



Keyless Shaft/Hub Locking Devices in the **MINING INDUSTRY**



Whether your operation is surface, conventional or longwall mining, your machinery is constantly subjected to some of the harshest environments and torturous loads for which an engineer can design. To compensate, for many applications designers forgo traditional keys and keyways which are subject to failure and rely upon spline and interference fits to mount critical components on rotating shafts.

Keyless shaft/hub locking devices, internal locking assemblies and external shrink discs offer all of the benefits of splines and sweat fits with none of the disadvantages, which is why they are employed by many mining machinery OEMs.



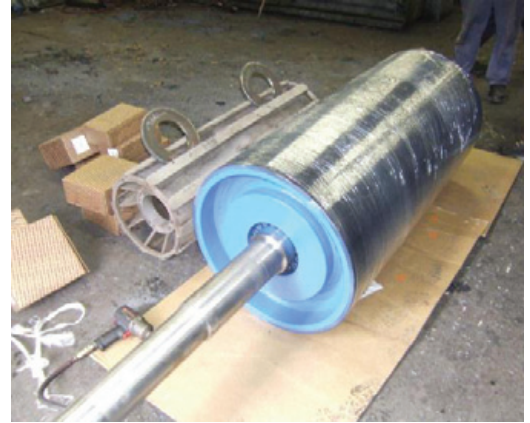
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KEYLESS LOCKING DEVICES IN THE MINING INDUSTRY

BELT CONVEYOR SYSTEMS

KLD locking assemblies are utilized in both mine duty and engineered class conveyor pulleys. Designing a drum pulley, especially head or tail pulleys, with locking assemblies rather than QD, XT or taper-lock bushings can eliminate issues with axial movement, bending capacities as well as shaft fatigue failures originating at keyways.



	Mine Duty Pulley	Engineered Class Pulley
Series Name	C133 or C415 series	C405, C415, or C425 series
Benefits	<ul style="list-style-type: none"> • High torque and bending capacity • No axial movement during installation 	<ul style="list-style-type: none"> • Extreme torque and bending capacity • Eliminates shaft keyways and easy installation/disassembly

JAW CRUSHERS

Climax KLDs can be used for mounting flywheels and drive gearing in jaw crusher applications. By using a Climax KLD in these applications, customers can eliminate shaft keyways with associated notch factors and stress concentrations and/or expensive and time consuming labor associated with using a sweat or press fit connection.



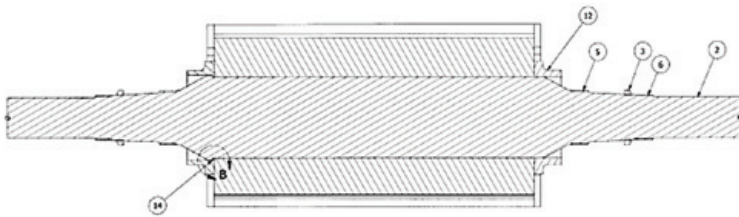
DRIVE SYSTEMS

KLDs can also be found in various locations of mechanical drive systems. Locking assemblies are frequently used to mount high speed coupling hubs between motors and reducers. Shrink discs and shrink disc moment couplings are the industry standard to mount large high horsepower gearboxes on alignment free drives.

Moment Couplings (FC733M)	Keyless Rigid Couplings (C600)	Shrink Disc (C733, C732)
Alignment-free drive	Cost effective shaft-to-shaft keyless connection	Alignment-free drive
Capable of very high combined torque and bending moment loads	High torque and bending moment capacity	Capable of very high combined torque and bending moment loads
Flanged bolt design for ease of installation and disassembly	Preferred solution for torque-arm mounted hydraulic drives	Preferred solution for flexible coupling hubs and hollow shaft gearboxes
Accommodates shaft sizes up to 300mm	Accommodates shaft sizes up to 150mm. Available with stepped bore	Accommodates shaft sizes up to 400mm

IMPACT CRUSHERS

Interference fit rotor/shaft connections in rock crushers require expensive machining, fixturing, heavy hydraulic presses and a great deal of labor to facilitate assembly. Heavy duty locking assemblies achieve the same fit with much simpler and less expensive machining, assemble with hand tools and afford field serviceability.



The same heavy duty locking assemblies can be used to mount drive sheaves on these machines offering all of the advantages of eliminating the keyway.

	Rotor	Drive Pulley
Series Name	C405 Series	C405 Series
Traditional Connection	<ul style="list-style-type: none"> Shrink and/or Press Fit Interference fit 	QD Taper Lock
Benefits of Using KLD	<ul style="list-style-type: none"> Do not require close tolerances and expensive finishes Simple to install and replace in the field 	Eliminates wallowing and fatigue failures associated with shaft keyways subjected to constant pounding



SHOVELS AND EXCAVATORS

Climax KLDs are used in clevis pin retention and to mount brake rotors in excavators and dragline shovels. They allow simplified installation and removal and eliminate issues due to wallowing of keywayed connections.



	Pin Retention	Brake Rotor
Series Name	C133, C405, C415 Series	C133, C405, C415 Series
Traditional Connection	Interference fit	Bore and keyway or tapered bushing
Benefits of Using KLD	<ul style="list-style-type: none"> Do not require close tolerance machining and press fit Simple to install and field serviceable 	<ul style="list-style-type: none"> Eliminates wallowing Do not require welding or a tapered bore in the component Meant to transmit reverse bending

Climax is a 68 year old company headquartered in Mentor, Ohio. Our product line of keyless locking devices is the highest quality European product supported by application and product engineers with experience second to none.

In June 2011, Climax entered into an exclusive agreement with MAV S.p.A. of Bosentino, Italy to market and sell MAV's Keyless Locking Devices in the North American market. Perched on a hillside in the breathtaking Dolomites, the foothills of the Alps, MAV has been a worldwide leader in the design and manufacture of Keyless Locking Devices and related products for over 30 years.

By joining forces, Climax and MAV offer the North American OEM and industrial distribution markets an unparalleled combination of product quality, extensive inventory, design and application acumen, and flexible manufacturing with attractive lead times. Together we have unsurpassed knowledge about KLDs and their applications.

Keyless Locking Assemblies

Internal bushings installed between the shaft and the component bore, capable of transmitting high torque, thrust and bending loads

As the high-strength screws are tightened, tapers simultaneously apply radial force on the shaft and the component bore creating a high pressure mechanical Interference fit

No key means infinite angular and axial positioning for precise alignment and timing

Easily mounted and removed in the field with standard hand tools

Shrink Discs

External locking device mounted on the outside of an hub or hollow shaft, compressing it onto the driven shaft. Most typical application is hollow shaft gearbox

As the screws are tightened, tapers create a radial force on the hollow shaft compressing it onto the driven shaft creating a high pressure mechanical interference fit

Keyless so infinite timing capability as well as easily mounted and removed with ordinary hand tools

Outer rings are supplied zinc plated for added corrosion protection

Keyless Locking Devices (KLDs) are mechanical bushings used to connect power transmission components onto rotating shafts. Without the use of keyways, KLDs eliminate the problems associated with backlash including fretting, corroding, and wallowing.

KLDs work with straight bores and generous tolerances, reducing component machining and complexity cost. In addition, KLDs are installed and removed using simple hand tools; no heat or high forces are required.

