Saker Solutions

Part of the ITI Group

- **Ford Motor Company are a significant user of simulation worldwide using a variety of Simulation Software.**
- **A simulation model can help validate proposed system control logic.**
- **Saker Solutions have expertise in a range of simulation software and across a range of Industries and applications.**

Ford New Gantry Equipment Verification

Saker Solutions use Witness Simulation tool on Ford Gantry Project. Validating the Performance of an Integrated Gantry Design

Introduction & Background

The Ford Bridgend plant, which started production in 1980, is a centre for petrol engine production and specialises in engines for Ford's small and medium cars, whilst also making and supplying engines for Volvo and Jaguar Land Rover.

An existing engine block manufacturing line at Ford Bridgend incorporated a material handling system consisting of a gantry beam which utilised a single carriage to unload an incoming feed conveyor, move three different part types between a series of processes, washers and buffer areas and finally to load the outgoing conveyor. Ford engineers were reviewing a proposal, submitted by the gantry suppliers, to integrate a material handling system that incorporated a new carriage which would serve certain machines and load the finished parts onto the outgoing conveyor. Within the design process, there was a requirement for Ford engineers to verify the proposal to reconfigure the line.

Ford has used discrete event simulation extensively throughout the business to validate designs and optimise system performance. Saker Solutions were asked to develop a Witness simulation model of the proposed integrated system to support the Ford engineers in identifying potential bottlenecks and verifying that the proposed configuration would deliver the required hourly throughput. Witness simulation software was the preferred simulation tool because of the experience of the project engineers with this simulation software.

The Witness simulation model incorporated the existing double headed H-carriage gripper which unloaded the incoming conveyor onto one of four machines and then moved the parts into a multistage washer before unloading into an intermediate buffer for transfer to the downstream area. The new single headed gripper retrieved parts from the intermediate buffer and served the downstream machines, including the rework area, before returning the parts to the upstream area via a second buffer.

Final processing was carried out and the finished parts were transferred downstream for a second time and loaded onto the outgoing conveyor. Unplanned outages of the machines and gantries were included in the simulation model.

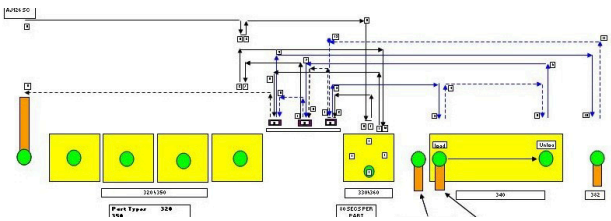

Figure 1: Schematic of manufacturing line and gantry movements .

Synchronising the Integrated Design / Maximising System Throughput

In order to optimise performance and to achieve maximum throughput, the gantry system is required to move parts through the manufacturing line efficiently. Within the model, priority was given to pulling parts through the system whilst ensuring that destinations were ready to receive parts in order to prevent blocking or unnecessary idle time .

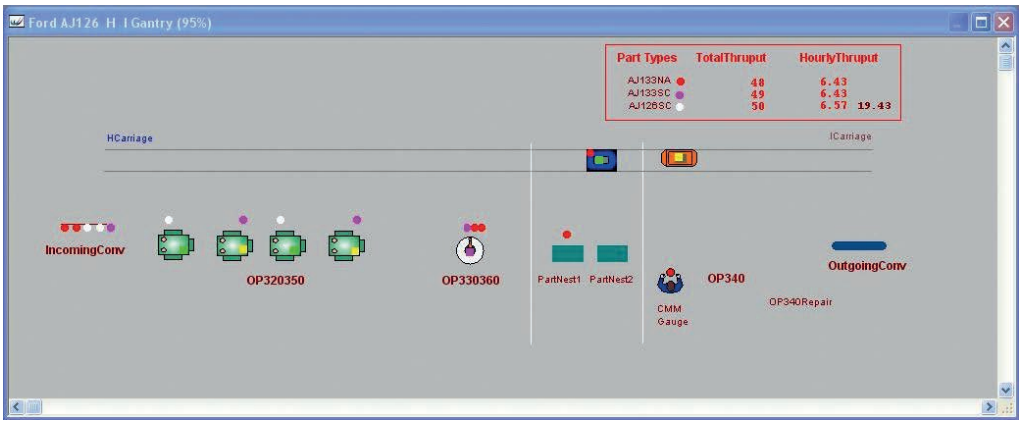

Figure 2 – Model Layout

To maximise throughput, the model searched for upstream parts at different stages which could be transferred downstream via a series of uninterrupted unload-load–unload–load gantry movements to fill the position made available by the removal of the finished part. An added complication was that two stages of the manufacturing process were carried out on the same equipment and so, in order to maximise performance whilst preventing the system from blocking, the control logic on the material handling system had to maintain spare capacity at the machines for parts which were to return for the 2nd process step, whilst ensuring that incoming parts were allowed to enter the system as soon as possible. In addition, both gantry carriages required access to the intermediate buffers in order to transfer parts from one area to the other and therefore the control logic had to ensure that the carriages did not cross in front of each other.

Configuring the model

In order to help users to verify the proposed gantry configuration, the Witness simulation model incorporated historical machine and gantry breakdown data and allowed users to specify a variety of parameters via input data files which were imported into the model. Input parameters included the part arrival schedule, carriage loading/unloading times, transfer durations and set up and processing times. The model included a simple graphical representation of the process and gantry line (See Figure 2.), which helped the users to validate the movement of parts through the system and to analyse the dynamics and interdependencies of the two gantry areas.

Model Results

The model outputs enabled Ford to verify the hourly throughput of the system by part type and to review the utilisation of the processing equipment and gantry carriages.
(see Figure 3)

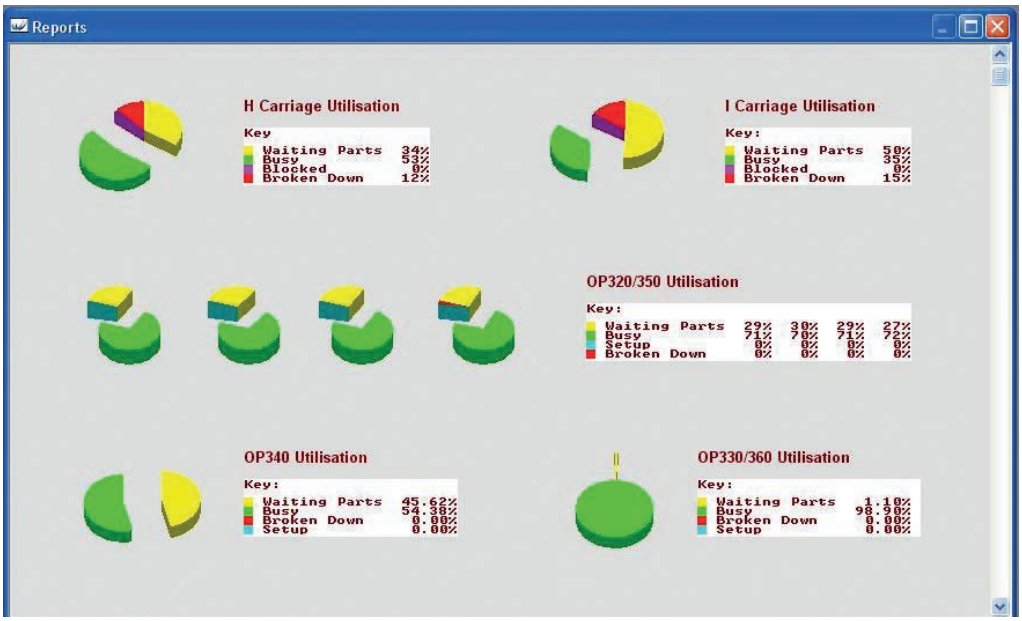

Figure 3 Equipment Utilisation Reports

Contact us
Upper Courtyard
Ragley Hall
Alcester
B49 5NJ

T: +44 1789 762255
E: info@sakersolutions.com

Follow us
LinkedIn: /ITI_transforms
Twitter: @ITI_transforms