

Zero-Max

Couplings Provide High Torque Capability While Handling Merritt PMI's High Reverse Loads on its Sliced Hardwood Veneer Production System.



When Merritt PMI of Lockwood, NY, was in the market for couplings, the company couldn't take any chances on couplings that could slow their operations, even by a few seconds.

Merritt's MS-40 vertical veneer slicers produce a high quality wood veneer in sheet sizes up to 4 meters long by 900 meters wide by 0.5 mm thick. The design incorporates state-of-the-art servo drive technology that allows for operation with virtually no downtime during a 24-hour period.

"Our machine slices veneer from a tree. It absolutely needs to produce 90 sheets a minute and run for 24 hours," says Merritt PMI president David Mellor.

It was with these specifications in mind that a team of Merritt employees conducted their search for the perfect, reasonably priced coupling and came across Zero-Max of Plymouth, MN.

"What seemed different about the Zero-Max couplings is that they have lower inertia than the others, thus they could improve machine performance," says Mellor.

For Merritt design engineer Mark Lorenc, who was also instrumental in the purchasing decision, motion control was a critical factor due to the rapid start/stop cycling of the veneer slicers. He says the Zero-Max couplings absorb backlash tendencies in the power train so that there are no damaging forces imposed on the servomotor or other components in the system's drive train.

Three CD couplings are used in the power train of the system, which has a T-shaped configuration. The servomotor power source sits at the base and contains an output shaft, which connects the coupling to the input shaft of a right-angle Cone Drive gearbox that forms the top of the T-shaped drive configuration. The two output shafts are connected to two additional CD couplings, which connect to two lead screws. It's the lead screws that drive the reciprocating knife carriage, which slices the wood veneer.

"Reactionary forces are magnified when you have a coupling that doesn't allow for 3° angular misalignment," says Kevin Wells, a regional sales manager at Zero-Max. "That's when you can run in to bearing loading and premature failure of equipment."

Also key to this design is the ability to keep motion under control with smooth, uninterrupted, high-speed operation. A 40 hp servomotor and a low-backlash worm drive with an output torque of 3,107 in.-lbs. at 6 arc/min. powers the veneer system.





Acceleration is also a consideration, as the speed and the change from clockwise to counterclockwise can create problems unless the motion forces are properly controlled. A patented open-arm disc pack made of a rugged composite material reacts to coupling forces with high torsional stiffness. The coupling has the ability to lessen reaction loads in heavy-duty applications, like those used at Merritt PMI, while absorbing and dampening shock and vibration. The disc's composite material has a ply or fiber orientation to it, which gives it rigidity and also has a dampening effect on shock and noise.

Of the three CD couplings at Merritt PMI, the two 6A52QD models connect the cross shaft and bevel gearbox. With a 5.25" diameter, the couplings have a rated torque of 402 Nm and a torsional stiffness of 168,656 Nm/rad and a maximum hp of 5.62/100 rpm.

The 6A76QD model connects the servomotor and Cone Drive gearbox. It has a 7.75" diameter with a rated torque of 1,763 Nm and a torsional stiffness of 609,303 Nm/rad and a maximum hp of 24.75/100 rpm.

Both varieties are classified as CD QD quick disconnect, meaning the hubs are machined to accept standard QD bushings and are assembled into the system without alignment tools.

Other features include the ability to stand up to harsh chemical environments. Merritt PMI operates a moisture-rich environment. With its couplings' temperature range from -70 to 250°C, Zero-Max reports that its couplings don't run the same failure risk in harsh environments as conventional steel disc and elastomeric couplings.

Though its couplings' most common applications are in mandrels, drives, gearboxes, speed reducers and driven components for printing, packaging, and PCB manufacturing,

Wells says that it's not unusual for the company's couplings to be used in production systems. Also, it's not that uncommon for a Zero-Max coupling to work in a constant run environment. Currently, they were used in a wind generator that was connected to a turbine shaft to a gearbox for electric power products. ■

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