

TECHNICAL UPDATE # 010

Application of the Thompson TCVJ® coupling to marine driveshafts

One market realising the benefits of the Thompson Constant Velocity Joint TCVJ® is the marine industry.

Specifically the integration of the TCVJ® to the powertrain that permits large angles of misalignment to be achieved is proving beneficial to many types of marine vessels.

Traditional types of powertrain shaft couplings – such as universal joints – have great limitations when the connecting angle from engine/gearbox to propeller shaft is moderately large (typically greater than 3 degrees) as significant shaft vibrations often occur. Additionally, with the flexible nature of the hull, shaft coupling misalignment creates further disturbances and energy losses in the powertrain from unwanted shaft side loads.

One recent application has seen the installation of the TCVJ® constant velocity shaft coupling for the main propulsion in a naval patrol boat. This vessel was recently refitted with two new 500HP engines. Since the newer engines had a crankshaft centreline significantly higher than the previous types created a new uneven shaft angle. As such a traditional universal joint shaft solution if fitted would lead to significant shaft vibrations when operating at normal engine speeds.



The new engines with higher crankshaft centre made the universal jointed shaft inoperable

The boat builder turned to Thompson Couplings Ltd to develop a solution that would permit the new engines to be installed with minimal changes to the rest of the driveline.

The Thompson Couplings model TCVJ-2C-15 with nominal articulation angle up to 15 degrees was fitted with appropriate adaptor flanges to suit the new engine flywheel and gearbox flange. Once installed the resultant shaft angles measured 5 degrees at the engine flywheel and 1 degree at the gearbox. Since the TCVJ® operates at constant velocity at different angles (unlike a universal joint) the resulting vibration spectrum was smooth and well below permissible levels.

The resulting benefits of the Thompson TCVJ® driveshaft to the boat builder included:

- Easy retro fitment of new modern engines in older craft without the need to maintain accurate alignment of existing propeller shafts
- Energy savings through the use of highly efficient coupling technology minimising shaft side loads
- Proven reduction in vibration levels due to pure constant velocity shaft rotation
- Resultant low noise signature of the craft from low vibration of the driveline- especially useful in military applications.



Thompson Couplings TCVJ2C-15 driveshaft

David Farrell – B.E. Mech (hons)☺

(David Farrell is Chief Engineer for Thompson Couplings - designers and manufacturers of The Thompson Constant Velocity Joint. David has more than 30 years as a professional mechanical engineer involved in a wide range of mechanical engineering designs and maintenance projects. He was one of the key founders of Thompson Couplings Ltd since 2001 and continues to design the range of TC products as well as support the engineering community with specific applications for power transmission and shaft couplings.)

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