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USING DETAILED MATERIAL HANDLING MODELS TO REDUCE RISK IN WAREHOUSING UPGRADES

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ABSTRACT

To accommodate changes in demand, companies often require upgrades to their Distribution center (DC) material handling equipment. These upgrades cost millions of dollars, and it can be difficult to understand exactly what the impact on operations will be. Savvy managers use simulation to help understand how the upgraded systems will perform, using simulation models as "insurance" that their investment will pay off.

Accurate simulation models help DC managers reduce risk, and also help them see how far into the future these upgrades will work. In this presentation, we will review two recent DC case studies, and discuss how AutoMod® simulation models provided the level of confidence the customer required before making their investment in new equipment. Both models use actual data to drive the simulations, and the clients acquired AutoMod® run time licenses to build internal support for simulation, assist in validation, and to perform continued experimentation.

1 CASE STUDY 1 – INDUSTRIAL CONTROLS FULFILLMENT CENTER EXPANSION

This client is an industrial controls provider that uses e-commerce to ship a large variety of stock keeping units (SKU). The client experienced substantial growth over their years in business, and they had seriously outgrown their original order fulfillment center in the Atlanta area. The current warehouse is landlocked with little room for horizontal expansion . The client was looking at several material handling and order fulfillment solutions, including high density storage for their many SKUs. Additionally, the client wanted to consolidate operations and bring the receiving and warehousing operations under one roof.

The client is working with a material handling systems integrator to provide a solution. The systems integrator has extensive experience with simulation, convincing the client to fund a simulation to help evaluate the effectiveness of the material handling solution. The material handling integrator's solution had an eight figure price tag, so a five figure simulation project was justified. After the simulation, the end client was very positive about the benefits of doing the simulation.

Figure 1 shows an overall view of the 3D simulation model built using AutoMod®. In the foreground is the shuttle system used to store 1000s of SKUs for picking operations. The shuttle system is also used for short term storage of received products which have to be depalletized and then repalletized for longer term storage in narrow aisle racks. Conveyors connect the shuttle to picking operations and order consolidation. The model used actual customer data to represent current and future expectations for order volume and the size and mix of orders.

The client realized significant value from the simulation, and the systems integrator sold their concept and equipment to the client. The simulation model facilitated the sale of the automation solution, and gave the client confidence the new system will meet their needs into the future.

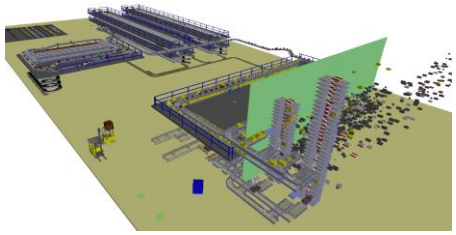

Figure 1: 3D View of AutoMod model

2 CASE STUDY 2 – TEMPERATURE-CONTROLLED WAREHOUSE EXPANSION

The client in this case study runs one of the largest networks of temperature-controlled warehouses in the United States. The client is planning to bring new products into an existing warehouse, and add picking capabilities. The unit of handling for this system is the pallet, or "unit load". In one area of the expansion, taller pallets are split in two and then sent to either be stored or shipped. The flow of pallets is from receiving into a large Automated Storage and Retrieval (ASRS) system, and then either to the pallet split expansion or to shipping. The two picking areas feeds newly configured pallets into the system to be either stored or shipped.

One of the areas of complexity in this system was the conveyor controls. The conveyor loop in front of the ASRS is being upgraded to include bi-directional cross-overs from each side of the loop. Also, conveyor merge points include time for raising and lowering of transfer mechanisms. Most of the modeling time was spent developing the controls to precisely replicate how the pallet conveyors would behave in the upgraded system. Modeling this level of detail for the conveyor controls was crucial to understanding the throughput of the system during peak periods. Diamond Head Associates built the model including a flexible spreadsheet interface, so the integrator could run scenarios depicting various loading configurations.

Please see Figure 2 for an overall view of the system. Pallets were color coded to help with the understanding of the system. Initially the ASRS was modeled as a "black box", but this detail was added in subsequent phases of the modeling effort.

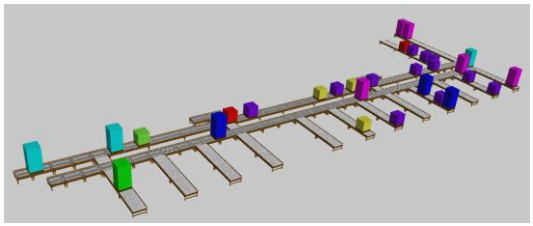

Figure 2: Temperature Controlled Warehouse model