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Answers to 51 common questions about custom springs, wire forms and working with Oshkosh Coil Spring, from quotes and lead times to materials, finishes and spring basics. Terms in **orange** refer to OCS resources at oshkoshcoilspring.com, including the Spring Calculator, the Coil Spring Glossary and the Spring Materials Properties Guide.

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01 Ordering, Quotes and Lead Times

What lead time can I expect?

Typically 3 to 7 weeks. Where your order falls in that range depends on raw material availability, the in-house secondary finishing your part needs, and any outside finishing or plating. If you need parts sooner, ask us about expediting.

Is there a minimum order quantity?

No. We build to your specifications with no high minimums, so engineers and buyers can start with a prototype or a small batch. Setup costs are spread over larger runs, so piece prices drop as quantities rise.

What do you need to quote a part?

A print or sample, your estimated annual usage (EAU) and the quantities you want quoted. You can upload your drawing with your quote request. If you don't have a print yet, estimate your design with the **OCS Spring Calculator** and send us the results. **Request a quote**.

What types of springs and wire forms do you make?

Custom compression, extension and torsion springs and wire forms for industrial and OEM applications, in wire diameters from .008″ to .625″:

- **Compression springs:** any size and rate, with open, open and ground, closed, or closed and ground ends.
- **Extension springs:** custom sizes, rates, initial tension, hooks and ends.
- **Torsion springs:** custom torque, deflection, leg configuration and wind direction.
- **Wire forms:** custom bent and formed wire shapes built to your print or sample.

See our full capabilities.

Do you stock standard or catalog springs?

No. We are a custom spring manufacturer, and every part is built to your print, sample or specifications. At production quantities, we can often make standard springs more economically than a catalog supplier.

Do you expedite orders?

Yes. When you need parts sooner than our standard lead time, we'll expedite your order, subject to material availability and current workload. **Contact us** to discuss your date.

How long does a quote take?

Routine quotes usually come back within 3 business days. Quotes that need hard-to-find materials or outside services can take longer.

Can you give me a ballpark price?

Not reliably. Spring pricing depends on material, wire size, coil count, ends, finish and quantity, and a guess almost always misses something costly. Estimate your design with the **OCS Spring Calculator**, then **upload your drawing** and we'll return an accurate quote.

What does it take to place an order?

Your company name, contact, address and phone number, credit references, a print or sample, and a purchase order.

How can I save money on a custom spring order?

1. **Material:** Choose the lowest-cost material that suits your operating environment, temperature and corrosion exposure.
2. **Finish:** Consider pre-plated wire instead of plating after forming, and specify passivation or plating only where function or appearance requires it.
3. **Packaging:** Bulk packaging costs less than special packaging. Specify bagging, counts per box or tangle-free packaging only when your assembly line needs it.
4. **Quantity:** Blanket orders let us lock in material costs and availability, and larger quantities lower the piece price.
5. **Tolerances:** Hold tight tolerances only on the dimensions that affect function.

Do you offer inventory programs such as blanket orders, JIT, kanban or consignment?

Yes. We can stock parts against your blanket order and ship to your just-in-time releases, and we'll build a kanban or consignment program around your needs.

Where are your springs made?

In Oshkosh, Wisconsin. We have been family-owned and managed since 1959, and our Wisconsin plant gives you a reliable domestic supply.

What industries do you serve?

We make compression, extension and torsion springs and wire forms for industrial and OEM customers in industries from agriculture and aerospace to medical and mining. **See the industries we serve**.

02 Prototypes and Samples

Do you make prototypes?

Yes, every day. Send a print, sample or spec sheet with a purchase order, and we'll build to it. Prototypes use the same processes as production parts, and our prototype program takes you from concept to production-ready parts, with manufacturability feedback and design review along the way. **Contact us** to start a prototype.

Do I have to approve samples before a production order?

No. If you have a print, we build to it, and parts that meet the print are ready to ship. Samples are worth ordering when you need to confirm the spring works in your assembly; otherwise they add cost and time.

Why do a few samples cost so much?

Two reasons. Setup costs are the same whether we make 1 spring or 1,000, and material suppliers often have minimum buys for a given wire size.

Is there a way to reduce sample costs?

The setup cost itself doesn't change, but it's easier to absorb in a larger order. Ordering samples together with a first production lot often lowers the total. We'll review options with you case by case.

03 Design and Engineering Help

Can you help with spring design?

Yes. Start with the **OCS Spring Calculator** to estimate load, rate, torque and stress. Then send us your design, and our engineers will review it for manufacturability, materials and performance.

What should I consider when designing a spring?

1. **Environment:** Operating temperature, and any contact with corrosive media.
2. **Life:** How many cycles the spring must survive without breaking or taking a set.
3. **Load:** The loads required, the deflection range over which they apply, and how fast and how often the load is applied.
4. **Space:** The room available, including clearance over a shaft or inside a bore, so the spring can work without overstressing.

What tolerances are realistic for a spring?

Tolerances should let parts be made economically by normal production methods. Wire size and material properties vary within their own tolerances, so identify the few critical dimensions early and leave the others free for us to adjust. Machined-part tolerance blocks are usually too tight for springs. We'll help you decide what is critical and what tolerance each dimension needs. **Contact us** or call **(920) 235-7620**.

Can you help me avoid a bad design?

Yes. Send us your requirements and ask for a stress or fatigue analysis. We'll flag problems before you commit to tooling or production.

What is design stress, and why does it matter?

Design stress is the stress in the spring wire at a given load. In a compression or extension spring it is a torsional (shear) stress that depends on the load, coil diameter and wire diameter. Comparing it with the material's allowable stress tells you whether the spring will hold its shape and how long it will last. See our **Spring Materials Properties Guide** for design stress by material.

My print says "remove all burrs and break all sharp edges." Does that affect cost?

Usually yes. We keep burrs to a minimum during forming, but the cut ends of the wire are naturally sharp. Removing those edges adds an operation and cost without improving performance, so include that note only where sharp ends are a real problem.

What is the development process for a wire form?

Wire forms vary widely, and small design choices can change the cost a great deal. The best start is a conversation with one of our engineers about your part and how it will be used. **Contact us**.

04 Materials

What spring materials can you use?

We work with wire from .008″ to .625″ in music wire, oil tempered, hard drawn, chrome silicon, chrome vanadium and stainless steel (302/304, 316, 17-7 PH and others as required). Common materials are usually in stock at our suppliers, while specialty alloys can add lead time. Compare grades in our **Spring Materials Properties Guide**.

What is the difference between hard drawn and music wire?

Both are high-carbon spring wire. Hard drawn (ASTM A227) costs less and suits lower-stress, static applications. Music wire (ASTM A228) has higher tensile strength and better fatigue life, so it is preferred for higher stresses and cyclic loading. See both grades in our **Spring Materials Properties Guide** and terms in our **Coil Spring Glossary**.

How much weaker is a stainless steel spring than the same spring in carbon steel?

About 13% lower in rate. Type 302 stainless has a shear modulus of about 10 million psi, compared with 11.5 million psi for carbon spring steel, so a stainless spring with the same dimensions has a proportionally lower rate.

How can I tell stainless steel from carbon steel?

The surest way is the material certification or a lab or handheld (XRF) analysis. Shop tests are less reliable: 302 stainless is partly magnetic in spring temper, so a magnet test can mislead, and stainless also throws sparks on a grinder, just fewer and duller than carbon steel. If the material matters, ask us for a certification. See our **Spring Materials Properties Guide**.

What is a die spring, and when is it used?

A die spring is a heavy-duty compression spring wound from rectangular wire (often keystone-shaped before coiling). Rectangular wire packs more material into the same space than round wire, so die springs carry high loads in tight spaces, as in stamping dies and tooling. Their life depends on how far they are compressed, so manufacturers rate them by percentage of free length. OCS makes die springs to your print.

05 Finishes and Corrosion Protection

What finishes are available?

We offer finishes in-house and through local partners to improve corrosion resistance, appearance or identification. Finishes add lead time and cost, but the right one can extend spring life considerably. Powder coating and wet paint are done in-house.

Finish	What it is	Main benefit
Zinc plating	Electroplated zinc in clear, yellow or black	Corrosion protection and appearance; high-strength steels need baking after plating to prevent hydrogen embrittlement
Passivation	Acid treatment of stainless steel that removes surface iron and contaminants	Improved corrosion resistance; common for medical and food applications
Powder coat or paint	Applied color coatings	Corrosion protection and color matching
Black oxide	Chemical conversion coating	Black appearance; mild corrosion resistance with an oil topcoat
Nickel or tin plating	Electroplated metal	Bright appearance; tin aids solderability
Copper plating	Electroplated copper	Conductivity for electrical applications
Rust preventive oil	Oil- or water-based film	Low-cost protection in storage and shipping
Color dip	Dipped paint mark	Part identification and color coding

Which finish should I choose?

Start with the environment and whether the concern is function, appearance or both. In many cases, a corrosion-resistant material such as stainless steel, or pre-plated wire, costs less overall than plating after forming. **Ask us** and we'll recommend options.

06 Manufacturing Processes

What secondary operations do you do in-house?

Shot peening, grinding, heat treating, powder coating, wet paint, welding and light fabrication, so parts move from coiling to finished part under one quality system.

Why grind spring ends?

Grinding the squared ends flat helps a compression spring sit square, load evenly and resist buckling, especially over a shaft or in a bore. It adds cost, so it is usually specified only when squareness matters or the spring is heavy enough to need it. Light-wire and high-index springs often work well with squared, unground ends.

What is shot peening, and what does it do?

Shot peening blasts the spring surface with small, round steel shot. It is a cold-working process that puts the surface in compression, which resists crack growth and can improve fatigue life several times over, depending on the design and stress level. See "Shot peening" in our **Coil Spring Glossary**.

What does "taking a set" mean, and can you prevent it?

A spring takes a set when it is stressed beyond its elastic limit and doesn't return to its original length. We can preset (remove set from) springs by compressing them to solid height during manufacturing, so they hold their length in service. See "Set" and "Preset" in our **Coil Spring Glossary**.

What is stress relieving?

Stress relieving is a low-temperature heat treatment done after coiling or forming. Forming stretches the wire on one side of each bend and compresses it on the other, leaving residual stresses that can cause early breakage. Stress relieving relaxes those stresses so the spring holds its shape and lasts longer. See "Stress relieve" in our **Coil Spring Glossary**.

Does stress relieving change a spring's dimensions?

It can. The amount depends on the temperature, the time at temperature and the material, and we allow for it when we set up the job so finished parts meet your print. Typical effects:

- **Extension springs:** lower initial tension; hook position and diameter can shift.
- **Compression springs:** free length and diameter can change slightly.
- **Torsion springs:** the leg position (free angle) can shift; a low-temperature treatment helps stabilize it.

Is heat treating the same as stress relieving?

No. Stress relieving relaxes the spring without changing the material's structure. Heat treating changes the structure to make the material harder or softer, and each material needs its own temperature and time. For example, 17-7 PH stainless is precipitation hardened after forming at about 900°F for one hour.

Do you make your own tooling?

Yes. We keep a broad inventory of standard tooling for each machine's wire range, so most orders need no custom tools. When a part does need special tooling, we make it in-house to save time and cost.

07 Quality and Certifications

Are you ISO 9001 certified?

Yes. Our quality management system is registered to ISO 9001:2015. An accredited registrar audits us every year and recertifies us every three years.

How do you keep parts consistent from run to run?

We use process controls at every stage, build to certified material that meets the applicable ASTM specifications, and run an ongoing continuous improvement program under our ISO 9001 system.

What testing do you do?

We inspect raw material and finished springs with load testers, optical comparators and vision systems. Material certifications are available on request.

Do you practice lean manufacturing?

Yes. Lean manufacturing focuses on continuous improvement and eliminating waste. Our tools include 5S workplace organization, root cause analysis (such as 5 Whys), Plan-Do-Check-Act cycles, visual management and standard operating procedures.

What is ISO 9001?

ISO 9001 is the international standard for quality management systems, published by the International Organization for Standardization (ISO). Certification shows that a company has documented processes for meeting customer requirements and continually improving quality.

08 Spring Basics

What does "load" mean on a spring drawing?

Load is the force the spring exerts at a specified length or deflection, usually in pounds. It is not a maximum safe weight. Every spring also has a maximum working deflection; compressing or stretching it beyond that overstresses the wire and can cause it to take a set or fail. See "Load" in our **Coil Spring Glossary**.

What is the best way to measure a spring?

Use calipers for outside diameter and length, and a micrometer for wire diameter. Measure inside diameter with pin gauges or calipers. Load and rate are measured on a spring load tester, which we can do for you if you send a sample.

What is the difference between pitch and the space between coils?

Pitch is the distance from the center of the wire in one active coil to the center of the wire in the next. The space between coils is the open gap between them, which equals the pitch minus one wire diameter. See "Pitch" in our **Coil Spring Glossary**.

How design changes affect rate and stress. These rules of thumb come from the standard rate formula for compression and extension springs, where *G* is the shear modulus, *d* the wire diameter, *D* the mean coil diameter and *n* the number of active coils:

$$R = G\,d^4 \div (8\,D^3\,n)$$

What happens if I change the wire diameter by 1%?

The rate changes by about 4% in the same direction, because rate varies with the fourth power of wire diameter. A wire 1% larger gives a spring about 4% stronger; a wire 1% smaller gives one about 4% weaker.

How does a 1% change in wire diameter affect stress?

At the same load, stress changes by about 3% in the opposite direction, because stress varies inversely with the cube of wire diameter. A wire 1% larger lowers the stress about 3%.

What happens if I change the mean coil diameter by 1%?

The rate changes by about 3% in the opposite direction. Increasing the mean diameter 1% makes the spring about 3% weaker.

What does adding or removing a coil do?

Rate is inversely proportional to the number of active coils: adding a coil lowers the rate, and removing one raises it. Rate × active coils stays constant, so you can solve for the coils you need.

Example: a spring with 10 active coils has a rate of 90 lb/in, and you need 100 lb/in.

1. 10 coils × 90 lb/in = 900
2. 900 ÷ 100 lb/in = 9 active coils

Result: 9 active coils give a rate of 100 lb/in. For the meaning of rate, active coils and mean diameter, see our **Coil Spring Glossary**, or try your own numbers in the **OCS Spring Calculator**.

Still have a question? Call **(920) 235-7620** or visit **oshkoshcoilspring.com**

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