



SEN NAI
森耐机械

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SEN NAI
森耐机械

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



PINS&BUSHING

Shandong Sennai Machinery Manufacturing Co.,LTD



SEN NAI
森耐机械

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

Superior Performance

Quality Guarantee

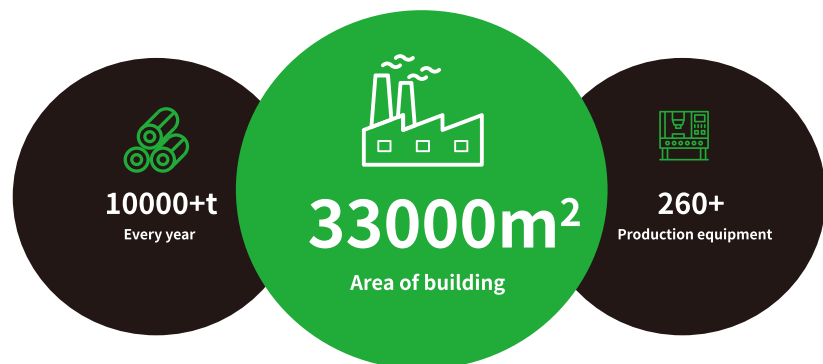
Custom Processing

Quickly Delivery

Company Introduction



Shandong Sennai Machinery Manufacturing Co., LTD. is located in Jinan City, Shandong Province. It owns a factory in Liaocheng, Shandong Province. As a professional manufacturer of self-lubricating bearing equipment and a trade enterprise integratsR&D, production, sales and technical service. With 16 years industry expertise and many global sales channels which provides supporting services for many well-known construction machinery and equipment manufacturers domestically and overseas. And also provides OEM/ODM services for nearly 100 trading companies every year.



Advanced Equipment

It now has more than 260 advanced production equipment such as finishing 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, 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
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Mesh steel bushing
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Bimetallic composite self-lubricating bushing
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Pins
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Special bucket bushing
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Seamless steel pipe and forging service
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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 bearing 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	58-62
MaxLoad	N/mm ²	250
Max Linear Velocity	m/s	0.1
Max PV Value	N/mm ² .m/s	1.5
WorkingTemperature Limit	°C	-100~+350
Linear Expansion Coefficient	10 ⁻⁵ /°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 1.0~1.2mm.

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



SN-01



SN-08



SN-15



SN-22



SN-29



SN-35



SN-02



SN-09



SN-16



SN-23



SN-30



SN-36



SN-03



SN-10



SN-17



SN-24



SN-31



SN-37



SN-04



SN-11



SN-18



SN-25



SN-32



SN-38



SN-05



SN-12



SN-19



SN-26



SN-33



SN-39



SN-06



SN-13



SN-20



SN-27



SN-34



SN-40



SN-07



SN-14



SN-21



SN-28

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 : 0.02mm

Parallelism : 0.02mm

Verticality : 0.03mm

Circularity : 0.005mm

Roughness : 0.6

HRC Hardness : 58-62

High Precision : ± 0.02 mm

Inner Diameter Accuracy : 0.02mm

Outer Diameter Accuracy : 0.005mm

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 ²	200
Max Linear Velocity	m/s	0.1
Max PV Value	N/mm ² .m/s	1.5
WorkingTemperature Limit	°C	-100~+350
Linear Expansion Coefficient	10 ⁻⁵ /°C	1.1



Process: Multipurpose furnace carburizing
 Thickness of carburized layer: 1.5-2.0mm
 Hardness of carburized layer: HRC60--62
 Molybdenum disulfide spraying on inner surface

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

3 SN-X

Mesh steel bushing



Optimized surface morphology of the mesh line bushing provides grease reservoirs and allows abrasive particles to be removed from the contact area. Double-sided printing surface processing provides high surface hardness and excellent wear resistance, seizure resistance and corrosion resistance.

Due to the combination of double surface treatment and special surface morphology, the mesh bushing has excellent wear resistance and seizure resistance. This cross hatch morphology provides a grease reservoir in the load area and can remove abrasive particles. They are suitable for working under harsh working conditions: High pressure, wear, impact and corrosion.

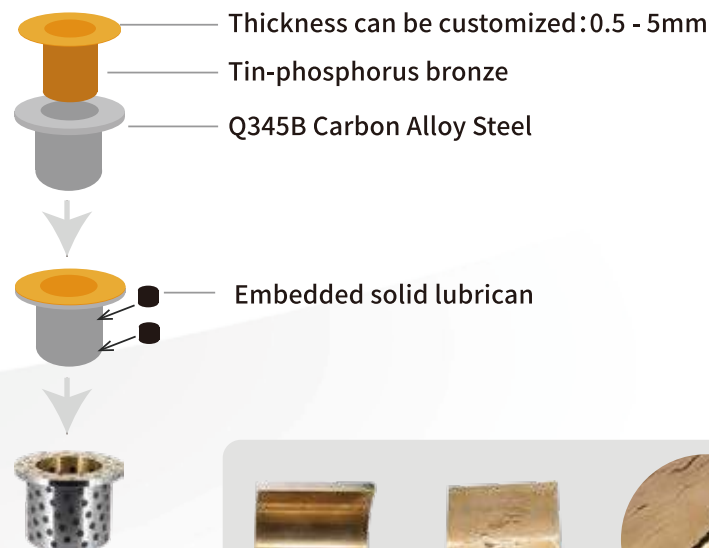
Mesh sleeves are alternatives without cross-hatches. They provide excellent performance under high static loads (low dynamic pressures) and small oscillations (wear resistance and seizure resistance...)

Performance Index		Data
Hardness	HV	≥650
Max Load	N/mm ²	200
Max Linear Velocity	m/s	0.1
Max PV Value	N/mm ² .m/s	1.5
WorkingTemperature Limit	°C	-100~+350
Linear Expansion Coefficient	10 ⁻⁶ /°C	1.1

4 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.



Adhesion test of bimetallic composite layer

Material and bushing characteristics	Company	value	Company	value
Maximum load	Mpa	100	psi	145,00
working temperature	° C	-40 to 300	° F	-40 to 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

The bimetallic self-lubricating graphite copper bushing is a novel lubricating bearing with the characteristics of metal bearing and self-lubricating bearing. It is loaded by metal matrix, and the solid lubricating material with special formula plays a lubricating role. It has the characteristics of high bearing capacity, impact resistance, high temperature resistance and strong self-lubricating capability. It is especially suitable for occasions that are difficult to lubricate and form oil membrane, such as heavy load, low speed, reciprocating or swinging, and it is also not afraid of water erosion and erosion of other acids.

5 SN-P

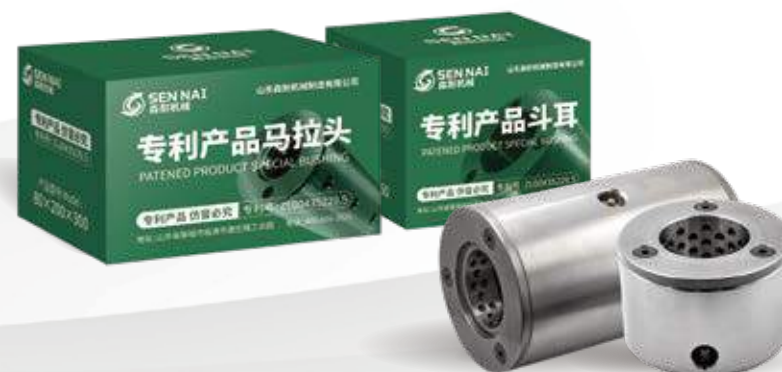
Pins



Choose 45#, 40Cr, 42CrMo, 20CrMnTi 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 σ_b (MPa) : $\geq 1080(110)$, yield strength σ_s (MPa) : $\geq 930(95)$.

6 SN-S

Special bucket bushing



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

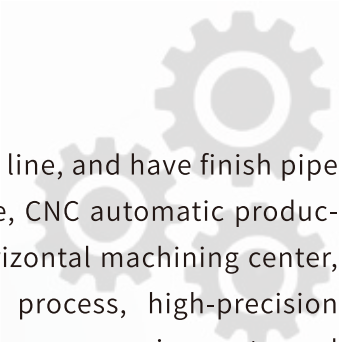


Scope of sale



Our products are exported to more than 120 countries and regions, providing supporting services for many well-known construction machinery and equipment manufacturers at home and abroad, and providing OEM/ODM services for nearly 100 trading companies every year.

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

We have the most professional team
with the original intention,

Create value for customers, create opportunities for employees, and create benefits for enterprises and society!



Partner Customers



... look forward to cooperating with you!