

Automation and control of an ethanol production process

**Food & Beverage:
Minnesota
Brewing Company**



UNITED STATES

**System Integrator:
Dahlen Systems, Inc.
Golden Valley, MN**

Introduction

St. Paul based Minnesota Brewing Company, the producers of Grain Belt and Pig's Eye beer, commissioned a recent renovation of an older facility they own in downtown St. Paul. This facility had been shut down because it could no longer compete with the other major breweries. It was brought back to life to produce products for regional markets by diversifying its production capability. Recognizing the similarity between the ethanol production process and the brewing of beer, Minnesota Brewing has retrofit a portion of this facility to allow for the production of ethanol which will be used as a gasoline additive. As an added benefit, a by product of the ethanol production process is CO² which can be used in the brewing process.



The application

The production of ethanol is a fermentation process that uses grain and yeast to produce a solution that contains alcohol. The solution is further distilled into the final product.

The ethanol production process at Minnesota Brewing employs TSX Quantum processors for the process control system's main controller. The sub processes such as grain handling, distillation, yeast propagation etc. are coordinated by means of a communication system that integrates more than 1000 digital and analog control points located throughout the plant.

Merlin Gerin

Modicon

Square D

Telemecanique

Schneider
 **Electric**

These I/O points provide data and control the many motor starters and drives that implement the process. The I/O will consist of TSX Modicon Momentum bases for the analog signals and some of the digital points in the system. Seriplex® will be incorporated in the motor control centers to control the many motors used in this process. The communications system integrating the TSX Modicon Momentum bases and the Seriplex system to the TSX Quantum controllers is Profibus DP. Profibus DP was selected because the original project specifications called for a competitive process controller that was advertised as supporting Profibus DP. At the time of installation it was discovered that the specified controller did not have a functional interface for Profibus DP. Dahlen Systems immediately switched the process controllers from the original specification to the TSX Quantum. They were pleased to discover that they could use Concept function blocks for programming which were very similar to what they were using to program traditional process controllers.

The objective

One of the requirements of this project was to do a quick installation of this system so as to minimize the impact on the ongoing production of beer in the brewery. It was necessary to have

a control system that was as pre-engineered and tested as possible so the electricians could accomplish the installation in the shortest amount of time possible and minimize disruption of normal plant production.

The solution

By utilizing Seriplex in the MCCs all the control and communications could be installed and tested before the MCCs left the factory. When the MCCs arrived at the job site all that remained was to connect the motor leads and a single Profibus DP communication cable from the MCC to the network. The use of Seriplex in the MCC buckets also allows for easy last minute repositioning of starters buckets in the MCCs.

In a similar manner, the Momentum I/O bases and the Profibus DP communication top hats are installed in the motor control centers. They are pretested and only the field wiring of the I/O needs to be completed at the job site

Elliot Contracting along with Dahlen Systems developed the specifications for the project. The system controls all facets of the production process including material handling, distilling, evaporation, yeast propagation, clean in place and evaporation.