Wireless I/O Stamps Out Downtime on Auto Press

By Adrienne Lutovsky, ProSoft Technology

Front of the bolster, where an operator can be seen loading a stamping die

At the Gestamp plant in McCalla, Alabama, everything is oversized. The floor is a vast concrete slab, bare but for two giant 2000 metric ton transfer presses stretching into the air. To accommodate these beasts, the ceilings are built so high that the lights above appear dimmer. Nothing can be heard above the overwhelming roar of the ram as it slams into sheets of metal, molding the shape of what will soon be structural parts.

Hiss, ka-JUNK, hiss, ka-JUNK, hiss, ka-JUNK.

Then…silence.

"Alright everyone, call your wives and tell them you're going to be late tonight. By the time we get these presses up-and-running again we're all going to have to work late just to meet production requirements," Mike Mullins, the Press Maintenance Team Leader, breaks the news to his crew. "This is going to cost us."

…And this isn't the first time. Gestamp Automoción owns and operates more than 70 transfer presses and 100 progressive presses, but the two transfer presses at their facility in McCalla had been causing a ruckus. At least once a quarter, the hardwired network suffered cable degradation, and each occurrence caused the entire operation to shut down for up to two hours. Something had to be done.

Network Problems Take Down the Plant

Gestamp Automoción is a tier one Spanish-based automotive supplier, with 56 production centers located in 17 countries. They produce metal components for most of the leading automobile manufacturers in the world, from the high-end Mercedes-Benz, Porsche, Bentley and BMW to the high-volume Ford, GM, Nissan and Suzuki.

At the McCalla facility much of the production is for the Mercedes-Benz plant in Tuscaloosa, Alabama. The plant utilizes two presses which produce up to 1800 parts per hour. The presses were hardwired and faced frequent downtime from cable breakage or damage, frustrating the team on the plant floor.

"The RG-6 coaxial cable we were u sing cost $57 per foot and we had about 165 feet to replace each time the system went down," commented Mullins. "The cable alone cost between $9400 and $9500 to replace and

that's not including the cost of the system shutdown. We once estimated the overhead costs of downtime at about $2500 an hour, and it typically took a couple of hours to replace the cable."

In total it cost Gestamp approximately $14,500 each time they had to replace the cable, plus the value of the 1500-2400 parts that could not be produced during the outage.

"It wasn't uncommon for this cycle to repeat every 2 to 3 months per press," said Mullins.

The application

The application involves two presses. Each press consists of one ram, two dies, and two bolsters. The bolsters are mobile metal plates on which the dies are mounted. A die is used as a mold that defines the shape that the part will take. In this application each die is roughly the size of a one ton pick-up truck.

During the process, a metal sheet is fed across one bolster and comes to a rest above the dies. The ram rises and drops with a force of 800 to 1400 metric tons, sandwiching the metal sheet between itself and the die to stamp out the parts. While one of the bolster stamps parts, the second is loaded.

The Challenge

The cable wasn't as much the problem as the demands placed on it. The cable's path ran along a corner that required it to achieve such a sharp angle that the cable inevitably wore in this area.

Nevertheless Gestamp needed a more reliable network, but there was a question about whether a wireless system would be effective given that wireless points would need to be affixed in a partially obstructed location beneath the bolsters.

"What we really needed was a radio that could communicate through a ten inch thick plate of steel," commented Mullins.

Sharp angle of bolster cable that was used prior to the wireless network

The solution

Since he would be hard-pressed to find a radio that can penetrate steel, Mullins spoke with his local Rockwell Automation® distributor, who recommended using six Frequency Hopping Ethernet radios (RLX-FHE) from ProSoft Technology®, along with Gestamp's existing ControlLogix Programmable Automation Controllers (PACs).

Kevin Zamzow, ProSoft Technology's Strategic Product Manager for Wireless Technologies explains, "When the direct path (line-of-sight) is obstructed, a signal will reflect off of other objects, taking an alternate path to the receiving radio. Because there are multiple reflections, the signals arrive at the receiving radio at different times, so the radio needs to be able to distinguish between the different signals. ProSoft Technology's Frequency Hopping Spread Spectrum (FHSS) radios are able to work with reflected signals because of the narrow band "hops" and changing frequencies, making them less impacted by multipath interference compared to higher speed, wider band technologies such as 802.11."

The Wireless Network

Each press is automated by a dedicated Rockwell Automation® ControlLogix® PAC. To replace the hardwired system, four Flex™ I/O ControlNet™ communication adapters—one for each bolster—were replaced with EtherNet/IP Adapters and a ProSoft Technology Ethernet radio. Each PAC was fitted with a second 1756-ENBT Ethernet card and an Ethernet radio.

Cliff Whitehead, Manager Strategic Applications for Rockwell Automation notes, "EtherNet/IP was designed as a media independent solution - Gestamp has been able to

directly take advantage of this flexibility in their wireless application."

Harry Forbes of ARC Advisory Group elaborates, "One of the key advantages of Ethernet-based automation networks is the wide variety of solutions for wireless Ethernet bridging. These solutions can have enormous value in manufacturing applications."

Performance

"We've got a unique application here, involving large moving hunks of steel. Our initial concerns that the steel would impede the radio performance turned out to be unfounded. When the bolsters interfere with line-of-sight, the radios continuously try to read through the bolsters," comments Mullins.

This specific application shows that though the laws of physics cannot be changed, the obstacles they present can be circumvented when armed with the right technology; in this case, a high quality industrial wireless solution. By using ProSoft Technology's Industrial Frequency Hopping radios, Gestamp has been able to eliminate the downtime plaguing its McCalla facility, translating into a savings of up to $174,000 per year, plus the value of parts produced during that time. The wireless system has been live for two years now and Mullins is still pleased with the performance of the radios. "In fact, the radios work better than expected. We've been very happy with them."

For more information about the products used in this application, please visit www.prosoft-technology.com/wireless.