SIXNET®

APPLICATION STORY

Contact Information
Company: ThIS Automation
Name: Ad Hamers, Managing Director
Phone: 76-587-10 10
Fax: 76-581-01-11
Email: info@thisautomation.nl

Advanced Process Control for a Urea Reactor

This OEM process control system uses redundant SIXTRAK I/O, advanced ISaGRAF control algorithms, Fix software and a combination of Netbuei and TCP/IP sharing an Ethernet network to reduce the cost of manufacturing fertilizer.

SYSTEM OVERVIEW

ThIS Automation, acting as an OEM supplier, designs and installs control systems that reduce the cost of operating urea reactors. Urea is the primary nitrogen-rich ingredient of fertilizer. This continuous process is most efficient if the concentration of urea is kept in equilibrium.

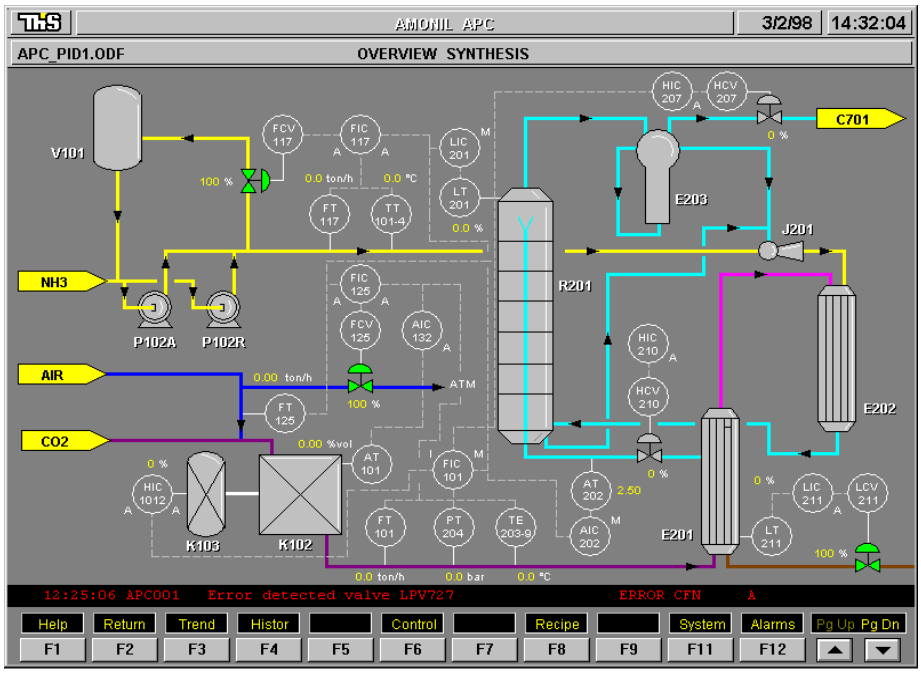

Figure 1: An overall view of the process in the fertilizer plant.

That requires a density measurement and a complex calculation involving many process variables. Under license from Stamicarbon bv, a subsidiary of DSM, ThIS has created an ISaGRAF program that: First, starts up the process and establishes equilibrium; and then continuously maintains precise control with the help of well designed Intellution Fix SCADA screens.

The control program involves 43 cascaded and interactive control loops to balance the relationship between the process variables. This ISaGRAF program runs in two SIXTRAK programmable Gateways providing a backup to improve reliability. (Many of these systems run in remote locations which are not easily accessed for service.)

The primary control outputs are pump speed and product flow rate, which under different conditions, offer an optimum way to maintain the ratio of products according to this equation:

$$\text{N/C molar ratio} = \frac{2\ \text{urea} + NH_3}{1\ \text{urea} + CO_2}$$

To help the operators and the maintenance people, ThIS has developed a set of interesting Fix SCADA screens. Figure 1, previous page, shows an overview of the synthesis process. This classic plant diagram gives a quick look at the entire process.

Figure 2, right, displays control loop templates that replace the single loop controllers in the older, less efficient control system. This view is well understood by the operators.

Figure 3, below, is a hardware maintenance screen showing a diagram and status of the system. Notice that Neteui (used between Fix consoles) and TCP/IP (to the SIXTRAK Gateway) easily share the same open Ethernet highway. Not shown is the redundant SIXTRAK backup system.

This system improves reliability further by reading back the analog outputs into analog inputs. A comparison is made to assure that the actual outputs match the desired levels within an acceptable band.

ThIS installs these systems in fertilizer plants as far away as Africa and Romania. The high reliability of the SIXNET system has gained it a good reputation as a dependable solution to this complex control requirement.

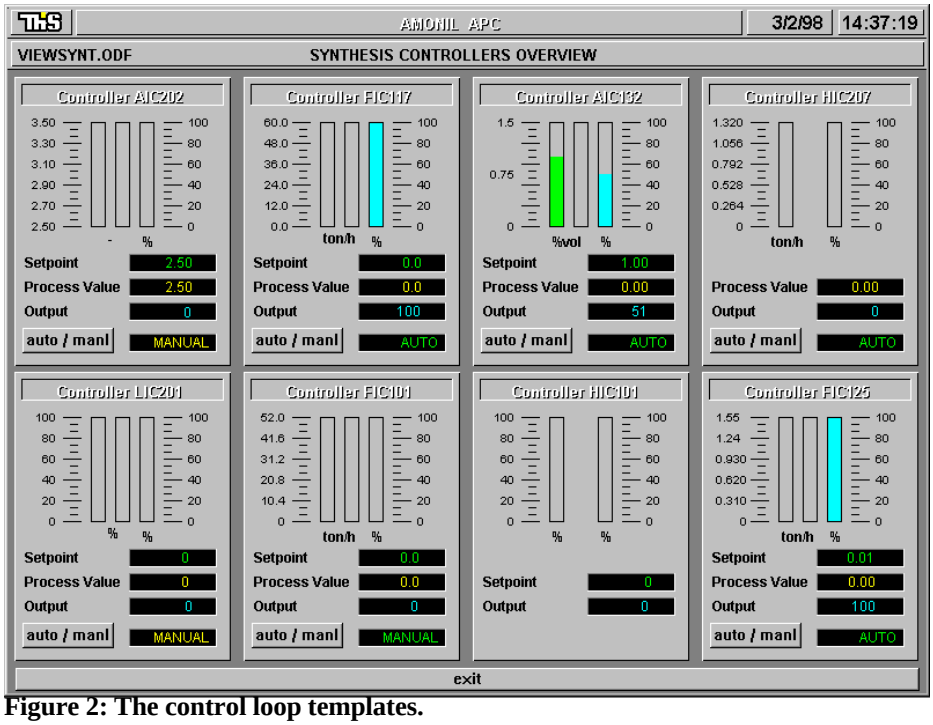

Figure 2: The control loop templates.

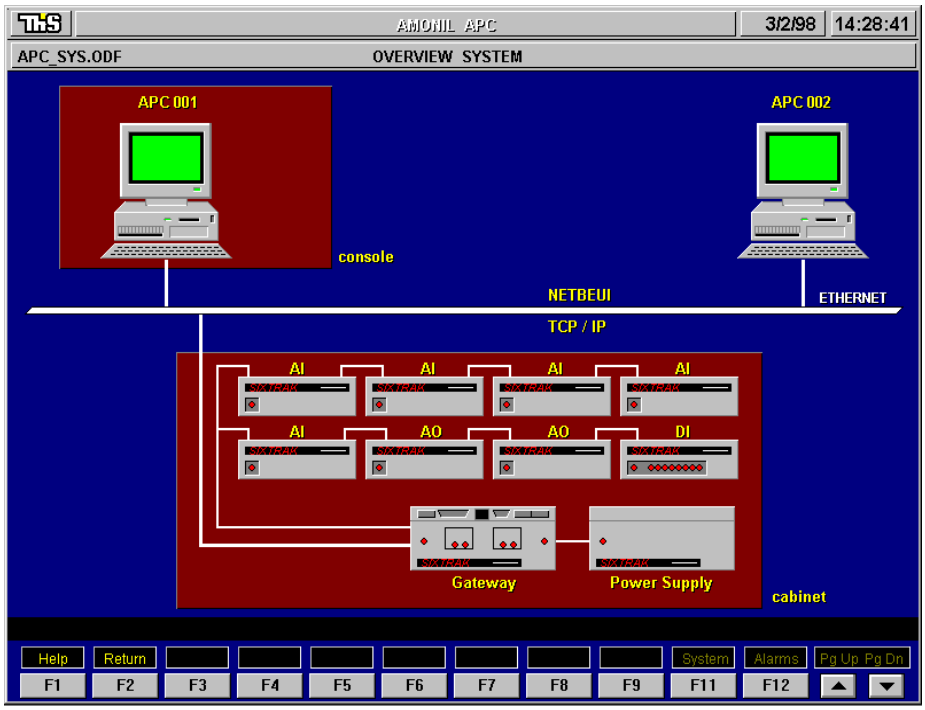

Figure 3: Hardware maintenance screen showing system status.

SYSTEM COMPONENTS

All SIXNET components below are duplicated into two redundant systems:

- ST-GT-ETH-24P programmable Ethernet Gateways
- 5 ST-AI-INS-08U instrumentation analog input modules for thermocouples and 4-20 mA
- 2 ST-AO-20M-08F 4-20 mA analog output modules
- 1 ST-DI-024-16H discrete inputs for panel switches
- Control Room software linking two computers to the SIXNET I/O
- ISaGRAF Workbench to maintain the control program
- 2 redundant Pentium computers with Intellution Fix SCADA software