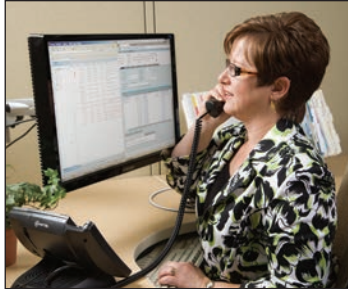
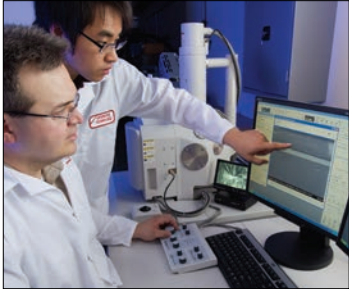


## COMPANY OVERVIEW

Greene, Tweed is a world-class leader in the design and manufacture of high-performance materials and custom-engineered solutions for the aerospace, energy, and semiconductor industries. For nearly 150 years, we have partnered with global leaders across the markets we serve, working collaboratively to identify critical challenges and solve them with advanced technologies. With expertise across a variety of industries, materials and manufacturing techniques, we deliver the innovative, custom-engineered solutions that enable our customers' next generation technologies. Headquartered in the suburbs of Philadelphia, PA, Greene, Tweed maintains a global presence throughout North America, Europe and Asia.

Through our worldwide network of engineering, design and manufacturing resources, we deliver local expertise on a global scale with:

- Locations across more than 10 countries in the Americas, Asia and Europe
- More than 300 unique elastomeric compounds, over 300 plastic production compounds, a growing suite of high-performance thermoplastic composite components, and a portfolio of innovative integration capabilities
- Manufacturing facilities in four countries, including the U.S. (Pennsylvania & Texas), the U.K., Taiwan and Switzerland
- Technical centers in Japan, Switzerland and the U.S.



## OUR BRAND PROMISE

As a world-class organization, Greene, Tweed differentiates itself from competitors by providing:

- In-depth understanding of our customers' application environments, industry trends, dynamics and influencers, and processes to deliver innovative solutions that solve their challenges
- Expertise across a wide range of material technologies to properly match the most effective solution to your application requirements
- Talented and inspired employees who believe in exceeding customer expectations
- Local technical expertise with a global reach



AT A GLANCE

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## MARKET FOCUS



### AEROSPACE

**Redefining What Is Possible.** That is what aerospace manufacturers achieve with every new aircraft they deliver. Beginning with the first commercial flights in the early 1900s, these innovative companies have pushed the limits of travel while maintaining an exceptional track record for quality and passenger safety. Today, the industry is reinventing itself again – focusing on new materials and processes to improve efficiency and reduce environmental impact. But with new materials comes complex specifications with stringent controls and processes – making the adoption of new ideas a challenge.



### ENERGY-UPSTREAM

**With deep industry and material expertise, Greene, Tweed offers the most effective solutions on the market to minimize downtime, maximize production and ensure safety in oil and gas exploration and production.** Our specialized oilfield sealing systems withstand pressures up to 30,000 psi and temperatures ranging from subzero to 500°F (260°C). And our innovative electrical connectors safeguard communications, ensuring reliable and accurate data collection. With a worldwide network of engineers and material experts, we work in partnership with our customers to enable their technology around the globe.



### ENERGY-DOWNSTREAM

**Greene, Tweed has been involved in the refining, petrochemical, and power generation industries for over 25 years. During this time, we have primarily focused on developing solutions that enhance reliability, improve safety and reduce cost of ownership in pumps, compressors, mechanical seals and valves.** What began nearly 150 years ago with all-purpose seals has grown to include an expansive range of elastomers, engineering thermoplastics and thermoplastic composites. Whether O-rings, wear parts, or structural components, our solutions find application throughout the refining, chemical processing, and power generation industries. And to ensure the optimal solution is found for each application, we provide engineering support worldwide.

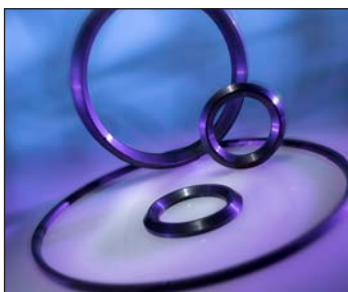


### SEMICONDUCTOR

**Consumer & Business Electronics Are Evolving Faster Than Ever.** Semiconductor and solar companies must remain ahead of the next big consumer and business trend. Beginning with Moore's Law in 1970, the industry has maintained lightning growth – fueled by the increasing desire for lighter, faster and cheaper technologies. And with the expanding interest in renewable energy and environmental conservation, photovoltaic solar panels are becoming one of the fastest growing sources of residential and commercial power. To continue these paths of rapid expansion while seizing a competitive advantage, companies are continually improving their production equipment to maximize their yields.

## DESIGN CAPABILITIES

- **Research & Development**—Our R&D scientists work collaboratively with customers to develop solutions that deliver lasting benefits for next-generation technologies
- **Application Engineering**—With industry and material expertise across a range of technologies, our application engineers enable DFM (design for manufacturability) capabilities for our customers.
- **Process Engineering**—By enabling product realization through advanced technology and leadership, our Process Engineers drive innovative solutions to the market.
- **3D Modeling**—This ensures a proper and accurate fit of all components and hardware.
- **FEA**—To analyze the stress of plastics and elastomers under pressure and dynamic movement conditions to ensure that the material is specified correctly and not overstressed.
- **3D Rapid Prototyping**—Creates a three-dimensional ABS plastic model from a CAD design in just hours for a visual design prototype.
- **Extensis®**—Our patent-pending manufacturing process enables the development of very large, custom seal designs



Arlon® 3000 XT



Xycomp®, WR® and AR® thermoplastic composite components



Innovative split-design air fan bearing assembly



High-performance sealing systems

## PRODUCT INNOVATION

Greene, Tweed is a global technology company with the industry, engineering and manufacturing expertise required to effectively identify our customers' critical challenges and solve them with advanced technologies.

### Aerospace

Greene, Tweed has worked with leading aircraft manufacturers for over 50 years. Focusing on collaboration, we have developed high-performance thermoplastic composite solutions and advanced processing techniques that deliver components with dramatic weight savings, increased efficiency and reduced part-count.

### Semiconductor

We have delivered innovative solutions to the semiconductor and solar markets for over 20 years and are committed to enabling your next-generation technologies. Our custom-developed, integrated components have the potential to truly transform your operation by minimizing particulation, enhancing plasma resistance and maximizing yield.

### Energy

Greene, Tweed Energy combines the global resources and operations of our upstream (Exploration & Production), downstream (Refinery, Petrochemical), and Power Generation business units to bring our customers a portfolio of advanced materials among the most comprehensive available. Greene, Tweed is uniquely positioned to align with the scalability of the market and rapidly adjust capacity to market demand. Our holistic systems approach and commitment to quality make Greene, Tweed the market's preferred resource for custom-designed components as well as a vast selection of standard parts and stock shapes.

Greene, Tweed Energy gives customers the global support they need, while delivering responsive, regional service throughout all of their locations worldwide, with state-of-the-art manufacturing facilities, engineering services, and customer support located throughout the Americas, Europe, and Asia.



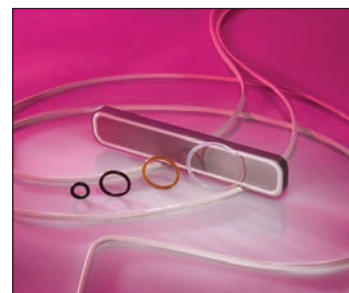
Xycomp® thermoplastic composites



Seal-Connect® electrical connectors



Electromechanical assembly



Chemraz® elastomers & Voraz® Extensis® seal

## SOLUTIONS PORTFOLIO

- **AR®**—Greene, Tweed's proprietary AR thermoplastic materials exhibit outstanding wear characteristics in media containing solids. AR combines excellent abrasive resistance, good dry run capability and superior vibration dampening characteristics with no hydrolysis or swell.
- **Arlon®**—A tough, high-temperature, semi-crystalline, advanced engineered thermoplastic with a unique combination of mechanical, thermal, chemical and electrical properties.
- **Avalon®**—Advanced engineered thermoplastics (constructed from proprietary high-performance reinforced PTFE) are chemically inert, provide low friction and offer customized designs for each unique application.
- **Chemraz®**—This high-performance perfluoroelastomer provides the broadest chemical resistance of any elastomeric material, while offering excellent chemical and thermal compatibility.
- **Fluoraz®**—This versatile compound delivers excellent performance in a variety of harsh environments and outperforms fluorocarbon and other conventional elastomers in the most severe environments.
- **Xycomp®**—High-performance composites that deliver lighter weight solutions with improved chemical resistance; increased impact resistance; improved toughness and ductility; excellent post-molding machinability; and infinite shelf life.
- **Xyfluor®**—Xyfluor® elastomers are highly fluorinated, providing excellent chemical resistance with low-temperature capability. Xyfluor withstands aggressive media such as sour gasses and steam, and maintains sealing integrity in temperatures as low as -76°F (-60°C). In particular, it outperforms comparable FKM and FQMV elastomers in applications with high H<sub>2</sub>S and CO<sub>2</sub> content.
- **WR®**—Wear resistant components made from carbon-fiber reinforced thermoplastic composite material provide enhanced performance and reliability over metallic wear parts.

Visit [www.gtweed.com](http://www.gtweed.com) for details on our full line of materials and capabilities.







## MOLDING TECHNIQUES

- Composite molding
  - Plate, net and complex contour compression molding
  - Techna3™ tubular molding
  - Thermoplastic fiber placement
- Compression molding
- Injection molding
- Isostatic molding

## PROCESS CAPABILITIES

- Braided packing
- Cleanroom manufacturing
- Cleanroom packaging
- CNC milling/turning
- Composite fiber placement
- Induction brazing
- Lathe/mill
- Laser
- Laser welding (metals)
- Mold design & manufacturing
- Precision tolerancing
- Surface grinding
- Waterjet

## GLOBAL REACH

Greene, Tweed partners with customers to provide reliable, efficient answers to their application needs. As a world-class leader in the design and manufacture of high-performance materials and customized-engineered components, we leverage our expertise in a variety of markets and products to give our customers the most innovative and cost-effective solutions to their demanding applications. To learn more about what the Inside Advantage can offer you, visit our website at [www.gtweed.com](http://www.gtweed.com).



## QUALITY & IMPROVEMENT

Continuous improvement strategy using Lean Six Sigma tools & techniques. Lean Six Sigma activities include—5S, Kanban, Visual factory, Value stream mapping, SPC, set-up reduction, Kaizen, Black Belt and Green Belt projects, standard operating procedures and Poka-Yoke.

- ISO 9001 Certified
- ISO/IEC 17025 Certified
- AS/EN 9100 Certified
- Infinity QS (automated SPC & statistical analysis)
- Wonderware (automated equipment data acquisition & monitoring)

## VERIFICATION

- Cleanrooms with Class 100 and 1000 environments
- Composites & plastics NDT (nondestructive) testing (e.g., x-ray, ultrasonic)
- CMM both contact and noncontact used for verification
- Materials test lab—Advanced equipment to evaluate basic material properties of raw material for quality control and to support proprietary material development
- Plasma lab—Testing of parts using four process gases utilized in the semiconductor industry
- Product test lab
  - Pump wear test rig—Simulates pump operation and tests wear material performance
  - Landing gear test rig—Full-scale landing-gear seal and bearing test equipment