

## Case Study

### DuPont Shares Impact of Effective Tools for DCS Conversion



“Safety considerations and the need for a contemporary Human-Machine Interface (HMI) provided the impetus to replace the plant automation system at DuPont’s Chambers Works plant.”

- Nicholas P. Sands, Manufacturing Technology Fellow, DuPont

#### Background

For more than 200 years, DuPont has brought world-class science and engineering to the global marketplace through innovative products, materials and services.



DuPont’s Chambers Works chemical production facility.

DuPont’s market-driven innovation has led to the introduction of thousands of new products and patent applications every year, serving markets as diverse as agriculture, nutrition, electronics and communications, safety and protection, home and construction, transportation and apparel.

#### Benefits

##### Controller Configuration and Bulk Build:

Typical control modules were leveraged from previous projects, modified to meet plant-specific needs, such as motor control wiring differences from previous projects.

DuPont used C300 simulation for development and testing of control strategies, using dynamic simulation. The company was able to configure, in one Excel file, 350 control modules, 3,955 function blocks, 157 C300 I/Os, and 681 connections between control modules.

Bulk Build allowed DuPont to integrate functional description with configuration, shifting the automation engineer from configuration to strategy. “Bulk Build reduced the cost of configuration, without the need for an integrator for this project. The tool increased configuration consistency, improving configuration supportability,” said Nicholas P. Sands, Manufacturing Technology Fellow at DuPont.

##### HMIWeb Solution Pack:

HMIWeb SP’s standardized, integrated shapes and faceplates allowed DuPont to leverage the results across several sites, allowing for modification to meet specific requirements.

DuPont also leveraged standardized training on HMI functions for several projects across several sites.

“Proven solutions make leveraging easier, with lower cost than custom solutions and lower resistance to standard solutions,” noted Sands.

#### Challenges

DuPont’s Chambers Works plant in Deepwater, New Jersey, was founded in 1917. The facility was first known as the Dye Works, and it has made more than 1,200 products in its more than nine-decade history.

Teflon was invented at the Chambers Works Jackson Laboratory in 1938, and during World War II the site was used for research and development of chemicals in support of national defense efforts.

The Chambers Works plant was built originally with pneumatic controls, which were migrated to Single Loop Controllers (SLCs) in 1986. The controls included a panelboard Human-Machine Interface (HMI) and hardwired Safety Instrumented System (SIS).

The system needed bypass interlocks to purge the process to make it safe for maintenance; however, the hardwired SIS did not have a designed bypass. The common practice was to reverse the tubing on solenoid valves to force valves open.

The site was keenly aware that bypassing valves can lead to major incidents, such as the Phillips Pasadena incident in 1989 and the Formosa Illiopolis incident in 2004.

## Solution

DuPont worked with Honeywell to determine the best replacement for the outdated controls at the Chambers Works plant. The Experion® Process Knowledge System (PKS), including the C300 Controller, Experion Station HMI, and Safety Manager SIS, is the new system that fulfills DuPont's requirements.

Honeywell worked with the site to address installation issues that threatened the migration, bringing the project in on schedule. Several tools were used to simplify the conversion process, including Bulk Build and HMIWeb™ Solution Pack.

## Project Activities

Controller Configuration and Bulk Build:

DuPont employed the Bulk Build process to create a typical control module (CM), using Microsoft® Excel to populate the parameters — essentially a copy & paste and search & replace operation.

When using Excel to develop the typical control module, a macro creates copies using functional description tables. The Bulk Build output includes multiple tabs, including the Bulk Build tab and the Connections tab. Within the Bulk Build tab are all of the CM and

input/output (I/O) parameters that need to change from typical. The Connections tab configures connections to other control modules.

HMI Displays and HMIWeb™ Solution Pack (SP):

DuPont followed the guidelines of the ISA-101 HMI Lifecycle in its HMI development. The ISA-101 HMI committee was formed to establish standards, recommended practices, and technical reports relating to HMIs in manufacturing and processing applications.

System standards for the HMI Lifecycle Include:

- HMI Philosophy document - provides guiding principles and conceptual foundation for the HMI design, including details on how the HMI is designed and used.
- HMI Style Guide – applies the guiding principles and concepts of the HMI Philosophy to provide implementation examples and guidance.
- HMI Toolkits – generate all graphical symbols and other supporting elements as required to implement the HMI Style Guide.

Honeywell's HMIWeb SP meets the ISA-101 HMI Lifecycle standard, offering a written guideline emphasizing ergonomics and performance, style guide information, and a toolkit of display shapes that can be modified for user requirements. In practice, DuPont modified all of the SP shapes.

In addition, the Solution Pack aided in console design, review of procedures for task requirements, easy process for simple and more detailed displays, plus operator training.

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## For More Information

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