Flow Control In The Semiconductor Industry - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts 2019 - 2029

Market Report | 2024-02-17 | 191 pages | Mordor Intelligence

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Report description:

The Flow Control Market In The Semiconductor Industry is expected to grow from USD 5.67 billion in 2024 to USD 7.74 billion by 2029, at a CAGR of 6.41% during the forecast period (2024-2029).

The need for tighter process control during semiconductor manufacturing and the growing investment in new production facilities driven by higher demand are among the key factors driving the growth of the studied market.

Key Highlights
-Flow control is highly critical in the semiconductor industry as several processes, including plasma-etch, chemical vapor deposition (CVD), and many other processes, require two or more of these gases to react to produce the passivation layer or essential film, wherein even a slight deviation in gas flow can cause the process to fail. Hence, accurate metering of gas flow into the process chamber is essential.
-Significant advancements in the semiconductor and electronics industries are expected to drive industrial growth. The strong adoption of the work-from-home lifestyle may also add to the surge in demand for electronic equipment caused by the pandemic. Furthermore, with technological advancements and well-established distribution networks, European and US electronics manufacturers strive to expand operations in emerging nations. Furthermore, the increasing popularity of consumer electronics among China's and India's youth is expected to boost the demand for semiconductor chips, which in turn will have a positive impact on the studied market's growth.
-Driven by the growing demand, the semiconductor industry is also witnessing significant growth. For instance, according to the Semiconductor Sector Association (SIA), the global semiconductor industry's sales reached USD 580.13 billion in 2022, a 4.4% growth over the previous year's total of USD 555.89 billion. Although the growth is anticipated to slow down, with SIA anticipating revenue of USD 556.57 billion in 2023, stable growth will positively influence the studied market's growth.

-Due to the existence of major global and local players, the market studied is fragmented as of now. With the increasing complexity of semiconductor manufacturing, the requirement for flow control equipment is also increasing, and much more sophisticated and technologically advanced pumps, valves, and seals are required. Global investment in research and development in power efficiency and facility upgrades in the semiconductor industries are also important drivers of severe competition among companies. The ongoing developments of products and mergers and acquisitions in the market further add to the market's competitiveness.
-However, a higher cost involved with semiconductor manufacturing is anticipated to continue to remain among the major challenging factors for the growth of the studied market. Additionally, the design complexity involved in designing flow control devices/components, considering the critical nature of applications associated with the semiconductor industry, also challenges the growth of the studied market.
-The COVID-19 pandemic had a detrimental impact on the market studied, especially during the initial phase, as the widespread lockdown imposed across the globe significantly disrupted the supply chain and manufacturing capability of chip manufacturers. However, the demand for semiconductor chips significantly increased during the pandemic, which is anticipated to continue during the forecast period, driving investments in new production facilities, which in turn will drive the demand for flow control solutions.

Flow Control Market Trends

Mechanical Seals to Register the Fastest Growth

- A mechanical seal's primary function is to prevent fluid or gas leakage through the clearance between the shaft and the container. Mechanical seals are made up of two faces separated by carbon rings. The revolving equipment comes in touch with the initial face, which is stationary. Furthermore, the seal ring (first face) is the main component of the seal on which the mechanical force generated by springs, bellows, or fluids in the equipment acts. In the semiconductor industry, seals are invariably housed in areas of the processing system where they need to withstand highly corrosive gases, liquids, gases, and plasmas, often in vacuum conditions or at elevated temperatures.
- The mechanical seal market has seen substantial growth in recent years. It is expected to continue to grow in the coming years, primarily due to growing investment in semiconductor manufacturing facilities. In emerging nations, the rise of AI, ML, and IoT, as well as smartphone and consumer electronics development, is predicted to prompt further development policies and investments in the semiconductor industry. Cartridge seals, balanced and unbalanced seals, pusher and non-pusher seals, and conventional seals are examples of mechanical seals impacting the mechanical sealing market expansion.
- In the fabrication of semiconductor products, seal reliability and contamination reduction are crucial. Chemical filtration, chemical transfer, AODD pump sealing, and silicon wafer fabrication are essential semiconductor applications where mechanical seals have proven to be the best option.
- Deposition, etch, ash/strip, plasma, and heat processing or annealing are synergistic process technologies that constitute some of the most difficult environments for elastomer seal materials. These are frequently encountered during the fabrication of semiconductor-integrated circuits. Clean-room manufactured seals with low particle and trace metal contamination are used to minimize yield loss and chemical erosion rates. These seals can provide benefits such as increased system up-time, increased mean time between failure (MTBF), decreased wet clean or mechanical clean frequency, and reduced cost of ownership (CoO) through lower consumable costs (CoC).
- In recent years, the digitization and automation trends have significantly enhanced the demand for semiconductors. For instance, according to SIA and WSTS, sales of semiconductors reached a valuation of USD 580.13 billion globally in 2022, reporting a year-on-year growth of 4.4%. Although it is anticipated to stabilize in the coming years, gradual growth is anticipated during the forecast period, which is anticipated to drive the growth of the studied market during the forecast period.

United States is expected to Hold Significant Market Share

- In recent years, the United States has started taking several initiatives to boost the growth of the semiconductor industry. For instance, in 2022, the Biden administration signed the CHIPS and Science Act. This USD 52.7 billion industrial program intends to support research, improve supply chain resilience, and revive semiconductor manufacturing in the United States.
- The U.S. has experienced increased domestic chip manufacturing facility proposals since the U.S. CHIPS and Science Act was first proposed and up to its adoption in 2022. The development of new plants and research and design projects have received investments totaling more than USD 200 billion. To entice original chip manufacturers (OCMs) to their borders, U.S. states have implemented legislation requiring them to provide additional financing.
- Incentives and forgiven loans for OCMs totaling USD 200 million are being considered by Oregon. New York promised state incentives of USD 5.5 billion, while Michigan authorized over USD 800 million in incentives. Since the CHIPS and Science Act was enacted, OCMs have increased initial investments by a factor of two to three. From USD 12 billion to USD 40 billion, TSMC expanded its investment in Arizona-based factories.
- Due to the CHIPS and Science Act, the United States is well on its path to boosting its proportion of semiconductor production worldwide as the USD 52.7 billion aims for the overall development of the semiconductor industry, which include USD 39 billion as manufacturing incentives, USD 13.2 billion for R&D and workforce development, and USD 500 million for semiconductor supply chain activities and international information communications technology (ICT) security.

Flow Control Industry Overview

The competitive rivalry among the flow control equipment providers is moderate, owing to the presence of various dominating brands competing for market shares globally, making the market moderately competitive. The demand for vacuum pumps has spiked in recent years due to the massive consumer electronics and smartphone penetration across developing countries. This is leading to an increased focus on customer acquisition and formulating distribution channels as key strategies. Some key market players include Pfeiffer Vacuum GmbH, Atlas Copco AB, Gardner Denver, and Busch Holding GmbH.

In December 2022, Atlas Copco expanded its foothold in the US by building new semiconductor production facilities. To help the quickly expanding North American semiconductor industry, Edwards, a subsidiary of the Atlas Copco Group, kicked off two new production plants in Arizona and Massachusetts.

In November 2022, Pfeiffer Vacuum offered the first hermetically sealed rotary vane pump for mass spectrometry. The SmartVane is a backup pump for mass spectrometers (ICP-MS, LC/MS) used in pharmaceutical and clinical analytics, food and environmental analytics, and other related fields. Its vacuum pump's construction prevents contamination by making sure there are no oil leaks. The SmartVane features extended maintenance intervals because there is no need for a traditional seal due to the integrated motor.

Additional Benefits:

- The market estimate (ME) sheet in Excel format
- 3 months of analyst support

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