

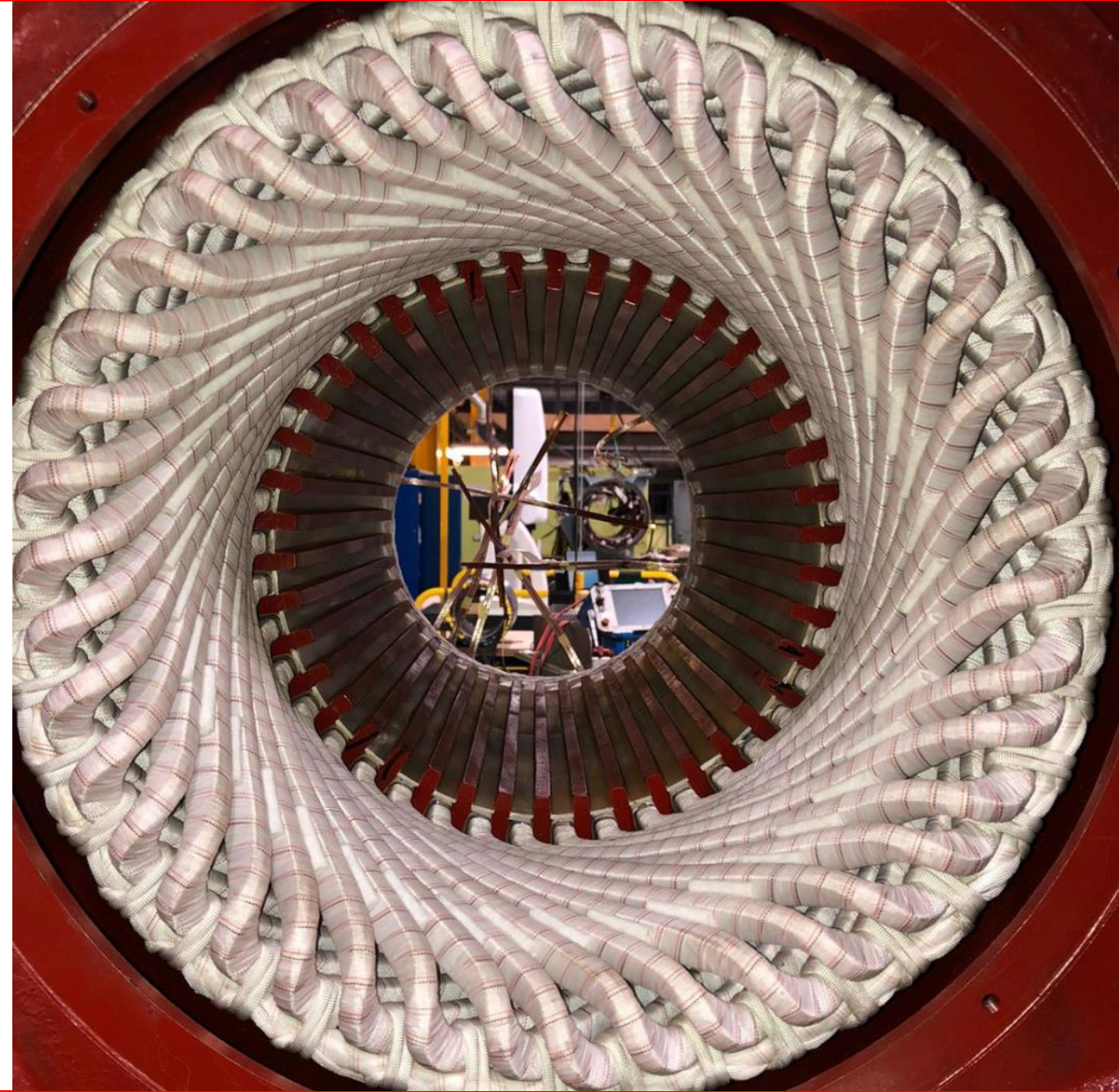
**PREFORMED
WINDINGS**

OBSESSED WITH QUALITY

Resin Rich vs VPI

**OUR PARTNERS
RELY ON US TO
DELIVER QUALITY**

- Resin-Rich coils are impregnated or coated with a resin to protect coils against environmental factors.
- Preformed Windings offers an award-winning range of Resin-Rich coils for our valued customers.



What are Resin-Rich coils made of and what's the process?

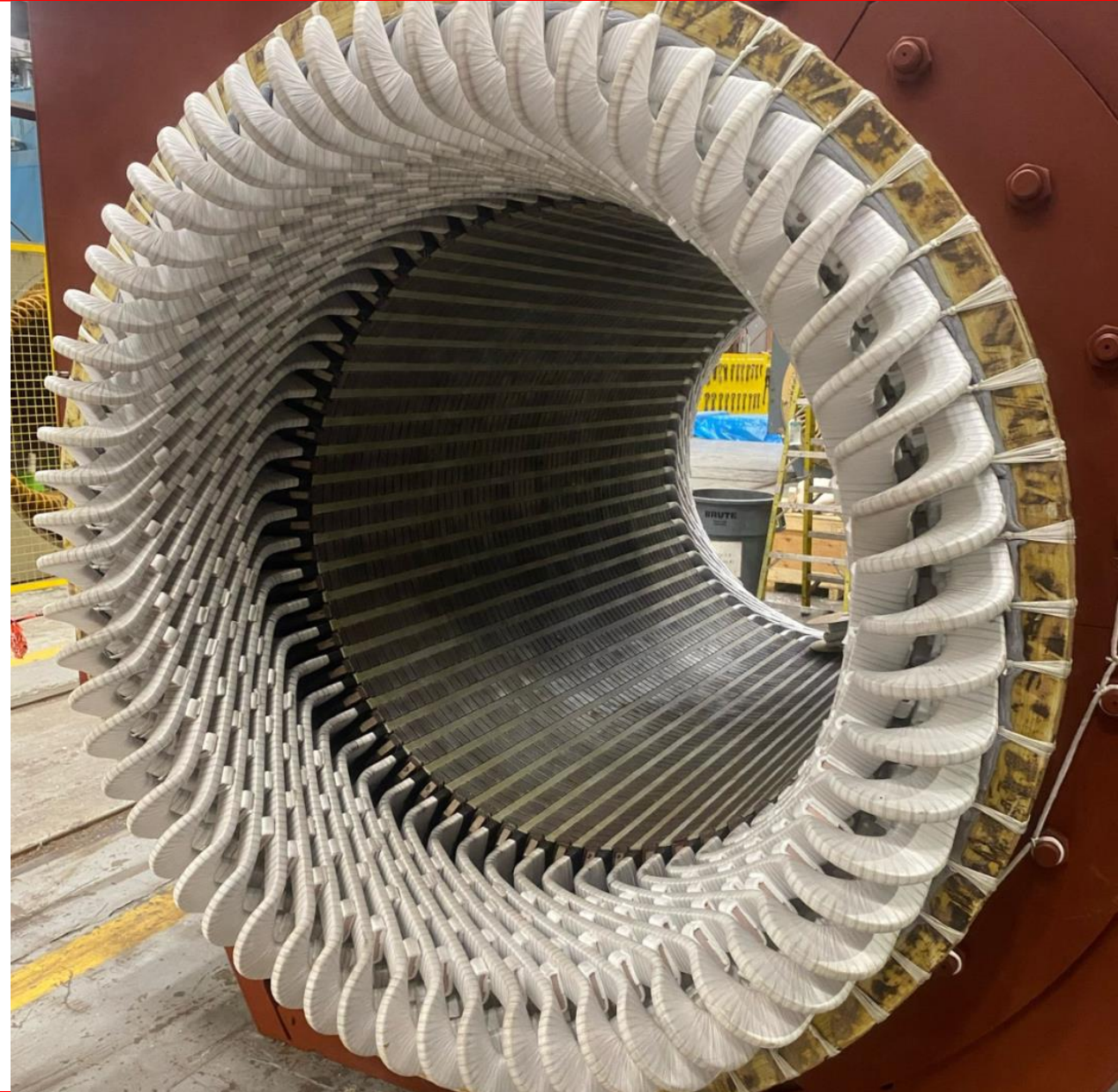
- These coils are often made of copper or aluminium wire wound around a core.
- The Resin is poured or vacuum-impregnated into the coil winding assembly and then cured to form a solid insulating material.
- The resin helps to fill gaps between the wire windings, improve mechanical strength, enhance electrical insulation properties, prevent breakdowns, and increase the overall durability and lifespan of the coil.



Resin-Rich Advantages + Disadvantages

Advantages	Disadvantages
<p>Highly uniform impregnation of the resin in the slot portion reduces the risk of partial discharge occurring.</p>	<p>The coils are more expensive (typically offset by the additional cost of the VPI process).</p>
<p>Rigid resins are employed in the slot cell section of the coil, while flexible resins, containing flexibilities, are utilised in the end winding to withstand coil movement.</p>	<p>End winding may have voids, but due to the surface being charged to coil voltage, internal void breakdown is not an issue except at the initial bend under the stress grading tape.</p>
<p>Capability to control partial discharge in the slot and remedial action in service is practical during insulation system life.</p>	<p>End winding insulation and blocking is not a homogeneous system therefore more dependent on competence of winders.</p>
<p>Partial repairs are practical i.e. coils that have failed can be replaced.</p>	<p>Resin rich coils in the end winding can be more prone to chemical attack than VPI windings (Our Resin Rich coils incorporate a sealant tape mitigating this risk).</p>
<p>Coils can be installed on-site as there is no requirement for further processing (i.e. the VPI process).</p>	
<p>End winding bracing systems can be improved & made more robust to meet operational requirements.</p>	

- VPI stands for Vacuum Pressure Impregnation - a process that coils undergo to remove unwanted substances from within to ensure the best quality.
- Along with Resin-Rich, Preformed Windings also offers high-quality sets of VPI coils for our valued customers.



What is the VPI process and what does it do?

- The VPI process involves placing the coils in a vacuum chamber and then filling the chamber with resin. The vacuum removes air and moisture from within the coil, and then pressure is applied to ensure the varnish or resin thoroughly saturates the coil's insulation.
- This process enhances the insulation properties of the coil, making it more robust and durable. It also improves electrical properties, mechanical strength, and thermal performance.



VPI Advantages + Disadvantages

Advantages	Disadvantages
Reduced manufacturing cost (often offset by the cost of the VPI process).	Cost of buying and maintaining the VPI equipment and materials such as tank and resin.
Fast to install due to high level of flexibility.	Only one resin, a rigid thermosetting type, is used in the VPI process for both stator and winding impregnation to maintain coil stability within the slot.
No scarf joint at end of coil slot straight meaning the straight length can be reduced.	Multiple processing is required for good surface finish.
Reduced risk of voids in the end winding.	After 15 -20 years service the rigid resin can cause cracking in the end winding due to the frequency related movement.
Homogeneous insulation & bracing.	Maintaining the coil parallel in the slot portion can be difficult.
Gives good insulation resistance.	Differential expansion in the end winding can loosen coil-to-coil bracing, requiring frequent rectification over the machine's lifespan.
Inherently Resistant to moisture & chemicals.	Manufacturers use a variety of resins in the VPI process. Low-viscosity resins present challenges in maintenance and require high resin turnover.
	Retaining resin in the stator winding during curing typically involves rotating the stator, which is facilitated by manufacturers who wind a stator core pack before inserting it into the stator case.
	The VPI vacuum/pressure vessel must be sufficiently large to accommodate the entire stator during processing.
	Stators that have been VPI-impregnated are very difficult to repair.
	Complete rewinds are pricier due to the difficulty of removing old windings, a major concern for machines requiring on-site rewinding.

To learn more about Resin-Rich & VPI Coils:

- Visit our [Resin-Rich vs VPI website page](#)
- Contact a member of the team on LinkedIn or through our [website contact form](#).
- We are available 24/7 to answer any queries.

