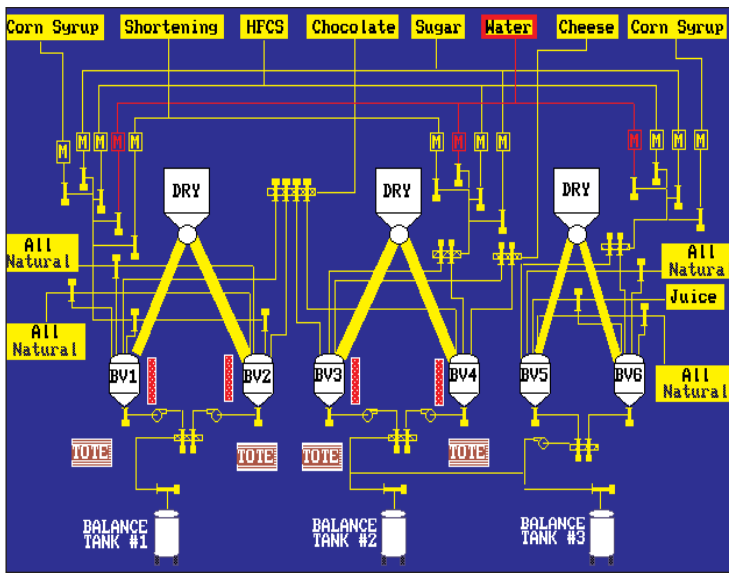


CQS Innovation, Inc.



Batch Process Control Provides:

- Improved yields
- Recipe library on-line
- Automatic recipe execution

Batch Process Management

CHALLENGE — *Reverse engineer an undocumented system to improve quality and yield.*

Background

Batch process manufacturing requires accurate processing of the correct amounts of the right ingredients to create a quality product. And then starting all over again on a completely different product from different ingredients and processing steps.

A Midwest manufacturer of cheese sauces, pudding and diet meal substitutes needed a better batch management and control system to improve quality and yield, for a number of product recipes.

The normal operation has one tank of each pair being cleaned and loaded while the other is mixing. This keeps the equipment fully utilized. The loading of ingredients is sequenced to provide the amount of each ingredient specified by the product's recipe. When the ingredients are loaded, mixing is initiated according to the recipe steps specified. Mixing continues until all ingredients are included and mixed to recipe specifications. When complete, the mixture is sampled for quality testing. Based upon test results, the product is delivered to aseptic processing, or reformulated to a different product by adding ingredients and mixing some more, or scrapped. Cleaning of the mixers and tanks takes place according to Standard Operating Procedures' requirements between product batches.

Challenge

CQSI worked with project team members from the customer's operations and engineering departments to define the new system's requirements. The previous control system was too limited to meet the company's needs and was difficult to maintain. The following needs were identified by team members:

- a reliable Human Machine Interface (HMI);
- many reports from the system; and
- the capability to handle any number of recipes.

In addition, the system had to be thoroughly tested off-line since the installation "window" was a brief, scheduled shutdown period.

The current system operated the equipment well, but didn't have any documentation. CQSI staff members "reverse engineered" the logic for process interlocks and operation sequences from the controller's program code.

The configuration of the batch management software had to handle the largest expected formula and broadest operation ranges.

New PLC code had to be developed to provide an interface between the new batch management software and the control system of the original system.

TANK #1			ACTUAL	PRESET	DESCRIPTION
FORMULA #	7483		396	489	LB - Minor water
BATCH #	12		1002	1000	LB - Major water
STEP #	5		250	250	LB - Shortening
			271	275	LB - Corn syrup
			153	150	LB - HFCS
			160	170	LB - Liquid sugar
			242	240	LB - Chocolate
					LB - Tote
					LB - Diet formula
					LB - Hot water
					LB - Cold water
					LB - Oil
			248	250	LB - Major dry ingr.
			1251	1250	LB - Hand added ingr.
			46	45	
			4029	4030	LB - Total Batch Wt.

■ Low Level	■ Tank Stopped
■ Tank Not In CIP	■ Liquid Active
■ Tank Not In Correction	■ Dry Active
■ Tank In Auto	■ Liquid Ingredient Power
■ E-Stop Power "ON"	■ High Level

▲ *Screen displays allow the operator to know what's going on at a glance*

Solution

The new system has an A-B PLC5/30 and a PC-based batch management system from A-B running with ControlView as the HMI. The system handles approximately 1500 data points, and presents animated graphic screens to provide status information, including process and equipment interlocks.

CQSI reverse engineered the ladder logic code to develop a design specification for the system as it existed. I/O lists and drawings were developed for the equipment. This information was then altered for the new system's design. The new system components were purchased and the code was written for the PLC and PC software products used. CQSI simulated the signals from the process to debug and demonstrate the operation of the new system once constructed in our shop. The customer witnessed a Factory Acceptance Test of the system with simulated I/O. This process provided a well-documented system for ease of maintenance and a well-tested system that was installed and commissioned very quickly.

Results

The customer is receiving numerous benefits from the system, including:

- Accurate measurements of ingredients
- Reduction of scrap batches
- Increased uptime by reducing re-formulations
- Reduced amount of direct and indirect labor
- Return on investment of \$100,000 realized within three months
- Continuing backup support and personnel training provided by VAI.

The system was installed on time, during the scheduled shutdown. CQSI staff trained the company's operators and did extensive testing by dry running the system.

In the words of a customer team member, "CQSI delivered when we needed them...a job well done"

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