

Valves

The Valves segment offers the industry's broadest range of high-precision vacuum valves, both standard and customized products. The segment serves mainly original equipment manufacturers (OEMs) and in 2018 comprised four business units: Semiconductors, serving the semiconductor sector; Display & Solar, serving high-end flat-panel display and solar photovoltaic OEMs; General Vacuum for customers in research and OEMs in various industries; and Modules, delivering customized multi-valve solutions. The Valves segment draws from VAT's manufacturing facilities in Switzerland and Malaysia, plus sales, service, and engineering operations in all major markets.

While growth continued in the first six months of 2018, it slowed substantially during the second half. This was driven by a decline in orders from the semiconductor sector which in recent years has seen intense capital spending to build new production capacity, especially for memory chips. This new capacity came on line in 2018, leading to short-term oversupply and the postponement of several capital investment projects. The resulting moderation in demand for vacuum equipment was the main driver of lower full-year 2018 sales in the Valves segment.

The longer-term growth drivers for vacuum process manufacturing equipment remain firmly in place, driven by the increasing complexity of semiconductors and displays and the higher market penetration of devices that can handle more data faster and with less power consumption. This has pushed the market into the zettabyte era, where memory is measured in billions of terabytes and is expected to fuel growth for several years.

Semiconductors: Previous specification wins partly mitigate softer 2018 demand

The Semiconductor business unit was negatively impacted by the demand slowdown in the second half of 2018 and, despite sales generated by successful specification wins from the past two years, full-year

net sales declined compared with the record level achieved in 2017.

Nevertheless, semiconductor OEMs continued to work on yield improvements for existing applications and preparing for the next generation of applications, such as logic chip node sizes of 5 nm and smaller. VAT responded by successfully developing new control valve technologies – resulting in an increase in the number of specification wins in 2018 versus the previous year – to support sales growth in the coming years. The business also qualified its latest flow valves for production at the VAT plant in Malaysia, which will strengthen the company's position as a local supplier in the important Asia market. In addition, both internal and customer tests on the latest generation of transfer valves showed completely particle-free operation based on the most accurate measurement methods currently available. All of these developments will support growth when market demand recovers.

As of the beginning of 2019, the Semiconductors and Modules business units were merged to provide a stronger and more efficient focus on the needs of their company's semiconductor customers, building on common sales channels and leading-edge valve technologies.

Modules: Customized solutions for higher performance in a smaller footprint

VAT's Modules business unit designs customized multiple-valve solutions for specific customer requirements. By combining valves with actuating equipment and other components to move and manipulate materials in a high-vacuum environment, VAT can help customers achieve maximum process purity in a smaller space. The modules can also be designed in a way that makes service and maintenance simpler and faster, leading to lower process downtime.

The Modules business, which mainly serves semiconductor OEMs, was also impacted by the slowdown in the second half of 2018, and net sales declined for the full year. However, Modules continued its successful track record of collaborating early in its customers' product development efforts and recorded almost 20 specification wins in 2018, an increase of almost 30% compared with 2017. The business expects these to lead to market share gains in 2019 and beyond.

Display & Solar: Record results and market share gains

Driven primarily by buoyant demand in the solar sector in 2018, the Display & Solar business unit generated double-digit revenue growth for the third year in a row to achieve another record for net sales.

Growth in the solar sector was particularly strong in China, where the market has been supported by significant government investments. In addition, new technologies aimed at increasing the power conversion rate of solar photovoltaic systems – often involving new and more complex solar cell structures and materials – are driving demand for new vacuum processes and the associated vacuum valve solutions.

In Display, organic light-emitting diode (OLED) displays remain the mainstream technology for most mobile devices in the higher price range. This continues to drive demand for vacuum valves, as these displays require additional and more complex vacuum process steps. Similarly, the increasing manufacture of large-format LCD TVs requires new equipment and manufacturing lines.

VAT responded to these development in 2018 with the introduction of a new G10.5 transfer valve for large display substrates. These were accepted by key customers in Japan and South Korea for etching and plasma-enhanced chemical vapor deposition (PECVD) applications. VAT also successfully developed a new generation of electrically driven pendulum valves that provide more precise soft motions, which are key in display fabrication processes.

Key figures Valves

In CHF million	2018	2017	Change
Order intake	497.5	590.6	-15.8%
Net sales	551.1	554.2	-0.6%
Inter-segment sales	44.4	41.1	+8.0%
Segment net sales	595.5	595.3	+0.0%
Segment EBITDA	192.4	188.6	+2.0%
Segment EBITDA margin ¹	32.3%	31.7%	
Segment net operating assets	631.2	606.8	+4.0%
of which net trade working capital	121.8	108.6	+12.2%

¹ Segment EBITDA as a percentage of Segment net sales

General Vacuum: Record sales in all product categories

The general vacuum business benefited from the generally positive world economy and scientific research environment in 2018 and reported a double-digit increase in net sales and a new record of 70,000 product deliveries.

In the research sector, a record number of projects were running in 2018, including the use of particle accelerators and space simulation chambers for testing satellites that require the highest levels of vacuum purity. This drove record sales of ultra-clean all-metal valves.

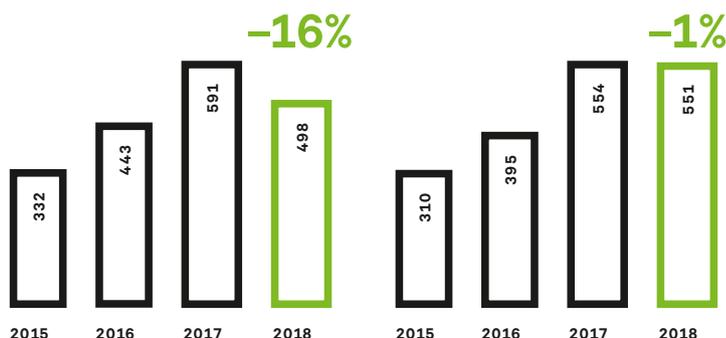
On the industrial side, the business manufactures stainless steel and aluminum valves used in a wide variety of industrial applications and benefited from continued high demand for both customized valve solutions used in individual projects, such as the development of mass spectrometer applications, as well as standard products for use in high-precision manufacturing processes in the automotive, pharmaceutical and other industries.

Performance review 2018 and market outlook

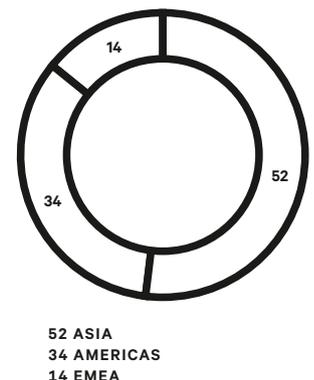
At CHF 551 million, net sales in the Valves segment were basically flat compared with 2017. Net sales in the Display & Solar and General Vacuum business units increased, but were lower in Semiconductors and Modules as a result of softening demand from the semiconductor sector in the second half of the year. Segment EBITDA rose by 2% to CHF 192 million, and the EBITDA margin climbed to 32%, driven by the growth of some higher-margin products in the Display & Solar business unit.

For 2019, VAT expects the overcapacity in some semiconductor-related markets to persist in the first half, which is likely to continue to negatively impact demand for vacuum valves. The company expects this to be partly mitigated by higher demand for general industrial vacuum solutions, while the outlook in the display and solar sectors is mixed. In this environment, the Valves segment will continue to drive targeted growth initiatives in areas not impacted by the slowdown in memory semiconductors, such as logic chips, and to expand its market share with some key customers and through a broader offering to its industrial customers.

Order intake & net sales in CHF mn



Net sales by region %



Global Service

VAT's Global Service segment supplies both OEM and end user customers in all key markets with original spare parts, valve maintenance and service, technical support and training. In addition, Global Service helps customers to improve equipment performance with customized product upgrades and equipment retrofits.

The Global Service segment set a new sales record in 2018 while maintaining high levels of profitability. Sales growth was supported by VAT's growing installed base of valves, and was augmented by the company's increasing focus on equipment retrofit programs and faster maintenance and repair times, which resulted in closer collaboration with the key OEMs in the industry.

Technology innovation by device manufacturers to continuously improve the performance of integrated circuits and displays is driving demand for ever-purer vacuum environments, which in turn drive the need for valve retrofits and upgrades in their existing plants in order to create purer vacuum environments. Additionally, these upgrades often provide

the customer with higher productivity and improved maintenance life cycles, resulting in a rapid payback on their service investment. Since most upgrades target products that have been in the field over ten years, they typically involve multiple improvements. Such upgrades allow the customer to significantly extend the lifetime of their equipment, which helps them generate a higher return from their existing installed assets.

In addition to upgrades and retrofits of valves in the field, VAT continues to offer customers a global network of service and repair centers to maintain their valves at peak working condition. Operating in eight different countries, six of which are in Asia, VAT provides the largest network of valve repair facilities in the market. For example, VAT enhanced its spare parts supply capabilities in South Korea and China to provide better service to large display customers. Being close to customers is a key success factor in the service business and allows for rapid turnaround of maintenance and repair services.

Key figures Global Service

In CHF million	2018	2017	Change
Order intake	108.4	103.6	+4.6%
Net sales	105.8	98.7	+7.1%
Inter-segment sales	-	-	-
Segment net sales	105.8	98.7	+7.1%
Segment EBITDA	49.6	47.6	+4.2%
Segment EBITDA margin ¹	46.9%	48.2%	
Segment net operating assets	118.9	122.5	-3.0%
of which net trade working capital	15.2	15.8	-4.1%

¹ Segment EBITDA as a percentage of Segment net sales

VAT is also developing service products for additional segments of the market, such as subfab valve systems used for pumping and abatement systems operating in harsh conditions below the fabrication floor. These technologically demanding systems are key to protecting process chambers from such things as sudden pump failures. Developing targeted service programs and new service products such as these for VAT’s industry-leading installed base remains a key to the company’s longer-term growth strategy.

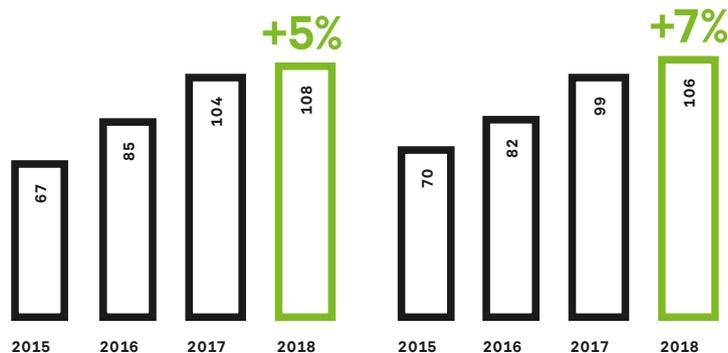
Capacity utilization in the semiconductor industry is expected to remain high, leading customers to focus on improving yield and output. As a result, VAT expects the trend of valve upgrades and retrofits to continue in 2019 and beyond as a way for customers to significantly lower total cost of ownership of their existing assets.

Performance review 2018 and market outlook

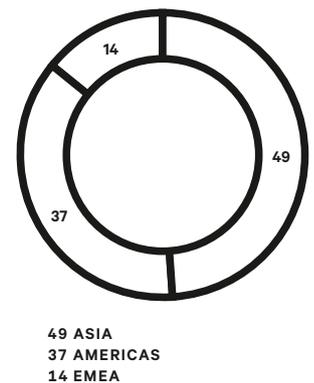
Net sales increased 7% in 2018 to reach CHF 106 million, surpassing the CHF 100-million mark for the first time. Growth was strongest in the service centers and in the subfab market where more customers invested in services to protect their critical processes. Segment EBITDA rose 4% to CHF 50 million. The EBITDA margin amounted to 46.9%, a slight decrease compared to 2017.

VAT expects the market for its Global Service business to remain strong in 2019 as the company continues to build its installed base of vacuum valves and expand its portfolio of upgrades and subfab service products.

Order intake & net sales
in CHF mn



Net sales
by region %



Industry

The Industry segment serves various markets, including semiconductors, automotive, aerospace and medical products. The business manufactures high-precision edge-welded sealing devices. These thin-metal membranes are used in a range of both vacuum and non-vacuum industrial processes, to manufacture products from vacuum valves in semiconductor fabrication to aneroid capsules found in high-pressure fuel injection pumps to pressure storage equipment used in commercial aircraft hydraulic systems. VAT's industry products are also used in medical devices such as drug delivery systems implanted in the human body as well as in medical equipment, such as CT scanners. Another key application is in a wide variety of synchrotron particle accelerators around the world. The segment also manufactures a range of mechanical components and assemblies for the European machinery and construction industry.

After a very strong first half year, the demand for edge-welded bellows for vacuum applications slowed significantly, in line with the softening demand seen in the semiconductor and displays markets, where bellows are used for improved process contamination control. This was more than offset, however, by growth in other industrial markets, especially the automotive sector, where VAT won large orders for dampers used in advanced automotive fuel injection systems that improve fuel efficiency. This market is expected to continue to grow in the coming years.

The Industry segment continued to generate product innovations in 2018, with a focus on advanced bellows solutions that deliver higher sealing performance and greater corrosion resistance for use in a wide variety of industrial applications. The business also invested in upgraded automated production and testing capacity – including ultra-clean machining and welding – to better handle both high-volume orders for damper capsules as well as customized solutions.

Key figures Industry

In CHF million	2018	2017	Change
Order intake	42.2	42	+0.5%
Net sales	41.3	39.5	+4.7%
Inter-segment sales	21.9	22.6	-3.1%
Segment net sales	63.2	62.1	+1.8%
Segment EBITDA	8.4	13.4	-37.3%
Segment EBITDA margin ¹	13.3%	21.5%	
Segment net operating assets	83.1	74.9	+11.0%
of which net trade working capital	20.1	14.8	+35.4%

¹ Segment EBITDA as a percentage of Segment net sales

Performance review 2018 and market outlook

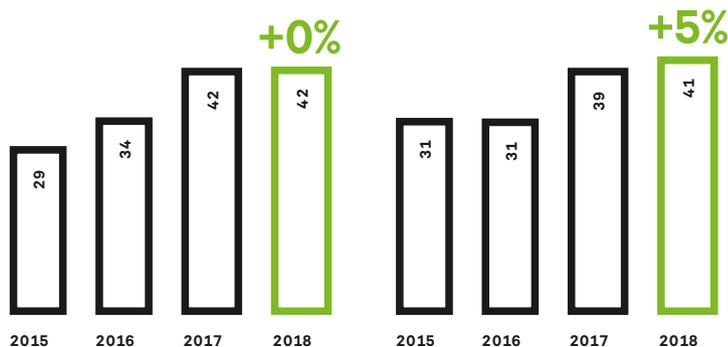
Net sales in the Industry segment grew 5% compared with the year before, reaching CHF 41 million in 2018. Internal sales (not included in the net sales number) to the Valves segment declined 3% to CHF 22 million, reflecting the slowdown in the semiconductor equipment market in the second half of 2018.

The growth in third-party net sales was driven by various industries, led by automotive, and is the result of a focused strategy to increase the penetration of these markets.

Segment EBITDA declined 37% however, as the buildup of capacity in the first half of the year, including investments in new equipment to increase productivity, led to under-absorption in the second half of the year.

For 2019, VAT expects further demand growth across a variety of industrial markets. The automotive market is expected to remain strong, and there will continue to be growth opportunities in the aerospace and medical device segments. Growth in the semiconductor-related markets will depend on the timing of the demand recovery for products such as memory chips. VAT’s Industry segment will continue to expand its product portfolio to tap growth opportunities in new industrial applications as well as to build its existing strong market positions.

Order intake & net sales
in CHF mn



Net sales
by region %

