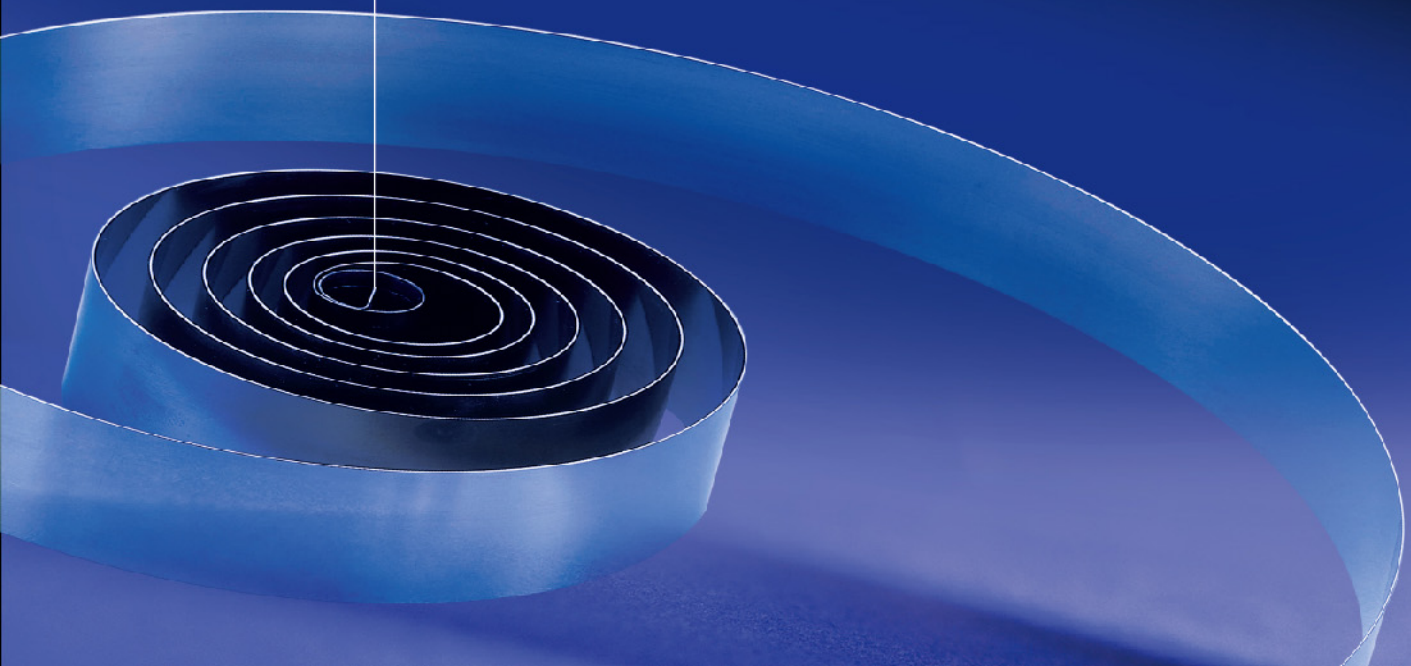


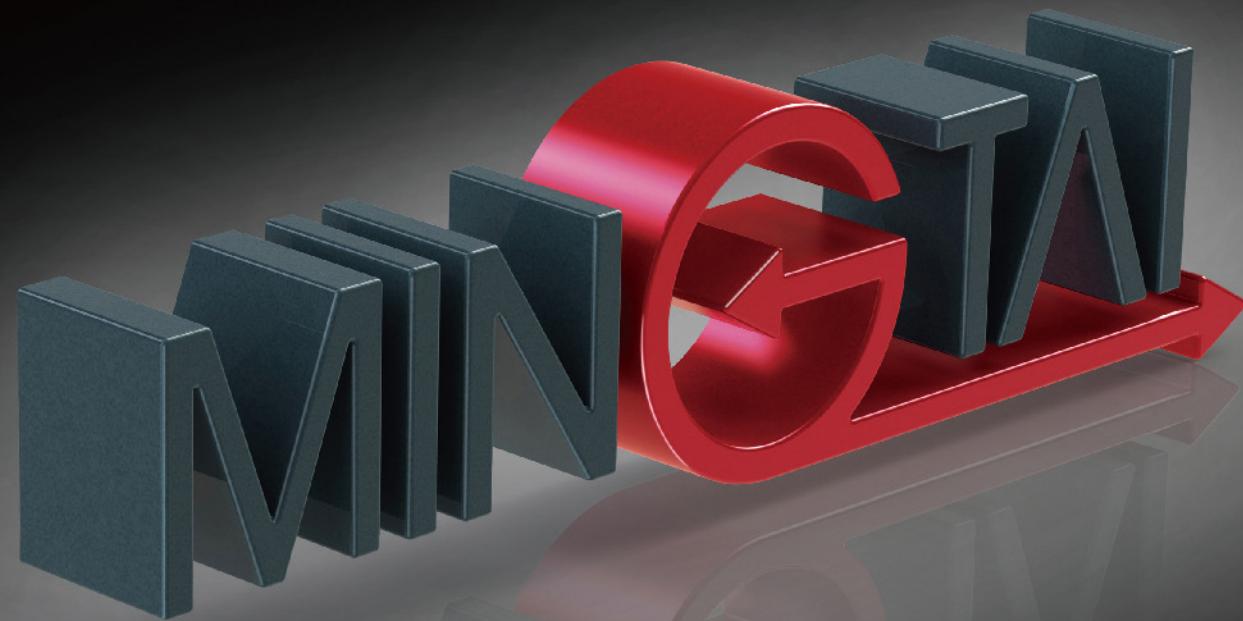
**MING**  **TAI**

Since 1966

Constant Force Spring & Power Spring  
Specialized Manufacturing from Taiwan







## INTRODUCTION OF MING TAI INDUSTRIAL CO., LTD

### Company Brief

Ming Tai Industrial Co., Ltd, is a professional manufacturer of steel strip spring. The company was founded in 1966. Today Ming Tai has factory area of approximate 5600m<sup>2</sup>, and equips with various special precision steel-strip spring forming machine to support production.

Product categories of Ming Tai include constant force spring, constant torque spring, constant force spring for carbon brush, power spring and variable force springs. Each manufacturing procedure including steel strip slitting, heat treatment, edge trimming and forming process is consistent production and completed in-house to ensure highest quality requirement.

Most of specific computerized production machinery is built by Ming Tai in-house machine shop, which enables Ming Tai to produce wide variety steel strip springs and to meet all kind industrial applications. Ming Tai has precision instruments to do force, torque, product life testing to ensure the stable quality. Ming Tai is certificated with ISO 9001: 2015 and RoHs.

Ming Tai stocks sufficient and variety raw material enable us to provide customer with prototyping and running mass production rapidly. It shortens lead times for customer and help customer to makes the new products on time to market!

Ming Tai is capable of serving customer from the technical support in develop procedure, prototype, to trial run, mass production, spring mounting and assembly.

### Total Solution of Steel-Strip Design and Manufacture

Based on the over 50 years of experience, Ming-Tai equips comprehensive know-how in assisting customers to solve each kind of steel strip spring demand. Ming-Tai provides integrated service from spring design consulting to high precision manufacturing. Even though it is a rough idea initially, Ming-Tai is capable to turn it into optimized spring product to fulfill your individual need.



### In house major manufacturing equipment is as following

1. Hardened & Tempered steel-strip furnace.
2. Slitting machines for steel-strip.
3. Edge trimming machines for steel-strip.
4. CNC forming machines for various steel-strip spring.
5. Rewind machines for various steel-strip spring.
6. Cleaning machines & temper furnace for spring parts.

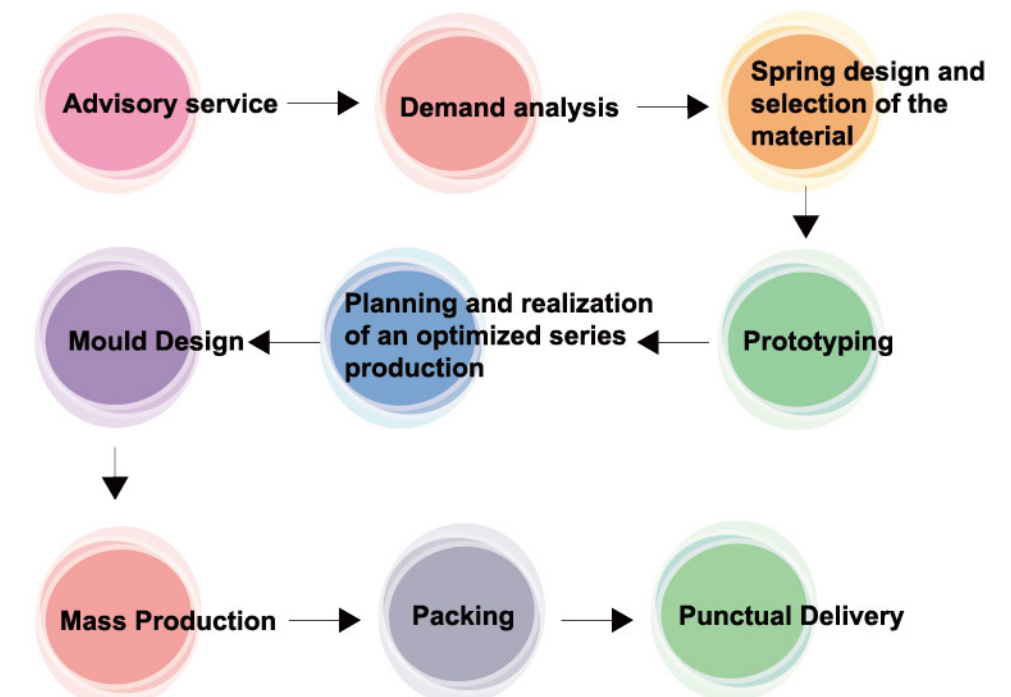
### Quality Insurance

The major inspection equipment is as following

1. INSTRON material testing system for tension and compression test
2. INSTRON torsion testing system for torque test
3. Cycle Life tester for constant force spring
4. Cycle life tester for power spring and constant torque spring
5. MICRO VICKERS Hardness Tester
6. CNC 2D vision measurement system

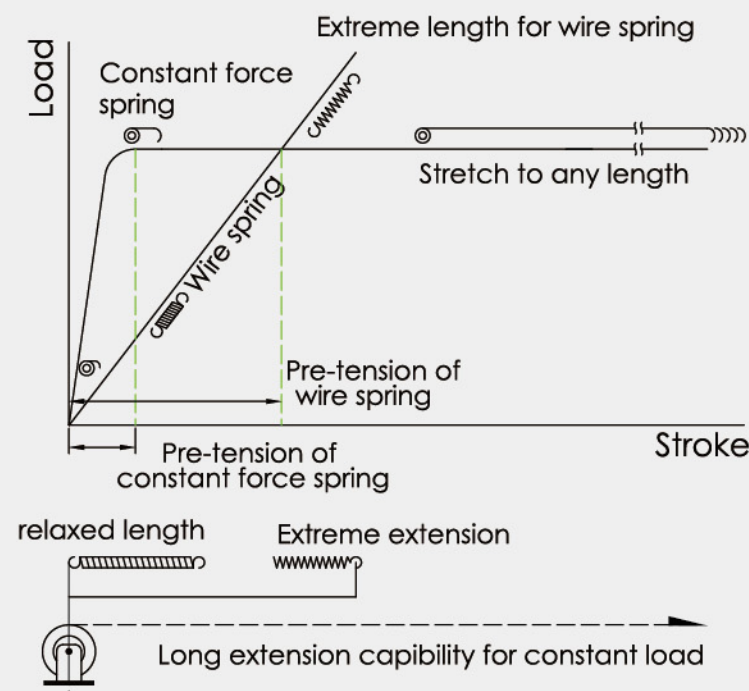


### Service Item



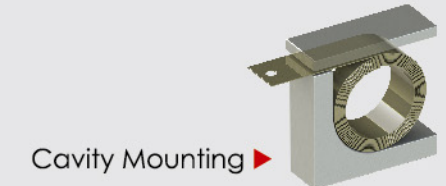
There are a number of different spring design possibilities for a given application, we strongly suggest you to consult with a Ming-Tai engineer early in the design phase. We will create an optimized solution for your spring demand. Custom designs are available as well.





## CONSTANT FORCE SPRING

Mounting Method



### Feature:

Constant force spring is made by winding the steel strip into a coil which exerts a nearly constant returning force to resist uncoiling.

Constant force springs offer following advantages:

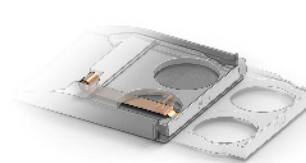
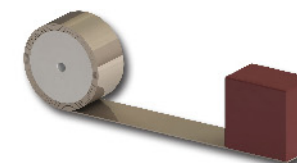
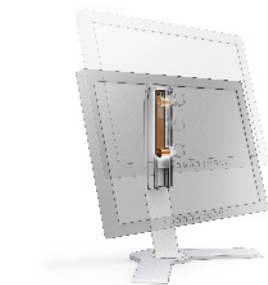
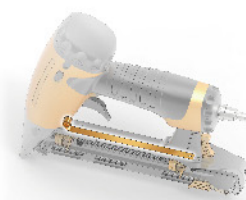
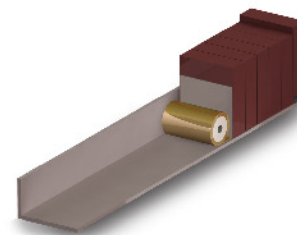
1. High force output with very small space requirements
2. To exert nearly constant force during entire extension.
3. Short initial pretension, it means that can afford the rated load at short extension.
4. Provides long extension capability

They are ideal for a wide variety of applications where constant force is needed, including applications requiring smooth returning and retrieving, counterbalancing applications, and tensioning and loading applications.

There are a number of different spring design possibilities for a given application, we strongly suggest you to consult with a Ming-Tai engineer early in the design phase.

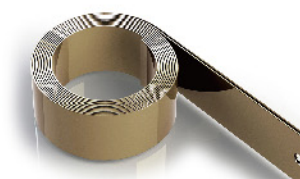
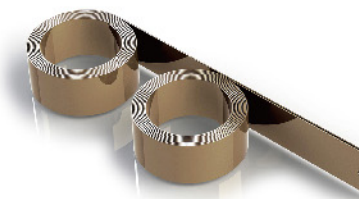
We will create an optimized solution for your spring demand. Custom designs are available as well.

### Function+Applications



### Multiply the Load

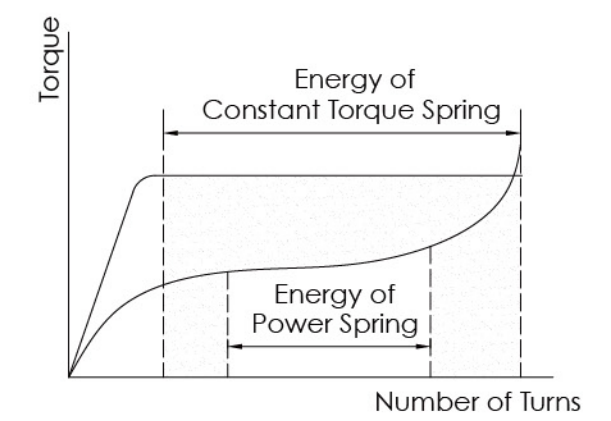
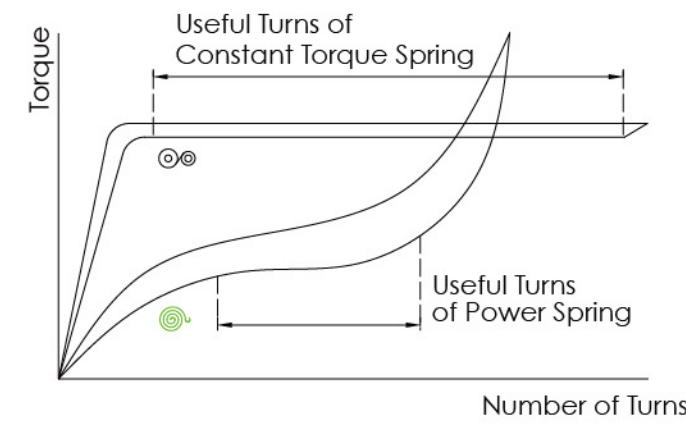
By multiplying the load, longer life and better load will be obtained in the smaller space



### High Adjustment Application







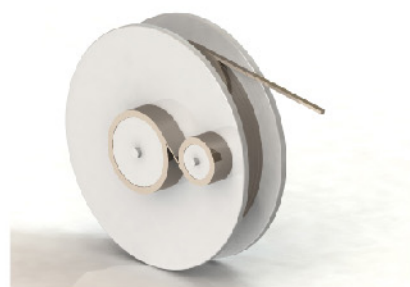
Constant torque spring is made by winding the steel stripe into a coil. When the coiled springs are counter wound onto output drum by a load, a force to resist uncoiling will be occurred. Constructed from a specially stressed constant force spring, constant torque springs offer following advantages:

1. Provide high amounts of torque in a very small package.
2. To exert nearly constant torque during entire turns.
3. It has better performance than power spring in higher turns design.
4. All turns are almost useful turns. It's high efficiency.

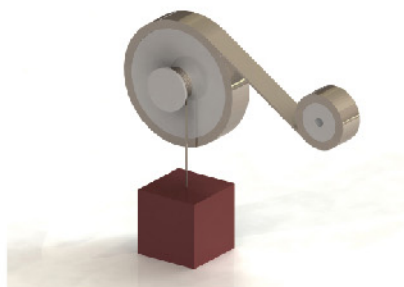
## CONSTANT TORQUE SPRING

### Function+Applications

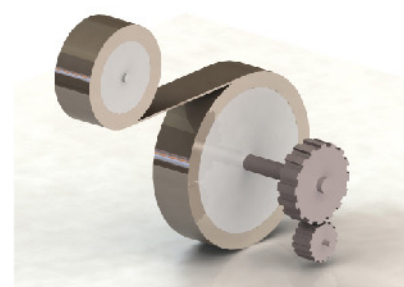
There are a number of different spring design possibilities for a given application, we strongly suggest you to consult with a Ming-Tai engineer early in the design phase.



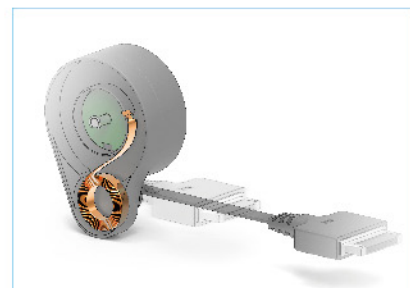
Retrieving & Returning



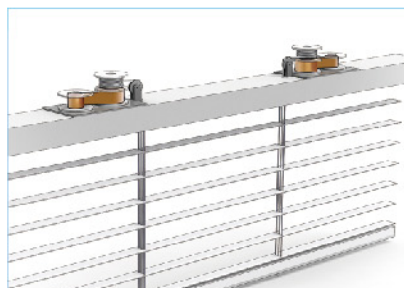
Counterbalancing



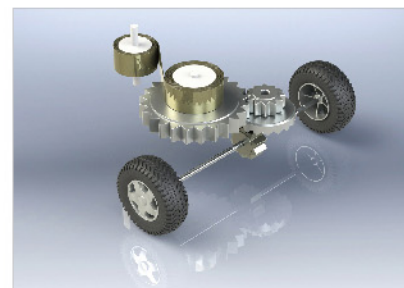
Drive motor



Cord Retractors

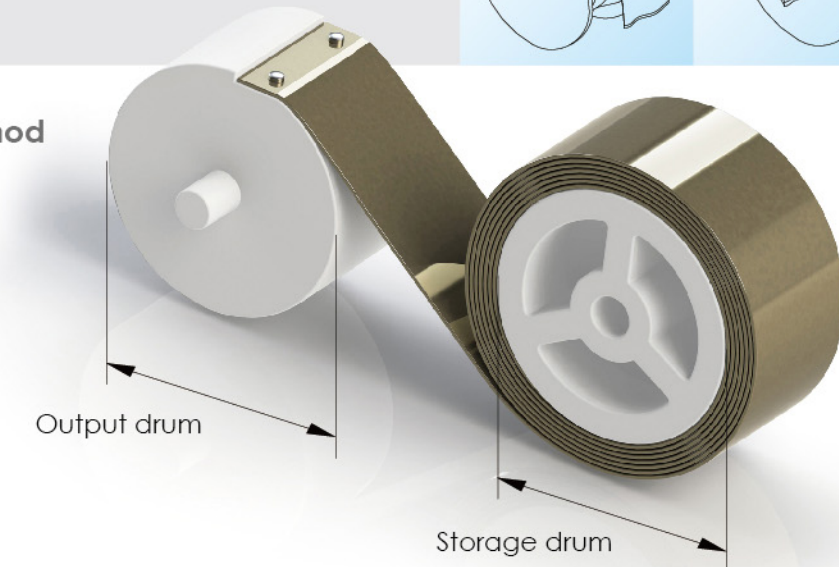


Cordless Shades



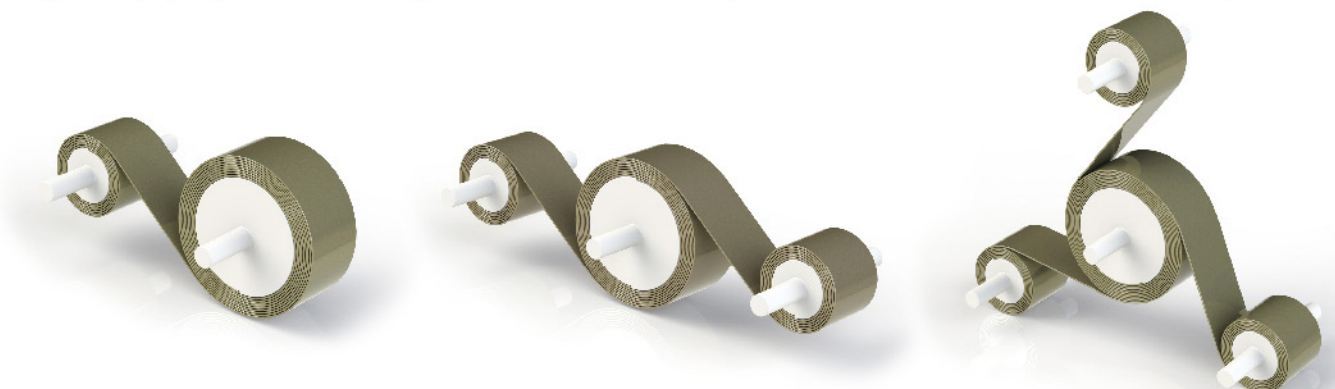
Drive Mechanisms

### Mounting Method

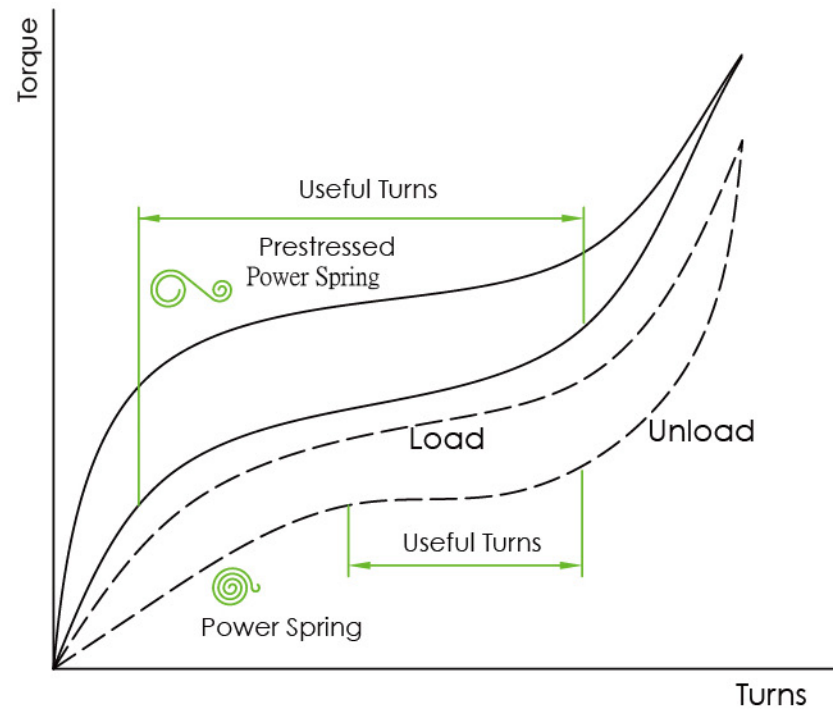


### Multiply the Load

By multiplying the load, longer life and better torque will be obtained in the smaller space







## POWER SPRING & Prestressed Power Spring

### Feature:

Power Springs, also known as clock springs. Power Spring and Pre-stressed Power Springs are formed by winding a strip of material on an arbor and into a case or retaining ring to create a compact power source. When a pre-stressed power spring is released, it assumes S shape, while power spring a spiral shape.

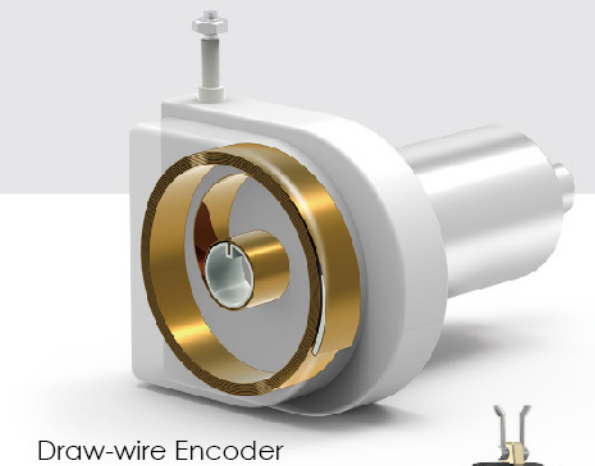
The advantages of pre-stressed power spring are as follow:

1. Pre-stressed power springs are pre-stressed to produce a flatter torque gradient than conventional power springs.
2. Pre-stressed power spring can store 25% ~ 55% greater energy than power springs.
3. Pre-stressed power spring also has higher turns than power spring when their sizes are the same.



### Function+Applications

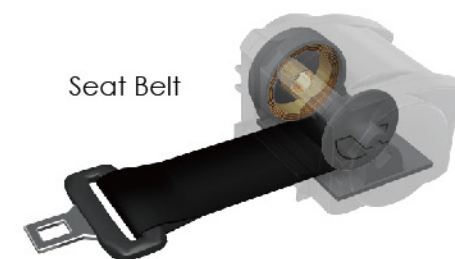
Power springs are mainly used in clock, spring motors for toys, timers, as well as in retractor mechanisms for electrical cords, compressor pipes, wire and seat belts. Recently medical and pharmaceutical industry employs power spring in pen auto injector, drug delivery system.



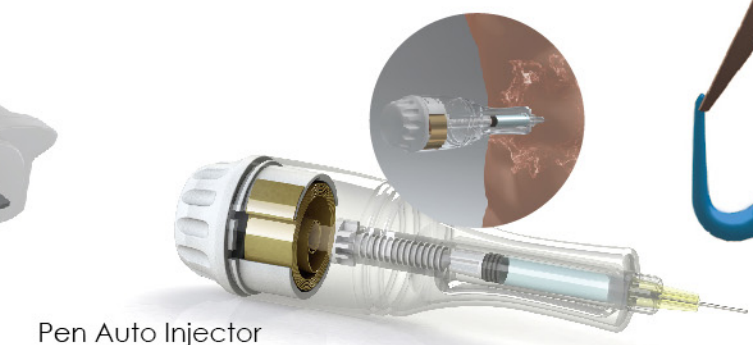
Draw-wire Encoder



Retractable Dog Leash



Seat Belt



Pen Auto Injector



Fall Arrester





#### Feature:

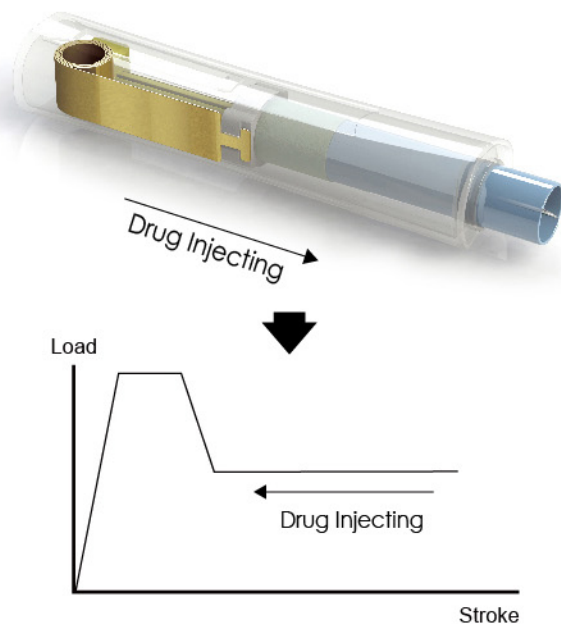
Variable force spring and variable torque spring are very similar with constant force spring and constant torque spring. But we diversify the radian by winding the steel strip into a coil. Therefore, it can unfold negative gradient, positive grained compounded in a spring. Here are some relations between load and stroke that can be use on specific occasion. There are many different variable force springs designed available for any give application to meet customized solution. We strongly suggest you to consult with a Ming-tai engineer early in the design phase.

#### Function+Applications

1. Automotive seat belt
2. Point of purchase display
3. Pen auto injector
4. Fireplace up-down slide door
5. Cordless Shades

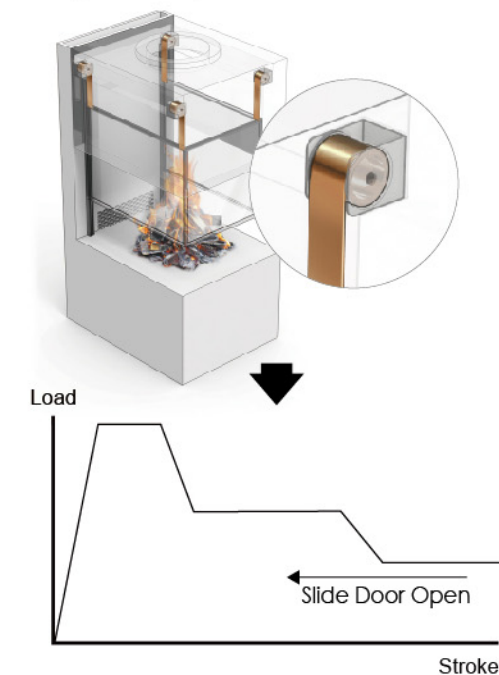
## Variable Force Spring and Variable Torque Spring

Pen Type Drug Injector Application



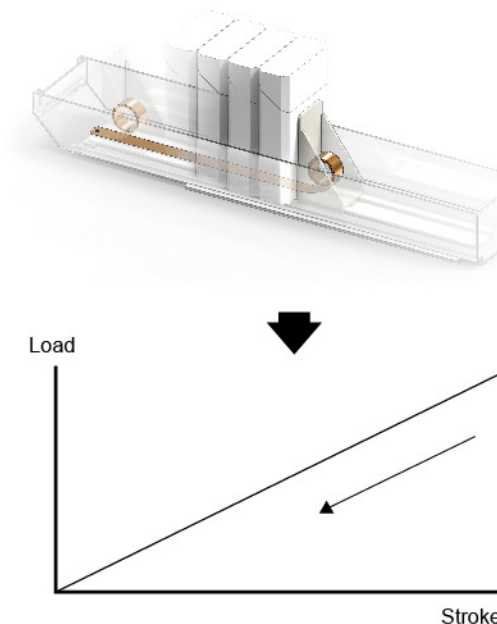
The spring exerts constant force to keep the drug flow fixed, preventing the patient from feeling uncomfortable when applying it. It features stretch force in end of the stroke to ensure all drug can be injected entirely.

Fireplace up-down Slide Door



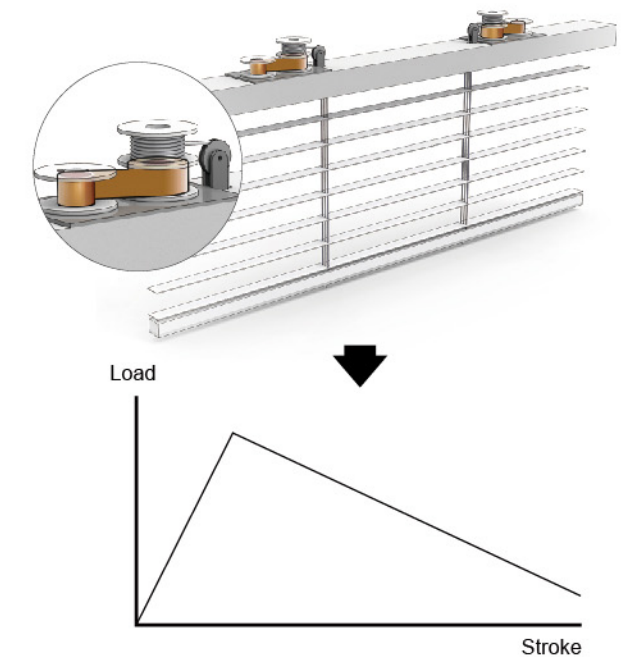
Variable force spring can be applied to up-down slide door of fire place. When the door is closed, the spring force is less than the weight of door; while the door in middle stroke, the spring force is equal to the door weight. When fully open, the spring exerts force greater than the door weight to secure the door does not slide down.

Point of Purchase Display



Variable force spring can be applied to point of purchase display. The spring export variable force to match the quantity of display items. While the large force can ensure push large quantity display item smooth, the small force push small quality items availably and avoid flattening the display items.

Cordless Shades



The variable torque spring can be applied to cordless shade, it makes user to adjust curtain up and down easily. The spring exerts smaller torque step by step, which generate balance of gravity to allow the curtain to stop at any height.





#### Specification:



The available minimum size :  
A = 0.03mm ; B = 1mm ; C = 1.2mm

## STAINLESS STEEL STRIP SPRING TUBE

#### Feature:

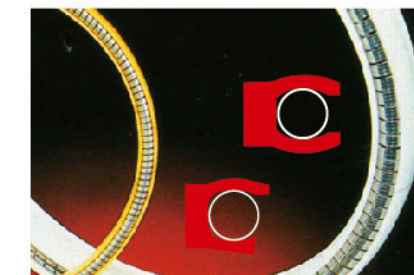
**Strip-spring tube is made from stainless strip steel wound into a round helical cross section. It is designed for use in special seals and the inner tube of endoscope as a radial or axial compression energizer.**

Based on decades' experience in manufacturing steel strip spring Ming Tai Industrial Co., Ltd. (founded in 1966) is now glad to present its newly developed Stainless Steel strip Spring tube. The Spring tube is made from stainless steel strip wound into a round helical cross section, both its elasticity and flexibility are better than those made of wire. It is normally used in static or slow dynamic applications and often when very low temperatures are present. The Spring tube is designed for use in special seals (Fig.1 & Fig.2) and the inner tube of endoscope (Fig.3) as a radial or axial compression energizer.

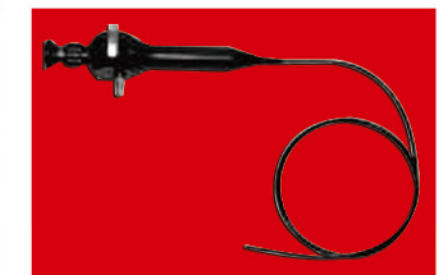
#### Function+Applications



▲ Fig1: Special seal



▲ Fig2: Cross section of special seal

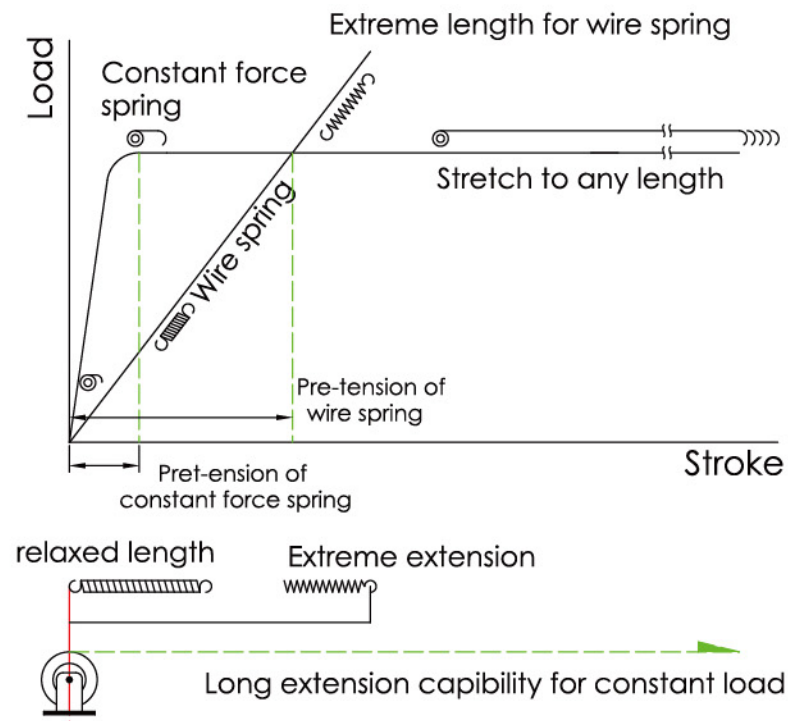


▲ Fig3: Flexible endoscope



Bowden Cable for  
Automotive and industrial





## CONSTANT FORCE SPRING FOR CARBON BRUSH

### Feature:

Motor brush springs are constant force springs that are specially constructed to provide the ideal method of ensuring consistent, dependable pressure to electric motor commutators, we can provide you both single coil constant force springs and twin coil constant force springs for carbon brush.

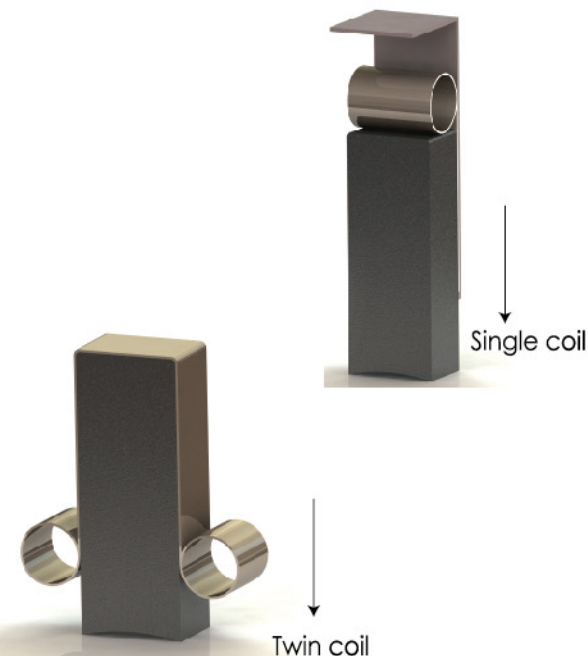
Advantages of Constant Force Spring for Carbon Brush:

1. Constant pressure for commutator in any brush length.
2. Increases brush life, reduces electrical wear.
3. Compact design for overall motor size.
4. Allows longer brushes.
5. Allows larger commutators.
6. Reduces spark, lower influence of electromagnetic interference (EMI)

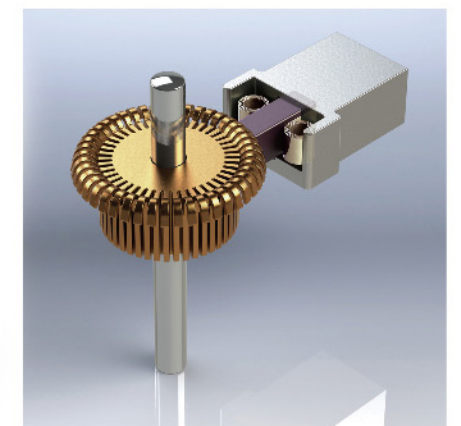
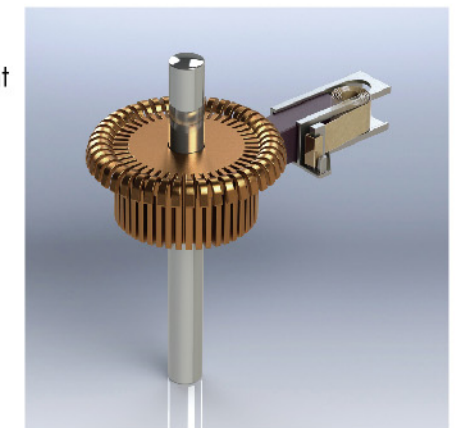
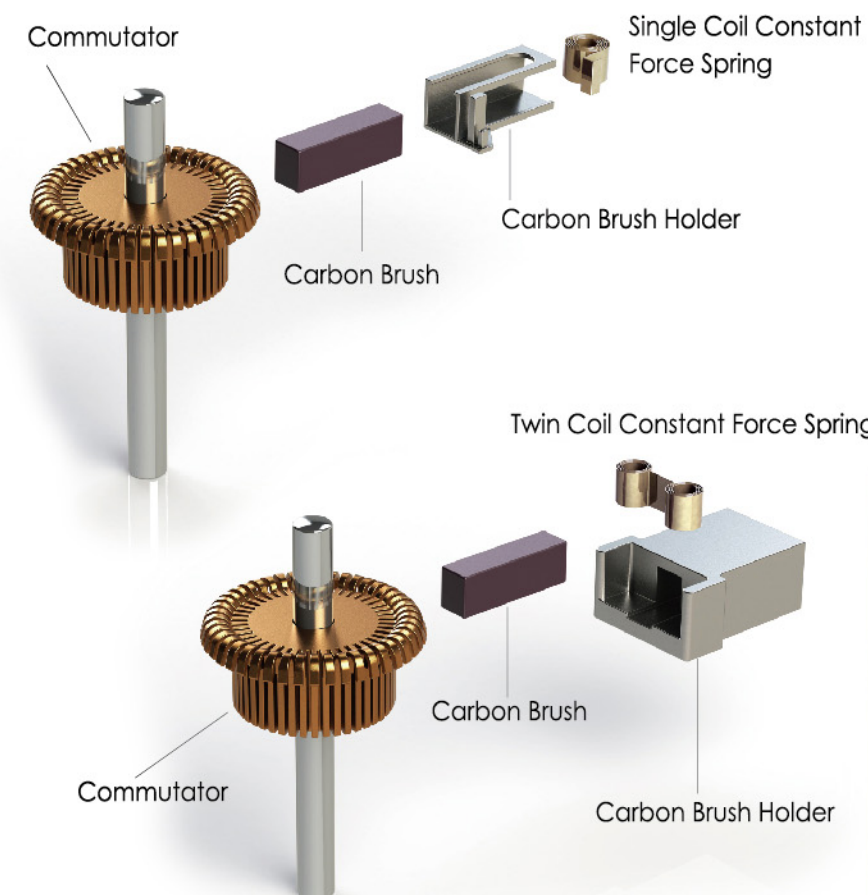
There are a number of different spring design possibilities for a given application, we strongly suggest you to consult with a Ming-Tai engineer early in the design phase.

### Advantages of Twin Coil Comparing with Single Coil

1. To afford maximum brush length and double the load of single coil.
2. To allows a minimum motor size.
3. To offer better load for its symmetry.



### Mounting Example



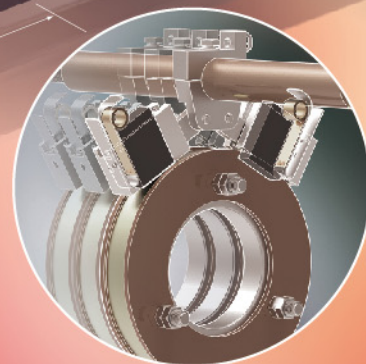
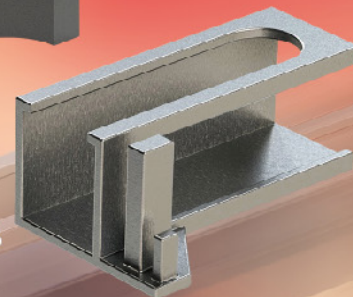




## HOW TO CHOOSE SUITABLE CONSTANT FORCE SPRING FOR CARBON BRUSH

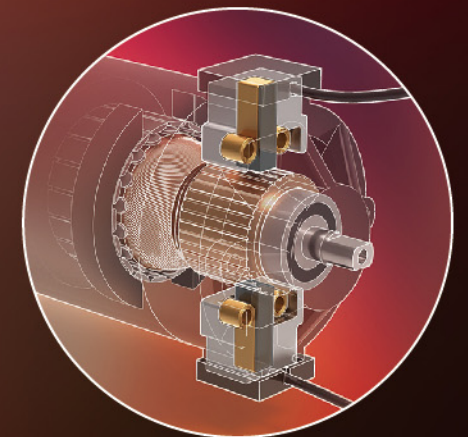
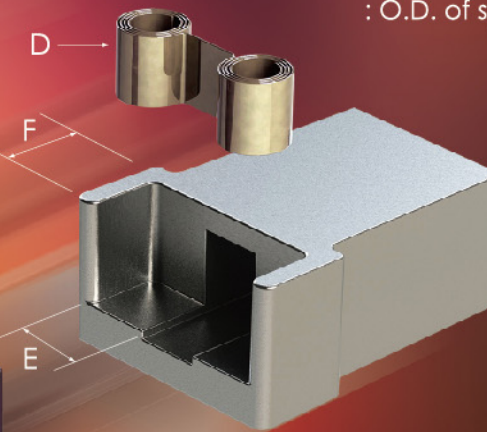
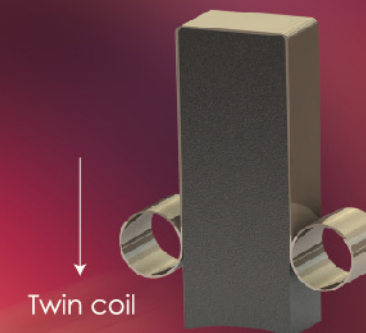
### Single Coil Type

1. Width of carbon brush (A)  
: O.D (D) must smaller than Spring width(A)
2. Height of carbon brush (B)  
: Spring width must smaller than brush height
3. Wearing length of carbon brush (C)  
: Stroke must bigger than brush wearing length
4. Pressure on commutator  
: The load of the spring (L)



### Twin Coil Type

1. Width of carbon brush (A)
2. Height of carbon brush (B)  
: Spring width must smaller than brush height
3. Wearing length of carbon brush (C)  
: Stroke must bigger than brush wearing length
4. Pressure between commutator and carbon brush (L)  
: The load of the spring
5. Mounting room of brush holders (E) and (F)  
: O.D. of spring (D) must smaller than both





## ASSEMBLY AND MOUNTING SERVICE

Ming Tai offers assembly and spring mounting service for customers to increase convenience of purchasing. For assembly various types of spring to the cavity, drum or other fitting, Ming Tai organizes excellent manufacturers to provide customer with plastic parts, stamping, aluminum extrusion, rivets, screws and other components. Assembly and spring mounting service that Ming Tai offers include: riveting, screw lock, axle assembly, welding and marking and so on. Based on 45 years of experience, Ming Tai has wide variety of processing and design capabilities for spring mounting and fitting. We sincerely recommend you consult our R&D engineer in initial phase of product to research the best solution to meet your application needs. If you already have a design, Ming Tai industry is also able to provide a complete assembly and mounting service for you.



## NOTES:



**MIN****TAI**

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