FORD MOTOR COMPANY

Designing and Simulating In-Plant Logistics for the Factory of Tomorrow

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Ford Motor Company is a leading global manufacturer of commercial and retail automobiles. To stay at the forefront of automotive manufacturing, the company invested $45M to create its Advanced Manufacturing Center, a development hub supporting Ford manufacturing by designing and testing future technologies. To improve manufacturing flexibility and reduce costs, Ford is creating an unconstrained logistics process through automation.

Consumer preferences have led to a proliferation of vehicle models and configurations, increasing the complexity of in-plant logistics. An average vehicle consists of over 3000 components, most of which are added during Final Assembly and are unique to a specific vehicle. Ford is dependent upon their supply base to sequence component parts and must set a production schedule far in advance or face steep cost premiums.The Tauber team, therefore, was tasked with reviewing the current process and proposing a futuristic approach to increase manufacturing flexibility in the “Factory of Tomorrow”.

A design-thinking approach was used to tackle this problem. First, the team thoroughly analyzed the current state to identify pain points and areas for improvement. Next, the team generated a future vision for unconstrained in-plant logistics, integrating emerging technologies and lean manufacturing principles. Then, the team developed a robust simulation model with a combination of agent-based and discrete event modeling to prove the feasibility of the proposed future vision. The model was also key toquantify future vision parameters and visualize the interaction between agents such as autonomous mobile robots and material picking stations. Simulated production enabled the team to obtain actionable insights and provide recommendations on the technical and technological requirements of the proposed innovations.

As thefuture vision will require a new set of operational indicators to evaluate the flexibility and performance of the new processes,the team created a suite of key performance indicators (KPIs) and a calculation tool with a visual dashboard to encourage continuous improvement. The simulation model was constructed to be a versatile tool capable of running multiple variants to test adjustments to the future vision processes and then compare performance versus the Tauber vision benchmark using the provided KPIs. Thus, the simulation supports Ford’s manufacturing leadership in developing the optimal and most flexible logistics ecosystem.

The Tauber team’s model confirmed their future vision can help Ford’s Final Assembly plants meet the corporate reduction goal of (1) 30% cost, (2) 30% labor, and (3) 30% land. Within the Final Assembly plant, the future vision can reduce:

1) Inventory costs 67% and part delivery logistics costs 27%
2) Part delivery logistics labor 93%
3) Warehouse footprint 44%

Overall, the future vision could generate cost savings up to $1.4M annually per Final Assembly plant.