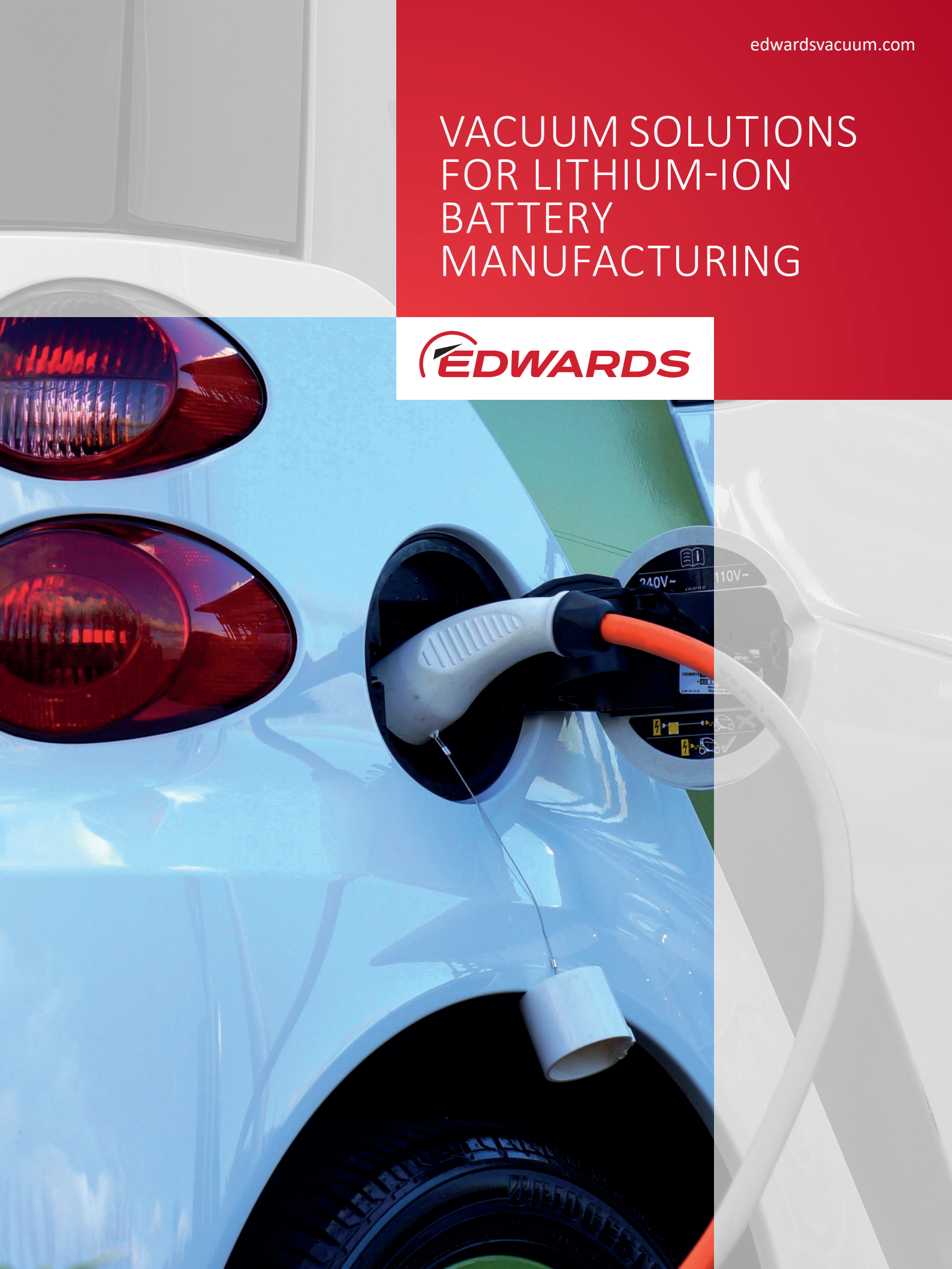


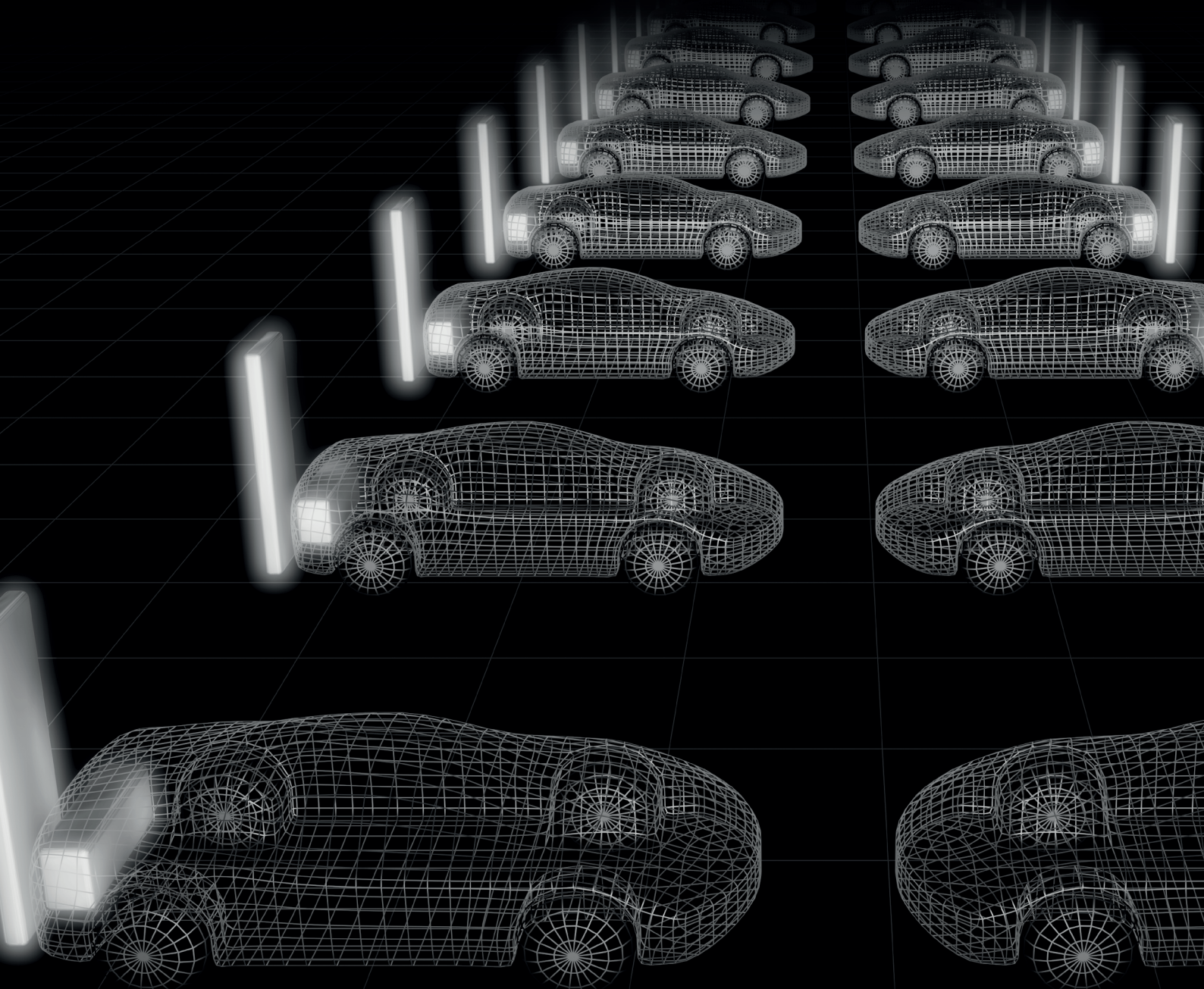
VACUUM SOLUTIONS FOR LITHIUM-ION BATTERY MANUFACTURING



EDWARDS THE PARTNER OF CHOICE

Edwards is a world leader in the design, technology and manufacture of vacuum pumps for industrial applications with over 100 years' history.

We believe in delivering results that bring value to our customers by using our breadth of industry experience to identify and apply solutions. Using the most innovative and up-to-date modelling techniques, we can optimise the pumping configuration for customers to provide a system design giving the maximum performance in the most reliable and cost-effective way.



TOTAL VACUUM SOLUTIONS

Edwards is a leading supplier of vacuum pumping solutions for Lithium-ion battery manufacturing processes. With a wide range of product offerings, we are able to provide comprehensive solutions for high throughput yields with low cost of ownership.



Reduced maintenance costs
Dry vacuum pumps



Advanced control capability
Intelligent pumps

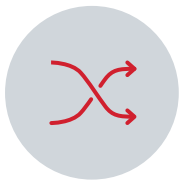


Low cost options
Oil rotary pumps and
oil screw pumps



OPTIMISING YOUR PRODUCTIVITY AND PERFORMANCE

Vacuum systems play a vital role in every stage of the lithium-ion manufacturing process. It is important to understand the crucial role of the applications in the production in order to develop a reliable battery with high performance and long life for use in electric vehicles. Edwards offers pumping solutions and applications expertise in various manufacturing processes including:



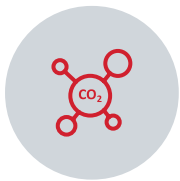
MIXING

During the manufacture of electrodes, the initial mixing process of the slurry with various materials like Lithium metal oxides, different binding agents and solvents is done under vacuum. Preventing build up of air bubbles in the mixture and enabling a uniform homogenous paste is critical to the process.



DRYING

Vacuum is essential in drying processes in order to remove moisture and other solvents like NMP (N-Methyl Pyrrolidone). Vacuum pumps are required to perform under harsh conditions while retaining high levels of vacuum to deliver superior quality electrodes. Vacuum drying can be done in batch or as a continuous process in in-line drying machines.



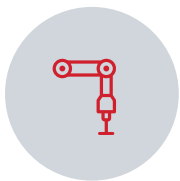
FILLING & DEGASSING

Pre-evacuation of cells is carried out under vacuum after which the electrolyte is filled in the cell as the transport medium. Degassing is carried out in vacuum to ensure Lithium ions are able to move freely, resulting in efficient charging and discharging. Vacuum pumping systems must be robust to effectively manage the harsh process and retain the purity of the electrolyte.



SEALING

Sealing is done in vacuum to remove air and moisture from the battery pouch, resulting in a high-performance product with a long life.



PICK AND PLACE

Many other processes involving cell assembly, stacking, cell formation need vacuum systems for heavy duty cycle operation for high throughput yields.

GXS DRY SCREW VACUUM PUMP

For lithium-ion battery applications, our full range of GXS pumps take vacuum performance to the next level.

Improved product quality

Better ultimate vacuum

Safe operation, consistent output

Automated control of your process

Easy on the environment

No contaminated or dirty oil to dispose of



EDS DRY SCREW VACUUM PUMP

The new EDS range being robust and efficient is flexible and handles harsh industrial applications.

Faster

Higher pumping speed for quicker pumpdown times and increased process uptime

Robust

High tolerance to industrial contaminants with extended lifetime

Flexible

With engineered basic building blocks for special systems and for hazardous area installations



DRYSTAR® GV80 DRY VACUUM PUMP

Edwards DRYSTAR® GV80 dry vacuum pump provides a clean, robust and low cost alternative to traditional oil sealed pumps.

Consistent output

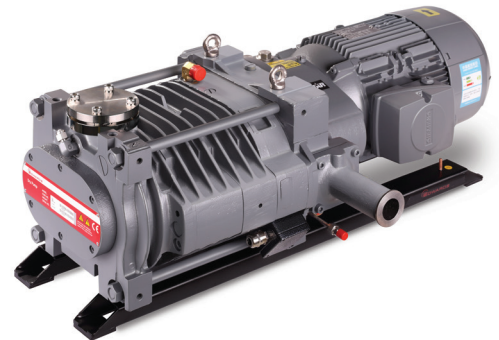
Providing delivery of repeatable pumping performance

Industry proven, tried and tested

Specifically designed for demanding industrial applications

Low cost of ownership

With clean, quiet pumping and minimal service disruption



nES OIL SEALED ROTARY VANE VACUUM PUMPS

The next generation nES single stage oil sealed rotary vane pumps provide an ideal solution for all processes.

Proven performance

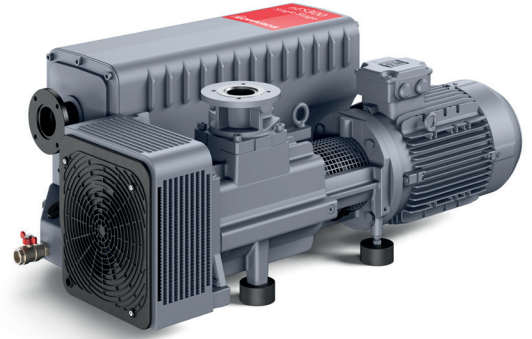
Consistent pumping performance with excellent vacuum stability

High reliability

Designed and engineered for maximum productivity and process efficiency

Low lifecycle cost

Optimized oil retention with efficient oil mist separation ensures minimum maintenance



EOSi ROTARY SCREW PUMP

Edwards EOSi range is a new generation of quiet, oil sealed screw pumps that offer:

Intelligent control

Closed loop pressure control and active power management

Quiet operation

Noise levels approximately half that of comparable technologies

Reduced environmental impact

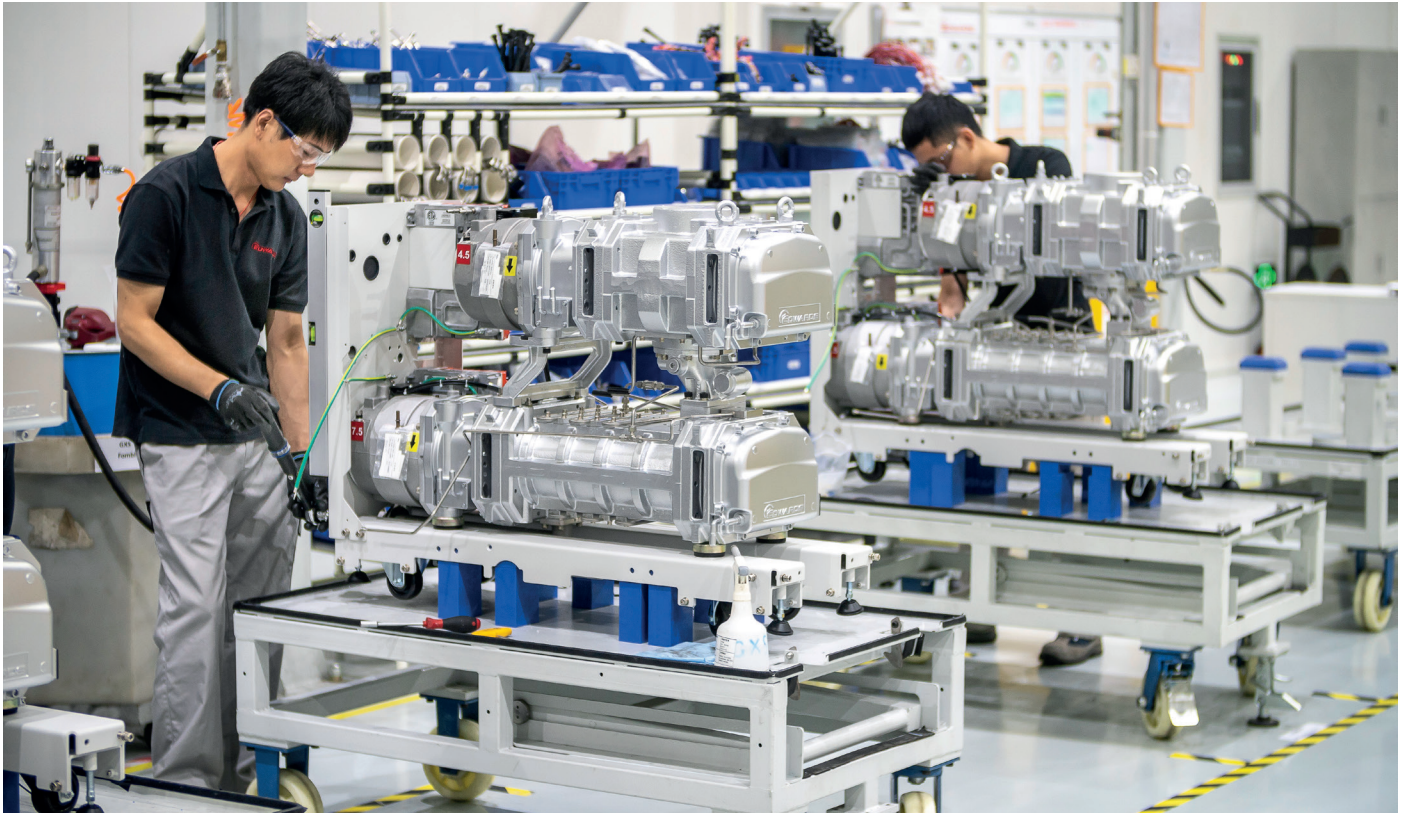
Ultra-high oil retention at all operating pressures



Vacuum Pumps Models	Mixing	Electrode Drying	Electrolyte Filling	Degassing	Sealing	Cell Formation/ Pick and Place
GXS dry screw pumps	●	●	●	●	●	
EDS dry screw pumps	●	●	●	●	●	
GV80 dry pumps	●	●	●	●	●	
nES oil rotary vane pumps	□	□	□	□	□	□
EOSi oil rotary screw pumps						●

● is recommended technology □ is conventional technology

SERVICE AND SUPPORT

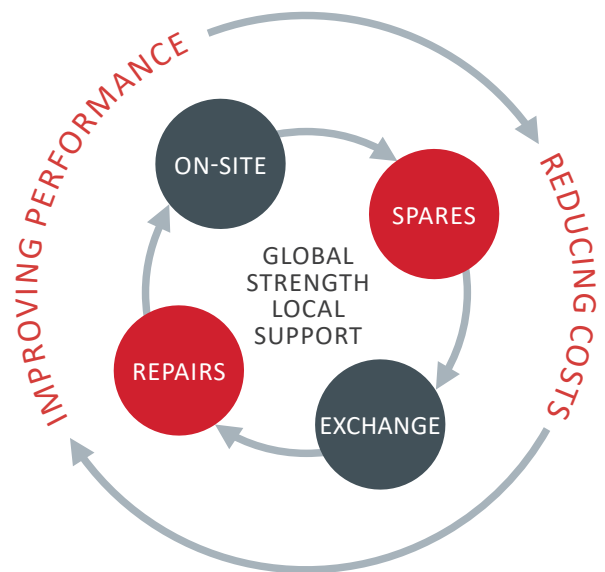


OUR EXPERTISE, YOUR ADVANTAGE

Our expertise is in vacuum technology. We have been in the business since 1919 and our knowledge runs deep. We design, develop and manufacture vacuum equipment to the very highest standards.

But it's not just the technology. With a global installed base of 750,000 pumps, we understand how vacuum pumps and systems perform in real life. We know how to get the best from our products, whatever the application. We know how to look after them. That's why a large section of our expert workforce is dedicated to service and support.

Our service solutions come under four main headlines; on-site service, repairs, exchange, and quality spares. All built on our world-class technical know-how and backed by our sophisticated logistics and supply chain infrastructure.





Global contacts

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