

Automotive Elastic Components Manufacturer

Cangzhou Hengde Kaiye Spring Manufacturing Co., Ltd

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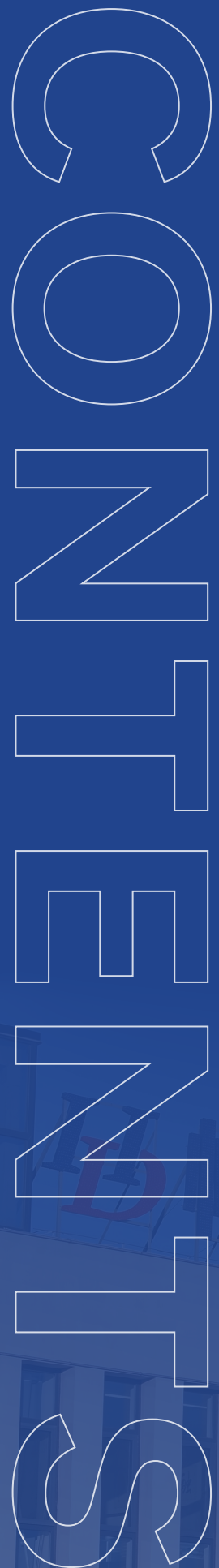


AUTOMOTIVE ELASTIC COMPONENTS MANUFACTURER

Flattened Wire Retaining Ring | Snap Ring | Circlip



Cangzhou Hengde Kaiye Spring Manufacturing Co., Ltd



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Automotive Elastic Parts Manufacturer

30 +
Years
Design And Manufacturing Experience

70 +
People
Team Size

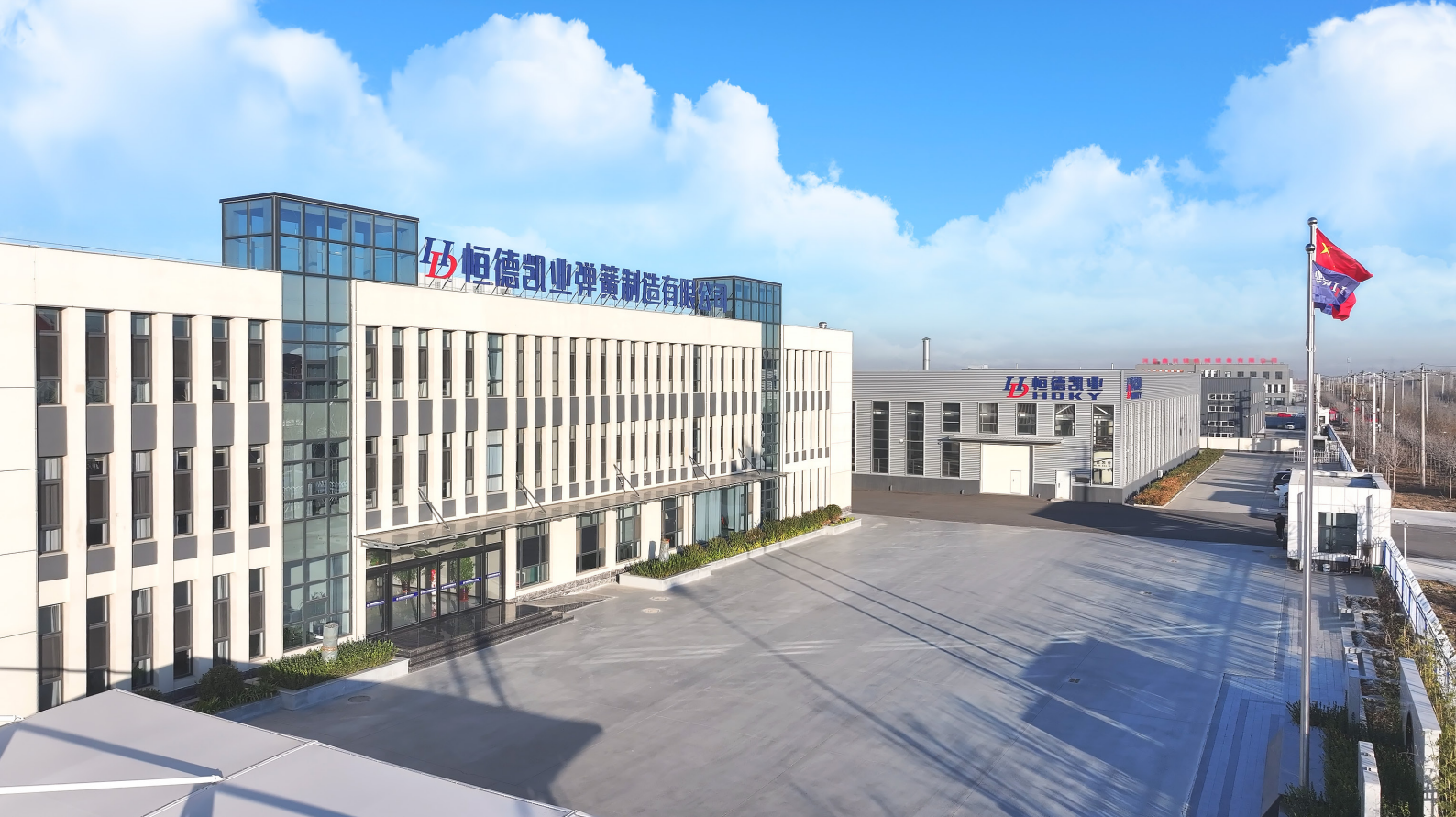
100 +
Individual
Countries And Regions Served

Cangzhou Hengde Kaiye Spring Manufacturing Co., Ltd

focuses on providing high-quality elastic parts for the automotive industry and is one of the leading suppliers of flattened wire retaining rings in China.

With more than 30 years of experience in the design and manufacturing of elastic parts, Hengde Kaiye has gradually developed into a comprehensive enterprise integrating product design, production, customization and trade, and is committed to providing excellent products and services to the global automotive industry.

The company has an experienced technical team, production team and consulting team. Focusing on accurately conveying customer needs, innovative design and manufacturing, and providing customers with high-quality solutions. The total number of team members is 75, including 10 technical team members and 6 quality team members.

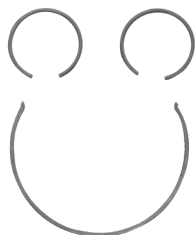


The products cover the elastic parts required by multiple automotive systems, mainly including: flattened wire retaining rings, elastic retaining rings, stop rings, springs, torsion springs, straight groove elastic pins, adjustment washers, suspension springs, steering ball head glands, etc. Flattened wire retaining rings, elastic retaining rings, and stop rings have become the main competitive strengths of Hengde Kaiye. These products are widely used in new energy gearboxes, reducers, dual clutch transmissions, (VT gearboxes, manual transmissions, steering systems, etc. Our parts are widely used in cars, SUVs, MPVs, pickups, passenger vehicles, and light and heavy freight vehicles.

We focus on product design and customization, can efficiently understand and implement customer needs, continuously optimize production processes, and improve product precision. The company uses advanced production equipment to provide comprehensive technical support including spring cold rolling, stamping, heat treatment, surface treatment, etc.



Flattened Wire Retaining Ring



Wire Retaining Ring



Circlip



Circlip

About HengDe KaiYe

Mission

Hengde Kaiye is dedicated to providing high-quality elastic components for the global automotive industry, supporting its green, intelligent, and sustainable development. We focus on innovation and technology, delivering high-performance products and services to create maximum value for customers. We also promote environmental protection technologies and the sustainable growth of the industry chain, contributing to the green transformation of the automotive sector.



Vision

To become a global leading supplier of automotive elastic components and a leader in industry technology innovation and quality management. We strive to become the preferred partner of global automotive manufacturers through continuous technological innovation and lean production. Our goal is to continuously improve product quality and service levels, expand international market share, set industry benchmarks, and promote the development of the global automotive parts industry.

Values



Integrity



Innovation



Quality First



Customer



First Teamwork

2015

The "Lean Full Value Chain" improvement project was launched. Through the introduction of lean production management, production efficiency was improved, operating costs were reduced, and the company's internal processes were further optimized.

2020

The first phase of construction of the company's new factory has started, further expanding production capacity and improving the company's overall level of manufacturing and R&D.

2003

Passing the ISO9001 quality management system certification marks that the company has taken a solid step forward in quality management and laid the foundation for the company's steady development.

2012

Passed TS16949 quality management system certification, further strengthened the quality control ability in the field of automotive parts production and improved the company's competitiveness.

2018

Passing the IATF16949:2016 quality certification has further improved the quality system, indicating that the company has stronger international competitiveness in the global automotive parts industry.

April 2021

The completion of the overall relocation to the new plant marks a comprehensive upgrade of the company's production conditions, management system and production capacity.

March 2021

The first phase of construction of the company's new factory has been completed, and the new facilities will better support the company's expansion of production scale and continuous technological innovation.

May 2021

The lean management improvement project has been launched to drive continuous improvement, enhance product quality, and increase production efficiency through advanced lean production concepts and tools.

2023

The company's second phase of construction has been basically completed, and the newly added production capacity and R&D facilities have laid a solid foundation for future technological innovation and market expansion.

2024

The company initiated ISO 14001, ISO 45001 and safety production standard certification to strengthen environmental protection and employee safety responsibilities and promote sustainable development.



Enterprise Qualification

Quality is the cornerstone of Hengde Kaiye's development

The company strictly follows the IATF16949 quality management system and uses Minitab capability analysis, metallographic analysis, cleanliness particle analysis, salt spray test and other testing methods to monitor the entire production process to ensure that the products meet international standards. Through metallographic testing and image analysis and other methods, the company optimizes product quality, focusing on controlling key indicators such as hardness, flatness, parallelism, cleanliness, etc. to meet customer needs.



Hebei Province Innovative Small and Medium Enterprises



Premium Partner



Factory Showcase

Hengde Kaiye has a number of advanced production lines, covering the entire process from raw materials to finished products. In order to continuously optimize the production process, the company continues to introduce automated equipment to replace old production methods, improve parts processing accuracy, and further improve product quality.



Figure: Winding production line



Figure: Surface treatment production line
(description of blackening production line)



Figure: Stamping production line



Figure: Continuous heat treatment production line



The production facilities include: continuous industrial electric furnace production line, continuous blackening production line, surface treatment automatic line, winding production line, sandblasting production line, stamping production line, coil stamping production line, mold warehouse, etc.



Figure: Continuous tempering furnace

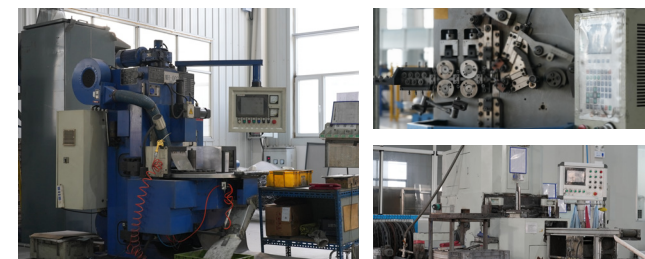


Figure: Grinding production line



Figure: Mould warehouse

The equipment and facilities are equipped with a number of CNC cam spring winding machines, CNC spring end grinders, CNC compression spring machines, double end grinders and ultrasonic cleaning machines.



The testing equipment includes a direct reading spectrometer, cleanliness particle analyzer, torsion testing machine, digital spring tension/compression tester, Vickers hardness tester, metallographic microscope, 2D imager, Rockwell hardness tester, and more. The equipment is continuously being improved to ensure comprehensive support for product testing from production to delivery.

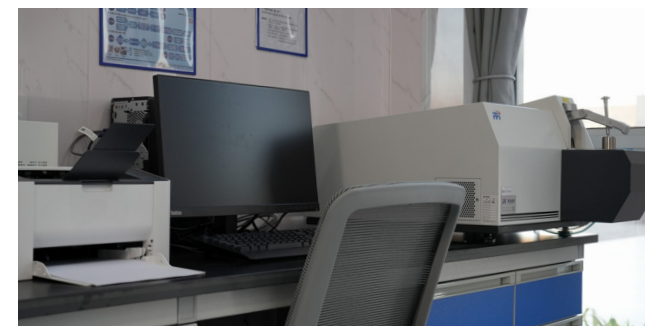


Figure: Direct reading spectrometer



Figure: Cleanliness analysis system



Figure: Cleanliness extraction equipment

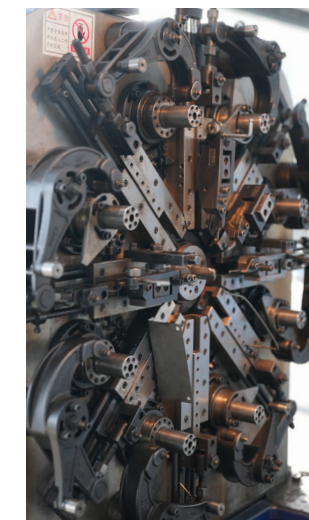


Figure: Computer cam universal machine

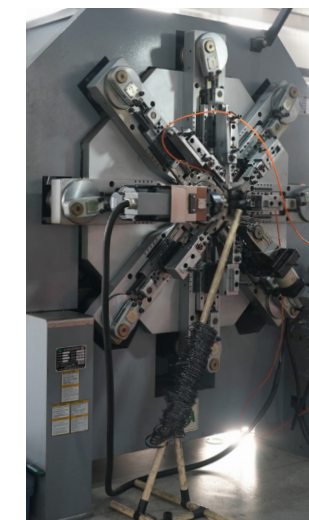


Figure: Computer camless universal machine



Left: Spring tension and compression testing machine



Figure: Salt spray test machine



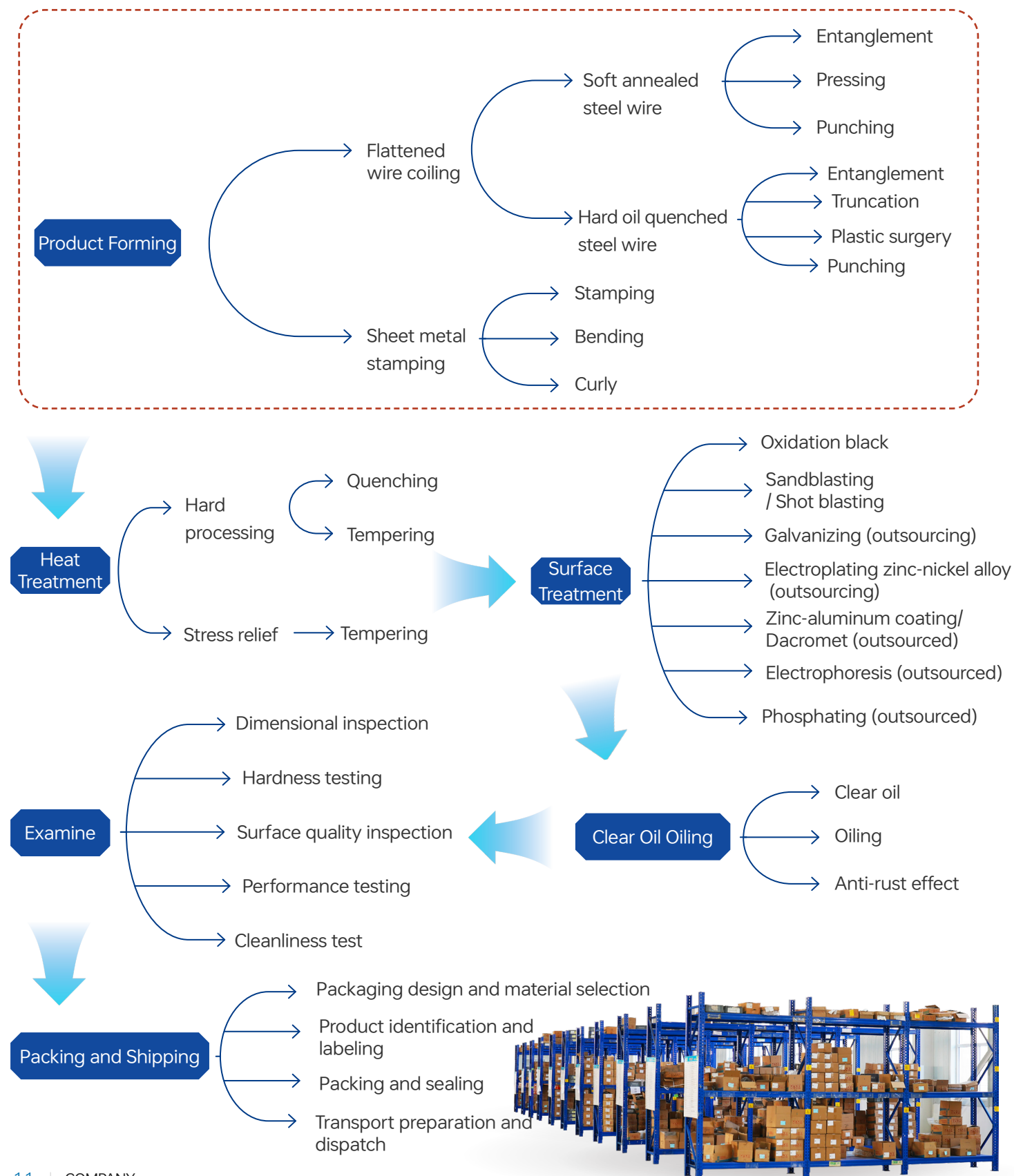
Left: Metallographic microscope
Right: Vickers hardness tester

For goods: Use shelves to distinguish finished products, optimize the space usage and stacking method of finished products in the finished product warehouse. Add shelf inventory search boards, in and out material detail cards, set replenishment points and replenishment batches, and quickly obtain finished product information (including inventory status, in and out details, etc.).



Process

Our production processes include cold coiling springs, cold coiling flattened wire retaining rings, stamping elastic and special-shaped retaining rings, and heat treatment (quenching and tempering). We also offer surface treatments like sandblasting, shot blasting, finishing, oxidation, bluing, phosphating, and electroplating to ensure parts meet functional requirements and have excellent surface quality.



Service

After years of development, Hengde Kaiye has established a wide customer base in China, with a sales network covering multiple cities and automobile industrial parks, serving five major automobile manufacturing bases. With its deep roots in the domestic market, the company is able to quickly respond to customer needs and provide customized products. In the international market, Hengde Kaiye has established stable long-term cooperative relationships with customers in Europe, North America, South America, Asia and other regions, and has been widely recognized.



In the future, the company will deepen its internationalization strategy, improve innovation, production efficiency and service quality, and strive to become a leader in the global automotive elastic parts industry.



Full Support - Cooperation / After-sales



Initial contact and demand communication

Customers contact us through telephone, email or official website to inquire about product information or put forward requirements. During the communication, our sales team discusses product requirements, application scenarios, budget, etc. with customers in detail and provides preliminary suggestions based on customer needs.



Cooperation agreement signed

After clarifying the needs and solutions, we draft a cooperation agreement, including product specifications, prices, delivery dates, payment methods and other terms to ensure that the rights and interests of both parties are protected. After the customer confirms the agreement and pays the advance payment, the project is officially launched.



Product design and development

We design products according to customer needs, provide relevant design solutions, and confirm with customers. If sample production is required, we will test and verify the samples to ensure that the product functions and quality meet the requirements. After the customer confirms the samples, we will enter the mass production stage.



Production and manufacturing

After confirming the sample, we purchase the appropriate raw materials and start formal production. During the production process, we conduct multiple strict quality control on each process to ensure that the product meets customer requirements and international quality standards. At the same time, we conduct inspections to ensure the stable quality of each batch of products.



Inspection and acceptance

After production is completed, we conduct a comprehensive product inspection to ensure that all products meet the design and quality standards. Customers can choose on-site acceptance, or remote acceptance or acceptance by a third party agency to ensure that the product meets actual needs.



Packaging and delivery

After the product has passed the inspection, we will select the appropriate packaging solution to ensure that it will not be damaged during transportation. After the packaging is completed, we will arrange logistics delivery according to customer requirements and provide detailed logistics tracking information to ensure that customers can keep track of the goods at any time.



After-sales service and support

After the product is delivered, we continue to track customer usage and provide customers with professional after-sales support. If customers encounter problems during use, our technical team will provide timely technical support or repair services to ensure the normal use of the product.

Technical support and maintenance services



We provide 24-hour technical support to ensure that customer problems are solved in a timely manner. Whether it is operation or failure, our technical team provides guidance or remote assistance.

Regular maintenance and inspection



To ensure stable operation of our products, we provide regular maintenance and inspection services. Our after-sales team develops maintenance plans based on customer needs, including cleaning, lubrication and adjustments to prevent failures and extend service life.

Operation training and technical documentation support



We provide product operation training to help customers master the usage methods and precautions to ensure safe and efficient operation. At the same time, we provide operation manuals and technical documents for customers to check at any time.

Warranty service and extended warranty



During the warranty period, if the product fails due to quality problems, we provide free repair or replacement services. In addition, we also provide extended warranty services. Customers can extend the warranty period according to their needs and enjoy longer quality assurance.

Customer feedback and continuous improvement



We provide 24/7 customer support and customers can contact us at any time. After receiving feedback, we will respond and provide solutions within 24 hours. Emergency situations are given priority to ensure quick resolution of the problem.

Industry Applications

Automotive Industry

- ★ High strength and durability
- ★ Precision Machining
- ★ Customized Solutions

It is widely used in heavy machinery and equipment such as engineering machinery, construction equipment, mining machinery, etc., especially in high-intensity and high-load working environments, providing stable performance support.

New Energy Industry

- ★ Highly adaptable
- ★ Energy saving and environmental protection
- ★ High stability and durability

With the development of the new energy industry, our products provide key technical support in the fields of electric vehicles, wind power generation, solar energy equipment, etc.

Construction Machinery And Equipment

- ★ Strong carrying capacity
- ★ High wear resistance
- ★ Reliability and stability

Our products are widely used in heavy machinery and equipment such as engineering machinery, construction equipment, mining machinery, etc., especially in high-intensity and high-load working environments, providing stable performance support.

Aerospace Industry

- ★ High temperature resistance
- ★ Corrosion resistance
- ★ High accuracy

Our elastic components are widely used in aircraft, spacecraft and ground equipment to ensure safety, reliability and high temperature resistance in demanding environments.

Electronics And Electrical Industry

- ★ High precision
- ★ High fatigue resistance
- ★ Environmental protection and safety

Our elastic components are widely used in power tools, home appliances, communication equipment and electrical control systems, ensuring the precise operation and long-term stability of electronic products.

Military And Defense Industry

- ★ High shock resistance
- ★ High temperature and corrosion resistance
- ★ Safe and reliable

Our elastic components are widely used in military equipment, weapon systems and defense facilities, ensuring the accuracy, reliability and durability of the equipment under harsh conditions.

**Innovative technology
win-win for the industry**

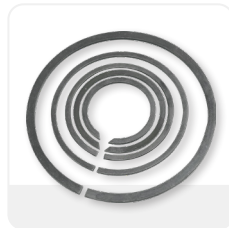
**——Provide high-quality elastic components for various industries
Enable innovation and efficient operation**

Product Range Overview

01.Wire Retaining Ring



Hole retaining ring
/Flattened wire retaining rings/



Shaft retaining rings
/Flattened wire retaining rings/

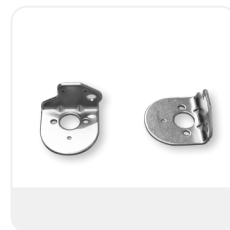


C-type retaining ring
/Flattened wire retaining rings/

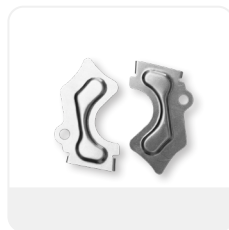


Roundwire snap ring

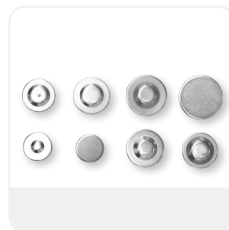
02.Automobile Stamping Parts



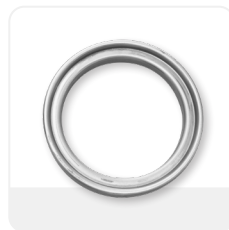
Motor bracket



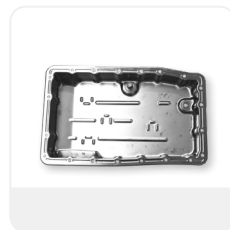
Shell oil collecting plate



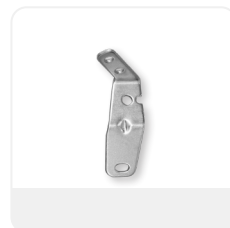
Connecting rod ball
pin plug cover



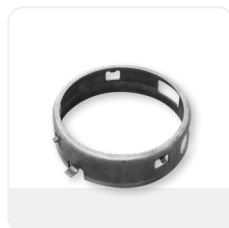
Automobile stamping parts



Automobile oil pan



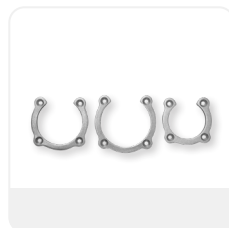
Wire harness bracket



Brake sleeve



Brake pressure plate



Bearing cover plate

03.Adjusting Shims



Adjusting shims

04.Circlip



Elastic ring for hole



Elastic ring for shaft



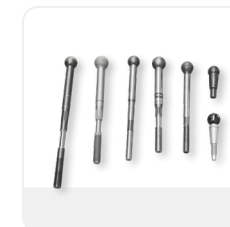
E-type ring

05.Wave Spring



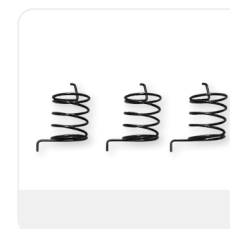
Multilayer top-to-top
wave spring

06.Cold Heading Parts

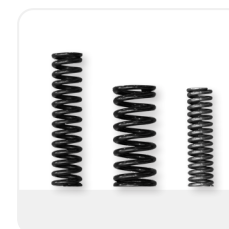


Ball pin connecting rod

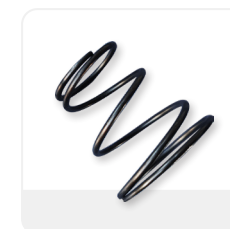
07.Spring



Cylindrical helical
torsion spring



Cylindrical helical
compression spring

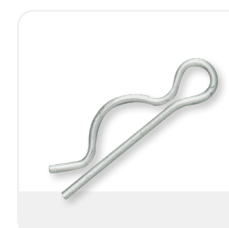


Conical helical
compression spring

08.Special-shaped Circlip



Dust cover retaining ring



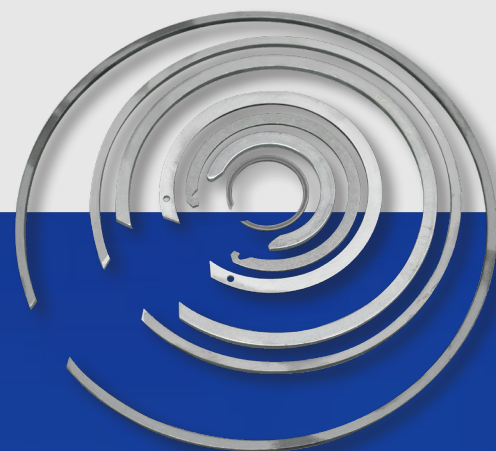
Lock pin



Spring expansion ring

01 | Wire retaining ring

Flattened wire retaining ring



Flattened wire retaining ring

01. Introduction

A retaining ring, also known as a circlip, is a part used for axial limiting, and a flattened wire retaining ring is one type of retaining ring made of flattened wire. It can prevent other parts from axial movement and ensure the stability and reliability of the mechanical device.

02. Classification

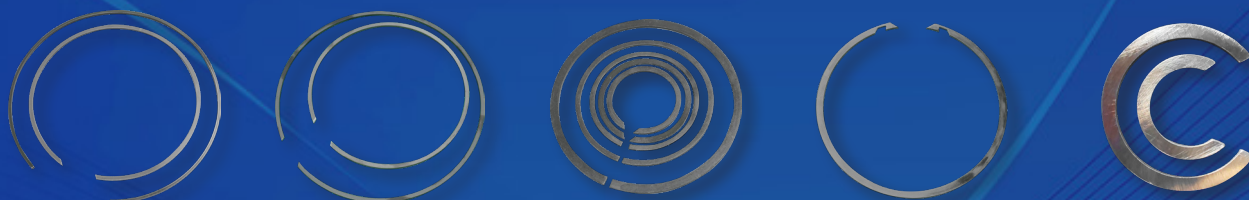
According to the different usage scenarios and installation positions, it can be divided into hole retaining rings, shaft retaining rings, and C-type retaining rings:

Hole retaining rings: Mainly used to be installed in the hole, and its elasticity or rigidity is used to limit the axial movement of the shaft or other parts.

Shaft retaining rings: Mainly used to be installed on the shaft, and its structural characteristics are used to fix the parts on the shaft to prevent their axial movement.

C-type retaining rings: Mainly used to be installed on the shaft. Due to the influence of its use environment, it cannot be installed with a flattened steel wire retaining ring for the shaft (that is, installed into the groove from one end of the shaft), and it needs to be installed in a radial manner.

In addition, affected by the usage scenario and installation position, some retaining rings have added mounting holes or slots to cooperate with calipers for installation operations.



Hole retaining ring

Hole retaining ring

Shaft retaining rings

Shaft retaining rings

C-type retaining ring

03. Material

Our company's flattened wire retaining rings are mainly made of 65Mn, SWRH72B, SWRH82A, 60Si2Mn and other materials. We can choose the appropriate material according to the use environment of the retaining ring, and support personalized material design and processing according to customer drawing requirements.

Flattened wire retaining ring



04. Molding process

The forming process of the flattened wire retaining ring mostly adopts sheet punching or wire winding. Among them, the functional cross-section of the retaining ring made by the sheet punching process is conical, and it is mostly "linear contact" after assembly; while the wire winding forming process is made by punching excess materials, and its cross-section is a regular rectangle, and it is "surface contact" after assembly.

Our company uses the wire winding forming process to process this type of flattened wire retaining ring to increase the contact surface between the retaining ring and the groove to form a "surface contact", so that it has a greater radial clamping force to meet the transmission shaft when it rotates and does not fall out.

Our manufacturing process includes:

Winding → heat treatment → forming → vibration grinding → surface treatment → packaging

According to the requirements of parts of different sizes and thicknesses, we will also add grinding, laser engraving and other processes. At the same time, according to the specific use environment of the parts, the surface treatment process can be divided into: anti-rust oiling, oxidation blackening, phosphating, ultrasonic cleaning and other processes. Among them, ultrasonic cleaning is particularly suitable for environments that require high cleanliness, such as DCT, AT gearboxes and new energy box applications, which can meet strict cleanliness requirements.

The superiority of the wire winding forming process enables some of our company's flattened wire retaining rings to reach a maximum speed of 20,000r/min, and will not fall off during high-speed operation, fully meeting the needs of high-speed environments such as new energy high-speed motors, AT and DCT gearboxes.

05. Specifications and dimensions

Our company provides a variety of specifications and sizes of flattened wire retaining rings to meet the needs of different mechanical devices. Common specifications include nominal diameter, height and thickness, and can be customized according to the actual needs of customers.

For customers who are not sure about the matching size, they can refer to the automotive industry standards QC/T 344 "Flattened wire retaining rings for holes", QC/T 345 "Flattened wire retaining rings for shafts" and GB/T 305 "Rolling bearing radial bearing retaining groove and retaining ring dimensions, product geometric technical specifications (GPS) and tolerance values" and other standards for selection. For demanding use environments, we can use precision grinding to meet the minimum thickness tolerance: $\pm 0.015\text{mm}$ ($\Phi 25 \sim 100\text{mm}$, thickness above 1.5mm), $\pm 0.025\text{mm}$ ($\Phi 20 \sim 200\text{mm}$), $\pm 0.05\text{mm}$ ($\Phi 20 \sim 400\text{mm}$).

06. Precautions

When using a flattened wire retaining ring, the appropriate specifications and installation position should be selected to ensure the best axial limit effect. Standard operations must be followed during installation to avoid damage or failure.

07. Application areas

Flattened wire retaining rings are widely used in the fields of automobiles, aerospace, ships, machine tools, etc. to ensure the normal operation and safety of mechanical devices.

Roundwire snap ring



Roundwire snap ring

01. Introduction

Round steel wire retaining ring, also known as steel wire retaining ring, is a kind of mechanical parts, mainly used to be stuck in the shaft groove or hole groove, for rolling bearing to stop after installation, and can also be used to position other parts. Its characteristics are that it is made of round steel wire, has certain elasticity and strength, is easy to install and disassemble, and can withstand certain axial force.

02. Classification

Round wire retaining rings can be divided into many types according to different usage scenarios and shapes, including but not limited to:

- Hole wire retaining rings: retaining rings specially designed for hole grooves, used for positioning and stopping parts.
- Shaft wire retaining rings: retaining rings suitable for shaft grooves, also have positioning and stopping functions.

03. Material

Round wire retaining rings are usually made of high-quality steel such as carbon spring steel to ensure good elasticity, strength and wear resistance. The selection of these materials helps the retaining rings maintain stable performance in long-term use.

04. Specifications and dimensions

The size and specifications of round wire retaining rings are usually customized according to specific usage requirements. Common size ranges include wire diameter, retaining ring diameter, etc. These parameters will directly affect the applicability and performance of the retaining ring. When selecting a retaining ring, the appropriate specification should be determined based on the actual shaft groove or hole groove size and the axial force required to withstand.

05. Application

The installation and removal of round wire retaining rings are relatively simple and usually require the use of special tools. During installation, ensure that the retaining ring is properly inserted into the shaft groove or hole groove, and check whether it is firm and reliable. During removal, appropriate tools should be used to avoid damaging the retaining ring and adjacent parts.

06. Installation and removal

The installation and removal of round wire retaining rings are relatively simple and usually require the use of special tools. During installation, ensure that the retaining ring is properly inserted into the shaft groove or hole groove, and check whether it is firm and reliable. During removal, appropriate tools should be used to avoid damaging the retaining ring and adjacent parts.

Round wire retaining ring is an important mechanical part with a wide range of applications and important functions. When selecting and using it, factors such as its material, size, specification, and convenience of installation and disassembly should be fully considered.

02 | Automobile stamping parts



Automobile stamping parts

01. Features

Automotive stamping parts are crucial in car manufacturing. They provide structural and functional support, and are essential due to their efficient production and low cost.

02. Types and applications

Automotive stamping parts are used in various vehicle parts like the body, chassis, and engine. Different materials and processes are chosen based on specific needs.

- Body parts: such as the hood, door, and roof, require high accuracy and good surface quality for appearance and safety.
- Support and structural parts: like frame crossbeams and longitudinal beams, enhance the body's rigidity and stability.
- Engine and chassis parts: such as exhaust elbows and oil pans, are essential for the car's performance and safety.

03. Production process

The production of automotive stamping parts involves steps like positioning and pressing. Key factors for improving efficiency and quality include mold design, process parameter optimization, and production control.

- Mold design: A good mold structure, stamping process, and rebound compensation are essential for efficiency and quality.
- Process parameter optimization: Choosing the right pressure, speed, and holding time ensures the best stamping result.
- Production control: Controlling factors like the production environment, equipment maintenance, and operators ensures part quality.



Brake pressure plate



Motor bracket



Wire harness bracket



Connecting rod ball pin plug cover



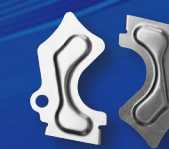
Brake sleeve



Automobile oil pan



Bearing cover plate



Shell oil collecting plate

03 | Adjusting shims

01. Introduction

A shim is a thin sheet-like part used to adjust the gap or position between mechanical parts. It is usually made of metal, plastic or other suitable materials with precise thickness and size to ensure that the mechanical device can operate as designed.

02. Classification

Adjustment gaskets can be divided into many types according to their shapes, uses and sizes, such as:

1. Flat gaskets: the most common type, with uniform thickness and shape, used to adjust plane gaps.
2. Corrugated gaskets: with a wavy surface, which can increase elasticity and sealing performance, suitable for occasions requiring sealing and buffering.
3. Conical gaskets: used to adjust the gap between conical parts, such as the fit between conical bearing seats and shafts.
4. Other special-shaped gaskets: such as annular gaskets, special-shaped gaskets, etc., used to meet the needs of specific application scenarios.

03. Material

The material selection of the adjustment gasket depends on its application scenario and requirements. Common materials include: copper, steel, stainless steel, etc., which have high strength and wear resistance and are suitable for harsh environments such as high temperature and high pressure.

04. Application areas

Adjustment shims are widely used in various mechanical devices and equipment, such as:

1. Automobile manufacturing: used to adjust the gap and position between components such as engines and transmissions.
 2. Mechanical manufacturing: used for adjustment and positioning of equipment such as machine tools and CNC machine tools.
 3. Aerospace: used to adjust the gap and position of key components in aerospace equipment such as aircraft and rockets.
- Other fields: such as petrochemicals, power equipment, etc., also widely use adjustment shims to meet various needs.



Adjusting shims

Adjusting shims



05. Molding process

1. Adjusting the gap: Adjusting the gasket can be used to adjust the gap between two adjacent parts to ensure the matching accuracy and smooth operation between them.
2. Compensating for errors: During the manufacturing or assembly process, the dimensional error caused by various factors can be compensated by adding or adjusting the gasket.
3. Preload effect: In some mechanical devices, the adjustment gasket can be used to achieve preload force to ensure a close fit between parts and reduce vibration.
4. Positioning effect: By reasonably arranging and adjusting the gasket, the accurate positioning of the mechanical parts can be achieved.



Adjusting shims



Adjusting shims

04 | Circlip

01. Introduction

The retaining ring, also known as the circlip, is a part used for axial limiting. The elastic retaining ring is one of the types made by the plate punching process. Its radial width is gradually deformed, that is, from wide to narrow, and an additional ear with a mounting hole is added at the opening. It can prevent other parts from axial movement and ensure the stability and reliability of the mechanical device.



Elastic retaining ring for hole

02. Classification

According to the different usage scenarios and installation positions, it can be divided into:

- Elastic retaining rings for holes: mainly used to be installed in holes, and limit the axial movement of shafts or other parts through their elasticity or rigidity.
- Elastic retaining rings for shafts: mainly used to be installed on shafts, and fix the parts on the shafts through their structural characteristics to prevent their axial movement.
- E-type open retaining rings: mainly used to be installed on shafts. Due to the influence of its use environment, shaft elastic retaining rings cannot be used for assembly (i.e., installed into the groove from one end of the shaft), and radial installation is required.

In addition, affected by the usage scenario and installation position, some retaining rings have added mounting holes or slot designs to cooperate with calipers for installation operations.

03. Material

The main materials of our company's flattened wire retaining rings are 65Mn, 60Si2Mn, C67S~C75S, etc., which can be processed according to the final customer requirements of the retaining rings.

04. Application Areas

Retaining rings are widely used in various mechanical devices, such as automobiles, aerospace, ships, machine tools, etc. They play an important axial limiting role in these fields, ensuring the normal operation and safety of mechanical devices.



E-type open retaining ring

Circlip



Elastic retaining ring for shaft

05. Molding process

The forming process of elastic retaining rings is mostly processed by plate punching. For some elastic retaining rings with larger nominal diameters, manufacturers in Europe, the United States and other countries have begun to use the processing method of wire winding and then punching to obtain better product characteristics. At present, the leading enterprises in the domestic industry have carried out this forming process, and our company is also actively developing this forming process. The functional cross-section of the retaining ring made by the plate punching process is conical, and it is mostly "linear contact" after assembly; while the wire winding forming process is made by punching excess materials, and its cross-section is a regular rectangle, and it is "surface contact" after assembly.

Our company uses the plate punching forming process to process this type of elastic retaining ring to increase the contact surface between the retaining ring and the groove to form a "surface contact", so that it has a greater radial clamping force, which can meet the requirement that the transmission shaft will not fall out when it rotates.

Our company's manufacturing process is: punching → heat treatment → vibration grinding → surface treatment → packaging. According to the different sizes and grouping requirements of the parts thickness, grinding, laser engraving and other processes will be added. According to the different use environments of the parts, the surface treatment can be divided into anti-rust oiling, oxidation blackening, phosphating, ultrasonic cleaning and other processes. Among them, ultrasonic cleaning can meet the use environment of DCT, AT and new energy box types with higher cleanliness requirements.

06. Specifications and dimensions

The specifications and sizes of elastic retaining rings are varied to meet the needs of different mechanical devices. Common specifications and sizes include nominal diameter, height, thickness, etc. The specific dimensions can be customized according to actual needs.

For customers who are not familiar with the matching dimensions, you can also choose according to the requirements of GB/T893.1 "Elastic retaining rings for shafts", GB/T894.1 "Elastic retaining rings for holes", or GB/T 896 "Open retaining rings".

For use environments with strict matching dimension requirements, parts can be processed into different thickness groups by grinding, and the parts can be used to adjust the shaft tooth clearance. At present, the minimum thickness requirement that our company can meet is $t \pm 0.015\text{mm}$ (diameter $\Phi 25 \sim 100\text{mm}$).

07. Precautions

When using a flattened wire retaining ring, you should pay attention to selecting the appropriate size and installation position to ensure that it can play the best axial limit effect. At the same time, during the installation process, you should follow the relevant installation specifications and operating requirements to avoid damage or failure caused by improper operation.

05 | Wave spring

01. Introduction

Wave springs, also known as wave springs, are elastic elements with several peaks and valleys on a thin metal ring. It is a high-end elastic element, a thin-plate annular elastic metal unit composed of multiple peaks and valleys.

02. Features

- The rigidity range is large, the buffering and vibration absorption capacity is strong, and the deformation energy per unit volume of the material is large.
- High strength, good flexibility, and strong impact resistance.
- The structure is compact, light, and small. Under the same physical parameter conditions, the required installation space is small.
- It has the effect of reducing vibration and noise.

03. Type

Wave springs can be divided into many types according to classification standards: stamping type and winding type according to processing technology; top-to-top, flat-end, single-layer, multi-layer, superimposed, overlapped and open according to structural characteristics. There are also WS series (continuously wound wave crest staggered type, suitable for small installation space) and WSS series (with flat coils, more uniform elastic force).

04. Materials and processing

Wave springs are usually made of 65Mn spring steel (or 60Si2MnA, 50CrVA, 0Cr17Ni7Al, SUS304) and other materials. Carbon steel, stainless steel, high-temperature alloys, etc. can also be used. The product undergoes specific heat treatment and the hardness is generally HRC44-55. Surface treatment methods include black boiling, phosphating, electroplating (chrome plating), electrophoresis, etc.

05. Application areas

Wave springs are used in applications with low load, small deformation, and where axial preload is needed. They are ideal for weight reduction and limited installation space. Common uses include aerospace, precision machinery, hydraulic seals, motors, automobiles, and textile machinery.

06. Standard

The standards for wave springs include JB/T 7590-2005 and HG/T 2479-2003.



Multilayer top-to-top wave spring



Multilayer top-to-top wave spring

06 | Cold heading parts



Ball pin connecting rod

01. Definition and function

The ball pin is a key part of the car's steering tie rod, allowing movement in the steering mechanism and suspension. It enables the wheel's up-and-down bounce and steering, ensuring the car's flexibility and stability.

02. Structure and composition

The ball pin assembly generally includes the ball pin, ball seat, ball bowl, baffle cover and sealing cover, etc. These parts work together to ensure that the ball pin can stably and reliably transmit force and torque.

03. How it works

Since the steering wheels of the car have camber and toe angles, and the kingpin has caster and inclination angles, the steering rod generally moves in space when turning and the wheels bounce up and down. The ball pin, as the joint of the transmission mechanism, realizes this movement through articulation to ensure the flexibility and accuracy of the car's steering.

04. Performance requirements

The ball pin should have a wear-resistant surface to endure friction. The core needs strength and toughness to prevent breakage or deformation. It must form a rigid connection with parts like the control arm and steering knuckle to meet strength and stiffness needs. All components must remain intact to ensure car safety.

05. Application Scenario

Ball pins are widely used in the independent suspension system of automobiles. Control arms or thrust rods are often connected to other components through ball pins at the ends. In addition, ball pins are also commonly used in other mechanical structures that require hinged connections.

06. Design points and verification methods

When designing a ball pin, focus on the large end diameter, anti-slip design, and the fit between the tapered hole and surface. Static strength verification is also needed, using tests like bending, axial, and radial displacement to ensure the ball pin meets usage requirements.

07. Maintenance and care

In order to ensure the normal use of the ball pin and extend its life, it is necessary to regularly check the wear, clean and lubricate the ball pin assembly, and replace it in time when it is worn or damaged to ensure driving safety.

In short, the ball pin is an important part of the automobile steering rod connection and is crucial to driving safety and stability. Understanding its relevant knowledge will help ensure vehicle safety.

07 | Spring

01. Introduction

A spring is a mechanical part that uses elasticity to work. It is made of elastic material and will deform under the action of external force and return to its original shape after the external force is removed.

02. Classification

1. According to the different characteristics of the load during work, the coil spring can be divided into three types: compression, tension and torsion.

- Torsion spring (torsion spring): generates mechanical energy by twisting or rotating elastic materials, often used in mechanical balancing mechanisms, and widely used in automobiles, machine tools, electrical appliances and other fields.
- Compression spring (compression spring): bears axial pressure, deforms and stores energy when the spring is compressed, has various shapes, and is divided into equal pitch and variable pitch springs, the latter of which is becoming more and more popular.
- Tension spring (tension spring): bears axial tension, usually the coils are tight, and uses rebound force to control movement, store energy, etc. It is widely used in machines and instruments, and has a variety of hook shapes.

2. According to the structural characteristics, it can be divided into two categories: cylindrical coil springs and variable diameter coil springs; variable diameter coil springs mainly bear compression loads.

3. According to its shape characteristics, it can be divided into conical, volute, concave and convex.

4. In production and use, coil springs can also be divided into two categories according to the forming method and material diameter: large coil springs and small coil springs; the former is usually hot-formed, and the latter is cold-formed.

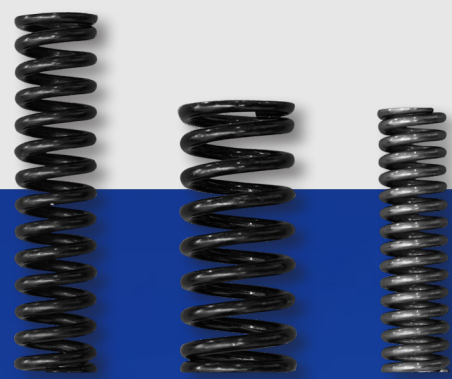
5. Other classifications

There are many types of helical springs. According to their appearance, they can be divided into: ordinary cylindrical helical springs and variable diameter helical springs.

According to the direction of the helical line, they can be divided into: left-handed springs; right-handed springs.

Variable diameter helical springs are divided into: conical helical springs, volute helical springs, and concave helical springs.

Cylindrical helical springs have a simple structure, are easy to manufacture, and are the most widely used. Their characteristic line is a straight line, and they can be used as compression springs, tension springs, and torsion springs. When the load is large and the radial size is limited, two compression springs with different diameters can be used together to form a combined spring.



Cylindrical helical compression spring



Cylindrical helical torsion spring



Cylindrical helical compression spring



Cylindrical helical compression spring



Conical helical compression spring

Spring



03. Materials and production

Springs are generally made of spring steel, but other materials such as stainless steel, rubber, memory alloys, etc. are also used for special types of springs. The production process of springs can be divided into cold coiling and hot coiling.

Our company mainly adopts the cold coiling method, which can produce various cylindrical helical springs, conical helical springs, cylindrical tension springs, torsion springs, etc. with a wire diameter of 0.8 to 5.0 mm. The materials include: 65Mn, 60Si2Mn, 55CrSi, SWPA piano wire, 304 stainless steel, etc.

The production process of cylindrical helical springs is: forming → tempering stress relief → grinding end → surface treatment → packaging. According to the fatigue performance requirements of the spring, strong pressure, shot blasting, sand blasting and other processes can also be added. According to the use environment of the parts, the surface of the spring can be oxidized, phosphated, electrophoresed, electroplated, painted, etc. Electroplating and other processes require pickling during the production process, so generally after the production is completed, dehydrogenation treatment is required to prevent hydrogen embrittlement of the spring.

04. Type

Springs can be divided into tension, compression, torsion and bending springs according to the nature of the force; according to the shape, there are disc, ring, leaf spring, spiral spring, etc.; according to the manufacturing process, there are cold-rolled and hot-rolled springs. Ordinary cylindrical springs are widely used because they are simple to manufacture and can adapt to a variety of loads.

The materials used to make springs must have high elastic limit, fatigue limit, impact toughness and good heat treatment performance. Common materials include carbon spring steel, alloy steel, stainless steel, copper alloy, nickel alloy and rubber.

The manufacturing methods of springs are divided into cold rolling and hot rolling. Cold rolling is used for diameters less than 8 mm, and hot rolling is used for diameters greater than 8 mm. Some springs also need to be pressed or shot peened to improve their load-bearing capacity.

05. Features and parameters

Springs have the function of storing energy, but they cannot release energy slowly. To achieve the slow release of energy, it is usually necessary to combine it with a large transmission ratio mechanism. The parameters of the spring include the working length (the length of the spring when it bears the working load), the spring stiffness (the load required to make the spring produce a unit deformation, the larger the value, the harder the spring) and the direction of rotation (divided into left-handed and right-handed).

06. Application and precautions

Springs are widely used in mechanical equipment such as clocks, toys, and automobiles. When using them, you need to pay attention to the load limit and avoid overloading to prevent the spring from deforming or breaking. At the same time, pay attention to the performance changes of the spring, such as elastic attenuation and dimensional changes, and check and maintain them regularly.

08 | Special - shaped circlip

01. Definition and characteristics

Special-shaped circlips are customized circlips with unique shapes, sizes, or functions. They have irregular contours and complex angles to suit specific applications, offering good elasticity and reliable fixation.



Spring expansion ring

02. Classification and application

Special-shaped circlips can be classified according to various factors such as their shape, purpose or material. Common special-shaped circlips include C-shaped circlips, E-shaped circlips and various specially designed circlips, such as serpentine circlips, annular circlips, etc. These circlips are widely used in mechanical engineering, automobile manufacturing, electronic equipment and other fields to fix shafts, bearings, gears and other parts to prevent them from axial movement or falling off.

Special-shaped circlip

03. Materials and manufacturing

The manufacturing materials of special-shaped circlips are usually high-strength and corrosion-resistant materials such as stainless steel, carbon steel or alloy steel. These materials ensure that the circlips maintain their elasticity and fixing effect during long-term use. During the manufacturing process, precision machining or forming techniques such as stamping, rolling, bending, etc. are usually used to ensure that the shape and size of the circlips meet the design requirements.

04. Installation and removal

Special circlip pliers are usually required for installation and removal of special-shaped circlips. When installing, clamp the circlip opening, compress it and put it into the slot; when removing, open the circlip opening and take it out.

05. Maintenance and Inspection

Special-shaped retaining rings are customized mechanical parts widely used in mechanical engineering. To ensure their reliability and safety, they need to be regularly checked for integrity, elasticity and fixing effect. If problems such as cracks, deformation or looseness are found, they should be replaced in time to avoid safety hazards.

06. Precautions

This product is similar to the flattened wire retaining ring, but due to the special installation environment, it cannot be assembled using press-fit or circlip pliers. It is necessary to make two spring tips at the open end to help the circlip assembly, and set the same notch on the counterpart so that the spring tip can be positioned at the notch to prevent the circlip from rotating.

Dust cover retaining ring

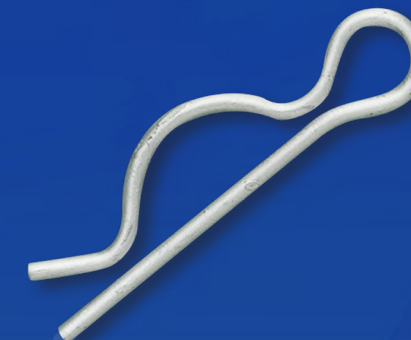


Dust cover retaining ring

01. Introduction

The dust cover circlip is a special-shaped multi-layer spiral retaining ring used to fix the rubber dust cover to ensure that it fits tightly with the counterpart to achieve a sealing effect. The raised spring tip can prevent the circlip from expanding and causing damage to the dust cover.

Lock pin



Lock pin

01. Introduction

A cotter pin is a mechanical part, commonly known as a spring pin or a safety pin. To avoid damaging the hole wall, lubricating oil can be added to the pin hole. High-quality steel or rigid materials with good elasticity are usually used to make cotter pins.

02. Material

High-quality steel, rigid material with good elasticity.

03. Specification range

The nominal specifications of the split pins are 0.6~20mm.

04. Characteristic

The angle between the inner planes of the two legs of the split pin should meet the specifications. There should be no burrs, irregularities and harmful defects on the surface. Each leg should be able to withstand repeated bending without breaking or cracking in the bent part.

05. Application

Application: Anti-loosening of threaded connection. After tightening the nut, insert the split pin into the nut slot and the hole at the end of the bolt, and pull the end of the split pin apart to prevent the relative rotation of the nut and the bolt. The split pin can also be used on some pins for connection according to its shape design. The straight part is inserted into the hole at the end of the pin, and the arc curved part is closely matched with the pin, so as to achieve the fixing function of the split pin.