GORE® GFO® Fiber

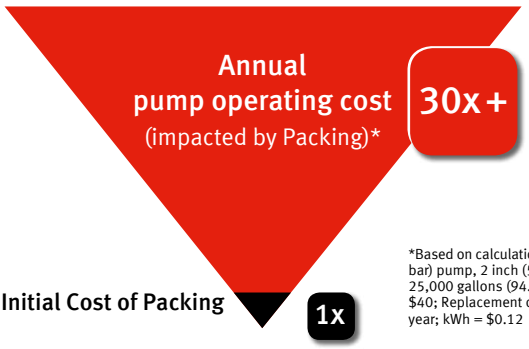
Overview

Compression Packing – Plant Experience

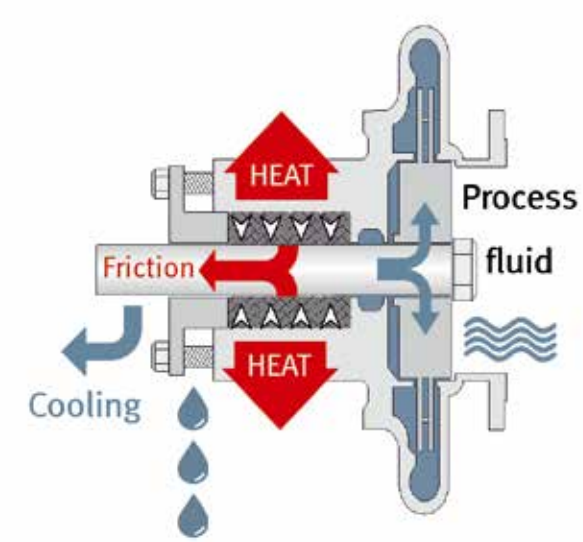
Compression packing has been around since the beginning of the industrial revolution. It is still used extensively today in equipment where plant operators understand the advantages of managing the warning signs of a degrading pump packing versus sudden failure mode of mechanical seals. Experienced operators know to watch out for tell-tale signs of packing degradation, such as an increase in flush water use, the need for gland follower adjustments, a hot running or even a smoking pump.

Hidden Costs

What is less known is that the annual operational costs of keeping a pump running through these conditions versus the original packing cost is estimated to be 30 times greater!! While procurement has a tight hold on the upfront packing cost, the greater cost takes place in operation.



*Based on calculations for a 100 psi (6.9 bar) pump, 2 inch (50mm) shaft; Drip rate 25,000 gallons (94.6 m³)/year; Packing = $40; Replacement of packing = 3 times per year; kWh = $0.12



Less visible throughout the process are the effects of the material's friction factor which has a direct impact on power and thus on the cost of operating the pump.

Power	Water	Maintenance
0.25 hp (0.19 kW) to 12 hp (8.95 kW) loss due to friction	*(Leak rate)* 3,000 gallons (11.35m³) to 15,000 gallons (56.78m³) water loss/year per inch shaft diameter**	7.5 – 78 hrs/year*** labor

** Based on FSA Article "Sealing Systems Matter – Choosing Mechanical Seals to Optimize Life Cycle Cost, Safety, and Environmental" & McKinsey Quarterly March 2013 "Measuring the real cost of water".
*** Based on over 300 documented case histories.

While sealing off the process fluid from escaping along the pump shaft, packing acts like a brake in a car, producing friction and heat. An operator must take care to avoid over-tightening the packing while disallowing media or excessive flush water leakage. Usually, an operator will opt for a bit more leakage when one more gland adjustment risks seizing up the pump and shutdown. But if early warning signs are missed on a degrading packing then increased maintenance is inevitable.

Avoidable Waste

Despite these operational losses which have been hidden in plain view for decades, the industry has so far failed to tackle these avoidable wastes. A typical pump loses up to 39,000 kilowatt-hours which is enough to power 10 homes annually. The same pump will send 15,000 gallons (56.78m³) of water down the drain per year which is a similar volume of water contained in an average sized swimming pool.

Material Attributes of Packing Affect Pump Performance

A smart solution is to make a strategic choice in compression packing based on material attributes. Over the years the industry has found that PTFE graphite packings perform among the best at balancing these competing dynamics. However, PTFE Graphite Packings vary in degree of quality and performance.

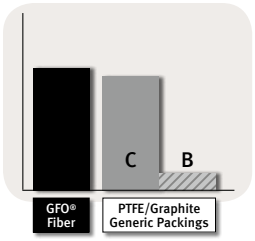
Packing Material Attributes	Power Consumption	Water Consumption	Maintenance Costs
Composition	X		X
Creep		X	X
Retention of lubricant	X	X	X
Shrinkage		X	X
Thermal Conductivity	X	X	X
Quality/Consistency	X	X	X

IMPACT

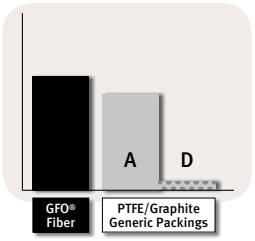
A SUSTAINABLE SOLUTION

Gore has tested packing made of 100% GORE® GFO® Fiber alongside generic graphite/PTFE packings.

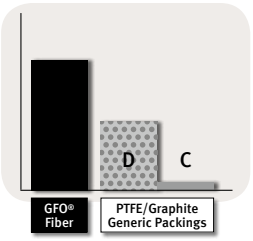
Creep resistance
Up to 7x more creep resistant



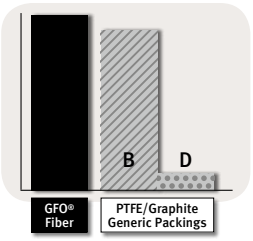
Sealability
Up to 11x more "tight"



Retention of lubricant
Retain up to 15x more lubricant



Stability (less shrinkage)
Up to 15x more stable



Packings made of 100% GORE® GFO® Fiber achieve better results for all attributes. The differences in performance for each generic packing will have an impact on the operational costs. The example below shows an estimate of the savings that can be made by using packing made of 100% GORE® GFO® Fiber.

ANNUALIZED COSTS SAVINGS (ESTIMATED)

Operating Cost	Generic Packing	100% GORE® GFO® Fiber	Savings
Power consumption	$ 531	$ **227**	$ 304
Water consumption	$ 228	$ **116**	$ 112
Maintenance	$ 1,450	$ **245**	$ 1,205
Total operating cost per pump, per year	$ 2,209	$ **588**	$ 1,621
Initial cost of packing	$ 40	$ **65**	- $ 25

Based on calculations for a 100 psi (6.9 bar) pump, 2 inch (50 mm) shaft; Drip rate 25,000 gallons (94.6 m^3)/year; Packing = $40; Replacement of packing = 3 times per year; kWh = $0.12

QUALITY ASSURED

Many PTFE/Graphite packings are available in the market. While they may all look the same, it is worth noting that there are huge inconsistencies in the actual product quality and performance of many of the packing solutions offered. The installation of these products can lead to premature failure and unscheduled shutdowns. Such problems can cost a lot of time and money. To help overcome these challenges, Gore created the Seal of Assurance Program. Through a global network of authorized braiders, this program ensures that every fiber used to braid the packing is a GORE® GFO® Fiber. Look for the 100% GFO® seal on the box and print right on the packing – it's the only packing that is identified this way!

THE RIGHT PACKING FOR RELIABILITY AND SAVINGS

FOR INDUSTRIAL USE ONLY. Not for use in food, drug, cosmetic or medical device manufacturing, processing, or packaging operations.

Supplied by

For detailed selection criteria, technical information, installation guideline and a complete listing of local sales offices please visit **gore.com/sealants**

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