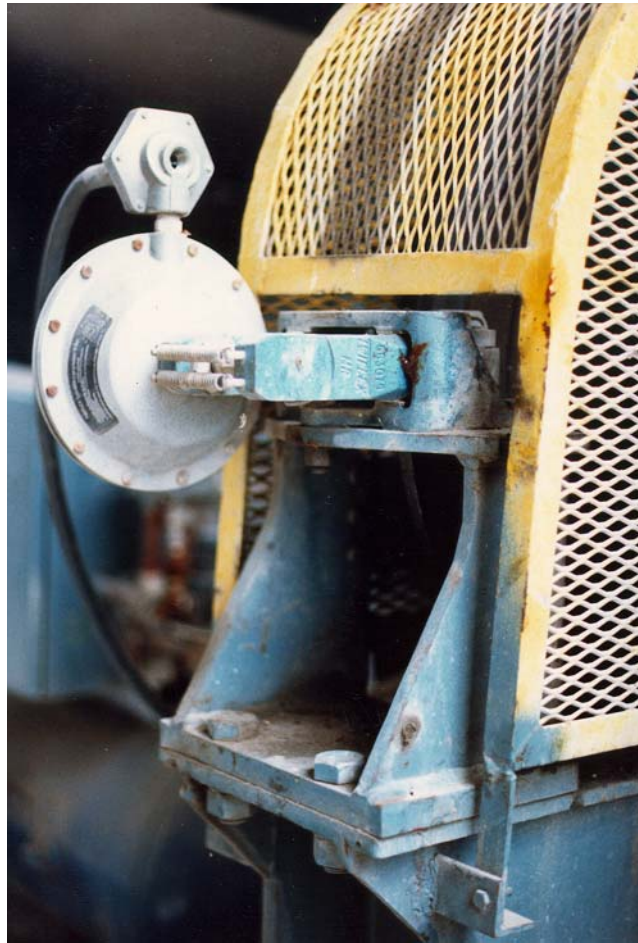


Inching Drive Backstops/Brake System for Ball Mills, Kiln Drives, and Incinerator Applications

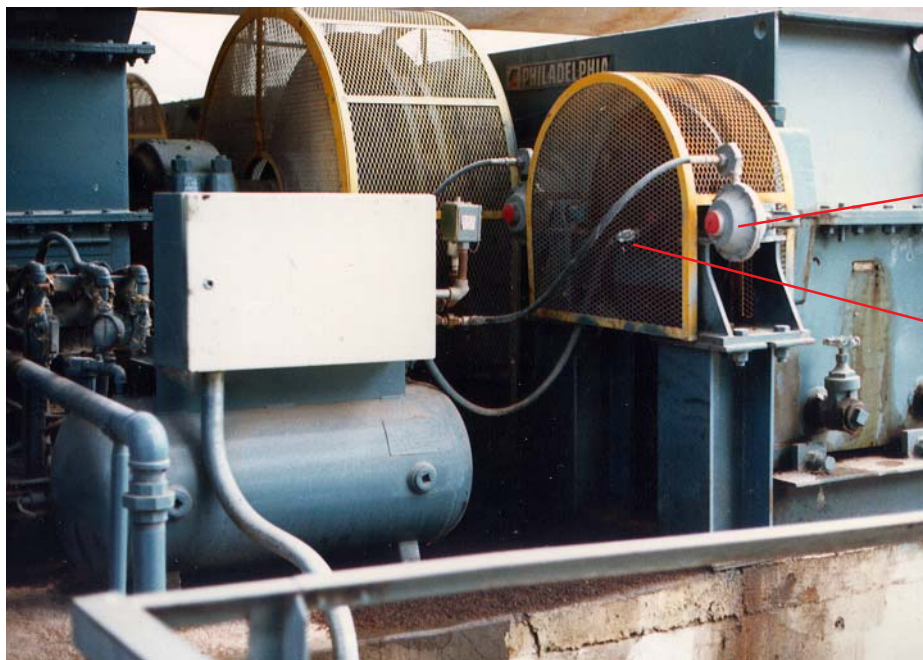


Disc Brake Method

The inching drive is an auxiliary drive for rotating the ball mill when maintenance work is done on the mill. It consists of an electric motor and gear reducer. It may be portable to the extent that one inching drive is available for servicing more than one ball mill or each ball mill may have its own inching drive. During operation, the output shaft of the reducer is coupled to either the main reducer of the mill or coupled at another location in the drive system. The main mill motor does not operate when the inching motor is connected. During maintenance, which might be as often as every two weeks in some situations, usually consists of replacing the grinding medium (steel balls) in the mill. The “man holes” in the mill must be properly aligned so that the mill can be opened, enabling replacement of the medium. The inching drive may also be used when the mill liners need to be replaced.

Caliper Disc Brake Configuration

Twiflex automatic brakes are also used on emergency drives for kilns. The emergency drive is normally used only during a power failure in order to keep the kiln rotating. When the engine is stopped, the brake prevents over-speeding of the engine when the kiln rolls back in the reverse direction.



MRK Series spring-applied
pneumatic-release brake

Speed limiting switch

System Description

The Hilliard/Twiflex Inching Drive Backstop and speed limiting system uses one or more spring-applied caliper brake systems to engage a disc which would be attached to either the high- or low-speed shaft of the inching reducer. The brake system can be released either electrically or pneumatically via an overspeed circuit where an overspeed switch is directly mounted on the brake disc. The brake system will then be applied when the disc speed exceeds a pre-set value on the brake control. When the kiln reaches bottom position with no further rotation, at zero RPM, the caliper brake will be fully applied by releasing the start/stop pushbutton.

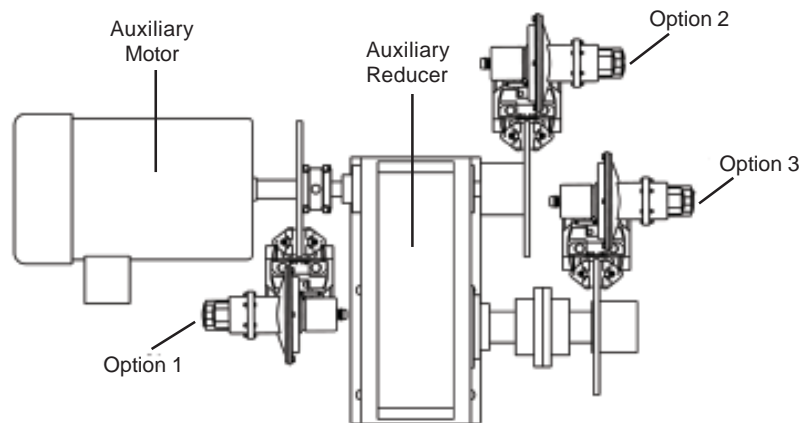
The RPM of the kiln during roll-back is observed on a tachometer in the control room. If an overspeed is observed, the operator can release the start/stop button to stop or “inch” the kiln to complete the roll-back sequence. During maintenance on the kiln, a manual switch placed in the ‘close’ position prevents power from being applied to release the brake. When this switch is manually closed, an indicator pilot light illuminates (indicating that the switch is closed). This switch must be manually set to the open position to allow the system to operate again.

If any switch in the speed control unit malfunctions, the brake system will be applied. In this case, the caliper brake can be manually released to allow a manually controlled kiln roll-back until the kiln reaches bottom position.

Design Features

- Controlled release of disc during roll-back
- Smooth reversals
- Manual release provision
- Automatic application of disc brakes with loss of power

Inching Drive Backstop Options



Option 1: Caliper will be applied to a disc mounted on a coupling located at high-speed shaft.

Option 2: Caliper will be applied to a disc mounted on a clutch located at high-speed shaft extension.

Option 3: Caliper will be applied to a disc mounted on a clutch-coupling located at low-speed shaft.

Centrifugal Clutch Configuration

System Description

The Hilliard automatic centrifugal brake is normally mounted on the high-speed shaft extension of the inching reducer. In some instances, it may be necessary to mount the brake on an extension of the next lower speed intermediate shaft. The brake housing is stationary and is bolted to the frame of the reducer.

When the electric motor drives the mill in the normal direction of rotation, the Hilliard centrifugal brake must not function to impede the mill rotation. This is accomplished by having an engaging speed higher than the RPM at which the motor causes the brake to rotate or by using a Hilliard overrunning clutch connected to the Twiflex brake. The brake prevents over-speeding of the motor and gear reducer in the reverse direction when the motor is turned off and the mill begins to roll back. Rolling back occurs when a heavy, unbalanced, off-center load of grinding medium inclines up the side of the mill when the mill is stopped. The medium's angle of repose could be between 30 and 60 degrees. Because of the high reduction ratio used, the RPM of the high-speed shaft connected to the motor could be extremely high if the mill is allowed to rotate backwards unrestrained.

The Hilliard centrifugal brake must be selected to limit the RPM of the shaft on which it is mounted and it must absorb the heat developed during the period of time it takes for the mill to roll back to a rest position at the bottom. Depending on the ratios involved, this time could be two to five minutes or more in duration for a 60 degree roll-back of the mill.



*The Gilford Hill Cement Plant located in Dallas, Texas.
Kiln manufactured by Ford Bacon & Davis.*

Data needed for accurate selection of Hilliard Twiflex Inching Drive Brake System

Pinion: No. of teeth _____
 Bull Gear: No. of teeth _____
 Motor: HP _____ RPM _____
 Main Reducer: Overall Ratio _____
 Emergency Reducer:
 Overall Ratio _____ Make _____ Model No. _____ Type _____
 Engine: HP _____ RPM _____ Make _____ Model No. _____ Type _____
 Coupling: _____
 If Applicable: Overall Ratio _____

The Hilliard Corporation
 100 West Fourth Street
 Elmira, New York 14902-1504, U.S.A.
 Phone: (607) 733-7121
 Fax: (607) 732-8979
<http://www.hilliardcorp.com>

Your Local Representative:

