

CSIM for Java User Story:

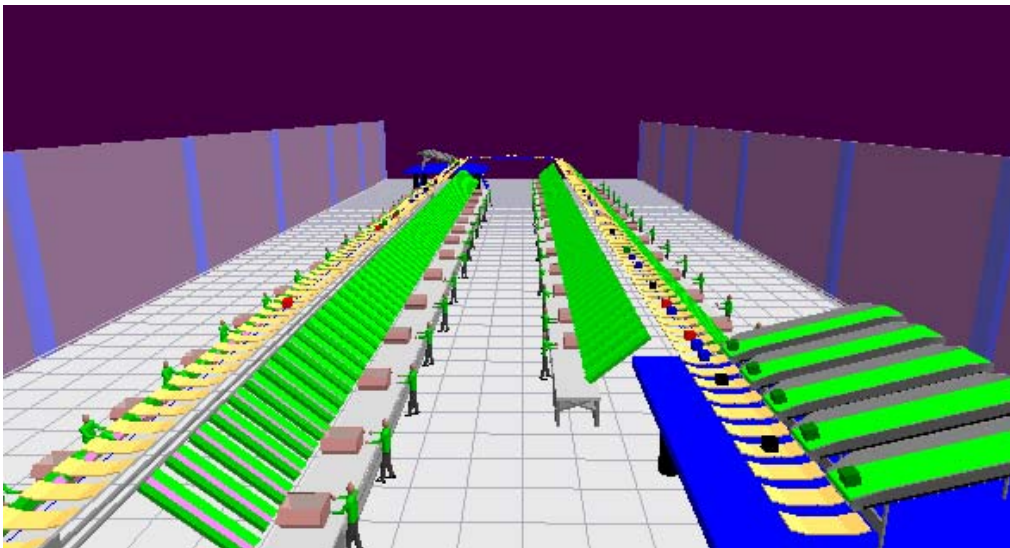


Material Handling Modeling Using CSIM for Java and Systemflow 3D Animator

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Introduction

At Systemflow Simulations, Inc. we have extensive experience modeling material handling systems using diverse simulation modeling tools. We have been exploring the possibility of adding CSIM for Java to our modeling toolkit.



Our first CSIM for Java model consists of a tilt-tray sorter system used in order- fulfillment operations for small-sized product. The sorting system consists of an oval containing the path around which the trays travel. At one or both ends of the oval there are induction chutes containing product to be placed on trays. Aligned at each side of the oval are arrays of delivery chutes onto which product is dropped. In a tilt-tray sorting system, product generally conveys to the sorting area where human operators place the product on induction chutes. The product rests on the induction chutes until an empty tray arrives. Upon arrival the chute releases the product and the tray tilts to accept the oncoming item. Once the item is fully onboard, the tray returns to its normal upright

Application Area:
Materials handling

CSIM for Java's Challenge:
Simulating the behavior of materials handling systems and integrating with Systemflow 3D animator software to graphically display results

position and begins travel around the sorter. When the tray arrives at its designated delivery point, the tray tilts once again to drop the product down a chute to waiting packing operators below who assemble orders to prepare them for delivery.



Model Logic

We constructed this model by using processes to represent the incoming product from the conveyor system, the induction and conveyance of product at the induction chutes, the product item itself, and the tilt-tray. When the model starts a tray generator process creates trays and dispatches them to begin traveling the sorting loop. At the same time an induction manager is creating project items and placing them at the end of the induction chutes. When an empty tray passes an induction chute with product, the tray activates the item's process so that the item can begin conveying along the sorter loop while riding on the tray. The item then travels to its designated delivery point at which it signals the tray to tilt toward the correct delivery side dumping the item onto the delivery chute. At this point the item conveys down the delivery chute to order packers waiting below. Once the tray has delivered the item it returns to its upright position and continues empty around the sorter loop to repeat this process. In this model we used the `untimed_wait` method of the Event class for inter-process signaling. This model uses inter-process signaling to signal to the induction process when items arrive to the sorting area on conveyors, and for trays to signal to the induction process that an empty tray has arrived so that it can place the item on the tray.

Animation

We animated this model in 3D using the Systemflow 3D Animator software from Systemflow Simulations, Inc. This software package provides for post-process 3D animation of simulation models using a time-stamped event file created by the simulation model. To create this animation we created a layout file consisting of an oval track that represents the sorting loop conveyor. We also defined the 3D shapes that make up the tilt-trays, induction and delivery chutes, product cartons, packing boxes, and order packers. Inside our CSIM for Java model code we placed animation command statements to create all of the induction and delivery chutes along with the packing stations, tilt-trays and product cartons. We also included animation commands to convey the trays

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around the sorter loop, to convey the cartons down the delivery chute, and to perform the tilting operation of the trays. The simulation model produced a completed time-stamped event file for this animation. To view this animation we opened the time-stamped event file and the layout file in Systemflow 3D Animator. Using this tool we were able to have 360-degree navigation through the sorting area along with the ability to view the animation at different speeds. Using this software's AVI capture feature we captured AVI movies to place on our web site.



Conclusion

The productivity and quality of the CSIM for Java modeling environment combined with the smooth 3D animation of Systemflow 3D Animator software make an ideal toolkit for modeling material handling applications. Using these tools we can offer our clients cost-effective, high-fidelity simulations with compelling 3D animations.

For more information about this project and the Systemflow 3D Animator software, please contact Systemflow Simulations:

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