

Press Release - MACHINE PROTECTION: PREVENTING DAMAGE AND FAILING SAFE

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MACHINE PROTECTION - PREVENTING DAMAGE AND FAILING SAFE

Protecting machinery and systems against expensive failures and costly downtime is critical in today's competitive market. Neil English of Altra Industrial Motion looks at the technologies available to protect machinery against overloads and to provide safe stopping and holding.

Large machinery and rotating systems can generate enough rotating energy (inertia) to cause significant machine damage during a jam-up or crash, or during un-controlled braking due to, for example, a power failure. While electronic control systems, the latest electronic safety products and features such as regenerative braking all ensure smooth operation under ideal load conditions, putting systems in place to protect the machinery under unforeseen conditions should be regarded as essential. It's a key part of assuring machine availability, and protecting the significant financial investment that the machinery often represents.

The inertia generated within machinery is dependent upon the speed the mass of the rotating system. A high mass at slow speed could do more damage than a lower speed mass at high speed during a jam or crash stop. At very low speeds systems can develop a huge amount of unnecessary torque, which can seriously damage drive system components such as shafts, gearboxes, chain and couplings. So how might we protect machinery from the mechanical overload generated by a jam or a crash? A torque limiter provides just such protection, limiting the torque to pre-set levels. A torque limiter can be thought of as a mechanical fuse to shut down the machine and allow the rotating energy to dissipate without causing excessive damage, so extending system component life. It will provide faster response times and better protection than typical electronic methods at high crash rates.

Overload protection

Based on its 30-years experience in some of the most arduous machinery applications, Bibby developed its UEP range of modular torque limiters provide optimum protection against overloads, delivering maximum safeguarding against expensive failures and prolonged downtime on machinery. They offer users the key benefits of simplified installation, very accurate release torque repeatability – achieved with minimal variation between static and dynamic release, simple fast manual re-engagement and low cost maintenance.

The Bibby UEP limiters are convenient individual modules which are factory preset to provide the required release torque. The benefit of this modular system is that downtime can be kept to an absolute minimum, using spare pre-set modules that are held in stock as immediate replacements for when overloads occur. The optimised design of the UEP torque limiters also means that installation is highly flexible, enabling the centre section of the torque limiter to be removed without the need to move the motor or gearbox. Similar design versatility ensures that any maintenance of the modules is a straightforward operation, and that recalibration is a simple removal operation achieved without having to replace the complete torque

limiter unit.

Whilst each torque limiter assembly is normally factory preset, site adjustments can be carried out, if required, and a setting chart with instructions is provided for this purpose. Manual reset of the torque limiter can only be carried out when the drive is at rest. Switching the drive off following an overload is accomplished by proximity sensors, which are used in conjunction with sensor targets that are included with the UEP package.

When designing a torque limiter into the machine to provide the best possible overload protection, ideally a torque limiter should be placed as close as possible to the source of the jam. This will allow the system inertia and torque to be quickly and effectively disconnected from the jammed section. The system can then be allowed to coast to a stop without causing further damage to the machine.

Safe stopping

Where coasting to a stop might also create a danger, or where heavy loads have to be held reliably, or where fail-safe stopping is required in the event of a loss of power (and so a loss of regenerative braking capability), mechanical braking is another essential machine protection technology. There are many different types of brake, but when we talk about safety braking then typically we mean brakes which are spring applied, and then released either hydraulically, pneumatically or electrically. Being spring applied is the key to these brakes offering a fail-safe function, as no power is required to apply the braking force.

Offering the best possible performance in demanding applications, the new VCS MK4 from Twiflex is a spring-applied, hydraulically-released caliper brake, employing the same basic technology as Twiflex's well proven VCS MK 3 caliper brakes, which have demonstrated their reliability and consistent performance over many years service in the most demanding applications worldwide. The VCS MK4 has been designed to provide a 50% increase in pad area, providing improved stopping and holding. The design also features increased service factors, modular construction for easy assembly and maintenance, plus precision monitoring options, and improved sealing and full compatibility with existing VCS mounts and controlled braking systems.

In common with other Twiflex modular brakes, the VCS MK 4 brake is a standard two-module design. The brake is provided as a complete unit with two pre-fitted brake pads. Additional items such as mounting bolts (tie rods), optional finishes and monitoring switches are available options.

Optimising the operation of the VCS MK 4 safety brakes is Twiflex's "MP" (Modular Range) of Electro Hydraulic Power Units. These provide an advanced and flexible means of brake control in the most arduous of operating conditions; typically, mining steelmaking and container handling. The "MP" unit is essentially an assembly consisting of a base unit, a hydraulic circuit and various auxiliary options. In addition to preventing damage to associated drive train components in the event of a jam or crash, or to damage caused by a falling load, the combined use of torque limiters and calliper brakes also helps to ensure operator safety by providing a controlled shut down in the event of a power failure. We can see then that torque limiters and safety brakes are essential machine protection technologies, giving companies the assurance of increased machine availability and reduced downtime – critical in today's competitive production environment.

Photo Captions:

Picture 1: Images shows a Twiflex VCS MK4 Caliper Brake.

Picture 2: Images shows a Bibby UEP Torque Limiter.

About Altra Industrial Motion Inc.

Altra Industrial Motion, Inc, is a leading multinational designer, producer and marketer of a wide range of mechanical power transmission products. The company brings together strong brands covering over 40 product lines with production facilities in nine countries and sales coverage in over 70 countries. Altra's leading brands include Warner Electric, Matrix International Wichita Clutch, Stieber Clutch, Twiflex Limited, Bibby Transmissions, Huco Dynatork, TB Wood's, Formsprag Clutch, Ameridrives Couplings, Industrial Clutch, Boston Gear, Marland Clutch, Nuttall Gear, Inertia Dynamics, Warner Linear and Kilian Manufacturing. Altra Holdings, Inc. (Nasdaq:AIMC), a leading global supplier of clutch brakes, couplings, gearing, belted drives, linear actuators and power transmission components.

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