Control System Upgrade Saves Cable Manufacturer Millions, Brings Production From China to the U.S.

Rockwell Automation Migration Solution Offerings Help Reduce Upgrade Cost, Time and Risk

**Challenge**
- Leading cable manufacturer needed control system upgrades to consolidate production and testing in North America
- Facility needed to modernize and optimize line by moving from an outdated PLC5 solution to a ControlLogix platform

**Solutions**
**Migration Solutions**
- RSLogix 5000 design and configuration software with embedded conversion utility
- Bulletin 1492 I/O Wiring Conversion Systems made transferring more than 150 points of I/O from 1771 to ControlLogix 1756 simple by connecting through prewired cables to existing digital and analog I/O
- FLEX I/O adapter modules allowed for the migration of all 32 points of I/O for existing line drives from hard wire to EtherNet/IP
- EtherNet/IP cut the need for gateways and allows CommScope to more easily share information

**Results**
**Reduced Supply-chain Costs**
- Producing cables in U.S. cut shipping costs by $6 million dollars

**Low-risk Migration with Large Upside**
- Migrating to ControlLogix PACs and FLEX I/O on EtherNet/IP reduced equipment footprint, increased flexibility, and cut installation and maintenance costs
- A phased migration completed in just four months with only a few days of planned downtime

**Background**
Today, more than 85 percent of the global population has a cell phone. This means almost six billion phones need access to a radio link to complete a call, send a text or stream the latest viral kitten video. Cellular networks that provide these links are composed of individual cell sites or base stations made up of the requisite antenna and equipment that facilitate cellular communication.

CommScope, a leading provider of communications network infrastructure, addresses the growing need for cellular links by producing base stations for its customers in a quicker and more cost-effective manner. Cell base stations require a specific type of coaxial, or coax, cable. Coax cables are insulated and provide precise, consistent conductor spacing needed for radio frequency transmission.

CommScope produces the coax cable used in its base stations out of its facilities in Suzhou, China. During production, spools of a coated inner copper core are pulled through an extruder that applies a layer of plastic insulation. The now-insulated coax cable is moved down the line by payoff wheels until it arrives at a welding table where it is surrounded by the outer conductive channel, a sheet of copper tape that is welded around the core. The cable then moves through a corrugater, where the outer conductive channel is given a bumpy exterior for flexibility. After this, the cable moves into another extruder where the final polymer jacket is applied.
Once production is complete, CommScope ships its products to Mexico for extensive quality testing. After testing, the spools of wire are shipped back to the factory in China where they are cut into six-foot lengths and incorporated into cellular base stations, connecting antennae to a hardwired network. These stations are being installed all over Asia to expand mobile network coverage.

**Challenge**

In early 2012, CommScope management realized the company could save upward of $6 million per year in shipping costs if it moved production from Suzhou, China to its facility in Claremont, N.C. In doing this, the company could eliminate shipping costs associated with product testing.

In order to make the move, the company needed to upgrade the automation equipment on the home automation production line at its North Carolina facility that produced several types of coaxial, twisted pair and special-order cables. The line at this facility did not have the necessary extruding or feeder equipment for the new cable. The new machinery would be shipped from the factory in China. However, a control-system upgrade was necessary to allow all existing and new equipment to communicate reliably, and ensure the line could quickly change over to produce a wide range of cables.

**Solutions**

Committed to keeping his preferred control and design environment, Lewis began working with Rockwell Automation to develop a migration plan in mid-April 2012. Step one was to document his current system and define the requirements he needed from his new system. The team decided to transition to Allen-Bradley ControlLogix 5571 (catalog #1756-L71) programmable automation controllers (PAC) on EtherNet/IP for line control.

From here, the remaining system parts were selected in under an hour with the use of Rockwell Automation Integrated Architecture Builder (IAB). Lewis uploaded an autoCAD drawing of the existing system into the tool, and it produced a list of all the new part numbers needed to migrate.

The new system included Allen-Bradley Bulletin 1492™ I/O Wiring Conversion System interface modules and cables that connect through prewired cables to existing digital and analog I/O. This allowed Lewis to integrate control, motion and safety functions, and easily communicate with legacy processors and new third-party components. Doing so helps keep costs and risks low by allowing Lewis utilize much of his existing I/O investment.

In the next phase of the migration plan, Rockwell Automation worked with CommScope to begin the migration. Fortunately, RSLogix 5000 design and configuration software contains an embedded conversion utility, which automatically converted...
about 80 percent of the programming code. This saved CommScope time and engineering resources in addition to reducing the risk of human error.

After the code was converted and tested, Lewis upgraded the PLC-5 processor to the ControlLogix PAC and programmed the new PAC to communicate with the three uptakes controlled by the SLC 500 processor. More than 150 points of 1771 I/O were converted using the 1492 I/O Wiring Conversion System. The existing in-chassis 1771 I/O swing arms fit directly onto new interface modules. Since the I/O conversion was accomplished without the removal of any field wires from the existing swing arm, risk of wiring errors was greatly reduced. Next, for the distributed I/O, Lewis used the Allen-Bradley FLEX™ I/O adapter module to migrate all 32 points of I/O for existing line drives from hard wire to EtherNet/IP.

The CommScope plant only endured a few days of planned downtime throughout the whole phased migration process.

It took only two hours to exchange the PACs. After two days of verification, the line was up and running. The CommScope plant only endured a few days of planned downtime throughout the whole phased migration process. The smooth, safe transition also gave Lewis and his team several months to run the upgraded line and make sure everything was in order before new equipment arrived from China.

When the new feeder and extruder equipment arrived in July, Lewis connected the new equipment to the ControlLogix system on EtherNet/IP by simply sliding a fieldbus interface card into the controller chassis. Three new Allen-Bradley PanelView™ Plus human-machine interface terminals running FactoryTalk® View software were installed to help CommScope engineers visualize the production process, quickly respond to hiccups. It also enables data collection for easy production of process reports for engineering or business-level stakeholders.

Production on the new coax cable line started in August – just four months after the migration began.

Results

“I didn’t know how long this transition would take when we first started the project, but going from mechanical drawings to product in just four months with only a few days of downtime was faster than I thought it could be done,” said King. “The Rockwell Automation migration tools obviously helped make the process relatively fast and painless.”

To stay competitive, CommScope needs the ability to produce multiple types of cables. This requires precision and flexibility as lines change over frequently. King said, “Our sister plants and competitors overseas can run single cables for a long period of time at low costs to the customer. We have to keep our plant up to date, so we can push product through more quickly and maintain the best quality. This system migration not only allowed us to produce a new cable, saving more than $6 million in shipping costs annually, but it also improves production on the other five to 10 types of cable we make on this same line.”

When Lewis first began working at CommScope, the North Carolina facility was controlled only by Allen-Bradley PLC-5 controllers and 1771 I/O. After the migration, the facility uses ControlLogix PACs, 1756 in chassis IO and FLEX I/O on EtherNet/IP. “These new products allow us to shrink our equipment footprint, move equipment around, and cut installation and maintenance costs,” added Lewis. “Using EtherNet/IP means we don’t have to deal with gateways and can more easily share information throughout the company. We’ve removed pushbuttons and added functionality. And all the migration support and tools from Rockwell Automation reduced the risk of our transition.”

The results mentioned above are specific to CommScope’s use of Rockwell Automation products and services in conjunction with other products. Specific results may vary for other customers.