Sumitomo Drive Technologies

NILL DUTY CYCLO® DRIVES

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WHITE PAPER

Sumitomo Mill Duty Cyclo[®] Drives by Sam Hancock

The Mill Duty Cyclo[®] was developed to thrive in the toughest applications and environments. Steel and Lumber Mills are two of the many industries where the additional features allow for superior performance and durability. The reliable performance of the Mill Duty Cyclo[®] Drives has prevented disruptions to production and costly downtime for decades.

Long lasting protective epoxy paint, two dual lip seals mounted on a precision ground hardened collar, and a wash down / heavy dust duty breather prevent corrosion and lubrication contamination. (Figure 1.)

The unique operating principle of cycloidal gearing and use of high quality materials are optimal for extreme loads making the Mill Duty Cyclo[®] Drive the perfect choice for high shock and reversing applications.

In general, reducers are selected based on specific conditions and operating requirements of the application by the use of AGMA-defined Service Factors. There are three AGMA load classifications for reducers: uniform (U), moderate shock (M) and heavy shock (H). The Mill Duty Cyclo[®] is designed to perform under Heavy Shock (H) conditions, up to **500%** of rated load momentarily.

Unlike traditional involute gears, the Cyclo[®] design has two thirds of its internal reduction components in contact at all times, while operating under compression. This is an inherit advantage over traditional spur and helical gears with contact points limited to a few teeth operating under shear. (Figures 2. &3.)



Figure 2. Cyclo disc in compression

Figure 3. Spur gear teeth in shear

Internal reduction components are manufactured from hardened, vacuum-degassed 52100 bearing grade steel. Vacuum degassing removes the undesired dissolved gases of hydrogen and nitrogen, while also greatly reducing the density of harmful inclusions in the steel. Precision machined components of this high strength clean steel result in minimal vibration, low noise, low backlash and an extended operational life. (Figure 4.)





The Mill Duty Cyclo[®] housing components are manufactured out of Ductile Iron versus the commonly used Cast iron. Ductile iron has the favorable characteristics of cast iron, such as good casting/pouring properties, ease of machining, and vibration dampening. Ductile Iron provides a significantl increase in strength ratings, yielding a much more torque dense product when compared to cast iron. The High Fracture Toughness (Ability to resist fracturing) and High Fatigue Strength compared to Cast Iron makes it an excellent choice for shock and impact loading. (Figure 4.)

For proper unit performance, the Input End Shield, Ring Gear Housing, and Output Casing must remain in precise alignment. The standard ring gear housing (RGH) bolts provide a clamping force to do so. The Mill Duty Cyclo® also features DIN grade 12.9 steel shoulder bolts, which an interference fit to prevent slip at contact surface between the housing components. The shoulder bolts mechanically lock the housing component positions and absorb shear forces generated by the high torque of a shock load or reversing application. Additionally, the shoulder bolts will reinforce the housing components, which further enhances the speed reducer performance and resistance to applications with high vibration. (Figure 6.)



Figure 6. Examples of shoulder bolts and installation locations

Shock loads, reversing, rapid acceleration / deceleration, and high vibration applications will often result in fretting or deformation to keys and keyways. The Mill Duty Cyclo® addresses this issue with the application of an engineered retaining compound to the internal keyed connections at assembly.

The Mill Duty Cyclo[®] is available with multiple input and output configurations and for all mounting orientations. New units and parts are readily available. CAD drawings, manuals, a two year standard or optional extended warranties, and Sumitomo's worldwide customer support make it an easy choice for the toughest applications.