

MAPS:

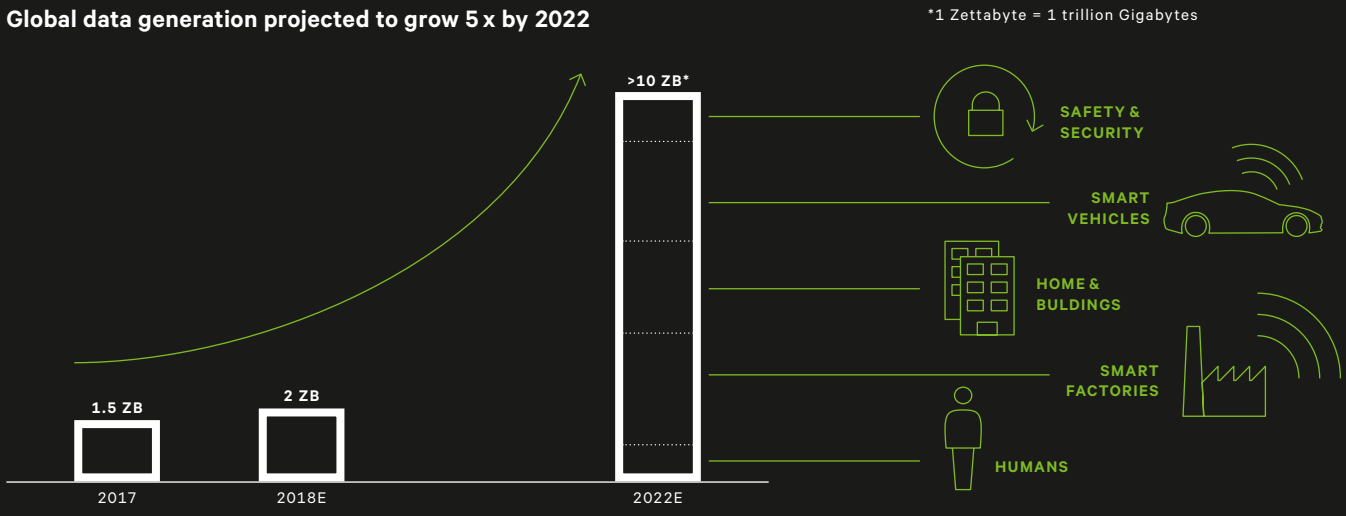
**VAT is the world's No. 1
producer of high-precision
vacuum valves that
enable global digitalization.**

The digital revolution continues to accelerate rapidly. Increasingly vast amounts of data need to be stored, analyzed and displayed in more and more digital devices. In the following pages, we illustrate some of these future trends and how VAT's commitment to innovation will help make them a reality.

DIGITALIZATION DRIVES GROWTH

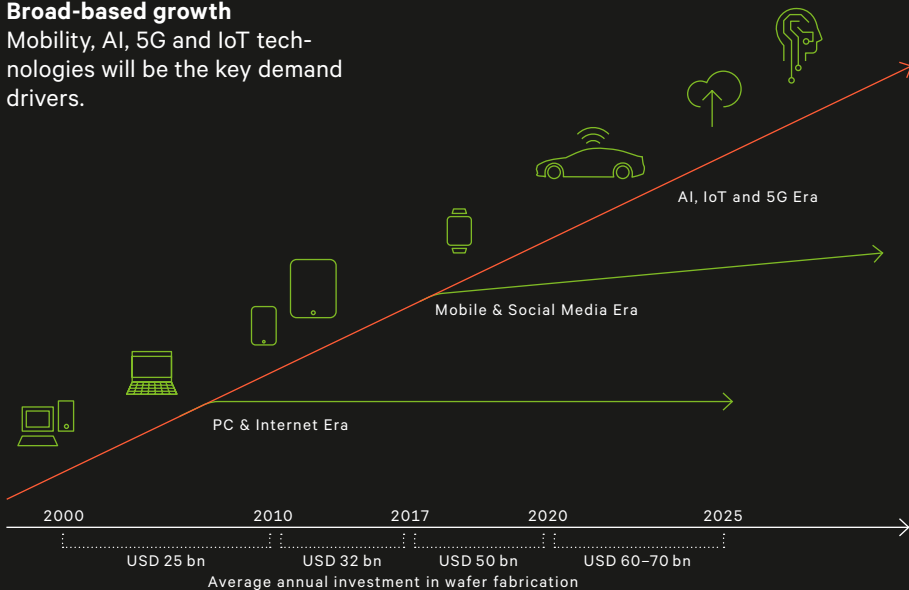
New technologies require huge data storage and processing power, meaning new chip designs and innovative vacuum valve solutions.

Global data generation projected to grow 5x by 2022



Broad-based growth

Mobility, AI, 5G and IoT technologies will be the key demand drivers.

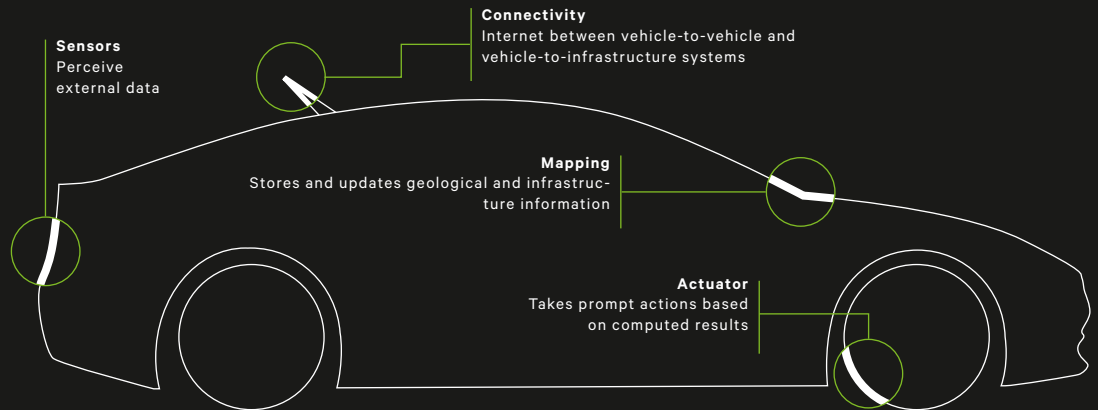


VAT vacuum innovations will be key to the next era of digitalization.

AUTONOMOUS DRIVING

Data-driven cars

New semiconductors needed for cameras, radars and sensors to give self-driving cars the ability to see and to decide what the vehicle should do.¹

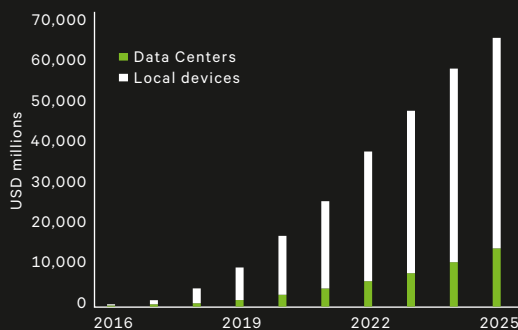


ARTIFICIAL INTELLIGENCE

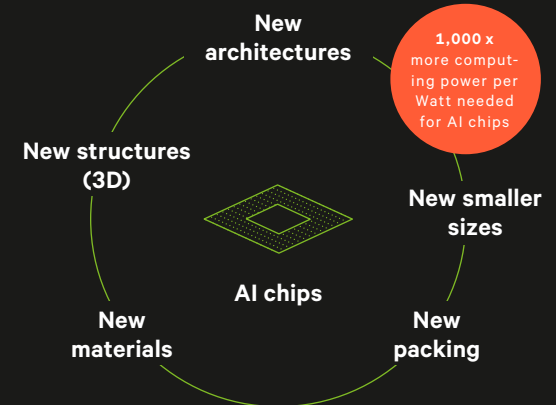
Explosion in smart devices

More AI chips will be needed in phones, drones, smart speakers, virtual reality headsets, etc.²

Deep learning chipset revenue by market sector (forecast)³



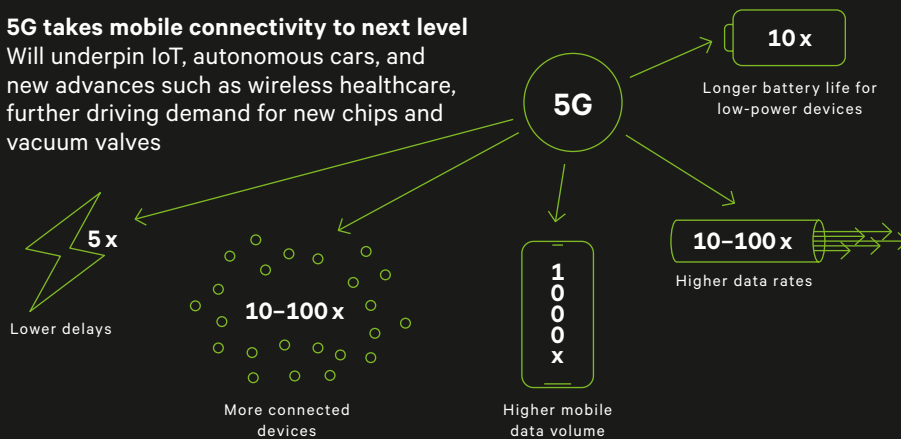
AI next-generation semiconductors will drive valve growth⁴



5G MOBILE COMMUNICATIONS

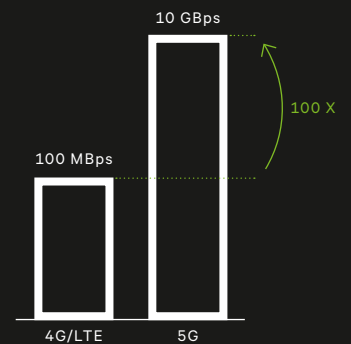
5G takes mobile connectivity to next level

Will underpin IoT, autonomous cars, and new advances such as wireless healthcare, further driving demand for new chips and vacuum valves



A network quantum leap

Peak download speeds (Log₁₀ scale)

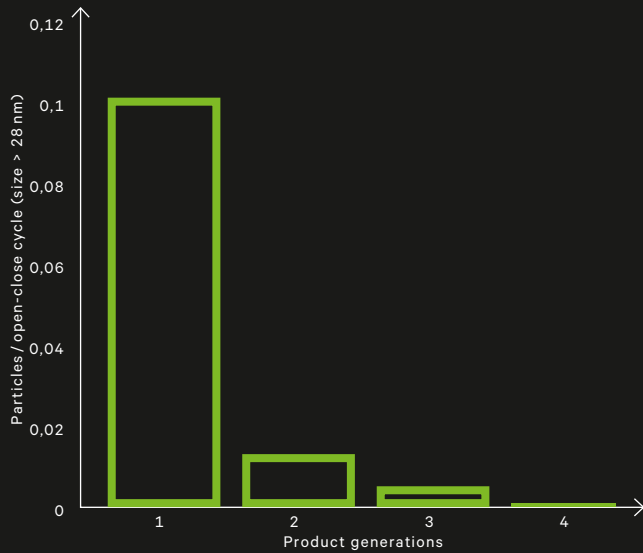


INNOVATION IS KEY TO SUCCESS

High-purity vacuums are critical in the manufacture of digital devices with transistors smaller than 10 nanometers (nm) – the size of a virus. Cleanliness is measured in parts per trillion, equivalent to dissolving a sugar cube in the world’s largest supertanker. To meet that challenge, our valves must feature particle-free and low-shock operation, areas where VAT has made significant progress in recent years.

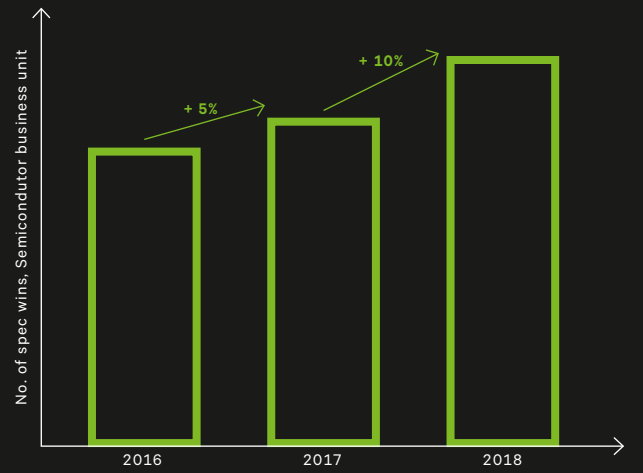
Particle-free operation

VAT’s investment in particle research and measurement has resulted in virtually particle-free vacuum valve technology.



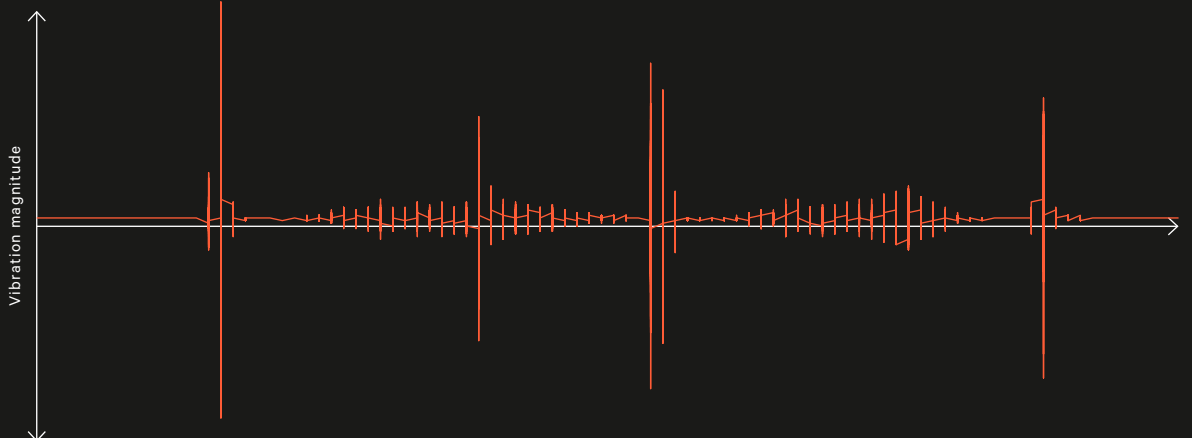
Spec wins support future growth

VAT works closely with customers to create specifications for future innovations. When the customer accepts these specifications, we have a “spec win” that secures future sales.

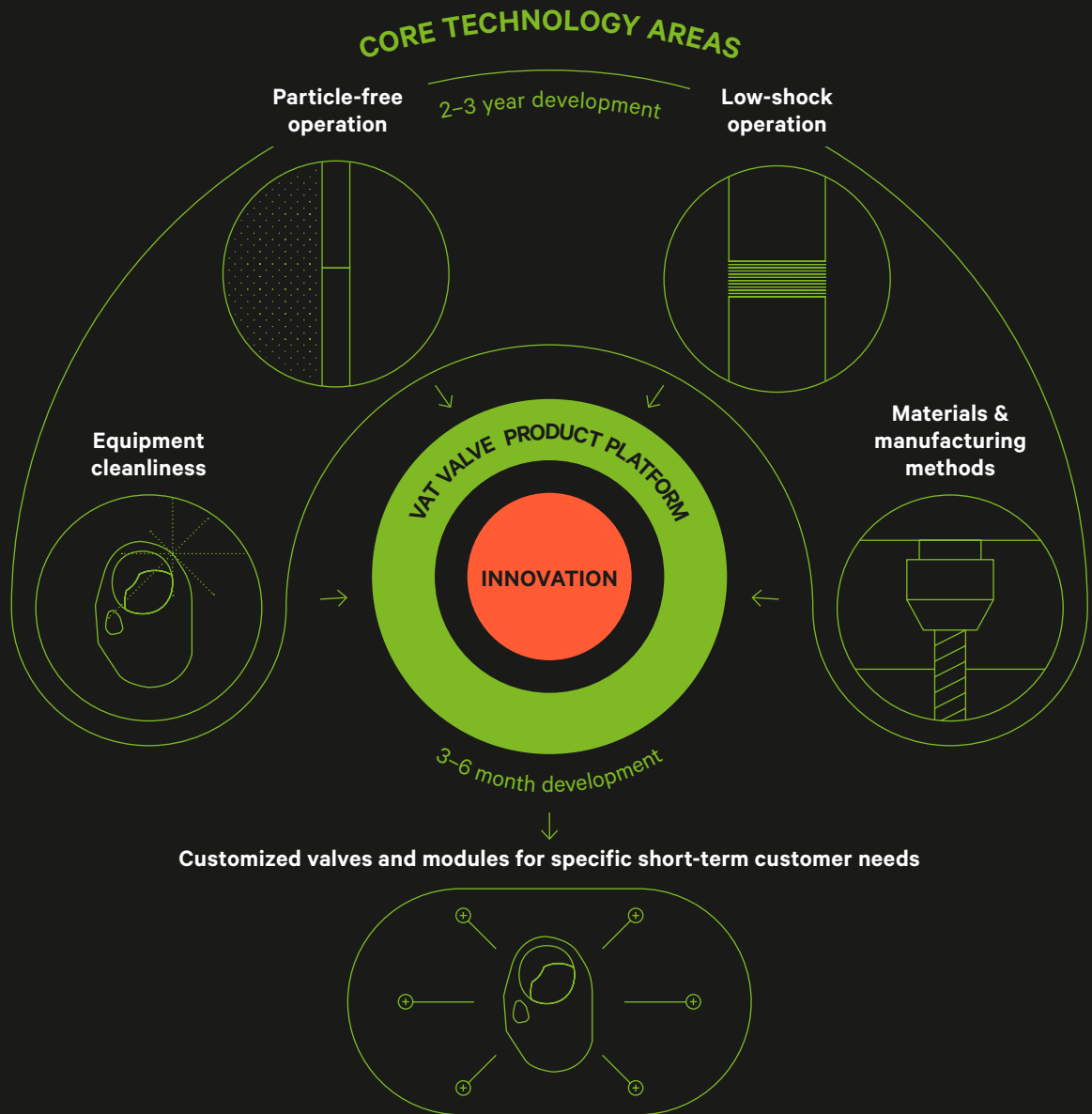


Low-shock operation

Lower shock levels on open and close operations reduce particle generation and improve valve reliability.



**VAT's core re-
search areas**
VAT drives
long-term
research in key
technology
areas to ensure
that we can
deliver break-
through innova-
tions when our
customers
need them,
and to support
our standard
valve product
platform. At the
same time, we
create custom-
ized valves and
modules with
a shorter time
horizon to meet
specific, more
immediate cus-
tomer needs.

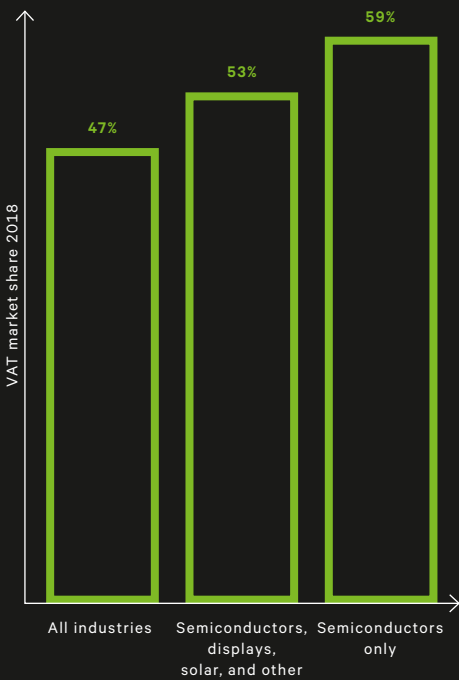


Our ability to continuously develop new products that meet the needs of the world's most demanding customers in a fast-changing market is what distinguishes us from the competition.

NO. 1 TECHNOLOGY AND MARKET SHARE

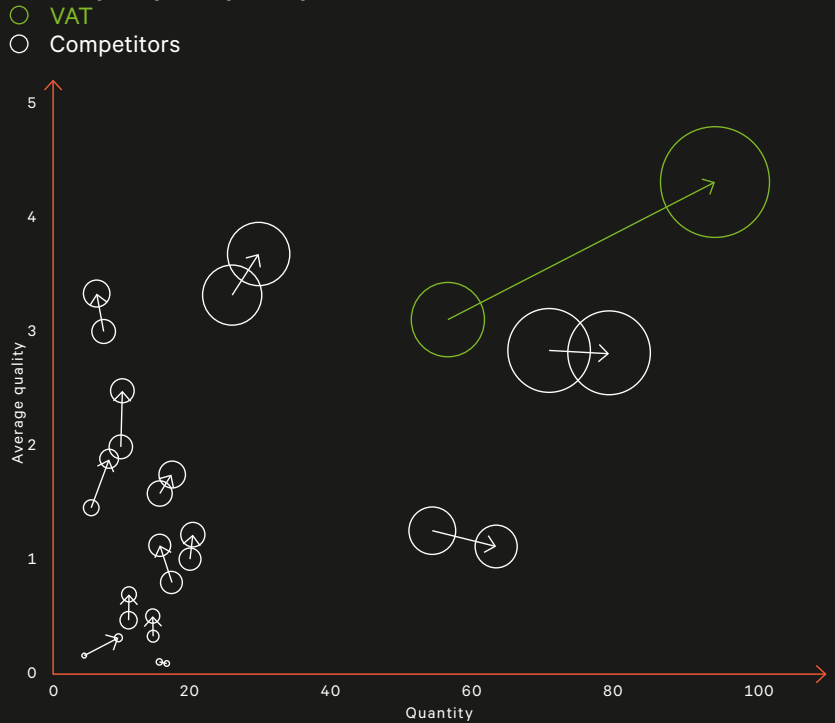
Semiconductor manufacturers are among the world’s most technologically demanding customers. The tiniest contamination, measured in parts per trillion, can ruin the fabrication process. VAT valves have earned an unrivaled reputation for purity and precision over decades of experience in this most challenging industry.

More demanding technology = higher market share
VAT 2018 market share by customer industry¹



VAT has steadily improved its patent position vs competition
Development from 2013–2018

Patent quality and quantity

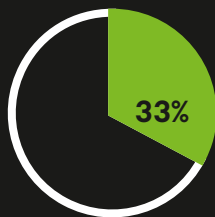
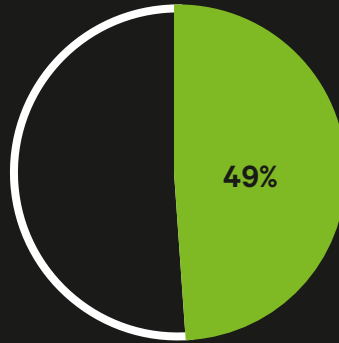


Our track record of innovation is key to our leading market share and the depth of our customer relationships. It’s a significant competitive advantage.

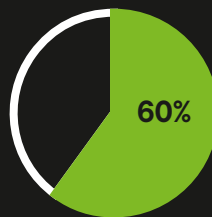
LEADING MARKET SHARE ACROSS THE PORTFOLIO

VAT manufactures more than 10,000 standard and customized vacuum valves in three broad categories: isolation valves to seal high-vacuum process chambers; transfer valves to move substrates between process chambers; and control valves to regulate the flow of gases into the vacuum. VAT has the leading market share in each of these applications.

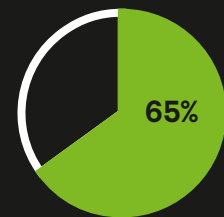
VAT's total market share



MARKET SHARE



MARKET SHARE



Isolation valves

Function
Vacuum maintenance

Technologies
Sealing
Contamination



Transfer valves

Function
Moving substrate
between process steps

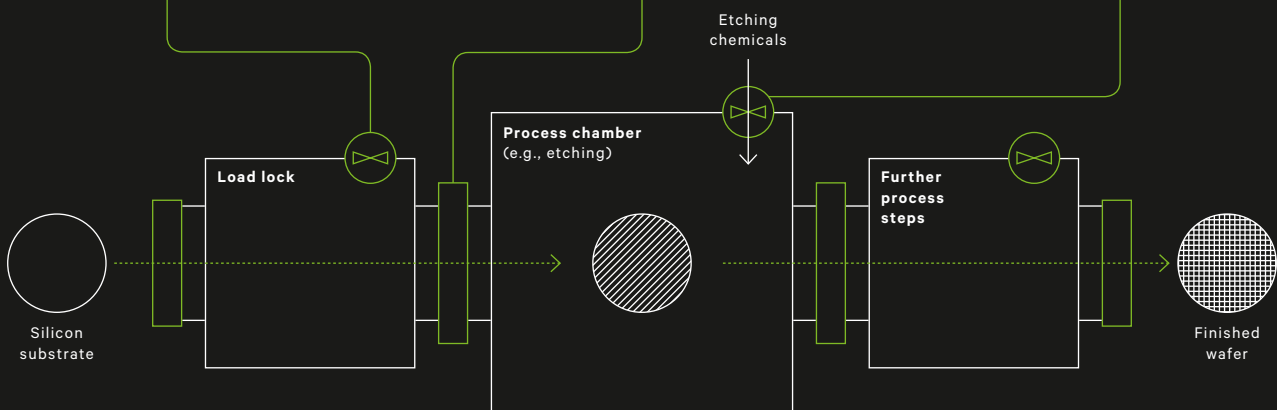
Technologies
Sealing
Contamination
Speed
Precision



Control valves

Function
Process control

Technologies
Sealing
Contamination
Speed
Precision
Corrosion resistance



DYNAMIC GLOBAL FOOTPRINT

VAT is creating a scalable, cost-efficient and highly customer-oriented organization. We are close to our customers in all major markets, benefiting from scale economies through our global supply chain, and able to adjust capacity quickly in a fast-changing environment.

VAT sales by region

Share total
2018 sales

Americas
33%

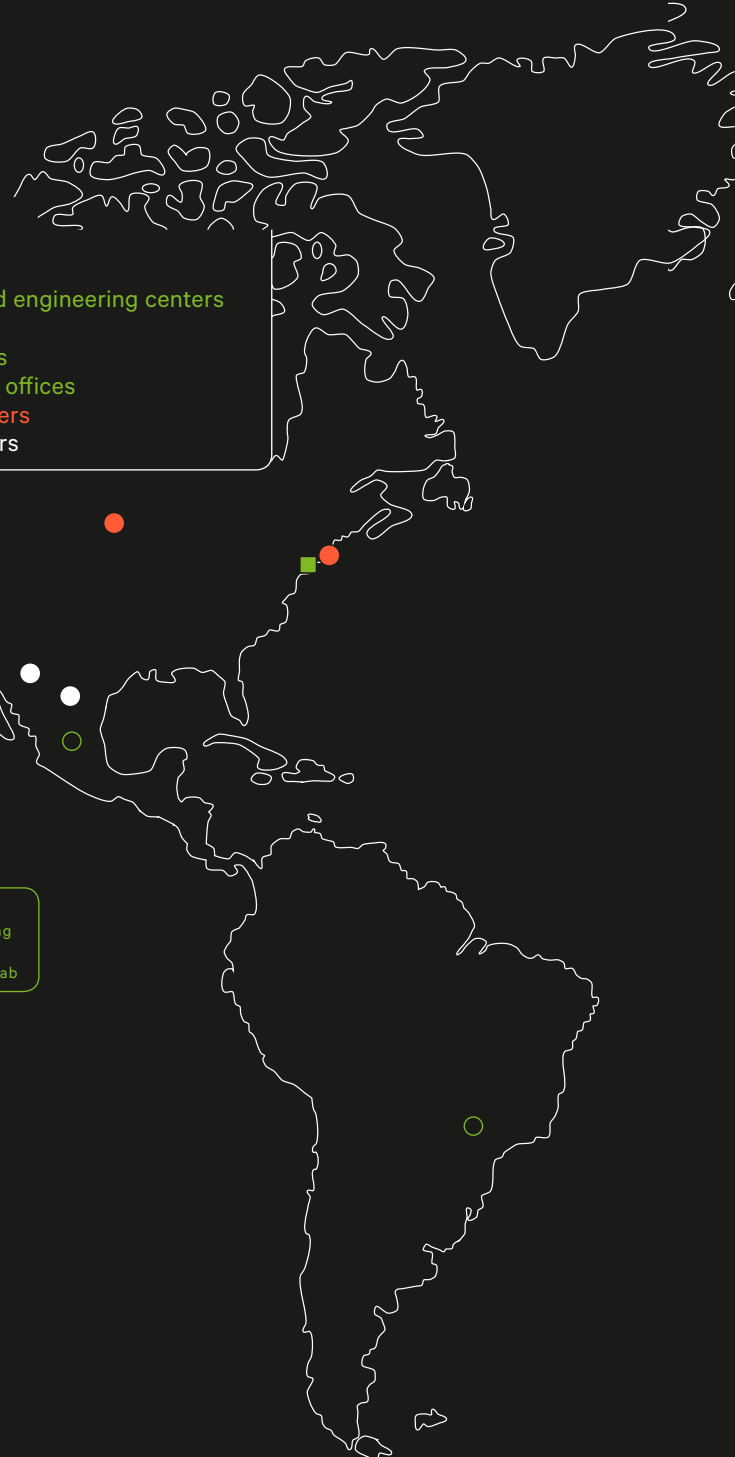
Europe & Middle East
17%

Asia
50%

Close to customers

- VAT production and engineering centers
- VAT locations
- ⊙ VAT service centers
- VAT representative offices
- Top 3 OEM customers
- Top 3 end customers

VAT USA
Application engineering
Customer service
Particle measurement lab



It's a fast and flexible set-up aimed at generating sustainable profitable growth.



* Based on projected capacity at the end of 2020