Mechanical Braking System

Application:
Braking systems for off-highway equipment are commonly designed to be hydraulically actuated. In most cases, braking occurs when pressurized fluid compresses stationary friction discs against plates that rotate with the drive shaft. The amount of friction between each set of plates controls the deceleration of the vehicle. Without an additional fail-safe system, this design alone has limited reliability. If a hydraulic seal is compromised, or the hydraulic cylinder loses pressure for any reason, the brakes fail.

Solution:
The mechanical back-up design uses SPIROL® Disc Springs. Under normal circumstances, the hydraulic system holds a constant pressure on Disc Springs stacked in series. If pressure fails to be maintained, the stack of Disc Springs decompresses to actuate the braking mechanism. A compression spring or wave spring is not capable of providing the force required (in the space available) to actuate the brakes. The reliability of this safety system is dependent on the consistent performance of Disc Springs. In this critical application, the Disc Spring’s performance and level of predictability improves product quality and ensures overall safety.

SPIROL® Disc Springs have a consistently high capacity to store potential mechanical energy. The conical design of SPIROL® Disc Springs makes their spring characteristics and performance more predictable than traditional compression springs. Disc Springs are also capable of providing more force in less space than a compression spring or wave spring. They are commonly stacked in multiples to achieve application specific spring rates: a stack in series provides less force over more travel; a stack in parallel provides more force over less travel. The precise tolerances of each individual Disc Spring provides unparalleled performance predictability when they are stacked (either in series or in parallel).

SPIROL® Disc Springs also allow fatigue endurance to be predicted. Stress analysis enables the minimum cycle life of Disc Springs (singly or stacked) to be calculated as a part of the application’s design.
**Application:**

As mandated by the ASME code for pressure piping, proper design and installation is critical for the performance and safety of piping systems. Industrial pipe systems are primarily supported by rod hangers, base line or base elbow supports. While these static supports are used to carry weight, dynamic supports are necessary to control loads on the pipe system.

**Solution:**

For example, in heat exchanger applications, SPIROL® Disc Springs are used to accept thermal dynamics. As the temperature of the fluid within the pipe changes, the pipe will expand (when hot) and contract (when cold) accordingly. SPIROL® Disc Springs support the system by maintaining a constant pressure at any temperature. This consistency is transmitted to the pipe joint and is essential for maintaining a proper seal. A well sealed gasket prevents fluids from escaping and reduces costly maintenance.

SPIROL® Disc Springs offer an advantage to coil springs by providing an equivalent displacement in a fraction of the space. In many instances, such as under a heat exchangers bottom flange, this space savings is required. SPIROL® Disc Springs are the solution to providing a robust, maintenance free support system for industrial pipe systems.

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Pick-Off Unit for CNC Machines

**Application:**

Pick-off spindles in CNC screw machines are designed to hold a part as it is cut to length and then finished. The spindle uses a collet to release the part when it is complete and then clinch a new part.

When the machine is setup, the clamping force required to hold each part in the collet must be precisely calibrated to prevent the finished product from slipping (if the force is too low) or being crushed (if the force is too high). This calibration is dependent on the geometry and material of the final product. After calibration, the quality of the finished product relies on a consistent clamping force for thousands of cycles at a time.

**Solution:**

This high degree of reliability is provided by SPIROL® Disc Springs. When the collet is opened, 16 SPIROL® Disc Springs stacked in series are compressed by a hydraulic cylinder. Each time the force from the cylinder is released, SPIROL® Disc Springs provide a consistent force to close the collet on the part.

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Pipe Supports for Industrial Pipe Systems

**Application:**

As mandated by the ASME code for pressure piping, proper design and installation is critical for the performance and safety of piping systems. Industrial pipe systems are primarily supported by rod hangers, base line or base elbow supports. While these static supports are used to carry weight, dynamic supports are necessary to control loads on the pipe system.

**Solution:**

For example, in heat exchanger applications, SPIROL® Disc Springs are used to accept thermal dynamics. As the temperature of the fluid within the pipe changes, the pipe will expand (when hot) and contract (when cold) accordingly. SPIROL® Disc Springs support the system by maintaining a constant pressure at any temperature. This consistency is transmitted to the pipe joint and is essential for maintaining a proper seal. A well sealed gasket prevents fluids from escaping and reduces costly maintenance.

SPIROL® Disc Springs offer an advantage to coil springs by providing an equivalent displacement in a fraction of the space. In many instances, such as under a heat exchangers bottom flange, this space savings is required. SPIROL® Disc Springs are the solution to providing a robust, maintenance free support system for industrial pipe systems.
SPIROL Application Engineers will review your application needs and work with you to recommend the optimum solution. One way to start the process is to visit our Optimal Application Engineering portal at SPIROL.com.