

INNOVATION

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ALTRA COMBINED OVERLOAD AND OVERRUNNING CLUTCH SOLUTION PROVIDES SUPERIOR PROTECTION AND SAFETY ON CONE CRUSHER APPLICATIONS

Thousands of cone crushers are utilized in mines and quarries around the world. Material is fed through the top of the crusher and falls over a mantle. A vertical shaft rotates a cone-shaped mantle in an eccentric (wobbling) fashion below the bowl liner (concave), crushing the material in the small, varying size gap between the mantle and concave.

Various clutches are utilized on these critical machines to help reduce potential damage and hazards, along with associated costly downtime.

On startup, the inertial force of the large, heavy cone mantle causes it to spin on the vertical shaft as it begins to orbit eccentrically. An overload clutch is needed to provide critical “anti-spin” protection during startup, which prevents material from flying out of the bowl, creating a dangerous condition for personnel and equipment.

As wear occurs, the mantle needs to be recalibrated. A torque limiting clutch slips during recalibration but quickly re-engages to return to the original material (rock) size to ensure desired product uniformity. The overrunning functionality is needed to allow the normal mantle head rotation.

ADVANCED DUAL-CLUTCH TECHNOLOGY YIELDS SUPERIOR PERFORMANCE

To meet the dual-clutch requirements, Boston Gear engineers worked with Formsprag Clutch, another Altra Industrial Motion brand, to design a unique single-piece, packaged overrunning/torque-limiting clutch solution.



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Boston Gear
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Formsprag Clutch
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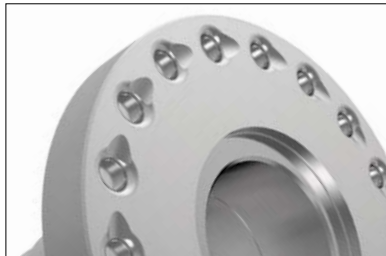
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THE MODIFIED BOSTON GEAR HOR OVERLOAD CLUTCH FEATURES AN INTEGRATED FORMSPRAG FSO OVERRUNNING CLUTCH

Boston Gear and Formsprag engineers have collaborated to develop a unique dual-function combination clutch solution for applications, including cone crushers.

The combination clutch is positioned at the base of the vertical mantle u-joint drive shaft. It performs as an overrunning clutch while rotating in one direction, and a torque-limiting clutch when rotating in the opposite direction.

The combined unit is a modified HOR clutch that incorporates the outer race of a special FSO clutch. The space-saving combination design provides both torque-limiting and overload protection in a compact package for use where both devices are required to fit in tight spaces on the same shaft.



The modified automatic reset HOR overload release clutch features a unique ramp system that utilizes a 360-degree, multiple “teardrop” ball detent design. This allows the clutch to reset quickly following the calibration procedure.

COMBINATION CLUTCHES ARE BUILT FOR LONG LIFE PERFORMANCE IN HARSH CONDITIONS

HOR clutches feature convenient torque adjustment, maximum torque limit stop, limit switch actuating mechanism, hardened components for long life, electroless nickel finish and stainless steel hardware for superior corrosion resistance. Units are sealed for protection against external contamination in tough mine environments.

The modified integral overrunning FSO outer ring features special heavy duty bearings. FSO clutches have a high torque density and require no adjustments or controls. Units contain Formchrome® sprags and Formsprag “free-action” retainers. These clutches mount on a through shaft, with the inner race driven by a key.

Four models of the combination clutch are available with torque ranges from 100 in.lbs. to 50,000 in.lbs.



BOSTON GEAR/FORMSPRAG COMBINATION CLUTCH SELECTED FOR USE ON QUARRY CONE CRUSHERS

A leading mine crusher manufacturer required a reliable combination overrunning/torque limiting clutch for use on its line of cone crushers.

The unique Boston Gear/Formsprag clutch configuration allowed both mated components to fit in the OEM's very tight space constraints. Because the combination clutch utilizes components with improved performance enhancements, smaller sized clutches, with shorter lengths, were able to be installed on the cone crushers in the line.

* Source: Metso