



Air Emissions Control Solutions for Carbon Fiber and Fiberglass Composites



AIR EMISSIONS CONTROL SOLUTIONS

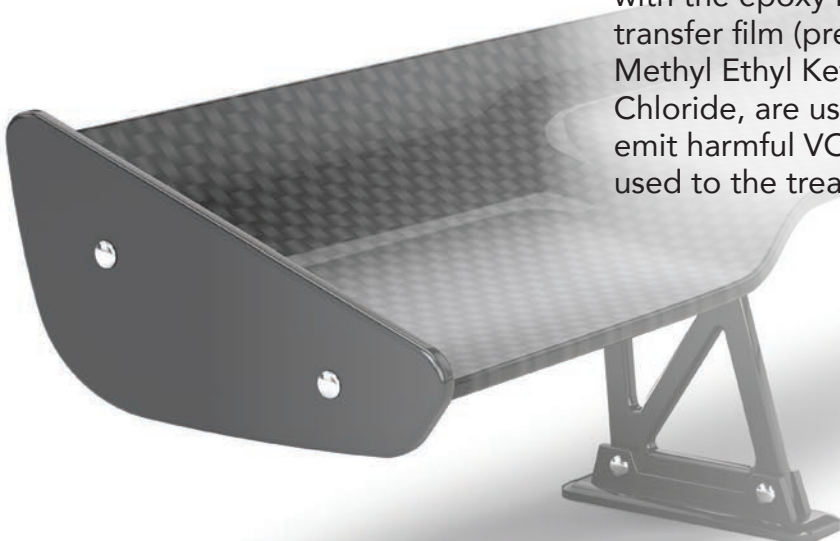
Reinforced plastic composites are made by combining fiber such as glass, aramid or carbon with a thermoplastic or thermoset resin matrix to yield lightweight materials with superior strength, stiffness and corrosion resistance. These materials can be formed into various shapes for various consumer, industrial, automotive and aerospace applications.

PRODUCTION OF CARBON FIBER:

Carbon fibers are prepared from Polyacrylonitrile (PAN) Precursors. PAN is the primarily used precursor for carbon fiber due to its superior strength, stability and higher carbon yield. About 90% of carbon fiber produced is made from PAN, and the remaining 10% is from rayon or petroleum pitch. CECO Environmental offers VOC abatement solutions such as Packed Wet Scrubbers to treat vapors from the polymerization of Acrylonitrile, and Thermal Oxidizers, such as Direct Fired Thermal Oxidizer and Regenerative Thermal Oxidizer, to treat emissions from carbon furnaces during carbon fiber production.

PRODUCTION OF CARBON FIBER COMPOSITES:

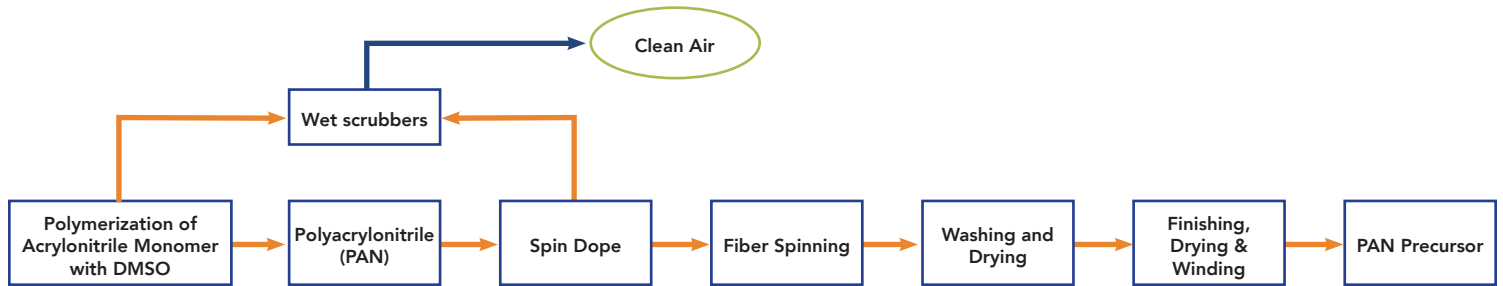
Epoxy resin is prepared in batches and applied to a transfer film (filming). The carbon fiber filaments are then impregnated with the epoxy resin that has been previously applied to the transfer film (prepreg). Different cleaning solvents, such as Methyl Ethyl Ketone, N-Methylpyrrolidone, and Methylene Chloride, are used throughout the manufacturing process and emit harmful VOCs. Wet Scrubbers and Thermal Oxidizers are used to the treat those emissions prior to release.



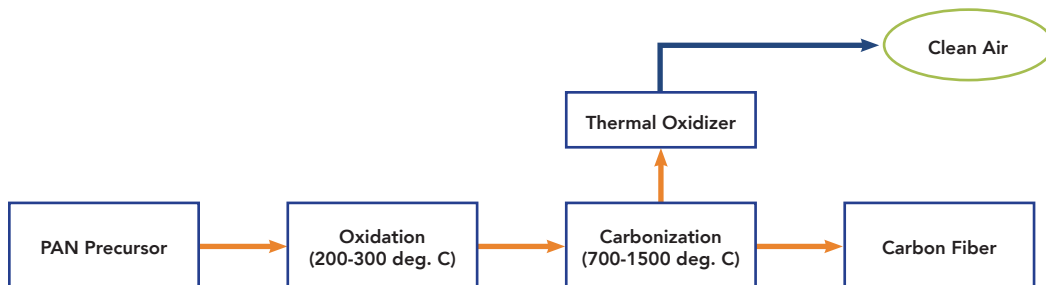


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PAN PRECURSOR PRODUCTION



CARBON FIBER PRODUCTION





FIBERGLASS PRODUCTS

FIBERGLASS PRODUCTS

Glass fibers and polyester are the most widely used fiber reinforcement and resin materials. Fiberglass composites are versatile and are used to make a range of products such as bathtubs, boats, swimming pools, storage tanks and roofing.

Manufacturing products such as fiberglass boats involves a gel coat spray application to the molded part followed by an application of resin and fiberglass. The resins used in this process usually contain styrene, a known hazardous air pollutant (HAP). In addition, the exhaust from the gel coat spray booth and the spray application areas have high airflow rates with low VOC concentrations (styrene and solvents such as Methyl Methacrylates and Methyl Ethyl Ketone) which need to be treated.

CECO designs and manufactures **VOC Concentrators** that take large volume process streams with low VOC concentrations and condenses them to reduce the air volume that needs to be treated. These **Catalytic Thermal Oxidizers can treat VOCs at lower temperatures**, which reduces energy costs. **Regenerative Thermal Oxidizers (RTO)** are highly energy efficient reaching 98+% heat recovery efficiency and achieves a high Destruction Rate Efficiency (DRE) of 99%. CECO also offers **baghouses and cartridge dust collectors** to handle any dust that is generated in the finishing process.





FIBERGLASS PRODUCTS



CECO SOLUTIONS	EMISSIONS	PROCESS STEPS (FIBERGLASS PRODUCTS -BOATS, TUBS, ETC.)
VOC Concentrator, Thermal Oxidizer	VOCs, Hazardous Air Pollutants (HAPs)	Gel Coat Spray Application (Styrene) Resin and Fiberglass Application (Styrene) Equipment Cleanup (Acetone)
Baghouses and Dust Collectors	Particulate Matter	Surface Finishing (Remove Flash, Smooth Surfaces)

CECO SOLUTIONS	EMISSIONS	PROCESS STEPS (FIBERGLASS INSULATION MATS AND ROLLS)
Baghouses, Scrubbers	Particulate Matter, Aerosols	Raw Material Handling Molten Glass Preparation
Thermal Oxidizers	VOCs, HAPs	Fiberglass Mat Formation
Thermal Oxidizers with Optional Heat Recovery	VOCs, HAPs	Fiberglass Mat Drying/Curing
Cyclones and Dust Collectors	Particulate Matter	Mat Trimming Rolling and Packaging

VOC, HAP, ACID GAS EMISSIONS CONTROL PRODUCTS AND APPLICATIONS

VOCs

ADWEST: REGENERATIVE THERMAL OXIDIZERS (RTOs)

- Reliable, Simple Dual Chamber RTO from 1,000 to 80,000 CFM
- Can handle low to high VOC concentrations
- Up to 99% VOC DRE (Destruction Removal Efficiency)
- NO_x free operation with flameless Natural Gas Injection (NGI)
- Lower RETOX RTO gas usage with 95-97% primary heat recovery and NGI



Regenerative Thermal Oxidizer

HEE-Duall: ACTIVATED CARBON SYSTEMS

- Skid-mounted systems up to 2,500 CFM
- Suitable for Low VOC concentration air streams
- Custom designed single and dual bed systems
- Low pressure drop
- Space saving minimal footprint
- FRP, PVC, and PP Construction



Dual Bed Carbon Systems

ACID GASES AND MIST CONTROL

HEXMASTER DRY SCRUBBER

- Lowest pressure drop CMP system for energy and maintenance savings. Fastest payback in the industry
- Low water requirement during washdown
- Three stage unit can be upgraded to a wet scrubber

Typical contaminants removed: Chromic Acid, Sulfuric Acid, Nickel, Cyanide, Phosphoric acid, Alkaline

PACKED WET SCRUBBER

Horizontal: Cross flow, low profile, easy access
Vertical: Counter current flow, minimal footprint.



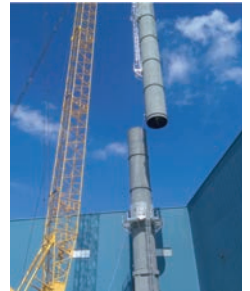
HexMaster Dry Scrubber



END TO END SUPPLIER OF TURNKEY AIR QUALITY IMPROVEMENT SOLUTIONS

DESIGN, INSTALLATION AND AFTERMARKET SUPPORT

- Design: Design of various items per applicable industry standards; regulatory code reviews; CAD, P & ID drawings.
- Installation & Commissioning:
 - Complete field installation and service, which includes on-site installation of fabricated components, including electrical and mechanical services.
 - Installation of: Ductwork, Regenerative Thermal Oxidizers (RTOs), Cyclone Dust Collectors, Scrubbers, Bag Houses, Mist Control and Filtration Systems.
- Aftermarket Support – Preventive Maintenance & Inspection, spares and service support.



TURNKEY SOLUTIONS

We can provide turnkey ducting and air emissions control solutions that are customized to meet specific site requirements. The benefits of working with a single vendor include streamlined and simple purchase, installation and service process including:

- A single purchase order with a single set of terms and conditions.
- Design and engineering with performance guarantees and manufacturer's warranty from a single vendor.
- Dedicated project management, installation and aftermarket spares and service support.



CECO ENVIRONMENTAL

CECO ENVIRONMENTAL is a leading environmentally focused, diversified industrial company whose solutions protect people, the environment, and industrial equipment across the globe, serving a broad landscape of industrial air, industrial water and energy transition markets. It is listed in NASDAQ (ticker symbol: CECO).



CECO Environmental Brands

Flex-Kleen HEE-Dual Adwest Fisher-Klosterman

CECO Environmental

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