

CPFL Paulista Completes River Crossing with 3M ACCR to Avoid Expense and Delay of Building Mid-Span Tower

New Low-Sag, High-Capacity Conductor Lets CPFL Transmission Unit Bypass Flooded Island, Allow Clearance for Boats; Application is Third for ACCR in Brazil

CPFL Energia's power distribution unit, CPFL Paulista, has installed and energized the low-sag, high-capacity 3M Aluminum Conductor Composite Reinforced (3M ACCR) across the Tietê River as part of a new line boosting power to northwestern portions of São Paulo State.

3M ACCR was chosen for the crossing to avoid the necessity of building a foundation and tower on an island that is currently under water as a result of a long period of above-normal rainfall, according to Paulo Ricardo Bombassaro, engineering and planning manager for CPFL Energia.

This is the third application of 3M's new conductor in Latin America, and the second by CPFL, one of Brazil's largest investor-owned electric utilities, serving some 6.5 million customers in four states. In the prior application, using the light-weight ACCR enabled CPFL to upgrade a line passing through a densely populated suburb of the city of Varzea Paulista without having to build larger towers, which would have caused expensive and disruptive logistical problems.

3M ACCR, which can carry more than twice the electricity of conventional steel conductors of the same diameter without new towers or rights of way, is now in use by some two dozen utilities, large and small, throughout the United States, as well as in six other nations.

CPFL Energia's new line connects its new Iacanga substation to a portion of the grid that serves a growing region some 200 miles (320 kilometers) northwest of São Paulo. The line crosses the Tietê River with a 968-meter (1,059 yards) span. This project originally involved an ACSR conductor that would have been supported by a tower on a small island about midway across. However, the swollen river submerged the island during the Brazilian spring rains in September of 2009. The 3M ACCR solution eliminated the need for the island tower installation, enabling a single segment of the 138kV line to make the full crossing and still leave about 23 meters (75.5 feet) of clearance for river traffic.

"Building the foundation and tower on submerged land would have posed engineering difficulties, and waiting until mid-year for the river possibly to subside would have caused unreasonable delay," says Bombassaro. "Using the ACCR was a far more desirable alternative; less costly, and safer for the construction team."

Tim Koenig, director of the 3M High Capacity Conductor Program, notes that the ACCR "has emerged as a dependable, recognized problem-solver wherever upgrades and new line installations require minimal impact on their social or natural surroundings. Its high capacity, light weight and heat sag resistance make it a versatile and cost-effective solution in both high-population and environmentally sensitive locations."

3M ACCR's strength and durability result from its core, composed of aluminum oxide (alumina) fibers embedded in high-purity aluminum, utilizing a highly specialized and patented process. The constituent materials can withstand high temperatures without appreciable loss in strength, even over long periods of time.

3M ACCR was developed with the support of the U.S. Department of Energy, which tested the conductor at its Oak Ridge National Laboratory (ORNL) in Tennessee, and with early contributions by the Defense Advanced Research Projects Agency. The ORNL tests demonstrated the conductor retains its integrity after exposure to temperatures even higher than the rated continuous operating temperature of 210 degrees Celsius and the

emergency operating temperature of 240 degrees Celsius. It has the durability and longevity of traditional steel core conductors, even when operated continuously at high temperatures.

Also, since 3M's ACCR is based on aluminum, it is not as susceptible to environmental conditions such as moisture or UV exposure, as other traditional conductors, and it has the corrosion resistance typically associated with aluminum-based conductors.

3M holds 18 patents on its ACCR technology, which has been recognized by *R&D Magazine* with an R&D 100 Award as one of the most technologically significant products introduced into the marketplace, and by the Minnesota High Tech Association with a Tekne Award for innovative development.

3M ACCR is offered by 3M's Electrical Markets Division (EMD), which designs, manufactures and markets products for electrical utilities, electrical construction and maintenance, and electrical/electronic device manufacturers. EMD has more than 60 years of experience serving utility customers with highly reliable products, including high-capacity transmission conductors; power cable splices and terminations; electrical wire connectors, terminals and tools; wire marking products; cable ties; electrical insulating tapes; electromagnetic shielding and absorbing materials; heat shrinkable tubing and molded shapes for electrical insulation; and cold shrink sealing and insulating tubes.

More information about the 3M high capacity conductor is available at www.3M.com/accr.

About 3M

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3M Public Relations Colleen Horn Harris, 651-733-1566 www.3m.com/PressCenter or LVM Group Inc. Bob Rurman, 212-499-6567 bob@lvmgroup.com or Rachel Antman, 212-499-6570 rachel@lvmgroup.com

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