www.norplex-micarta.com

About Norplex-Micarta

Norplex-Micarta is the leading manufacturer of high performance thermoset composites. Norplex-Micarta's vast product line of tubing, sheet, pre-preg, and rod products serves power generation, military/aerospace, oil & gas, medical device, electrical device, electronics assembly, construction, heavy industry, and transportation industries throughout Asia/Pacific, Europe, and The Americas.

Dedication to Quality

Quality extends well beyond Norplex-Micarta products; it is infused into every aspect of the company. A strategic investment in quality assurance is reflected in state-of-the-art machine control for treaters, new tube grinding and winding equipment, and material analysis and testing. Norplex-Micarta is also well-known for its comprehensive staff training in multiple process improvement methodologies, exceptional on-time delivery, and a commitment to the future of the industry.

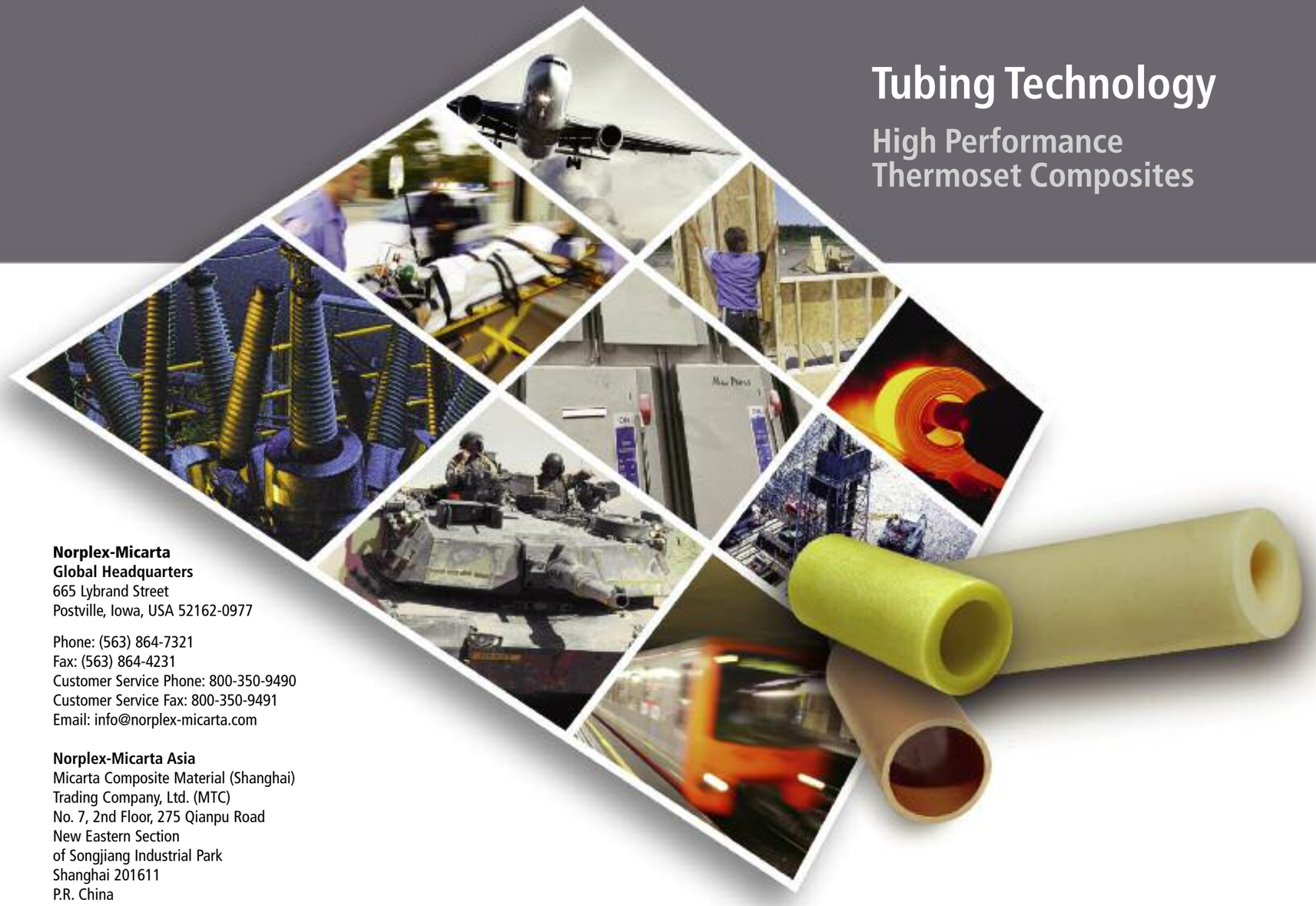
Computerized control systems monitor treating operations in real time, reducing process variation through a quality database and a proprietary process control algorithm, while driving variables toward their nominal targets. These quality processes lead to increased productivity, improved inventory turns, waste reduction, and the elimination of unplanned downtime in production.

Norplex-Micarta is committed to being the leader in high performance thermoset composites, and has made several strategic investments to position itself at the forefront of the industry. These include a $10 million upgrade to its USA headquarters for increased capacity and improved quality, as well as the addition of skilled resources in engineering, operations, sales, marketing, and customer service.

Careful attention is paid to OD, ID, and wall thickness.

Tubing Technology

High Performance Thermoset Composites



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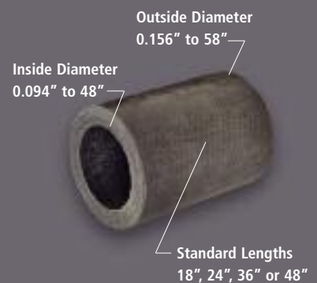
NORPLEX MICARTA
High Performance Thermoset Composites

NORPLEX MICARTA

THERMOSET COMPOSITES

Technology Leadership

Norplex-Micarta is the leading global supplier of high performance thermoset composites to OEMs and fabricators. Providing thorough applications knowledge, the highest quality, and the most responsive customer support in the industry, Norplex-Micarta supplies thermoset composites for the world's most demanding applications.



Capabilities: Norplex-Micarta tubing grades are available in a wide range of sizes and specifications, and additional dimensional capabilities are constantly under development by the Norplex-Micarta tubing team. Material compositions include phenolic, epoxy, melamine, or silicone resin systems combined with paper, cotton, or glass fabric substrates.

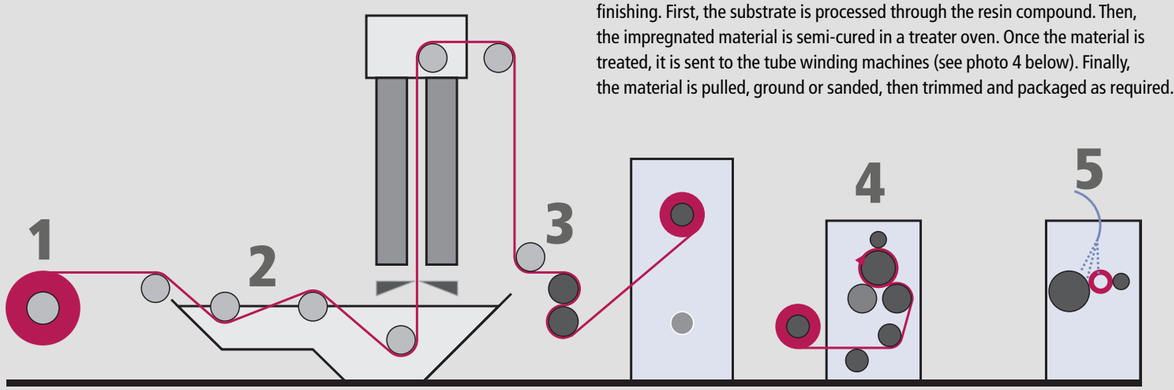
Tubing Grades

Norplex-Micarta tubing grades are available with paper, cotton, or glass fabric substrates. *Phenolic paper* grades are used in electrical, heavy industry, and general-purpose applications. *Phenolic* and *epoxy cotton* grades are available with fine- to medium-weave cotton reinforcement, ideal for applications requiring mechanical strength and electrical insulation, such as those in the military/aerospace market. Some grades also include self-lubricating modifiers that reduce friction.

Glass fabric grades utilize fine- to medium-weave glass reinforcement with epoxy, phenolic, melamine, or silicone resin systems for applications requiring high temperatures, electrical and mechanical strength, and resistance to cryogenic temperatures, arcing, and combustion. These characteristics are frequently required in oil & gas applications. All Norplex-Micarta tubing grades meet the most rigorous customer, NEMA, military, and ASTM requirements.

Tube Manufacturing Process

Norplex-Micarta utilizes state-of-the-art equipment for each step in the manufacturing process, from material preparation and treating to winding and finishing. First, the substrate is processed through the resin compound. Then, the impregnated material is semi-cured in a treater oven. Once the material is treated, it is sent to the tube winding machines (see photo 4 below). Finally, the material is pulled, ground or sanded, then trimmed and packaged as required.



1 **Substrate Roll**
Norplex-Micarta has the most stringent vendor qualification process in the thermoset laminate industry, ensuring that our customers receive the highest quality and consistency from batch to batch.

2 **Resin Metering**
Precision-aligned rollers apply and meter resin to the substrate with uniform consistency and fabric wet-out. The system guarantees that the resin will completely penetrate the substrate, filling all voids.

3 **Treater/Rewinder**
A proprietary computer-controlled treating technology is used for the curing process. Both vertical (illustrated above) and horizontal treaters are available to fit customer process requirements. After treating, tubing products are sent to the rewind system, which ensures consistent tension throughout the process.

4 **Tube Winder**
Pre-preg is wrapped around precision-ground mandrels with controlled temperatures and pressure to create a convolute-wound tube. Inside diameters range from 0.094" to 48", with wall thicknesses down to 0.031". The tube is then baked to customer specifications.

5 **Wet Centerless Grinder**
Tubes are wet-ground to meet outside diameter and surface finish specifications. Custom applications for specialty products feature outside diameter tolerances as low as +/- 0.003".

Applications

Norplex-Micarta serves many industries with high performance thermoset composites. In addition to military/aerospace, oil & gas, and heavy industry, Norplex-Micarta supplies material to companies developing groundbreaking applications in such markets as medical device, electrical device, electronics assembly, construction, transportation, and power generation.

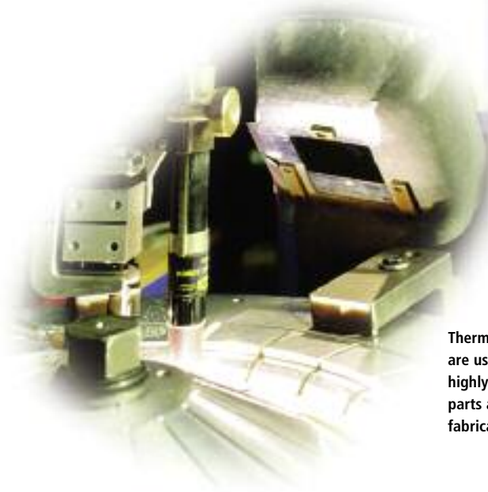
Military/Aerospace: Numerous standard and custom tubing products meet the performance and reliability requirements of military aircraft and commercial aerospace applications, as well as military ground vehicles. These materials offer excellent thermal insulation, mechanical strength, structural support, protection, and durability.

Oil & Gas: Fabric-reinforced materials provide thermal insulation and structural support for large-diameter transport systems, thermal insulation for storage vessels, and cathodic protection between dissimilar materials. In oil & gas structures, fabric-reinforced thermosets offer excellent thermal insulation in cryogenic, ambient, or elevated temperature applications. Additionally, the materials offer a high degree of impact resistance, and are impervious to moisture and corrosive chemicals over extended periods.

Braking components provide high reliability against impact forces and extreme temperatures during installation and use.

Heavy Industry: Various resin and substrate combinations allow thermal and mechanical performance to be tailored to specific heavy industrial applications. Unlike many thermoplastics, thermoset composites withstand high temperatures created by cutting tools without breaking down, burning, or adhering to tool-cutting surfaces. Compared to metal options, thermosets often cost less and provide wear resistance and insulating features not offered by metal materials.

Pipeline supports prevent thermal migration between the pipeline and support structure.



Thermoset composites are used to create highly wear-resistant parts and improve fabrication productivity.