

# Work Roll Gas Springs

## Hyson Mill Duty Cylinders / Separator Cylinders

Hyson's Mill Duty Cylinders are innovative cylinder solutions for any rolling mill that wants to not only reduce costs but also increase productivity and product quality.

Our cylinders have many years of success in mills around the world, in a variety of mill cylinder applications.

### Safety First

- Designed to survive safely in mill environments
- Robust design can handle side impact and misalignment
- Nitrogen gas is inert, non-toxic, and nonflammable
- Designed with custom charge ports, so the cylinder can be discharged while in the chock, if needed, for utmost safety while handling

### Maximize Productivity

- Each cylinder is custom designed for your application.
- Quick and easy installation and removal
- Interchangeable with existing systems
- Self-contained system requires no additional lines/parts
- Reduced chock maintenance
- Readily available/shorter lead times

### Reduce Costs

- Maintenance costs are reduced
- Wear on machinery, especially costly bushings and bearings, is reduced with design spec. separating force.
- Inventory costs are reduced by eliminating the need for additional equipment or spare parts
- Reconditioning service available to help reduce your preventative maintenance costs
- No chock modifications required in most applications

### Reliable

- A large diameter rod, thick cylinder walls, and high-pressure seals are engineered into every spring
- Special coating resists corrosion and wear
- Bore seal design reduces contaminants and extends the life of the cylinder

### Environmentally Friendly

- Uses nitrogen gas which makes up 78% of the air we breathe
- No MSDS sheets required!
- Steel cylinder is recyclable



## How It Works:

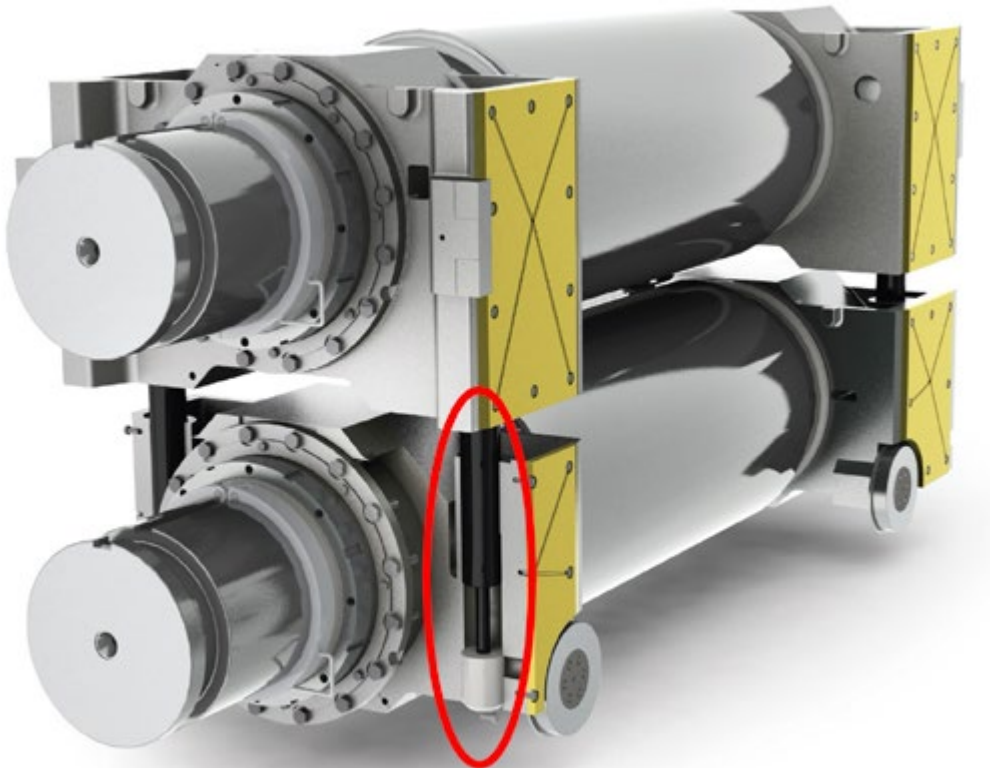
- Cylinders are charged with nitrogen to the necessary pressure for your application.
- Nitrogen filled cylinders provide the full specified separating forces designed to drive backup rolls, maintain pass line height, and ensure quality rolling operations.
- Compared with typical hydraulic systems, customers often see visible improvements in roll stand stability and process quality.
- Cylinders can be dropped into existing chock cavities to replace existing hydraulic or fluid-filled cylinders.

## Protect Your Investment

- Keeps work rolls separated during installation, removal, and transport
- Prevents rolls from being damaged, scratched, dented, etc.
- Maintains integrity of the roll face to minimize product defects

## Get Rolling

- Allows for quick roll changes.
- Supplies the necessary contact force to establish the motion of the roll stack
- Once engaged, provides force to prevent slippage, keeping the integrity of the roll face intact





## Liquid Spring Application:

Traditional liquid-filled springs can be unsafe and have proven to be costly for rolling mills. As the side-by-side comparison illustrates, Hyson mill cylinders have many advantages including a more robust design, safety features, and the ability to be custom engineered into existing applications, so no modifications are needed.

Additional cost savings include less downtime, lower maintenance costs due to increased life of chocks and bearings, reduced inventory due to shorter lead times, and an overall more reliable system.

### Hyson Mill Cylinder

**Initial Force: 12,000 lbs.; 24kN**  
**Initial Pressure: 2175 psi; 150 bar**

#### Charge/Discharge Port

Enables easy, on-site charging and discharging for safe servicing of system.

#### Thick Cylinder Wall

Mill duty design resists side impact damage.

#### N2 Gas

Uses pressurized nitrogen gas to generate force. This safe, inert gas is readily available and harmless to the environment.

#### Bore Seal Design

Features internal sealing surface not exposed to external contaminants. Scratches or misalignment of rod does not result in pressure loss.

#### Large Diameter Rod

Mill duty design resists bending.



### Standard Liquid-Filled Spring

**Initial Force: 12,000 lbs.; 24kN**  
**Initial Pressure: 22,698 psi; 1565 bar**

#### Thin Diameter Wall

Use of non-compressible fluid requires thin wall to accommodate fluid when rod is depressed.

#### Silicone-Based Liquid

Uses compressed silicone-based liquid to generate force. Cannot be discharged on-site. Fluid can ooze out around rod or the rod can bend so system remains compressed and fully loaded even when not actuated by the roll.

#### Rod Seal Design

Features outside sealing surface exposed to external contaminants. Scratches or misalignment of rod can result in pressure loss.

#### Small Diameter Rod

Use of non-compressible fluid requires small rod to accommodate fluid when rod is depressed. Small rod is subject to damage and bending creating safety issues.

## Bluetooth Pressure Sensor

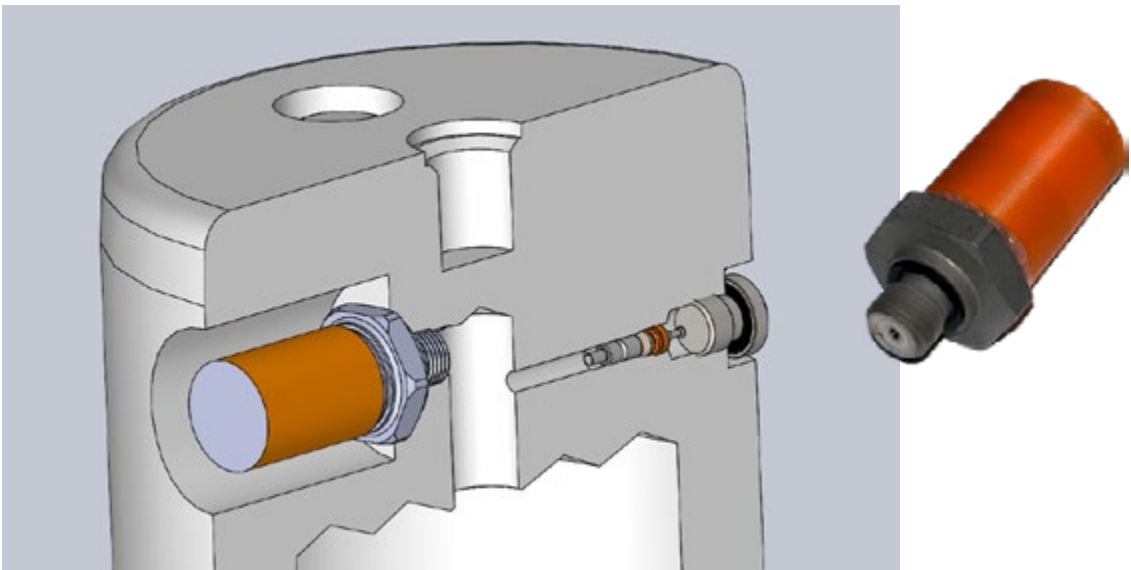
Hyson mill cylinders can be provided with a Bluetooth pressure sensor

Cylinder pressure can be verified before installing cylinders into the chocks.

- In the Roll Shop: Identify cylinders for chock build, verify the cylinder pressure, and install them into the chocks with full confidence. Wireless pressure monitoring during operation (see Toolmind section). Read pressure using our handheld reader (shown) or base station.



Sensor port sealed with epoxy to protect the sensor



CROSS-SECTION OF CYLINDER WITH PRESSURE SENSOR INSTALLED



## Hyson Mill Duty Cylinders Can Replace Hydraulic Cylinders:

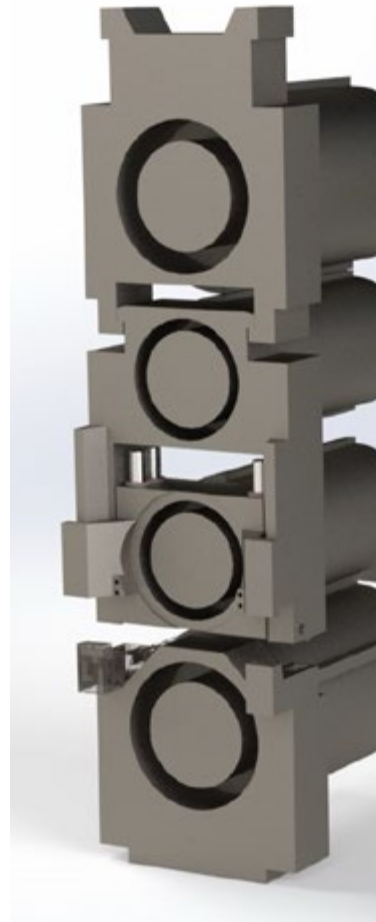
**By switching from hydraulics to Hyson nitrogen charged mill cylinders, customers will:**

- Ensure they are getting the designed force in their cylinders. No line losses in pressure or leaks.
- Eliminate labor hours to hook up hydraulic lines or install crossover pipes.
- Eliminate the possibility for errors in hooking up hydraulics.
- Eliminate costly and messy hydraulic oil spills and hydraulic oil costs. Diminish risk of fires.
- Eliminate downtime and costs for maintenance and repair of hydraulic systems.

**Our engineering team has helped many customers switch from hydraulic systems to self-contained nitrogen gas cylinders in their mill stands. We support our customers with our technical resources.**



**Ex.: Hydraulic cylinder (left) replaced with self-contained Hyson Gas Spring (right). Hyson engineering designed a special adapter and process to charge this cylinder after installation. This change eliminated multiple annual hydraulic hose incidents in a bar mill.**



**Hyson team has modeled mill stand assemblies to help understand the roll change process and manage the process of switching from hydraulics.**

# Additional Applications

## Steady Stand Springs

Hyson provides an innovative solution for bar mills, using nitrogen springs instead of Belleville washers as a shock absorber inside the chock housing. This solution stops the mill stands from jumping as the steel bites and will support deceleration forces to the neutral position to accept the next bar.

- Eliminates labor cost of assembling and adjusting individual Belleville stacks
- Preserves the life of the equipment
- Consistent and repeatable force values result in improved beam quality
- Increases mill efficiency and productivity
- Reduces maintenance costs
- Keep inventory down
- Increase uptime
- Prevents wear of bearings and threads on the mill screw
- More force in the same space
- Improved reliability and repeatability
- Improved chock load balancing resulting in reduced work roll and drive motor wear



### Belleville Washers Disadvantages:

- Inconsistent contact force
- High inventory levels
- Assembly is very time consuming
- Unreliable force over time
- Short lifespan
- Fixed force
- Fatigues over time



### Steady Stand Spring Advantages:

- Consistent contact force
- One-piece, stable design
- Quick installation
- Longer lifespan
- Low maintenance product
- Adjustable force
- Tighter tolerance
- Consistent product quality
- Dimensional consistency
- Ability to know exactly how much force is generated by each cylinder

