

Improved Productivity in Levelling. AutoSet Couplings at BlueScope Steel, Australia







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- 1 Steel
- 2 Rolling Mill at Blue Scope Steel, Australia

Protect the Driveline

The steel production process should be the same as the metal it produces; smooth, strong and reliable. Torque-limiting couplings can increase the operating efficiency, reduce downtime and operational costs.

Continuous production with a constant and even flow is essential when handling heavy loads in the production of flat, long and strip steel products. In steel production, world leading torque-limiting couplings from Voith protect big and heavy machinery by releasing or slipping at a very precise set torque. Connection couplings are used for torque transmitting, often in straightening and levelling.

A constant and even production is required during the levelling process too. Torque and speed variations cause slippage between the plate and rolls, which can create further scratch marks or broken spindles.

To achieve an unstressed, even material, torque limiting coupling AutoSet can be installed on the pinion shafts. The AutoSet makes micro slippages to reduce high torque peaks and can release fully if the machine is malfunctioning.



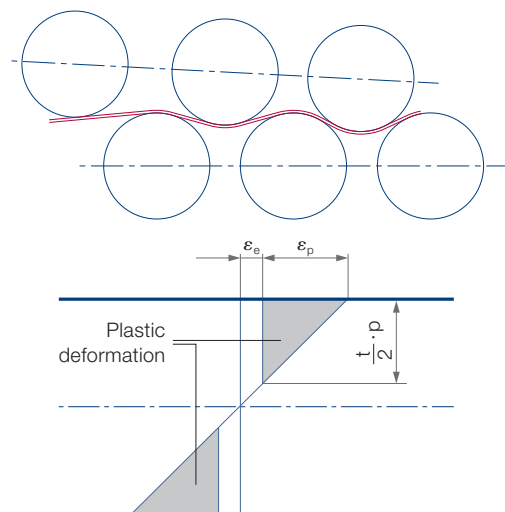
Torque Peaks in Levelling

When the strip coil arrives at the milling plant, the steel plate has still got a lot of internal stress. The stress is released by bending the plate within the plastic deformation zone to the point where all tension is relieved. This leaves the plate straight and free of internal stresses.

When thin plate goes through the leveller, a slight elongation of the plate results in speed differences between the first rolls and the last. Thick plate can also cause speed differences due to the length difference of the inner track and outer track at each roll pass of the plate.

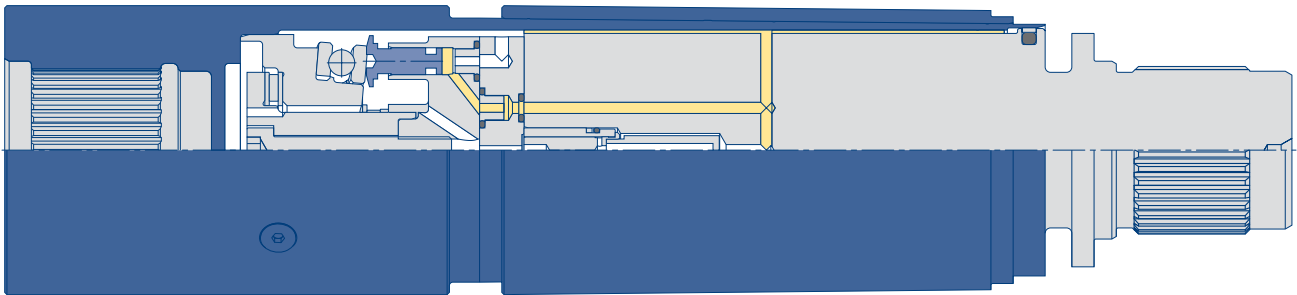
The rolls are all connected to the same pinion gearbox, so they want to rotate with equal speed. The speed difference of the roll causes the torque to build up, and without a slip and release coupling it can cause wind-up drive shafts. Hence it can cause the plate to slip on the rolls. This leaves ugly slip marks which is unacceptable for many customers. Even worse; broken shafts will be the result.

Levelling process



Complete deformation is needed to release all stress in the material

Leveller spindle equipped with AutoSet



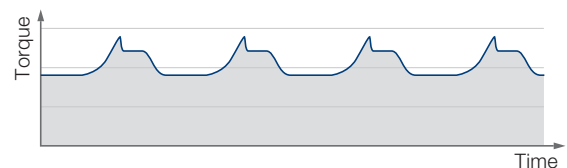
Level out the Torque

To overcome the torque peaks that are caused by the speed differences, an AutoSet may be used. The AutoSet has a primary function to improve the process. It slips internally during normal production and distributes the torque and speed variations smoothly through the leveller. It has also got a secondary function to serve as overload protection.

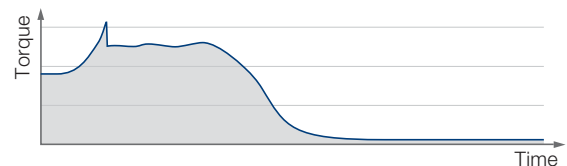
If the torque peak has a longer duration, the internal pump elements will be activated and subsequently start to produce an oil pressure that separates the friction surfaces. The coupling will then work as a hydrostatic bearing.

When the AutoSet has released fully, it automatically resets. You only need to shut the machine off for about a minute and it will simply reset itself. This saves a lot of time compared to resetting any torque limiter.

Drive characteristics during the levelling process



To give the pinion gearbox the possibility to distribute the torque due to speed differences from the first to the last rolls.



To release in break down situations and protect the driveline from serious damage.



AutoSet at BlueScope Steel

BlueScope Steel (formerly known as BHP Steel) is a steel manufacturing company located in Wollongong, New South Wales, Australia.

BlueScope uses a seven roll leveller after a cold strip mill, to level the steel and prepare it for further processing. Due to the speed differences they have always experienced torque peaks, which is why they installed SafeSets in the first place. SafeSet is a torque limiting coupling that fully releases when the set torque is reached. Without the SafeSets the torque peaks would wear on the machine and could reduce the quality of the product.

To increase the uptime even further, Voith Turbo Safeset suggested that BlueScope would change the SafeSets with the highest load, and therefore the most frequently releasing, into AutoSets.

Today all seven rolls are equipped with AutoSets. BlueScope Steel is very pleased with Voith's solution.

Benefits with AutoSet in levelling

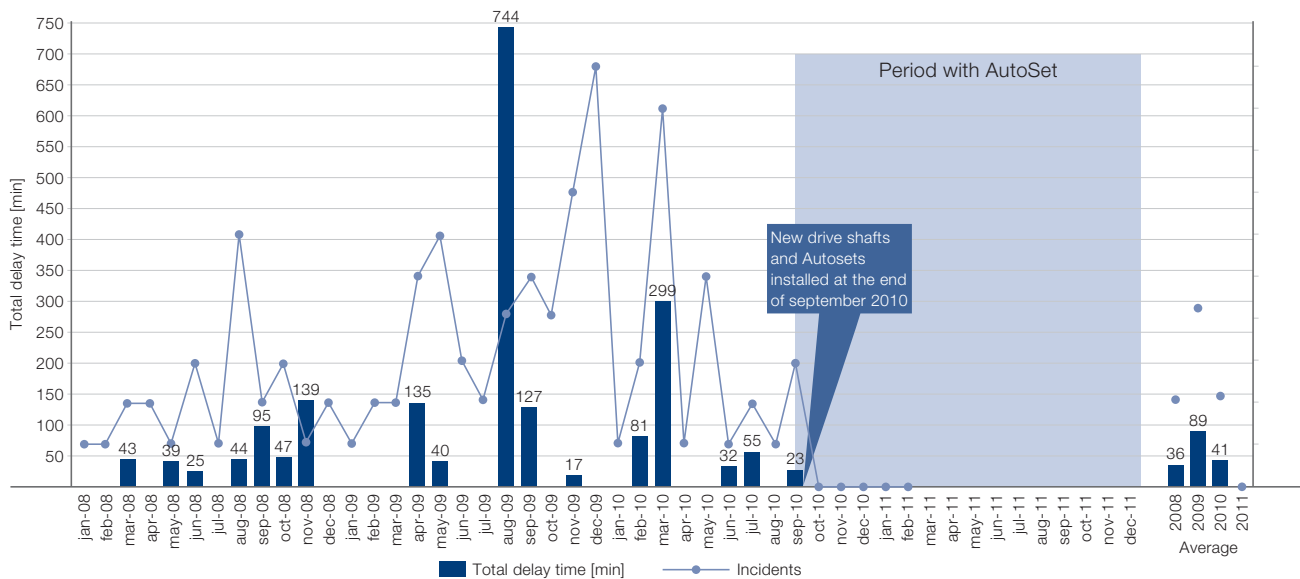
- Increased uptime
- Reduced wear on the rolls as the slipping between rolls and plates are eliminated
- Improved product quality (no slipping marks)

Process improvement features in levelling

- Internal slip to overcome roll torque / speed differences and allow leveller to operate with full capacity
- Better result of the straightened material (fully stress relieved)

Case study at BlueScope Steel in Australia, SafeSet replaced by AutoSet

Delay time (min) due to torque limiter release and drive shafts in levelling process



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