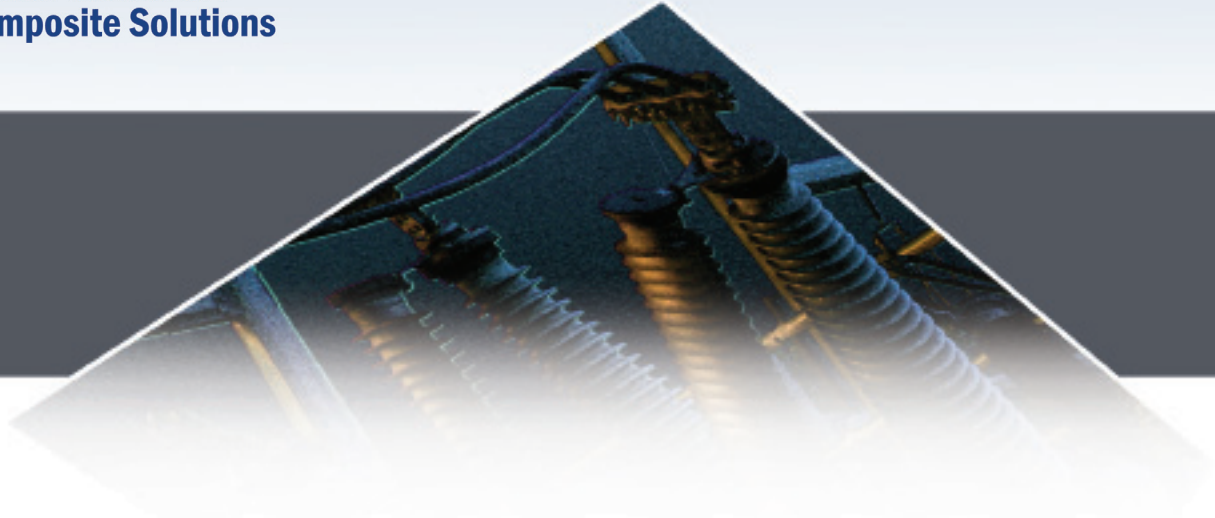




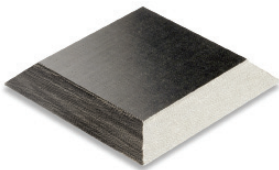
**Global Thermoset
Composite Solutions**

**High Performance Thermoset
Composites for the Power
Generation Industry**



NP310HT

Easy to machine, less abrasive than fiberglass, and heat treated to reduce warping with age



NP342LS

Machines cleanly, engineered not to shrink in generator applications



MC511A

Exceptional strength in high temperatures, plus superior insulation properties



MC511AF

Excellent flexural strength at high temperatures

The power generation industry relies on high temperature thermoset laminates, pre-pregs and specialty molded shapes that can endure extreme heat and mechanical conditions. Composites used in the power generation industry must maintain high tensile, compressive, shear and flexural strength; exhibit low creep; minimize abrasion; and retain electrical insulating properties at high temperatures internal to a generator. Norplex-Micarta offers a full line of these specialty composites, all certified to meet the most challenging power generation specifications. From blocking materials to molded wedges and ripple springs, Norplex-Micarta is the preferred high performance composites manufacturer for OEMs and fabricators around the world.

Norplex-Micarta materials retain high strength even at elevated operating temperatures. Several of the grades developed for the power generation industry can function continuously at temperatures approaching 180°C and have the ability to withstand much higher excursion temperatures. When exposed to elevated temperatures, these products retain a minimum of 50% of their flexural strength, as well as excellent impact and bond strength with little or no creep. Norplex-Micarta is continuously developing new materials that will further extend operating temperatures and withstand extreme mechanical conditions.

To reduce the threat of damage to generators, Norplex-Micarta materials can be manufactured with abrasion-resistant substrates. Fiberglass composites can be produced with Kevlar™ or Nomex™ surface materials to make them comparable to softer, cotton-based products. These custom composites offer long life in wear applications without the risk of abrasion-generated dust particles or damage to sensitive equipment.

Norplex-Micarta materials also offer excellent electrical insulating properties at high voltages. The products maintain low permittivity and dissipation factors in dry, humid or extreme environmental conditions.



Molded and Machined Wedges

Wedges provide much needed security to the generator rotor. Several layers of copper coils and turn insulation are packed into deep steel slots that run the entire length of the rotor and stator. Wedges are hammered into the slots to lock the coils in place. Wedges must first withstand impact forces during installation, then the mechanical forces associated with the magnetic stresses on the rotor and stator coils, and eventually the centrifugal force of the spinning rotor during operation. Norplex-Micarta wedges are manufactured with or without non-abrasive surfaces from materials with excellent insulation properties, maximum creep resistance and have the ability to withstand extreme compressive forces in high temperature environments.

Blocking Materials

At the end of the stator Norplex-Micarta materials are used to secure coil ends and phase leads by providing tie down points to which they are laced securely. It is essential for the coil ends and phase leads to remain stationary, independent of environmental changes and momentary forces from electrical current surges.

Top Ripple Springs

Ripple springs provide protection to the contents of the generator rotor. When a slot wedge is hammered into place, a ripple spring is flattened between the wedge and the contents of the slot. During operation ripple springs maintain compressive forces against the coils and slot wedges. This fail-safe system negates the effects of the extreme centrifugal and magnetic field forces of the generator by holding the coils and insulation in place. Norplex-Micarta ripple springs have excellent insulating properties and can withstand extreme compressive forces at elevated temperatures.

Turn Insulation

The copper coils in rotor slots are insulated from each other with Norplex-Micarta turn insulation. Turn insulation is fully cured ready to be fabricated to the specific requirements of the rotor's design.

Pre-Preg Materials

Norplex-Micarta offers a line of pre-preg products that can be molded into slot cell insulation for power generators or used to insulate through bolts. These products feature long life and electrical insulation properties in their finished laminate form.

Specialty Molded Shapes

Norplex-Micarta understands the design requirements of new generators, as well as the repair and refurbishment of old units. The power generation industry frequently calls for customized products and Norplex-Micarta works directly with engineers to design molded shapes to fit the most exacting applications.

Molded and Machined Wedges can withstand extreme compressive force at high temperatures.



Blocking Materials separate and stabilize coil ends and phase leads in power generators.

Ripple Springs are a factor in a fail-safe system to minimize coil and insulation movement.