



## POWER LINE DAMAGE, ELECTRICAL OUTAGES, REDUCED IN THE “SLEET BELT”

### WIND DAMPING INVENTION MINIMIZES POWER OUTAGES, REDUCES REPAIR COSTS TO TRANSMISSION LINES

#### BENEFITS

- Can be retrofitted on high-tension power lines in plant complexes or in utility distribution systems.
- Protects vulnerable systems in geographic areas where weather-induced outages commonly interrupt plant production schedules.

#### APPLICATIONS

Applies to the general protection of power lines, communications and transmission lines, especially in the sleet belt that extends through the central U.S. and the Eastern Canadian provinces. Wind damping products have been installed and are preventing power outages in other states, such as Colorado and California, as well.

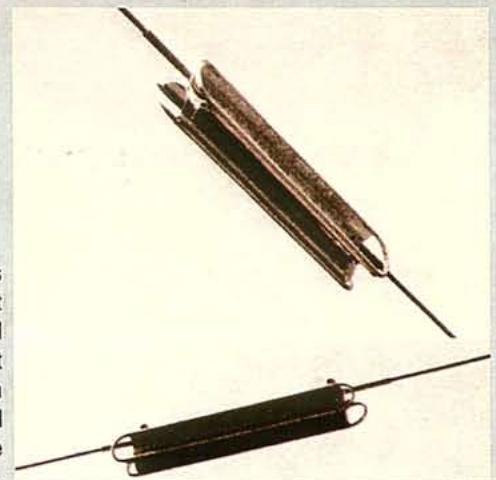


Companies that depend on reliable supplies of electricity, as well as electrical utilities, need to defend against weather-related damage and power outages. Weather-related damage claims in the U.S. totaled \$16 billion during the ten-year span from 1980 through 1989 and have already reached \$48 billion in the first five years of this decade, evidence that climate change could be causing more severe storms. This makes technology that minimizes weather damage all the more welcome.

Ice and snow build-up on high-voltage electric power lines in moderate to high winds causes high-amplitude low-frequency mechanical vibrations, called galloping. When power lines react aero-elastically to these conditions, undamped vibration tears apart transmission towers and fittings or propels lines into each other, shorting out large circuits. Besides causing costly electric system outages and structural damage, this dramatic phenomenon steals power through higher electricity line losses that occur when other conductors have to carry more power to compensate for a tripped or damaged line. In a 1981 survey, 17 of 38 utilities reported that galloping was a moderate to severe problem, and 11 reported that they had a galloping event at least once a year. Fifty-seven percent of the incidents included flashover, and 60% included structural damage.

#### DEVICE CUTS DOWN ON COSTLY POWER OUTAGES

The AR Windamper was developed through a grant from the Inventions and Innovation Program, to protect power transmission lines in sleet belt states and provinces by eliminating the “galloping” phenomenon.



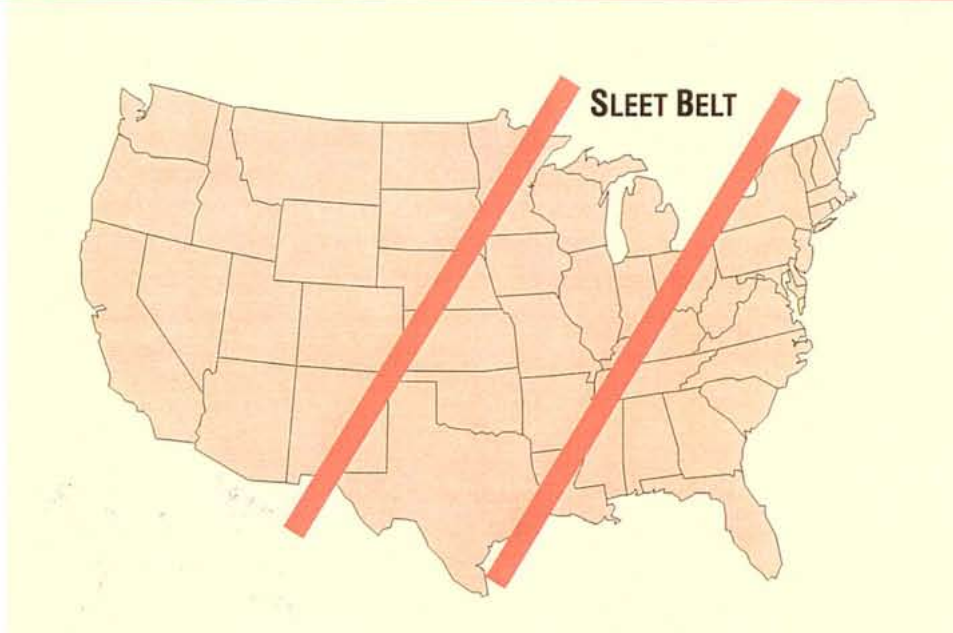
## Technology Solution

With assistance from the Inventions and Innovation Program, AR Products has developed the AR Windamper System, an aerodynamic device clamped to high-voltage overhead transmission lines to overcome galloping. The system introduces a positive damping force by twisting the conductor to cancel the aerodynamic lift that clinging ice and snow cause. Another product, the AR Twister, accomplishes the same result using an inertial device that can also be used to dampen vibration of guy wires on tall broadcast towers.

## Current Status

The company has installed the AR Windamper on transmission systems for the Western Area Power Administration and ten utility companies as well as in three steel plants. Through Research Consulting Associates, a full range of transmission line protection equipment is commercially available. More than 18 utilities and companies have installed this technology during the last decade.

### AREAS THAT COULD BENEFIT MOST FROM WINDAMPER PRODUCT USE



## INDUSTRIES OF THE FUTURE—STEEL

Through OIT's Industries of the Future initiative, the Steel Association, on behalf of the steel industry, has partnered with the U.S. Department of Energy (DOE) to spur technological innovations that will reduce energy consumption, pollution, and production costs. In March 1996, the industry outlined its vision for maintaining and building its competitive position in the world market in the document, *The Re-emergent Steel Industry: Industry/Government Partnerships for the Future*.

OIT Steel Industry Team Leader: Scott Richlen (202) 586-2078



The Inventions and Innovation Program provides financial assistance for establishing technical performance and conducting early development of innovative ideas and inventions. Ideas that have a significant energy savings impact and future commercial market potential are chosen for financial support through a competitive solicitation process. In addition, the program offers technical guidance and commercialization support to successful applicants. Ideas that benefit the Industries of the Future, designated by the Office of Industrial Technologies as the most energy-intensive industries in the U.S., are especially encouraged.

## PROJECT PARTNERS

Inventions and Innovation Program

AR Products/Research Consulting Associates,  
Lexington, MA

## FOR MORE INFORMATION

OIT Web site:  
<http://www.oit.doe.gov>

Inventions and Innovation Program contact:  
David Crouch  
Office of Industrial Technologies, EE-20  
Department of Energy  
1000 Independence Ave., SW  
Washington, DC 20585-0121  
(202) 586-4844  
(202) 586-7114 (fax)  
[david.crouch@ee.doe.gov](mailto:david.crouch@ee.doe.gov)

Research Consulting Associates:  
(781) 862-7200 (telephone & fax)

Office of Industrial Technologies  
Energy Efficiency and Renewable Energy  
U.S. Department of Energy  
Washington, D.C. 20585



DOE/GO-10098-559  
April 1998