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Tapping Tides for Clean Energy



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Machine Design
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 **Wichita**[®]
Clutch

An Altra Industrial Motion Company

Tapping Tides for Clean Energy

By Leland Teschler
Editor, Machine Design



Atlantis AK-1000 1MW Tidal Turbine



The unique Wichita HBS 42-14 wet brake uses oil shear technology as the torque generator and does not wear or create dust like a dry friction brake.



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A 75-ft-high tidal turbine will include a custom-designed brake to prevent overspeeding and eliminate shock loads that could damage the novel power-generating device.

Last August, the Atlantis AK-1000 turbine, the world's largest single-axis tidal turbine to date, was installed at the European Marine Energy Centre in Scotland for testing. Designed by Atlantis Resources Corp. in the U.K., the turbine contains twin rotors 59 ft. (18 m) in diameter that harness ebb and flow tides to generate 1 MW of power. These horizontal-axis turbines sit on the ocean floor in what is considered to be the harshest environment on the planet.

The turbine's need for a large-capacity braking system eventually led to the use of a wet, multiplate marine turbine brake from Wichita Clutch in the U.K. The Wichita HBS 42-14 clutch installs on the rotor (low-speed) shaft. The unit's wet-brake technology uses oil shear to generate the braking torque and does not create dust or debris as would a dry-friction brake. Because brake torque transmits through the shearing of the oil film, friction plates never actually touch until relative velocity approaches zero; consequently there is little wear.

For this environmentally sensitive project, Wichita tested and approved the use of a biodegradable synthetic oil as a safer alternative to traditional hydraulic oils. And because the turbine rotors turn at just 6 to 8 RPM, studies indicate the units present little hazard to marine life.

The rugged HBS 42-14 has a dynamic torque capacity of 1.2 MNm and was custom designed to suit the Atlantis parameters for braking torque, controlled and emergency stops, condition monitoring, nacelle mounting and shaft sealing. It also incorporates a custom hydraulic power pack which provides proportional braking control under normal circumstances and a fast-approach, soft-braking feature in the event of total power loss.

The brake sits inside a dry nacelle. The main shaft, brake and generator reside in a sealed tube at normal atmospheric pressure. Although not required on the Atlantis turbine, the Wichita brake is capable of full submersion and could be used in a pressurized environment (typical depth 100 ft.).