Wrap Spring Productivity Decreases from Misapplied Installation

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How they are made

The standard plate mounted Wrap Spring Clutch Brake (CB Models) and Clutches (SAC or SP Models) are self contained packaged product. The internal drive hubs are manufactured from sintered iron material (Powdered Metal) and impregnated with oil for self lubrication properties. The oil volume content is determined by the density of the sintered iron material. The sintered iron materials are lubricated to make the units maintenance free. The internal springs are custom helical wound and either interference fit on a clearance fit depending on the function. The Clutch Brake (CB Models) the spring differential setting is one key element that is factory set to insure the product performs. The spring differential is a preset measurement that is necessary to obtain the stopping accuracy of 1 degree. The last critical factory setting is the solenoid actuator\collar setting. This setting maintains the optimum stroke of the solenoid assembly to achieve the maximum performance. The internal component material, spring material, lubrication and the factory settings are key elements on the product performance and life. If anyone of the related materials, lubricants or factory settings or related processes is compromised the product performance and life will be affected.

How they are applied

The majority of problems associated with Wrap Spring productivity decreases are from misapplied customer installation. Customers assume you can put this product on any application and the unit will perform. If misapplied, the unique design can make this product appear to be application sensitive. The application speeds, inertia, friction, radial and axial forces associated with mounting hardware and the plate attachment to the mating stationary frame are all related to the product performance and life. The application parameters must be clearly reviewed and defined so the sensitivity of the product is eliminated by achieving the optimum performance and life.

The majority of misapplied applications are from sizing a clutch to fit onto a specified shaft diameter. The clutch may fit onto the shaft but the speeds and loads either exceed the clutch rating or the unit is over sized for the application. If the load exceeds the clutch rating there will be a series of clutch issues. The unit may break springs, make multiple cycles, over heat and the solenoid will have an intermittent pulling. If the clutch is over sized for the application the stopping position will vary from cycle to cycle. This condition will also cause premature input

hub wear and or drive spring fatigue breaks.

The clutch internal drive hubs are sintered iron material (Powdered Metal) with larger running clearances which limits the speed ranges plus axial and radial load capacities. The speed range is also associated with the clutch torque rating. The higher the speed the inertia loads will usually increase along with the unit temperature. The mating drive hardware that attaches to the input hub of the unit will also have an affect on the clutch performance and life.

The mating drive hardware when attached to the input hub the radial load needs to be centered over the input hub to achieve the optimum bearing support. Most applications the customer will attach a sprocket or pulley flush to the input hub which creates a cantilever load. The cantilever load will cause the input hub inside diameter to wear premature or seize. This same condition will sometime cause the retaining ring on the input side to wear into the input hub contact surface. When this condition occurs the drive spring will wrap down into the large clearance from the input hub wear. This condition will either cause the drive spring to break, create excess concentricity, and cause the input to jam or the unit to prematurely fail.

The major cause of premature clutch failure is the clutch mounting plate being rigidly mounted to the stationary frame. The mounting plate needs to have at least one degree of radial and axial movement not to preload the brake hub attached to the mounting plate. If the plate is rigidly mounted this will cause cycle to cycle stopping accuracy, excessive heat, premature brake hub\retaining ring wear, the output seizing to the brake hub and cause the unit to prematurely fail.

How they're run

When clutches are installed into the final machines and have been in service there are sometime performance and life issues. The majority of the problems are associated with rigid mounting the clutch plate, foreign materials accumulating on the outer surfaces, stopping accuracy, breaking springs or solenoid actuation problems. The clutch plate rigidly mounted is the most problems associated with product performance and life. Depending how long the unit has been in service by just adding the 1 degree of radial and axial movement will correct in intermittent clutch performance. If the unit has been in service for an extended period of time the unit may have to be replaced. The foreign materials accumulating on the outer surfaces cause premature component wear or complete clutch failures. There is a soft vinyl boot cover available to keep out the debris off of the outer surface. This cover will not keep out moisture and not recommended for these types of application. Stopping accuracy is usually associated with Clutch Brakes (CB Models) with insufficient inertia to fully engage the brake spring. This is usually corrected by added an inertia type flywheel to the output or increasing the speed. When springs are broken in most applications they are a sign of over torque (undersized for the application) or from jamming conditions. The solenoid actuation problems are usually the pulse width on time is to long or to short depending on the failure. If the solenoid pulse width is on to long the clutch will make multiple revolutions. If the pulse width is to short the solenoid will

not be able to pull the solenoid plunger back to cause the unit not to drive.

Example

The majority of applications are horizontally mounted with the clutch supported in the center with 2 pillow block bearing supports. There are applications where the clutches are required to be mounted vertical. Vertical mounting will cause additional forces to be generated through the weight of the clutch and the mating drive hardware.

The majority of the customers that require vertical mounting have a tendency to mount the input hub in the 6:00 o'clock position. They also attach the mating drive hardware to the input hub which adds addition weight to the clutch assembly. When the clutch is operating in the application the added weight of the clutch and mating drive hardware starts premature wearing of the input hub and retaining ring surfaces. After a short period of time the clutch will eventually fail because of extreme wearing of the retaining ring into the mating face of the input hub. The failure is usually a drive spring fatigue break, excessive radial concentricity, vibration, noise and the unit stating to disassemble and fall apart.

When vertical mounting is required the input hub should be faced in the 12:00 o'clock position. The clutch still needs to be supported by 2 pillow block bearings. The output clutch shaft needs to ride against the pillow block bearing. The mating drive hardware should have a bearing (sleeve or ball bearing) in the bore and use drive pins to couple to the input hub of the clutch. The mating drive hardware must not be hard mounted to the clutch and be able to free float. The bearing in the mating drive hardware should rest against the clutch output shaft to eliminate the additional forces associated with mating drive hardware. To keep the mating drive hardware from separating away from the clutch a shaft retaining collar will need to be added to keep the assembly together. The mating drive hardware with the bearing support can be used is all phases of mounting to achieve the optimum life on Wrap Spring Clutches.