Manufacturing Process Optimization

Arena® Simulation Software Enables Manufacturer to Redesign Assembly Line and Reduce Costs

**Challenge**
Appliance manufacturer sought to redesign assembly line to gain operational efficiency. This included determining optimal buffer space for liners and better allocation of floor space.

**Solutions**
Rockwell Software
Arena Simulation Software

A manufacturing simulation model was developed using Arena. The highly-detailed model evaluated the dynamic flows of products through the system, evaluating material handling as well as production operations.

**Background**
A major manufacturer of household appliances produces a line of refrigerators.

**Challenge**
A major manufacturer of household appliances wanted to redesign a significant portion of its refrigerator-linear final assembly process, as well as create and implement an effective and appropriate production schedule for that process.

**Key Objectives:**
- Determine the optimal amount of buffer space for liners.
- Locate additional floor space for new equipment purchases.

The system under evaluation produced various sizes of refrigerator liners; transferred those whole liners to an area where they were cut, taped, and pressed; then transferred them to an insertion area. Limited resources required that the appropriate mix of liners enter the “press” area to maximize system equipment since changeovers required significant time. A buffer area prior to the press area provided the space to “bank” liners for later use during off-shift or slow production due to upstream failures or bottlenecks. More buffer space was needed for overflow storage and additional floor space had to be located for new equipment purchases. While the company was willing to invest in additional equipment and man-power, they wanted to have a clearer picture of what would be required. The Rockwell Automation Arena consulting team was asked to provide a workable and affordable solution.
Solution
A manufacturing simulation model was developed using Arena. The highly-detailed model evaluated the dynamic flows of products through the system, including material handling as well as production operations. The high level of detail was required to capture the system sensitivities to the production operations in the system. The analysis clearly showed the amount of buffer space that was required for various production scenarios as well as for multiple equipment layouts. A detailed animation of the system provided validation of the model by displaying each liner as it traversed the system (including system bottlenecks), as well as the dynamic status of the buffers.

Results
By running an anticipated production schedule through the manufacturing simulation model, Arena was able to find a design with the optimal amount of buffer space as well as the minimum system resources necessary to meet production goals. Various cost trade-offs were calculated with the model, balancing equipment and conveyor costs versus production throughput and volume.