

SYSTEM MIGRATION, MISSISSIPPI STYLE

*Pulp Processor Mississippi River Corporation Converts
Highly Customized Control System to New HMI Platform* **By** *Olan Atherton*

Mississippi River Corporation (MRC) operates a 400 ton/day re-pulping and de-inking facility in Natchez, Miss. The company produces a recycled paper fiber called “wet lap” that is sold to local paper manufacturers. In the early ‘90s MRC purchased a Moore Products’ APACS+ control system incorporating seven non-redundant ACMs, approximately 1,200 I/O’s and a custom HMI package. The HMI encompassed three independent systems, with a total of six conventional CRTs, as well as a stand-alone data historian.

Over time, MRC’s distributed control system underwent numerous hardware and software additions and modifications. During that period, the original HMI software vender also went out of business and failed to transfer the intellectual property and support for the HMI.

It was high time for an upgrade. MRC decided to migrate the old system to Siemens’ PCS 7 OS. Besides delivering contemporary levels of process control, the new HMI technology had the ability to communicate with the MRC’s legacy APACS+ control hardware without modification.

A Phased Approach, Naturally

To help spread capital outlay over a longer period, MRC tasked RSH Engineering Inc., a control systems integrator based in Monroe, La., to develop a phased approach to its proposed HMI system upgrade plan. Probably the greatest obstacle blocking the conversion was MRC’s extensive customization to the APACS+ controller library.

Another road block soon presented itself. The existing configuration contained no HMI comments, which are used to automatically create the HMI tag database from the controller configuration. Every sheet in the controller configuration would need to be modified to add the appropriate HMI comments in order for database automation to work. In addition, there was no system documentation, and the PC hardware platform was unstable.

Phase 1 focused on auditing of the system to thoroughly document it and identify a workable path forward. The existing HMI had to be completely documented to assure that

nothing was missed in the conversion process.

The MRC plant configuration contained three distinct operational databases connected to seven non-redundant APACS+ controllers. Each database was completely independent of the others, though some information from spe-

FIGURE 1.

NEW INTO OLD



MRC’s decade old hardware forms the backbone of the new Siemens system.

cific controllers was available in more than one database. The existing HMI databases were broken down into 10 separate Excel databases: three multi point, three single point, two calculation point, and two constant point.

Using the data extracted from the existing HMI’s multiple components, RSH built a complete spreadsheet mapping the connection between the HMI and its respective controllers. The information included connection path details, point descriptions, point ranges, HMI resident alarms, point-attribute level connections, and HMI faceplate-to-controller type mapping.

Every configuration component needed to be modified, all derived blocks needed to be brought up to the current version (rev. 4.5) of Siemens 4-mation software. It was not economically practical to bring everything back to a standard “as shipped” convention, so RSH adopted a hybrid approach to move the configuration toward the standard while

minimizing re-engineering of the controller configuration.

Complication Times Eight

Complicating this issue was the existence of eight different versions of the External-set PID controller, all of which differed from the standard. There were also custom motor controllers for reversing motors, and several versions of block valve controllers, including a controller for automated valves with no limit-switch feedback.

The custom components were reduced to seven new custom-derived types, their matching block icons, and faceplates.

Seven for PCS 7

Because the APACS+ system was customized, RSH needed to develop seven custom-defined type templates, block icons, and faceplates.

From the beginning RSH understood that the bulk of the work would take place in the APACS+ controllers.

RSH modified the APACS+ controller configurations using the Excel databases as formal checklists for each step, and various reports available from within *4-mation* detailing derived block types, locations, and softlist parameters for user-defined function blocks (UDFBs).

Another challenge was finding enough space in the configuration to locate the large number of HMI comments required for local variables.

Best Practices

MRC purchased standard, off-the-shelf PC hardware. The integration of

the OS software proceeded smoothly after the software installation was complete, and all computers were imaged to CD-ROMs to facilitate any required software repair during project implementation. A separate partition was created on each machine for the OS software keys so that they would be safe from damage by utility software.

From Text Dump to Database

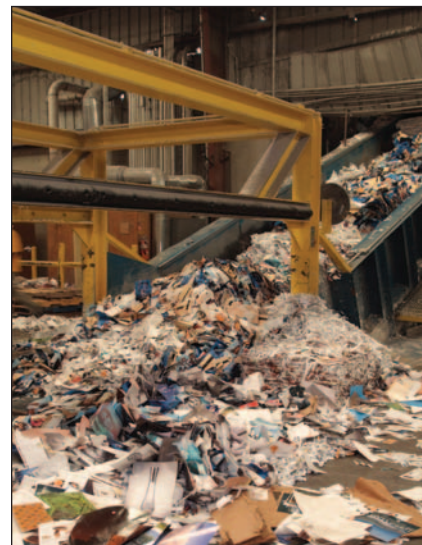
RSH reviewed all existing HMI graphics for connections to other graphics, and developed a process graphic navigation structure. To document the functionality of the existing graphics and recreate the images/graphics in the new OS, RSH used the Excel databases and a running copy of the old OS. This part of the effort that took the project team eight weeks to complete.

MRC performed thorough reviews of the existing graphics to update them and eliminate unnecessary components. As the graphics reviews progressed, MRC determined that several contained too much information and recommended splitting those displays. By the time the OS implementation was finished, the number of graphics grew from 70 to 75.

RSH installed the DCS network and HMI hardware on site during a normal two-day maintenance outage—the first day, hardware was set up and verified network functionality, and the second day they reloaded all of the APACS+ controllers with the modified configuration and connected the new servers to the existing MBUS network.


The last step required was to modify the existing HMI OS point-attribute

FIGURE 2.
MAKING WET LAP



recycled paper is re-pulped, de-inked and sold again as “wet lap.”

mapping to match the nub-name modifications made in the controller configurations. Prompting this step was the need to bring the plant back online with the existing HMI, and then perform the checkout of the new OS while the plant was in production.

MRC’s system migration was completed in approximately 11 months, with a three-month delay between phases 1 and 2. The conversion did not halt production downtime, and anything project related that did require downtime was accomplished during scheduled maintenance outages. 

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