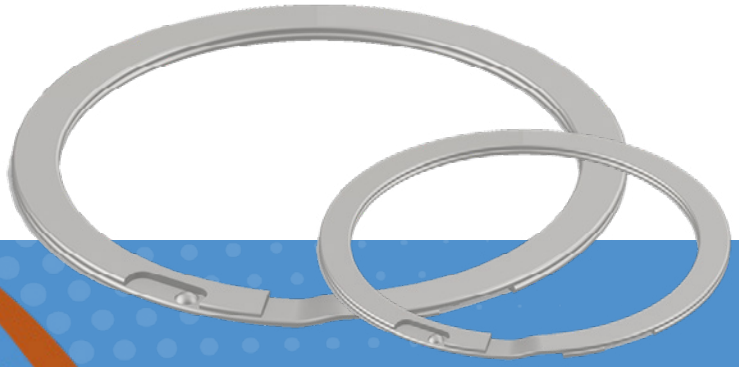
PRODUCT GUIDE

REVOLUTIONIZE YOUR HIGH RPM DESIGN WITH A REVOLOX™ SELF-LOCKING RING



Safely and easily secure your high-speed rotational needs with our latest retaining ring innovation, the Revolox Self-Locking Retaining Ring.

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SMALLEY®
THE ENGINEER'S CHOICE™

OVERVIEW

The Revolutionary Revolox Self-Locking Retaining Ring

Safely and Easily Secure Your High-Speed Rotational Needs

Rotational capacity requirements for modern applications such as electric motors are higher than ever.

As the market leader for innovative retaining ring solutions, Smalley has been continually investing in ongoing research and development to meet the demand for high RPM requirements.

Smalley's latest retaining ring innovation, Revolox Self-Locking Ring, features a 'dimple and slot' design that safely and efficiently secures your application at high speeds. Test results have shown significantly higher RPM capacity over an equivalent non-locking retaining ring.

In addition, the revolutionary design is the first high-RPM ring on the market designed with automated installation in mind, making it ideal for high production volumes.

Fig 1. Close up of the 'dimple and slot' design on a Revolox Self-Locking Ring.

FASTENING IN HIGH RPM APPLICATIONS

Background

Retaining Ring RPM Limitations

With rotational capacity requirements of modern applications higher than ever, many engineers struggle to find retaining rings that can withstand high speeds, resulting in non-retaining ring alternate designs that need more assembly time and cost more money, or even worse, fail in the application.

Centrifugal forces limit all retaining rings operating on a rotating shaft. If the centrifugal forces are great enough to expand and lift the retaining ring from the groove, failure occurs.

High Rotational Capacity Applications

Where are some common high rotational capacity applications?

Rotational-dependent applications can be found in nearly all industries but are especially critical for the automotive, industrial, and aerospace industries. For example, shafts in automotive applications can reach 15,000 RPM or more.

A retaining ring designed for high RPM is critical in applications such as electric motors, automotive transmissions, gearboxes, and high-speed spindles.

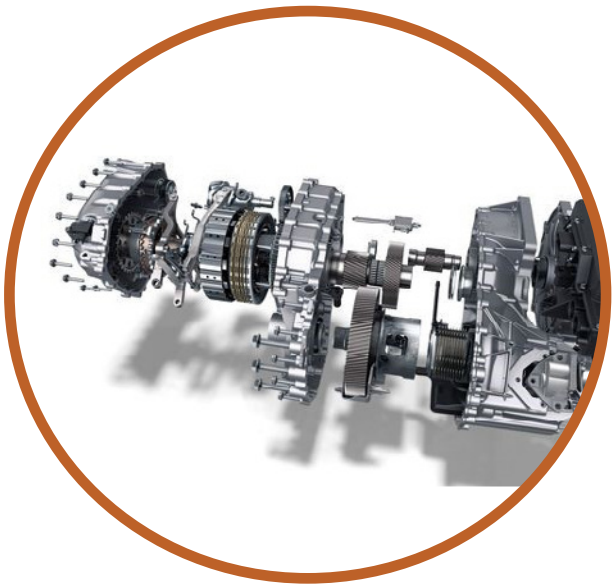

Fig 2. Electric vehicle transmissions require a fastening solution that can withstand high RPM.

REVOLOX SELF-LOCKING RING

Revolutionize Your Design

What is the Revolox Self-Locking Ring and how does it work?

Smalley's latest retaining ring innovation is the Revolox Self-Locking Ring.

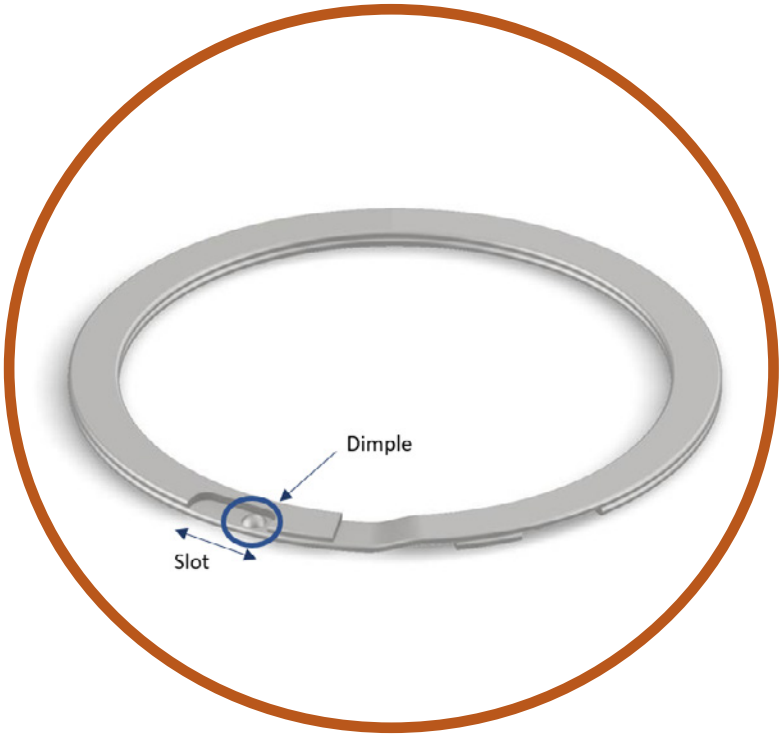

Fig 3. Revolox Self-Locking Ring with dimple and slot labeled.

The revolutionary self-locking feature consists of a 'dimple and slot' design to prevent ring expansion.

So what is a 'dimple and slot' design, and how does it work?

The dimple feature is punched into the underside of the ring, resulting in a dome shape on the opposing side of the ring. It's critical that the dome shape protrudes above the surface of the ring, but without shearing. The slot portion is created by cutting into the mating turn.

The dimple and slot are located such that the dimple is trapped within the slot once installed in a groove, thus locking into place. As the ring rotates it expands, engaging the dimple and the slot and preventing any further expansion.

REVOLOX SELF-LOCKING RING

Advantages

What are the advantages of a Revolox Self-Locking Ring?

The top five advantages of Revolox Self-Locking Ring include:

1. **Significantly higher RPM capacity over an equivalent non-locking retaining ring**

Revolox Self-Locking Rings were tested and optimized for high RPM performance. Contact Smalley Engineers to discuss RPM capabilities in your application.

Fig 4. The 'dimple and slot' design prevents ring expansion.

2. **Ease of installation**

The sturdy 'dimple and slot' design is not easily damaged during installation.

3. **Lightweight**

With a part weight approximately half the weight of a typical retaining ring, the lower part weight reduces rotating mass and therefore increases efficiency in the application.

4. **Automated installation capabilities**

Automated installation capabilities make Revolox Self-Locking Rings an ideal solution for high production volumes.

5. **Inherently better-balanced than snap rings**

Revolox Self-Locking Rings have an inherently better-balanced design that helps decrease vibration.

ALTERNATE SOLUTIONS

Application Issues with Other Options

Are there other retaining rings designed to tolerate high RPM?

Until Smalley's innovative self-locking ring design, there were no other retaining rings specifically engineered to tolerate high RPM.

Before hearing about Smalley's high RPM solution, engineers have tried to use standard snap rings in their designs and say they have experienced:

- Problems with yielding during installation due to the snap ring's heavy cross-section
- Excess vibration due to imbalance of the snap ring
- Yielding and failure at high speeds

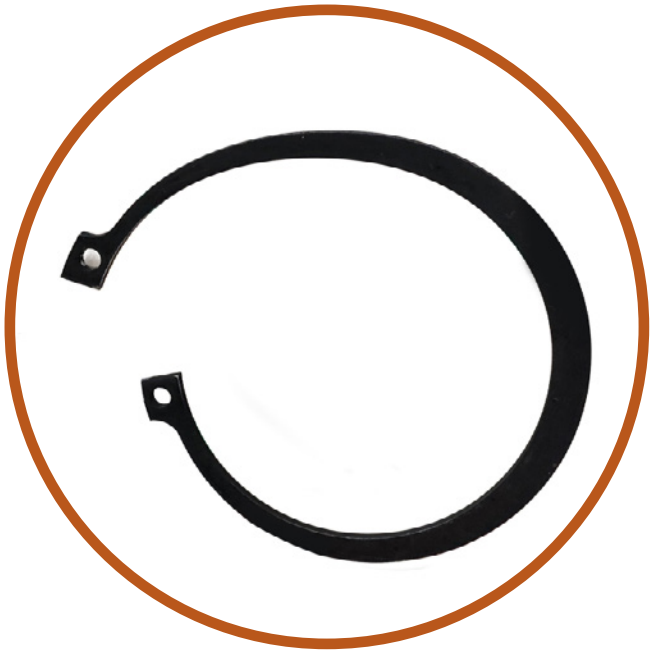

Fig 5. Yielding (deformation) on a snap ring after testing at high RPM.

Other alternate industry designs include:

- Stacking multiple stamped rings or adding more component(s) to prevent ring expansion
- Welding to hold the ring in place
- Application redesign to avoid rings

In general, most alternate industry designs result in increased time, weight, cost, and often new issues.

FUTURE

High Rotational Capacity Applications

What does the future of high rotational capacity applications hold?

The demand for a secure and efficient high RPM fastening solution is critical as more and more applications require high rotational capabilities.

Smalley was the first to create a new fastening product category of self-locking rings.

The revolutionary Revolox Self-Locking Ring enables engineers to design around higher rotational capacity requirements safely, efficiently, and with ease of assembly for high volume applications.

Fig 6. The demand for electric vehicles is increasing.

Revolutionize My Design

As the inventor of the edgewound wave spring and with over 100 years of manufacturing excellence, Smalley is the Engineer's Choice® in providing wave springs, retaining rings, and constant section rings for all of your application needs.

We work with nearly every industry, from aerospace, oil & gas, automotive, medical, off-highway to industrial.

While all of our manufacturing is made in our U.S. based 300,000 ft^2 facility, our global network of offices, engineers, and distribution partners allows you to quickly receive parts and support from anywhere in the world.

Ready to get started?

We would love to hear from you.

Contact an Engineer

Request Samples

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