Oil and gas industry OEM provides single-source, cost-effective HVAC and building-management control system

**Background**

Oil production from bitumen – the heavy, tar-like substance found in regions around the world – is a booming industry. Technological advancements combined with the ever-increasing global demand for petroleum resources have made this previously cost-prohibitive method of oil production a viable addition to the world’s oil and gas resources. Canada is currently the largest known region of natural bitumen deposits, also known as “unconventional oil.”

To respond to this growing demand, each company serving the oil sands industry is seeking to quickly and safely establish facilities in order to begin production – and revenue generation – as soon as possible.

**Solutions**

**Safety Solutions**
- Allen-Bradley ControlLogix controller rated for SIL-2 applications provides the intelligence for the BMS system.

**Connected Components**
- Allen-Bradley MicroLogix controller-based system and PowerFlex drives provide robust, flexible control for the company’s custom-built air handling units.

**Global Solutions**
- The Rockwell Automation Global Solutions team designed and delivered building-management systems to control the plantwide HVAC system.

**PartnerNetwork**
- Collaboration among OEM program member SSM, Encompass partners Hoffman and Spectrum, and distributor Westburne Electric provided simplified project execution, innovative solutions and collaborative business opportunities.

**Results**

**Increased Profitability**
- Fifty percent cost savings over existing HVAC control solution
- Increased business opportunities thanks to PartnerNetwork collaboration

**Streamlined Supply Chain**
- Reduced number of control solution vendors
- Reduced end user’s spare parts inventory
- Single point of contact for all control hardware

**Improved Troubleshooting and Maintenance**
- End user makes a single call to obtain support on the HVAC and BMS system
- Simplified startup thanks to common programming environment
Challenge
The Athabasca Oil Sands region in Canada is home to multiple billion barrels of recoverable bitumen resources. When one large multinational oil company began work on a major project in the region, it was critical that all systems function as planned. Any delay in the building or startup of a project of this magnitude could result in a loss of as much as several million dollars per day.

In the race to build and commission production facilities, many oil and gas producers overlook the critical role a heating, ventilating and air conditioning (HVAC) system plays in a quick and efficient startup. Industrial HVAC systems used in the open-pit mines built for bitumen extraction are essential components of the overall process, responsible for cooling the cokers, mixers, turbines, chemical heat exchangers, and control rooms that drive the entire process. In many cases, if the HVAC system is down for any reason, production downtime will follow.

The company executing the project understood this risk and in 2009 tasked its engineering, procurement and construction (EPC) company with identifying a single provider for the project’s HVAC and building management system (BMS) solution.

“The oil and gas end user insisted on having a single vendor for the HVAC and BMS controls,” explained Rick Melia, general manager, Scott Springfield Manufacturing (SSM). “For them, it was about streamlining maintenance and spare parts. They wanted a single supplier for simplified maintenance and a smaller spare part inventory. We understood how critical the HVAC control system was for simplifying and speeding troubleshooting to preserve production uptime, and made sure it was a high priority in the early project stages.”

Solutions
The EPC on the project ultimately selected SSM, a Rockwell Automation PartnerNetwork OEM program member, to provide the HVAC and BMS, based on the company’s long and proven record of HVAC experience. “The first phase of the project called for 183 air handling units and 43 BMS systems,” explained Melia. “We needed a partner that could provide controls for both systems, as well as supply the knowledge and experience that we lacked in designing and installing BMS systems.”

The SSM team reviewed proposals from multiple controls vendors, but ultimately selected Rockwell Automation to provide control hardware for the HVAC solution, as well as BMS system design, engineering and commissioning services from the Rockwell Automation Global Solutions team. “The Rockwell Automation team was able to deliver everything we needed: a cost-effective, flexible control solution for the HVAC system, and the domain knowledge, industry experience and project management capabilities to efficiently and cost-effectively implement the BMS solution,” said Melia.

Allen-Bradley PowerFlex 40 variable frequency drives control fan speed, allowing operators to select and automate their preferred fan speed.
SSM implemented an HVAC control system based on the Allen-Bradley® MicroLogix™ 1400 controller to accommodate the robust communication and troubleshooting requirements the end user required for its system. Allen-Bradley PowerFlex® 40 variable frequency drives control fan speed, allowing operators to select and automate their preferred fan speed. To complete the system, the SSM team used Allen-Bradley IEC contactors and overloads, push buttons, terminal blocks, power supplies, safety and control relays, power distribution blocks and high-density I/O cards from PartnerNetwork™ Encompass™ program member Spectrum. In addition, the control system bill of materials – including Encompass Partner products – is available from SSM’s local authorized Allen-Bradley distributor Westburne Electric as a single purchase order, which helped simplify SSM’s procurement process, as long as the EPC maintains a consistent engineering specification.

"Forty percent of the HVAC units we delivered for phase one of the Kearl project are located in hazardous locations," explained Melia. "Because the MicroLogix controller is Class I, Division II rated, we were able to avoid purchasing expensive air-purge panels or NEMA 7/9 enclosures, which meant cost savings for us and a simplified, easier-to-maintain solution for the end user."

For the BMS, the Rockwell Automation Global Solutions team designed, programmed, installed and commissioned a control system based on the company’s Integrated Architecture™ system. A SIL-2 certified, Allen-Bradley ControlLogix® programmable automation controller provides the HVAC system intelligence for the SSM-designed air handler and the peripheral unit heaters, exhaust fans and dampers. The system communicates data from the HVAC system directly to the facility-wide process control system via an EtherNet/IP™ network for improved system reliability. So that the HVAC, process control, and fire and gas systems could maintain robust communications connections, the Rockwell Automation team installed Allen-Bradley Stratix 8000™ managed Ethernet switches. Allen-Bradley PanelView™ Plus human-machine interfaces offer operators intuitive, easy-to-navigate access to system health and operation data.

"The end user understands that a healthy HVAC system is critical to managing oil extraction process uptime," said Melia. "The BMS provides the company with real-time operational data on everything from air flow and temperature, to steam temperature and electrical amp draws, to the central control system. That means control room operators get actionable data immediately, and if something is wrong, they can easily troubleshoot the issue and get the system up and running quickly."

The system communicates data from the HVAC system directly to the facility-wide process control system via an EtherNet/IP network for improved system reliability.
Results

The first phase of the project is due to begin startup and commissioning efforts in 2012. SSM anticipates that the oil and gas producer's spare parts inventory will be significantly reduced compared to other oil sands projects. In addition, being able to get all the hardware they require from a local distributor simplifies the procurement process for SSM.

“When we get to the commissioning phase, we anticipate being able to reduce our on-site support from two people to one, thanks to the common programming language between the two systems and the pre-testing that was conducted on the system,” said Melia. “The operators should also have an easier time with maintenance and troubleshooting due to the system’s robust data reporting capabilities and single programming language. Plus, they’ll only need to make one phone call should they need outside support.”

From a hardware perspective, using industrial-rated controllers in hazardous locations saved almost 50 percent in costs that would have otherwise been spent purchasing more expensive NEMA 7/9 enclosures or the air purge panels required when using traditional HVAC controllers. From the end user’s perspective, the flexibility of the industrial control solution allows them to easily and cost-effectively add I/O points should they want to expand the system’s capabilities in the future.

“Our relationship with Rockwell Automation has opened our eyes to what’s possible in terms of serving both current customers and customers in new industries with cutting-edge technology,” said Melia. “We’ve formed a strong relationship with Rockwell Automation, and see a lot of future business opportunities to combine our expertise and deliver innovative HVAC control solutions to the market.”

Rockwell Automation also provided an invaluable service in designing and engineering a BMS system that met end user’s specifications on time and on budget. “Ultimately, we wanted to provide our customer with exactly what they asked for – an easy-to-use, seamlessly integrated air handling system – on time and on budget,” said Melia. “Partnering with Rockwell Automation allowed us to do exactly that – while also empowering us to extend our own capabilities.”

The results mentioned above are specific to Scott Springfield Manufacturing’s use of Rockwell Automation products and services in conjunction with other products. Specific results may vary for other customers.