

### High speed tool steel & Alloy tool steel

JIS	ISO	AISI	BS	DIN VDEh	
		ASTM			
SKH51	HS 6-5-2	M2	BM2	S 6-5-2	1.3343
SKH55	HS 6-5-2-5	—	BM35	S 6-5-2-5	1.3243
SKS 3	—	—	—	—	1.2419
SKD11	—	D2	BD2	—	1.2379
SKD61	40CrMoV5	H13	BH13	X40CrMoV51	1.2344

### High-carbon chrome bearing steel

JIS	ISO	AISI	BS	DIN VDEh	
		ASTM			
SUJ2	BLor100Cr6	52100	—	100Cr6	1.2067/1.3505

### Carbon steel for machine structural use & Chrome molybdenum steel

JIS	ISO 683/1,10,11 <sup>5)</sup>	AISI	BS	DIN	
		ASTM	970Part1,3 BS EN 10083-1,2		
S45C	C45	1045	C45	C45	1.0503
	C45E4	1046	C45E	C45E	1.1191
	C45M2		C45R	C45R	1.1193
S50C	C50	1049	080M50	C50	1.1213
	C50E4		C50	C50E	
	C50M2		C50E	C50R	
			C50R		
S55C	C55	1055	070M55	C55	1.0535/1.1203
	C55E4		C55	C55E	
	C55M2		C55E	C55R	
			C55R		
SCM430	—	4133	—	—	1.7218
SCM435	34CrMo4	4137	34CrMo4	34CrMo4	1.722
	34CrMoS4		34CrMoS4	34CrMoS4	
SCM440	42CrMo4	4140	708M40	42CrMo4	1.7225
	42CrMoS4	4142	709M40		
			42CrMo4 42CrMoS4		

### Stainless steel

JIS	ISO TR 15510 L - NO.	AISI	BS	DIN	
SUS 303	13	303	303S21	X10CrNiS189	1.4305
SUS 304	6	304	304S31	X5CrNiS1810	1.4301
SUS 430	41	430	430S17	X6Cr17	1.4016
SUS 440C	—	440C	—	X105CrMo17	1.4125

### Aluminum and aluminum alloy extender

JIS H4000:88	ISO 636190 ISO 209:89	ASTM	BS	DIN	
		B209:M95	EN485-2:95 BS EN573-3:95	EN485-2:95 DIN EN573-3:95	
	AlMg2.5	5052	ENAW-5052	ENAW-5052	
	—	6061	ENAW-6061	ENAW-6061	
	AlZn5.5MgCu	7075	ENAW-7075	ENAW-7075	

© Remarks:AISI(USA) · ASTM(USA) · BS(UK) · DIN(Germany)

© ISO(International Standard) · JIS (Japan)

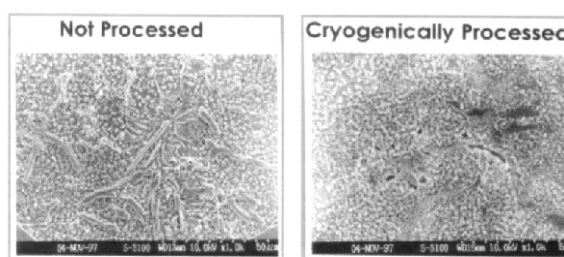
## ADVANTAGES OF CRYOGENIC PROCESS

All **MINDMAN** Slide Rall Set / Slide Table is well been cryogenic processing. Cryogenic process is to, place the part in the medium with temperature under 196°C, followed step by step progress of new technic to improve material character. Found by relevant search, cryogenic process is not only obviously increase on strength and life of black (colour) metal, plastic and china... etc, but also improve the structure evenly. Increase of dimension stability brings huge economic benefit and promising application in aviation, aerospace 、optics 、creatures 、chemistry 、machinery, electronic and light industry.

### Purpose of cryogenic process

Improving physical character (mechanical character) of metal or other material by progress of subzero processing, to raise usage life, efficiency and quality of parts or workpiece.

**EX:** comparison of metallographic analysis



### Benefit analysis of aluminum alloy after cryogenic process:

Improvement during process or in the end of process:

- (1) Deformation of microstructure stress caused by designed material shape.
- (2) Effectively controlling aging deformation.
- (3) After mechanical testing, mechanism strength has been obviously improved, and perfectly perform the designed mechanism.

Practical appliation: After dissolving aluminum alloy (Duralumin), have it with cryogenic process and unfrozen immediately. It could not only speed up aging, but reduce most of residual stress at same time to improve mechanical character. Found by another info, aluminum alloy casting with cryogenic process has improvement of processed ability.

Material	Parts	Hardness	Durability	Processing life	Dimension stability	Others
SKH	Drill, Cutting, Tools	+	+	+	+	1 time temper
SKD11	Blanking Die, Punch, Cutting Blade, Roller	+	+	+	+	Avoid broke by grinding
SKD61	Aluminum extrusion die	+	+			
SUJ	Rail, Roll guide	+	+		+	
inner parts	Bearing, Gear, Bushing, Cam	+	+		+	Avoid broke by grinding
<b>SUS</b>	Austenite(300)	+	+		+	Improvement of corrosion resistance
	Martensitic(420J2,440)	+	+	+	+	
	Separated(630,631)	+	+		+	
18Ni 280Grade	18%Ni type	+	+		+	Speed up sging Speed up sging
	25%Ni type	+	+		+	
Sintering alloy	Cutting tools, Roller, Automobile parts		+	+	+	Reduce residual stress
Cu alloy	Electrode, Fire gate					
<b>AL alloy</b>	Automatic machinery, precision processing, die manufacture, electronic and precision instrument , SMT, PC board soldering device		+		+	Improvement of processed ability

## LUBRICATION COMPATIBILITY LUBRICATION

If two lubricants incompatible, but mixed to use, would change functionally and physically, such as viscosity 、 shear stability 、 oil filtration 、 and oxidized stability...etc, and also soften lubricant mixed to increase oil leakage. It 's better to use same thickener for the mixture of two lubricants .

If two lubricants with different thickeners required to mix, you need to check compatibility of two thickeners first. To avoid mixture of different thickeners is safest .

### Compatibility comparison of different thickeners as follows

■ Critical compatible    ⊙ Incompatible    ● Compatible    ▲ Same lubricant

	Aluminum complex	Barium-based	Calcium-based	Calcium 12-hydroxysteric acid	Calcium complex	Clay-based	Lithium-based	Lithium 12-hydroxysteric acid	Lithium complex	Urea-based
Aluminum complex	▲	⊙	⊙	●	⊙	⊙	⊙	⊙	●	⊙
Barium-based	⊙	▲	⊙	●	⊙	⊙	⊙	⊙	⊙	⊙
Calcium-based	⊙	⊙	▲	●	⊙	●	●	■	●	⊙
Calcium 12-hydroxysteric acid	●	●	●	▲	■	●	●	●	●	⊙
Calcium complex	⊙	⊙	⊙	■	▲	⊙	⊙	⊙	●	●
Clay-based	⊙	⊙	●	●	⊙	▲	⊙	⊙	⊙	⊙
Lithium-based	⊙	⊙	●	●	⊙	⊙	▲	●	●	⊙
Lithium 12-hydroxysteric acid	⊙	⊙	■	●	⊙	⊙	●	▲	●	⊙
Lithium complex	●	⊙	●	●	●	⊙	●	●	▲	⊙
Urea-based	⊙	⊙	⊙	⊙	●	⊙	⊙	⊙	⊙	▲