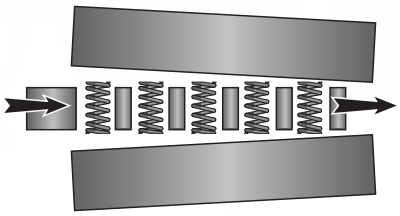
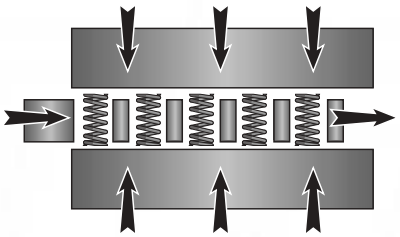
Next the ends of the spring are ground. This operation is critical because it insures each spring is square and that the forces will be evenly distributed to the stem of the valve. The necessity for a spring to be square is obvious, and each Engine Lab™ spring is held to an incredible tolerance of 2° to the retainer and the spring seat.

Conventional
Crush Spring Grinding



COMP Cams® Advanced
Downfeed Spring Grinding

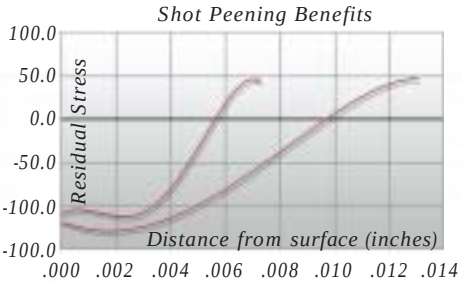


*Downfeed grinding is much more consistent and allows for better fitment and longer lifespan.*

Then the springs go through a finishing step that removes any uneven areas on the surfaces of the ground ends, paving the way for the next critical process of shot-peening.

The shot peening operation is vital to the spring manufacturing process. It is the process that bombards the spring surface with application-specific media to impart compressive stresses on the surface. This is a crucial step that, when complete, provides a dramatic increase on fatigue life of the spring to meet the design requirements for a given application.

Following on the heels of shot-peening, each spring is heat-set. This is a step in which the spring is compressed for a very specific time, at a very specific temperature, and takes the initial load out of a spring. Simply put, each COMP Cams® spring comes already pre-set for initial load loss.




*Shot peening imparts beneficial compressive stresses at and below the surface of the material. Compressive stresses that are deeper into the material and have a lower value help a spring live longer and handle rougher working conditions. These charts are provided by the X-Ray Diffraction Machine.*

At the end of the manufacturing process springs receive a coating of an anti-corrosive material. This is done to provide a moisture barrier that prevents surface corrosion which is virtual death to a spring.

## Testing, Testing, Testing

Now that the spring is made, you might think this is the end of the story. However, there is a lot more to do which insures that the spring you put in your engine is the best.

Our engineers perform destructive and non-destructive tests on every spring batch to be sure that every spring made is as good as the last.

These tests are performed on sophisticated equipment such as a IST Cycle Tester, Scanning Electron Microscope and X-Ray Diffraction Machine. The IST Cycle Tester tests for spring cycle life. In this test, springs are caused to fail by taking them through as many as 10,000,000 cycles at stresses much greater than they will see in an engine.

As each application is tested, we are sure that the life cycle of our springs will meet and exceed its design requirements. When this is completed, we have documented proof that the cycle life of a given spring design meets and exceeds the design criteria. This also insures batch to batch consistency of each run of springs.

A high-tech Scanning Electron Microscope (SEM) is used as another check for material integrity. This high-powered equipment permits our Metallurgists to view material cross sections to check and double check that the material microstructure is correct. The information provided from this test verifies that the material integrity exceeds the requirements of its intended application.

Another tool that's used to verify spring integrity is a half-million dollar X-Ray Diffraction Machine (XRD). The XRD is used to measure compressive residual stress, imparted by the shot peening process at and below the surface of a spring. This inspection verifies that shot peening operation is correct because it is critical to the fatigue life of a given spring application.

## Bottom Line

In the end, each complex and intensive step we take in our spring making process boils down to one simple truth: We want you to have the best spring possible.

For us, this is our mission. We are dedicated to this, and you can have the confidence in knowing that it is the same intensity we put into every product we make.