

DuPont™ NOMEX®

MOTOR REPAIR CASE HISTORY

**FOR BRITHINEE ELECTRIC, SUPERIOR MOTOR PERFORMANCE
MEANS NOMEX® PAPER AND LAMINATES**

Brithinee Electric builds customer confidence and business growth with a no-compromise demand for quality and exclusive use of NOMEX® paper for more than 25 years.

**Quality.
Innovation.
Rapid Response.**

These are the hallmarks of Brithinee Electric. Founded in Colton, CA in 1963 as a motor repair shop, Brithinee keeps the motors that power industry running smoothly. The company has experienced rapid growth in the motor repair, rewinding and control systems business in recent years.

Add to these accomplishments the use of superior materials, such as the exclusive use of NOMEX® paper and laminates to meet the demanding requirements of motor insulation, and you have a winning combination for Brithinee's diverse customer base.

Don and Wally Brithinee (l to r) with a variety of motors.



The miracles of science™

DuPont™
NOMEX®



Chuck McGinnis trimming NOMEX® phase insulation.

Brithinee and DuPont Build a 25-Year Partnership

Brothers Wallace and Donald Brithinee began using NOMEX® paper in the early 1980s with marketing support from DuPont. "NOMEX® is the premium product for insulation and distinguishes us from many other companies. They may have it on their shelves, but we decided to move to 100% use for reliable, superior performance," says Don Brithinee. "As technology advances, raw materials play a critical role as building blocks of quality, and NOMEX® is a big part of that," says Wally Brithinee.

High Quality Procedures and Raw Materials = Zero Failures*

"There are a number of tools that we use to build a better finished product. These include innovative data handling systems, detailed work instructions and strict adherence to written procedures. Qualified personnel check winding data in a variety of ways, establish coil dimensions and machine setup, then verify compliance by review of the test data," according to Wally Brithinee. "The raw materials for the motor rewinding process include the sheet insulation (for slot cells, for coil and phase barrier end turn insulation, and layer insulation), and top sticks. These are primary parts of the insulation system along with the wire, wire coating and impregnating resins. These must be selected in a comprehensive approach to achieve the performance we desire," he says. "We believe that the repair industry perceives that the raw materials are all alike. But that's not been our experience."

For example, says Don, "We have special wire made. Industry standard wire allows five discontinuities in the film coating per hundred linear feet. Our wire is continually tested during manufacture and results in zero film discontinuities per hundred feet, plus it has a consistently higher rating than the wire routinely used by the repair industry in the manufacturer's scrape test. This attention to quality contributes to the company's record of zero winding failures during the one-year warranty period on a repaired motor."

*Zero winding failures during the one-year warranty period on a repaired motor.

Exceeding Original Performance Levels with NOMEX®

All of these materials working together lead to superior motor performance levels. "One of the things that NOMEX® does for us is that it meets or exceeds standards for slot cell insulation of 99% of the motors we repair. We can be highly confident that when we use NOMEX®, we're shooting at or above the original performance levels of the motor and generator manufacturers," says Don Brithinee. Because NOMEX® has exceptional insulation properties, such as thermal and moisture resistance and dielectrics, it plays a critical role in extending motor life.

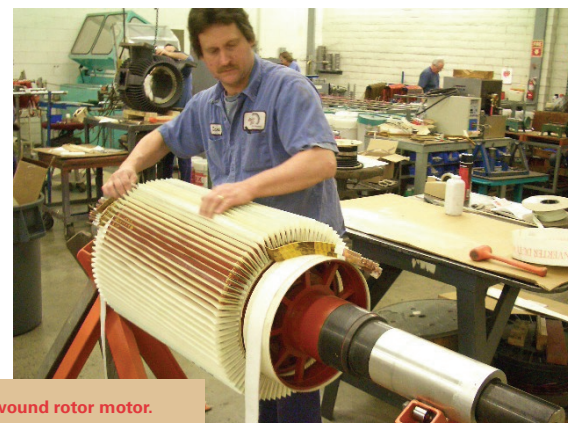
As technology grows and customers experience changing needs, special applications, such as operation on a Variable Frequency Drive (VFD) or a wind-powered generator require the best insulation systems available. NOMEX® in combination with Brithinee Electric's special wire and a VPI resin process provide high quality solutions for these unique voltage problems.

Brithinee Electric Partners with Materials Manufacturers

Lynda Butek, special project manager at Brithinee Electric, says that one of the important ways the company stays on the forefront of new developments in motor technology is by working with manufacturers, such as DuPont. Learning about NOMEX® means working closely with DuPont, she says. "By communicating directly with manufacturers, we can stay on top of the newest developments and then offer them to our customers," says Lynda.

Brithinee Electric representatives visited the DuPont Spruance plant near Richmond, VA. They were invited there to discuss best practices for motor repair and needs in the industry.

Brithinee Electric has also communicated its information needs to the original motor manufacturers, according to Wally. "We held meetings in the 1990s with a variety of motor manufacturers and said, 'Here's what we need from you to do a better repair job.'" Wally says more manufacturers stepped up to the plate, making product information more available. "That helped us on special motors and definitely helped us produce a better product."



David Barnett inserting NOMEX® slot cells in wound rotor motor.

Albert Torres cutting NOMEX® sheets.



Relationships Are Key

Brithinee Electric's reputation extends beyond its customers to industry groups. The company actively works with the Electrical Apparatus Service Association (EASA) and the National Electrical Manufacturers Association (NEMA), both of which set standards for electric motors. Brithinee Electric also works with the Motor Resource Center, a partnership between Advanced Energy Corporation (Raleigh, NC) and the Washington State University Extension Energy Program, in a motor reliability research project funded by the U.S. Department of Energy, the California Energy Commission, and several other state agencies.

Diverse Customer Base

Brithinee Electric works with a diverse customer base all over the United States. Their customers include municipalities, utilities, food processors, rock and gravel producers, cement companies, air conditioning contractors, chemical companies, paper and plastic producers, wind farms, a locomotive manufacturer and OEMs. The largest business segment is in delivery of municipal water and wastewater treatment in Southern California—an area populated by 19 million people in hundreds of communities. "Our job is to keep their water pumps and wastewater motors running," says Lynda. A few other specific applications examples include:

- **Wind energy:** Southern California's wind energy industry represents a significant part of Brithinee Electric's generator repair. "Reliability is key because the towers that support the generators are located in remote areas," says Wally Brithinee. "These towers are often 300 feet tall, and the generators weigh 10,000 pounds. They can't fail and must pass rigorous inspections for quality and reliability," he adds.
- **Locomotive engine fan motors:** There are some 21,000 locomotive motors in the United States, and Brithinee Electric has reconditioned and rewound more than 3,000 of these motors in North America. NOMEX® paper used by Brithinee Electric gives these motors a new level of reliability. "The manufacturers of the driven equipment like our product, its workmanship and appearance. Hands down, they say they prefer our rewind motors over the brand new products," says Wally.

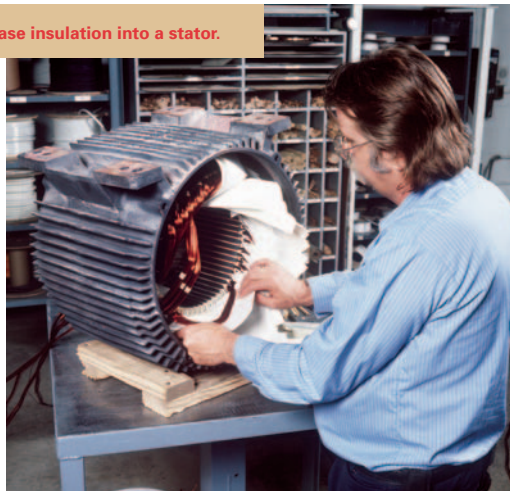
Delivering the Best

Market studies surveying end users of various motors have demonstrated that if there is an error or a premature motor failure, customers tend to shop around for a new vendor. "It's known as the 'one strike' rule. That supports our strong belief in the critical importance of continuing to achieve zero failures," says Wally. "NOMEX® plays a big part in helping us meet that goal. We will not compromise."

David Barnett inserting NOMEX® slot cells into a stator.



Chuck McGinnis inserting NOMEX® phase insulation into a stator.





Brithinee Electric is a member of the DuPont™ NOMEX® Motor Repair Alliance Program.

USA

DuPont
Advanced Fibers Systems
Customer Inquiry Center
5401 Jefferson Davis Highway
Richmond, VA 23234
Tel: 800.931.3456
Fax: 800.787.7086
email: afscdt@usa.dupont.com

Canada

DuPont
Advanced Fibers Systems
P.O. Box 2200
Streetsville Postal Station
Mississauga, Ontario, L5M 2H3
Canada
Tel: 800.387.2122/905.821.5193
Fax: 905.821.5177
email: products@can.dupont.com

Europe

Du Pont de Nemours International S. A.
P.O. Box 50
CH-1218 le Grand Saconnex
Geneva, Switzerland
Tel: +41-22-717-5111
Fax: +41-22-717-6218
email: info.nomex@che.dupont.com

South America

DuPont do Brasil S. A.
Alameda Itapecuru, 506
BR-06454-080 Alphaville
Barueri, Sao Paulo, Brasil
Tel: +0800-17-17-15
+55 11 4266 8449
Fax: +55 11 7266 8904
email: produtos.brasil@bra.dupont.com

Japan

DuPont Teijin Advanced Papers
(Japan) Limited
Sanno Park Tower
11-1, Nagata-cho 2-chome
Chiyoda-ku, Tokyo 100-6111
Japan
Tel: +81-3-5521-2800
Fax: +81-3-5521-2825
email: chihiro.kondo@jpn.dupont.com

Asia Pacific

DuPont Teijin Advanced Papers
(Asia) Limited
1122 New World Office Building,
East Wing
24 Salisbury Road
Tsimshatsui, Kowloon
Honk Kong
Tel: +852-2734-5363
Fax: +852-2734-5486
email: nomexpaper@hkg.dupont.com

www.nomex.com



The miracles of science™

Product safety information is available upon request

This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentations. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge and experience becomes available. Since we cannot anticipate all variations in actual end-use conditions, DUPONT MAKES NO WARRANTIES AND ASSUMES NO LIABILITY IN CONNECTION WITH ANY USE OF THIS INFORMATION. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any trademark and patent right.

