The smart choice in engineered metal products.

Wire forms

Stampings

Springs

Rings

Since 1914, Peterson Spring has been accumulating the understanding of spring steel that shapes its products and serves its customers. In that year August Peterson, an immigrant Norwegian blacksmith who chose spring-making as his career, came to Detroit and founded a company to meet the demands of the burgeoning railroad and automobile industries.

Broader reach

Today the Peterson American Corporation (PAC) is the largest independent spring manufacturer in North America. Applying the lessons learned over more than 90 years, the company has expanded its focus beyond the transportation industry to markets across the wide spectrum of global business, including the appliance, agriculture, lawn and garden, medical, furniture, and heavy equipment sectors.

Peterson's product lineup has lengthened as well. Building on our core manufacturing competency, we now produce an array of rings, wire forms, and stampings to complement a comprehensive portfolio of springs.

Deeper commitment

As we developed greater technological and manufacturing capabilities, we have been able to provide greater support to a growing number of customers throughout the world.

A truly global supplier, PAC currently serves more than 400 customers in 29 countries on six continents. With 13 manufacturing and distribution facilities worldwide, we can offer the economic and logistical benefits of local supply to much of our customer base.

Greater value

From a maker of superb springs, Peterson Spring has grown to become a full-line, full-service manufacturer of engineered metal products. In the process, we have increased our knowledge of our own business as well as our appreciation of the needs of our customers. As a result, our products and services provide greater value today than ever before. It is a trend we plan to continue.

Smart solutions

There are no smart springs. Or torque rods. Or clips. There are only intelligent solutions to the needs of a particular application for the efficient management of mechanical energy. Solutions from Peterson Spring reflect our command of both the art and the technology involved at every phase of product development.

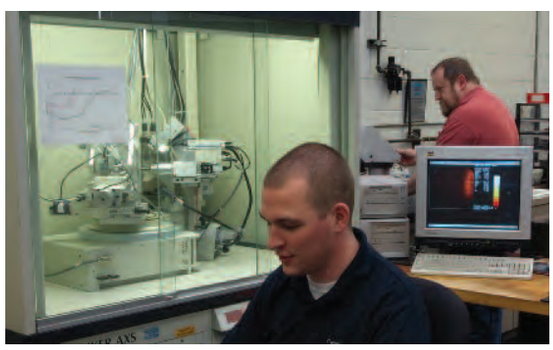
Materials - We have the metallurgical expertise to distinguish among different grades of steel. We know which suppliers use advanced processes to make their steel as clean as possible. We have the resources in-house to test material quality. And we have developed statistical methods to assure that our selection decisions are based on the latest data. So we can buy the best materials for a specific product, at a competitive price, in any region of the world.

Design - The product designers at Peterson Spring are among the best and most experienced in the industry. A proprietary computer model not only facilitates their work, but it enhances our considerable understanding of spring operation. This capability allows our customers to concentrate on the overall design of an application, without having to worry about the geometry or performance of the engineered metal components. Or we can build a product to a drawing.

Production - PAC springs, wire forms, and stampings are manufactured in facilities located as conveniently as possible to the operations of our global customers. Our plants are equipped with the latest production equipment and are certified to current TS/ISO/QS standards.

In addition, a specialized division focuses on assembly, secondary operations, packaging, and distribution. Capabilities include poly-bagging with bar code imprint, packaging to customer requirements, bulk shipments to customer specifications, and layer packaging.

Product support - Peterson supports every product through its complete life cycle. Should a failure take place in the field, we have the forensic resources to determine the cause. And we have the experience to take appropriate steps to assure satisfactory performance in the future.



Smart business

Working with a large, full-line, global supplier makes good business sense for our customers on a number of levels.

Peterson's comprehensive product portfolio presents the opportunity to streamline a customer's purchasing operations by shrinking the supply base. Our global operations promise to shorten delivery times, simplify logistics, and enable local sourcing.

We have the experience and expertise to meet the most demanding requirements, such as those of the automotive industry, assuring our customers that we can apply the highest technology to spring-steel solutions for any market.

A complete metallurgical laboratory, comprehensive design expertise, and technologically advanced production facilities: the resources developed to meet our biggest challenges are available to support our smallest customers.

Finally, our long history is a measure of the company's stability. It tells customers that we will be here to support their current products – and to design for their upcoming needs – whatever the future may bring.

Market intelligence

From the start, the automobile industry has been a large part of our customer base. The demands of the industry have driven progress in engineering innovation, product quality, and production efficiency. The resulting advances have enabled us to expand beyond this important sector. Today, the work we do with a variety of other industries accounts for more than half of our global business.

Automotive - Chassis springs were among the first products that Peterson delivered to carmakers. PAC designs and manufactures engine valve springs, including springs used in competition – the most demanding application in the industry. We have developed the resources and understanding necessary to provide solutions throughout the body assembly, from bumper to bumper.

Appliances - PAC supplies durable, economical parts in multiple materials for a wide variety of applications. The simplest door springs or hose clamps. The most precise actuators. The most rugged directional control rods.

Agriculture - This industry demands large parts, rugged and simple designs, and extended life expectancy in unpredictable conditions. Suspension springs. Rake tines. And many other components.

Lawn and garden - We deliver springs and stampings of every configuration in production quantities to a highly competitive industry with significantly seasonal variations in demand.

Medical - We have found that advanced springs and wire forms used in luxury seating in up-market automobiles for weight reduction, durability, and improved support are also applicable to today's hospital beds and other medical equipment.

Furniture - Driven by high-level design and sophisticated performance, the furniture industry challenges Peterson to produce precise, complex solutions in springs and stampings.

Heavy equipment - The extended life cycles of trucks and construction equipment require evolutionary improvements in springs, retainers, and actuators to meet rising expectations for both performance and long life.

Motorsports - Automobiles. Motorcycles. Marine engines. In racing, the operating and environmental conditions are the most harsh, and the consequences of failure are the most spectacular. Yet PAC springs, dampers, rings, clips, and clamps are trusted and specified on ovals and dragstrips at every level of competition.

Solutions in spring steel

More than 90% of Peterson's products are built for a specific customer application. Even our extensive selection of standard die springs incorporates levels of design expertise and production technology that distinguish them from competitive offerings. A founding member of the Spring Manufacturers Institute and a member of the Institute of Spring Technology, we bring nearly a century of experience to a comprehensive portfolio of spring-steel solutions.

Springs: compression, torsion, extension, engine valve springs, die springs

Rings: transmission rings, retaining or snap rings

Wire forms: torque rods, seating frames, clips, hose clamps, reinforcement wires

Stampings and Four Slide: flat and wire clips in high-carbon or stainless steel, aluminum, or various other metals. "R" clips, spring clips, fuel line clips, cable control clips, strapping retainers

Special orders: prototypes, short runs, and custom orders

- rings in various steels or aluminum and in a range of sizes and end configurations (notches, tangs, chamfering, etc.)
- springs in various configurations, featuring a variety of secondary treatments; flat or round wire forms; stampings; and assemblies

Special services:

Assemblies:

- including bearings, dampers, caps, bolts, buttons
- stampings assembled or welded to wire forms
- painting, striping, packaging, sequencing for production

Packaging and distribution:

- assembly, light manufacturing, and secondary operations
- including poly-bagging with bar codes, bulk or layer packaging to specification

Die Springs

Peterson American Corporation manufactures a complete lineup of high-force compression springs that are designed for use in applications where extreme temperatures are reached, typical of die-stamping or injection-molding operations.

Our die springs are available from stock in a wide range of standard sizes. But the standards we set for their materials and design distinguish them from other offerings on the market.

The excellent performance and durability of Peterson die springs result from the extensive experience and unique resources we have developed in producing a broad portfolio of solutions for the most demanding applications in a variety of industries.

Exceptional Standards

For its die springs, Peterson specifies a high-grade, pre-tempered, chrome-silicon wire with a trapezoidal cross-section. The properties and purity of this material are ensured through extensive testing in our metallurgical laboratory, using a range of analytical resources, including such techniques as electron scanning microscopy and x-ray diffraction to measure stresses in the wire stock.

These springs are coiled on CNC equipment, taking on a precise rectangular cross-section. This proprietary aspect ratio minimizes space between adjacent coils, resulting in a shorter compressed height than competitors products. Greater travel-to-solid distance across the product line affords flexibility in choosing springs for applications where space is limited. This configuration also provides greater force at the limits of the efficient operating range.

Extended Fatigue Life

All die springs are stress-relieved after coiling, compressed to solid to reduce load loss during operation, and shot-peened for long cycle life. Both ends are precision-ground to size, and the springs are powder coated and striped to identify duty range (inch series). Springs in the ISO (metric) series are coated in solid colors.

Applications

Die springs are primarily used in metal stamping to cushion die impact and to assist stripping of finished parts. They find similar use in plastic injection molding. Other applications include:

- casters
- clutches
- counterbalance
- conveyor tensioning
- hydraulic cylinders
- shock absorbers
- valve actuators

Specifications

800 part numbers are in stock for rapid delivery direct from the factory or through our global distribution network:

- 380 springs in hole sizes (ODs) from 3/8 to 2 inches
- free lengths from 1 to 12 inches
- more than 400 metric (ISO) selections.

Custom Options

Peterson can produce custom spring sizes, manufactured to the same quality standards, and delivered quickly in required quantities. Coating alternatives include:

- DACROTIZED® ceramic coating for corrosion resistance
- powder coating in customer-specified colors
- unpainted and oil coated.

Peterson American Corporation (PAC) has perfected the art of making springs for nearly a century. In all the years of commitment to continuously improve our products and our manufacturing processes, we have acquired an extraordinary breadth of knowledge and depth of understanding of our craft. It is our dedication to sharing with our customers this wealth of experience and expertise that distinguishes us as a truly full-service supplier.

Across our complete lineup of springs, wire forms, and stampings, we can provide comprehensive design and engineering support – from application analysis to prototype or product testing. We manufacture the results in efficient facilities and deliver cost-effective spring solutions to customers in multiple markets throughout the world.

MATERIAL QUALITY

Our advanced metallurgical laboratory exists to ensure the quality of the materials that go into our products. We use a full range of analytical resources to examine fundamental material properties, distinguishing among steels of differing specification or from different suppliers:

- rotating-bending fatigue of wire stock
- tensile yield of competing materials
- optical metallography, including scanning electron microscopy and energy-dispersive x-ray analysis
- x-ray diffraction to measure stresses in both wire stock and finished parts
- microhardness testing to verify hardness profile, residual stress profile, and surface processing effects
- surface roughness and decarburization analysis
- impact testing to measure fracture toughness and notch sensitivity.

PRODUCT DEVELOPMENT

The engineering personnel in our corporate headquarters are fully experienced in product design, in spring design analysis, in dynamic simulation, and in the application of advanced technology to product innovation. We can bring to a customer's application a variety of industry-standard and proprietary software tools to optimize performance and efficiency, including:

- 3D dynamic simulation
- solid modeling
- 2D drawing
- spring design
- finite element analysis.

DESIGN VALIDATION

In the dynamics laboratory we examine prototypes or production examples in conditions that closely approximate actual use:

- cycle testing to determine and enhance fatigue life
- rate progression analysis of compression and extension springs
- torque testing of torsion springs and rods.

PROCESS INNOVATION

PAC designs and manufactures products for the most demanding applications, including those in the aerospace industry and the automotive competition arena. We are constantly applying the latest developments from these sophisticated sectors to advance the performance of products throughout our lineup. We are taking advantage of process and manufacturing progress on multiple levels:

- advanced high-tensile materials
- nitriding and piece hardening
- innovative wire cross-sections
- unique packaging configurations
- advanced surface-finishing processes.

RAPID PROTOTYPING

Personnel and facilities throughout the company are dedicated to rapid prototyping and minimizing cost during spring development. Many of our plants throughout the world are equipped for sample production and for short runs.

In a short period of time, we can create prototypes, test them in-house, and analyze the data. The results can be readily applied to modifications for further iterations of the process.

INFORMED CUSTOMER SUPPORT

We are prepared to partner with our customer in providing specific product improvements. Or we can provide broad assistance in the development of a completely new design – from analyzing an application to identify the loads, to designing and packaging a solution that precisely addresses cost concerns as well as performance parameters.

We can, of course, manufacture a product to an existing engineering drawing. This is often the case, particularly for wire forms or stampings. At the very least, we can offer suggestions that might simplify manufacturing or enhance performance.

Because we understand so well what goes into the products we produce, we can stand solidly behind every spring, wire form, and stamping in our extensive product portfolio.

COMPRESSION SPRINGS

Helical compression springs are among the most efficient devices available for energy storage. This simple example is the most widespread spring configuration in use today, finding application in markets as diverse as the automotive, agriculture, aerospace, lawn and garden, and industrial sectors.

Applications: Compression springs are found in perhaps the broadest selection of uses of any spring type:

- appliances
- ATV and motorcycle suspensions
- brakes
- clutches
- door checks
- door latches
- engines
- fuel canisters
- fuel injectors
- hay balers
- lawn and garden equipment
- pedal assemblies
- soil cultivators
- tools
- transmissions
- vibration controls

Material specifications: Depending on their performance requirements and operating environments, Peterson produces compression springs in a variety of materials and a range of sizes:

- hard-drawn carbon spring wire
- high-content chrome or silicon alloys
- stainless steel
- wire diameters from 0.008 to 0.625 inches.

Engineering options: Because of the number of compression spring characteristics that can be tailored to specific circumstances, this type of spring represents a flexible design approach to force resistance and energy storage.

Traditional round-wire as well as square, ovate, rectangular, and other custom cross-sections are available to help meet specific performance requirements.

These springs can be produced with cylindrical, conical, hourglass, barrel, or other profiles. Overall shape can be tailored to address such needs as dynamic resonance or packaging restrictions.

Varying the distance between the coils (pitch) can vary the spring rate throughout the operating range, helping to minimize resonate surging or vibration.

Precision manufacturing: We manufacture our compression springs on computer-numerical-controlled (CNC) coiling equipment. This permits us to hold tight tolerances with repeatable results throughout a production run.

A variety of finishing processes and secondary operations are available, including:

- shot peening for extended cycle life
- grinding of the end coils for squareness
- OD or ID chamfering
- heat treatment
- hot or cold set
- post plating for corrosion protection
- enamel, E-coating or powder coating.

EXTENSION SPRINGS

Extension springs store energy as they are stretched, exerting force to reduce distance as they return to shape. Because they do not have a solid stop to prevent overloading, they are designed with lower stress levels than compression springs.

Applications: Extension springs find use in multiple applications, including:

- appliances
- automotive seats
- balance scales
- bay doors
- dock levelers
- drum brakes
- farm machinery
- garage doors
- lawn and garden equipment
- medical devices
- spring tensioning devices
- trampolines
- vehicle door latches

Material specifications: Peterson manufactures extension springs to fit many different performance requirements and environmental conditions, in a range of materials and sizes:

- hard-drawn carbon spring wire or stainless steel
- wire diameters from 0.030 to 0.625 inches.

Engineering options: In order to work as part of an assembly, extension springs require some means of attachment, commonly called "hooks." The ends of these products can be fashioned in a variety of shapes, including threaded inserts, swivel hooks, twisted loops, and side loops.

The length and positioning of the hooks can be adjusted to produce exactly the prescribed load at any extended position.

Silencers can be included to prevent vibration within the spring itself, eliminating noise without disturbing function.

Precision manufacturing: Our extension springs are manufactured on high-speed CNC coiling equipment, ensuring adherence to tight tolerances throughout a production run:

- multi-axis, 3-dimensional bending can produce complex hook configurations
- plating for corrosion protection.

TORSION SPRINGS

Torsion springs are designed to apply or to store energy in a rotational direction about the axis of its helical coils. The helix may be wound in a single direction, or it may be composed of two sections wound in opposite directions, in order to combine the torque of the two coils. The free ends, through which the spring transmits its energy, are called "legs."

Applications: Perhaps the most familiar torsion spring is the one found in the common clothespin, but their versatility and packaging lend them to uses in more complex applications, including:

- appliances
- concentric-shaft couplings
- counterbalance devices
- dock levelers
- door closers
- door and hood latches
- engines
- lawn and garden equipment
- hay balers
- rake tines
- ratchets
- soil cultivators
- transmissions
- vehicle seats

Material specifications: PAC produces single-bodied and double-bodied torsion springs in a range of materials and wire sizes, to meet the demands of many operating requirements and environments:

- hard-drawn carbon spring wire
- high-content chrome or silicon alloys
- stainless steel
- wire diameters from 0.008 to 0.625 inches.

Engineering options: In order to facilitate operation, mounting, and packaging, the legs of torsion springs can be fashioned in a variety of configurations, including straight, hinged, and short hooks.

When conditions demand, non-round wire can improve efficiency and obtain higher energy storage. Rectangular wire can be used to provide optimal performance when packaging space is limited.

Double-bodied springs, incorporating separate sections of coil wound in opposite directions and connected together, can be used to manage instances of severe torque.

Precision manufacturing: Peterson torsion springs are coiled on CNC equipment for consistent adherence to tight tolerances throughout a production run:

- multi-axis, 3-dimensional bending can produce complex torsion leg shapes
- shot peening for long cycle life
- post plating for corrosion protection.

WIRE FORMS

Peterson Spring fashions flat springs and custom wire forms from round wire or strip material using multi-axis, multi-head, 3-dimensional CNC or multi-slide equipment. A wide array of hooks, bends, or other attachment points can be shaped in a single operation:

- sizes from 0.030 to 0.500 inches
- carbon, high-content alloys, stainless, or galvanized steel
- vinyl, nylon, DACROTIZED®, or other coatings
- pre or post plating for corrosion protection
- custom design services match materials and processes to suit customer need.

We have the experience and resources to design and manufacture spring-steel solutions for use in a range of applications in multiple industries:

- automotive, appliance, marine, lawn and garden, office furniture and other industrial markets
- engines, transmissions, brakes, seating systems, cushion frames, fuel lines, and more.

Flat springs in leaf, beam, and cantilever configurations.

Torsion rods manage rotational energy where application geometry demands remote linkage.

Frames and frame components use shapes, length, and material tensile properties to manage energy or provide structural support. A limitless variety of frames can be precision formed from wire or steel strip.

Clips, brackets, and clamps in complex shapes can be produced from wire or strip material in a single precision operation.

Hose clamps and clamp systems in stainless steel or special alloys are suited for applications where constant joint expansion and contraction are required.

STAMPINGS

Clips and brackets stamped in spring steel are designed to maintain a static load over time. Four-slide and multi-slide stamping equipment can turn out thousands of small parts an hour.

Precision manufacturing: With press capacities up to 200 tons, our progressive-die operations can produce heavier, complex parts. These precision stampings can be attached to other spring systems in secondary operations.

Peterson has the capacity and the craftsmanship to create prototypes, short runs, or high-volume production:

- high-carbon steel, stainless, aluminum, or multiple other metals
- galvanized or other coated materials in wire or strip form
- available vinyl, rubber and other coatings to suit customer need
- thicknesses ranging from 0.012 to 0.25 inches.

Markets: We supply stampings to customers in a wide variety of markets, including automotive OEMs and suppliers, agriculture, appliances, defense, aerospace, medical, dental, and telecommunications.

Applications: These products are used in such diverse applications as "R" clips, spring clips, fuel line clips, hose clamps, cable control clamps, and strapping retainers.

Our highly qualified engineering staff is always available to help in the design of custom stampings. And our complete range of manufacturing options ensures that every customer requirement is met with a product that delivers quality and cost-efficiency.

The smart choice in engineered metal products.

Peterson American Corporation provides every product with exceptional support. Our metallurgical laboratory ensures the quality of our materials and the consistency of our suppliers. In the dynamics lab, we evaluate performance and durability. And our engineering group provides design analysis or assistance with product configuration.

SMALL QUANTITIES. FULL SERVICE.

Within the Corporation, two divisions provide access to the full array of resources for customers who require our springs, wire forms, and rings in limited numbers, whether to evaluate prototypes, to meet intermittent demand, or to use in pilot production. Our Specialty Spring Division and Specialty Ring Division make sure these customers enjoy all the benefits of Peterson's experience and expertise.

SPECIALTY SPRING DIVISION

The Specialty Spring Division treats designs and deadlines with equal respect. This group has the flexibility to process springs and wire forms on production equipment or at a standard, mechanical station run by our resident spring expert. Either way, rigorous quality control assures that final parts meet specification.

For an existing print, the division can quote cost-effective production on schedules as short as six weeks or less. We are also organized to handle trial and prototype production. We can conduct a design review, taking into account materials, function, and packaging, and recommend a configuration that meets performance targets in the space allowed.

Products: Compression, extension, and torsion springs; wire forms; torque rods; and simple retaining rings. Profiles in wire diameters from 0.009 to 0.25 inch. We can also source small stampings and larger sizes with complete quality assurance.

Options: Carbon steel, chrome-silicon alloys, stainless, aluminum, and more are available. Secondary operations include heat treating, coating for corrosion resistance, and surface hardening for durability.

SPECIALTY RING DIVISION

For customers requiring the smallest quantities on the shortest schedules, the Specialty Ring Division is the point of contact for full-service design, production, and technical support. The Division inventories a full selection of raw materials in a range of wire profiles. Our ability to shape unique cross-sections ensures both quality and rapid response.

Our retaining rings are produced on precision coiling equipment. A range of end configurations are standard. Special treatments, such as notches, bends, tangs, or holes, can be achieved in secondary operations. We can turn around short runs of five to 5,000 rings on schedules significantly shorter than serial production. Based on a customer's history, we can produce quantities covering multiple ordering cycles and deliver them as required, saving both time and cost.

Materials: Oil-tempered or hard-drawn, high-carbon steel; chrome-silicon alloys; stainless; low-carbon steel; and aluminum.

Sizes: Standard circular rings in diameters from 0.500 to 60 inches. Elliptical rings in diameters from 2.5 to 11.5 inches.

Finishing: Coining; stress relieving; shot peening; coating for corrosion resistance or identification; plating; and grinding for tight tolerances. Special packaging is available.

MARKETS

Peterson's Specialty Divisions serve customers in the aerospace, agriculture, defense, heavy-truck, and industrial markets. We also provide prototyping services to such high-volume markets as the automotive industry.

The smart choice in engineered metal products.

Rings

Peterson American Corporation is a full-service supplier of retaining rings, or "snap" rings, that are used to locate or to retain parts on shafts or in cylinders during operation. The company's manufacturing facilities are staffed and equipped for high-volume production of a comprehensive catalog of sizes and configurations for a wide range of well characterized applications.

In addition, the Specialty Ring Division can apply the company's considerable resources and expertise to the design and production of ring prototypes, short runs, or special orders. For every product, Peterson's ring professionals are dedicated to achieving the functionality required by our customer in a cost-effective and environmentally sound manner.

EXCEPTIONAL SERVICE

Peterson can offer engineering, design, and technical assistance to help any customer determine the optimum combination of material, ring design, and dimensions that will provide the greatest value in a specific application. Even when manufacturing to a specification, every program is subject to a design review to ensure cost efficiency.

Our unique ability to engineer and shape our own wire improves quality control and shortens customer lead times. Analytical laboratories monitor raw materials, manufacturing processes, and completed rings, assuring clean, consistent parts.

Every Peterson ring is manufactured by coiling on precision, CNC equipment to minimize scrap and dimensional variation that can result from stamped production. And storage in a climate-controlled environment maintains the integrity of finished products.

MARKETS AND APPLICATIONS

Peterson serves customers in multiple markets, including the automotive OE and aftermarkets, aerospace, defense, agriculture, and industrial equipment.

Our high-volume and specialty rings provide value in a wide variety of mechanical systems, including:

- automatic transmissions
- body and assembly
- torque management systems
- powertrains, including hybrids
- steering and chassis
- industrial bearings
- piston pin retainers.

SPECIFICATIONS

Materials: oil-tempered or hard-drawn, high-carbon steel; chrome-silicon alloys; stainless steel; low-carbon steel; and aluminum.

Cross-sections: range of size and shape, including beveled and multi-beveled configurations; pre-shaped wire is available for high-aspect-ratio sections and improved stability.

Coil sizes: range of diameters from 0.500 to 60 inches on standard, round rings; diameters from 2.5 to 11.5 inches on elliptical rings; diameters from 3 to 7.5 inches on wave rings.

End configurations: standard cut-offs include straight, inside and outside angle, inside and outside butterfly, angle/straight, and full radius. Specialty notches, bent tangs and holes are also available.

CUSTOM OPTIONS

All Peterson ring products are stress relieved after manufacture. Additional special operations can include:

- coining
- color coating
- grinding
- shot peening
- plating
- special packaging.

The smart choice in engineered metal products.

Engine-Valve Springs

Springs that operate in the powertrain and fuel-system environment of automotive and industrial engines are among the most highly engineered products manufactured by the Peterson American Corporation. They demand the company's most sophisticated technological tools and processing for their development and for the evaluation of their performance. In turn, the understanding of spring operation and construction that we gain in the process can be applied to every other product we make.

Technological Capabilities

Two advanced laboratories are dedicated to ensuring the quality and performance of our engine-powertrain springs. In the metallurgical laboratory, our scientific and technical staff can mount samples for raw material qualification and validation. We use a full range of analytical resources to examine fundamental material properties, distinguishing among steels of differing specification or from different suppliers:

- evaluation of rotating-bending fatigue of wire stock
- measuring tensile yield of competing materials
- optical metallography, including scanning electron microscopy and energy-dispersive x-ray analysis, to evaluate surface condition and structure, to determine grain size, and to identify the presence and content of inclusions in raw materials
- x-ray diffraction to measure stresses in both wire stock and finished parts to confirm the quality of materials or the effectiveness of production processes
- microhardness testing to verify hardness profile, residual stress profile, and surface processing effects
- surface roughness and decarburization analysis
- impact testing to measure fracture toughness and notch sensitivity, and to evaluate processing effects.

In the dynamics laboratory our engineers employ a full range of testing resources to examine production or prototype springs in conditions that closely approximate actual use:

- cycle testing of finished springs to determine and enhance fatigue life
- video analysis of the complete spring event identifies crucial dynamic forces
- laser measurement of valve position determines precise location throughout the working cycle
- proximity probe focuses on the valve-closing event to determine position, timing, and the occurrence of valve bounce
- rotary cycle and servo-hydraulic fatigue testing
- specialized equipment for evaluating spring rate, spring frequency, spring load, and spring pitch profile
- strain gauging capabilities for springs and valvetrain components
- SpinTron motorized valvetrain tester and KDY data analyzer.

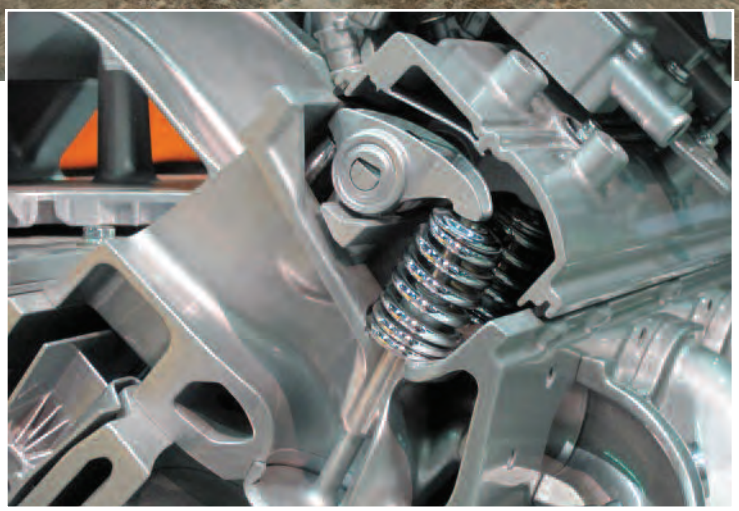
Engineering Capabilities

The engineering personnel in our corporate headquarters are fully experienced in product design, in spring design analysis, in dynamic simulation, and in the application of advanced technology to product innovation. We use a variety of software for spring design, modeling and assembly, and FEA to optimize performance, including:

- 2D dynamic motion software
- 3D dynamic simulation modeling software (ADAMS)
- solid modeling (NX)
- 2D drawing software (NX, ProE, ACAD)
- spring design tools (IST, SMI, PAC proprietary).

We are constantly applying the latest developments from our PAC Racing division to advance the performance of springs throughout our engine-powertrain lineup. We are taking advantage of improvements on multiple levels:

- advanced high-tensile materials
- nitriding and piece hardening
- ovate and multi-arc wire sections
- beehive spring configuration
- advanced surface-finishing processes.



RAPID PROTOTYPING

Personnel and facilities throughout the company are dedicated to rapid prototyping and minimizing cost during spring development. Many of our plants throughout the world are equipped for short runs and sample production.

In a matter of hours, we can create a set of prototype springs, test them in-house, and analyze the data using KDY software. The results can be readily applied to modifications for further iterations of the process.

The expert use of actual materials in evaluating spring designs provides true dynamic data much more quickly than using appropriate 3D modeling to simulate the entire valvetrain system.

INFORMED DEVELOPMENT AND PRODUCTION

The professionals who staff the laboratories and our production facilities use the knowledge generated by technology to improve our current offerings and to develop new springs that meet the performance demands of our customers in a cost-effective manner.

Our understanding of materials and processes helps us to maximize the fatigue life of our powertrain springs and to minimize load loss throughout a product's design life.

MARKET SUPPORT

The performance and durability built into our engine-valve springs serve customers in several related industries:

- OE automotive powertrains and fuel systems
- OE industrial powertrains and fuel systems, including stationary engines for the production of heat or electrical energy, farm equipment manufacturers, and heavy-truck makers
- manufacturers of aftermarket or service parts
- high-performance competition and racing powertrains and fuel systems.

APPLICATIONS

The technology in this product line is used to produce not only engine-valve springs, but also springs in fuel injectors, latch mechanisms for valvetrain components, and springs in torque converters.

DISTINGUISHING FEATURES

All of these products are manufactured from high-tensile, pre-tempered steel alloys that are certified to be clean of contaminants. Among the manufacturing and finishing processes used to extend fatigue life and limit load loss are:

- use of non-circular wire to maximize efficiency and travel
- treatment after coiling to relieve detrimental forming stresses
- heat setting to minimize load loss during operation
- shot peening to improve cycle life
- closing and grinding of both ends.

Parts intended for high-performance applications can be piece hardened, polished, or nitrided to enhance durability. Closed ends can be chamfered, radiused, or otherwise conditioned to improve performance.

INTELLIGENT INNOVATION

Peterson Spring has the experience and expertise to command every step in the production of high-quality springs for use in engines, powertrains and fuel systems. In support of our comprehensive product lineup, we have developed proprietary designs and processes that can significantly enhance performance and reduce costs for our customers:

- patented spring-damper technology that limits dynamic stresses at maximum compression, reducing fatigue and extending spring life; an integrated valve-stem seal consolidates parts and simplifies assembly
- surface enhancement techniques that can significantly improve performance and enhance durability
- use of advanced materials and processing techniques
- beehive spring configuration to reduce weight and mass, to increase natural frequency, to minimize errors in asymmetric assembly, and for efficient packaging in valvetrains where space is an issue
- drawn, high-tensile, valve-quality material in unique wire cross-sections.

The smart choice in engineered metal products.