

# Smart Batch Monitoring with VBA

**Improving Visibility and Problem Identification** 

Presented by Kelsey Duffy

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## **About Sartomer**





- Division of Arkema Inc
- □ Headquartered in Exton, PA
- Production plants in West Chester, PA; Chatham, VA; France; China
- Specialty acrylic and methacrylic monomers
- Hundreds of different products
- Products are UV curable liquid monomers
- Major industries include paints, inks, coatings, flooring, electronics, and fiber optics

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# West Chester, PA **Monomer Production**

## **Business Challenge**

- 11 different reactors
- 250 different recipes
- Each recipe runs differently
- Each vessel acts differently
- Impossible for every operator to know what every product is "supposed" to look like in every vessel
- Small problems go unnoticed until they become major

#### Solution

- PI ProcessBook display that runs 24/7 untouched
- Plots characteristic trends of currently active batches
- Plots the recent batches of that product in that vessel and a golden batch as a shadow for the current batch
- VBA automatically updates the PI ProcessBook display every time a vessel changes batches

### **Results and Benefits**

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- Better production visibility
- More robust problem identification
- More proactive production
- Easier to walk into the control room and get a feel for how production is going
- Chaotic control loops become very obvious very quickly and can be clamped quicker

## **Display Overview**

One Batch Group per vessel

- Graphs the characteristic trends of the actively running batches
- Recent production and golden batch graphed behind it as a shadow
- □ Shows how the batch "should" look
- □ Batch groups automatically update when a batch starts or finishes

The display uses PI ProcessBook, PI Batch, PI BatchView, and Visual Basic



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## **Visual Basic**

□ VBA is event based



- An "event" could be anything from the display opening, to a PI Server tag updating, to a user clicking on a text box
- Code can be written that runs on every occurrence of that event.
- Event triggers used by this display
  - When the display opens
  - When any vessel's product tag updates

## □ This allows the display to run 24/7 untouched



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## **Code Logic – Free State**

Batch Definition	
Main Layout Settings	
Search Parameters	REACTOR-A
Find: The Last 🔻 4 🖕 PIUnitBatches 💌	
Include: O Running O Completed O Both	EDEE
Batch ID 🔹 *	TREE
	· · ·
Unit Name  REACTOR A	
Time Range and Duration:	
Active  Between: *-365day  and *	
Batch ID 😚 😵 Start Time End Time Product Unit Name Procedure	
509455 60° ∑ 2/25/2014 7:13: 2/26/2014 1:53: PRODUCT1.V1 REACTOR_A	Reactor is empty
B 509443     60' ≥ 2/23/2014 10:08 2/25/2014 12:41 PRODUCT4.V1 REACTOR_A     2/22/2014 9:49: 2/23/2014 9:12: PRODUCT9.V1 REACTOR_A	
± 509386     60°	
	Product tag is blank
	The Batch Group search starts off free
	The Datch Oroup search starts on nee
PiBaGen     Add Aliac      PiBaGen	
Nucl Alida -> No Pibagen Decanter Vieight	
Tag Search	
Custom Placeholders	
OK Cancel Help	

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## **Code Logic – Batch Start**



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## **Example Problem Identification**



This temperature spike and solvent jump are red flags to the operator that we had a problem while he was out of the control room.

This batch reacted poorly but could be salvaged in the next unit operation, instead of investigating its low yield after the fact.



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## □ Allows very flexible production while retaining precise batch monitoring

Summary

• Expected values are updated automatically and are vessel specific

□ Perfect fit for batch plants with swing production vessels, but good for anyone with a repeatable unit operation

> Display provides better production visibility Provides more foresight on problems Operations and maintenance better absorb disturbances □ Reduce repeating and propagation of issues

Plant runs smoother and better.





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