

Composite Springs

Using composite materials for anti-extrusion springs and molded rubber seals

Why use a Composite Spring?

- Reduce operating costs by limiting failures caused by traditional materials
- Will not scratch sealing surface or mark-off steel surface during service
- Will not corrode like steel
- Composites drill out easier than steel, not nesting in the drill bit

How does this compare to metal springs?

Extrusion resistance is comparable to steel springs, sometimes better. Carbon Fiber composite tape modulus, in the fiber direction, is about 2/3 that of steel. Tensile strength of tape in the fiber direction is 300KSI (~2000 MPa). Given geometry constraints and surrounding by rubber, the spring need not act exactly like steel and can be designed with fewer gaps for rubber to extrude through.

Are springs difficult to mold?

Some customers use a bonding agent, others do not. Springs' gap can range from zero to several times the width of the material. Most customers experiment with springs of varying gaps to optimize their molding process.

What materials are used? What are the design options?

Springs are often made from continuous carbon fiber reinforced PEEK composite. Steel springs, O-ring cord, or PEEK monofilament may be inserted to prevent collapse during molding. Use of nested steel springs allows higher overall stiffness of steel, with scratch-protection of composites on the exterior.

How do we attach the ends of the springs?

The most elegant approach is simple and efficient. The helix at each end of the spring is intertwined with itself for about an inch, eliminating end-connectors.

What is your approach to evaluation?

We recommend ordering a small initial quantity for molding trials. Our engineers help design the springs and are available for consultation before and after testing. We have extensive experience in molding these springs for our clients around the world.

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