

3M™ ACCR Advance Transmission Conductor

3M™ Aluminum Conductor Composite Reinforced (3M ACCR) is a high-voltage, overhead transmission conductor. By replacing the steel core of standard conductors with wires composed of alumina fibers embedded in high purity aluminum, it can provide up to two or more times the current-carrying capacity.



The conductor will soon be installed on over 1,000 miles of transmission lines on voltages ranging from 46 to 400 kV and in 11 nations on 4 continents.

Compared to standard conductors, 3M ACCR has:



- the same strength, but with less weight,
- less sag at high temperatures, and
- consistent performance when operated at high temperatures for long periods of time.

These properties are important if a utility wants to use existing structures and rights of way, but:

- large capacity increases are needed,
- the structures cannot tolerate increased weight or tensions,
- clearances must be maintained or matched to other lines,
- lines cross environmentally sensitive or densely populated areas, or long spans.

Benefits

Reconductoring with 3M ACCR:

- eliminates constraints to delivering renewable energy;
- minimizes disruptions to the environment and community;
- is faster than construction and avoids lengthy permitting;
- provides U.S. manufacturing jobs in three states (Minnesota, Wisconsin and Illinois);
- is demonstrated to be a reliable solution, with 100% successful installations;
- saves cost.

Development

Through a four-year (2002-2006) Department of Energy research program¹, field testing was performed at Oak Ridge National Lab on a state-of-the-art accelerated-aging test line. The test line was designed to simulate in three months the thermo-mechanical loads

¹ Funding agreement DE-FC02-02-CH11111.

of over 40 years of transmission operation. In addition, thirteen utility field test lines were installed and monitored in the U.S.

Commercial Application Examples

1. For an Xcel Energy upgrade that crossed a protected wet land, the Minnesota Environmental Quality Board would have required 4 to 6 months for permitting. Instead, only a 30 day written notification was required because the 3M ACCR installation used only the existing structures.

2. Arizona Public Service (APS) installed 3M ACCR to increase capacity on a 230 kV line serving downtown Phoenix, including the airport and sports arenas. The conductor eliminated the need to construct a new line in a congested downtown business area.

3. Western Area Power Administration (Western) upgraded a twenty-mile stretch of the Topock-Davis 230 kV line with ACCR, which parallels the Colorado River along the Arizona/California border. The area served includes fast-growing Arizona, Nevada and California communities.



*Xcel Energy Blue Lake to
Black Dog*

4. Shanghai Electric Power Company deployed 3M ACCR to shorten construction time and save costs while increasing capacity on a 10-mile line serving growing demand in the city of Shanghai, including the 2010 World Expo area.

5. Allegheny Power upgraded a 138 kV line linking the Bedington and Nipetown substations along Interstate-81 in West Virginia, some 50 miles northwest of Washington, D.C. Using 3M ACCR allowed the under-built 12 kV distribution circuits to stay in service during construction and avoided structure replacement.

6. British Columbia Transmission Company installed 3M ACCR on two segments of the Vancouver Island Transmission Reinforcement (VITR) Project to minimize disruption to diverse and sensitive waterways from heavy equipment, installing new foundations and towers, digging out the existing footings, and transporting the aggregate. In addition, they were able to use unusually long spans, avoiding adding towers in the waterway. One segment, the Sansum Crossing, included a 5,800 foot (1,770 m) single span.

7. Companhia de Transmissao de Energia Eletrica Paulista (CTEEP) upgraded a 138 kV line crossing an environmentally sensitive river bed. The line crosses the nearly mile-wide Paraná River and is subject to strong winds and extremely high temperatures. The installation was completed in just 6 days.

8. A set of storms during the summer of 2008 in Colorado resulted in downed power lines. The contingency line upgraded with 3M ACCR the year before kept the power flowing, providing reliable and secure service into a major U.S. metropolitan area during the emergency.



*Oak Ridge National Lab Field
Test Facility*