

Case Study

Hoffmann Filter Reduces Wiring, Improves Filter Diagnostics

With Siemens Unique, In-Cabinet IO-Link

From the automotive sector to startups, manufacturers know that contaminated grinding and cutting system cooling lubricants can wreak havoc on the bottom line. Improperly filtered fluids damage components costing hundreds of thousands of dollars on multi-million-dollar systems. Imprecise parts waste labor time and materials. And, when an automotive production line goes down, it can cost tens of thousands per minute.

For more than 30 years, Hoffmann Filter Corporation, Brighton, Michigan, has partnered with manufacturers large and small supplying them with compact, dependable and effective filtration systems. The company's filters deliver filter fineness from one to 100 microns. Its filtration capacities are extensive as well, from five to more than 2,000 gallons-per-minute (GPM). Cooling capacities range from one to 200 tons.

Commonly found in aerospace, automotive, medical, tool, wind and other industrial machine shops, Hoffmann Filter has gained its

leadership position through constant technological innovation that is laser focused on quality and the end-use customer.



Hoffmann Filter UBF 300 undergoing operational testing prior to shipment.

Mark Keylon, Hoffmann Filter’s engineering manager, points to a recent sensor and actuator communication upgrade as an example of this commitment to innovation. While similar communication methodologies are located outside of the control cabinet, Keylon says Siemens IO-Link is unique because it can connect motor starters to a controller inside the cabinet, the first and only company to do so.

Now a basic feature on most of its filtration systems, he says by offering the open communications standard inside the cabinet, Hoffmann Filter has significantly decreased wiring and labor costs, while improving customer maintenance system diagnostics.

“Most of our systems are now entirely IO-Link,” Keylon says. “I initially took it to Hoffmann Filter management and explained the benefits, including being a lot more cost effective, especially with wiring reduction and easy programming.”

Reduced Wiring a Big Selling Point

IO-Link technology is designed to reduce wiring because it offers point-to-point sensor and actuator connection to the control system. Parameter and diagnostics data are transmitted in addition to the cyclic operating data for the connected sensors/actuators (and in this case motor starters) using unshielded three-wire cable.

“Our total output is between 100 and 120 control panels a year,” Keylon says. “Let’s say an average panel build takes about 50 hours to start and finish. Because we can install IO-Link inside the panel, we’ve reduced build time to about 40 hours per panel. That can save us \$200 to \$500 per panel. It’s really great.”

Additionally, Keylon says the IO-Link upgrade has allowed Hoffmann Filter to remove all auxiliary contacts within the control panels. “That is another \$15 or so in savings per overload.”

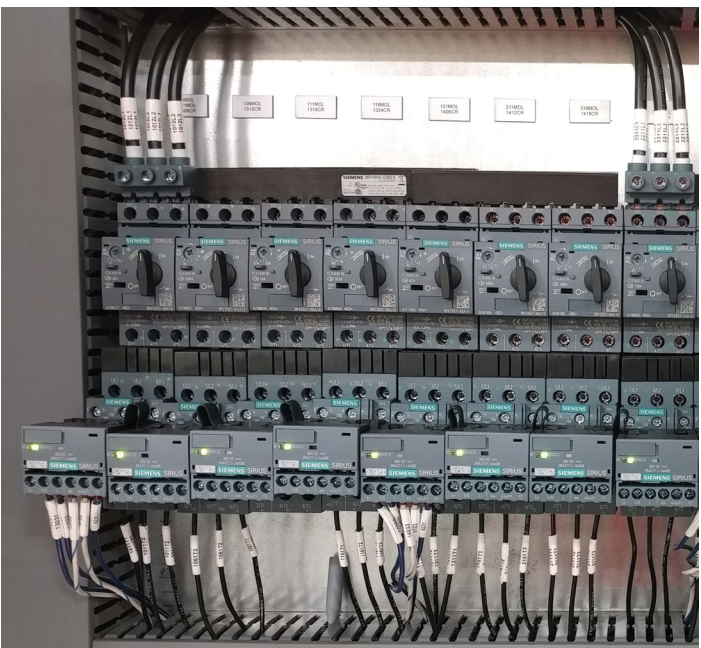
Derek Bolton, industrial controls specialist for Electro-Matic Products, Detroit, worked with Siemens and Keylon on the in-cabinet, IO-Link upgrade. He agrees that installing the communications hardware inside the control panels has saved Hoffmann Filter a significant amount of wiring costs.

“They were terminating five wires per starter and sometimes more because of customer requirements,” Bolton says. “There were connections duplicated needlessly due to hard-wired limitations.”

Following the IO-Link upgrade, Bolton says Hoffmann Filter reduced the wire count from approximately 45 wires on eight motor starters to around ten in the original design. “There was definitely a significant reduction in wire count,” he says.



Before



After

Previous designs required 5-6 connections per each motor starter whereas the new Siemens IO-Link design allows us to make 5 connections to control 4 motor starters.

Easy Commissioning and Maintenance

In the early stages of the upgrade, Keylon met with Bolton and Siemens engineers every two weeks to address commissioning questions. On occasion, he would present his questions over the phone, often times resulting in onsite visits.

"When the learning curve was over with the first system, commissioning IO-Link into the control cabinets became quite easy. Siemens and Electro-Matic were both fantastic resources and helped us out a great deal."

Additionally, Keylon says his customers have reported no problems with the IO-Link installations. They have noted that maintenance has been simplified. "They can swap out a bad sensor and not have to recreate any set points," Keylon says. "They just swap it out and it goes."

Bolton adds that because the need to pull wires into the control cabinet has been greatly reduced, chances for error have also diminished.

"We showed to Mark that Siemens could help control the logic in their system reducing opportunities for wiring errors since fewer connections are terminated by others," Bolton says. "Since there are fewer points of termination, others cannot point to loose wires as the cause of faults in the system."

Bolton says replacing a motor starter has also been simplified. Each starter has an IO-Link Communication Module mounted on the front with the same part number and three to five wires per group of four starters. Connections between the four starters is done with plug in ribbon cables reducing additional remaining discrete control wiring and labor. Logic is handled in the PLC in the same manner as used in discrete input and output modules. In essence, the IO-Link master uses one and zero-binary signals. The IO-Link master is the core of the IO-Link installation and communicates with the controller at the sensor/actuator level.

"If a motor load changes, simply replace the breaker and possibly the contactor if the load increases. Return the IO-Link communications module onto the face of the contactor. The master stores the preconfigured IO requirements and instructs the control module to run the motor without additional programming. If the communications module fails, they can just unplug the faulted module on the starter, replace it with a new one of the same part number and away you go!"

When maintenance is required, following the lock out/tag out procedure and the disconnect is deactivated, technicians can easily make changes. "When the main disconnect is closed and power is cycled onto the replacement products, the starters run based upon their IO configuration in the master. I-O Link just knows what to do!" Bolton says.

Enhanced Diagnostics

Now that the need for auxiliary contacts has been eliminated, diagnostic data is pulled directly from IO-Link and displayed on a Siemens Simatic HMI KTP700 Basic Touch Panel, mounted on the front of the control cabinet. Each cabinet, depending on the filter application, may also include a disconnect or Siemens circuit breakers, relays, motor controllers and Sitop power supply for a 24-volt, DC Simatic (S7-1214) controller.

"We can determine if the overload is tripped or not because that information is included in the IO-Link data," Keylon says. "Previously, we'd need auxiliary contacts to be able to read whether the overload's tripped, or if a contactor is opened or closed."



External sensors now plug into IO-Link master modules external to the enclosure. This reduces the number of entries into the enclosure from up to 16 devices to 3 connections for power and PROFINET signal.

"Now that diagnostics are being handled in logic instead of single IO points, it is possible to pinpoint the source of a bus fault through the IO-Link identifier," Bolton says.

"Technicians can differentiate between whether a single circuit is off, or if several circuits are off, in the same group," Bolton says. "Those diagnostics are in the IO-Link master and you don't have to create logic to get this data. This has also reduced engineering time."

Keylon says Hoffmann Filters covers IO-Link's advanced diagnostics capabilities with customers in detail as well as in instruction manuals, including whether an overload is tripped, or a contactor is closed or opened.

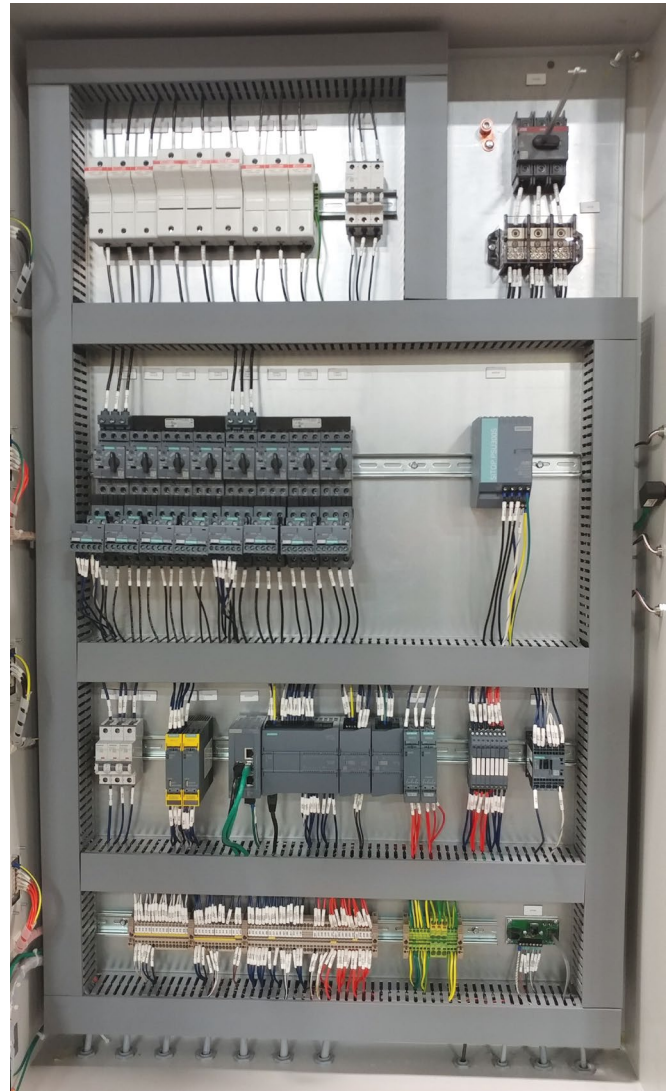
Technology Like No Other

Installing IO-Link inside the control cabinet presents Hoffman Filter's customers with new levels of reliability and diagnostic capabilities to keep their systems running, Keylon says.

"A lot of our customers are commenting that this is really high tech," Keylon says. "We are on the cutting edge of innovation as far as IO-Link is concerned within the filter system industry. No other filter provider utilizes IO-Link inside the cabinet like we do. That's why it is such a unique solution for motor starters or whatever else we put on the IO-Link communication technology."

To learn more about Hoffmann Filter Corporation's products, visit their website at www.hoffmannfilter.com.

To learn more about Electro-Matic, visit their website at <https://products.electro-matic.com/>.



Enclosures are much more simplified and have a cleaner appearance due to utilizing Siemens IO-Link capabilities.

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