



Coupling Corporation of America

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Synchronous Motor Coupling Still Running Strong After 25 Years!

25 years ago a large petro-chemical company operating in the US faced a serious design task and a short design time envelope for project completion and operational date.

Two motor-driven compressor sets were to be installed and operational within a relatively short few months. The larger of the two sets was a 25,000 HP across the line start synchronous motor driving through a gear box into a centrifugal propane compressor. The second system was a synchronous motor driving through a gear box into an ethylene centrifugal compressor.

Because of the sensitive nature of torsional pulsations with synchronous motors on start-up, the systems were initially designed to use rubber block couplings on the low speed motor drive ends.

When the initial torsional analysis was made, it was discovered that the most serious torsional stress condition existed on the 10 inch gear shaft of the 25,000 HP system. It was estimated that the gear shaft would fail after a relatively few starting cycles using the rubber couplings.

The motors, gear boxes, and compressors had already been purchased but now their adequacy for a long life was in serious question.

The engineers came to Coupling Corporation to see if couplings for the two drive trains could be quickly designed and manufactured. The couplings needed to handle the large torque pulsations occurring during start-up while providing the correct torsional spring rate to minimize the torsional stresses in the gears, pinions, and compressor shafts.

Working with a consultant to evaluate the torsional stresses, CCA engineered FLEXXOR couplings for the low and high speed drives which did satisfactorily reduce torsional stresses throughout the systems.

In the 25,000 HP 1200 RPM motor to gear box coupling, CCA designed and manufactured an extremely low torsional spring rate coupling using a long thin quill shaft.

This design allowed the torsional stresses in the 10 inch gear box shaft to be reduced tremendously so that the predicted number of starts for the propane system was very adequate for hundreds of years of operation.

By now in the latter half of 2014, the four FLEXXOR couplings have been operating continually for 25 years. There have been no failures or wear in the couplings and the systems, all while enduring normal startups as expected. Without question, these couplings have saved the owner millions of dollars of possible lost production and have given unquestionably reliable service to very critical applications.