



Case Study: Alliance Pipeline Sheds Proprietary GE Mark V Communications

When Alliance Pipeline Ltd. chose to use GE Mark V turbine micro-controllers¹ to regulate the flow of approximately 1.6 billion cubic feet of rich natural gas along its 3700-kilometre pipeline², it had to use GE's Cimplicity Human Machine Interface (HMI), by default. The reason: only Cimplicity had the Turbine Control Interface (TCI) software needed to communicate with the Mark V controller via the GE Standard Messaging (GSM) protocol over ArcNet. Lacking this interface, other HMIs had no access to real-time and alarm-and-event (A&E) data.

When Alliance implemented the system, it soon found itself in a true one-step-forward-two-steps-back situation. While Cimplicity could communicate with the Mark Vs, it could not accommodate the data throughput Alliance needed. Alliance searched the market and found that MatrikonOPC was the only company offering a viable solution.

ESTABLISHING OPC COMMUNICATION WITH THE MARK V

To resolve the data throughput issue, Alliance turned to MatrikonOPC and using OPC technology could soon transfer over 2000 real-time points per second with the MatrikonOPC Server for Mark V/VI (GSM). Dave Stuart, Alliance Pipeline Operations Manager, explains

"...we implemented OPC because we could not get enough data out of the Mark V controller. Under our original GE system we were only able to move 500 points of data per second. With the original Alliance MatrikonOPC [Server for Mark V/VI (GSM)] we were able to move 2000 points (or scans) per second."

As is often the case, resolving one issue uncovers others. While Alliance could achieve the required 2000+ real-time data rate using MatrikonOPC, it became apparent that the GSM software did not work reliably and could trip the turbine - causing it to shut down. This posed a serious problem to both pipeline operations and the long-term health of the turbine. The 34-MW turbines run at approximately 6,100 RPM directly feeding the compressors - unnecessary shutdowns unnecessarily stress the components.

In addition, Alliance identified Citect as its HMI of choice but could not use it because, here again, proprietary turbine controller communications precluded the use of any third party HMIs.

Instead of sinking more money into a proprietary -- vendor specific solution,

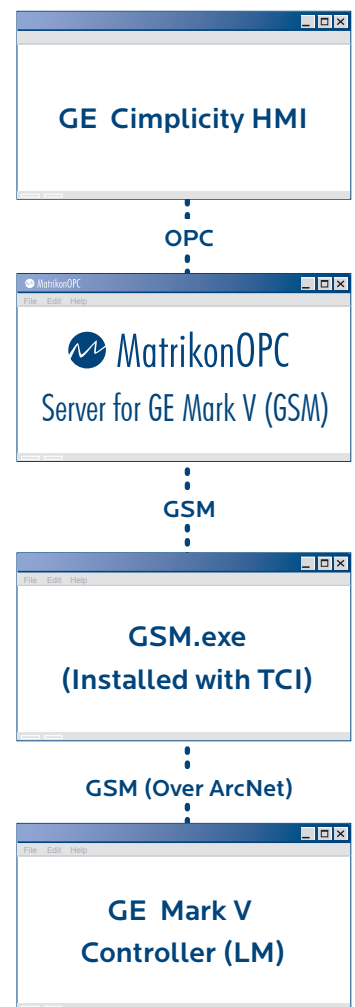


Figure 1 - OPC connection to GE-Mark V via GSM

Alliance took stock of the situation and addressed the issue head on. Given the success of the original MatrikonOPC solution, Alliance approached MatrikonOPC to implement an upgrade that would:

- 1. Remove the GSM component.** "The reason to move to the new Version of Matrikon was to get rid of the GSM component. GSM is potentially dangerous to the Mark V in that it posed a risk of tripping (re-starting) the GE Mark V controller unit."
- 2. Allow it to better manage Mark V R-Core idle time** (similar to the Microsoft Windows Task Manager's "Idle Process" measurement). As Dwayne explained, the importance of this feature was that "...If the Mark V becomes too busy and the idle time drops below 12-13%, the Mark V could trip." An important consideration given that avoiding such 'trips' "...helps increase the life and health of the Mark V."
- 3. Expose real-time and A&E data** without the use of proprietary GE drivers and products.
- 4. Boost reliability to provide stable, 24/7, communications**
- 5. Reduce implementation costs** while maximizing functionality

OPEN MARK V COMMUNICATIONS



As a result, MatrikonOPC accelerated the development of its next generation **MatrikonOPC Server for the Mark V (Direct)**.

The new version marked a significant departure from the way its predecessor communicated with the Mark V controller. As the word "Direct" in its name implies, the new OPC Server communicates directly with the Mark V for both real time data (OPC DA) and Alarm & Event information (OPC A&E). At once eliminating the need to use TCI/GSM and the need to use the Cimplicity HMI, which until now was the only HMI capable of accessing

the controller's alarm and event information. This was exactly what Alliance was looking for. As Dwayne put it "The reason to move to the new version of Matrikon[OPC Server for Mark V] was to get rid of the GSM component."

Leveraging its ability to communicate directly with the turbine controller, the MatrikonOPC Server for Mark V (Direct) also allows OPC enabled clients, such as HMI's or historians, to directly monitor the Mark V's controller loading via a built in tag. This controller idle-time, reported as a percentage, lets Alliance adjust tag-quantity and update-rates based on precise, quantitative measurements instead of approximations and 'gut-feel'. The benefit? Alliance can optimize how much and how quickly it transfers data to tune the turbine for efficient use without tripping it.

From a **business perspective**, Alliance needed to address the GE product based communication issues to more reliably control the Mark V and do so in a budget-conscious fashion. Working with MatrikonOPC, Alliance recognized it could achieve both goals. While MatrikonOPC addressed the technical aspects, would using OPC save Alliance money? Dave Stuart thinks so.

"Definitely in the long run. A GE Solution would have been more expensive than this solution. It wouldn't have resulted in the same quality end product."

Dave goes on to elaborate the benefits of adopting MatrikonOPC technology:

"The benefit for us is increased data availability (2000+ scans as opposed to 500 with the GE solution), the idle time has gone up on the Mark V that helps to increase its life and health. We got rid of GSM- which eliminated the danger of OPC tripping Mark V, we have enhanced A&E monitoring, and we now have the ability to trend diagnostic data which we did not have before".

QUICK STATS	
Total Points	4,000 per station or 72,000 total
Points Read	64,800
Points Written	7,200
Update Frequency	Typically 1 second. Possible up to 100 milliseconds

Figure 2 - Direct OPC Server Connection to GE-Mark V

"The development and implementation of the overall solution is on-going. Asked how well the implementation is performing, Alliance Pipeline IT Analyst Dwayne Peardon replied "We are still in the development and testing stage...[but] in the test lab it has performed exceptionally well."

By choosing to standardize their communications on an open, MatrikonOPC solution, Alliance Pipeline could easily and reliably communicate with its Mark V controllers using third party solutions of choice, such as the Citect HMI.

¹ Mark V was GE's second generation of micro-processor based control for gas and steam turbines. Over 2,742 units shipped from 1991 to 2004 for power generation and mechanical drive applications. – GE Power

² Based in Calgary, Alberta, the Alliance Pipeline system transports approximately 1.6 billion cubic feet of rich natural gas from British Columbia and Alberta through Saskatchewan, North Dakota, Minnesota, and Iowa to its terminus in Illinois, USA. There are 14 compressor stations located across the mainline system.

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