

Get yourself connected

Cost control by:

Standardising, replicating wherever possible and following a manufacturing-style value-engineering approach.

One oilfield services executive noted:

“The main cost drivers are specifications. We are designing Rolls-Royces instead of Minis. There is so much gold-plating on everything we are doing now”.

*Deloitte -
Standardisation*



BUMAX[®]

THE WORLDS STRONGEST
STAINLESS STEEL BOLT

Bufab Group



Established
in 1977



2.700 mSEK
(300 mEUR) in annual
turnover



Listed on the
stock exchange



Headquarters in
Värnamo, Sweden



30 wholly owned
subsidiaries in
23 countries



940
employees



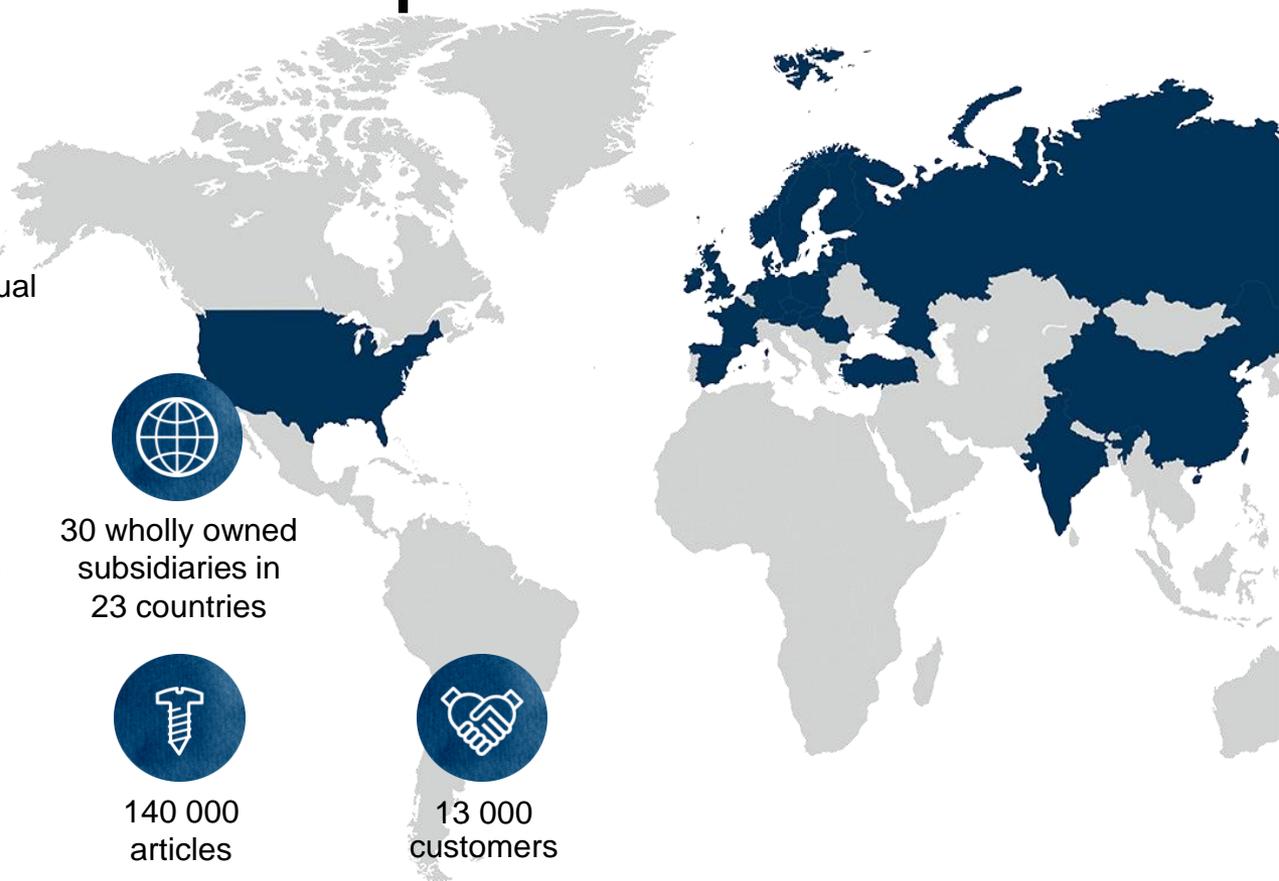
In-house
production



140 000
articles



13 000
customers



OUR CUSTOMERS

SECTOR	REFERENCES
Engineering	   
Automotive	   
Oil & Gas	    
Offshore/ Marine	    
Process	     
Industrial Construction	 
Energy	   
Science	 



2015 New name: BUMAX AB

2015 Bumax NORSOK

2013 Bumax Super Duplex

2013 Bumax New Generation

Bumax PED approved

2002

2000 Bulten stainless incorporated into the Bufab group

The Bumax brand registered 1997

1982 Hasselfors Stainless merged with Bulten Stainless, Åshammar

Åshammar Bolt factory incorporated into the Bulten group

1947

1926 Production of Stainless steel fasteners begins

The first cold forming machine installed 1916

1899 Name changed to Åshammar Bolt Factory

Åshammar Forging & Nail founded 1660

BUMAX AB Production sites

- ◆ Sales and Customer service, Örebro Sweden
- ◆ Central warehouse, Värnamo Sweden
- ◆ Cold heading and hot forging, Åshammar Sweden
 - ◆ Manufacturing of fasteners since 1899
 - ◆ Stainless fastener production since 1926 (one of the first in the world)
 - ◆ M3 to M36
- ◆ Turning, Värnamo Sweden
 - ◆ Ø 6 to 65 mm, CNC lathes, small volume
 - ◆ Ø 8 to 35 mm, CNC multi-spindle, volumes over 10 000 items
 - ◆ Ø 5 to 45 mm, Hydromat, volumes over 25 000 items



Quality

- ISO 9001
- ISO 14001, environmental management
- The Pressure Equipment Directive PED No 97/23/EC (BUMAX 88)
- ISO/TS 16949, management system for Automotive Industry
- CE marking for non-preloaded applications according to EN 15048
- Norsok M-650 D60

CERTIFICATE



Management system as per
SS EN ISO 9001 : 2000

In accordance with TÜV CERT's procedures, it is hereby certified that

BUFAB Stainless AB
SE-493 03 Svärta

applies a management system in line with the above standard for the following scope

Marketing, sales, purchase, stockholding and distribution of fasteners and components in stainless steel

Certificate Registration No.: 44 152 073268
Audit Report No.: 300768

Issue date: 2013-08-04
Initial certification: 2004-11-02

Validity until: 2015-08-04
Total certification: 2009-07-04

Göteborg, 2013-08-07

TÜV CERT Certification Body at AF TÜV Nord AB
AF TÜV Nord AB Box 1551, SE-401 51 Göteborg www.afnord.com




CERTIFICATE



Management system as per
SS EN ISO 14001 : 2004

In accordance with TÜV CERT's procedures, it is hereby certified that

BUFAB Stainless AB
SE-493 03 Svärta

applies a management system in line with the above standard for the following scope

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TÜV CERT Certification Body at AF TÜV Nord AB
AF TÜV Nord AB Box 1551, SE-401 51 Göteborg www.afnord.com




CERTIFICATE



The TÜV CERT Certification Body of TÜV NORD CERT GmbH & Co. KG certifies in accordance with TÜV CERT procedures that

BULTEN STAINLESS
Bulten Stainless AB
Bultägen 30
812 94 Ashammar, Sweden

has established and applies a quality management system for the

Manufacturing, sales and distribution of fasteners
no design responsibility according to section 7.3.

In an audit, Report No: **8090 324 135**, evidence was given that the requirements of the

ISO / TS 16949 : 2002
2nd edition from 2002-09-01

with its addenda and it exceeds new limits.

This Certificate is valid from: **2005-05-26** to: **2008-05-30**
Certificate Registration No: **07 115 0014**
VCI Certificate No.: 000769

Issue date: 2005-05-26
Page 1 of 2




EVSI

Certificate of Approval

Awarded to
Bulten Stainless Industry AB, Svärta
Bulten Stainless Components AB, Svärta
Member of **Hexxiden Group, Sweden**

Bumax Veritas Quality International certifies that the Management System of the above operator has been assessed and found to be in accordance with the requirements of the environmental standards and operational scope detailed below

ENVIRONMENTAL MANAGEMENT SYSTEM
ISO EN ISO 14001:1996

OPERATIONAL SCOPE
Packaging, stockholding and sales of stainless steel fasteners plus
Design, manufacturing and sales of machined high strength steel components and fasteners.

Original approval date: **20 October 1999**

Subject to the normal validity and implementation of the operator's Management System, this Certificate will remain valid until:

31 October 2004

Checked by: 12 November 2003

Certificate No: 11733




Rev. No.: 1

BUMAX®		Qualification Test Record (QTR) NORSOK M-650		QTR No.: SDE-11232750A Rev. No.: 1	
Manufacturer name/address: Web page:	Bumax AB Bultägen 30 S-812 49 Ashammar Sweden TUV (www.bumax.com)				
Reference standard:	NORSOK M-650, Edition 4				
Material designation and MDS No.:	ASTM A193 Gr. 2L S32750 MDS D60 rev 2	Manufacturing Summary doc. No.:	Rev. No.: 1		
Products and manufacturing process(es):	Stubbolts, Norsok M-650 MDS D60 rev 2				
Mandatory conditions and sub-conditions:	Mechining at Bufab Linn AB Threading at Bumax AB Quality control Bumax AB Inspect, Corrosion and Micrographic inspection made by Sarvik P&D				
Other information:	Bufab Bulten Stainless AB has changed the company name to Bumax AB, effective since 16.09.2015.				
Qualification expires:	01.09.2020				
Tested and qualified thickness and weight					
Products and manufacturing process(es):	Test record No.	Tested thickness	Qualified thickness	Test piece weight kg	Qualified weight kg
Stubbolts	D60-1	1%	±1%		
Qualification/acceptance signatures					
Manufacturer: Bumax AB	Test record No. D60-1	Prepared by/Date: Boris Svan 28.09.2015	Checked by/Date: Carin Tronellius 28.09.2015		
The manufacturer and this QTR are evaluated and found to be in compliance with the requirements of NORSOK M-650 for supply of the above listed products and materials. This acceptance does not exempt any purchaser from his responsibility to ensure that this qualification is valid for his products within the essential variables of NORSOK M-650.					
Qualified/Accepted by (company name/address):				Signature/Date:	
APPROVED 				 28.09.2015	

BUMAX®



- Solution provider regarding materials with in house material expertise
- Made in Sweden and only European material according to our own specification
- Cold headed fasteners with unique mechanical properties.
- Norsok approved for turned Super Duplex fasteners
- Expertise in cold heading of difficult stainless material

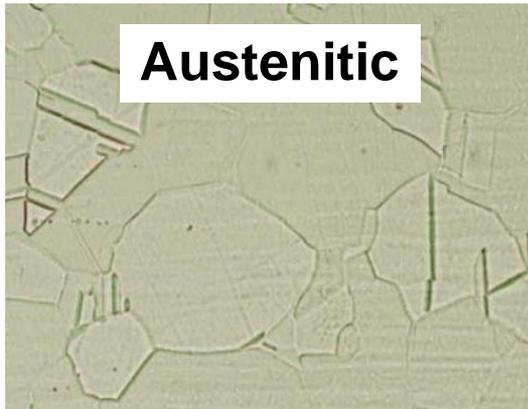


Families of Stainless Steel?

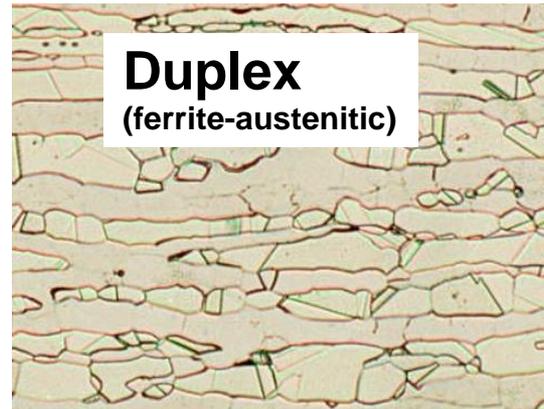
EN 10022: Corrosion resistant steels

Stainless steels are alloyed steels with a carbon content of max 1.2% and min **10.5% Chromium**, with or without other alloying elements

Cr 18%
Ni 8%
Fe bal

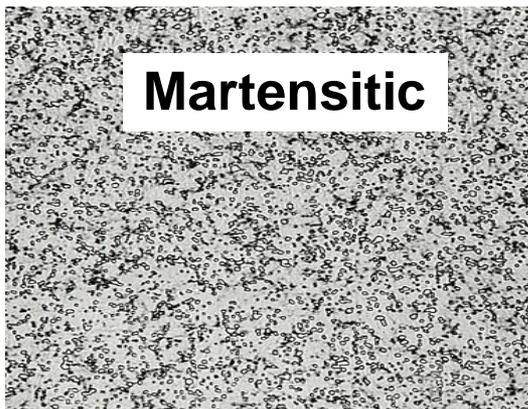


Duplex
(ferrite-austenitic)

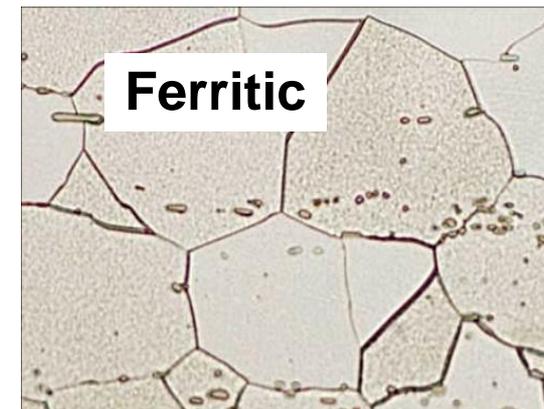


Cr 25%
Ni 7%
Mo 4%
Fe bal

C 0.2%
Cr 13%
Fe bal



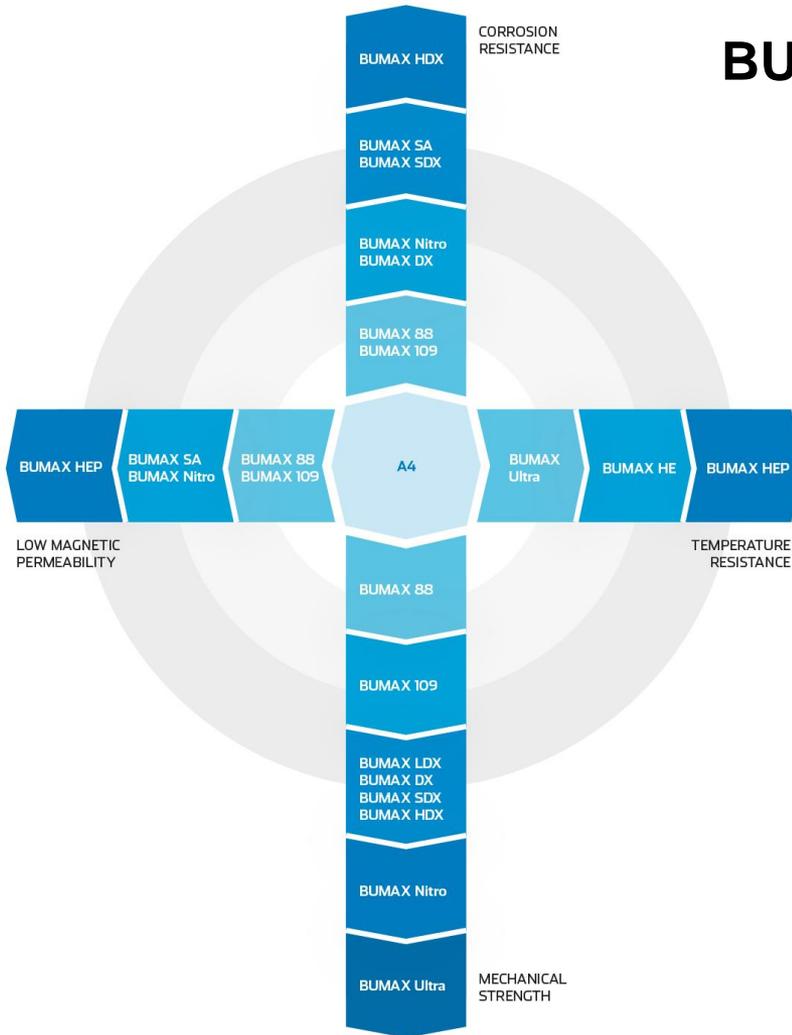
Ferritic



Cr 17%
Fe bal

BUMAX[®] begins where standard ends

BUMAX[®] grade selection cross



BUMAX[®] portfolio

Nominal wt%

GRADE	EN	UNS	Microstructure	C max	Cr	Ni	Mo	Other	PRE ¹⁾
BUMAX 88	1.4432, 1.4436, 1.4435	S31603	Austenitic	0.03	17	11.5	2.7		27
BUMAX 109	1.4432, 1.4436, 1.4435	S31603	Austenitic	0.03	17	11.5	2.7		27
BUMAX Nitro		S31675	Austenitic	0.035	20.5	10	2.4	N 0.4	35
BUMAX SA	1.4547	S31254	Austenitic	0.01	20	18	6.2	N, Cu	43
BUMAX LDX ²⁾	1.4162	S32101	Ferrite-Austenitic		21.5	1.5	0.3	N 0.22, Mn 5	26
BUMAX DX	1.4462	S31803, S32205	Ferrite-Austenitic	0.03	22	5.2	3.2	N 0.18	36
BUMAX SDX	1.4410	S32750	Ferrite-Austenitic	0.03	25	7	4	N 0.3	42
BUMAX HDX	1.4658	S32707	Ferrite-Austenitic	0.03	27	6.5	4.8	N 0.4, Co	49
BUMAX Ultra		S46910	Martensitic	0.02	12	9	4	Al, Ti, Cu	25
BUMAX HE	1.4980	S66286	Austenitic	0.08	15	26	1.5	Ti, V	
BUMAX HEP	2.4952	N07080	Austenitic	0.10	19	>65	-	Al, Ti, Co	

Pitting Resistance Equivalent, PRE value, a common and good way of ranking stainless steels

$$\text{PRE} = \%Cr + 3.3 \times \%Mo + 16 \times \%N$$

Corrosion resistance



5 year exposure at coastal roads

Results from exposure of stainless steel specimens in heavily trafficated coastal roads at different locations in Sweden.

Maximum attack depth in μm .

Grade	Standard	PRE	Borås	Gothenburg	Öresund	Öland	Höga kusten	Svartnora
A2 (304)	1.4310	20	65	50	64	100	80	29
A4 (316)	1.4404	25	35	52	30	45	27	-
A4 (316L high Mo)	1.4436	27	-	-	-	-	-	-
Lean Duplex	1.4162	26	-	-	26	62	-	-
Duplex	1.4462	36	-	-	-	-	-	-
Super Duplex	1.4410	42	-	-	-	-	-	-
254SMO	1.4547	43	-	-	-	-	-	-

Outokumpu Corrosion Data

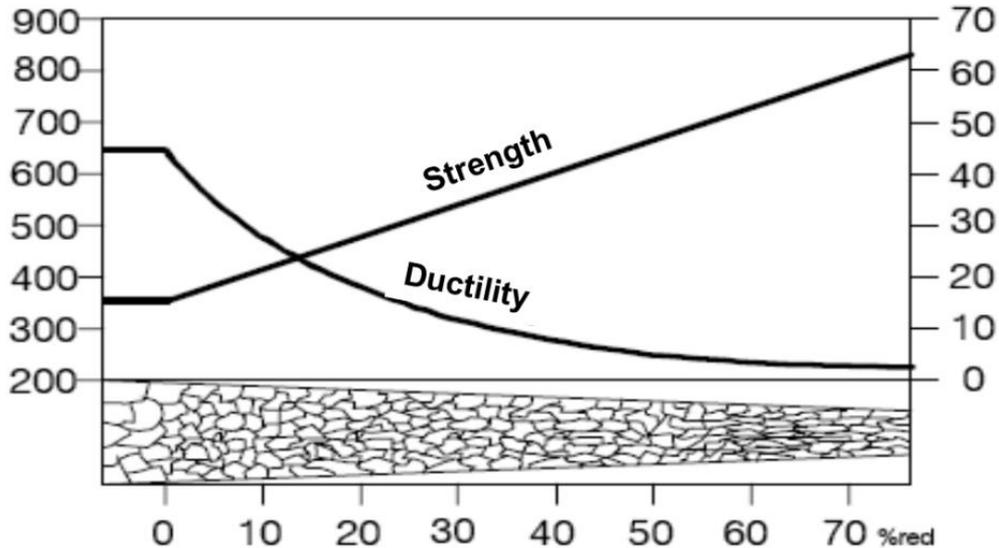
Mechanical properties

Grade	Strength Class	Yield Strength (MPa), min	Tensile strength (MPa), min
Strength class designation according ISO 3506 (stainless steel fasteners)			
A4-70	70	450	700
A4-80	80	600	800
Strength class designation according ISO 898 (carbon steel fasteners)			
8.8 Carbon steel	8.8	640	800
10.9 Carbon steel	10.9	900	1000
12.9 Carbon steel	12.9	1080	1200
Bumax 88	8.8	640	800
Bumax 109	10.9	900	1000
Bumax SDX	12.9	1080	1200
Bumax Ultra	15.9	1350	1500

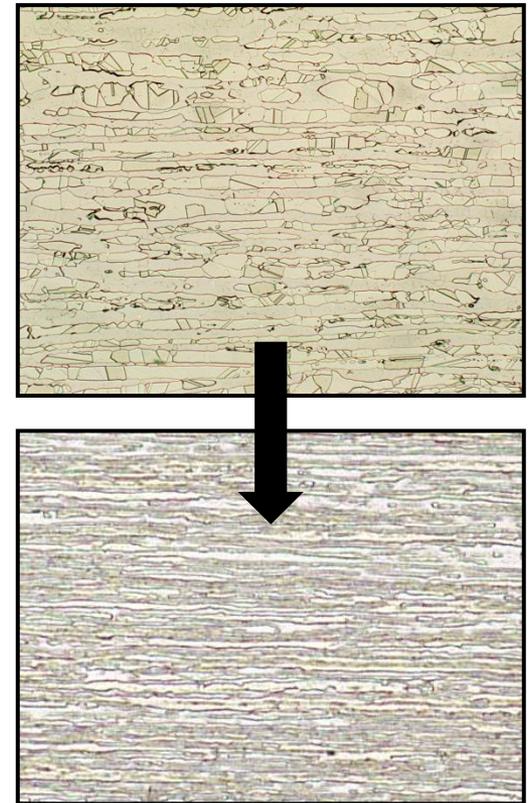
- Standard A2 or A4 stainless steel has lower strength than Carbon steel
- Bumax offers same or higher strength than Carbon Steel

Strain hardening

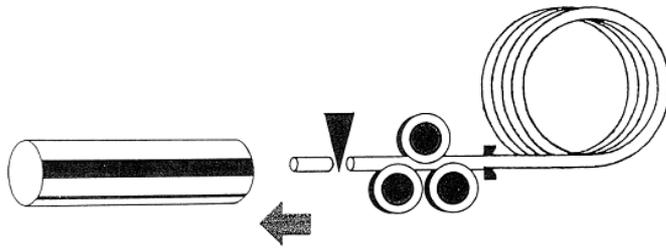
Cold forming such as drawing and cold heading stretches the grains \Rightarrow Higher strength



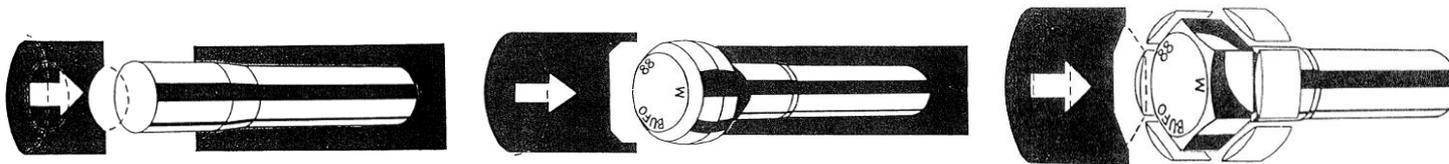
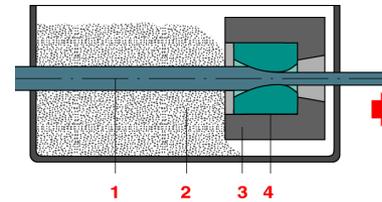
Duplex microstructure before and after strain hardening



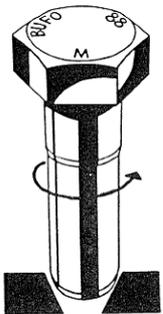
Bumax production



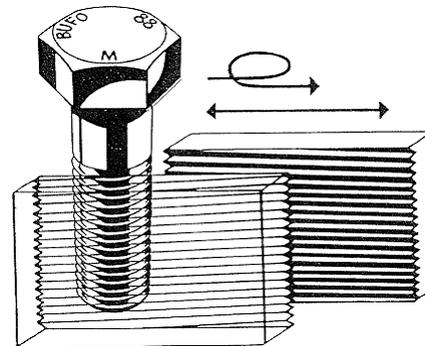
The wire is straightened, drawn and cut into length



Cold heading in several steps.



Chamfering of the screw tip



Threading by rolling

Bumax production



DEVELOPED TO WITHSTAND THE GREATEST FORCES

BUMAX[®]

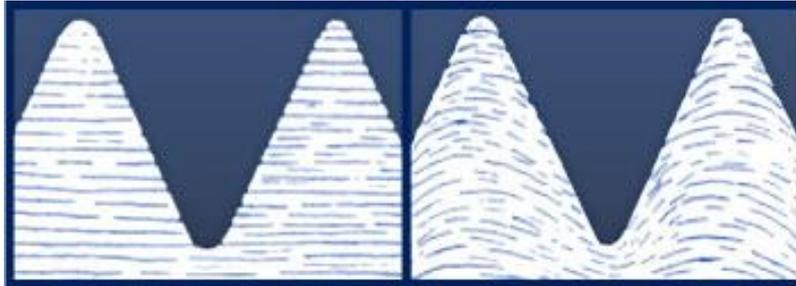
Rolled vs Cut threads

Rolled threads offers several advantages

- Work hardening occurs during rolling \Rightarrow higher strength and hardness
- Compressive stresses increases Fatigue resistance
- Higher thread hardness reduces the risk of galling

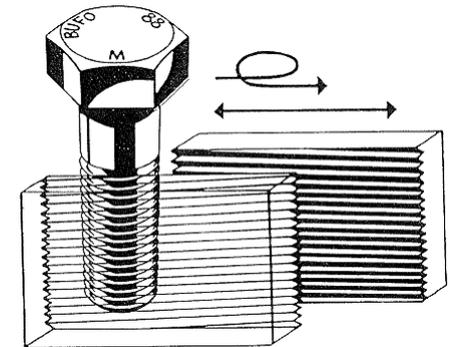
Machining disrupt grain flow and create planes of weakness

Work hardening causes the material to plastically flow



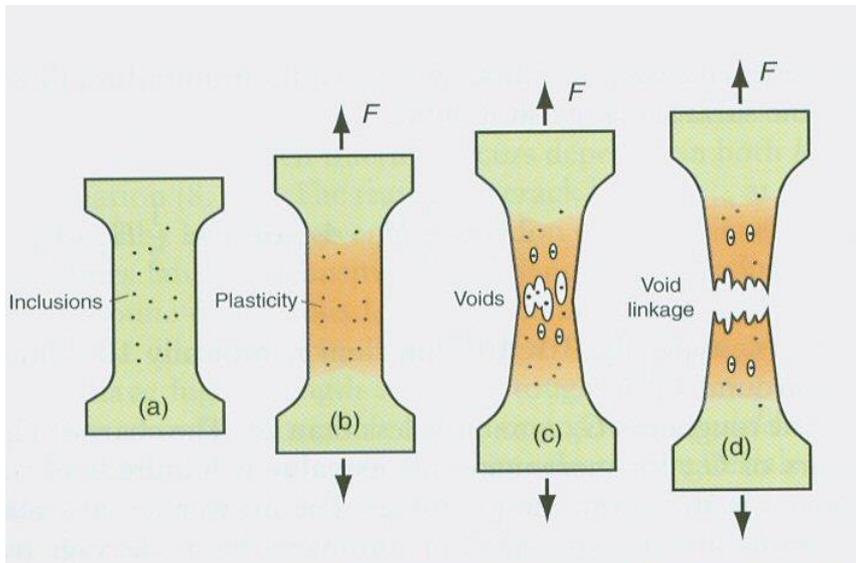
Cut Thread

Rolled Thread

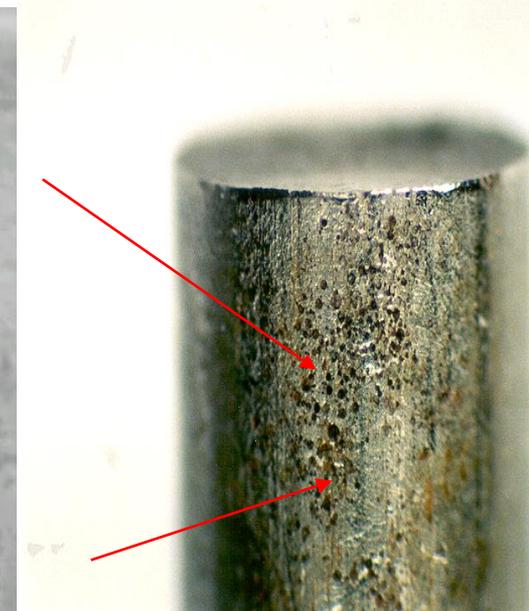
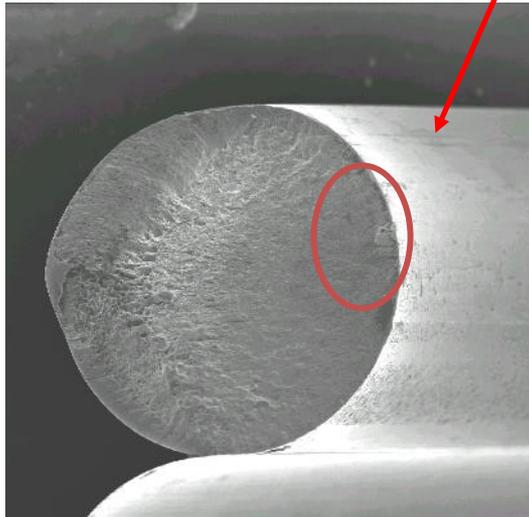
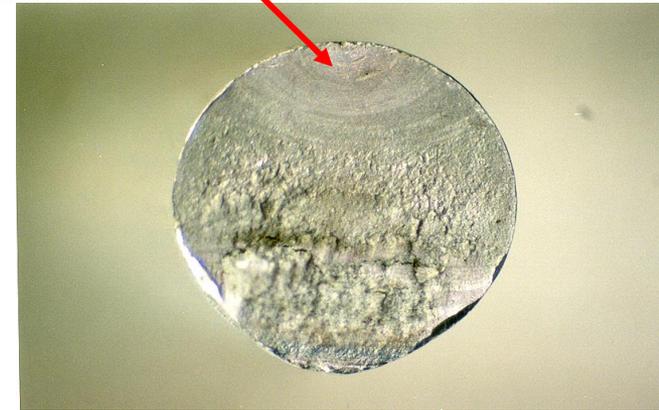
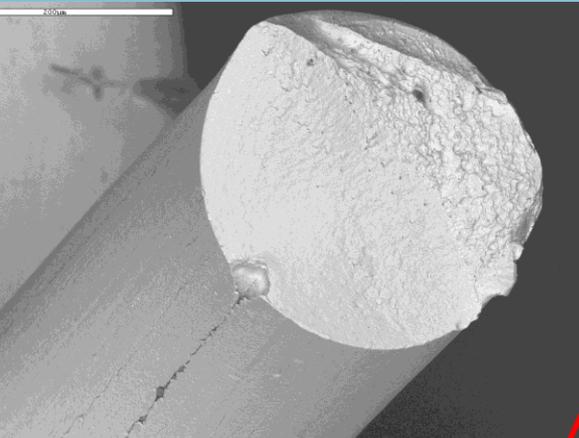


Fatigue

- ◆ Fatigue occurs when a material is subjected to repeated loading and unloading (cyclic loading)
- ◆ Repeated stress may be much less than the yield strength
- ◆ Microscopic crack form at stress concentrations such as
 - ◆ Surface defects
 - ◆ Inclusions
 - ◆ Slags



Fatigue fracture



Fatigue resistance of BUMAX Duplex

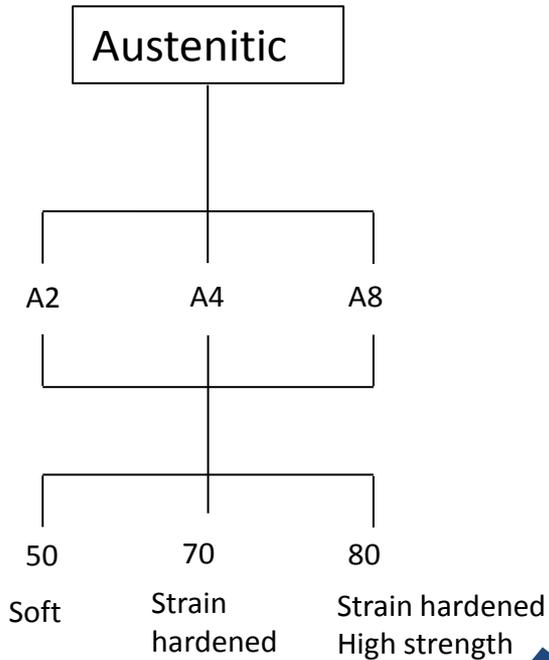
M6x50 ISO 4017

Tested at Sandvik R&D

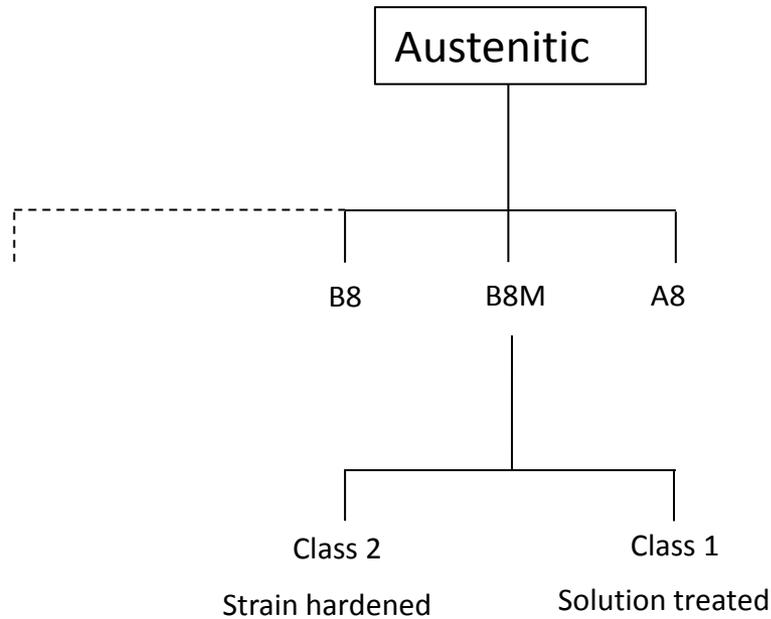
Stress, MPa Typical preload	BUMAX Duplex cycles before fracture TS 1130 MPa YS 978 MPa A 4.4 mm	BUMAX 88 cycles before fracture TS 1090 MPa YS 928MPa A 3.5 mm	A4-80 cycles before fracture TS 960 MPa YS 815 Mpa A 4.6 mm
400±50	10 million	10 million	10 million
400±50	10 million	10 million	1.4 million
400±55	10 million	10 million	0.4 million
400±55	10 million	10 million	0.4 million
400±60	10 million	4.2 million	0.5 million
400±60	10 million	5.6 million	0.3 million
400±70	10 million	1.9 million	-
400±70	10 million	1.8 million	-
400±80	10 million	0.7 million	-
400±80	10 million	0.4 million	-
400±85	10 million	-	-
400±85	2.6 million	-	-
400±90	5.1 million	-	-
400±90	0.6 million	-	-
400±95	0.4 million	-	-
400±95	0.3 million	-	-

ISO and ASTM

ISO 3506



ASTM A193



Type	Dimension	Min TS	Min YS	Min elong.
70	All	700 MPa	450 MPa	0.4 x d mm
80	All	800 MPa	600 MPa	0.3 x d mm
Class 2	≤ 3/4"	758 MPa	655 MPa	15%
	>3/4" – 1"	689 MPa	552 MPa	20%
	>1" – 1.1/4"	655 MPa	448 MPa	25%
	>1.1/4" – 1.1/2"	621 MPa	345 MPa	30%

Bumax, higher standard within standards

Fastener standard

A4	C 0.08	Cr 16-18.5	Ni 10-15	Mo 2-3
B8M	C 0.08	Cr 16-18.5	Ni 10-15	Mo 2-3

Steel standard

(Just a few examples many more exists)

316	C 0.08	Cr 16-18	Ni 10-14	Mo 2-3
316L	C 0.03	Cr 16-18	Ni 10-14	Mo 2-3
UNS S31603	C 0.03	Cr 16-18	Ni 10-14	Mo 2-3
UNS S31651	C 0.08	Cr 16-18	Ni 10-14	Mo 2-3
EN 1.4401	C 0.07	Cr 16.5-18.5	Ni 10-13	Mo 2-2.5
EN 1.4404	C 0.03	Cr 16.5-18.5	Ni 10-13	Mo 2-2.5
EN 1.4432	C 0.03	Cr 16.5-18.5	Ni 10.5-13	Mo 2.5-3
EN 1.4435	C 0.03	Cr 17-19	Ni 12.5-15	Mo 2.5-3
EN 1.4436	C 0.05	Cr 17-19	Ni 12.5-15	Mo 2.5-3
SS 2343	C 0.03	Cr 17-19	Ni 12.5-15	Mo 2.5-3
SS 2347	C 0.07	Cr 16.5-18.5	Ni 10-13	Mo 2-2.5

Brand name

Bumax 88

Bumax 109

Tighter spec
than any
standard. Exact
chemical
composition is
confidential

BUMAX[®] 88/109

Bumax 88 and Bumax 109 are premium A4 fastener offered in two strength classes

Bumax 88/109 offer many advantages compared to a typical A4 fasteners

- ◆ Higher strength
- ◆ Better corrosion resistance
- ◆ Higher fatigue resistance
- ◆ Always thread rolled and coated with our tailor made assembly wax to prevent galling
- ◆ Full traceability with 3.1 certificate
- ◆ Stock product

Water Jet

Grade:

BUMAX 88

Customer:

Rolls Royce

Country:

**Sweden,
Finland,
Norway, USA**

Rolls Royce water jets are used on navy ships as well as civil high speed boats.

BUMAX 88 fulfills the demands of:

- Corrosion resistance in seawater
- High fatigue resistance
- Consistent, reliable, high quality material



Control Valves for X-mas tree



Grade:
BUMAX 88

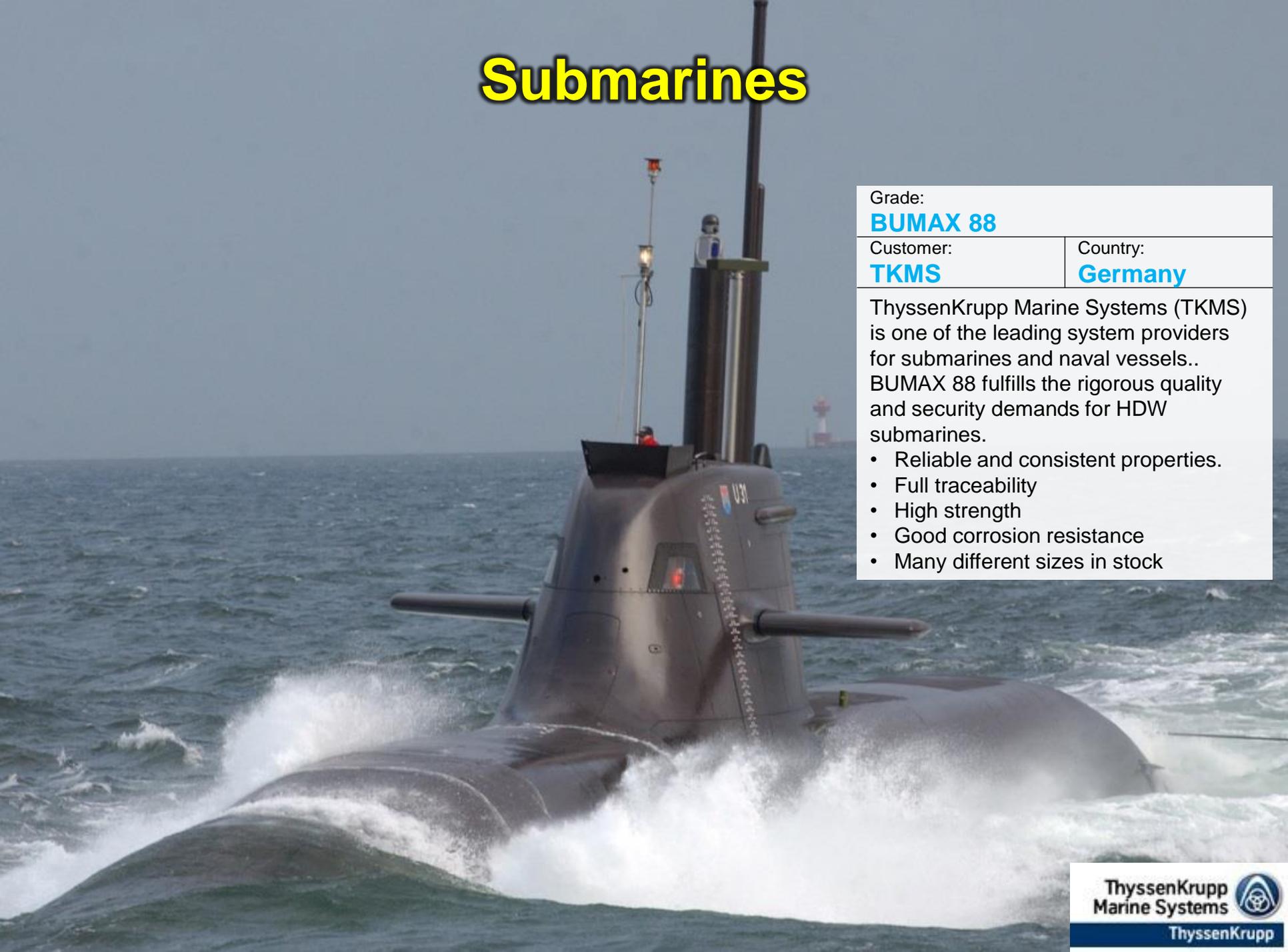
Customer:
**Oceaneering
Rotator**

Country:
Norway

Hydraulic Directional Control Valves (HCVs) are used to control various critical functions of a subsea X-mas Tree (XMT) and other well access tooling.

OCEANEERING®

Submarines



Grade:

BUMAX 88

Customer:

TKMS

Country:

Germany

ThyssenKrupp Marine Systems (TKMS) is one of the leading system providers for submarines and naval vessels.. BUMAX 88 fulfills the rigorous quality and security demands for HDW submarines.

- Reliable and consistent properties.
- Full traceability
- High strength
- Good corrosion resistance
- Many different sizes in stock

Cargo pump system

Grade:

BUMAX 88, BUMAX 109, BUMAX Super Austenite

Customer:

Frank Mohn

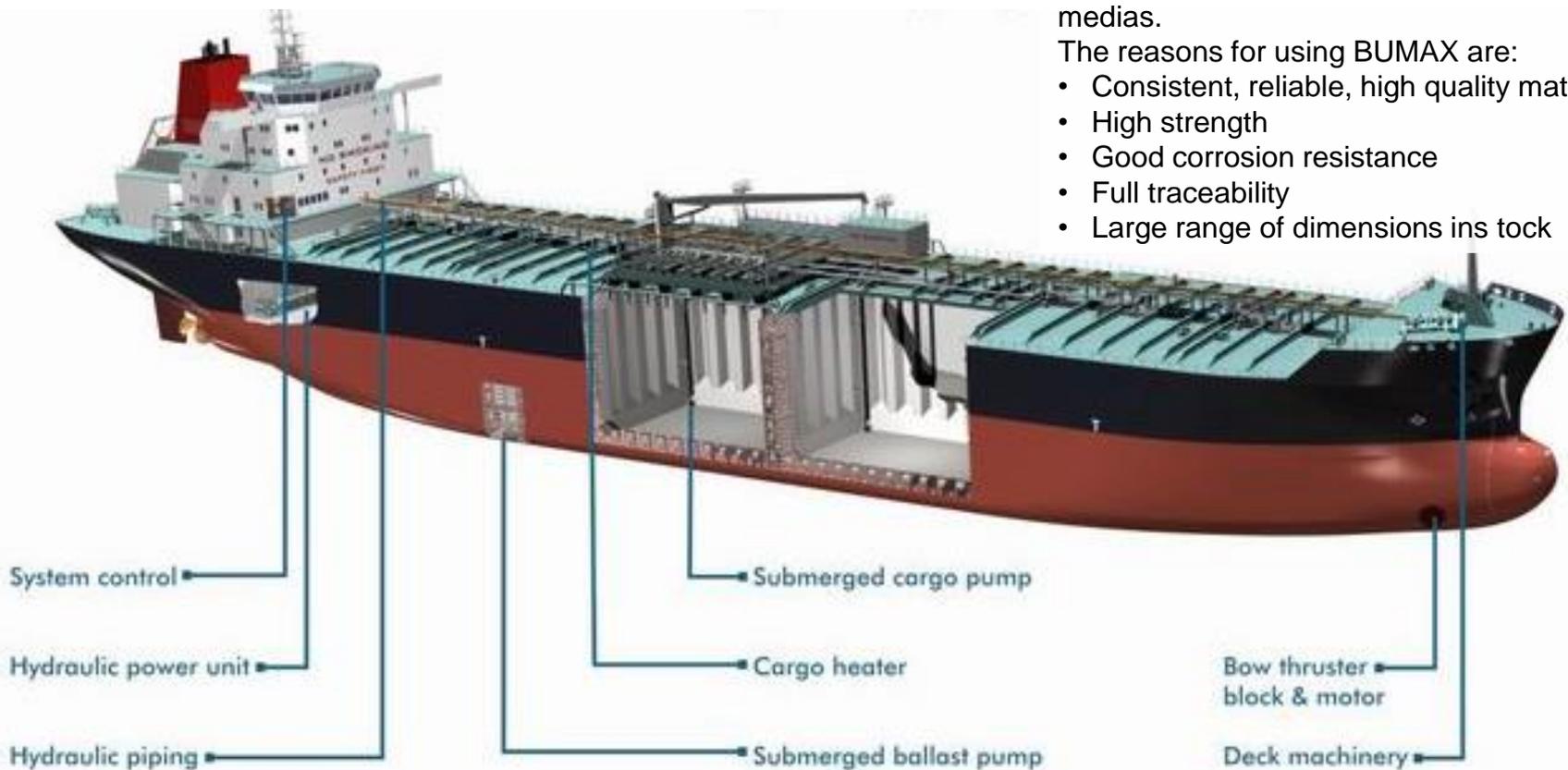
Country:

Norway

Cargo pumps for handling different types of liquid cargo. Many times highly corrosive medias.

The reasons for using BUMAX are:

- Consistent, reliable, high quality material
- High strength
- Good corrosion resistance
- Full traceability
- Large range of dimensions ins tock



Frank Mohn AS

Thruster

Grade:

BUMAX 88

Customer:

Brunvoll

Country:

Norway

Brunvoll manufacture thrusters and provides driving/control systems in connection with the thruster. BUMAX 88 is mounted on the propeller blade and offers.

- Good corrosion resistance in sea water
- Excellent fatigue resistance
- Full traceability
- Consistent, reliable, high quality material



Offshore Windmill

Grade:

BUMAX 88

Customer:

Alstom

Country:

North Sea

Alstom is designing and producing offshore and onshore wind turbines. BUMAX 88 because of its:

- Excellent corrosion resistance
- Consistent, reliable, high quality material

ALSTOM
ECO-1XXM

ALSTOM

CERN, Particle accelerator

Grade:

BUMAX 109

Customer:

CERN

Country:

FRA, CN

At CERN, physicists are probing the fundamental structure of the universe. BUMAX 109 is used in the cavity system of the particle accelerator and fulfills the high demands of:

- High strength
- Low magnetic permeability
- Low Cobalt content

BUMAX® Super Duplex (SDX) strain hardened

10.9 bolts
now in Stock

Bumax SDX has exceptional corrosion resistance and suited for marine environments in chloride bearing medias such as saltwater.

Bumax SDX offer many advantages compared to other Super Duplex fasters that are available on the market

- ◆ Higher strength. BUMAX SDX is offered in strength class 10.9 or 12.9
- ◆ Cold formed and thread rolled which and thereby offers higher strength, higher fatigue resistance and less risk of galling
- ◆ Best possible steel, 1.4410, UNS S32750, grade from Sandvik
- ◆ Always coated with our tailor made assembly wax
- ◆ Full traceability with 3.1 certificate
- ◆ Stock product, visit www.bumax.se



Real strength on BUMAX[®] Super Duplex

Strength on Bumax SDX in stock

Marked class 100

Type	Dim	Rm 1 (MPa)	Rm 2 (MPa)	Rp _{0,2} 1 (MPa)	Rp _{0,2} 2 (MPa)
ISO 4014	M12x100	1208	1224	1102	1112
ISO 4014	M12x120	1219	1198	1079	1084
ISO 4014	M12x80	1218	1239	1103	1108
ISO 4014	M12x90	1215	1215	1101	1110
ISO 4762	M12x100	1231	1255	1055	1091
ISO 4762	M12x120	1207	1224	1033	1055
ISO 4762	M12x45	1248	1226	1128	1125
ISO 4762	M12x50	1205	1254	1105	1149
ISO 4762	M12x90	1210	1219	1042	1061

Exceptional ductility of Bumax SDX

Bumax SDX Class 12.9
ISO 4762 M10x100
Tensile strength 1284 MPa

Elongation more than 1.5 x diameter !



A4 class 70, elongation min 0.4 x diameter
A4 class 80, elongation min 0.3 x diameter

Subsea fiber optic transmission

Grade:

BUMAX Hyper Duplex

Customer:

Siemens

Country:

Norway

Fiber optic sub sea cables used for communication, monitoring and controlling the oil/gas platform. The applications should last at least 25 years Titanium screws has previously been used but has been substituted by BUMAX Super Duplex due to:

- Better corrosion resistance
- Much higher strength
- The grade has excellent track record in oil/gas, offshore applications
- Lower cost than Titanium

SIEMENS

BUMAX[®] SDX Application



Grade:

BUMAX Super Duplex

Customer:

InApril

Country:

Norway

InApril manufactures complete and fully integrated ocean bottom node based seabed seismic solution systems for oil exploration. Super Duplex cold headed fasteners are used for the system. Super duplex is needed to achieve enough strength and corrosion resistance. The fasteners are surface treated to prevent galvanic corrosion. System is used down to 3000 m.



inApril

Venator

the Most Cost Efficient and Complete
Seabed Seismic System

Marine suspension seats



Grade:

BUMAX SDX

Customer:

**Ullman
Dynamics**

Country:

Sweden

Ullman Dynamics is the World Leader in Shock Mitigation Seating. Ullman Dynamics contacted Bufab because of corrosion problems with their A4 fasteners.

Norsok approved SDX



- ◆ It has not existed any Fastener standard for Norsok until now
- ◆ Norsok Super Duplex fasteners has been bar turned from Norsok M-630 MDS D57 approved bars and machined fasteners from it
 - ◆ Using the bar MDS D57 also for fasteners
- ◆ Norsok has however recently released two standard specifically for fasteners
 - ◆ M-630 MDS D60, machined fasteners
 - ◆ M-630 MDS D59, strain hardened fasteners

Norsok summary

	MDS D57		MDS D60		MDS D59	
Type of MDS	Bar material		Fasteners		Fastener	
Tensile strength R _m min	750 MPa	Tested on bars (steel mill certificate)	750 MPa	Tested on bars (from D57 certificate)	860 MPa	Tested on fasteners
Yield strength R _{p0.2} min	550 MPa		550 MPa		725 MPa	
Elongation A min	25%		16%		16%	
RA min	-		30%		30%	
Impact strength min	45J average at -46°C		45J average at -50°C		45J average at -46°C	
Hardness max	-		33 HRC		35 HRC	
Corrosion test G48	No pitting max 4 g/m ²	Tested on bars (steel mill certificate)	No pitting max 4 g/m ²	Tested on bars (from D57 certificate)	No pitting max 4 g/m ²	Tested on bars (from D57 certificate)
Ferrite content	35 - 55%		40 - 60%		40 - 60%	
Microstructure	No detrimental phases		No detrimental phases		No detrimental phases	

BUMAX[®] Norsok SDX application

Johan Sverdrup



- Bolts for Johan Sverdrup in Super Duplex
- Norsok D60 and Statoil VN605 Specification
- Life expectancy min 50 years
- Corrosion resistance with PRE Min 40
- Studbolts, nuts and washers

Super duplex fastener production

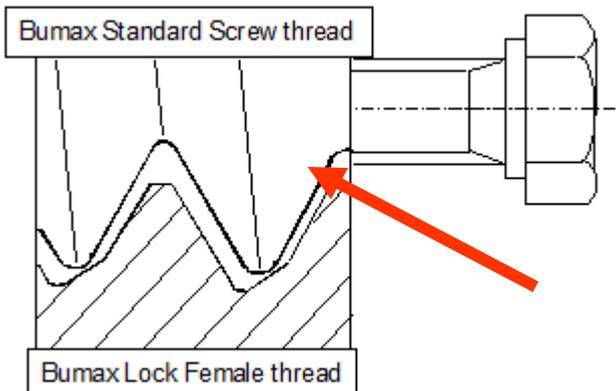
Production	Typical properties	Comment
Machined	$R_m \sim 820$ MPa $R_{p0.2} \sim 630$ MPa	<ul style="list-style-type: none"> Most common way of producing Super Duplex fasteners Most competitors do not test the strength on the final product, they are copying the bar properties into the certificate
Hotforged	$R_m \sim 900$ MPa $R_{p0.2} \sim 750$ MPa	<p>Super Duplex are very sensitive in the temp range of 600 to 1000 °C</p> <ul style="list-style-type: none"> Formation of intermetallic phases and forming delta-ferrite These defects will drastically reduce the corrosion resistance and ductility of the fastener Formation of oxide that will decrease corrosion resistance unless it is thoroughly removed <p>Important that the final fastener is thoroughly tested to make sure that the microstructure is OK</p>
Strain hardened Bumax SDX	$R_m \sim 1220$ MPa $R_{p0.2} \sim 1080$ MPa	<ul style="list-style-type: none"> Unique production method for Bumax Does not add any extra heat during processing so it is completely safe from forming any type of intermetallic phases Bumax always test the final product

BUMAX[®] Lock

ALL-METAL
LOCK NUT

Bumax Lock is an all-metal lock nut made out of the same steel grade as Bumax 88

- ◆ Special designed thread profile that locks when it is tightened
- ◆ 316L high Mo Bumax Lock in stock
- ◆ Bumax Lock is free spinning with no prevailing torque
- ◆ Better load distribution and greater gripping strength
- ◆ Reusable, up to approximately 10 times
- ◆ Prevents vibration loosening and increased fatigue resistance



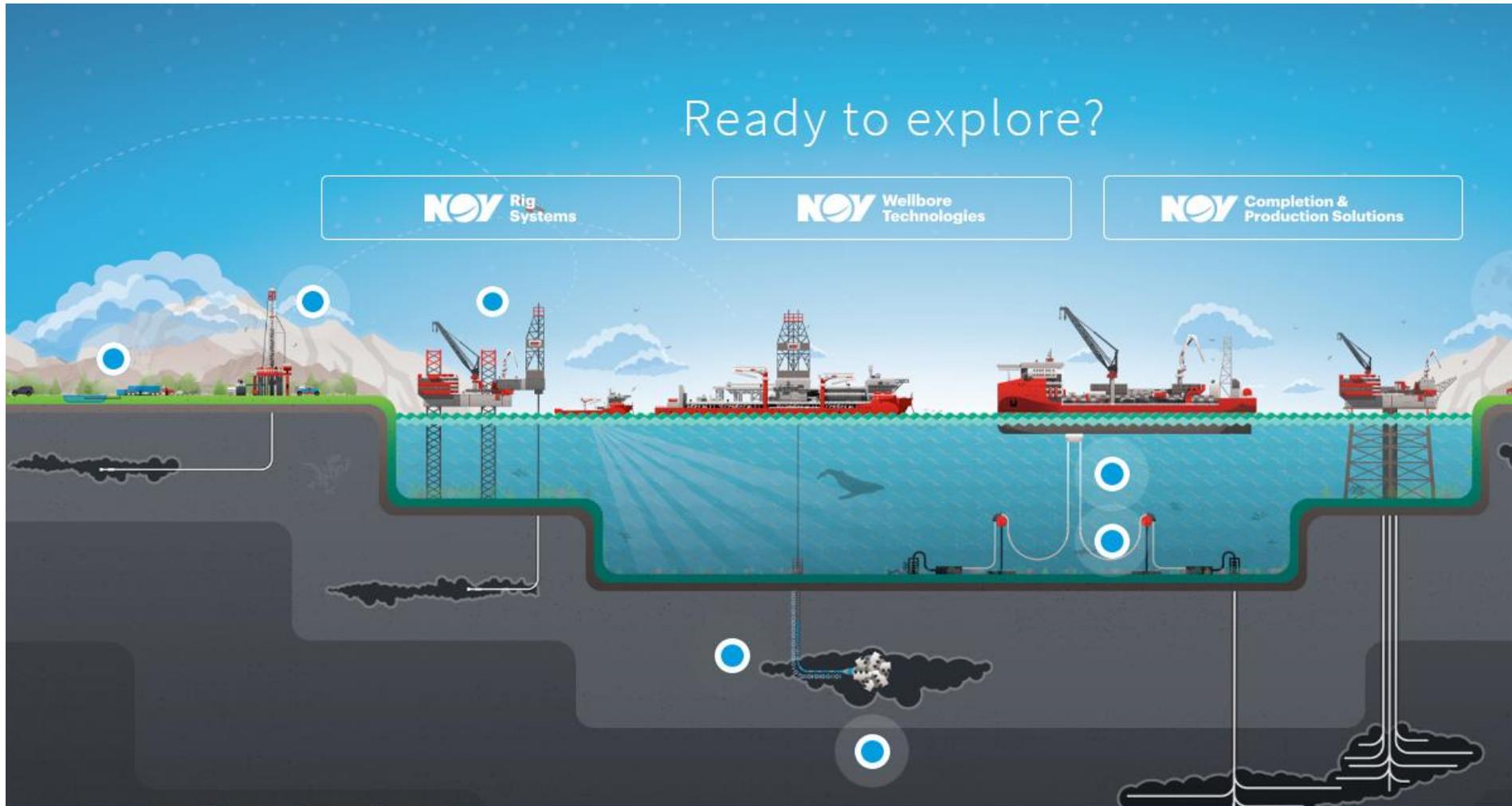
NOV uses Bumax Lock

Ready to explore?

NOV Rig
Systems

NOV Wellbore
Technologies

NOV Completion &
Production Solutions

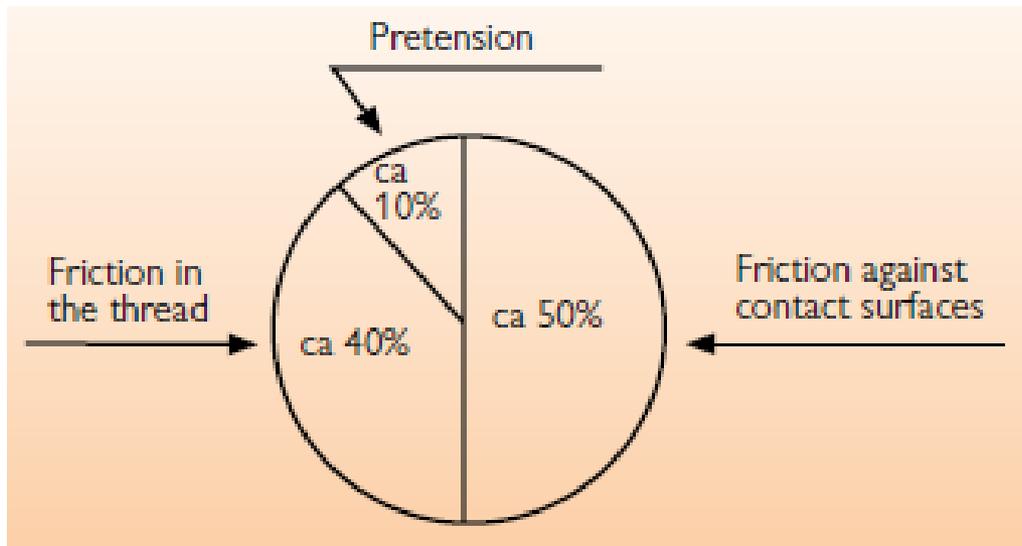


DEVELOPED TO WITHSTAND THE GREATEST FORCES

BUMAX[®]

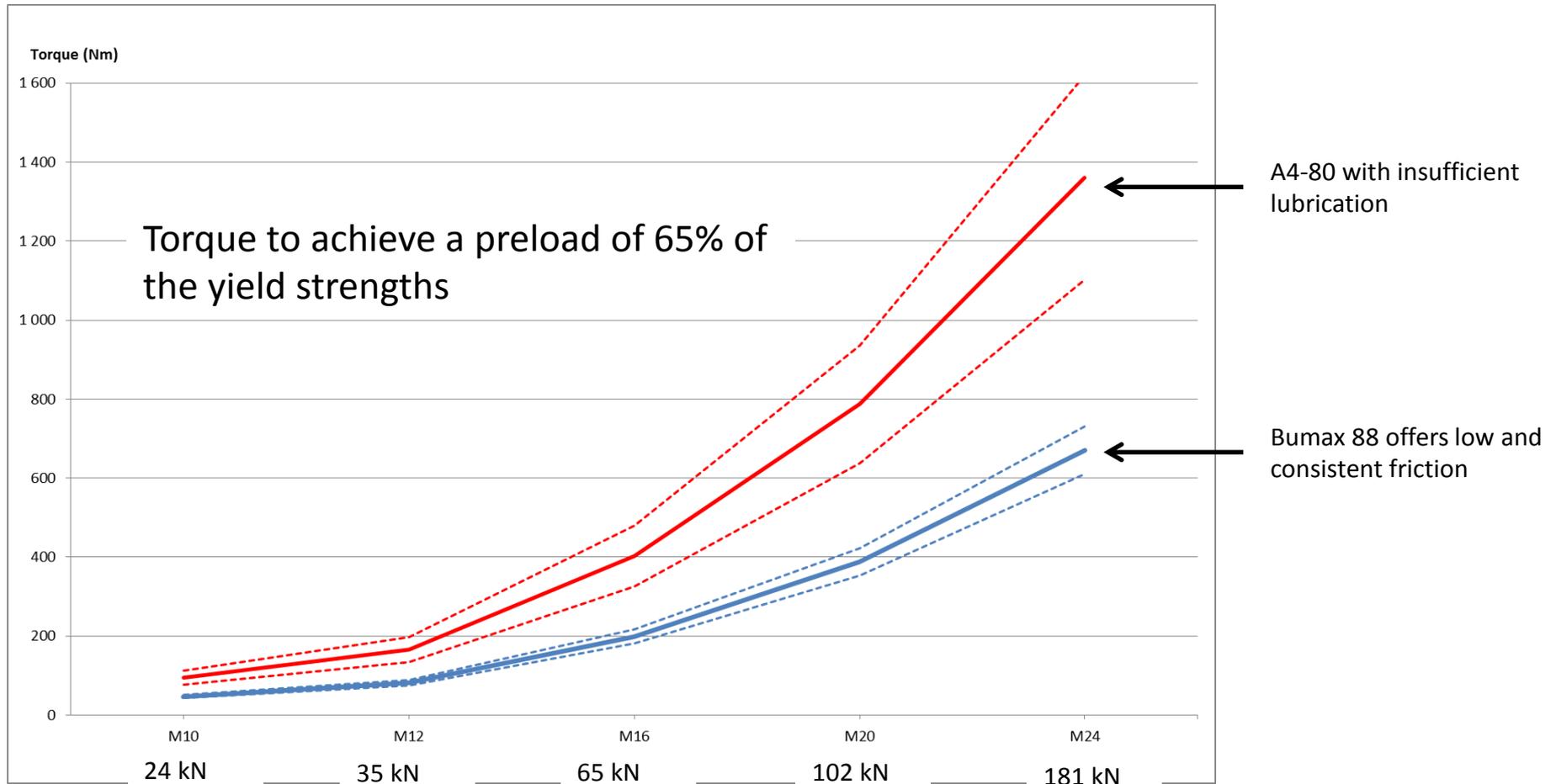
Tightening Torque and Friction

- ◆ Pre-tension is necessary for a joint to resist stresses and function correctly
- ◆ The greater part of the tightening torque is used to overcome friction
- ◆ Only 10 to 20% of the torque remains to achieve the pretension force (preload).



Tightening Torque and Friction

Control of the friction is the key to be able to predict a clampload



Tightening torque, Waxed Stainless

Description	Class	Screw/bolt diameter														
		M3	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M24	M27	M30	M36
Tightening torque Mv i Nm	50	0.4	1.0	1.9	3.3	7.8	15	27	43	65	91	127	220	318	434	755
	70	0.9	2.0	4.1	7.0	17	33	57	91	140	195	273	472	682	930	1620
	80	1.2	2.7	5.4	9.3	22	44	76	121	187	261	364	629	909	1240	2160
	BUMAX 88	1.3	2.9	5.7	9.8	25	47	82	129	198	275	385	665	961	1310	2280
	BUMAX 109	1.7	4.1	8.1	14	34	66	115	161	248	344	481				
Prestressing force average kN	50	0.8	1.4	1.9	2.7	5.0	7.8	12	16	21	27	33	48	63	77	112
	70	1.5	2.6	4.2	5.9	11	17	25	34	47	56	72	103	134	164	239
	80	2.0	3.4	5.5	7.8	14	23	33	45	61	75	96	138	179	219	319
	BUMAX 88	2.1	3.6	5.9	8.4	15	24	35	48	65	80	102	181	235	287	418
	BUMAX 109	2.9	5.2	8.6	12	21	34	49	60	81	100	128				
Breaking force kN	50	2.5	4.4	7.1	10	18	29	42	58	79	96	123	177	230	281	409
	70	3.5	6.1	9.9	14	26	41	59	81	110	134	172	247	321	393	572
	80	4.0	7.0	11	16	29	46	67	92	126	154	196	282	367	449	654
	BUMAX 88	4.0	7.0	11	16	29	46	67	92	126	154	196	282	367	449	654
	BUMAX 109	5.0	8.8	14	20	37	58	84	115	157	192	245				
Yield load kN	50	1.3	2.2	2.9	4.2	7.7	12	18	24	33	40	51	74	96	118	172
	70	2.2	3.9	6.4	9	16	26	38	52	71	86	110	159	207	253	368
	80	3.0	5.3	8.5	12	22	35	51	69	94	115	147	212	275	337	490
	BUMAX 88	3.2	5.6	9.1	13	23	37	54	74	100	123	157	226	294	359	523
	BUMAX 109	4.5	8.0	13	18	33	52	76	93	125	154	196				

The calculated torque will give a preload that is approximately 65% of the yield strength.

Increase torque on flange screws/nuts with 10%

Increase torque on countersunk screws with 30%

Can be found on www.bumax.se or technical handbooks



Galling



Galling is a cold welding phenomena that can occur between male and female thread under heavy pressure. Stainless steel is generally more sensitive than other metallic materials due to the passive chromium oxide layer that breaks down under high pressure.

Bumax fasteners offers less risk of galling due to:

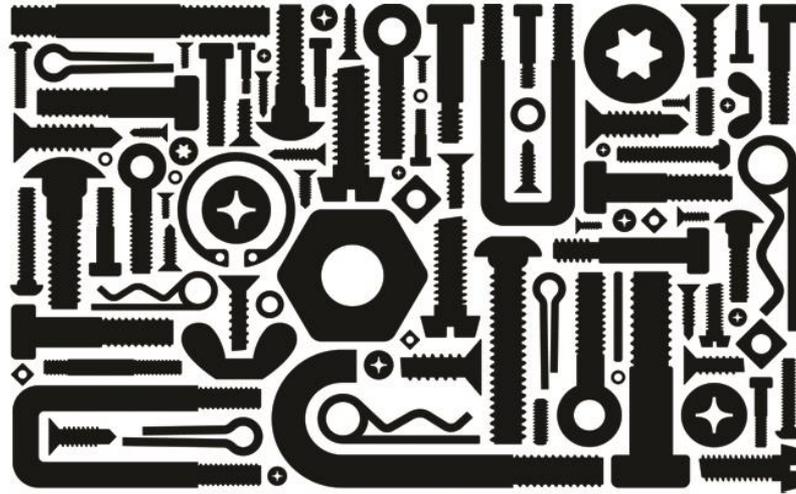
- ◆ High surface hardness reduces the risk of galling.
- ◆ Always thread rolled
- ◆ Fasteners coated with assembly wax that gurantees a low and consistent friction
- ◆ Overall better surface properties and less thread dimension variation

What is also important:

- ◆ Avoid fine threads if possible
- ◆ Use a good lubricant, with low and even friction coefficient
- ◆ A high speed during assembly will generate more heat and increase the risk of galling. Lowering the wrench speed during assembly and not use a power tool is therefore recommended

Benefits

- Cost Savings
- Full Traceability
- Corrosion Resistance
- High Strength
- Fatigue Strength
- High Quality
- Heat Resistance



Get yourself connected

Q&A