



Carbon Fiber Springs

A Lightweight Alternative to Compression Springs

Carbon fiber springs, also known as carbon composite springs, are made of a strong yet lightweight polymer reinforced with carbon fiber. Most commonly found in disc spring form, carbon fiber springs can be used singly or in stacks to replace traditional compression springs.

Material:	Carbon fiber reinforced polymer (CFRP)
Component:	Disc spring
Use:	Metal compression and disc spring alternative

Carbon Fiber vs. Traditional Springs

Carbon fiber disc springs provide the same or greater functionality as traditional coil springs and metal disc springs, but are lighter weight. They can be used in many of the same applications as compression springs, often functioning as suspension components, counterbalances, assembly supports, and more.

In addition to reducing weight, carbon fiber springs have low to no side load when used in comparable applications to compression springs. The ability to use carbon fiber springs as a single element, or in series or parallel stacks, also allows for customized load/rate curves depending on specific application requirements. Stacked elements can even help guard against catastrophic failures because, while single elements in a stack may fail, the remaining elements continue to function.



Features & Benefits of Carbon Fiber Springs

- Lightweight: up to 60% weight savings compared to steel
- High performance
- Minimal side load
- Reduced friction and tunable hysteresis
- Ability to maintain alignment
- Nonmagnetic
- Rapid, dynamic response
- Thermally insulating
- Ability to customize the load/rate curve
- Safe failure mode

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More!**

Types of Carbon Fiber Springs

Configurations for a Wide Variety of Applications



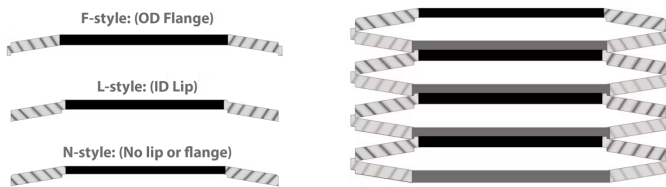
Matthew Warren Spring

Type 1

A set of two or more carbon fiber disc springs with interlocking flanges, type 1 disc springs are ideal for replacing coil compression springs because they do not require an ID or OD guide rod.

Characteristics:

- IDs larger than 1.38"
- Configurable for linear or non-linear load curves
- Two or more elements stacked in series or parallel
- ~ 1% - 20% hysteresis

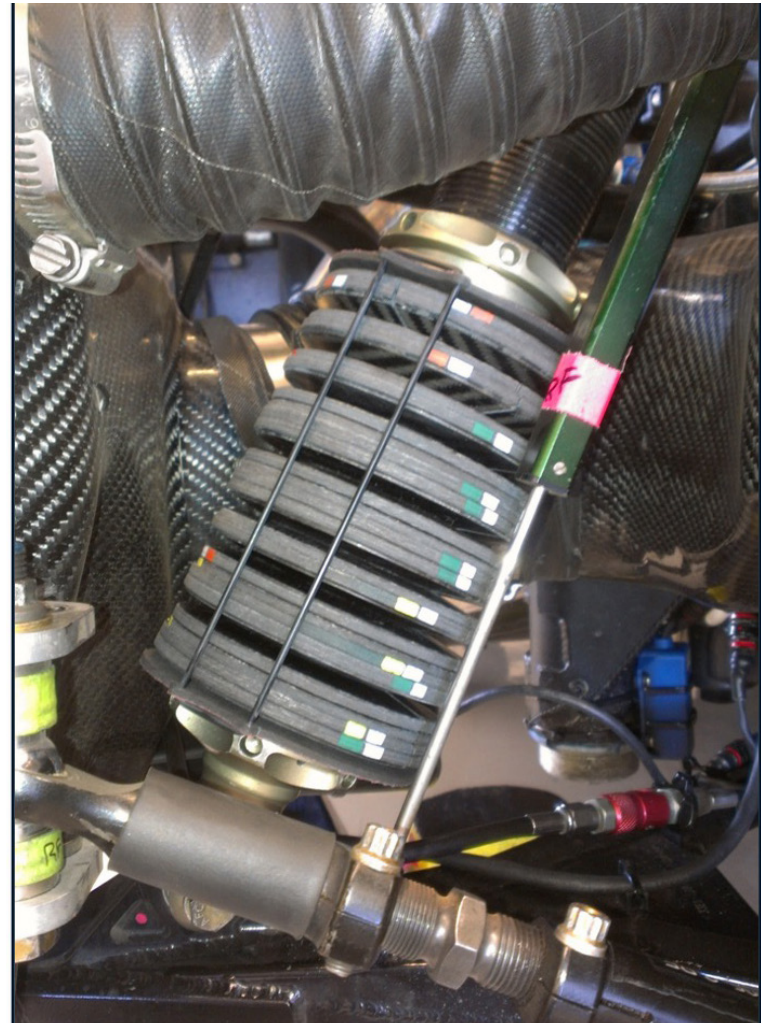
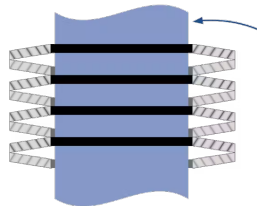


Type 2

One or more disc springs that require a full-length ID or OD guide rod to align the elements. Type 2 disc springs have lower upfront costs than type 1 springs because there is only one part style, reducing tooling costs.

Characteristics:

- Used as a single element or with multiple elements stacked in series or parallel
- Offers a deeper deflection allowance



Is Carbon Fiber Right for Your Application?

Carbon fiber may be a good fit if:

- Weight is critical
- Reducing side load is beneficial
- The design envelope is flexible
- Material temperature will be 200° F (93° C) or less
- The application allows for maintenance
- Corrosion resistance is beneficial

Markets

- Aerospace
- Construction
- Consumer Goods
- Sporting Equipment
- Military & Defense
- Motorsports
- Oil & Gas

Application Examples

- Counterbalance in cameras and optical equipment
- Heel support in shoes
- Springs for compound crossbows
- Suspension springs for motorcycles, mountain bikes, and snowmobiles

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