

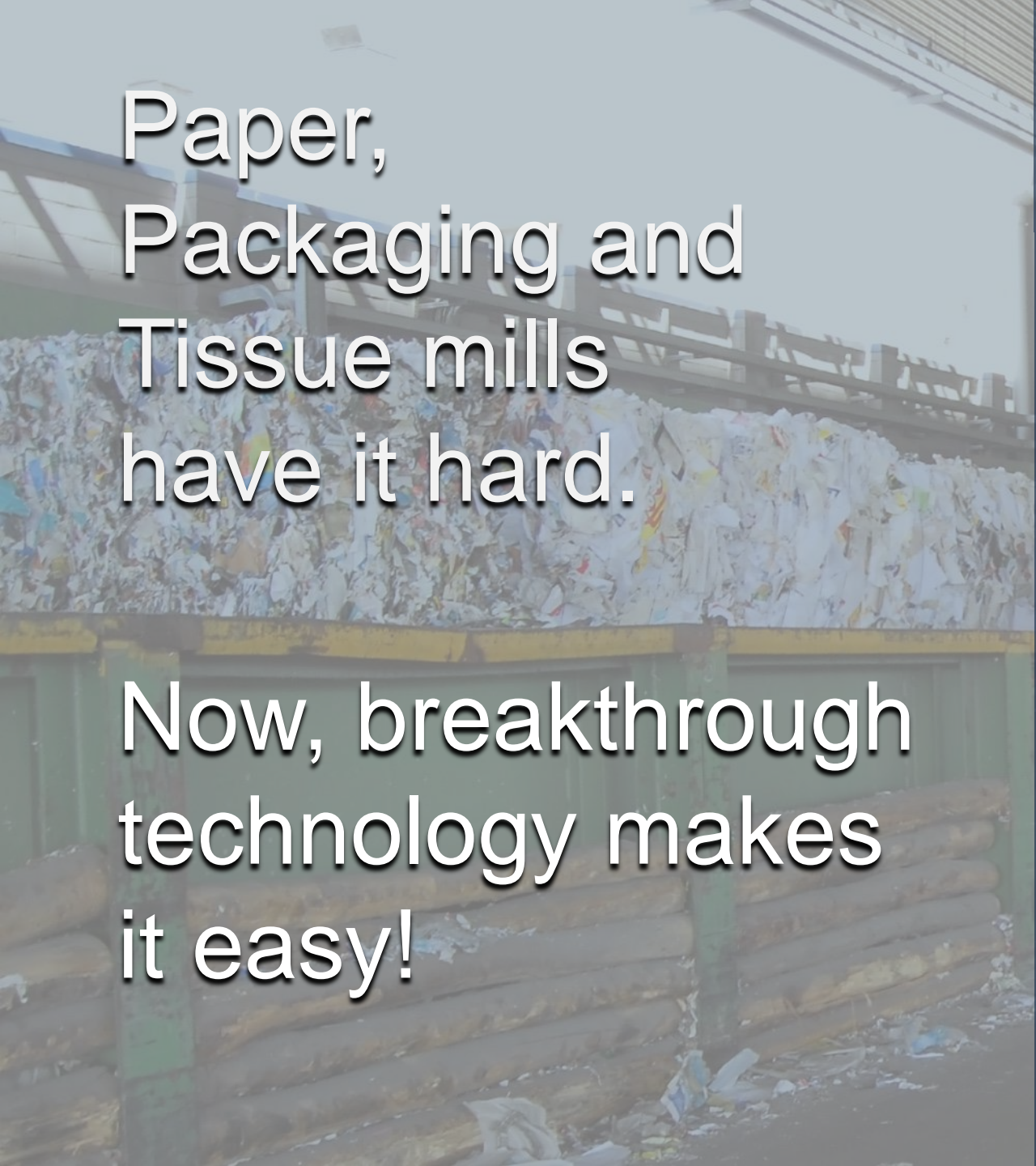


— DELEGATES —

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Buckman

New MCA Generator

The Next Level of Control for a Safer and Smarter Monochloramine Program

A large pile of recycled paper and cardboard in a mill. The pile is composed of various types of paper, including newspapers, magazines, and cardboard boxes, all shredded and baled. The background shows the industrial structure of the mill, with metal beams and a high ceiling.

Paper,
Packaging and
Tissue mills
have it hard.

Now, breakthrough
technology makes
it easy!

- Constant pressure to increase efficiency and reduce cost.
- Increased pressure to use less water.
- Rising contamination in recycled OCC.
- Complex specialty chemical requirements.
- Greater reliance on anaerobic digesters for effluent treatment.

**With all this
going on...
what if you
could...?**



New MCA Generator

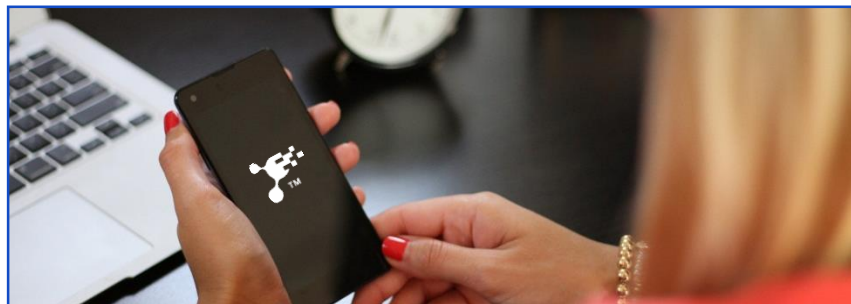
**Reduce your
biocide costs
by 15% or more**

**Reduce
microbial
contamination
(ATP) by >30%**

The Next Level of Control for a Safer and Smarter Monochloramine Program

**Reduce slime
related machine
efficiency issues**

**With
world class safety...**



Chemical-digital solution

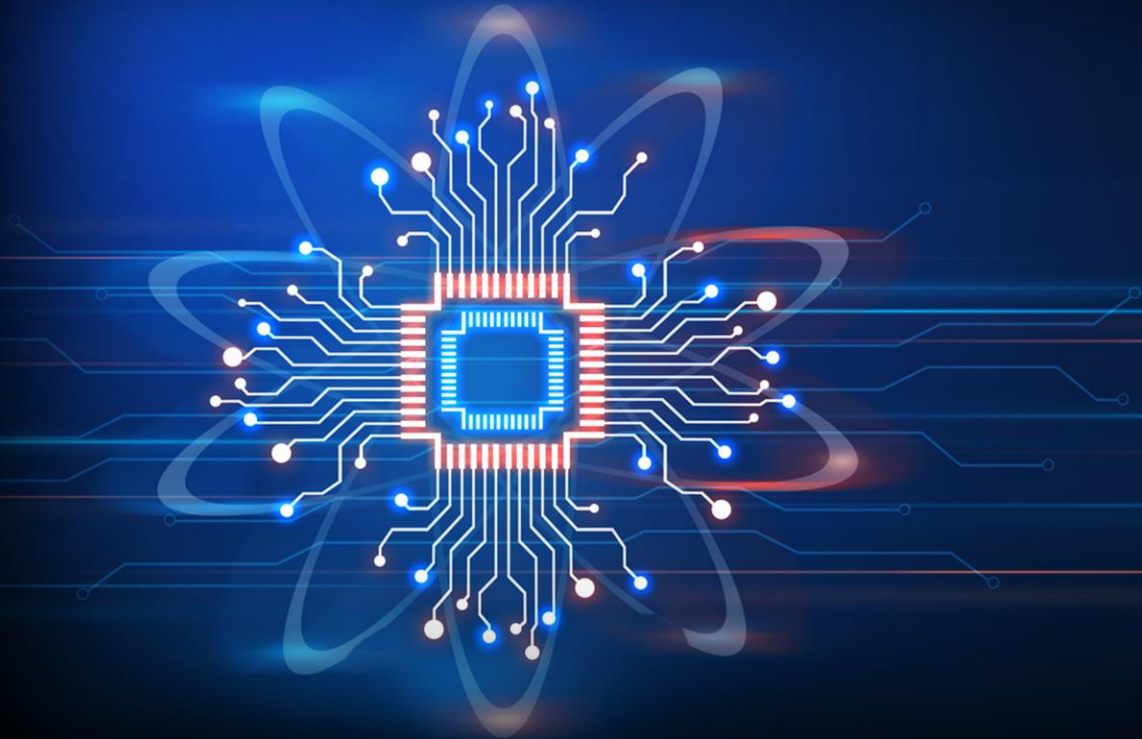
Combines best-in-class MCA chemistry with state-of-the-art sensing technology, cloud-based data analytics, 24/7 expert monitoring and analysis.



Stabilize the wet-end

Provide improved machine performance with reduced overall chemical costs.



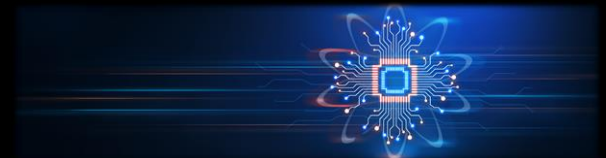


Introduction

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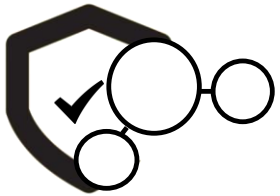
- Monochloramine (MCA) is formed in situ by mixing an industrial grade sodium hypochlorite (bleach) with an ammonia source (i.e., monochloramine precursor or MCAP) in water.
- Depending on the pH and molar ratio of the chlorine to ammonia source, three species of inorganic chloramines can be formed.
NH₂Cl (monochloramine) | NHCl₂ (dichloramine) | NCl₃ (nitrogen trichloride)
- Because it is a “combined chlorine”, **monochloramine is a weaker oxidizer** when compared with other oxidants (hypochlorous acid, hypobromous acid, and chlorine dioxide).

This offers several advantages over the traditional oxidants commonly used in the paper industry.

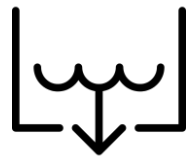


MCA Advantage

- **MCA chemistry** has become one of the major oxidant biocides used in the paper industry for neutral and alkaline processes.



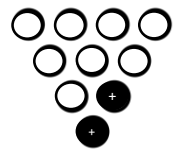
Little to no
interaction with
wet-end additives



Excellent
biofilm
penetrator

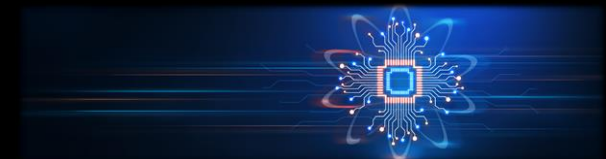


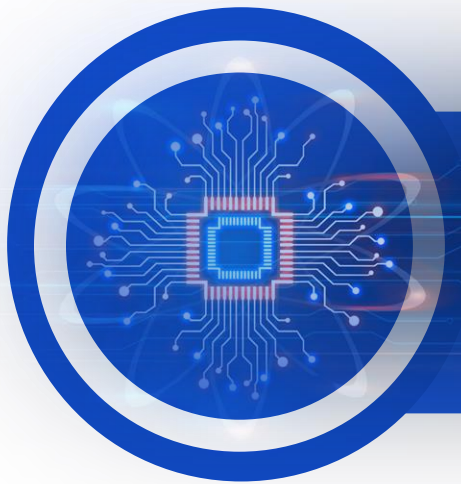
Lower potential of
vapor corrosion at
typical continuous
dosing rates



Minimal formation
of disinfection
by-products

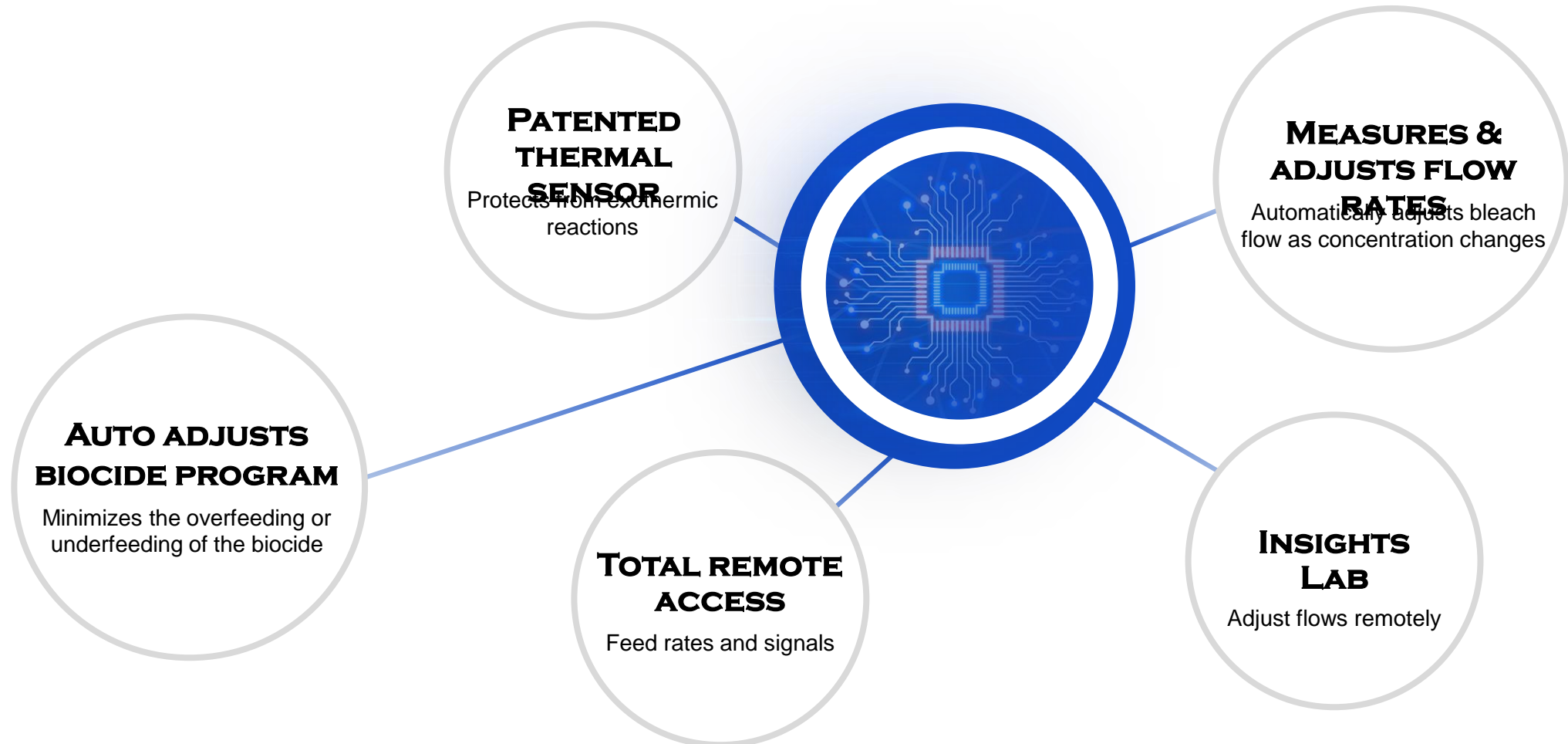
New MCA Generator



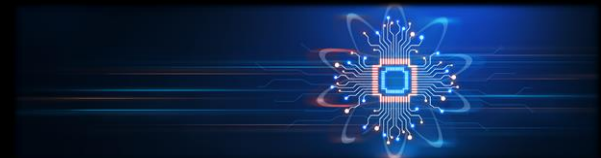


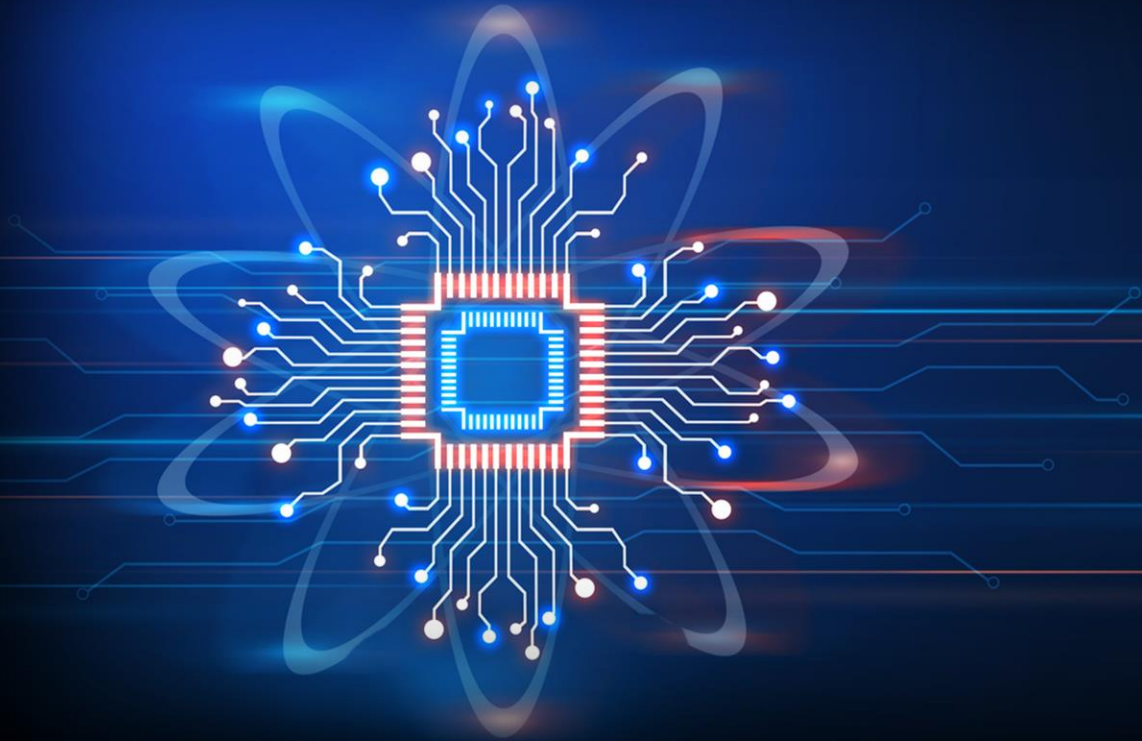
New MCA Generator combining
MCA chemistry and Artificial Intelligence

A Safer and Smarter MCA Program



New MCA Generator





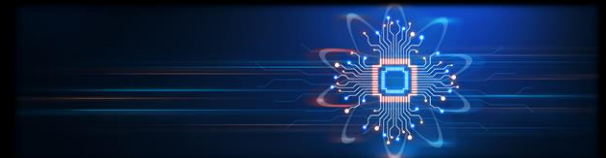
Performance and Impact

Performance and Impact

A ***three-phase trial*** of this new technology was conducted at a North American paper mill, and this is quite representative of the performance we have seen to date with this new technology:

- **Phase 1 : Old vs New**
 - Compare the new MCA generator with an older MCA generator by maintaining the mill's KPIs
- **Phase 2: Perfecting the MCA generation**
 - Quantify impact of new MCA generator unit's proprietary automated ratio control for superior MCA generation
- **Phase 3: Targeting machine KPIs**
 - Explore the system's capability to achieve *Machine Microbial Control KPIs* through the activation of the advanced control module

New MCA Generator



Phase 1 : Old vs New - Key Findings

- The objective of Phase 1 was to **compare the new MCA generator with an older MCA generator by maintaining the mill's key performance indicators**, such as MCA headbox residuals and microbial activity, without changing the application points or dosing strategies.

Summary of key findings from Phase 1 Trial Evaluation:

KPI	Older MCA Generator	New MCA Generator	Difference	% Change
Headbox MCA Residual, ppm	1.5	1.7	+0.20	13.3
MCAP Flow Rate, LPH	13.3	11.7	-1.6	-12.0

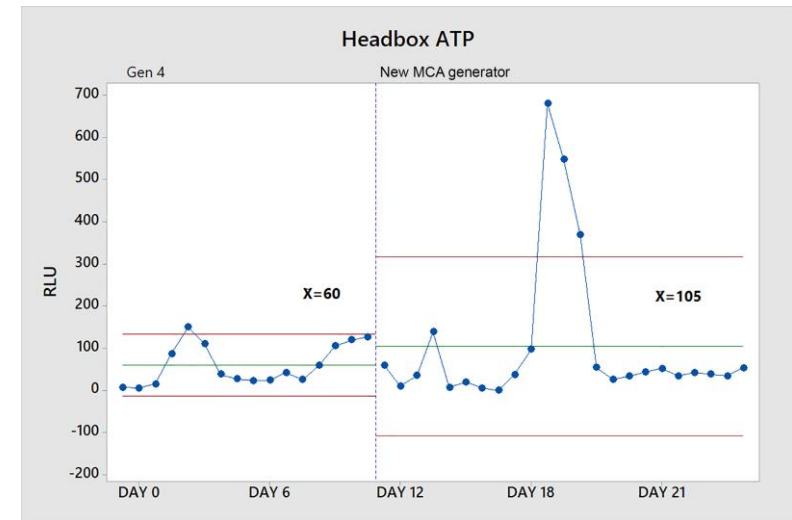
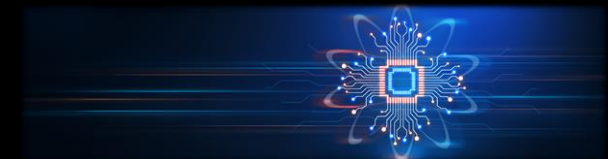


Figure 3. Phase 1 Trial Evaluation of Microbial Control via Adenosine triphosphate (ATP) Analysis. The original MCA program using the older generator achieved RLU of Gen residuals were achieved during both periods as the headbox MCA residuals were below the mill's established upper limit of 500 rlu. The headbox ATP numbers with the new MCA generator was 100% below the upper limit of the older generator. The new MCA generator was able to respond with a spike in ATP numbers to slightly lower MCA headbox residuals during the same time period (Figure 1).

New MCA Generator



Phase 2 : Perfecting MCA – Key Findings

- The objective of Phase 2 was to **utilize two of the new MCA generator unit's key features**, a proprietary automated ratio control of the **chemicals** and **PID (proportional–integral–derivative) flow control valves**, for continued optimization of the biocide program.

Summary of key findings from Phase 2 Trial Evaluation:

KPI	Older MCA Generator	New MCA Generator	Difference	% Change
Headbox MCA Residual, ppm	1.5	1.7	+0.20	13.3
MCAP Flow Rate, LPH	13.3	10.7	-2.6	-19.5

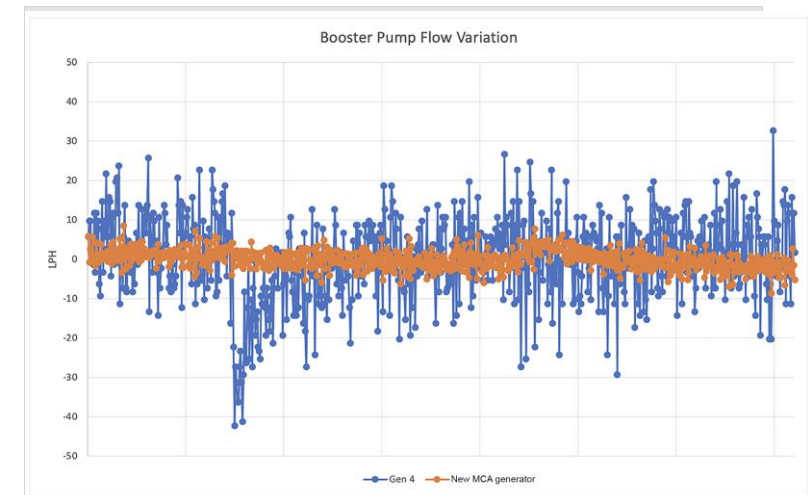
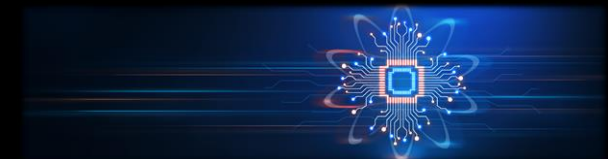


Figure 6. Phase 2 Evaluation of the MCA PID Flow Control. The water flow rate and biocide chemical flow rate were compared between the new MCA generator and older generator. The use of PID flow control valves on the new unit reduced flow variation by 75% (Figure 6).



Phase 3 : Targeting KPIs - Key Findings

- The objective of Phase 3 was to **reduce variability in the established KPIs for the biocide program** by using **advanced control modes** on the new MCA generator. This was accomplished by using two of the mill's process variables to continuously adjust the MCA flow rate. Thus, the MCA dosage would constantly adapt in real-time to the changing mill process conditions.

Summary of key findings from Phase 3 Trial Evaluation:

KPI	Control Method	Mean	Standard Deviation
Headbox MCA, ppm	Baseline	1.6	0.4
	Advanced	1.5	0.3
Headbox ATP, rlu	Baseline	139	111
	Advanced	47	35

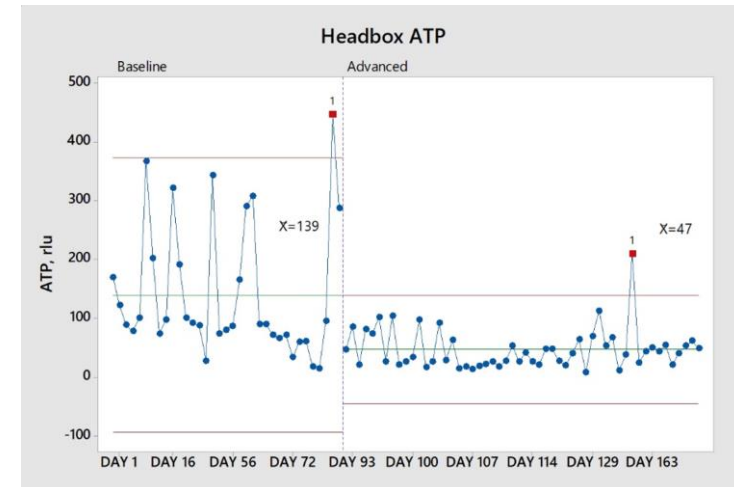
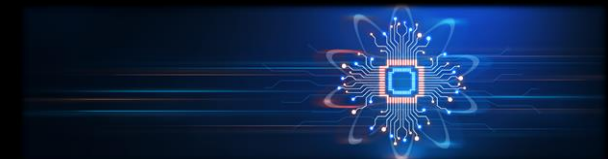
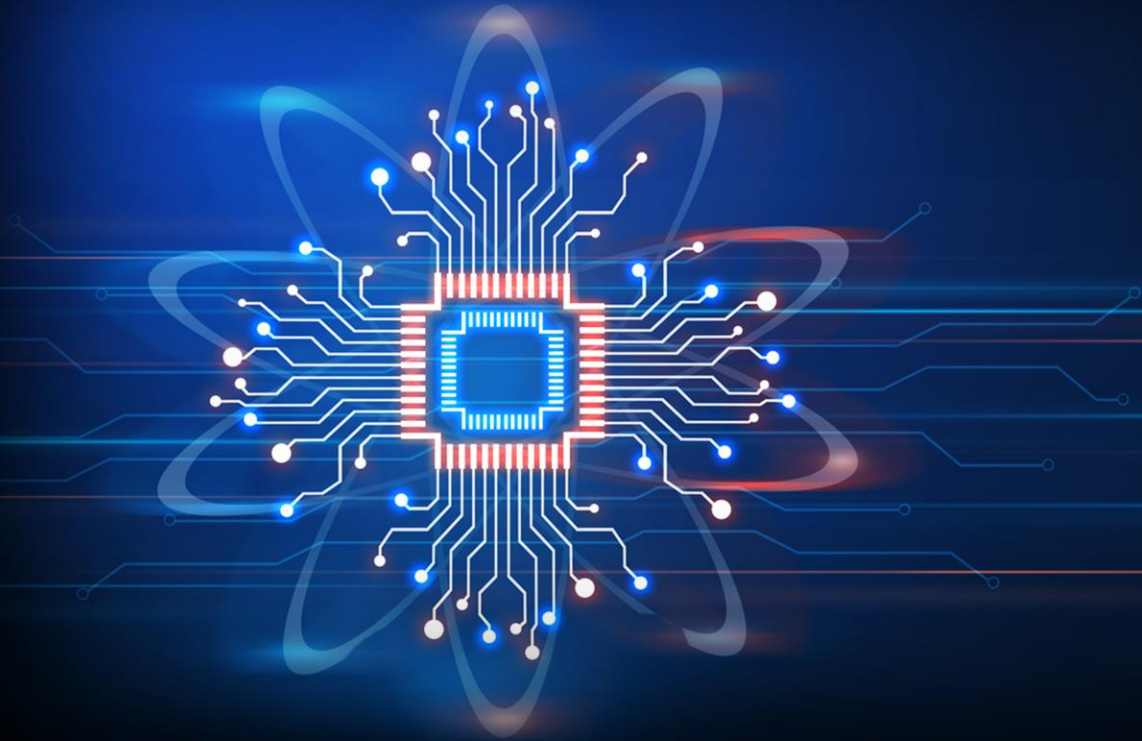


Figure 3. Phase 3 Evaluation of Headbox MCA Residual Headbox ATP results were compared to both baseline and advanced control modes. The standard deviation for the baseline was 111 rlu compared to 35 rlu for the advanced control period.



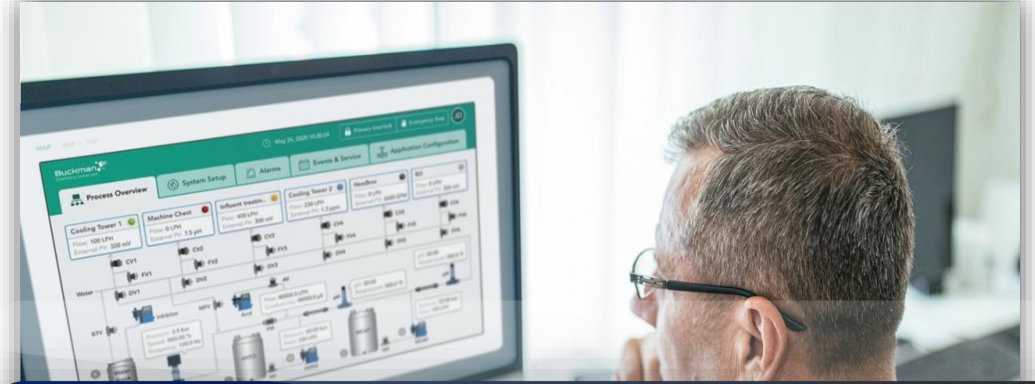


Actionable
Insights

Converting the right data to actionable insights.



With conventional sensors and digital applications, you can get too much data and not enough meaningful insight.



But what if you had the power to see all and the insight to make decisions more easily?

New MCA Generator



What's an insight?

At-a-glance, New MCA generator gives you the power to:

Know in real time the status of your system

See how your KPIs are tracking

See fouling patterns and corrosion

Identify changes in product or water usage

Detect process changes

Know whether an action is needed now or later



New MCA Generator



New MCA Generator

- Produces simple easy-to-read, actionable system visualization graphics, real-time triaging of alarms and notifications.
- Delivers it all to your desktop or mobile device.



New MCA Generator



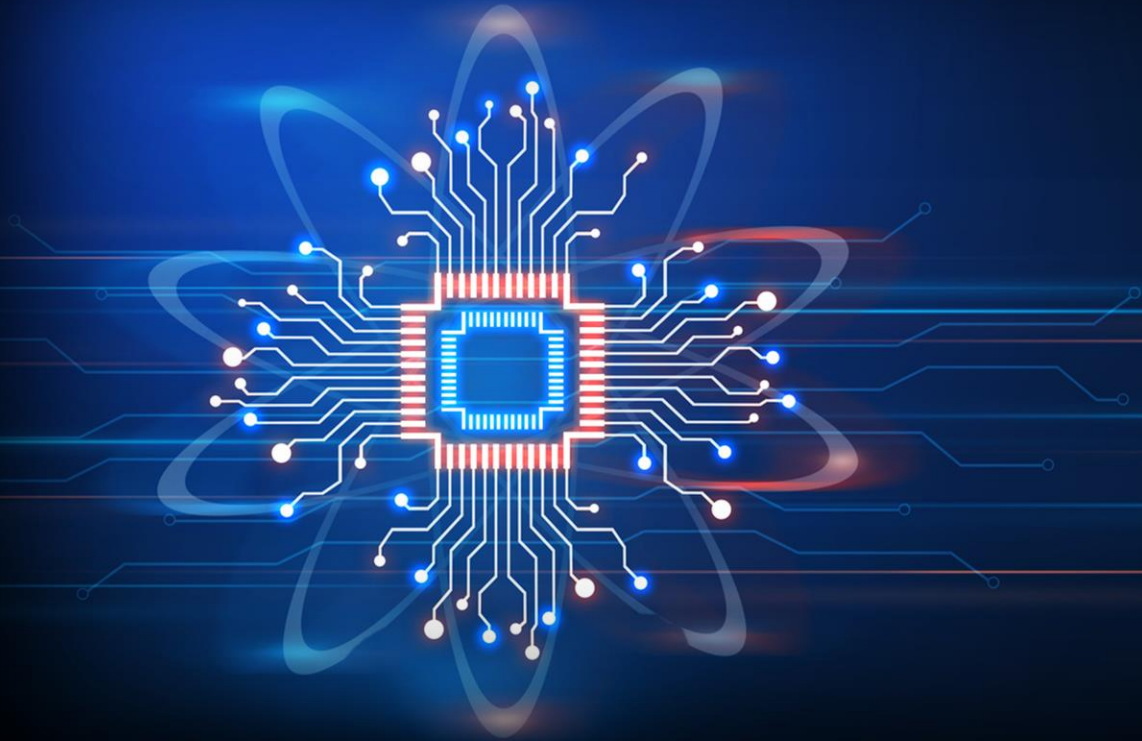
Expert monitoring, benchmarking, and predictive modeling

- New MCA generator is backed by 24/7 monitoring and analysis performed by data scientists and engineers in our Insights Lab.
- The Lab deals with events as they happen, assessing every alarm and eliminating false ones.
- Chemical engineers working closely with data science experts to see and analyze patterns that are not visible to the naked eye.
- Considering changes in furnish, grade, production rate, equipment and more, “digital twins” in the cloud constantly compare real performance with expected performance to enable the Insights Lab to predict future trends and take proactive action.



New MCA Generator





Safety at the Mill

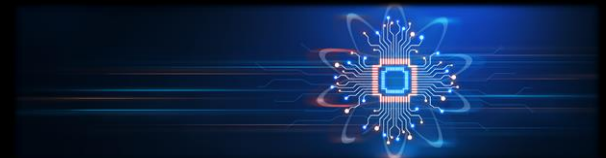
Unmatched feed system safety

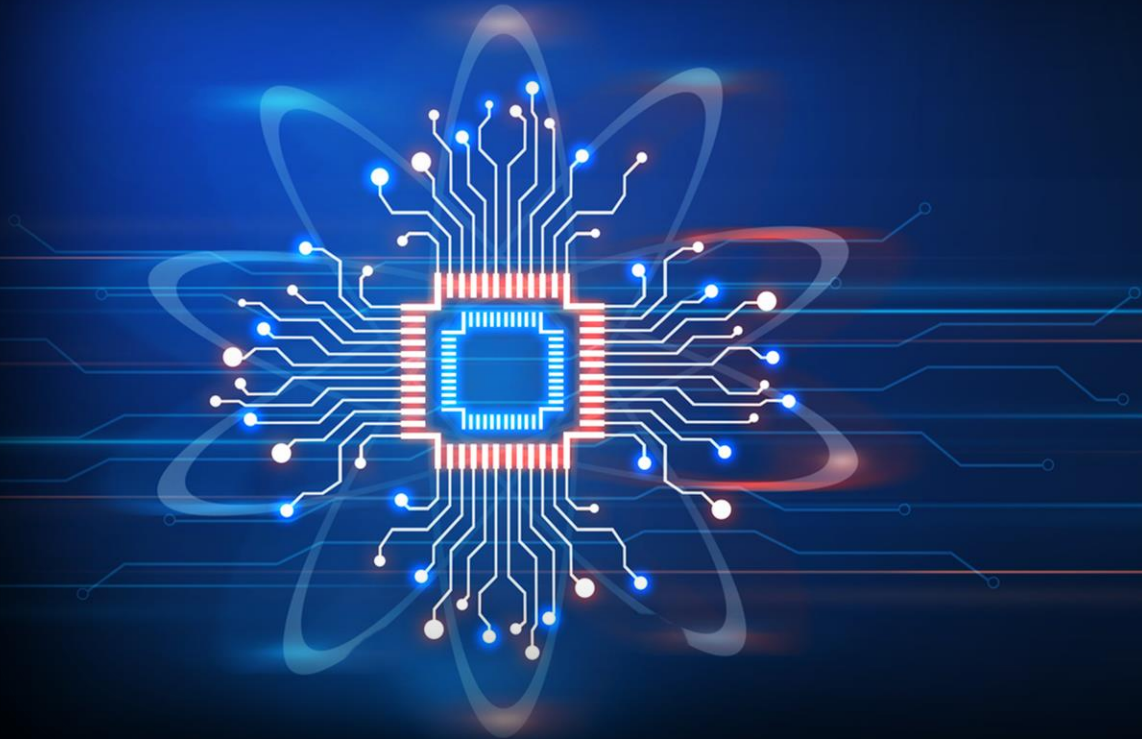
New MCA Generator system feed equipment provides:

- Consistent, accurate delivery
- A wide application range and flexible dosing options

Unique technology with these advanced safety features:

- Leak detection
- A built-in separator to keep neat chemicals apart in the case of a line break or other issue
- Automatic flushing of all application lines in case power is lost
- Regular inspection by Buckman personnel to maintain efficient, safe operation
- 24/7 chemical engineers remotely monitoring the unit





Conclusion

...early customer reviews...

Large Multinational Tissue Corporation

- *“The program as a whole is more intelligent and ‘makes more sense’ than the <current> program.”*
- *“These units are definitely the best in the industry. I have seen others, and they don’t compare.”*

Large Packaging Corporation

- *“You can see everything remotely? Wow that’s a cool option and enhances our comfort with the level of safety with this program.”*
- *“If all [our] chemical dosing equipment was to this standard then [we’d] have far less problems in [our] mills.”*



thank
you



Buckman ™
Chemistry, connected.

Questions...