



**EMERSON**  
Process Management

**MICRO MOTION™**

TREND REPORT

# CONTINUOUS IMPROVEMENT OF CONTINUOUS CHEMICAL PROCESSING



# THE CRITICAL ELEMENTS OF YOUR BUSINESS STOICHIOMETRY

Chemical processing enterprises strive to achieve goals common to all production industries: cutting costs and increasing output. While this seems like a simple set of objectives, anyone who really knows the business understands that the formula for meeting – and surpassing – those goals is quite complex. The variables exist inside the plant, where approximately two-thirds of the control loops are poorly tuned, malfunctioning or operating in manual<sup>1</sup>, and outside the plant as well. For example, fluctuation in energy prices adds to operational expenses, and rapid economic globalization has created an increasingly complex regulatory landscape for businesses.<sup>2</sup>

Workforce dynamics add more pressure to the situation. In 2013, the median age for workers in chemical processing was 45.3.<sup>3</sup> The tribal knowledge that leaves the company when older workers retire can be compensated for by technology and training, but retaining top talent also requires offering career opportunities that younger “gold collar” workers<sup>4</sup> look for.

## Coriolis is the Catalyst: Greater Efficiency, Lower Costs

How you react to these challenges determines costs of operation, output capacity and your competitive position. As a seasoned leader in chemical processing, Emerson™ Micro Motion® offers the flowmeter technology and services to:

- Increase output
- Reduce costs

We've developed this Trend Report so that you learn more about how we can help you increase quality, throughput and reliability. The value you'll experience will allow you to overcome the barriers to investing in technology that can position your enterprise for rapid process improvement and long-term operational excellence.



Approximately **two-thirds** of the control loops are poorly tuned, malfunctioning or operating in manual<sup>1</sup>

1. Torres, B.S., Carvalho, F.B., de Oliveira Fonseca, M., and Filho, C.S., "Performance Assessment of Control Loops—Case Studies," International Federation of Automatic Control Conference, 2006.

2. Succeed at Global Compliance, [www.chemicalprocessing.com/articles/2014/succeed-at-global-compliance/](http://www.chemicalprocessing.com/articles/2014/succeed-at-global-compliance/)

3. Bureau of Labor Statistics, [www.bls.gov/cps/industry\\_age.htm](http://www.bls.gov/cps/industry_age.htm)

4. “Gold collar” worker is in reference to the high-skill, high-wage, high-demand occupations that are prevalent in the chemical industry today, given the decrease in workforce availability to fill these necessary roles in the chemical processing industry.



## INCREASE OUTPUT

**ELEVATE QUALITY** > by providing the highest accuracy, measuring in mass

**INCREASE THROUGHPUT** > by improving blending ratios & supporting a wide range of flow rates

**MAXIMIZE AVAILABILITY** > by virtually eliminating downtime, reducing proving cycles

## REDUCE COSTS

**STREAMLINE OPERATION & MAINTENANCE** > by investing in flowmeters that have no moving parts or reliability challenges

**ENHANCE SAFETY, HEALTH & ENVIRONMENTAL** > by using in-situ diagnostics instead of hands-on monitoring & troubleshooting

**MANAGE ENERGY & UTILITIES** > by controlling combustion & boosting fuel efficiency

**CUT WASTE & REWORK** > by using feed forward for faster batch formula perfection



**HOW CAN YOU INCREASE OUTPUT & DRIVE DOWN COSTS?** The biggest obstacle is the cost of investing in technology that can make it happen.



**OUTPUT**



**COSTS**



# TECHNOLOGY SIMPLIFIES THE FORMULA

Integrating proven automation technologies and advanced instrumentation is the first step in establishing the highest degree of continuous processing excellence. Coriolis mass flow and density meters give you the degree of process control that legacy instrumentation lacks, and the process visibility you need to maximize ROI in feedstocks and maintain continuous production.

## Streamlined Work Practices

Micro Motion Coriolis meters with Smart Meter Verification (SMV) technology enable critical meter health insight. SMV is our patented, automatic on-board diagnostics tool that verifies Micro Motion Coriolis meter performance and integrity under flowing conditions. With it, you can prove flowmeter performance in-line, on your schedule, in 90 seconds, without interrupting your process.

## Create a Safer Environment with Remote Access to Process Visibility

When something goes wrong at a processing facility, it can have catastrophic consequences. There are inherent risks, but these can be minimized with training and advanced diagnostic technologies, such as those offered by Emerson Process Management.

- Smart Meter Verification (SMV) enables proactive maintenance and minimizes operator exposure to potential dangers.
- AMS Suite detects plant equipment problems before they occur.
- SMV provides an on-command and automated meter analysis for alarm conditions, sensor integrity, erosion or corrosion.





Lost production can account for 60 to 90% of total maintenance costs in process industries. <sup>5</sup>



Operators are blamed for 70-90% of incidents. But instead of trying to change the system, we try to change the people, an approach doomed to fail. <sup>6</sup>

5. Maintenance Performance assessment – Strategies and Indicators, M. Hågerby and M. Johansson, Department of Production Economics master's thesis, Linköping Institute of Technology, 2002.

6. Get to the Root of Accidents, Nancy Leveson, Chemical Processing, <http://www.chemicalprocessing.com/articles/2014/get-to-the-root-of-accidents/>

# LESS BURDENSOME **COMPLIANCE**

In light of shifting global regulations around health, safety and operations, the question is: How can you make addressing regulations including REACH (Registration, Evaluation and Authorization of Chemicals), CFATS (Chemical Facility Anti-Terrorism Standards), EPA (Environmental Protection Agency), EU ETS (European Union Emissions Trading System) and Governance, Risk and Compliance as painless as possible?

Sharpening visibility into your processes and having the right data is a great start to easing the burden of compliance. Micro Motion streamlines auditing and reporting through technologies built in to our flowmeters:

- Data historian delivers the logs and traceability to address regulatory compliance.
- Smart Meter Verification simplifies meeting industry mandates around proving meter performance and provides reports accepted by many third party agencies

Micro Motion flowmeters are equipped with Smart Meter Verification to make it easier to address mandates and your own standards. In fact, the Environmental Protection Agency (EPA), American Gas Association (AGA), Alberta Energy Regulator (AER), International Standards Organization (ISO), and International Electrotechnical Commission (IEC) already have recognized and/or accepted SMV for its ability to provide traceability. With the right data available in near real-time, you can be sure that each part of the process is performing at the level you decide is optimal and lighten the compliance burden.

We've developed this Trend Report so that you learn more about how we can help you increase quality, throughput and reliability. The value you'll experience will allow you to overcome the barriers to investing in technology that can position your enterprise for rapid process improvement and long-term operational excellence.



## CASE STUDY

### **COSTS OF GREEN HOUSE GAS COMPLIANCE CUT BY 50% WITH EMERSON MEASUREMENT SOLUTIONS**

> A major US HFC refrigerant producer faced significant capital investment and recurring costs to comply with EPA 40 CFR part 98. Original EPA accuracy requirements for the HFC refrigerant producer had been 0.2% for daily mass balance, which was difficult to attain with most measurement devices. Another challenge they faced was complying with mandatory annual wet-calibrations, which were expensive and caused process disruptions.

For the HFC refrigerant producer to meet the original EPA requirements, new flow measurement technology and Gas Chromatographs would have been required. The capital cost was estimated at \$300,000 with an additional recurring cost of \$300,000.

Emerson played a large role in negotiating with the EPA during the Industry Comment and Implementation phase as the regulation was developed. EPA mass balance accuracy requirements were relaxed to 1% and the manufacturer's recommended schedule for calibrations was accepted (rather than mandatory annual calibrations). Emerson provided an integrated equipment and software solution for measurement through documentation.

Micro Motion Coriolis meters with Smart Meter Verification, Smart Wireless THUM™ and Gateway were installed. Smart Meter Verification technology allowed the customer to perform an in-situ check, eliminating expensive and inconvenient wet-calibrations. Smart Wireless THUM and Gateway technology provided easy access to the meters from the Instrument & Electrical shop, allowing the HFC refrigerant producer to generate the calibration documents required for EPA reporting. Emerson's AMS Suite software was used to enable the Smart Meter Verification audit trail, which assured reliable documentation for EPA.

As a result, measurement costs were cut in half. Safety was improved because lines did not require breaking for calibration. Additionally, process interruptions were reduced, the need for redundant metering was eliminated, equipment health was boosted, and staffing requirements were greatly reduced.

**CLICK HERE** to find out more about Emerson's solutions for chemical processing.



“ONE ESTIMATE IS THAT **30% OF THE EXISTING WORKFORCE** WILL RETIRE IN THE NEXT 5 YEARS, AND TAKE A LARGE SLICE OF THE OPERATING AND COMMISSIONING EXPERIENCE INTO RETIREMENT.”

— **KOLMETZ.COM**





## Get More Resources

With workforce turnover, budgetary constraints, changing and inexperienced people trying to ramp up their capabilities as fast as they can, you need technologies that embed expertise into your systems.

## Enhance Staff Effectiveness

By partnering with Emerson, you can offset the loss of experienced talent by contracting dedicated local service teams to work onsite and streamline planned outages or perform instrument and valve maintenance services. We can help your operations contend with the need to “do more with less,” compensate for lost tribal knowledge and get new talent performing like all stars. We can get you past these challenges by taking these actions:

Action	Advantage
Automating processes to offset resource losses	Multivariable diagnostic capability built directly into equipment gives you embedded expertise.
Augmenting your team	Consulting and Technician Expertise Services work onsite and streamline your planned outages or perform instrument and valve maintenance services.
Educating all experience levels	Training to take advantage of the embedded diagnostic technology in today's instrumentation will improve asset effectiveness.
Utilizing the latest measurement technology enables better plant reliability	No routine maintenance or calibration means less time checking on instrumentation that does not need attention.

# CASE STUDY

PROCESSING PLANT MAXIMIZES SOLVENT RECOVERY WHILE MINIMIZING ENERGY COSTS — WITH THE HOPES OF IMPROVING PROCESS BY 5%, IF NOT MORE

Eli Lilly, a producer of animal health products in Clinton, IN, uses a fermentation-based process to produce a number of its products. Solvent is recovered from the fermentation medium and reused within the production process, providing environmental benefits as well as raw material cost savings. The current technology installed in the solvent recovery columns was reaching the end of their useful lives. These products required a lot of maintenance, and were no longer giving the accuracy or reliability necessary for the recovery process. Eli Lilly estimated an average cost of \$3,000 per upset due to lost uptime. Plus, they were also seeing excursions outside of the control limits which were estimated to cost as high as \$50,000 per upset.

Eli Lilly chose to install the Micro Motion 2-Wire Coriolis Flowmeter because the plant had already standardized on Micro Motion equipment in other processes, such as for manufacturing and natural gas flow. With the introduction of the Micro Motion 2200 2-Wire transmitter they could easily integrate the meter into the solvent recovery columns, without the need for external power.

Once the device was in place, the company immediately found that feed flow rates were about 100 liters/minute higher than expected - demonstrating the difficulties they needed to overcome when controlling the process. They also saw improvements in stability of the recovery process, because they now had better control in making process adjustments. Plus, Coriolis meters have no moving parts and require very little maintenance — meaning less money spent on fixing the instruments.

Over time, Eli Lilly expects to see more savings and further improve the uptime and efficiency of the recovery process with the full integration of Micro Motion technology.

Find out more about the unique benefits of Micro Motion technology and solutions here:

[www.micromotion.com/lookcloser](http://www.micromotion.com/lookcloser)





## **THE RIGHT BALANCE** OF PEOPLE, PROCESS AND PRODUCTS

Micro Motion solutions and services provide you with the right technology and the industry insight that only a leader can offer. Investing in instrument and valve services will improve system reliability, our patented technologies optimize instrument performance and our consultants and training programs will bring new hires up to speed as quickly as possible.

Look closer. Make sure your meter performs its best even when conditions aren't lab like. Operating in the real world can be a challenge, but your meter can provide reliable measurement even under the harshest conditions.

With Emerson as your partner, you'll find that the value of your investment pays off in terms of getting the most from your staff and the resources you need in your processes, as well as achieving continuous improvement of continuous chemical processing.



# MEASUREMENT TELLS A STORY.

## MICRO MOTION MAKES IT POSSIBLE.

Confidence in your measurement is key to your process. That's why we believe that the integrity behind your measurement is critical.

We start with the pursuit of the ultimate real world performance — even in the most critical and complex applications. And we're committed to making your whole experience easier with our broad range of simple and scalable solutions.

With the Emerson Micro Motion team, you get more than industry-leading performance of our Coriolis flow and density meters. You also get the dedication of our people, our process and the pursuit of delivering measurement confidence in everything we do.

Get the full story at [www.micromotion.com/lookcloser](http://www.micromotion.com/lookcloser)

**MICRO MOTION™**



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