

Direct vs. Gear Driven Mixer Designs

BEARINGS:

Most direct driven mixer designs are found with either one or no bearings in the mixer housing. The bearings are most certainly commercially available double sealed designs. At 1750 or 1150 RPM's, the bearing temperatures are normally very high due to friction. This elevated temperature separates the factory packed grease into a light oil and an even heavier grease. A light oil dripping down the agitator shaft when the lower seal fails normally indicates this. Bearing longevity is highly dependent upon the properties of the lubricant used and when its lubricity is compromised premature failure is apparent. For this reason, it is quite common for the bearing to seize, causing the motor to fry.

BEARING LIFE:

The statistical life of ball bearings, which are found in both mixers and motors is determined using the following equation:

$$\text{Bearing Life, Hours} :: (\text{constant/RPM}) (\text{Dynamic Load Rating/Load Applied})^3$$

At 350 RPM's, the bearing life improve by a factor of 5 versus a 1750 RPM motor before any other factor is applied.

COMMERCIAL MOTORS vs. OVERHUNG MIXER LOADS:

Since there are either only one or no bearings located in the mixer housing of direct driven designs, the commercially available motor is forced to handle the overhung loads generated by the mixer. These loads can be substantial. Commercially available motors were not designed to handle these additional loads. This explains why it is also quite common for motors to experience premature bearing and/or overload failure.

MOUNTING ASSEMBLIES:

It is quite common for direct driven designs to exhibit excessive run out, if not when they are initially installed, sometime after the design is broken in. Maintenance personal constantly complain about housekeeping issues, where clamp & cup-plate assemblies require continual re-tightening as its hardware loosens due to the excessive run out. Once the mounting is compromised, maintaining its integrity becomes even more difficult to the point where the rotating impeller assembly can damage tank internals, including the tank wall.

SEALING:

Although there is no grease or oil chamber associated with direct driven housings, a lower single oil seal is normally located just below the lower bearing. Its function is to prevent premature failure of the bearing due to fouling caused by splashing and/or a corrosive

environment. Once seal failure has occurred, oil leakage down the agitator shaft is normally apparent (see BEARINGS above).

SPLIT COUPLINGS:

Split couplings are a very inexpensive alternative to a machined output shaft. Their function is to attach the motor shaft to the agitator shaft. Split couplings by their very nature will align non-concentrically - not a good idea, especially at 1750 or 1150 RPM's. Non-concentric alignment can exacerbate the problems associated with run out. It is commonly understood that as you increase mixer run out, you decrease mixer longevity.

VALUE ADDED FEATURES of the ACUMIX GEAR DRIVEN DESIGN:

By just evaluating price alone, a gear driven designs cannot compete with a direct driven design. From a value added approach, the incremental amount paid for an ACUMIX single gear reduction design will provide a great deal in return. The gear reduction allows for a lower speed and cooler operation thereby enhancing bearing longevity. The dual bearing designs isolate the loads generated by the mixer, from the motor. The quad & tertiary seal arrangement prevent the possibility of leakage and premature bearing failure normally associated with fouling. The ACUMIX quick release chuck assembly ensures precise alignment with minimal run out - this directly translates to mixer longevity.