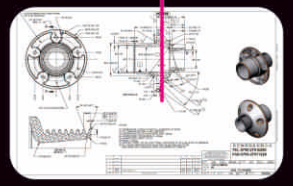
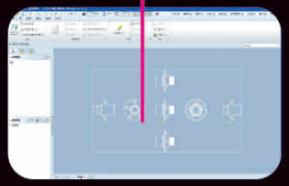
Contents

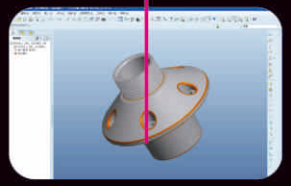
Ligo



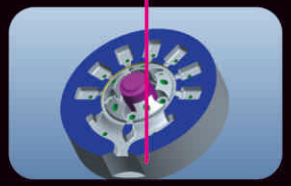
1.Drawing from customer



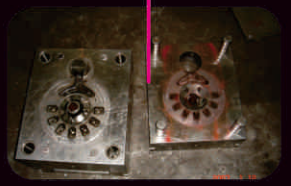
2.Evaluating the drawing



3.Drawing confirmation
From the customer



4.Mold design



5.Producing the mold

6.Trying the mold

7.Improving the part after
trying mold

8.Sample confirmation
from the customer

9.Checking dimensions
of as casting

10.Drilling on the
as casting

11.CNC machine the
as casting

12.Adding the surface
treatment

13.Finished Products

14.Inspection and Package

15.Logistics

16.Assemblying

Order Process

Customer’ s design or samples are welcome. Our engineers make sure that the design becomes manufacture–friendly and keep contact to the customer and the producer until the drawing meets the satisfaction of every party involved. After this the suitable mould can be made and a trial sample will be produced. If the customer is satisfied by the sample the mass production can be started. The whole process runs under the strict supervision of LIGO which QC–inspection system ensures the quality according to your needs. Additional LIGO arranges packing, loading and shipment of your products. As a matter of course we always stand by to listen your opinions continuously and provide after production services.

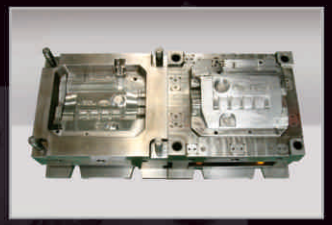
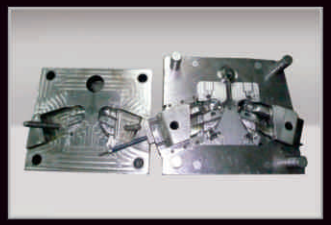
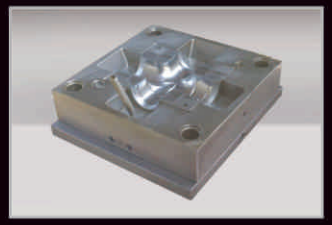
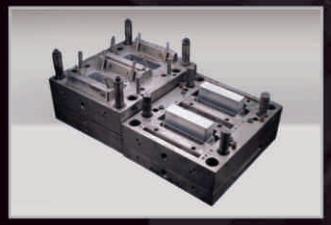
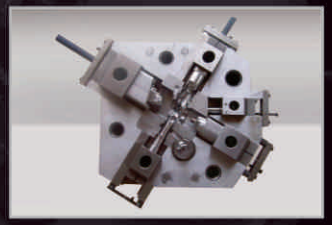
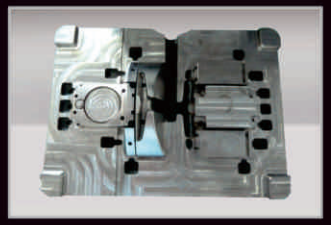
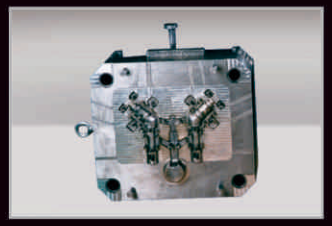
LIGO is a one–stop company for every spare part!

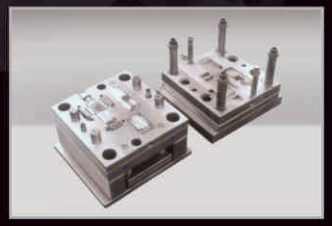
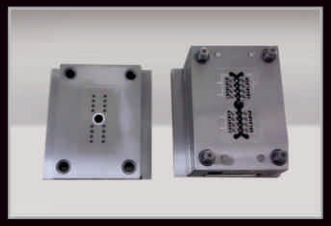
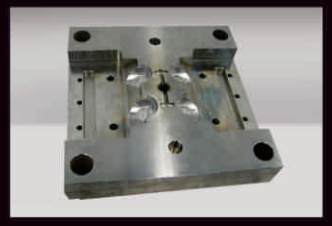
Ligo

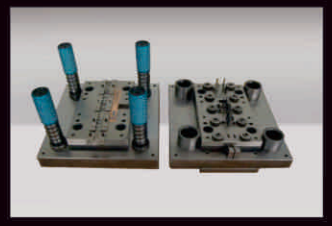
Die casting Mold

Our company can produce all kinds of die–casting mold, and its precision can reach to 0.06mm, and more precision can be reached by machining.



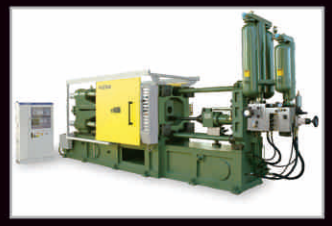







Die–casting Machine

Our company has Lijing, Jiexun, UBE, Toyo, Kaijing, Yuyuan, Zhenli famous brand of die–casting machine and full–automatic working machine, include 88T–1500T Aluminum alloys die–casting machines, 5T–400T Zinc alloys die–casting machine.

145T Die–casting machine



350T Die–casting machine

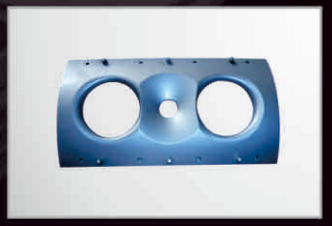
800T Die casting machine

900T Die–casting machine

Die casting parts

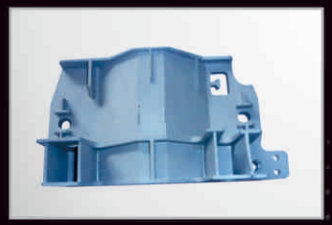
Our company exports die–casting parts for many years and can provide aluminum and its alloys and zinc and its alloys die–castings, and tiny die–castings, have the ability to produce large, middle, small metal parts.









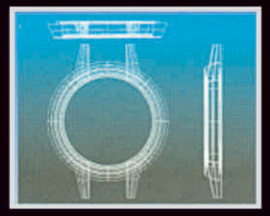



Ligo

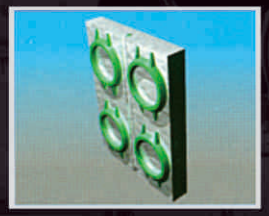
Investment Casting Parts

Company has many years of experience in casting carbon steel and stainless steel parts, has ability to analyze the material and accurately inspect the dimensions independently. Factory has special departments for wax pattern, wax parts combination, mold shell, drying, casting, CNC, sand spraying, polishing, etc. We are making fitness equipment parts, but also produce customized casting parts for different industry.

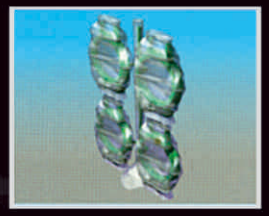
Technique


1 Technology Design


2 Mould Making


3 Wax Injection


4 Wax Mould Assembly


5 Dipping


6 Stuccoing


7 Wax Removing

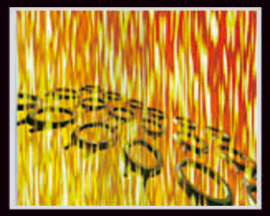

8 Sand Shell Preheating


9 Casting

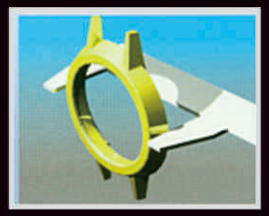

10 Sand Shell Removing


11 Cutting


12 Grinding


13 Heat Treatment

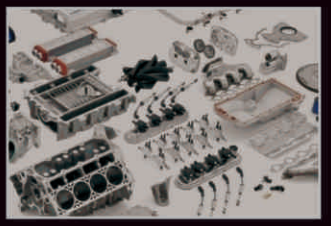

14 CNC machining


15 Quality Inspection


16 Package & Shipping

Hardware Casting Parts





Equipment


Wax attemperator


Low–temperature wax pattern making machine


wax pattern making machine


wax pattern making machine


Two–cylinders column wax injectioin machine


Wax paste mixer


Roasting furnace

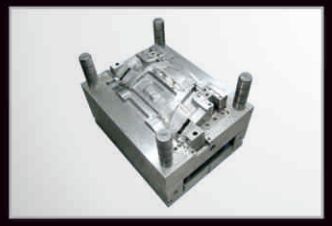
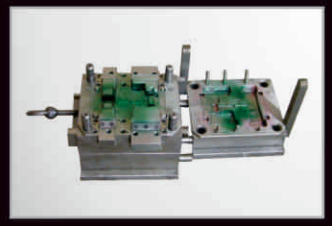
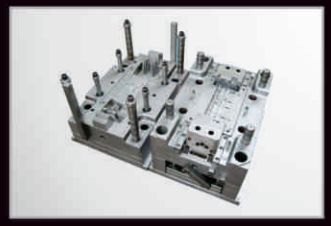

Shucking machine

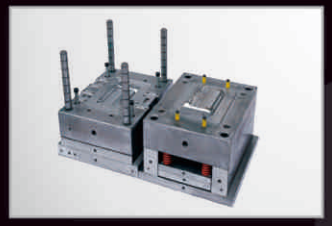
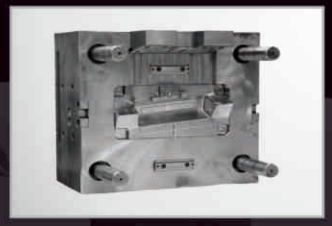
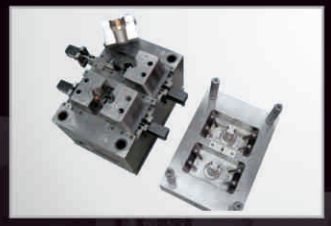
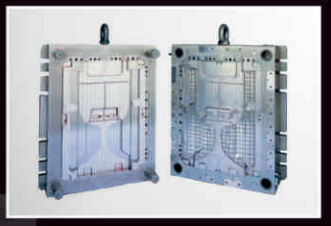
Ligo

Plastic parts

Ligo Company can produce large, middle, small and tiny plastic, e.g
Large plastic parts on body–building equipment and tiny plastic parts on mobile phone.

Plastic mold

Plastic machine


70T Injection machine


80T Injection machine


160T Injection machine


180T Injection machine

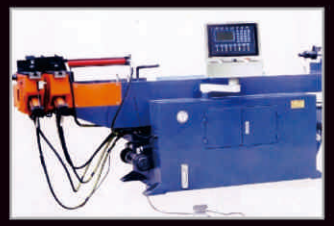

220T Injection machine

350T Injection machine

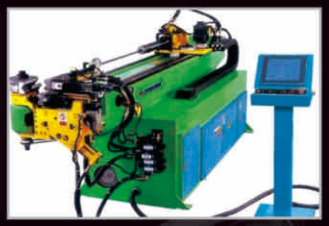

500T Injection machine


1000T Injection machine

Tube Equipment



Tube bender



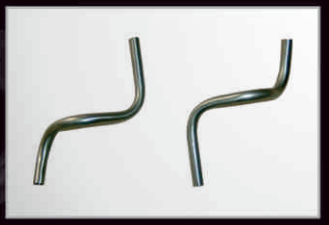
Tube bender

Tube bender

Hose crimping machine

Tube bender

Tube Parts



Stamping Equipment

Stamping machine

Oil hydraulic stretching machine

Oil hydraulic machine

Tube bender

Tube bender

Stamp Parts

Ligo

Prototypes

Our plastic & hardware prototypes regarded as top quality with low cost. We have independent programming ability, workshop have CNC machine, EDM, wire–cutting, grinding & polishing etc. Prototypes range covered all industry area.

Plastic prototype








Transparent prototype








Stainless steel prototype

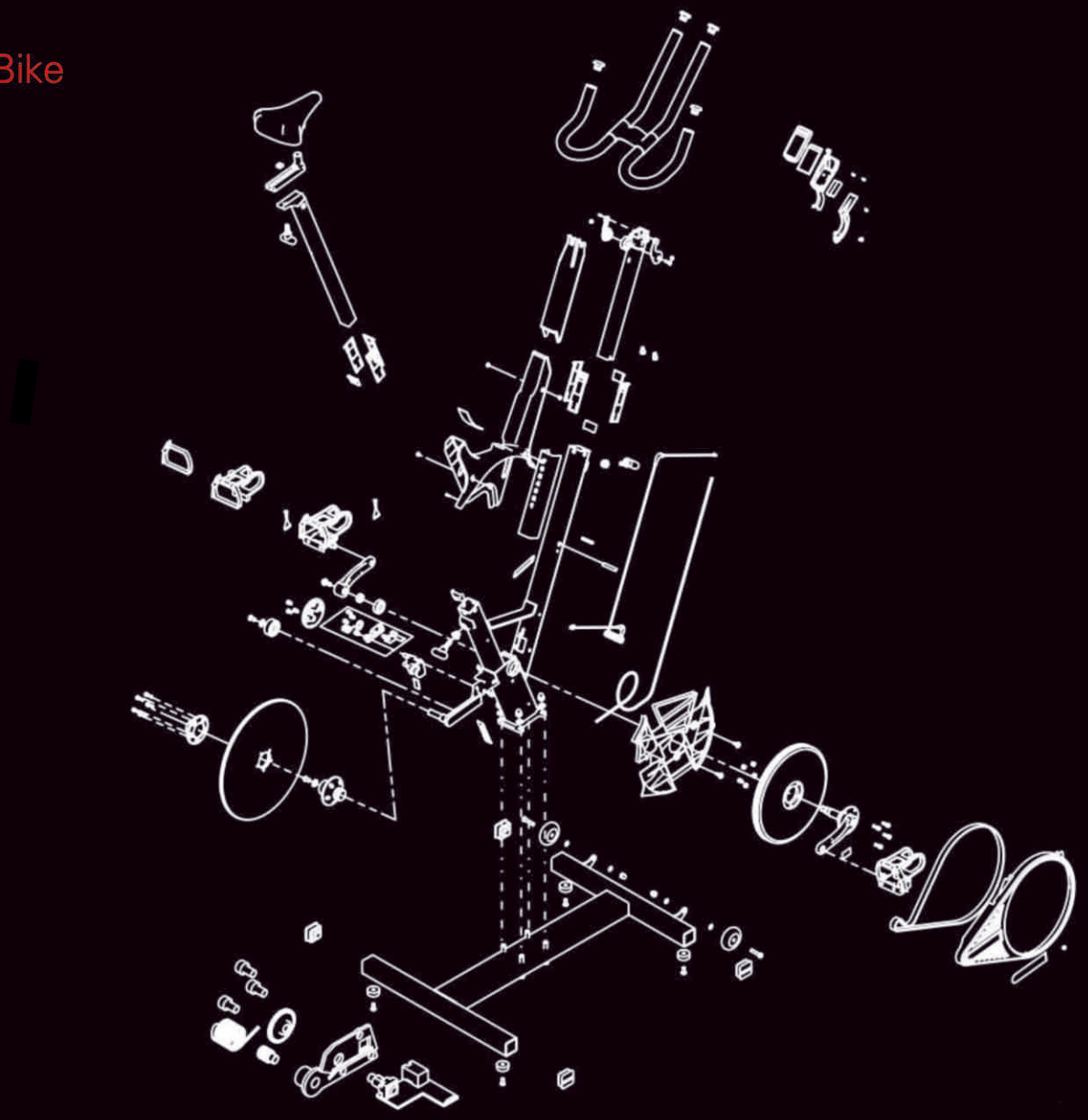
Aluminum alloy

Ligo

Auto parts

LIGO makes all kinds of customer designed Auto parts. The Auto parts are made by using precision Die–casting, Casting, CNC, Stamping, Plastic Injection etc, different production methods. We also provide precision moulds.

Spare Parts for GYM Bike



The material for gym equipment parts includes Aluminum alloy, Zinc alloy, S.Steel, Carbon Steel, ABS, POM, PU etc. LIGO has the ability to make the equipment parts by using all these different production methods.

Ligo

MACHINING

CNC Lathe








Cutting Machine








Grinding Machine







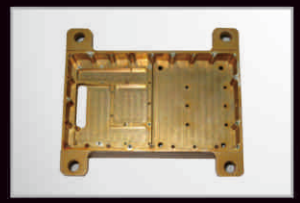

Milling Machine

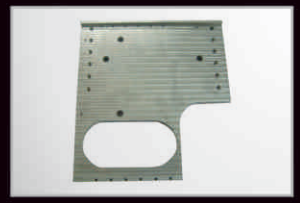







Drilling Machine





SURFACE TREATMENT

Metal plating

Metal plating is a process of plating sediment by electrolysis to change the characteristic of the part and improve the corrosion resistance, abrasion resistance and other function of the appearance and medium.



Plastic plating

Plastic plating is by metal treatment to nonmetal surface, and then by a process of plating sediment by electrolysis to change the characteristic of the part and improve the corrosion resistance, abrasion resistance and other functions of the appearance and medium.




Spraying with PU oil

Baking lacquer, Plastic lacquer, High temperature, Rubber paint, UV paint




Electrolytic polishing

It is an electrochemical process that removes material from a metallic part. It is used to polish, passivate, and deburr metal parts.



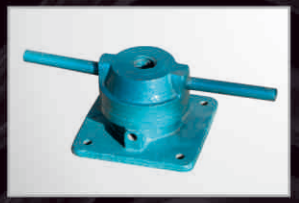





Sand polishing

Sand polishing is the optimum method for surface pretreatment to enhance the bonding strength between coating and matrix.





Draw–bench and silk screen

Surface draw bench process and silk screen parts







Ligo products has complied ISO 9001:2000 in 2008,
Ligo QA includes the following steps:

- Making sure the design is “manufacturing–friendly” and will not cause defects
- Auditing and approving factories based on a relevant checklist
- Getting the manufacturer’s approval of the quality control plan
- Writing down detailed product specifications, and getting the manufacturer’s approval
- Identifying failure points with production engineers, and removing them (back to design)
- Following pre–production sampling closely, and if possible launching a pilot run
- Ensuring that lessons from sampling will be taken into account for production
- Performing QC at one or several points of mass production
- Following up with corrective/preventive action plans, when applicable
- Re–engineering production processes (to reduce opportunities for errors)
- Revising product specifications for the next production batch

Ligo is dedicated to implement the quality management (TQC) which involves all employees and the whole production process. All employees are required as well as entitled to secure the quality according to our slogan:" Disqualified products will never be accepted, produced or distributed by us"

Ligo

Characteristics and application of common engineering plastics

Item	Commodity Name	Code	Fluidity	Yield Strength	Tensile Strength	Shrinkage Rate	Water Absorption	CTE	Precision	Material Cost
1	Acrylonitrile-butadiene-styrene	ABS	common		35~62	0.3~0.8	0.2~0.45	8	3	9800
2	Amino Resin	AF							3	
3	Chlorinated polyether	CP			49	0.5	0.01		4	
4	Epoxide Resin	EP							3	
5	Polytrifluorochloroethylene	F3	bad		37		<0.01	5.8		
6	Polytetrafluoroethene	F4	bad		27.6		<0.01	10.5		
7	Polytetrafluoroethene strengthened	F4+20%GF			17.5		<0.01	7.1	3	
8	Fluoroethylenepropylene	F46	bad		32		<0.01	5.8		
9	High Density Polyethylene	HDPE	good		27	2~5.0	<0.01	12.5	5	7150
10	High-impact polystyrene	HIPS			20	0.2~0.6	0.2	3.4~21		7800
11	Rigid polyvinyl chlorid	HPVC	bad		45.7	0.6~1.0	0.07~0.4	5	4	
12	Liquid crystal polymer	LCP				0.006				
13	Low density polyethylene	LDPE	good		7~15	1.5~5.0	<0.01	22	6	7200
14	Modified polyphenylene oxide	MPPO								
15	Polyamide 6	PA6	good		74	0.6~1.4	3	8.3	4	15000
16	Polyamide 6 strengthened	PA6+30%GF		22~30	110	0.3~0.7	1.1	2.2	3	
17	Polyamide 66	PA66	good		80	0.8~1.5	3.4~3.6	7	4	16000
18	Polyamide 66 strengthened	PA66+30%GF			189	0.2~0.8	0.5~1.3		3	
19	Polyarylsulfone	PASF			91	0.8	1.8	3.6		
20	Polybutylene terephthalate	PBT			55	0.44	0.09	9.2		16000
21	Polybutylene terephthalate strengthened	PBT+30%GF			137	0.2	0.07	2.7	3	
22	Polycarbonate	PC			61	0.5	0.15	7.2	3	19000
23	Polycarbonate strengthened	PC+30%GF	bad		132	0.2	0.1	2.7	3	
25	Polyaryletherketone	PEEK			103			10		
26	Poly(etherketone)	PEK						8.4		
27	Poly(ether-ketone-ketone)	PEKK			102					
28	Polyethersulfone	PES			85	0.6	0.25	5.5		
29	Polyethylene terephthalate	PET			78	1.8	0.26	10		
30	Polyester	PET+30%GF			124	0.2~0.9	0.05	2.9	3	
31	Phenolic plastics	PF							3	
32	Polyimide	PI			100	0.75	0.3	3		
33	Acrylic	PMMA	common		55~77	0.2~0.8	0.34	7	3	
34	Polyoxymethylene	POM-K	common		62	1.5~3.5	0.21	8.5		14000
35	Polyoxymethylene strengthened	POM-K POM+25%GF			130			2.6	3	
36	Acetal homopolymer	POM-H	common		70	1.5~3	0.25	7.5	5	
37	Polypropylene	PP	good		29	1~2.5	0.01	8	5	7300
38	Polypropylene strengthened	PP+30%GF				0.4~0.8	0.05	4		
39	Polyphenylene oxide-usually modified	PPO	bad		76	0.7	0.03	4	3	32000
40	Polyphenylene sulfide strengthened	PPS+40%GF			137	<0.12	<0.05	3	3	87000
41	Polystyrene	PS	good		50	0.4~0.7	0.05	8	3	7500
42	Polysulfone	PSF	bad		75	0.6	0.22	5.7	3	
43	Polyurethane	PU								
44	Flexible polyvinyl chloride	SPVC			10.5~20.5	1.5~2.5	0.25	1	6	6500
45	Ultra-high molecular weight polyethylene	UHMWPE			30~50	2~3	<0.01	12.5		
	Cellulose acetate		good							

Characteristics and application of common engineering plastics

Relative Density	Bending Strength	Compressive Strength	Breaking Elongation	Impact Strength	Notched Impact Strength	Rockwell Hardness	Heat Deflection Temperature	Friction Coefficient	Transmittance	Oxygen Index
1.05	69	69	3～60		7	R65～115	86			18
1.4	65	69	60～130		1.6～2.2		99			
								0.38		
2.13	70	14	125		17	R115	198		90%	>95
2.18	21	13	233		2.7		288	0.3	80%	>95
2.26	21	17	207		1.8			0.13	96%	–
2.11	55	12	190		37	R110	198	0.3		>95
0.95	11	10	〉500		40～70	R70	78			20
1.05			3.5							
1.5	100	20.5			2.2～10.6	D75～D85				
							315			
0.92	34	28	〉650		80～90	R45	50			20
1.14	120		70	33	8.3	M114	58			
1.37	210		3	76			190	0.6		
1.145	130		60	39	9.5	M118	60			
1.38	262		3	102			248	0.5		
1.37	121	126	13	243	8.7	M110	274			
1.31	85		200～300		4.3	M72	66			
1.53	196		4		7.8	R121	220			
1.2	82	78	90		20	M80	133			
1.45	170	125	<5		8	M90	146	0.37	93%	
1.3			11		1387		145			35
							185			
1.3			4							40
1.14	89	110	80	296	12.1	M98	210			
1.38	115		50		4		70		88%	
1.6	196		3		80	R120	215		90%	
1.38	205	166		53	4		360		85%	
1.19	110	130	2.5～6		21	M118	100	0.36		17.3
1.41	98	110			65	M80	110		93%	
1.61	182				86		163	0.31		
1.43	90	127			76	M94	124			
0.9	50	45	>200		0.5	R80～110	102			18
								0.51		
1.06	114		60	127.4		R119	173			
1.6	204		1.3		76	R132	260		0.39	44
1.05	105	115	2		16	M65～90	85			20
1.24	128	98	50～100	310	14.2	M169	185		90%	
1.4		8.8								
0.94	11	10	〉500		>100	R38	95		86%	20
								0.19		

Ligo

Domestic and foreign common steel cross–reference tables

Steel Specification	China GB	Russia ГОСТ	U.S.A ASTM	U.K. BS	Japan JIS	France NF	Germany DIN
	08F	08кп	1006	040A04	S09CK	XC10	C10
	08	08	1008	045M10	S9CK	XC10	C10
	10F		1010	040A10		XC12	
	10	10	1010,1012	045M10	S10C	XC18	C10,CK10
	15	15	1015	095M15	S15C		C15,CK15
	20	20	1020	050A20	S20C	XC32	C22,CK22
Quality	25	25	1025		S25C	XC38TS	CK25
	30	30	1030	060A30	S30C	XC38H1	
carbon	35	35	1035	060A35	S35C	XC45	C35,CK35
	40	40	1040	080A40	S40C	XC48TS	
structural	45	45	1045	080M46	S45C	XC55	C45,CK45
	50	50	1050	060A52	S50C	XC55	CK53
steels	55	55	1055	070M55	S55C	XC12	
	60	60	1060	080A62	S58C	XC18	C60,CK60
	15Mn	15Г	1016,1115	080A17	SB46	XC32	14Mn4
	20Mn	20Г	1021,1022	080A20		40M5	
	30Mn	30Г	1030,1033	080A32	S30C		
	40Mn	40Г	1036,1040	080A40	S40C	Xc48	40Mn4
	45Mn	45Г	1043,1045	080A47	S45C		
	50Mn	50Г	1050,1052	030A52	S53C		
				080M50			

Steel Specification	China GB	Russia ГОСТ	U.S.A ASTM	U.K. BS	Japan JIS	France NF	Germany DIN
	60	60	1060	080A62	S58C	XC55	C60
Spring	85	85	C1085	080A86	SUP3		
			1084				
steel	65Mn	65Г	1566				
	55Si2Mn	55C2Г	9255	250A53	SUP6	55S6	55Si7
	60Si2MnA	60C2ГA	9260	250A61	SUP7	61S7	65Si7
			9260H				
	50CrVA	50ХФA	6150	735A50	SUP10	50CV4	50CrV4
	GCr9	ШХ9	E51100		SUJ1	100C5	105Cr4
Ball			51100				
	GCr9SiMn				SUJ3		
bearing	GCr15	ШХ15	E52100	534A99	SUJ2	100C6	100Cr6
			52100				
steel	GCr15SiMn	ШХ15СГ					100CrMn6
Free	Y12	A12	C1109		SUM12		
	Y15		B1113	220M07	SUM22		10S20
cutting	Y20	A20	C1120		SUM32	20F2	22S20
	Y30	A30	C1130		SUM42		35S20
steel	Y40Mn	A40Г	C1144	225M36		45MF2	40S20
Abrasion -resistant steel	ZGMn13	116Г13Ю			SCMnH11	Z120M12	X120Mn12

Steel Specification	China GB	Russia ГОСТ	U.S.A ASTM	U.K. BS	Japan JIS	France NF	Germany DIN
	20Mn2	20Г2	1320,1321	150M19	SMn420		20Mn5
	30Mn2	30Г2	1330	150M28	SMn433H	32M5	30Mn5
	35Mn2	35Г2	1335	150M36	SMn438(H)	35M5	36Mn5
	40Mn2	40Г2	1340		SMn443	40M5	
Alloy	45Mn2	45Г2	1345		SMn443		46Mn7
	50Mn2	50Г2				~55M5	
structure	20MnV						20MnV6
	35SiMn	35СГ		En46			37MnSi5
steel	42SiMn	35СГ		En46			46MnSi4
	40B		TS14B35				
	45B		50B46H				
	40MnB		50B40				
	45MnB		50B44				
	15Cr	15X	5115	523M15	SCr415(H)	12C3	15Cr3
	20Cr	20X	5120	527A19	SCr420H	18C3	20Cr4
	30Cr	30X	5130	530A30	SCr430		28Cr4
	35Cr	35X	5132	530A36	SCr430(H)	32C4	34Cr4
	40Cr	40X	5140	520M40	SCr440	42C4	41Cr4
	45Cr	45X	5145,5147	534A99	SCr445	45C4	
	38CrSi	38XC					
	12CrMo	12XM		620CR.B		12CD4	13CrMo44
	15CrMo	15XM	A-387Cr . B	1653	STC42	12CD4	16CrMo44
					STT42		
					STB42		
	20CrMo	20XM	4119,4118	CDS12	SCT42	18CD4	20CrMo44
				CDS110	STT42		
					STB42		
	25CrMo		4125	En20A		25CD4	25CrMo4
	30CrMo	30XM	4130	1717COS110	SCM420	30CD4	
	42CrMo		4140	708A42		42CD4	42CrMo4
				708M40			
	35CrMo	35XM	4135	708A37	SCM3	35CD4	34CrMo4
	12CrMoV	12XMФ					
	12Cr1MoV	12X1MФ					13CrMoV42
	25Cr2Mo1VA	25X2M1ФA					
	20CrV	20XФ	6120				22CrV4
Alloy	40CrV	40XФA	6140				42CrV6
	50CrVA	50ХФA	6150	735A30	SUP10	50CV4	50CrV4
structure	15CrMn	15ХГ,18ХГ					
	20CrMn	20ХГСА	5152	527A60	SUP9		
steel	30CrMnSiA	30ХГСА					
	40CrNi	40XH	3140H	640M40	SNC236		40NiCr6
	20CrNi3A	20XH3A	3316			20NC11	20NiCr14
	30CrNi3A	30XH3A	3325	653M31	SNC631H		28NiCr10
			3330		SNC631		
	20MnMoB		80B20				
	38CrMoAlA	38XMIOA		905M39	SACM645	40CAD6.12	41CrAlMo07
	40CrNiMoA	40XHMA	4340	871M40	SNCM439		40NiCrMo22

Domestic and foreign common steel cross–reference tables

Steel Specification	China GB	Russia ГОСТ	U.S.A ASTM	U.K. BS	Japan JIS	France NF	Germany DIN
Carbon tool steel	T7	y7	W1-7		SK7,SK6		C70W1
	T8	y8			SK6,SK5		
	T8A	y8A	W1-0.8C			1104Y175	C80W1
	T8Mn	y8Г			SK5		
	T10	y10	W1-1.0C	D1	SK3		
	T12	y12	W1-1.2C	D1	SK2	Y2 120	C125W
	T12A	y12A	W1-1.2C			XC 120	C125W2
	T13	y13			SK1	Y2 140	C135W
Alloy tool steel	8MnSi						C75W3
	9SiCr	9XC		BH21			90CrSi5
	Cr2	X	L3				100Cr6
	Cr06	13X	W5		SKS8		140Cr3
	9Cr2	9X	L				100Cr6
	W	B1	F1	BF1	SK21		120W4
	Cr12	X12	D3	BD3	SKD1	Z200C12	X210Cr12
	Cr12MoV	X12M	D2	BD2	SKD11	Z200C12	X165CrMoV46
	9Mn2V	9Г2Ф	02			80M80	90MnV8
	9CrWMn	9XBГ	01		SKS3	80M8	
	CrWMn	XBГ	07		SKS31	105WC13	105WCr6
	3Cr2W8V	3X2B8Ф	H21	BH21	SKD5	X30WC9V	X30WCrV93
	5CrMnMo	5XГM			SKT5		40CrMnMo7
	5CrNiMo	5XHM	L6		SKT4	55NCDV7	55NiCrMoV6
	4Cr5MoSiV	4X5MФC	H11	BH11	SKD61	Z38CDV5	X38CrMoV51
	4CrW2Si	4XB2C			SKS41	40WCDS35-12	35WCrV7
	5CrW2Si	5XB2C	S1	BSi			45WCrV7
High speed tool steel	W18Cr4V	P18	T1	BT1	SKH2	Z80WCV	S18-0-1
						18-04-01	
	W6Mo5Cr4V2	P6M3	N2	BM2	SKH9	Z85WDCV	S6-5-2
						06-05-04-02	
	W18Cr4VCo5	P18K5Ф2	T4	BT4	SKH3	Z80WKCV	S18-1-2-5
						18-05-04-01	
	W2Mo9Cr4VCo8		M42	Bm42		Z110DKCWV	S2-10-1-8
						09-08-04-02-01	

Steel Specification	China GB	Russia ГОСТ	U.S.A ASTM	U.K. BS	Japan JIS	France NF	Germany DIN
Carbon tool steel	1Cr18Ni9	12X18H9	302 S30200	302S25	SUS302	Z10CN18.09	X12CrNi188
	Y1Cr18Ni9		303 S30300	303S21	SUS303	Z10CNF18.09	X12CrNiS188
	0Cr19Ni9	08X18H10	304 S30400	304S15	SUS304	Z6CN18.09	X5CrNi189
	00Cr19Ni11	03X18H11	304L S30403	304S12	SUS304L	Z2CN18.09	X2CrNi189
	0Cr18Ni11Ti	08X18H10T	321 S32100	321S12 321S20	SUS321	Z6CNT18.10	X10CrNiTi189
Alloy tool steel	0Cr13Al		405 S40500	405S17	SUS405	Z6CA13	X7CrAl13
	1Cr17	12X17	430 S43000	430S15	SUS430	Z8C17	X8Cr17
	1Cr13	12X13	410 S41000	410S21	SUS410	Z12C13	X10Cr13
	2Cr13	20X13	420 S42000	420S37	SUS420J1	Z20C13	X20Cr13
	3Cr13	30X13		420S45	SUS420J2		
	7Cr17		440A S44002		SUS440A		
	0Cr17Ni7Al	09X17H7Ю	631 S17700		SUS631	Z8CNA17.7	X7CrNiAl177
High speed tool steel	2Cr23Ni13	20X23H12	309 S30900	309S24	SUH309	Z15CN24.13	
	2Cr25Ni21	20X25H20C2	310 S31000	310S24	SUH310	Z12CN25.20	CrNi2520
	0Cr25Ni20		310S S31008		SUS310S		
	0Cr17Ni12Mo2	08X17H13M2T	316 S31600	316S16	SUS316	Z6CND17.12	X5CrNiMo1810
	0Cr18Ni11Nb	08X18H12E	347 S34700	347S17	SUS347	Z6CNNb18.10	X10CrNiNb189
	1Cr13Mo				SUS410J1		
	1Cr17Ni2	14X17H2	431 S43100	431S29	SUS431	Z15CN16-02	X22CrNi17
	0Cr17Ni7Al	09X17H7Ю	631 S17700		SUS631	Z8CNA17.7	X7CrNiAl177

Tolerance for casting dimension:tolerance for Geman investment casting VDGP690 D1

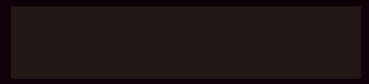
Basic Information	≤10	10–14	14–18	18–24	24–30	30–40	40–50	50–65	65–80	80–100	100–120
Tolerance	±0.12	±0.15	±0.20	±0.25	±0.30	±0.37	±0.44	±0.52	±0.60	±0.68	±0.76

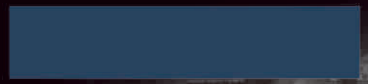
World Aluminium Alloy die casting material cross–reference table

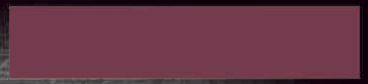
Alloy series	CNS code	JIS code (H5302)	AA/ASTM (1984)	SAE J452	ISO (DIS3522)	NFA57-703/2(1981)	BS1490	DIN1725 (1986)	Italy (UNI)
AL–Si系	1種	ADC1	A413	305	Al–Si12CuFe	A–S12Y4	LM20	GD–AlSi12(Cu)	5079
AL–Si–Mg系	3種	ADC3	A360.0	309	--	A–S9GY4	LM9	GD–AlSi10Mg	5074
AL–Mg系	5種	ADC5	518	--	--	A–G6Y4	LM5	GD–AlMg9	3058
AL–Mg系	6種	ADC6	515	--	--	A–G3T	--	--	--
AL–Si–Cu系	10種	ADC10	B380.0	306	AlSi8Cu3Fe	A–S9U3Y4	LM24	GD–AlSi9Cu3	5075
AL–Si–Cu系	10種Z	ADC10Z	A380.0	306	AlSi8Cu3Fe	--	--	GD–AlSi9Cu3	--
AL–Si–Cu系	12種	ADC12	383	383	--	--	LM2	--	--
AL–Si–Cu系	12種Z	ADC12Z	383	383	--	--	LM2	--	--
AL–Si–Cu系	14種	ADC14	B390.0	A23900	--	--	Lm30	--	--

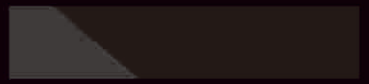
Strength Upholstery：

NOTE:Actual colors may vary from the colors seen on your viewing screen or print.


Black/Standard

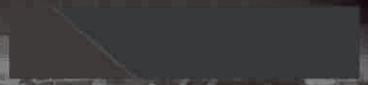

Slate Blue(Optional)


Clay Red(Optional)


Graphite(Optional)


Alloy(Optional)


American Beauty(Optional)


Alloy/Graphite(Optional)


Hazelnut/Alloy(Optional)

Product pricing is reflective of standard upholstery only.Other color options available at an additional charge.
Customized Upholstery Branding (6 week lead time)–Once all artwork completed.
Logo requirements:Adobe illustrator CS3 or earlier vector file.
Customized upholstery colors available.Contact your Ligo sales representative for pricing information.