



www.dongahbolt.co.kr



We will produce the best products

A global company with healthy growth



Bolt

Nut

Materials





We always produce the **best products** through constant **reform and challenge.**

Dong-Ah Co., Ltd. provides the best products for customers with original and advanced technological power in the fields of heavy construction equipment parts, steel manufacturing facilities, ship engine parts, bolt material heat treatment, high-tensile bolts for steel bridges and structures, and track bolts for earth moving machines. And through this process, Dong-Ah will focus on customer value creation and corporate social responsibility to grow as a global leading company.

DONGAH CO., LTD

Bolt & Nut

Heat treatment

Products line-up

Quality process & test



Main Plant, DongAh Co., Ltd.



Main Office, DongAh Co., Ltd.

HISTORY

- **1960~**
 - 1961.06 Established Dong Ah Co., Ltd. In Yeongdeungpo Plant, Seoul (Bolt, Nut)
 - 1967.05 Designated as the plant where the indication of KS mark is permitted (KS B 1002, KS B 1012)
 - 1978.08 Transferred to Bupyeong Plant, Incheon

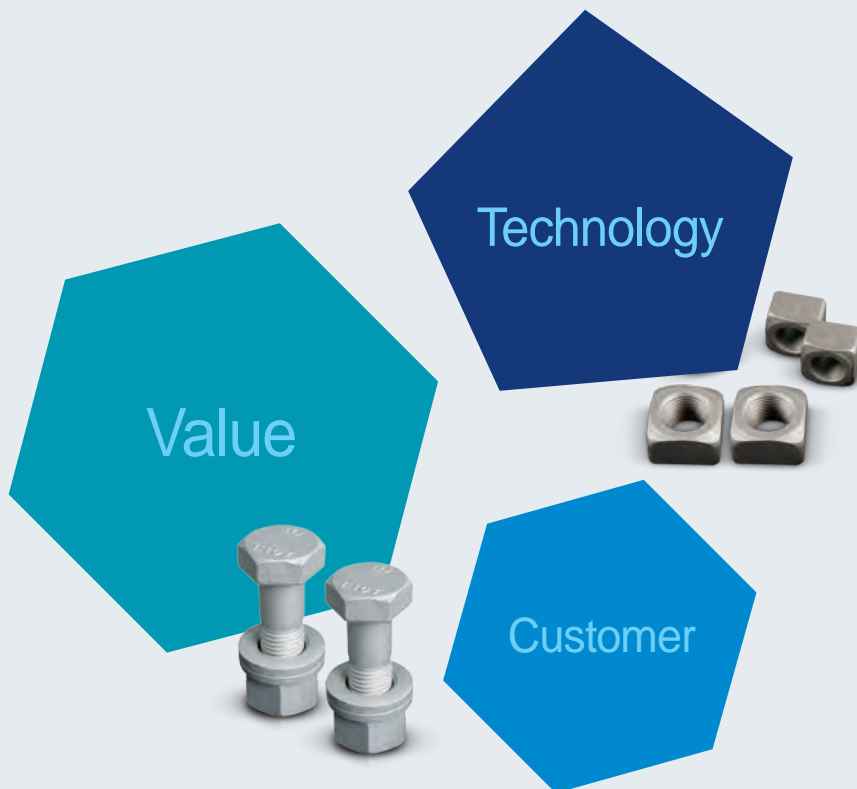
- **1990~**
 - 1991.12 Transferred to Changwon Plant
 - 1994.02 Obtained a patent for unpainted bolt
 - 1994.04 Designated as the Autonomous Calibration and Inspection Agency from the Industrial Advancement Administration
 - 1994.06 Obtained the K mark for the high-tension bolt sets of friction type (KS B 1010)
 - 1995.10 Obtained the certification for heat treatment quality from KOMATSU Limited, Japan
 - 1996.06 Obtained a patent for high-tension nut manufacture method by non-heat treatment of hot forging.
 - 1997.06 Obtained ISO 9001 and a patent for defective product detection device.

- **2000~**
 - 2003.04 Obtained JIS B 1186
 - 2005.07 Obtained ISO 14001
 - 2008.09 Obtained the certification of Korea Electric Power Industry Code (KEPIC)
 - 2010.10 Changed the name to Dong Ah Bolt Co., Ltd.
 - 2012.12 Won the trophy for exporting \$5,000,000 worth of products at the 49th Trade Day ceremony.
 - 2014.07 Obtained certification for CE.
 - 2014.08 Changed the name to Dong Ah Co., Ltd. (extension of business for Metal Heat Treatment)
 - 2015.07 A merger with Jinsung Heat-Treatment Co., Ltd.
 - 2016.09 Obtained a presidential citation for Single PPM quality innovation at the 17th Small Business Technology Innovation Competition.
 - 2016.10 DNVGL ship classification heat treatment process approval.
 - 2016.12 ABS ship classification heat treatment process approval.
 - 2017.09 Obtained Certificate (INNO-BIZ) for a technical innovation corporation.
 - 2018.05 Obtained certification by Japan's Minister of Land, Infrastructure, Transport and Tourism. Certification Item: Structural T/S Bolt Set (S10T) (JSS II-09)
 - 2018.07 Selected as a company specialized in materials and parts by Ministry of Trade, Industry and Energy.



VISION

We always realize **customer satisfaction** with **advanced technological power** for customer **value creation**.



Business Areas



BUSINESS AREA

All the products produced by Dong-Ah Co., Ltd. are being used in various ways in the whole industries.

Bolt



Major Production Items	Production Capacity
Construction High Strength BOLT, NUT, WASHER	20,000 Ton/year
<ul style="list-style-type: none"> ▶ HIGH STRENGTH BOLT, NUT, WASHER ▶ TORQUE SHEAR BOLT, NUT, WASHER ▶ HEX CAP SCREW(CLASS 4.6, 8.8, 10.9, 12.9), HEX NUT(CLASS 8, 10, 12) 	
Heavy equipment TRACK BOLT, NUT	10,000 Ton/year

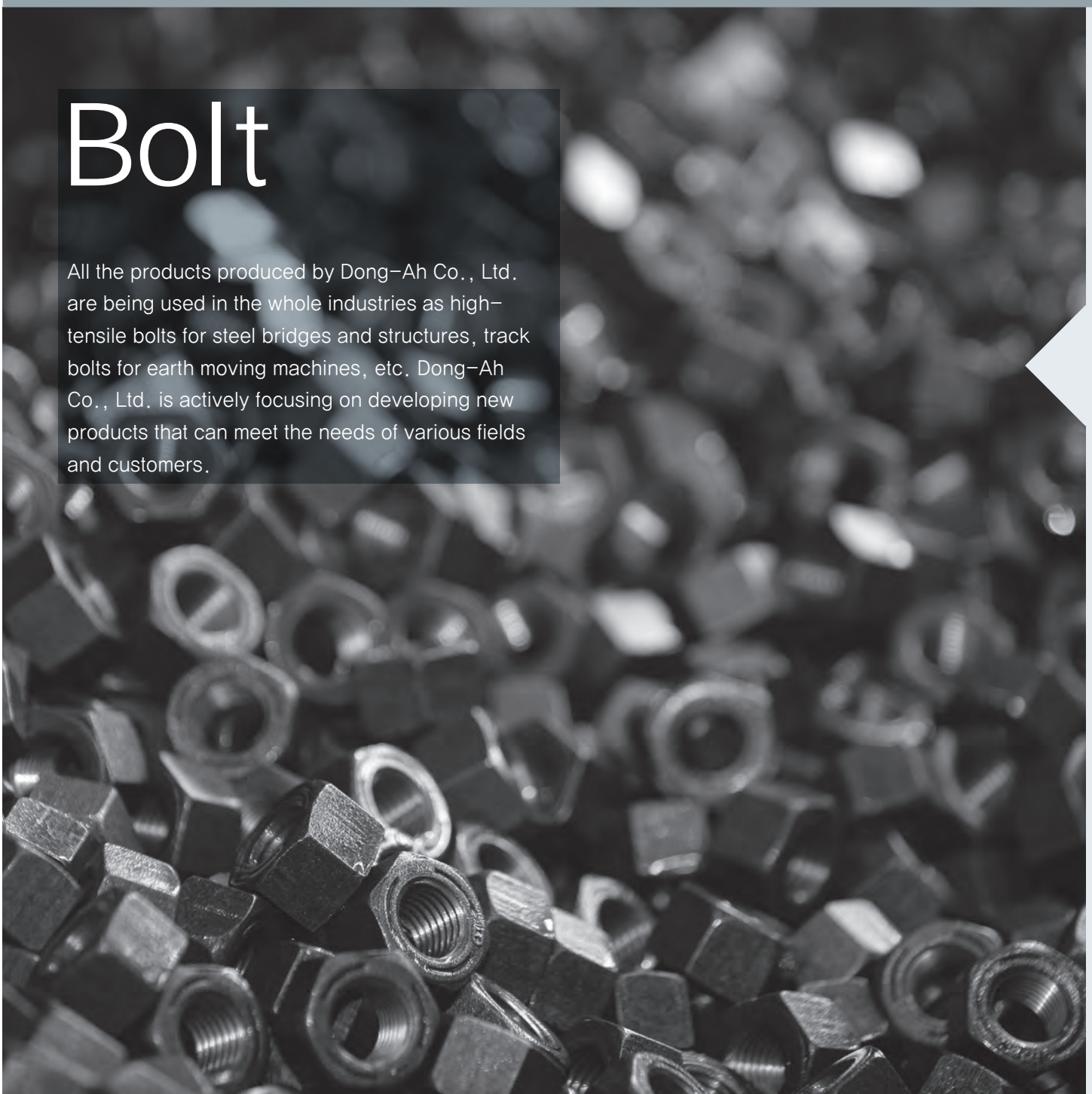
Materials



Major Production Items	Production Capacity
Successive Heat Treatment	54,000 Ton/year
2ROLL Straightening	18,000 Ton/year
Peeling	9,000 Ton/year

Bolt

All the products produced by Dong-Ah Co., Ltd. are being used in the whole industries as high-tensile bolts for steel bridges and structures, track bolts for earth moving machines, etc. Dong-Ah Co., Ltd. is actively focusing on developing new products that can meet the needs of various fields and customers.



CONSTRUCTION



Production Range

H/T



SIZE RANGE

DIA : M12 - M30 (1/2" - 1 1/4")
 LENGTH : 30 - 300mm (1 1/4" - 12")

APPLICABLE SPECIFICATION

KS B 1010, JIS B 1186

T/S



SIZE RANGE

DIA : M16 - M30 (5/8" - 1 1/4")
 LENGTH : 30 - 300mm (1 1/4" - 12")

APPLICABLE SPECIFICATION

KS B 2819, JSS II-09

CONSTRUCTION



Production Range

HEX CAP SCREW BOLT



SIZE RANGE

DIA : M6 - M80 (1/4" - 3")
LENGTH : 30 - 300mm (1 1/4" - 12")

APPLICABLE SPECIFICATION

SAE J429 ASTM A193, A354
ANSI/ASME B 18.2.1
KS B 1002, JIB B 1180
DIN 931, BS 3692A

HEX NUT



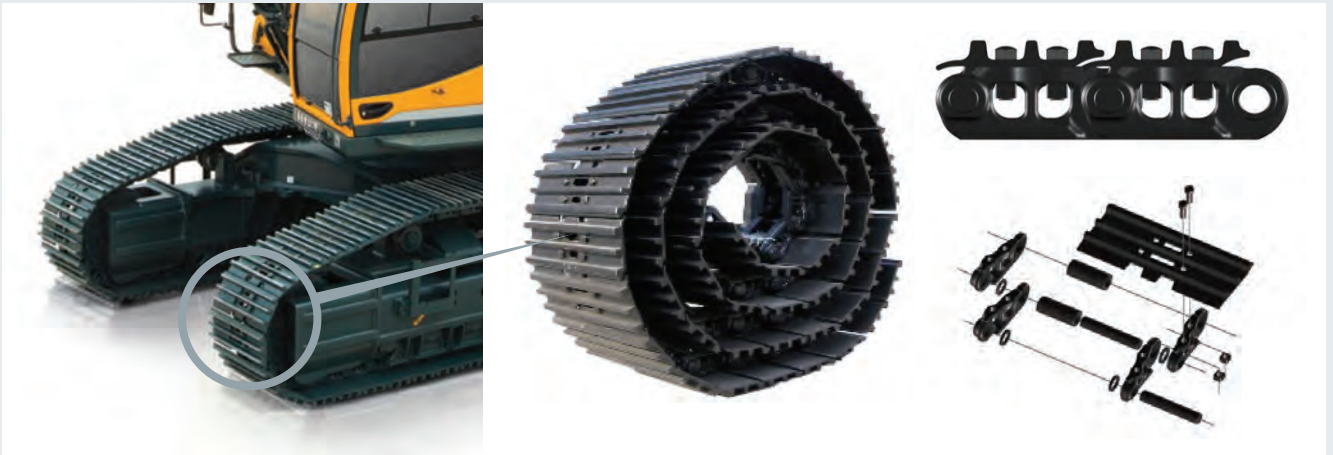
SIZE RANGE

DIA : M8 - M80 (1/4" - 3")

APPLICABLE SPECIFICATION

KS B1012, JIS B1181
ASTM A194, A563
SAE J995 DIN 934, 6915
BS 3692

HEAVY EQUIPMENT MACHINERY



Production Range

TRACK BOLT / NUT



TRACK BOLT

SIZE RANGE

DIA : M12 - M30 (1/2" - 1 1/4")
 LENGTH : 30 - 200mm (1 1/4" - 8")

APPLICABLE SPECIFICATION

Tensile strength of over 170,000 PSI
 (14% higher than SAE grade 8)
 Hardness of Rockwell HRC 38-42 securing

TRACK NUT

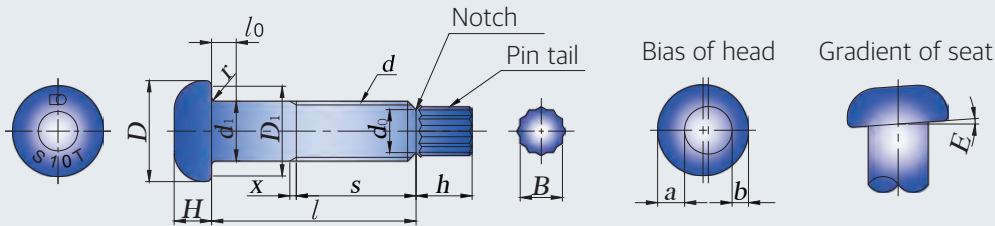
SIZE RANGE

DIA : M12 - M30 (1/2" - 1 1/4")

PRODUCT SPECIFICATION

Production Size

▶ Dimension/reference standard of high-tensile TS bolt. KS B 2819 • JSS II -09 (unit : mm)

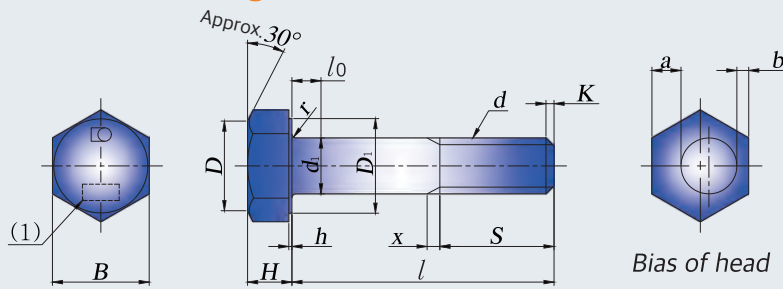


SIZE (d)	d1		D1		D		H		do		h		B		r	a-b		E		s	
	Standard	Tolerance	Min.	Min.	Standard	Tolerance	Standard	Tolerance	Reference	Standard	Tolerance	Max.	Max.	Standard		Tolerance					
M16	16	+0.7 -0.2	26	27	10	±0.8	Not specified	Not specified	15	11.3	±0.3	1.2 ~2.0	0.8	1°	30	+5 0					
M20	20	+0.8 -0.4	33	34	13	±0.9			18	14.1							~2.0	0.9			
M22	22		37	38.5	14				19	15.4		1.6 ~2.4	1.1								
M24	24		41	43	15				20	16.8	2.0 ~2.8						1.2				
M27	27		47	49	17				22	19.0		1.3									
M30	30		53	55	19	±1.0	24	21.1	1.5	55	+6 0										

Note(2) Measuring position of d1 Shall be $l_0 \approx d_1/4$.

Remark Length x of incomplete thread shall be approx. 2 threads and approx. 3 threads for complete thread.

▶ Dimension/reference standard of high-tensile hex bolt (HT) : KS B 1010 • JIS B 1186 (unit : mm)



(1) F10T or F13T

SIZE (d)	d1		H		B		D	D1	r	K	a-b		h	s	
	Standard	Tolerance	Standard	Tolerance	Standard	Tolerance	Approx.	Min.		Approx.	Max.	Standard		Tolerance	
M12	12	+0.7 -0.2	8	±0.8	22	0	20	20	0.8~1.6	2	0.7	0.4~0.8	25	+5 0	
M16	16	+0.8 -0.4	10		27	-0.8	25	25	1.2~2.0				2.5		0.8
M20	20		13	±0.9	32	0 -1	30	29		1.6~2.4	3				
M22	22		14		36		34	33	2.0~2.8				1.2		
M24	24		15		41		39	38		1.3					
M27	27		17		46		44	43	55		+6 0				
M30	30	19	±1.0	50	48	47	2.0~2.8	3.5	1.5	55	+6 0				

Note(2) Measuring position of d1 Shall be $l_0 \approx d_1/4$.

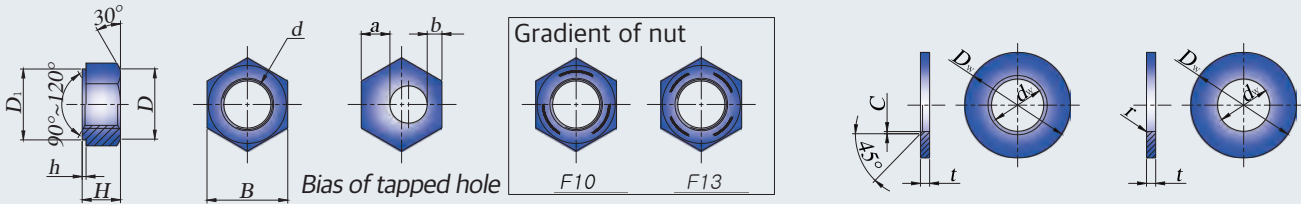
Remark Length x of incomplete thread shall be approx. 2 threads and approx. 3 threads for complete thread.

- Tolerance by bolt length (l)

Bolt grade	division by l	l tolerance
F10T-S10T	≤ 50	±1.0
	50~120	±1.4
	>120	±1.8

Production Size

▶ Dimension/reference standard of nut & washer : KS B 1010, KS B 2819 • JIS B 1186 • JSS II-09 (unit : mm)



SIZE (d)	Out diameter of malescrew	H		B		D	D1	a-b		h
		Standard	Tolerance	Standard	Tolerance			Approx.	Min.	
M12	12	12	±0.35	22	0	20	20	0.7		0.4~0.8
M16	16	16		27	-0.8	25	25	0.8		
M20	20	20	±0.4	32	0 -1	30	29	0.9		
M22	22	22		36		34	33	1.1		
M24	24	24		41		39	38	1.2		
M27	27	27		46		44	43	1.3		
M30	30	30		50		48	47	1.5		

SIZE	dw		Dw		t		C or r
	Standard	Tolerance	Standard	Tolerance	Standard	Tolerance	
M12	13	+0.7 0	26	0 -0.8	3.2	±0.4	1.5
M16	17	+0.8 0	32	0 -1	4.5	±0.5	
M20	21		40		6		
M22	23		44				
M24	25		48	±0.7			
M27	28		56				
M30	31	+1.0 0	60	0 -1.2	8	2.8	

Mechanical Properties

▶ Mechanical Properties

- Axial load of bolt

Bolt Grade	Bolt size (kN)							Ref. spec.
	M12	M16	M20	M22	M24	M27	M30	
F10T	54~72	99~134	155~209	191~259	223~301	290~392	354~479	JIS
F10T	53.1~72.1	98.7~134.0	154.2~209.3	191.4~259.4	222.1~301.4	289.0~392.3	353.6~479.9	KS
F13T	69.0~93.7	128.3~174.2	200.5~272.1	248.5~337.2	288.7~391.8	375.8~510.0	459.7~623.9	KS

- Mechanical properties of bolt specimen

Bolt grade	Yield strength N/mm ²	Tensile strength N/mm ²	Elongation %	Reduction of Area %
F10T-S10T	≥ 900 min	1000~1200	14 min	40 min
F13T	≥ 1170 min	1300~1500	12 min	35 min

- Mechanical properties of product

Bolt grade	Tensile strength of bolt(Min.) (kN)							Hardness HRC	Ref. spec.
	M12	M16	M20	M22	M24	M27	M30		
F10T-S10T	85	157	245	303	353	459	561	27~38	JIS · JSS
F10T	84.3	156.7	244.8	303.4	352.5	458.8	561.3	27~38	KS
F13T	109.6	203.7	318.2	394.4	458.3	596.4	729.7	40~45	KS

- Mechanical properties of nut

Nut grade	Hardness		Ref. spec.	Proof load
	Min.	Max.		
F10	HRC20	HRC35	JIS · JSS	Same as tensile strength(min.) of bolt
	HRB95	HRC35	KS	
F13	HRC30	HRC40	KS	

- Mechanical properties of washer

Washer grade	Hardness(HRC)
F35	35~45

- Steel grade of raw material

Item	Ref. spec.
Bolt	SCR420B / POSCM13
Nut	SCR420B / S45C
Washer	S45C

PRODUCT SPECIFICATION

Production Size

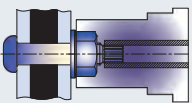
► High-tensile TS bolt set (KS B 2819 · JSS II - 09, S10T)

– Axial load of Bolt

SIZE	Axial load of Bolt (kN)		
	Normal temperature(10°C~30°C)	Standard Deviation	Beyond normal temperature(0°C~60°C)
M16	110 ~ 133	≤8.5	106 ~ 139
M20	172 ~ 207	≤13	165 ~ 217
M22	212 ~ 256	≤16	205 ~ 268
M24	247 ~ 298	≤19	238 ~ 312
M27	322 ~ 388	≤24	310 ~ 406
M30	394 ~ 474	≤30	379 ~ 496

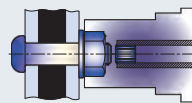
– Fastening order of high-tensile TS Bolt (TS)

1)



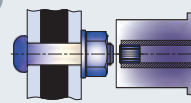
Insert the inner socket in pin tail of bolt end and turn the outer socket by hand and then insert in nut.

2)



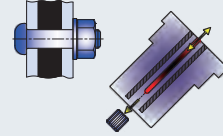
If you operate wrench, the reaction is applied to pin tail, by the rotation of outer socket, and rotate nut to fasten bolt.

3)



If prescribed clamping force is applied to bolt, inner socket rotates reversely and so notch part fractures, as a result, fastening is finished.

4)



Remove the Cut off pintail from inner socket by pulling the pintail release lever. (Note: Paying attention to human or high place work, check if there is any risk factor before removing pin tail.)


► High-tensile hex bolt (HT) (KS B 1010, JIS B 1186)

– Classification by torque coefficient

Grade of bolt		torque coefficient	
Grade by mechanical properties	Type by torque coefficient	torque coefficient Average	S.D of torque coefficient
F10T·F13T	A	0.110~0.150	≤0.010
	B	0.150~0.190	≤0.013

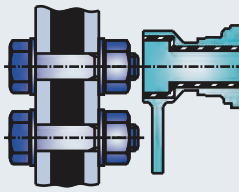
– Fastening order of high-tensile hex bolt (HT)

1)



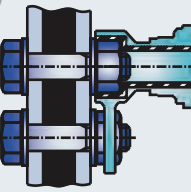
Set the fastening torque. Turn torque dial using (-) driver to set to your desired torque.

2)



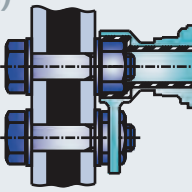
Insert the lever socket in the nut which you want to fasten. (Because it rotates in the opposite direction of rotation direction of nut when fastening, adjust to lock bolt of member of framework so that reaction is applied to the lever socket guide.)

3)



Pull operation switch to rotate the lever socket. At this time, operate the lever socket rotary guide adjusting it to the neighboring bolt or member of framework.

4)



When it reaches as much as set torque after fastening, electric wrench stops automatically.

– Formula of torque coefficient

$$K = \frac{T}{d \times N} \times 1,000$$

K: Torque coefficient
 T: Torque (Moment tightening nut)(N.m)
 d: nominal dimension of O.D of thread of bolt (mm)
 N: Axial load of bolt (N)

▶ High-tensile TS bolt set (BOLT_1 · NUT_1 · WASHER_1) Weight table / KS B 2819 · JSS II - 09

UNIT:gr

Size mm	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	
M16	185	191	199	207	215	223	231	239	247	255	263	271	279	287	295	303	311	319				
M20		315	328	341	354	367	380	393	406	419	432	445	458	471	484	497	510	523	536	549	562	
M22				463	478	493	508	523	538	553	568	583	598	613	628	643	658	673	688	703	718	
M24					631	649	667	685	703	721	739	757	775	793	811	829	847	865	883	901	919	
M27						877	900	923	946	969	992	1015	1038	1061	1084	1107	1130	1153	1176	1199	1222	
M30									1203	1231	1259	1288	1316	1344	1372	1401	1429	1458	1486	1514	1542	

Size mm	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	NUT	WASHER
M16																		57	20
M20	575																	97	32
M22	733	748	763	778	793													137	52
M24	937	955	973	991	1009	1027	1045	1063	1081									201	62
M27	1245	1268	1291	1314	1337	1360	1383	1406	1429	1452	1475	1498	1521					263	93
M30	1471	1599	1628	1656	1684	1712	1740	1768	1796	1824	1852	1880	1908	1936	1964	1992	2020	340	134

▶ High-tensile hex bolt (HT) (BOLT_1 · NUT_1 · WASHER_2) Weight table / KS B 1010 · JIS B 1186

UNIT:gr

규격 mm	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	
M16	194	202	210	217	225	233	241	249	257	265	273	281	289	296	304	312	320	328				
M20		335	348	361	373	385	398	410	422	435	447	459	472	484	497	510	523	536	549	562	575	
M22				496	510	525	540	555	570	585	600	615	630	645	660	674	689	704	719	734	749	
M24					666	683	701	719	737	754	772	790	807	825	843	861	878	896	914	932	950	
M27						953	976	999	1022	1045	1068	1091	1114	1137	1160	1183	1206	1229	1252	1275	1298	
M30									1347	1375	1403	1431	1459	1487	1515	1543	1571	1599	1627	1655	1683	

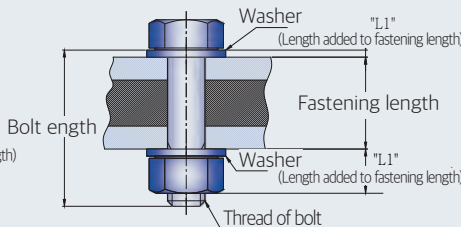
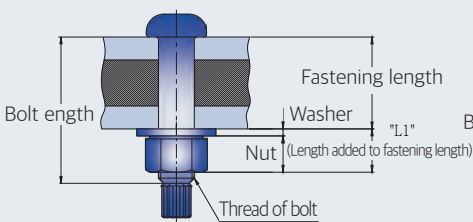
규격 mm	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	NUT	WASHER
M16																		57	20
M20	588																	97	32
M22	764	779	794	809	824													137	52
M24	967	985	1003	1021	1039	1056	1074	1092	1110									201	62
M27	1321	1344	1367	1390	1413	1436	1459	1482	1505	1528	1551	1574	1597					263	93
M30	1711	1739	1767	1795	1823	1851	1879	1907	1935	1963	1991	2019	2047	2075	2103	2131	2159	340	134

▶ Calculation criteria of bolt length

- High-tensile TS bolt

- High-tensile hex bolt (HT)

- Calculation criteria of bolt length for TS bolt · hex bolt (HT)



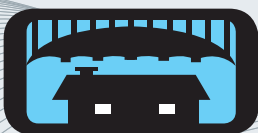
SIZE	Pitch	L1	
		TS(S10T)	HT(F10T-F13T)
M16	2.0P	25	30
M20	2.5P	30	35
M22	2.5P	35	40
M24	3.0P	40	45
M27	3.0P	45	50
M30	3.5P	50	55

* In calculating bolt length, add "L1" to fastening length.

- High-tensile TS bolt includes 1 washer in nut part.
- High-tensile hex bolt(HT) includes each 1 washer in bolt head and nut part.

▶ Recommendation for storage

▶ Things to avoid in storage



**OIL
WATER
DUST**

Materials Industry

Dong-Ah Co., Ltd., as a leading heat treatment maker, is trying its best to supply high-quality and perfect products by developing forging heat treatment, special steel long bar heat treatment, roller heat treatment, and ship engine stay-bolt heat treatment for consistent surface hardness, excellent hardening depth, and great wear resistance, strength, and durability.



HEAT TREATMENT

We produce the best products with **original and advanced** technological power.

| Features

- Continuous heat treatment ($\text{Ø}25\text{mm}\sim\text{Ø}300\text{mm}\times 15,000\text{L}$)
 - Hardness variation less and consistent intensity($\pm\text{HB}20$)
- Spray-Quenching
 - Deep and consistent surface hardness
 - Less deformation during the heat treatment

| Major products

- Stay Bolt & Stud Bolt For Marine engines
- Heavy equipment CYL/LOD & PIN
- Long Steel Bar
- 2ROLL Straightening
- Peeling

Marine engines



Heavy equipment CYL/LOD & PIN



Heat treatment

PRODUCTS LINE-UP

We will produce the best products by adding our best efforts to the best facilities.

| Heat treatment process

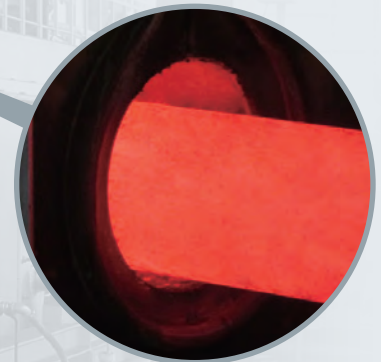


| Equipment Data

CONTINUOUS HEAT TREATMENT

Technical Data

Performance : Q" 1,000kw/0.2khz,
700kw/0.2khz T" 400kw/0.2khz
WorkingRange : Ø25~Ø300×15000L



| Machining process



| Equipment Data

2-ROLL STRAIGHTENING LINE PM 34-130

Technical Data

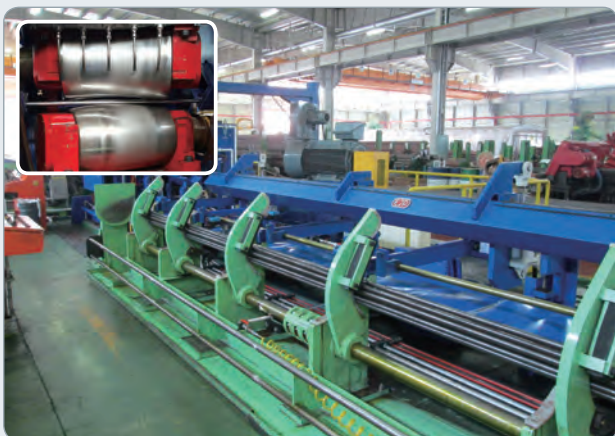
Performance : up to 350 HB
 Working Range : $\varnothing 34$ - $\varnothing 130$ mm max.
 11m length for Straightening line
 Straightness : 5mm/m (incoming material),
 1mm/m (finished material)



ONE PEELING LINE PM 25-130

Technical Data

Performance : up to 350 HB
 Working Range : $\varnothing 27$ - $\varnothing 135$ mm Round
 (Incoming material), $\varnothing 25$ - $\varnothing 130$ mm Round
 (finished material)
 Straightness : ≤ 1 mm/m (incoming material)
 ≤ 0.3 mm/m (finished material)



BACK 2-ROLL STRAIGHTENING LINE

Technical Data

Performance: upto 350 HB
 Working Range: $\varnothing 20$ - $\varnothing 80$ mm min.
 Straightness : ≤ 1 mm/m (incoming material)
 ≤ 0.3 mm/m (finished material)

QUALITY PROCESS & TEST

We will not tolerate even a small crack.
We will produce **only perfect products.**

1 Receiving Inspection

Purchase raw and subsidiary materials from enterprises evaluated and authenticated by the quality system, and perform receiving inspection

2 Frequent Inspection and In-Process Inspection

- Perform inspection on initial products and do frequent analysis based on checkpoints
- Perform in-process inspection on complete products and move them to the next process

3 Heat-Treated Intermediate Inspection and In-Process Inspection

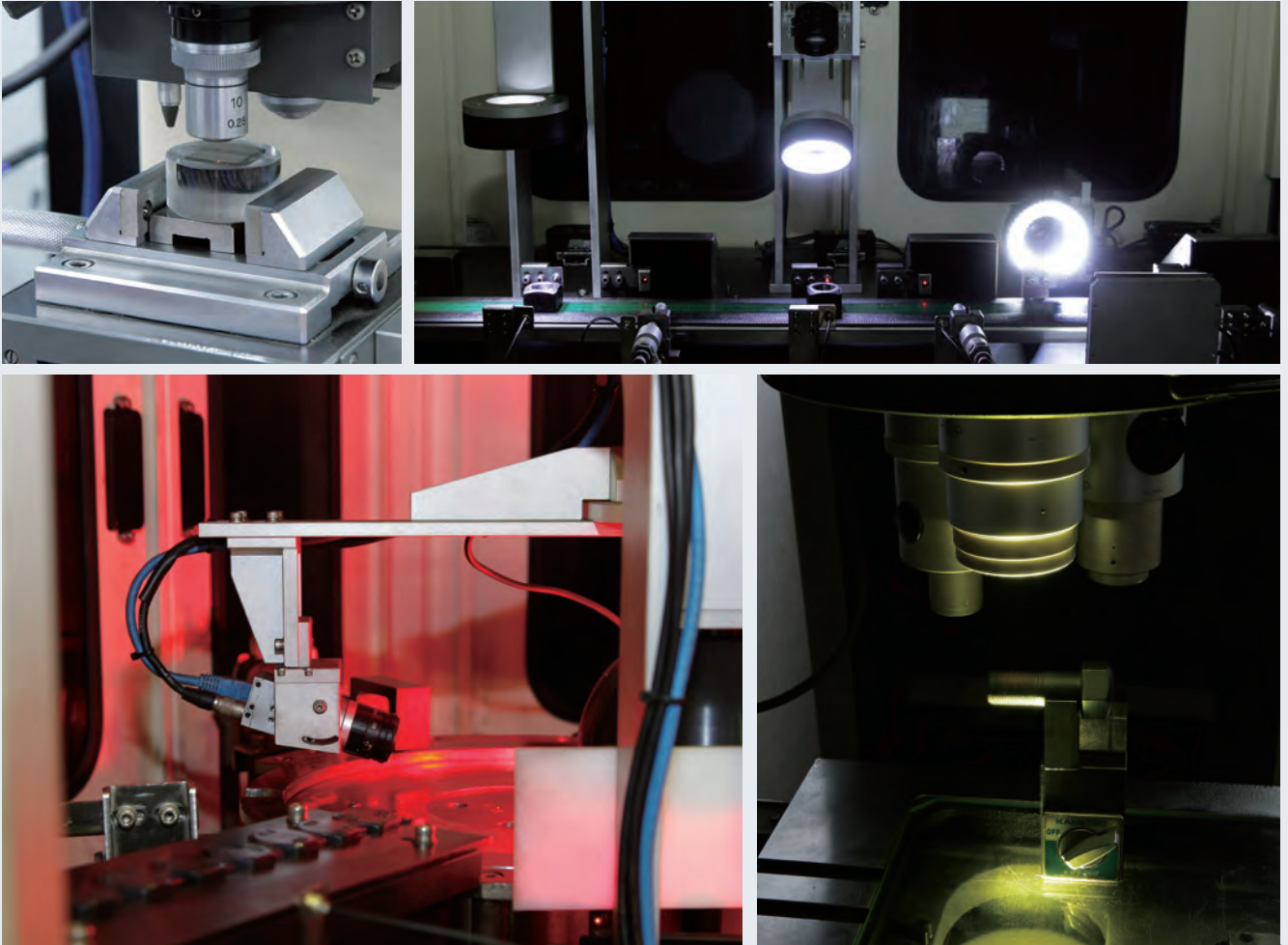
For product quality, periodically check on combustion performance including distribution of furnace temperature, and perform heat treatment tests in each stage

4 Packaging Inspection

Perform the final test on complete products along with automatic test, non-destructive test, product condition management, and in-process inspection

5 Shipment Inspection

Upon customers' request, check on product LOT, details, and appearance



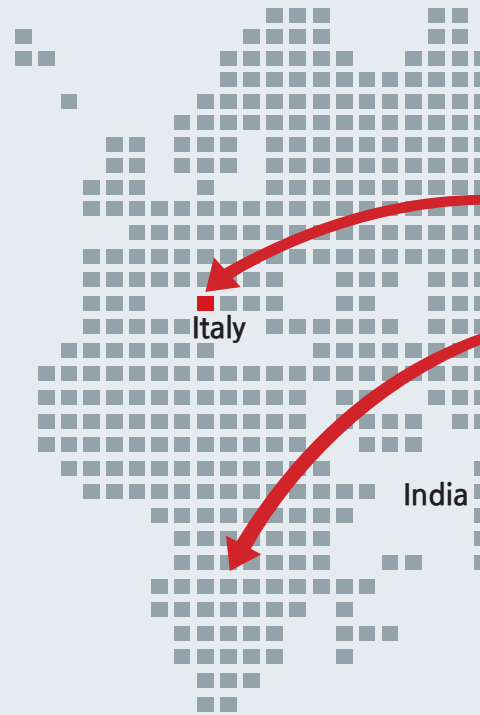
Dong-Ah Co., Ltd. went through **strict authentication procedures** and **proved its excellence**

- Charpy Impact Testing Machine
- Torque Tester
- Universal Testing Machine
- Surface Roughness Tester
- Impact Testing Machine
- Rockwell Hardness Tester
- Equo-Tip Hardness Tester
- Ultrasonic Flaw Tester
- Magnetic Particle Tester
- Automatic Sorting Equipment



CUSTOMERS & CERTIFICATE

Those below are the main clients of Dong-Ah Co., Ltd. trying to be a global company.



CERTIFICATE



Korean Standard Symbol Mark (KS B 1010)



JIS MARK (JIS B 1180)



JIS MARK (JIS B 1181)



JIS MARK (JIS B 1186)



EC CERTIFICATE of Factory Production Control



Certificate of Japan minister of Land, Infrastructure, Transport and Tourism



ISO 9001 : 2015



ISO 14001 : 2015





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