILWELL VARCO

Main Components	Materials
Bop (single, double, triple)	F22
Bop (annular)	4130
Piston	
Body	
Upper and Lower Housing	
Riser flanges	
Internal/external housing	





References

DRILQUIP

Main Components	Materials
Casing hanger	8630
Wellhead housing	4130
Body hanger	4140
Looking ring	4330
Actuator sleeve	

SBM OFFSHORE

Main Components	Materials				
Rail	F51				
Turret-swivel core	4130				
FPSO	4140				
Axial Bogie	F316				
Guiding whell					
Radial Bogie					

MAN TURBO	
Main Components	Materials
Compressor body Centrifugal impeller	F51 Inconel 718
SIEMENS	
Main Components	Materials
Centrifugal impeller	17-4 PH
Bullgears	Inconel 718
Casing/housing	F6NM

SULZER PUMPS

Main Components	Materials			
Barrel pump	F53			





SOLAR	
Main Components	Materials
Stator ring	In718
Diaphragm	In600
Clamp ring	In901
Rim Seal	Incoloy 909
Nozzle support	X12Cr13
Seal Plate Ring	X22CrMoWNiV
Housing Ring	304 SS
Exhaust Flange ring	316SS



FLOW CONTROL TECHNOLOGIES						
Main Components	Materials					
Valve body	In625					
EMERSON/SEMPELL						
Main Components	Materials					
Valve body	20MNNIV5-1					
Valve cover	20MNNIV5-1					
TYCO VALVES						
Main Components	Materials					
Valve body	F22					
	F51					

WALTER TOSTO (VRV)

Main Components	Materials				
Tube plate (400mm thickness)	F22 F11 F304/F304 L				
UNDISCLOSED					
Main Components	Materials				

Heat exchanger head	F51
(+600 mm thickness)	









The Group

FOMAS Group is an established global partner for Oil & Gas applications, with **dedicated engineering and production** of open die forgings, seamless rolled rings and metal powders with the highest levels of quality and delivery service.

Our purpose is to enable sustainable energy, reliable power and limitless motion by moving the needle in mastering the science of metals with a responsible approach.

The Group's Mission is to play to win with innovation, responsiveness and a passionate commitment to long-term partnerships.

Our vision for the future is to be a multicultural, people-centric organization leading our core businesses by leveraging cutting-edge competencies in the science of metals and embracing the digital transformation.

Everything we do is underpinned by our core values of: proactivity, integrity, meritocracy, accountability, reliability, transparency & trust.

The Group has over **1,400 employees** all around the world. Working with us signifies entering a team which is focused on continuous evolution, a company that measures its success in the achievement of excellence at each and every step of function and process.

The attention dedicated by our Group to **safeguard the health and safety** of its employees and to improve the environmental performance of its activities represents a key reference in continual improvement of business reliability. We believe this essential to ensure a long term health of our business.

FOMAS Group promotes safety and environmental protection in every aspect of its production cycle. This mindset is the foundation on which the company builds the continuous improvement of environmental, safety and health conditions in its sites worldwide.

An integrated group HSE management system, is the mean through which this goal is pursued.

In a continuous effort to reduce its impacts, FOMAS Group **sustainability** process adopts also energy management best practices. An example is the adoption of certified energy management systems and best practice sharing between the sites.





ANULAR BOP Monoblock F22





FOMAS Group structure



average 200,000 tons raw material purchased per year

Boost your innovative projects with our customised metal powders

MIMETE, part of FOMAS Group, produces gas atomised metal powders in Iron, Nickel and Cobalt base alloys thanks to a tailor made VIGA plant.

Our powders are available for additive (PBF, DED, and Binder Jetting) and HIP (Hot Isostatic Pressing) applications.

PRODUCT QUALITY

• Spherical powders

• Optimal flowability

· Particle size distribution tailored according to customers' request

TECHNOLOGY

- Vacuum Inert Gas Atomiser (VIGA) ensuring the highest purity and sphericity of the powder;
- SIEVING and BLENDING machines working under inert atmosphere
- Fully equipped in-house Laboratory (ISO/IEC 17025:2017 certified)

Alloy	AI	с	Co	Cr	Cu	Fe	Mn	Мо	N	Nb	Ni	Р	s	Si	ті	w	Nb+Ta	Reference Std
MARS F51		≤0,030		21,0-23,0		bal	≤2,00	2,5-3,5	0,08-0,20		4,5-6,5	≤0,030	≤0,020	≤1,00				ASTM A182
MARS F53		≤0,030		24,0-26,0	≤0,50	bal	≤1,20	3,0-5,0	0,24-0,32		6,0-8,0	≤0,035	≤0,020	≤0,80				ASTM A182
MARS 17-4PH		≤0,07		15,00-17,50	3,00-5,00	bal	≤1,00				3,00-5,00	≤0,040	≤0,030	≤1,00			0,15-0,45	ASTM A564
VENUS 625	≤0,40	≤0,10	≤1,00	20,00-23,00		≤5,00	≤0,50	8,00-10,00		3,15-4,15	bal	≤0,015	≤0,015	≤0,50	≤0,40			ASTM F3056
NEPTUNE *06		0,90-1,40	bal	26,00-32,00		≤3,00	≤0,50	≤1,00			≤3,00	≤0,025	≤0,025	≤2,00		3,00-6,00		AMS 5788G

Other Iron base powders are available upon request (es: F55, F61..)

OIL & GAS APPLICATIONS RANGE

MARS (Iron base powders) Standard grades (available in stock): Mars F51, Mars F53, Mars 17-4 PH VENUS (Nickel base powders) Standard grades (available in stock): Venus 625 NEPTUNE (Cobalt base powders) Standard grades (available in stock): Neptune *06 Customised grades: powders designed according to customer requirements

WHY MIMETE

- Alloy design, development and production in deep partnership with customers.
- Technical support on new applications and critical topics.
- Advanced laboratory testing on powders.
- Certified ISO 9001, EN 9100, EN 9120, ISO 45001 & ISO 14001.



Forgings

Actual as forged weight and dimension limits

- max. diameter: 5,500 mm
- max. length: 18,000 mm
- max. ingot: 125 ton ESR
- (equivalent to 170 tons conventional ingot)
- max. shipped weight: 100 ton

Six state of the art automatic UT stand both \cdot n° 2 - 3,500 ton vertical and horizontal, produced on FOMAS • 2,000 ton design and qualified by the major turbine manufacturers.

Titanium and Aluminium heat treatment production line equipped with electric drop furnace.

Presses

The forgings are processed in smaller or larger presses depending on the contours and size.

- Our presses for open die forgings
- (all with integrated manipulators):
- 12,500 ton
- 6,000 ton

Horizontal spray-quench

Electro Slag Remelting

plant

- Three ESR stands
- New 125 ton ESR ingot equivalent to a conventional ingot of 170 ton.
- Pressurised ESR for top quality remelting of special steel & stainless steel under full inert gas atmosphere.



• Differential heat treatment

- Fully control on drasticity
- Cooling zone control
- Time evolution of drasticity control
- Full rotor stability due to rotation
- Very uniform properties
- Plc controlled » fully reproducible process (no variance)
- Full control on position/distance of nozzles
- Green process



Rings

- max. ring diameter: 7,000 mm
- max ring height: 1,250 mm
- max ring weight: 20 ton 1
- max ingot weight: 40 ton

Rolling Mills

19 lines (axial/radial)

State of the art in-house heat treatment plants, with an automated mobile conveyor for loading/ unloading operations.

This means quick, consistent and optimized transfer time from furnace to tank.

Our production sites across the globe roll approximately 105,000 tons of rings per year.





Profiled shapes of rolled rings

BODIES AND SEALS · CONTOUR ROLLED CLOSURES · SHAPED ROLLED BALLS



		WE	СНТ	D	ext	HEIGHT		
		kg	pounds (lb)	mm	inches	mm	inches	
	HOT ROLL	1-82	2.2-180	100-1,000	3.9-39.4	25-220	0.9-8.6	
EUROPE	LA FOULERIE	1-50	2.2-110	100-500	3.9-19.6	25-200	0.9-7.8	
	ASFO	80-15,000	176-33,000	2,500-7,000 ²	98-275	60-1,250	2.4-49	
USA	FOMAS USA	6-1,306	13-2,879	191-3,048	7.5-120	35-508	1.4-20	
CHINA	FOMAS DALIAN	2-2,500	4.4-5,511.5	160-2,700	6-106	30-750	1-29.5	
INDIA	BAY-FORGE ³	20,000	44,100	5,500	216	1,000	39	







¹ up to 5,500 diameter mm

² 2,500 max / 7,000 max depending on rolling mill

³ Only max values reported. Minimum values depending on material











ADVANTAGES:

- Less raw materials employed
- Reduced machining process
- Better fibre flow pattern for improved mechanical properties





Certifications

Most of FOMAS Group Companies are certified by DNV in accordance with:

- ISO 9001 Quality
- ISO 14001 Environment
- ISO 45001 Occupational Health and Safety
- ISO 50001 Energy

• ISO 29001 Petroleum, petrochemical and natural gas industries Moreover each company is certified by the most prestigious bodies in specific sectors.

FOMAS Group's central research and development department aims to respond to customer needs.



Our approach is to focus on safety, cost reduction, minimize end waste. Moreover we strive to sustain profitability providing the highest level of quality and safety throughout the entire manufacturing cycle and at the same time ensuring the least possible impact on the environment.

QUALIFICATIONS

Among many of our qualifications, we hold:

- Norsok M-650 Rev.4 for F51 Qualified thickness: up to 370 mm
- Norsok M-650 Rev.4 for F53 Qualified thickness: up to 270 mm
- DNVGL-RP-0034 for the most common Carbon Steel grades (e.g. A 182 F22, ASTM A694 F60, AISI 8630)



MATERIALS - Special steels, nickel and titanium alloys

Steel	Material Number	Uns-Designation	Din-identification	Alloy	Application
	~1,4302	S30400	X5CrNi18-10	F304	
	~1,4306	S30403	X2CrNi19-11	F304 L	
<u>v</u>		S30454	X5CrNi18-10	F304 LN	
ee	~1.4841	\$31000	X15CrNi25-21	E310	
N N	~14401	531600	X5CrNiMo17-12-2	F316	
Ē	~1.4404	571607	V2CrNiMo17 12 2	E316 J	Nuclear, Oil&Gas
ster	1,4404	531005		F7ICLN	
Aus	~1,4406	531053	AZCINIMON17-II-Z	F316 LIN	
	~1,4541	\$32100	X6CrNi1i18-10	F-321	
	~1,4550	S34700	X6CrNiNb18-10	F347	
	~1,4961	S34709	X8CrNiNb18-10	F347 H	
<u>.</u>	~1,4454	S21904	X2CrMnNiN20-9-7	F XM-11 / Nitronic 40	Aprospace Nuclear Oil® Cas
enit	no	S20910	X3CrMnNiN22-5-12	F XM-19 / Nitronic 50	Aerospace, Nuclear, Oliadas
Ste Sul	~1,4547	S31254	X1CrNiMoCuN20-18-7	F44	
ъ	~1,4565	S34565	X2CrNiMnMoNbN25-18-5-4	F49	Oil&Gas
	~1 4413	\$41500	X3CrNil3-4	EGNM	
ti.	~14006	S41000	X12Cr13	F6 a	Oil&Gas,Process Equipment
sels	.1 (027	5 11000	V22CrMaV/221	100	Oil® Cas Dragges Equipment Dower Constation
Ste	~1,4925			-	olladas, process equipment, power deneration
ž	-	-	X4CrNII6-4	Virgo 38	Oll&Gas,Process Equipment
	1,4939	-	XI2CrNiMol2	Jethete M 152	Oil&Gas,Process Equipment,Power Generation
U O	-	-	X14CrMoVNbN	Cost F	Dower Constation Cas Steam Turking compo
Ste Biti			X12CrMoWVNbN	Cost E	nents
ree	-	-	X13CrMoCoVNbNB	FB2	
Aar ist	X10CrMoVNb9-1	K90901	X10CrMoVNb9-1	F91	
res		K92460		F92	Power Generation, Steam Valves, Pressure Vess
t. Jg	24545			10.001	
senir enir els	~1,4545			15-5 PH	Aerospace, high-strength corrosion
ored Prec	~14542	\$17400	X5CrNiCuNb16-4-4	17-4 DH	resistant components
о щ щ	1,7572	517400	ASCINICUIUSIO-+-+	17- 	
s les	~1,4462	S31803	X2CrNiMoN22-5-3	F51	Oil&Gas,FSPO platforms
dup sels	~1,4410	S32750	X2CrNiMoN25-7-4	F53	
Ster	~1,4501	S32760	X2CrNiMoCuWN25-7-4	F55	Oil&Gas, Pumps, Valves
o fi s	~1,4507	S32550	X2CrNiMo25-7-4	F61	
		N08120	NiFeCr	HR120	
	2 4683	R30188	CoCr22NiW	Havnes 188 / Udimet 188	Power Generation, shrouds, diaphrams,
1.00	2,1000	N06230	NiCr22W/16Mo		heat shields, turbine stage
	2,4/33	NOCCOF		In a second COS	
ςs	2,4831/2,4856	NU6625	NICr22M09ND	Inconel 625	Pressure Containers, Oil&Gas
e -	2,4642	N06690	NICr29Fe	Inconel 690	
Dera	2,4668	N06718	NiCr19Fe19Nb5Mo3	Inconel 718	Power Generation, Turbine components, Avia-
Sup	2,4665		NiCr22Fe18Mo	Hastelloy X / Inconel HX	tion, Oil&Gas, Nuclear
	2,465	N07236	NiCo20Cr20MoTi	Nimonic 263	Power Generation, shrouds, diaphrams, heat
				GTD333	shields, turbine stage
	1,4876	N08810	X10NiCrAlTi32-21	Incoloy 800H	Nuclear, Oil&Gas
	1,4944	no	no	A-286	Power Generation, Oil&Gas
				SA 105	
				SA 266	
				A 266 CL 2	
				SA 350 LE2	
-				SA 508 Grado 3 CI1/CI2	
				20 Mar F	
				20 Min 5	
				16 MnD 5	
				18 MnD 5	
				20 MnMoNi 55	
				A 694 F52	
<u>v</u>				A 694 F60	
tee				A 694 F65	
ŝ				A 694 F70	
loy				A 707 Grade 3W	
E A				15NiCuMoNb5	
Ň				SA 350 LF3	Oll&Gas, General Industry
s L				A 350 LF6	
E C	1,5421	K12822	20MnMo3-5	SA 336 F1	
arp	~1.7362	K41545	X11CrMo5	SA 336 F5	
Ũ	1,7002	K11572	no	SA 336 F11	
	~17777	K1156/	16CrMo4.4	SA 336 E12	
	-1,7557	1/215/5	10CTM04-4	SA 330 P12	
	10	K31545	10	5A 330 FZI	
	1,738	K21590		A 182 F22	
	no	K31835	I2CrMoV9-10	A 182 F22V	
	~1,7214	no	30CrMo4	AISI 4130	
	1,7225	no	42CrMo4	AISI 4140	
				39NiCrMo3	
				A 470 CL8	
				A 522 Type1	
				20 NCD 12	
				15 Mo 3	



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