Save Space with TRUWAVE® Flat Wire Wave Springs.

TruWave flat wire wave springs help to save up to 50% of axial space in your application when compared to conventional coil springs. The result is more compact applications in which unnecessary space and therefore excess material of neighboring components can be reduced to a minimum. The flat wire effectively reduces the solid height of the wave spring so that with the same amount of turns one can visibly reduce the work height without compromising the load or spring deflection. Another advantage is that one can increase the number of turns of the spring design in order to decrease the deflection per turn when the wave spring is compressed. Thus, the spring rate is reduced proportionally to the number of turns and a flat linear characteristic can be generated.

Despite an extensive standard program in tempered spring steel and stainless steel with different dimensions and spring characteristics, some applications are not served with a standard stock flat wire wave spring. In these instances Rotor Clip offers to produce a special spring according to customer specifications. Rotor Clip’s production process does not require special tooling for nonstandard specifications so that the production of a custom spring is equal to that of standard parts.

Contact Rotor Clip’s engineers to get help choosing the right flat wire wave spring for your application. Rotor Clip’s engineers are able to explain to you, using a special calculation procedure, the suitability of a standard spring for your application or if needed the characteristics of a custom designed spring.
Wave Spring Types

Single Turn Wave Springs

• Gap and overlap designs.
• Offered in a number of waves and material thicknesses.
• Designed for wide range of bore and shaft diameters.

Ideal for:
• Narrow radial wall dimensions.
• Light duty applications.
• Moderate thrust loads.
• Low clearance applications.
• Ball or roller bearing applications.

Multi Turn Wave Springs

• Compact in Size.
• Occupy 1/3 to 1/2 the axial space.
• Wide variety of loads, deflections, and diameters.

Ideal for:
• Medium & heavy duty applications.
• High thrust load capacity.
• Light & medium bearing series: Double row, tapered bearing depending on the ring version.

Material

Each application offers different operating conditions for a flat wire wave spring. Choosing the right material depends on operating temperature, contact with corrosive environments and the required number of load cycles. Rotor Clip’s engineers will help you find the right material for your application. An overview of the materials used by Rotor Clip for flat wire wave springs can be found here:

Standard Material Grades

SAE 1070-1090 Carbon Steel (1.1231 - 1.1273)
• This pre-hardened material is the standard material for wave springs.
• Less expensive option to Stainless Steel.

17-7 Stainless Steel (1.4568 – X7CrNiAl17-7)
• Used for high stress and fatigue applications.
• Can withstand much higher temperatures than SAE 1070-1090 and not lose its spring qualities.
• Higher corrosion resistance than SAE 1070-1090.

Special Material Grades

• AISI 302 Stainless (DIN Material No.: 1.4319)
• AISI 316 Stainless (DIN Material No.: 1.4401)
• A286 (DIN Material No.: 1.4980)
• Inconel X-750 (DIN Material No.: 2.4669)
• Elgiloy (DIN Material No.: 2.4711)
• Hastelloy C276 (DIN Material No.: 2.4819)
• Beryllium-Copper (DIN Material No.: 2.1247)
• Phosphor-Bronze (DIN Material No.: 2.1030)
Wave Spring Selection

Rotor Clip offers a wide range of standard metric and inch size flat wire wave springs with one or multiple turns. Depending on the requirements of each customer’s application, we determine if there is a suitable spring available from our standard program or if a custom spring design is necessary. Using the following selection criteria one can easily determine which spring type is best meets the application requirements.

SPRING LOAD AT WORK HEIGHT

By compressing a flat wire wave spring in an axial direction a preload is generated. The axial installation space in an application determines how far the spring is compressed. Here very exact preloads can be specified for this fixed or variable installation space. In variable installation spaces one has to consider if it is a quasi-static application with axial endplay take-up or a dynamic application with a specific number of cycles so that a sufficient lifetime can be achieved.

DIAMETER & PILOTTING

TruWave wave springs are always wound from a continuous flat wire. Designs with multiple turns have no welded or glued connection points. Therefore the spring must be piloted by either a shaft or a bore. This is the only way to safely avoid that individual turns are not skipped. This should be considered when specifying the spring diameter. In addition to an accurate specification of the piloting without radial contact with the shaft or bore wall, a slight grip on the shaft or in the bore can be generated and used as an advantage during the assembly process.

ONLINE CUSTOM WAVE SPRING CALCULATOR

The custom wave spring calculator allows the input of basic spring/application parameters and returns either a reference drawing to submit for quotation or an error message if the spring is not feasible. Design engineers should know right away if their design or application needs to be adjusted, allowing them to fine tune a nearly-finished product with Technical Sales.

The calculator can be found online: [www.rotorclip.com/wsc](http://www.rotorclip.com/wsc)
Wave Spring Applications

Quick Connector  Bearing Preload  Mechanical Seal
Spring Cushioned Shoe  Car Mirror  Flash Light Application  Lens
Intake Pump  Fishing Reel  Fuel Filter  Rolling Door
Plug-In Connector  Downhole Tool
Bearing Preload  Ultrasonic Motor  Clutch Application  Steering Motor Preload
Quote Form For TRUWAVE® Wave Springs

As soon as a standard catalogue item cannot be considered for your application, Rotor Clip can offer custom designed wave springs without expensive tooling costs and with regards to your specification criteria. Please fill out this form and send it to the Rotor Clip engineering department (Fax: +1-732-805-6474, E-Mail: tech@rotorclip.com) which will check a feasible wave spring design with regards to your specifications.

**CONTACT INFORMATION**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Date:</th>
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<tbody>
<tr>
<td>Company:</td>
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<td>Phone:</td>
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**Radial Guide / Pilot**

A multi turn flat wire wave spring has to be guided/piloted radially in order to avoid skipping of the turns. Please indicate a radial guide:

<table>
<thead>
<tr>
<th>Bore Diameter:</th>
<th>[mm]</th>
<th>[inch]</th>
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</thead>
<tbody>
<tr>
<td>Shaft Diameter:</td>
<td>[mm]</td>
<td>[inch]</td>
</tr>
</tbody>
</table>

- [ ] Pilots and Operates in Bore Diameter
- [ ] Pilots Over and Clears Shaft Diameter
- [ ] Clings in Bore Diameter*  
- [ ] Clings on Shaft Diameter

*For Single Turn Wave Springs only

**Load Specifications**

Please define the load(s) required at given work height(s). **Values in: [N] and [mm] or [lbs] and [inch]**

<table>
<thead>
<tr>
<th>Static Application</th>
<th>Dynamic Application/ Endplay Take-up</th>
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</table>
| Load (Min. / Max.) | at  
Work Height at  
Load 1 (Min. / Max.)  
1. Work Height  
Load 2 (Min. / Max.)  
2. Work Height |

Free Height: [min.][max.]

**Cycle Life**

Please specify the required cycle life:

- [ ] Static Application  
10^5 Cycles
- [ ] < 10^4 Cycles  
10^6 Cycles
- [ ] > 10^6 Cycles

**Operating Conditions**

Please define under which conditions the wave spring is expected to operate:

Max. Temperature: °C / °F

The spring will be in contact with:
# Quote Form For TRUWAVE® Wave Springs

## Type

- One turn with gap
- One turn with patented surface-friendly flat ends
- One turn with overlapping ends
- Multiple turns with plain ends
- Multiple turns with parallel ends
- Multiple nested turns

## Material (Standard)

- [ ] Carbon Spring Steel (SAE 1070 – 1090)
- [ ] 17-7PH Condition CH900 Stainless (DIN Material No.: 1.4568)

## Special Grades

- [ ] AISI 302 Stainless (DIN Material No.: 1.4319)
- [ ] AISI 316 Stainless (DIN Material No.: 1.4401)
- [ ] A286 (DIN Material No.: 1.4980)
- [ ] Inconel X-750 (DIN Material No.: 2.4669)
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- [ ] Phosphor-Bronze (DIN Material No.: 2.1030)

## Finish

What is the finish requirement of your application:

- [ ] Oiled (Standard with Carbon Spring Steel)
- [ ] Degreased & Ultrasonic-Cleaned (Stainless Steel)
- [ ] Passivation
- [ ] Vibratory Finishing
- [ ] Black Oxide
- [ ] Deburred
- [ ] Electropolish
  - with ________ µm abrasion rate
- [ ] Other: ___________________

## Volume

<table>
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<th>Volume</th>
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<tr>
<td>Series Volume:</td>
<td>Series:</td>
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## Description of Application / Sketch