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Ford Buffalo PTA
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Photos Ford

Head:
Smart sight makes for a smart system

Intro: A unique automation solution for racking and de-racking stampings is driving the future at Ford Motor Company's Buffalo Stamping Plant.

Text:

Traditionally, automotive stamping facilities relied on manual labor to rack and de-rack stampings to and from robotic welding lines. Today, Ford Motor Company's stamping plant in Buffalo, N.Y. in the United States is shaking things up a bit by incorporating robot automation in a way not done before: incorporating automated guided vehicles (AGVs) and robots to complete the job, thus saving the manual labor previously required to bring stampings onto and off of the robotic welding lines.

In the past, Ford's Buffalo facility featured some automation, paired with two operators on a line. The AGVs would deliver racks to the operators, with one operator de-racking subcomponents and placing them onto the robotic resistance welding line and the other operator picking up the completed parts from the conveyor and racking them for shipment to the end-user.

Many of Ford's divisions were already incorporating solutions provided by ABB Robotics, including the Powertrain Division, which had up to 80 systems in operation. "This experience, combined with introducing other facilities to vision system prototypes, drove Ford to consider vision-guided robotics for the Buffalo stamping plant," says Russ Schenck, Ford account manager, ABB Robotics.

In April 2007, Ford Buffalo and ABB started the process of fully automating the stamping plant's subassembly lines, including hoods, lift gates, floor pans, ladder assemblies and dashboards, for several Ford and Lincoln models. "We were looking for a system that would maintain a high level of quality and a low Mean Time to Repair [ease of system recovery by our skilled trades]," says Paul Gawronski, assembly process engineer, Ford Buffalo.

The existing lines were retrofitted with robots for the racking and de-racking functions. ABB installed a total of 13 IRB 6600 robots on seven spot welding cells, incorporating ABB's TrueView vision-guided robotics technology to further enhance the automated solution. This solution puts Ford Buffalo at the forefront of automation: vision-guided robots working in tandem with AGVs. The Buffalo plant is the second automotive facility to recently incorporate AGVs and robots working together.

The process is simple: A TrueView vision-guided robot at the beginning of the line uses a single camera to capture the location of subcomponent stampings on a rack and then places each part onto the line for processing by a spot welding robot. At the end of the line, a second TrueView-enabled robot uses vision to both locate a rack and the completed part on the line, removes the part from the conveyor and fills the rack for shipment to an assembly plant's body shop. While some lines still require human assistance to deliver or pick up racks, four of Ford Buffalo's seven automated cells rely on AGVs to present racks to the robots at the end of the line.

With TrueView, powered by Braintech's eVision-Factory software platform and single camera 3D guidance technology, the robots are able to "see" the parts and racks, eliminating Ford Buffalo's need for expensive precision equipment or rack locators. "Vision is especially helpful for capturing the location of the racks presented by the AGVs, as these vehicles are not able to stop accurately or in the same position with each rack presentation, typically stopping within a +/- 5-inch variance," says Eric Putnam, robot programmer, ABB Robotics. With retrofitting the existing lines with new robots, modifications to Ford Buffalo's existing racks were minor. TrueView is able to recognize variations in the racks, such as different styles or inconsistent colors.

Additionally, because TrueView's single camera is mounted to the robot, there's less concern for the system being jostled and requiring calibration. "However, unlike multiple-camera systems, if Ford Buffalo does require calibration, the process is quick and easy, typically taking less than five minutes," says Putnam.

The robotic racking and de-racking systems were easy to install and commission. In fact, ABB and Ford Buffalo worked to deliver and install the cells during the plant's summer shutdown in July to minimize interference with production. To meet these tight deadlines, ABB pulled three cells ahead, installing them prior to the shutdown. "By installing select cells early, we were able to develop lessons learned and apply them to the installations before the summer shutdown crunch," says Schenck.

"We were able to install five robotic load cells and have them production-ready for start-up during our summer 2007 shutdown. The lessons learned from installation of earlier cells helped with integration to AGV systems, plc programs and resource requirements," says Gawronski.

For easier integration, the systems were validated in a build shop. Before shipping the systems to Ford Buffalo, ABB utilized the eVisionFactory's AccuTest tool to test the process and generate reports defining how much variance the system could handle, thus maximizing the accuracy and performance of the systems once installed.

Meeting Ford Buffalo's requirement, the cycle time was maintained, while each vision-enabled cell has re-allocated production personnel to more value-added plant manufacturing positions.

Sidebar:

Top-rack solution

By using 13 IRB 6600 robots from ABB and automated guide vehicles to rack and de-rack stampings from the press line, Ford Buffalo has achieved a number of benefits, including:

- No expensive precision equipment or rack locators needed
- Personnel requirements re-allocated
- Easy installation meant some cells were in place before the major installation was made so lessons learned could be applied to the bigger installation
- Easy to use system with low mean time to repair

Captions:

An IRB 6600 robot loading liftgates onto a robotic spot welding line at Ford Buffalo.

An IRB 6600 works with an AGV to rack and de-rack stampings from a press line.