



Wear and Abrasion Solutions



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Greene, Tweed's line of engineered, high-performance thermoplastic composite wear parts is designed to ensure that rotating equipment, e.g., pumps in settings such as refineries, chemical plants, and power generation plants, function safely and efficiently for sustained periods of time.

Greene, Tweed offers a full suite of wear- and abrasion-resistant solutions developed over decades in partnership with original equipment manufacturers and with input from our customers. Our extensive portfolio enables us to cover any pump design, including single-stage, multi-stage, vertical, and positive displacement.

Composite wear and abrasion parts are lightweight sacrificial pieces that safeguard the rest of a machine's components better and longer than metal wear parts for two main reasons: efficiency and reliability. Metal parts in contact with other metal parts are prone to galling and seizing, particularly when lacking lubricant – a frequent occurrence in industrial settings. Composite parts by their very nature are non-galling and non-seizing, eliminating the risk of wear part failure.

Customers upgrading to composite wear parts from metal wear parts in their rotating equipment have reported the following reliability improvements:

- Improved mean time between repair and routine maintenance tasks and reduced mean time to failure for wear rings, bearings, and bushings
- Minimized chance of catastrophic damage to expensive components, such as the shaft or impeller, as observed with traditional metallic wear parts
- Reduced vibration due to tighter clearance
- Improved reliability and efficiency of older equipment
- Reduced costs for the equipment's life cycle

Traditional lower-grade, non-metallic, or rubber wear pump parts frequently require replacement as a result of their abrasive operational environments. Pumps need to be overhauled earlier or more frequently because rubber and non-metallic wear parts abrade quickly. Greene, Tweed has engineered abrasion-resistant composites that extend overhaul intervals and improve pump reliability.

Composite Versus Metal Parts

In centrifugal pumps, wear materials are used as a buffer between rotating and stationary parts, which are traditionally metallic. To avoid galling and potential equipment seizure, dynamic metal clearances are set at a generous minimum as an industry standard. Non-metallic wear parts, such as Greene, Tweed composites, enable smaller dynamic clearances, which provide two distinct advantages. First, the reduced clearance restricts the recirculation of process media, thereby improving system efficiency. Second, a reduced clearance generates increased fluid pressure around the shaft, resulting in shaft stabilization and less system vibration.

Greene, Tweed's high-performance thermoplastic composites offer wear resistance and abrasion resistance in a variety of materials, temperature ranges, and operating pressures to meet different application requirements. American Petroleum Institute Standard 610, 11th Edition, includes PEEK-based composites as a viable alternative to metallic wear materials and acknowledges the significant benefits of these advanced materials.

Greene, Tweed's WR® (wear-resistant) line offers excellent wear and friction properties, along with superior non-galling and non-seizing performance and exceptional chemical resistance. The AR® (abrasion-resistant) line offers superior abrasion resistance, enabling longer product life and reduced downtime for pumps handling media-containing solids.

Metals	Composites
Galling and seizing	Non-galling and non-seizing
Shorter intervals between routine maintenance tasks	Longer intervals between routine maintenance tasks
Shorter time to part failure	Longer time to part failure
Not impact-resistant	Impact-resistant
Larger clearance causes extra vibration and lessens equipment efficiency	Optimized clearance minimizes vibration and increases equipment efficiency

General Wear Solutions

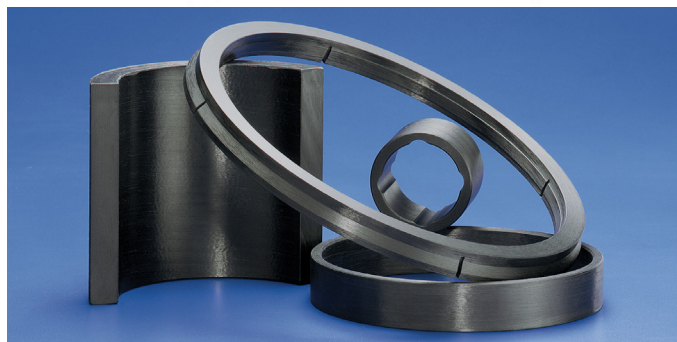
WR® 300



Greene, Tweed's WR® 300 is composed of PEEK reinforced with short, random carbon fibers with a temperature range from subzero to 275°F (135°C). WR® 300 is suitable for general wear resistance applications and is often used in pump bushings and cases or impeller wear rings.

WR® 300 provides excellent chemical resistance, has non-galling/non-seizing properties, and offers maximum service life in clean, lubricated, and moist environments. It enables pump users to increase efficiency with tighter wear ring clearances while decreasing potential damage. WR® 300 is available from our inventory in many common sizes, and is available as billets or tubes from 1-inch OD up to 90-inch OD in lengths from 3 inches to 8 inches, depending on the OD configuration.

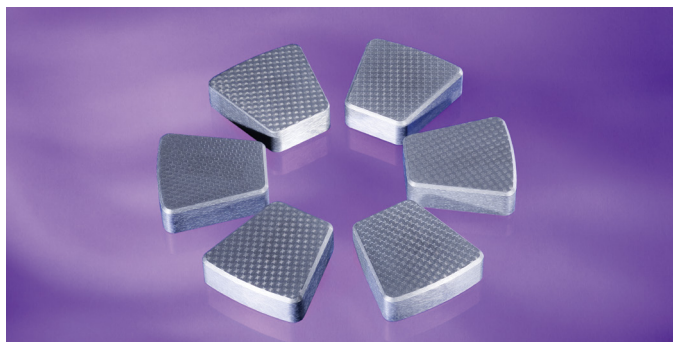
WR® 525



Greene, Tweed's WR® 525 is made of PEEK reinforced with continuous hoop-wound carbon fibers and is ideal for use as impeller wear rings, bushings, and case wear rings in high-pressure and high-temperature (HPHT) conditions. WR® 525's temperature range of subzero to 525°F (274°C) is suitable for stationary and rotating applications and allows users to increase efficiency with tighter wear ring clearances and decrease potential damage.

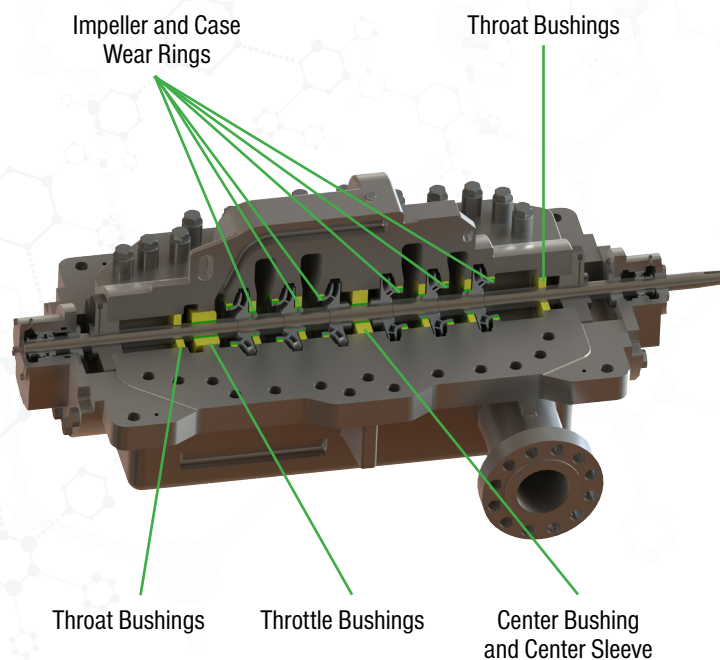
WR® 525 has non-galling/non-seizing properties and excellent chemical resistance. It is available in unfinished tubes, finished parts, and completed assemblies. Tubes are available in any length with 1-inch wall thickness and a minimum inside diameter (ID) of 0.75 inches. Greene, Tweed can provide large tubes using this process, up to 32 inches OD.

WR® 575



Greene, Tweed's WR® 575 thrust pads are PEEK reinforced with carbon, and are used in high-speed machinery such as pumps, compressors, and turbines to handle axial bearing loads and counterbalance the force applied on the shaft. WR® 575 thrust pads have a temperature range from subzero to over 480°F (249°C), and do not require an oil lubrication system because they use the application's existing media for lubrication. In addition, they will not crack or wear into fine powder under high shock or impact like carbon or ceramic pads. They resist aggressive chemicals and corrosion, won't gall or seize like metal alloys, and can be used in refining, chemical, power, and water applications.

WR® 575 is available in 22- by 28- by 1.25-inch plates as well as custom-shaped finished parts and thrust ring designs.



Dry-Run Solutions

WR® 650



One of the biggest threats to pumps is running dry with no lubrication, which may occur daily in a refinery, even if just momentarily. Non-lubricated metal wear parts may degrade over time, leading to a potentially catastrophic equipment failure.

WR® 650 is Greene, Tweed's most innovative performance wear material. This next-generation PFA reinforced with carbon composite offers superior dry run capability along with excellent thermal and chemical resistance and non-galling/non-seizing characteristics.

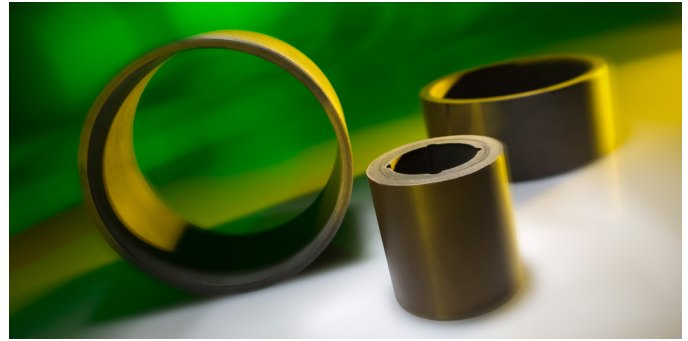
WR® 650 can perform in temperature conditions from subzero to 500°F (260°C), provides universal chemical resistance, and can handle prolonged dry runs to increase mean time between repairs. Its enhanced vibration damping capability extends the reliability and lifetime of pumps.

Greene, Tweed's WR® 650 composite wear parts are reinforced with 3D carbon fiber and can handle 2.5 times higher dry wear performance than other PFA composites, providing the extra time needed to safely shut down pumps without damage.

Available in unfinished tubes, finished machined parts, and complete assemblies, tubes of WR® 650 in lengths of 6 inches with 0.75-inch wall thickness are available with outside diameters (ODs) of 2.5 inches to 12 inches, in increments of 0.5 inches, for immediate shipment.

Abrasion-Resistant Solutions

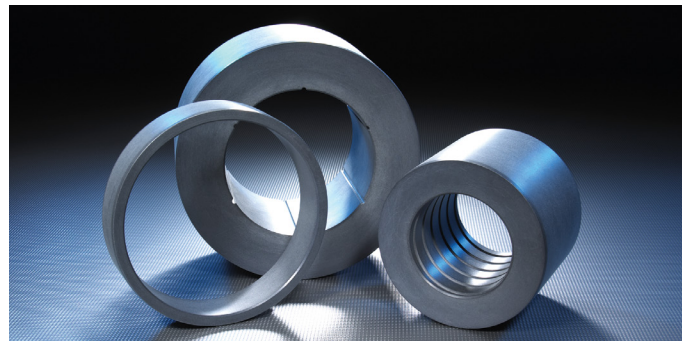
AR® 1



Greene, Tweed's AR® 1 is made of filled PTFE and is engineered to be abrasion-resistant. It can operate from subzero conditions up to 120°F (49°C), and is suitable for general abrasive resistance applications, particularly vertical pumps.

AR® 1 is available as unfinished tubes, finished parts, or completed assemblies, in tubes from 1.25-inch OD to 18.5-inch OD in 0.25-inch increments. Lengths up to 9 inches are available for tubes up to 11.25 inch OD, and 6 inches for tubes with larger ODs.

AR® HT



Greene, Tweed's AR® HT, a proprietary blend of PTFE and PEEK, offers abrasion resistance in higher operating temperatures, with a temperature range from subzero to over 250°F (121°C). AR® HT is suitable for high-temperature, abrasive-resistant applications, such as vertical water feed pumps in nuclear facilities.

AR® HT is available as unfinished tubes, finished parts, or completed assemblies, and available as billets or tubes from 1-inch OD up to 90-inch OD in lengths from 3 inches to 8 inches, depending on the OD configuration.

Markets

Greene, Tweed provides innovative composite materials and products for refineries, chemical plants, power generation facilities, and desalination plants. In refineries and chemical plants, abrasive and/or corrosive liquids, sludges, and slurries can lead to damage, downtime, or failure. Composite wear components for pumps and other rotating machinery provide the reliability, efficiency, and uptime to ensure consistent operation.

In power generation and desalination facilities, sandy and abrasive fluids wreak havoc on pump efficiency and can cause damage, downtime, or failure. Greene, Tweed's AR[®] composites last up to five times longer than traditional materials, extending machinery lifetimes and reducing downtime and maintenance requirements. Greene, Tweed's AR[®] materials have been specified in thousands of power industry pumps and have commonly replaced metallic line shaft bearings, bowl bearings, and bowl wear rings on vertical pumps.

The Power of the Portfolio

Greene, Tweed's diverse thermoplastic composite portfolio, developed over years of engineering innovation and customer collaboration, offers reliable parts for static and dynamic applications that resist damage from wear, abrasion, chemicals, vibration, thermal shock, and impact across a range of temperatures and pressures.

Although Greene, Tweed maintains a vast inventory of standard wear parts, we specialize in in-house design, prototyping, testing, and manufacturing services for custom solutions that meet any application requirement.

Greene, Tweed engineers understand the problems facilities engineers face. Our experienced team of design and field application engineers work with our customers to develop custom solutions for any application.

Quick Reference Guide

WR[®] 300

Material: PEEK reinforced with short, random carbon fibers

Temperature: Subzero/+275°F (135°C)

Application: General wear resistance

WR[®] 525

Material: PEEK reinforced with continuous hoop-wound carbon fibers

Temperature: Subzero/+525°F (274°C)

Application: HPHT stationary & rotating applications

WR[®] 575

Material: PEEK-reinforced woven carbon fiber

Temperature: Subzero/+480°F (249°C)

Application: Thruster pads for high-speed machinery

WR[®] 650

Material: Carbon fiber-filled PFA

Temperature: Subzero/+500°F (260°C)

Application: Extended dry run capability; almost universal chemical compatibility

AR[®] 1

Material: Filled PTFE

Temperature: Subzero/+120°F (49°C)

Application: General abrasive resistance

AR[®] HT

Material: Proprietary blend of PTFE and PEEK

Temperature: Subzero/+250°F (121°C)

Application: Higher temperature abrasive resistance



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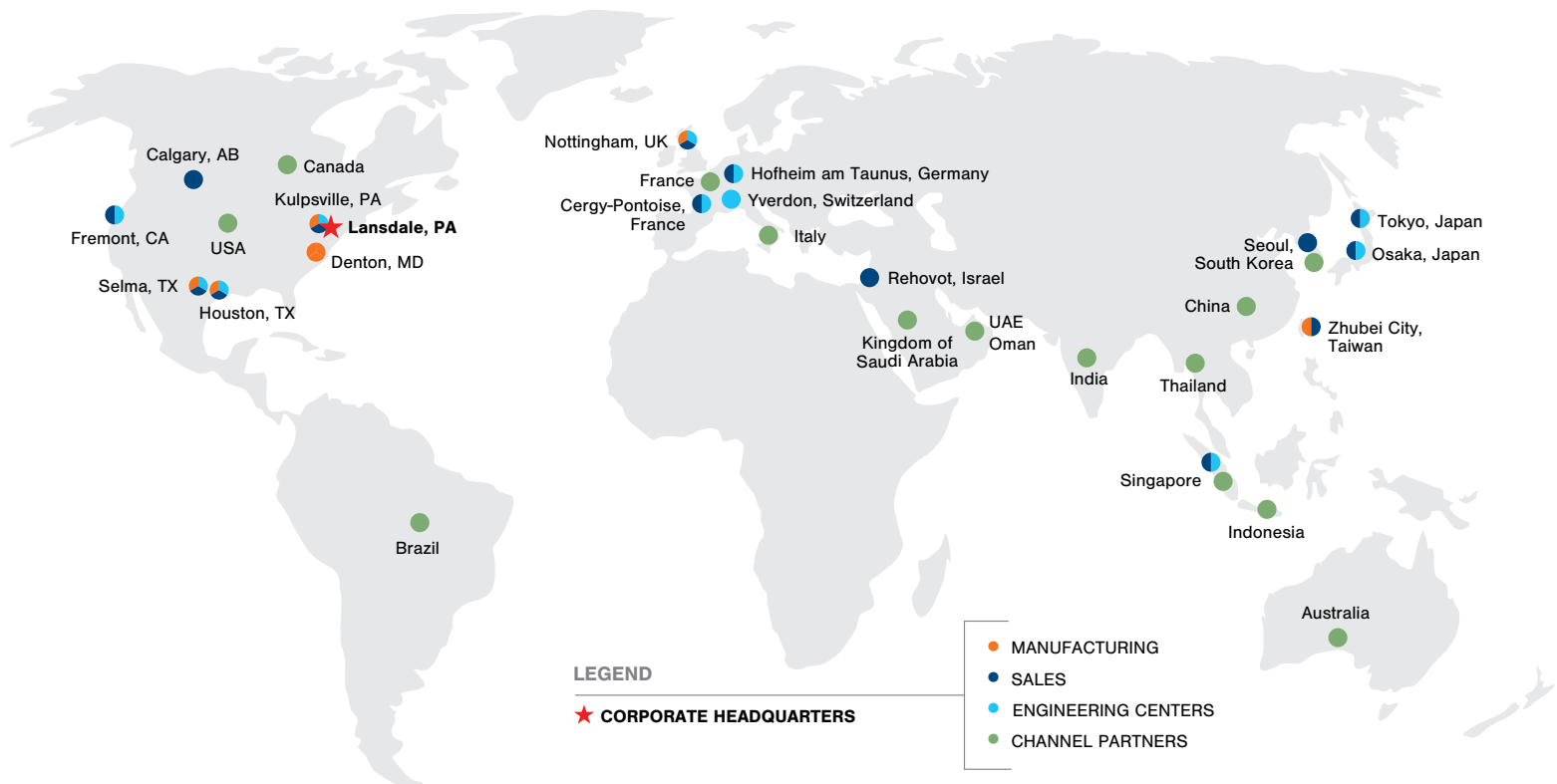
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Where We Play

Global Presence, Local Service.

With more than 1,600 employees across 11 countries, Greene, Tweed offers material, design, engineering, and manufacturing expertise worldwide, collaborating with customers to meet their critical challenges through the development of custom-designed, leading-edge components.



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