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WHITE PAPER

Advantages of Using ISO 8751 versus ISO 13337 in Applications with Soft Host Material

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In recent years, the tendency throughout industry has been to explore the use of new materials in order to reduce weight and process cost, or to provide solutions where more traditional materials such as steel, machined components or castings would not perform as well.

Under those considerations, the use of plastic, aluminium and soft alloys has seen an exponential increase, and nothing seems to indicate that this trend is going to stop. On the contrary, as plastics and moulding processes continue to advance, more and more applications that were traditionally made in steel are being reviewed to overcome the issues that prevented the use of these lighter, softer materials that provide equal or even better performance.

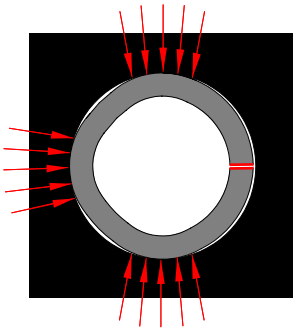
We can currently find numerous plastic components being used in demanding situations such as high temperature, high strength and chemical resistant applications. However, although the main component receives significant design attention and consideration, the mating components and the fastening method are habitually neglected until the end of the project. Also, it is routinely assumed that parts and design concepts that previously worked in steel will work with the softer alloys and plastics.

When it comes to pinning applications in new materials, it is frequently a situation of going for the cheapest option and what is known in the industry. In many cases this is the **Slotted Pin** ISO 8752 (also known as the *roll pin*), which has been around for many years, developed from the old DIN 1481 standard. This pin was designed long before the advancements in production techniques and materials made lightweight / high-volume production feasible. The ISO 8752 pin can and does, in fact, create significant assembly and quality issues in these new materials. Its thick wall, combined with an out-of-round or horse-shoe shape, does not provide the required flexibility for its use in relatively soft materials—often transferring the load from the pin to the wall of the host assembly, thereby damaging the hole, and resulting in premature assembly failure. In an attempt to reduce the disadvantages associated with the ISO 8752, a **Light Duty Slotted Spring Pin (ISO 13337 pin)** was designed. The main difference is the thickness of the pin wall. A thinner wall means increased flexibility, but also reduced shear strength, while other important issues remain unresolved. In fact, the thinner wall in and of itself creates new additional limitations with respect to fatigue resistance.

ISO13337 Slotted Spring Pins, similar to the ISO 8752 pin, present a horse-shoe shape cross-section which will, in many instances, create skiving during insertion into the hole. Coupled with that, the expanded diameter of the pin in relation to the size of the hole has the effect of creating a pin with a very wide slot. The result is a pin with an insertion force, and subsequent radial pressure against the wall of the hole, that will still be too high for most soft material applications, especially where holes are close to the edge of the component. Further, the existence of the slot implies a number of other problems.

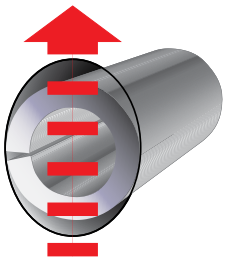
- It allows pins to **interlock**, making feeding and installation difficult and time-consuming, which is always a major concern especially in high volume applications. This attribute does not allow for automatic feeding and installation of the ISO 13337 pin.

- Usually, once installed in the recommended hole, the gap may close totally and the pin will become a solid part **unable to absorb shocks and vibrations** imparted to the assembly during its life. Since the pin does not absorb the forces, the loads are transferred to the host sort material resulting in **hole damage (*enlargement*)** and **premature assembly failure.**



NON-DYNAMIC CONDITION
Installed Slotted Pin showing the "Butted" condition making the pin unable to absorb dynamic loads

- As they are driven into the hole the gap will close creating a **stress concentration line** opposite the gap.

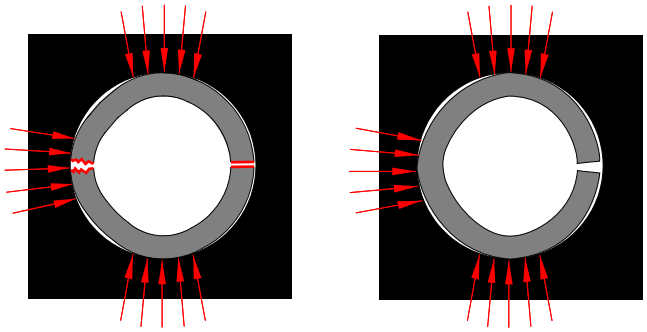


Direction of impact load and resulting hole elongation *(enlargement)*

- During the manufacturing of Slotted Pins, **material stresses** are concentrated at 180º opposite the slot. When the pin flexes in the application,

it flexes at the same location. The thinner material on the ISO 13337 pin is not able to easily absorb this additional material stress, and **premature fatigue** results in assembly failure.

- **Shear strength** will depend on pin orientation versus orientation of the applied loads. Slotted Pins need to be orientated to maximise strength.



BREAK CONDITION
Slotted Pin after fatigue failure at 180˚ from the gap

NORMAL CONDITION
Slotted Pin with three points of stress concentration in host

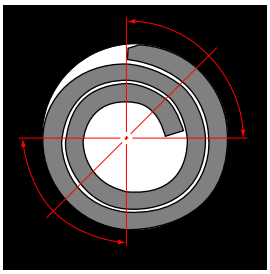
A better solution

All these problems can be avoided through the selection of the right spring pin. **Coiled Spring Pins** are a better solution. Coiled Pins can be easily identified by the 2-¼ coil cross-section.

The absence of a gap eliminates pin nesting and interlocking.

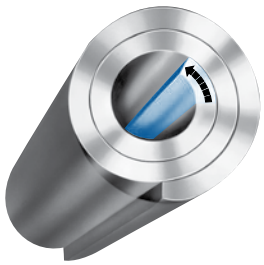
When Coiled Spring Pins are driven into the hole, the compression starts at the outer edge and moves through the coils towards the centre. As a result, the joint will have equal stress distribution and uniform strength and flexibility, independent of the direction of the applied load (force).

Since Coiled Spring Pins cannot butt, once installed they will be able to compress even further under additional forces, dampening shock and vibration that would otherwise be transmitted to the hole wall creating permanent damage. The Coiled Spring Pin becomes an active member of the assembly and prolongs the useful life of the end-product.

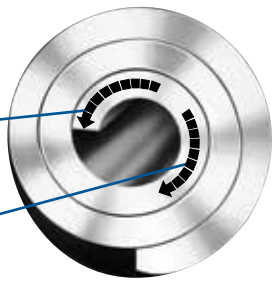


270º contact with hole

From the manufacturing point of view, Coiled Spring Pins are also a higher quality product. Coiled Spring Pins feature swaged chamfers at both ends (the bevelled chamfer of ISO 13337 Slotted Pins is optional in one side for diameters > Ø10mm), and they are made to narrower diameter tolerances (270º of the circumference will be within the specified tolerance as opposed to an average of just three measures in the case of Slotted Pins). This results in more contact area between the pin and its host with a Coiled Spring Pin versus **three points of contact** on a Slotted Spring Pin. Square, clean-cut pin ends are also an important feature of Coiled Spring Pins.



INSTALLATION FLEXIBILITY



Standard Coiled Spring Pins are manufactured in three duties: **Heavy Duty** (ISO 8748), **Standard Duty** (ISO 8750) and **Light Duty** (ISO 8751).

Light duty ISO 8751 Coiled Pins have been specifically designed for use in soft host material. The thinner material, and specifically designed coil relationships, deliver extra flexibility that will translate into reduced insertion forces, homogeneous axial forces and radial forces suitable for applications using soft materials. They will allow trouble-free automated installation, preventing damage to the hole. Ultimately, the selection of a light duty Coiled Pin for use in soft material hosts will protect the hole, reduce component cost preparation, increase productivity and enhance the overall quality of your end-product.

Comparison of ISO 13337 and ISO 8751 Spring Pins

ISO 13337 Slotted Spring Pin	ISO 8751 Coiled Spring Pin	Benefits of Coiled Spring Pins
- Gap	- No gap	- No interlocking, equal stress distribution, uniform strength and flexibility, no need for orientation to maximise shear strength, trouble-free automation
- Horse-shoe shape (3 point average diameter measure)	- 270º contact with hole	- Increase retention force, better transfer of dynamic loads
- Bevelled chamfer (optional in one side when diameter > 10mm)	- Swaged concentric chamfers in both ends	- Easier installation, the smooth chamfer without sharp edges protects the hole

In addition to the standard ISO range, **SPIROL** manufactures Coiled Spring Pins with special features such as **Extra Light Duty** Coiled Pins, **Superflex** Coiled Pins, **Headed** Coiled Pins and **Flared** Coiled Pins. We can also supply pins with controlled insertion force, improved CPKs and a choice of raw materials and finishes. Whatever the application, **SPIROL** has the right spring pin for it.

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SUPERFLEX PINS

FLARED PINS

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