



**SEN NAI**  
**森耐机械**

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WhatsApp



Website



Full technological process,  
professional, independent production,  
multi-field pins and bushings products



***PIN&BUSHING***

Shandong Sennai Intelligent Technology Co., Ltd.



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Superior Performance

Quality Guarantee

Custom Processing

Quickly Delivery

# Company Introduction



Shandong Sennai Intelligent Technology Co., Ltd. is a set of scientific research, production, sales, and service in one of the professional production of self-lubricating bearings and construction machinery for pins and bushings of industry and trade integration enterprises. With 16+ years of industry experience and global sales channels. We can provide support services for many famous construction machinery and equipment manufacturers at home and abroad and provide OEM/ODM services for nearly 100 trading companies every year. With a construction area of 33,000 square meters, the company has more than 260 sets of advanced production equipment such as a finishing rolling pipe production line, forging production line, CNC automatic processing production line, full-process heat treatment equipment, high-precision grinding equipment, physical and chemical analysis, and detection.



## Advanced Equipment

It now has more than 260 advanced production equipment such as finishing pipe production line, forging production line, CNC automatic production line, horizontal machining center, vertical machining center, heat treatment equipment of whole process, high-precision grinding equipment, physical and chemical analysis and testing equipment. Supporting facilities include large comprehensive exhibition hall, research and development room, professional laboratory, etc.



## Technical Talents

With an excellent R&D team and research cooperation with many domestic universities and metal research institutes to solve technical problems in processing and production. Together we continuously develop a variety of new products and focus on the heat treatment technology. This creates a research, development and production system integrating university, research institute and our factory.



## Management Capability

We actively implement the "8S" management method and ISO16949 Quality Management System, regulates staff behavior, optimizes the business operations, strengthens the site management system, promotes the standardized workshop regulations and ensures our production quality.

—Forging a century-old enterprise with a century-old culture—

# Catalogue of Products



Steel bushing  
Page: **05-14**



Blind hole/oil storage steel bushing  
Page: **15-16**



Bimetallic composite self-lubricating bushing  
Page: **17**



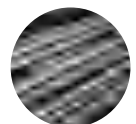
High strength wear-resistant shims  
Page: **18**



Pins  
Page: **19**



Bushings plinth  
Page: **20**

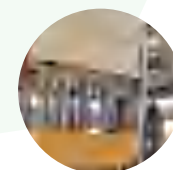


Seamless steel pipe and forging service  
Page: **21-22**

We can customize bushing, steel pipes and forging products in various industries



Construction machinery



Hydraulic industry



Automotive field



Bushing and pin for joint part

# 1 SN-H Steel Bushing



The inner surface of SN-H steel bushing is processed with various types of oil grooves, which improves the surface hardness and wear resistance after heat treatment. It is suitable for heavy-duty joint parts of construction machinery such as excavators, rotary drilling rigs, large loaders, wall grab and so on.

Performance Index		Data
Hardness	HRC	50-62
MaxLoad	N/mm <sup>2</sup>	80
Max Linear Velocity	m/s	0.1
Max PV Value	m/min	2
WorkingTemperature Limit	°C	-70~+300
Linear Expansion Coefficient	10 <sup>-5</sup> /°C	1.1

The steel bushing bearing of our company is based on 45#, 40Cr, 20CrMo, GCr15 and other materials. From raw materials to finished products, each process is strictly controlled to ensure the product quality. It produces bushing with high wear resistance, high surface hardness and strong internal toughness.



## SN-H-1 Integrally quenched steel bushing

**Material** 40Cr medium carbon alloy steel

**Surface** Phosphating, molybdenum disulfide spraying on internal surface

**Process** Integral quenching, hardness 50~55HRC.

## SN-H-2 Carburized and quenched steel bushing

**Material** 20CrMnTi, 20CrMo and other low carbon or low carbon alloy steels

**Surface** Phosphating, molybdenum disulfide spraying on internal surface

**Process** Surface carburizing and quenching  
Surface hardness 58~62HRC  
The depth of carburized layer is 1.0~1.5mm.

## SN-H-3 High frequency quenched steel bushing

**Material** 45, 40Cr

**Surface** Phosphating, molybdenum disulfide spraying on internal surface

**Process** Hardness of quenched and tempered treatment is 201~269HB, internal surface is highly quenched, surface hardness is 55~60HRC, and effective hardness of quench-hardened case is 1.0~2.0mm.



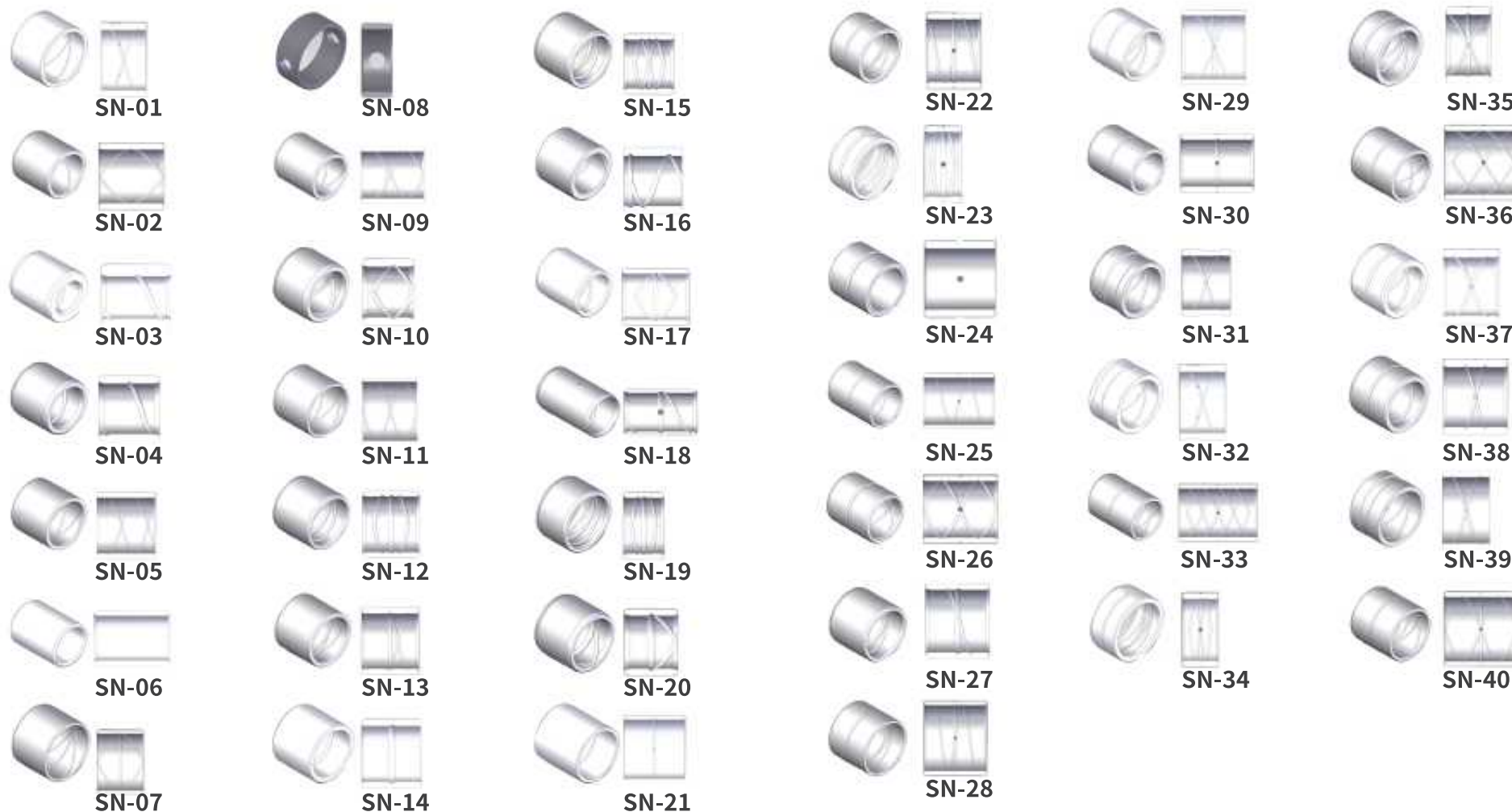
## Optional Material

- ▶ **42CrMo**-Super high strength steel
- ▶ **40Cr**-Medium carbon quenched and tempered steel
- ▶ **20CrMo/20CrMnTi**-Low carbon alloy steel
- ▶ **Gcr15**-Bearing steel
- ▶ **45#**-Carbon steel

A variety of product materials can be customized to meet your different product needs



# Optional Styles



For more styles, please send the picture and customize.

## Optional Specifications

We can customize the product according to the customer's drawings, process, tolerance requirements, style and quantity. The following is the processing scope. Please contact pre-sale customer service for specific dimensions.

### Custom Size



**Inner Diameter Range**  
25mm—250mm

**Outer Diameter Range**  
35mm—300mm

**Height Range**  
10mm—400mm

**Outer Diameter Range**  
45mm—300mm

### Accuracy



**Concentricity** : 0.05mm

**Parallelism** : 0.02mm

**Verticality** : 0.03mm

**Circularity** : 0.005mm

**Roughness** : Ra0.8

**HRC Hardness** : 50-62

**High Precision** :  $\pm 0.01$ mm

**Inner Diameter Accuracy** :  $\pm 0.02$ mm

**Outer Diameter Accuracy** :  $\pm 0.01$ mm

## Sample Display



Hardness after basic quenching and tempering  
Process: High frequency quenching of inner surface  
Hardness after quenching and tempering: :HRC 52-60  
Depth of quench-hardened case:1.5-2.0mm  
**Any product can be customized according to customer requirements**



Process: Carburizing and quenching  
Hardening depth:1.2-3mm  
Hardness of heat treatment: :58-62HRC  
**Any product can be customized according to customer requirements**



Hardness of blank after quenching and tempering:HB 201-275  
Hardness of high-frequency quenching and tempering:HRC52-60  
Depth of quench-hardened case:1.5-2.0mm  
**Any product can be customized according to customer requirements**



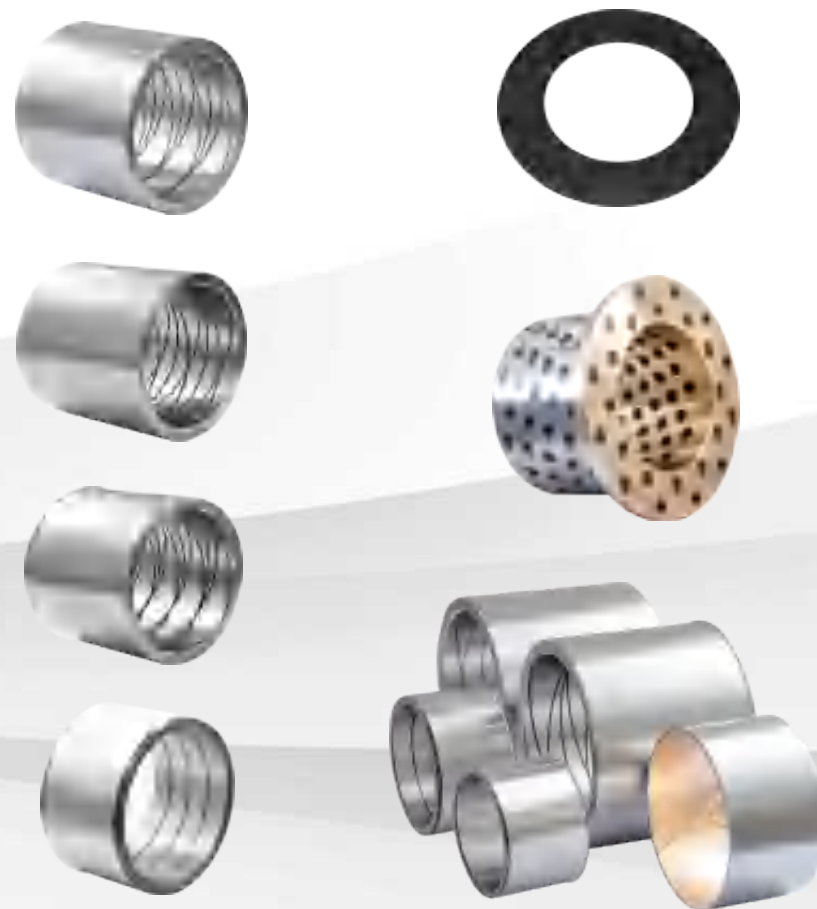
Process: Multipurpose furnace carburizing  
Thickness of carburized layer:1.5-2.0mm  
Hardness of carburized layer:HRC60--62  
Molybdenum disulfide spraying on inner surface  
**Any product can be customized according to customer requirements**



## Customized Products



We are one of the few factories in China that can independently produce in full process. We can control the quality of products at every stage of manufacturing, and the following is a customized case display of some customers.



We can customize bushing, steel pipes and forging products in various industries

# 2 SN-O

## Blind hole/oil storage steel bushing

The inner surface of the blind hole oil storage steel bushing is sprayed with molybdenum disulfide, which has the advantages of low friction coefficient and good wear resistance, and can work under the condition without oil or with little oil. Products are widely used in construction machinery, heavy duty high load equipment.



### Product Advantages

- The inner wall of the bushing is evenly distributed with blind holes with conical cross-section.
- The lubricating oil wedge is formed naturally during the grinding process of the inner hole of the bushing
- The oil storage capacity of oil pocket is large, which is 3~5 times of that of ordinary oil tank and can be free from maintenance for a long time.
- The oil pockets are evenly distributed on the inner wall, and the center distance of the oil pockets in the circumferential direction is fixed. No matter how large the bushing is, it only needs a small rotation angle to fill the inner surface of the bushing with the oil cloth, without lubrication dead area.
- The oil pockets evenly distributed in the inner holes do not damage the bearing capacity of the inner wall of the bushing and prolong the service life of the bushing.

**Material:** 20CrMnTi, 20CrMo and other low carbon alloy steels

**Surface treatment:** Molybdenum disulfide spraying

Performance Index		Data
Hardness	HV	≥650
Max Load	N/mm <sup>2</sup>	100
Max Linear Velocity	m/min	1.5
Max PV Value	N/mm <sup>2</sup> .m/s	2.5
WorkingTemperature Limit	°C	-70~+300
Linear Expansion Coefficient	10 <sup>-5</sup> /°C	1.1



Process: Multipurpose furnace carburizing  
 Thickness of carburized layer: 1-1.5mm  
 Hardness of carburized layer: HRC58-62  
 Molybdenum disulfide spraying on inner surface

**We can customize bushing, steel pipes and forging products in various industries**

# 3 SN-B

## Bimetallic composite self-lubricating bushing



The bimetallic self-lubricating graphite copper bushing is based on low carbon steel, and the inner surface is Tin Phosphorus Bronze, the thickness can be customized 0.5-5mm. The ZCuSn10P1 tin-phosphorus bronze has high hardness and wear resistance. It can be used to manufacture parts that work under heavy load, high speed and high temperature, and the copper bushing is subject to strong friction. The surface of the bimetallic self-lubricating graphite bushing is inlaid with a special formula of solid lubricant at a certain angle and density, which is precisely processed, so that the copper bushing has the advantages of high wear resistance, high hardness and high toughness.

Material and bushing characteristics	Company	value	Company	value
Maximum load	Mpa	100	psi	145,00
working temperature	° C	-40~+300	° F	-40~+572
Oil lubrication				
Maximum linear velocity	m/s	0.5	fpm	100
Maximum PV value	m/sxMPa	1.65	pis x fpm	48,000
Minimum hardness of sliding layer	HB	210	HB	210
Minimum hardness of dual parts	HRC	40	HRC	40

# 4 SN-S

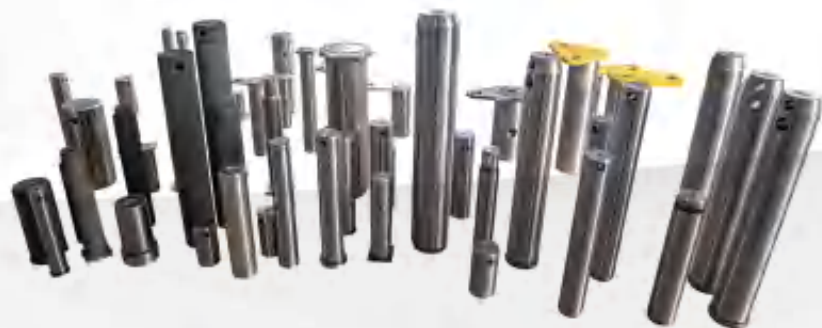
## High strength wear-resistant shims



The adjustment shims with high strength and high wear resistance is made of spring steel C70 with superior mechanical properties, strength, hardness, elasticity, toughness and hardenability are very good, with overheating sensitivity and tempering brittleness tendency, low cold deformation plasticity, is a kind of high strength and high wear resistance of adjustable parts, widely used in excavators, loaders and other construction machinery fields.

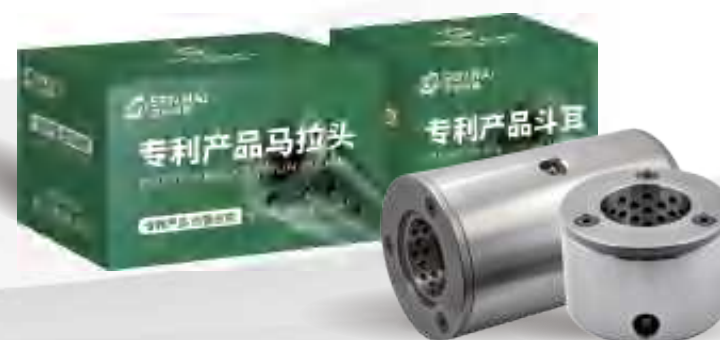


# 5 SN-P Pin



Choose 45#, 40Cr, 42CrMo and other materials as the main material, can also be customized according to customer requirements, according to the advanced heat treatment process, surface hardness can reach HRC 58-62, has good toughness, yield resistance and tensile properties, tensile strength can reach  $\sigma_b$  (MPa) :  $\geq 1080(110)$ , yield strength  $\sigma_s$  (MPa) :  $\geq 930(95)$ .

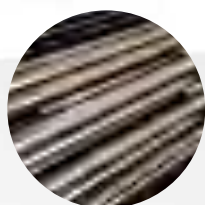
# 6 SN-BP Bushing plinth



The patented product selection of high strength alloy steel, 16Mn as the workpiece body, has good tensile and yield strength, excellent welding performance, the supporting flange type bushing, selection of high quality 40Cr alloy steel as raw materials; After forging process, advanced heat treatment process, so that the product has high hardness, high wear resistance, good flexibility, impact resistance. The product of the invention is a practical patented product with "cost-effective, one-time replacement and lifetime use".

# 7 Seamless steel pipe products and forging services

We provide various types of finish rolled seamless steel pipe products



- Various specifications of steel pipe
- Various steel pipe materials
- Large inventory
- Supply chain stability



## We Provide Forging Services

Sample after forging and sandblasting





## Parameter Table



No.	Size	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size
1	25*35*30	51	45*65*60	101	55*75*70	151	65*75*70	201	70*85*75	251	80*100*110	301	80*90*55	351	85*95*95	401	90*135*90
2	25*35*35	52	50*60*35	102	55*75*80	152	65*75*75	202	70*85*80	252	80*100*120	302	80*90*60	352	90*100*100	402	90*140*90
3	25*35*40	53	50*60*40	103	60*70*40	153	65*75*80	203	70*85*85	253	80*100*55	303	80*90*70	353	90*100*110	403	95*110*100
4	25*35*45	54	50*60*45	104	60*70*50	154	65*75*90	204	70*85*90	254	80*100*60	304	80*90*80	354	90*100*50	404	95*110*110
5	30*40*30	55	50*60*50	105	60*70*55	155	65*77*70	205	70*85*95	255	80*100*65	305	80*90*85	355	90*100*60	405	95*110*70
6	30*40*40	56	50*60*60	106	60*70*60	156	65*77*90	206	70*86*70	256	80*100*70	306	80*90*90	356	90*100*70	406	95*110*80
7	30*40*45	57	50*60*70	107	60*70*65	157	65*80*100	207	70*86*80	257	80*100*80	307	80*90*95	357	90*100*80	407	95*110*90
8	30*40*50	58	50*60*80	108	60*70*70	158	65*80*35	208	70*90*100	258	80*100*85	308	80*95*100	358	90*100*90	408	95*115*100
9	30*40*60	59	50*60*90	109	60*70*75	159	65*80*40	209	70*90*50	259	80*100*90	309	80*95*105	359	90*105*100	409	95*115*110
10	30*45*40	60	50*65*40	110	60*70*80	160	65*80*45	210	70*90*60	260	80*100*95	310	80*95*110	360	90*105*110	410	95*115*90
11	30*45*50	61	50*65*45	111	60*70*90	161	65*80*50	211	70*90*70	261	80*105*100	311	80*95*120	361	90*105*120	411	100*110*100
12	30*50*40	62	50*65*50	112	60*75*40	162	65*80*55	212	70*90*75	262	80*105*50	312	80*95*130	362	90*105*130	412	100*110*90
13	30*50*50	63	50*65*55	113	60*75*45	163	65*80*60	213	70*90*80	263	80*105*55	313	80*95*40	363	90*105*140	413	100*115*100
14	35*45*35	64	50*65*60	114	60*75*50	164	65*80*65	214	70*90*85	264	80*105*60	314	80*95*45	364	90*105*40	414	100*115*110
15	35*45*40	65	50*65*65	115	60*75*55	165	65*80*70	215	70*90*90	265	80*105*65	315	80*95*50	365	90*105*50	415	100*115*120
16	35*45*45	66	50*65*70	116	60*75*60	166	65*80*75	216	70*95*100	266	80*105*70	316	80*95*55	366	90*105*60	416	100*115*130
17	35*45*50	67	50*65*75	117	60*75*65	167	65*80*80	217	70*95*45	267	80*105*75	317	80*95*60	367	90*105*65	417	100*115*140
18	35*45*60	68	50*65*80	118	60*75*70	168	65*80*85	218	70*95*70	268	80*105*80	318	80*95*65	368	90*105*70	418	100*115*50
19	35*50*35	69	50*70*40	119	60*75*75	169	65*80*90	219	70*95*80	269	80*105*85	319	80*95*70	369	90*105*75	419	100*115*60
20	35*50*40	70	50*70*45	120	60*75*80	170	65*80*95	220	70*95*90	270	80*105*90	320	80*95*75	370	90*105*80	420	100*115*70
21	35*50*50	71	50*70*50	121	60*75*90	171	65*85*100	221	70*95*95	271	80*110*100	321	80*95*80	371	90*105*85	421	100*115*80
22	35*50*60	72	50*70*55	122	60*80*45	172	65*85*60	222	71*86*50	272	80*110*110	322	80*95*85	372	90*105*90	422	100*115*90
23	40*50*45	73	50*70*60	123	60*80*50	173	65*85*65	223	71*86*55	273	80*110*40	323	80*95*90	373	90*105*95	423	100*115*95
24	40*50*50	74	50*70*70	124	60*80*55	174	65*85*70	224	71*86*60	274	80*110*45	324	80*95*95	374	90*106*100	424	100*116*100
25	40*50*55	75	50*70*80	125	60*80*60	175	65*85*80	225	71*86*65	275	80*110*50	325	80*96*90	375	90*106*110	425	100*116*110
26	40*50*60	76	50*75*50	126	60*80*65	176	65*85*90	226	71*86*70	276	80*110*55	326	85*100*100	376	90*106*120	426	100*116*90
27	40*55*40	77	50*75*60	127	60*80*70	177	65*90*65	227	71*86*75	277	80*110*60	327	85*100*110	377	90*106*130	427	100*120*100
28	40*55*45	78	50*75*70	128	60*80*75	178	65*90*70	228	71*86*80	278	80*110*65	328	85*100*120	378	90*106*90	428	100*120*110
29	40*55*50	79	50*80*60	129	60*80*80	179	65*95*60	229	71*86*85	279	80*110*70	329	85*100*45	379	90*106*90	429	100*120*120
30	40*55*60	80	55*65*40	130	60*80*85	180	65*95*65	230	71*86*90	280	80*110*75	330	85*100*60	380	90*110*100	430	100*120*130
31	40*60*40	81	55*65*45	131	60*80*90	181	70*100*80	231	71*86*95	281	80*110*80	331	85*100*70	381	90*110*120	431	100*120*70
32	40*60*50	82	55*65*50	132	60*85*45	182	70*100*90	232	75*85*100	282	80*110*85	332	85*100*80	382	90*110*70	432	100*120*80
33	40*60*60	83	55*65*55	133	60*85*50	183	70*80*50	233	75*85*50	283	80*110*90	333	85*100*85	383	90*110*80	433	100*120*90
34	40*65*50	84	55*65*60	134	60*85*55	184	70*80*55	234	75*85*60	284	80*110*95	334	85*100*90	384	90*110*90	434	100*125*100
35	40*65*55	85	55*65*65	135	60*85*60	185	70*80*60	235	75*85*65	285	80*115*70	335	85*105*100	385	90*110*95	435	100*125*110
36	40*65*60	86	55*65*70	136	60*85*65	186	70*80*65	236	75*85*70	286	80*115*80	336	85*105*70	386	90*115*100	436	100*125*120
37	45*55*30	87	55*65*75	137	60*85*70	187	70*80*70	237	75*85*75	287	80*115*90	337	85*105*80	387	90*115*90	437	100*125*90
38	45*55*35	88	55*65*80	138	60*85*75	188	70*80*75	238	75*85*80	288	80*115*95	338	85*105*85	388	90*120*100	438	100*130*100
39	45*55*45	89	55*65*85	139	60*85*80	189	70*80*80	239	75*85*85	289	80*120*100	339	85*105*90	389	90*120*105	439	100*130*110
40	45*55*50	90	55*70*40	140	60*85*85	190	70*80*85	240	75*85*90	290	80*120*110	340	85*110*90	390	90*120*110	440	100*130*120
41	45*55*55	91	55*70*45	141	60*85*90	191	70*80*90	241	75*90*40	291	80*120*120	341	85*115*90	391	90*120*115	441	100*130*130
42	45*55*60	92	55*70*50	142	60*90*60	192	70*80*95	242	75*90*50	292	80*120*70	342	85*95*100	392	90*120*120	442	100*130*90
43	45*55*65	93	55*70*55	143	60*90*70	193	70*85*100	243	75*90*60	293	80*120*80	343	85*95*110	393	90*120*130	443	100*135*100
44	45*55*70	94	55*70*60	144	60*95*60	194	70*85*40	244	75*90*65	294	80*120*90	344	85*95*40	394	90*120*90	444	100*135*110
45	45*60*45	95	55*70*65	145	65*75*100	195	70*85*45	245	75*90*70	295	80*120*95	345	85*95*50	395	90*125*100	445	100*135*120
46	45*60*50	96	55*70*70	146	65*75*40	196	70*85*50	246	75*90*75	296	80*90*100	346	85*95*60	396	90*125*110	446	100*135*90
47	45*60*55	97	55*70*80	147	65*75*50	197	70*85*55	247	75*90*85	297	80*90*110	347	85*95*70	397	90*125*90	447	100*140*100
48	45*60*60	98	55*75*50	148	65*75*55	198	70*85*60	248	75*90*90	298	80*90*120	348	85*95*80	398	90*130*100	448	100*140*90
49	45*65*45	99	55*75*55	149	65*75*60	199	70*85*65	249	75*95*90	299	80*90*40	349	85*95*85	399	90*130*110	449	105*120*100
50	45*65*50	100	55*75*60	150	65*75*65	200	70*85*70	250	80*100*100	300	80*90*50	350	85*95*90	400	90*130*120	450	105*120*110

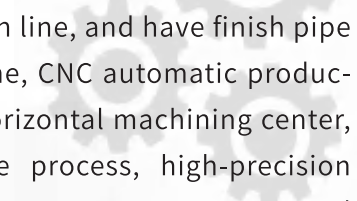


## Scope of Service



We can provide supporting services and OEM/ODM services for many well-known construction machinery and equipment manufacturers at home and abroad.

## Production Process



We own a complete product production line, and have finish pipe production line, forging production line, CNC automatic production line, vertical machining center, horizontal machining center, heat treatment equipment of whole process, high-precision grinding equipment, can meet various process requirements, and are equipped with professional technical team to provide technical support for customers.



### Product Raw Materials

We purchase more than 10,000 tons of seamless steel tubes every year, and have high-quality steel suppliers with large inventory and complete models, and ensure strong supply capacity of products



Seamless steel pipe finishing production line



CNC automatic production line



Forging production line



CNC processing equipment

# CNC machining center



Vertical machining center



Vertical machining center



Horizontal machining center

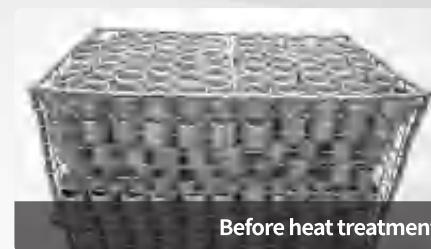
The factory has vertical and horizontal machining center equipment and professional and technical personnel team, high efficiency, strong comprehensive ability, can complete the shape of complex, high precision requirements of the single processing. And has a perfect staff skills training system, talent selection training plan.



Technology For Heating Processing

Thickness of carburizing layer: 1-1.5mm  
Surface hardness: HRC 50-62

We have a rich cluster of heat treatment equipment, complete solutions to various steel heat treatment problems and rigorous quality control systems. We can heat treat various precision components, and can accurately control the hardening depth and hardness of carburizing. The technicians conduct in-depth experimental research on each work-piece to ensure that the hardness, strength, plasticity and toughness of the different materials are optimized after tempering. Make the metallographic structure tend to be stable and ensure that no deformation occurs in later use process.



Before heat treatment



After heat treatment





Internal grinding



External grinding



QC quality inspection



Finished product area



Product packaging



Logistics transportation

Professional QC quality inspection team shall be responsible for the overall work of the department and organize implementation of relevant quality management regulations. Report batch quality problems timely, timely provide the information of unqualified products, and dispose unqualified products to ensure that the product quality meets the requirements.

## Product Testing R&D Center

