

The Siemens logo is displayed in a bold, teal, sans-serif font.

Ingenuity for life

Case Study

 **DFS** Diversified Fluid Solutions
A Critical Process Systems Group Company

Manufacturer sets new standards in High Purity Gas distribution systems for the semiconductor market

Customer Diversified Fluid Solutions is a semiconductor industry leader that manufactures best in class High Purity Gas and Chemical Blending and Distribution equipment.

Challenge The company chose to enter the global gas market with a flagship product that challenged the company and its internal resources to introduce industry-first automation and control standards for gas system delivery.

Solution Diversified Fluid Solutions used a high-performance PLC, HMI and the Totally Integrated Automation (TIA) Portal to design a gas delivery system that has 100 percent visibility of all operational parameters and automated pressure control.

Unprecedented automation, control and connectivity for gas delivery

Manufacturers that provide High Purity Gases have also historically provided gas delivery equipment to the semiconductor industry. Many gas delivery systems used today are legacy, off-the-shelf products that have existed for decades. Demand for specialty gases has dramatically grown within the semiconductor industry, particularly for technological innovation. The time arrived for gas delivery systems to evolve as well.

Diversified Fluid Solutions (DFS) recognized that legacy gas distribution systems were not open or flexible, and offered limited external connectivity for monitoring and manual pressure control. The company applied its expertise, ingenuity and partnership with Siemens to develop a modern gas system that set new industry standards by delivering much-needed connectivity, a flexible networkable platform and automated pressure control.



The Customer

Diversified Fluid Solutions, based in Boise, Idaho, is a global manufacturer of High Purity Gas and Chemical Blending and Distribution systems for the semiconductor industry. The company also provides technical, mechanical, electrical and software programming expertise and support for numerous gas and chemical applications.

DFS has an impeccable reputation for service and a talented staff of design engineers and manufacturing craftsmen with deep experience in designing, building and maintaining gas and chemical systems. The company serves organizations in high-volume microelectronic production and research, and in other industries that require precise control over gas and fluid processes. **Diversified Fluid Solutions** is part of **Critical Process Systems Group (CPS)**, a global leader in manufacturing process solutions.

The Challenge

Entering a new market with innovation in mind

Diversified Fluid Solutions had two objectives in building a new gas delivery product for the semiconductor market: The company wanted to diversify its offerings, and help the semiconductor market transform legacy and proprietary gas delivery systems. The challenge was to transcend old system technology with an open network, connectivity, and automated pressure control with a footprint that would fit within existing gas cabinets.

“When we set out on this mission to diversify our offerings, our long-held core competency was in chemical delivery and blending system manufacturing,” said Darren Willey, president of Diversified Fluid Solutions. “With our expertise and skill sets

in this market, we believed it was smart business and good for the semiconductor market for DFS to build in-house capabilities and capacity to serve the gas market.

“The challenge from day one was to design and build a better gas delivery system, from electrical designs to specifications for all of the components,” Willey said. “Then we had to define the operation of the gas cabinet – how the system would operate within the parameters of what the industry is used to seeing – and how a new system could be retrofitted into existing physical cabinets, which were very small and compact.”

Challenges and scope of the project

Diversified Fluid Solutions chose to develop a High Purity Gas delivery system that would:

- Ramp up internal capacity and programming expertise to serve the gas market.
- Comprise an open, state-of-the-art PLC and HMI panel, suitable for the global market.
- Be retrofitted within existing, compact physical cabinets (form factor was critical).
- Fully automate pressure control, operational sequences and networkability.
- Give end users 100 percent visibility of all operational parameters.
- Allow users to control, interface and monitor all aspects of cabinet operation.
- Deliver a game-changing system that looks as good as it operates

Introducing an industry first

In developing its flagship product for the gas market, DFS wanted to add fully automated pressure control, something not offered in the industry’s current manual process.

“We found a way to automate the pressure control function of our new gas delivery system through the use of Siemens PLC complex algorithms, and new pressure control regulators, using our chemical pressure control technology repurposed for the gas world,” said Kelly McDonald, Senior Gas Technologist Diversified Fluid Solutions.

The Solution

Compact, open and connected

Although automated High Purity Gas cabinets already existed, the system conceived by DFS presents an industry-first platform. The new system would replace closed, proprietary systems with a fully networkable control system, connectivity, and automated gas feed pressure control – all within existing cabinetry.



Siemens was chosen for its newest SIMATIC PLC technology, especially its Totally Integrated Automation (TIA) architecture and the TIA Portal engineering framework, an integrated engineering framework for all your automation tasks.

To accommodate size constraints of existing control cabinets, DFS selected the compact design of the Siemens SIMATIC ET 200SP S7-1510 CPU to deliver efficient engineering and maximum power with a small footprint. The integrated systems would enable automated pressure control for gas delivery by generating automated feeds and responsiveness that did not previously exist in the industry.

The SIMATIC HMI Comfort Panels allow for machine-level visualization across the entire engineering and software spectrum. Since remote access and data logging were also critical requirements, DFS used the SIMATIC Sm@rtServer in the configuration. Through integration with the Comfort Panels, the Sm@rtServer gives operators the ability to access and control the system from any location via the Internet or Intranet, and also allows operators to gather data logs.

Completely integrated with a common database

All automation was configured using the Siemens TIA Portal for unrestricted access to all solutions in a single framework with shared data storage. Leveraging the full power of the TIA Portal was important to DFS because it would allow the company to develop engineering standards utilizing the TIA Portal Global Library concept, and quickly deploy a variety of functionality that could be customized for unique customer requirements.

“This advanced platform positions us and our clients for up to 30 years with the latest scalable technology and the most functionality for a gas delivery system, which has been closed in the past. It’s all about improving process efficiencies,” said Willey.

“While we spoke with several automation providers, Siemens is a reputable brand in the gas world and has a big stake in global acceptance. We wanted to put a product out there that would meet our requirements and those of our customers, but also one that would be widely accepted,” Willey said.

“We knew Siemens was going to provide that platform. Our decision was also based on Siemens experience, consulting guidance, pricing and support. Price points were extremely good, and the service Siemens is known for worldwide is real. Their support of our efforts has been phenomenal,” said Willey.

Siemens provided all automation products within the control cabinet, and helped develop the application to leverage the full benefits of TIA Portal. DFS installed and performed the integration of the components.

The Results

A leap in technology for a new industry standard

The Ac_vFLO Gas Cabinet from Diversified Fluid Solutions was introduced to the market at SEMICON West 2016. The system delivers on its promise of connectivity and networkability, automated pressure control, and state-of-the-art operational sequences, allowing end users to control, interface and monitor all aspects of the cabinet operation.

The system, recommended for a range of gases, including toxics, corrosives, oxidizers, inert and flammables, is defining the new standard in High Purity Gas cabinet technology. It is available in multiple configurations to meet unique requirements, including a 2-cylinder auto-switchover configuration, a 2-cylinder independent outlet for compatible gases, and a 3-cylinder auto-switchover with an on-board purge cylinder.

Challenges

- Entering a new market required Diversified Fluid Solutions to build capacity and programming expertise to serve the gas market.
- The key challenge was to develop a game-changing gas delivery system with more functionality and capabilities than the industry had ever seen – including an open, fully integrated PLC and HMI panel, with connectivity and networkability, operational sequences, and automated pressure control.
- The system had to be retrofitted within existing, compact physical cabinets.
- The system had to give end users 100 percent visibility of all operational parameters, and allow users to control, interface with and monitor all aspects of cabinet operation from a variety of third-party software platforms.

Benefits

- **Form Factor and Density:** The size, shape, functionality and connectivity of the SIMATIC ET 200SP S7-1510 controller allow I/O and the processor to fit in a small cabinet and perform seamlessly integrated operations.
- **HMI Connectivity:** SIMATIC HMI Comfort panels and functionality allow end users to remotely access all parameters within the gas delivery control system.
- **Continuous Flow:** The system provides a continuous gas flow to process production tools with minimal technician intervention.
- **Automated Pressure:** The system automatically controls supply point pressure without the use of manual regulators or additional adjustments.
- **Psig Improvement:** Automated gas delivery pressure control and auto crossovers benefit from real time regulator adjustments to help minimize pressure fluctuations.
- **Reduced Technician Interface:** Technician interface with the system has been reduced by 30 percent through automated pressure control technology.
- **Improved Safety:** No longer does an operator have to open the cabinet to make manual pressure adjustments because the system does it automatically.
- **Better Process Control:** Controls are constant, reducing the need for process changes and reaction to issues.



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