

ECONOMICS OF ELECTRONIC GAS MEASUREMENT

Class # 3110

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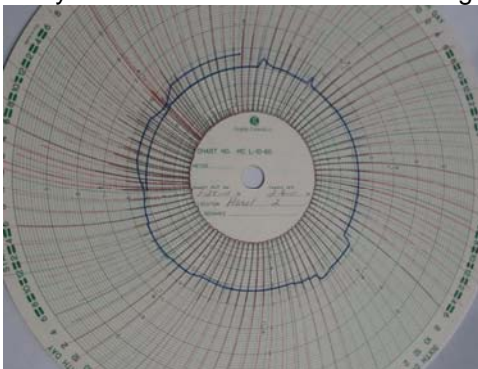
Introduction

Reasons to upgrade chart recorders to Electronic Flow Measurement (EFM) is a discussion that has been ongoing for years. In the early years EFMs were limited in their capabilities and the cost was high so companies were slow in accepting them. Being able to see measurement and pipeline pressures remotely was needed but the technology wasn't there yet. Today the EFMs can provide a vast array of information, accurately and timely at a reduced cost. Many companies have already switched to EFMs but there are several companies that haven't made the jump yet especially producers. There are several factors to consider when making the decision to switch from chart recorders to EFM's. This discussion will explain the benefits of having remote access to meters and production equipment. There is a cost to removing chart recorders and installing EFMs with communications but the benefits can easily outweigh the expense. Listed below are the areas that will be discussed concerning these benefits.

- Measurement accuracy
- Controlling pipeline pressures
- System Balances
- Production equipment monitoring
- Safety
- Work management
- Compressor diagnostics
- Alarming

Measurement Accuracy

When comparing charts to EFMs the accuracy of the EFM is vastly superior to the chart, it records all the variables every second and calculates the volume every minute or less. This records all the swings in the flow and other variables that production wells emit that a chart recorder can easily miss because of its slow response time. The data is stored in the EFM for 35 days and can be downloaded monthly or with communication it can be downloaded daily. A chart is usually changed on set rotations and then sent to an integrator where it is integrated and a volume calculated. This is subject to all kind of errors depending on the integrators skill and experience. The charts can have inking problems, differential swings that are hard to follow and other variables resulting in integration errors. The EFMs have excellent audit trail capabilities because they record every event any time any change is made to its setup. Analyses can be downloaded to the EFM remotely and the volume on the screen will be as close to accurate as possible. Looking at the chart below illustrates how bad chart measurement can be. This is an 8 day chart so the swings happen over several hours whereas with EFM's these swings are reordered every few seconds and there is no integrator error.



Controlling Pipeline Pressures

When a system is fully automated with EFM's the pressures of the pipeline throughout the system can be monitored and controlled remotely. Set points can be changed to allow gas to be delivered to various connect points and pressures being monitored will alert personnel to a problem if one occurs. Compressors can be started and stopped remotely as well to optimize the system for optimal throughput. With oil and gas being marketed on a daily basis, systems can be manipulated remotely so that nomad volumes are delivered to the correct pipeline. Without remote capabilities this is not possible and penalties can incur when correct volumes aren't delivered.

System Balancing

Balancing pipelines and gathering systems is one of the most important operations that is performed by Pipelines. With chart recorders it can be as much as 6 weeks from the first of a month before the volumes are available and a balance can be performed. If a leak has developed on the first of a month the cost of the gas lost before anybody knows about it can sometimes easily pay for EFMs being installed. With EFMs balances can be performed automatically on a daily basis and line loss can be flagged and personnel dispatched to look for the problem within hours of the issue being detected. With a good measurement department, being third party or in-house with EFMs, someone is monitoring the systems constantly, which is not possible with chart recorders.

Production Equipment Monitoring

With the cost of transmitters and other equipment decreasing, monitoring tank batteries and wellhead pressures can actually be a cost saving benefit. Being able to see tubing and casing pressures remotely allows engineers to monitor the well and use it as a diagnostic tool to determine if the well is loading up or if the tubing starts to leak into the casing or if there is a problem with gas lift valves. Having measurement available allows them to trend the production of the wells and determine the decline curve more accurately. In several areas the gas has high amounts of H₂s and gauger's climbing up on tanks to determine tank levels can be a safety issue. Installing tank level gauges on the tanks eliminates the safety concerns. The levels can be monitored remotely and alarms can be programmed to flag the system when levels are too high and product needs to be pulled off.

Safety

The safety issues that can be contributed to EFMs is the fact that so much data is monitored and can be used to help prevent accidents. Again with high levels of H₂S, monitors can be installed and monitored by the EFM and alarms and lights can be activated to warn personnel on site when a high concentration of H₂S is detected. Sensors can be installed on pipelines to detect H₂s and send alarms to the host so someone can investigate before people are affected by the gas. As mentioned before pipeline pressures can be monitored to prevent blow outs and leaks. Tanks levels can be monitored so that overflows don't occur, causing environmental issues.

Work Management

When everything in the field is automated with EFM's a gauger can view his laptop and see if there are any alarms and if there are none he can look at each location and decide where his issues are and prioritize his work day to be most efficient. He can look at tank levels and direct trucks to pull off loads where needed. He can look at balances and see if there is a loss on the system to determine where to go investigate. His windshield time is vastly reduced thereby saving time and wear and tear on the vehicle. Less field people are required because day after day routines are eliminated and work is better prioritized which increases production and maintains equipment run times to the max. Management can utilize the real time data to make business decisions versus using estimates. This again saves time and money from having to convert the estimates to actual at the end of the month. Without estimates incorrect decisions can be eliminated based off bad estimates.

Compressor Diagnostics

Compressors now come with panel boards that can be attached by Ethernet to the EFM and everything on the compressor can be monitored, temps, inter stage pressures, run time and just about anything a mechanic would want to see. When the compressor goes down and sends an alarm the mechanic can look to see what the problem is and take the necessary parts with him to fix it avoiding second trips and reducing down time. Run times can be trended making preventative maintenance occur when optimal to the engine instead of on a set

schedule. Temperatures and pressures can also be trended so that when something gets out of normal specs maintenance can be scheduled so that major failures can be prevented thereby again reducing downtime and increasing production.

Alarming

One of the best benefits of EFM is its alarming capabilities. Just about anything you can think of can be alarmed. And just about all alarms will signal the operator of issues that can be corrected quickly versus waiting until the next time he goes to the site to find problems. Certain permits require alarming, flares at an Amine plant require alarms telling when the pilot or igniter has gone out. Pilots on reboilers and line heaters can be alarmed to help maintain specs. H₂S analyzers can be alarmed and actually close valves on high alarms so that pipelines won't be soured up causing major expenses to re-treat the pipeline. Without the added expense of PLCs, EFMs at remote plants can alarm generators pumps compressors and any other critical points that could cause downtime.

Conclusion

The capabilities of today's EFMs and all the various points they can monitor and control and the time saved outweighs the additional cost involved. One environmental issue that could have been prevented with EFM's can cost thousands more than the additional cost to upgrade to EFM's. The measurement accuracy is superior, being able to control valves and tube switching remotely and having total control of the system is a great advantage