

# PICK-AND-PLACE SYSTEM DELIVERS IMPROVED PRODUCTIVITY AND SAFETY



Deciding between a gantry and a robot for your application isn't always as clear-cut as it may seem. To automate a simple, yet time-consuming and potentially dangerous task in its factory, a company that makes particleboards weighed the benefits of using a gantry system against a robot system.

**ROBOT OR GANTRY?** Chicago Electric was approached to design an automation system for stacking the metal screens used to make particleboards. These screens are stacked at the end of the process and sent back to the beginning for reuse.

For some time, two workers stood on opposite sides of these screens to carry and manually stack them one by one. This tedious process put its workers in harm's way and the company decided it was time to bring automation into the mix.

"After considering important factors like cost and efficiency, we chose a gantry system instead of a robot," said Bob Kaska of Chicago Electric.

Using a gantry requires less maintenance than a robot since it only uses two motors instead of six. This application's long reaches at high capacities are easier to achieve with a linear actuator than a robot system. In addition, its range of motion and weight of the product would have made robotics a much more costly solution – at least twice as expensive as the gantry solution.

Built around a pair of mating Rollon actuators, Chicago Electric designed an X-Z gantry system to stack the metal screens, allowing workers to use their time and expertise in other areas.



*Rollon's R-SMART actuators give this gantry system the accuracy, repeatability, capacity and travel length it needs.*

"The system's primary motivator was safety," said Kaska. "The task involved repetitive motion and the coordination of two people. It required the operators to be in close proximity to moving equipment to place the screen header on a moving sheet."

**RELIABLE LINEAR ACTUATORS FOR THE JOB.** Finding an actuator to meet all the requirements of your application can be a challenge. Some things to consider when selecting the right actuator are accuracy, repeatability, capacity and travel length. For this gantry system, Chicago Electric chose Rollon's R-SMART 160 and SC-130 linear actuators.

With a carriage made from machined anodized aluminum, the R-SMART 160 uses a dual linear guide – rather than a single linear guide – to provide high moment load capabilities and properly handle the required amount of weight. The SC-130, part of Rollon's PLUS series, mounts directly onto the R-SMART unit without an adapter plate. This actuator also features high capacity and increased rigidity.

Another important characteristic of the SC-130 is its stationary carriage and moving extrusion. By contrast, most other Rollon products have stationary extrusions and moving carriages. This feature makes the actuator a good choice for vertical applications like the new gantry system for particleboard screens.

**PICK-AND-PLACE SYSTEM FOR REDUCED CYCLE TIME.**

The X-Z gantry system that Chicago Electric designed is a pick-and-place system that reduces cycle time from 30 to 15 seconds, while also improving safety. In addition to the two Rollon linear actuators, the system consists of other parts including:

- Emerson HD-115C & HD-89C Servo Motors
- Emerson Unidrive Digital Positioning Controllers
- Industrial Magnetics Air Actuated Magnetic Tooling
- A Red Lion Graphite Series Color Touchscreen HMI
- An Allen-Bradley CompactLogix PLC
- A Keyence Laser Position Sensor

This fully automated pick-and-place system travels 3.7 m horizontally and 1.2 m vertically to stack the metal screens. The system's X-axis has speeds of 1.3 m/s and a force of 270 kg. Its Z-axis has a stroke of 122 cm and force of 224 kg. Also on the Z-axis, the gantry is fitted with a heavy duty magnetic tool that flips on once the tool comes down.

Chicago Electric's pick-and-place system also features a 1.27 cm header bar that's engaged by a chain conveyor and used to connect the steel screens.

**EXTENDED LIFE OF THE SYSTEM.** Rollon engineers determined the Z-axis moment on the R-SMART would be the limiting factor in this X-Z gantry system. With a maximum speed of 1.5 m/s, acceleration of 33 g and 1/3 factor of safety, this actuator has an  $M_z$  of 1192 Nm, which falls well within the limit of 5707 Nm.

Rollon performed a life calculation to find out how long the system could last and discovered that it could last up to 21 years. This number comes from the assumption that the system would complete an average of four cycles each minute for 16 hours per day over a 360-day period. In reality, however, the system is only used a few times each week.



*With the help of Rollon actuators, Chicago Electric designed a pick-and-place system that reduces cycle times and improves safety.*