Custom Engineered, Quality-Assured

FILAMENT-WOUND TUBES

CAST & MOLDED EPOXY

DENSIFIED, IMPREGNATED WOOD

COMPOSITE SOLUTIONS

CK Composites, Inc.

Introduction

At CK Composites, we engineer and produce solutions from three custom composite materials:

1. **Filament-Wound Tubes**
2. **Cast & Molded Epoxy Resins**
3. **Laminated, Densified, Resin-Impregnated Wood**

CK products are used as components in Original Equipment Manufacturing, Repairs/Rebuilds, and Service in Electric Power Generation and Distribution, Military Components, Medical Equipment, Research and Testing, Industrial/ Mechanical, and Nuclear Applications.

With few exceptions, our products are custom-engineered to meet the requirements of a particular customer. These products perform critical functions in complex equipment or machinery and must meet stringent quality specifications.

CK customers rely on our technical expertise in electrical, mechanical, and polymer engineering to assist them in design, development, and testing of new or improved products. Call us . . . we are always looking for new challenges.

Filament-Wound Tubes

Our engineers customize tubes of up to 6' in diameter and 40' in length on one of our nine filament-winding machines

Fiberglass

Our filament-wound fiberglass tubes are manufactured from continuous fiberglass rovings saturated with thermosetting epoxy resin. Using e-glass or s-glass and a customized formulation of resin, we can design a tube to meet your needs for corrosion resistance, strength, and electrical insulation.

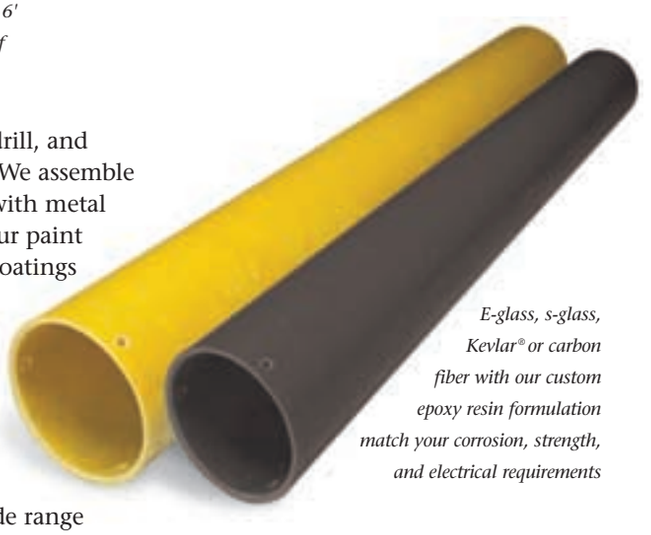
Tube Construction

Tubes are formed by precision winding a band of resin-saturated rovings around a rotating mandrel, which defines the inside shape of the part. The optimum combination of winding angles is programmed for the geometry to provide the finished part with the bursting strength, axial strength, and stiffness required for your application.

After winding, the mandrels rotate on curing stations or in large ovens to complete the resin reaction. The semifinished part is removed from the mandrel by extraction.

Precision Machining

For the many fiberglass parts that require machining after winding, our extensive machine shop includes CNC equipment as well as the tools and expert machinists to turn, drill, and route to precise tolerances. We assemble the complete component, with metal inserts as needed. Finally, our paint shop can apply protective coatings (for UV or heat resistance), paint, or varnish to finish the component.



E-glass, s-glass, Kevlar® or carbon fiber with our custom epoxy resin formulation match your corrosion, strength, and electrical requirements

Composite Assemblies

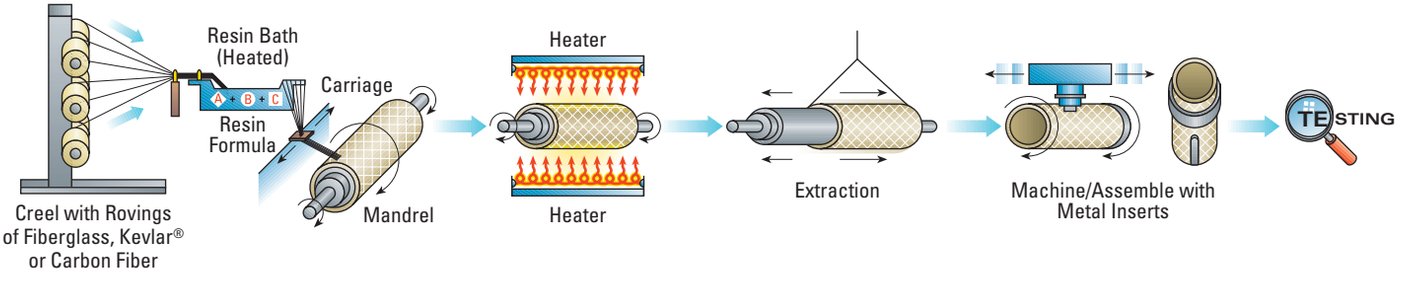
CK filament-wound fiberglass tubes are used in a wide range of applications to provide a very high strength-to-weight ratio, excellent electrical insulation properties, and outstanding resistance to corrosion .

Carbon Fiber and Kevlar®

Some applications require the special properties of a carbon fiber or Kevlar®. In these situations, the manufacturing areas are separated to ensure contamination-free quality.

Custom interrupter tubes machined to your specifications

Filament-Winding Process



Cast and Molded Epoxy Components

"One day a customer called with a challenge that no other custom composites manufacturer would attempt... what started as a difficult assignment turned into a rewarding job through design, prototyping, and successful manufacture of a complex bushing with multiple stress shields."

Customized Quality

At CK, the process of custom-engineering electrical components begins with the proprietary formulation of epoxy resin, hardeners, accelerators, and fillers, including our new toughened resin systems.

Our polymer chemists can match your product needs with the strength, durability and chemical resistance of the right resin system. Electrical insulators from 5-69 kV in Bis-A or Cycloaliphatic epoxy resins are tested to ensure outstanding performance characteristics. Using computerized electrical field plot analysis, our engineers work with you to design your component, the mold, conductors, or other inserts to meet your quality requirements.

Pressure Gelation/ Vacuum Casting

We can select from a range of manufacturing methods, to provide you the optimum balance of volume and manufacturing cost. The Open Pour, Vacuum Casting, and Automatic Pressure Gelation operations each have advantages which allow us to produce finished parts of the highest possible quality while minimizing mold investment.

Prototyping and Reverse Engineering

The combination of our technical capability, in-house testing, custom resin formulations, and low-cost manufacturing options make CK the ideal choice for partnerships in prototyping new designs. Or we can reverse engineer, replicate and replace original worn or damaged insulators.

Encapsulation

Using CK's expertise in electrical insulation component manufacture, we can take your sensitive sensor or instrument and protectively encapsulate it in the correctly chosen resin system.

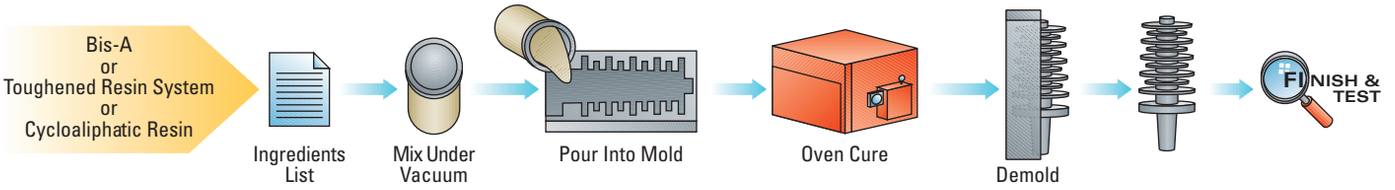
Acclaimed Customer Service

Our customer service professionals work hand-in-hand with our technical staff to offer award-winning customer service and delivery times to fit your J.I.T. or Kanban schedules.

Standard, custom, and reverse engineered electrical insulators and tap changer

Flexible manufacturing of precision components

Cast & Molded Epoxy Process



Specialty Wood Products

Type 7 Tangential clamping rings are individually constructed for the highest flexural strength in the transformer industry and machined to your specifications

Versatile Wood Composite

Our specialty wood products combine the dielectric properties and stability of thermosetting resins with the strength and toughness of wood fibers.

Specialty Wood Products Include:
Insulam—CK's trade name for our densified, resin-impregnated wood, non-metallic, non-magnetic.

Type 7—CK's trade name for the oil impregnable version used in transformer pressure rings.

Boron-Impregnated—CK's version of Insulam used for Biological Neutron Shielding.

Electrical Grade

CK's manufacturing process begins with thin beech wood veneer, selected from a single region in Europe where the climate and soil combine to produce the strongest, finest, and most consistent quality wood fibers.

Each piece of veneer is cut to size and individually impregnated with phenolic resin in a vacuum autoclave. They are next baked in an oven to achieve a "B" stage or partially cured condition. The veneers are stacked and arranged based on the directional strength requirements and thickness in preparation for the pressing step. Lamination, densification, and complete curing are accomplished simultaneously under pressures of up to 2000 psi and 350˚F. The resulting part is a block, sheet, or ring that can be further machined into the final component.

Components

CK's complete machine shop utilizes all the traditional woodworking operations as well as the latest in CNC technology. CK machines Insulam to close tolerance parts, assembles large structures and stocks standard threaded rods and nuts.

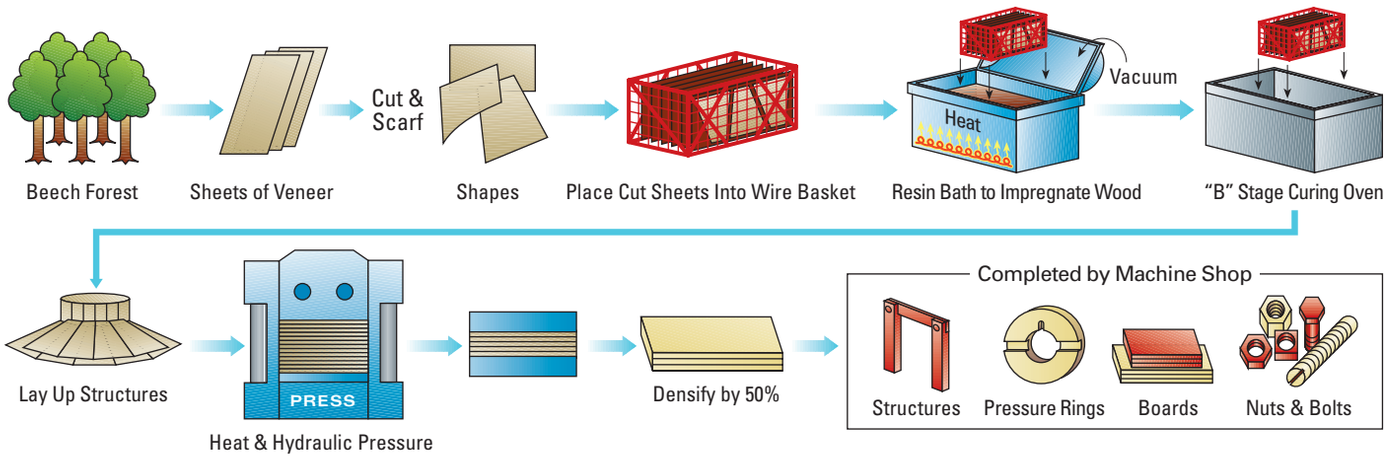
Applications

Insulam:
- **Pipe Supports**
- **Cryogenic Supports**
- **Transit System and Conduction Support Components**
- **Jigs and Fixtures**
- **Threaded Rods and Nuts**
- **Boards, Sheets and Blocks**

Type 7:
- **Transformer Pressure Rings**

Boron-Impregnated:
- **Biological Nuclear Shielding**

Specialty Wood Process



Composite Solutions

Insulation solutions for transportation systems

Custom Engineered

At CK our engineers and technicians are able to help customers in a wide range of industries solve problem applications using our line of custom composite solutions. We are always looking forward to the next phone call or e-mail with a new challenge.

Some applications include:

Electrical Power and Distribution

- Interrupters
- Current Transformer Spouts
- Bushings
- Insulators
- Transformer Pressure Rings
- Standoffs

Medical

- Waste Incineration Chambers
- Electrically Insulated Platforms for Electronics
- Lightweight, High-Strength Structural Components

General Industrial

- Paper-Making Rolls
- Corrosion-Resistant Tubes
- Insulated Pipe Couplings
- Slurry Tubes
- Custom Machine Guides, Jigs, and Fixtures
- Instrument Encapsulation

Transportation

- Corrosion-Resistant Barriers
- Static Spacers
- Shoe Beams, Slippers
- Current-Interruption Devices

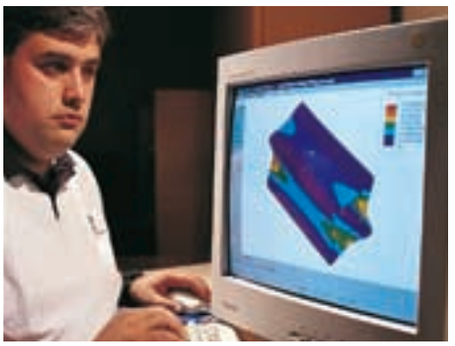
Airports and Utilities

- FAA-Approved, Low-Impact-Resistant Masts for Airport Approach Lights
- Lightweight Tilting Masts for Weather Equipment
- Environmental/Filtration Tubes

Government/Military

- Submarine Radomes
- Antenna Cylinders
- Nose Cones
- Large Test Structures

CK has manufactured radomes for the U.S. Navy for more than 15 years



Technical Capabilities & Quality Assurance

Finite Element Analysis

Quality Engineering

CK Composites' **quality system** is designed to comply with the 20 points of **ISO-9001**, in addition to meeting the requirements of **MIL-45208-A**, and **ANSI/NCSL Z540-1**.

CK's strong commitment to providing solutions to complex challenges is the strength of our technical organization. Our engineering staff consists of individuals with many years experience in the fields of Polymer Chemistry, Electrical, Chemical and Mechanical Engineering. They are proficient in state-of-the-art finite element methods to analyze complex electric fields or mechanical stresses, applying the results to component, mold or resin system design and characteristics.

Award Winning Results

Any unique quality requirements are incorporated into our operations in such a way that CK has been named **Outstanding Supplier** by satisfied ISO 9000 registered customers.

Inspection and Testing

Routine quality assurance procedures include testing and inspection of incoming raw materials, in-process inspection, and coupon testing. Specific electrical, mechanical, and hydrostatic tests are performed on the completed components to customer specifications. These tests frequently include 60 Hz Withstand, Full Wave Impulse tests, and thermal cycling tests.

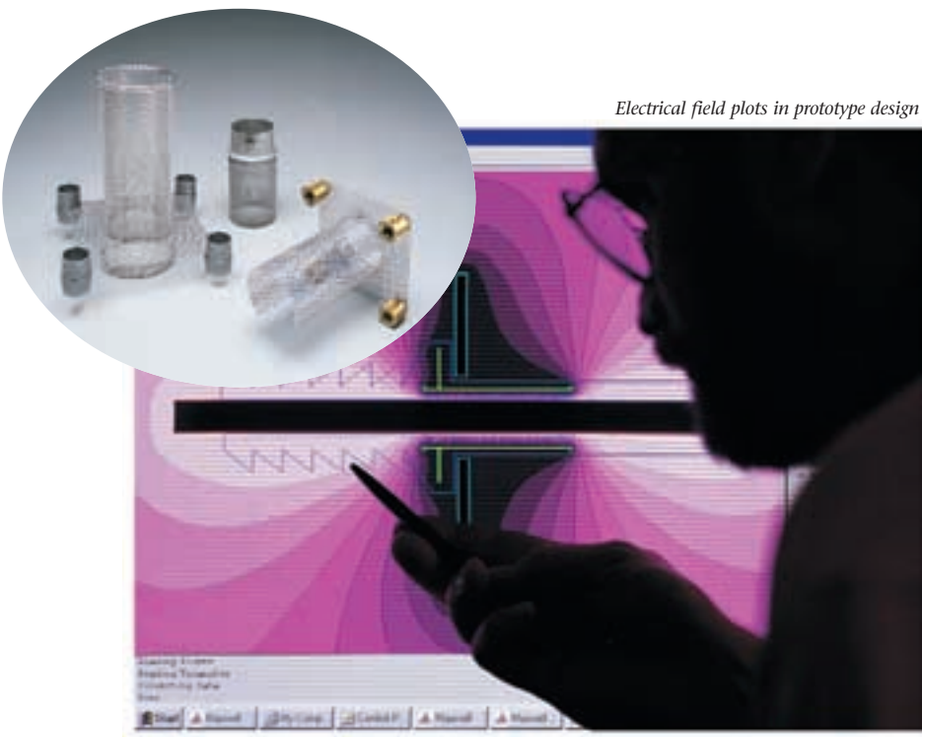
Often, parts are serialized and referenced to test data contained in detailed test reports.

In addition to a well-equipped QA lab, CK has extensive test equipment, of which several items are listed below.

Test Equipment

- **Universal Testing Machine** capable of measuring and recording stress/strain characteristics to 60,000 lbs.
- **200 kV Hi-Potential test set**
- **Biddle Partial Discharge Detection equipment**
- **Full Wave Impulse Generator** capable of up to **400kV**
- **Heat Distortion Tester** (5 specimen)
- **1500 psi hydrostatic test chamber**
- **Izod Impact Tester**
- **Miscellaneous testing and lab equipment**: muffle furnaces, environmental chambers and lab ovens, and hydrostatic test apparatus

Cast resin components can be made in our hand-pour shop or in automated pressure gelation, depending on the quantity of parts you require



Electrical field plots in prototype design

Our unique wood manufacturing area boasts the largest press in the country and is capable of 3,900 tons of pressure

Manufacturing

Our 80,000-square-foot manufacturing facility has separate production areas for cast resin, wood laminates, and fiberglass products, and features state-of-the-art filament-winding machines with computerized controls. A second building houses our metalworking shop.

5-Axis CNC Router

Left: Computer for filament winding

Below: Continuous fiberglass rovings

For More Information

Customer Service available by phone, fax and through both our web site and the Thomas Register web site. And we can serve your needs for e-commerce options and J.I.T./Kanban inventory systems.

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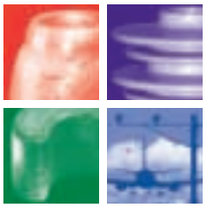

Quality Policy

CK Composites is committed to manufacturing products that consistently meet or exceed our customers' requirements and will deliver them on time, and at a competitive cost.

CK Composites, Inc.

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