

## CASE STUDY – BORG PACK STORE – WAREHOUSE EXECUTION SYSTEM

EXPERTISE SERVICE OFFERING: Warehouse Execution / End of Line Integration

Borg Manufacturing, a leading Australian based manufacturer of particle board and components for joinery applications partnered with Crossmuller to develop an innovative solution to streamline and optimise the operation of a new automated warehouse at one of its main production facilities. A warehouse operating at optimum efficiency would deliver a step change improvement to the site's output capacity by taking control of the assembly and outflow of finished goods orders, as well as ensuring a constant infeed of raw materials to the plant's two new press lines.

### The Challenge

Crossmuller engineers quickly realised that many of the real-time optimisation features required could not be delivered by a standard Warehouse Management System (WMS) alone. A successful solution would also have to incorporate many of the concepts of a model-driven Manufacturing Execution System (MES) as well as integrating conveyor control. Being an Endorsed Wonderware System Integrator the MES space, Crossmuller set out to develop a modular and configurable solution capable of handling a diverse range of applications beyond this project.

### The Solution

In close consultation with Schneider Electric and Borg Manufacturing, Crossmuller developed a Warehouse Execution System (WES), built around Schneider Electric's Model Driven MES concepts. Leveraging the features of the Wonderware product suite in a warehouse context, the WES combines the functionality and optimisation aspects of a WMS with the core operations and work order tracking capabilities of a MES. Within the WES, inventory management and work order execution is tightly coupled in real time. This product is also highly configurable and seamlessly integrates the underlying control systems logic and the overarching Enterprise Resource Planning (ERP) systems by means of a standard API.

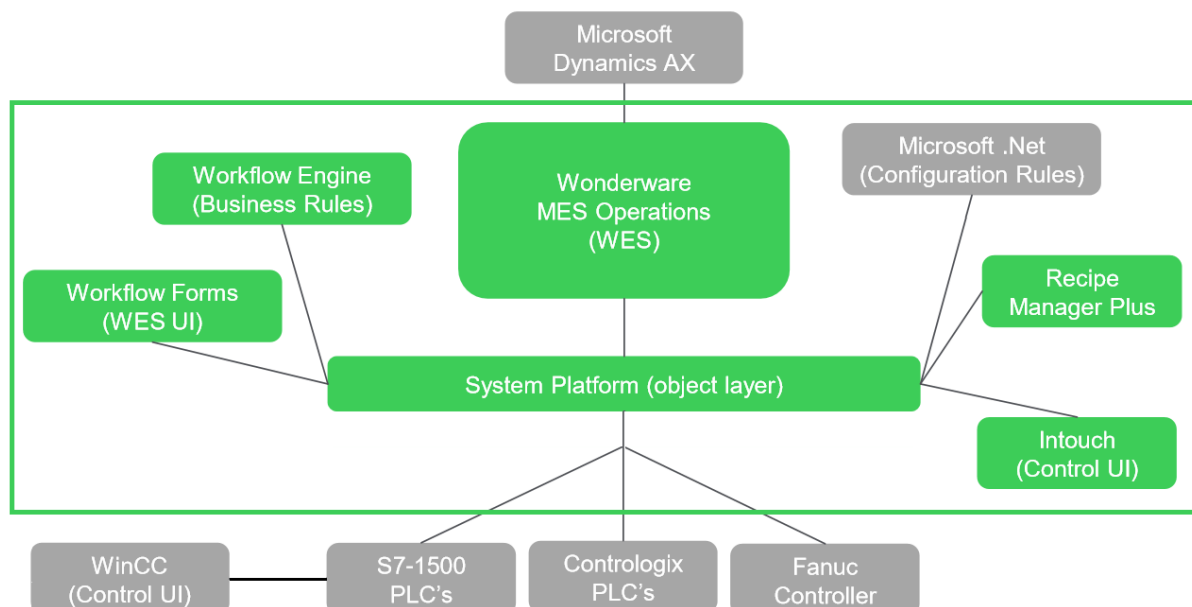
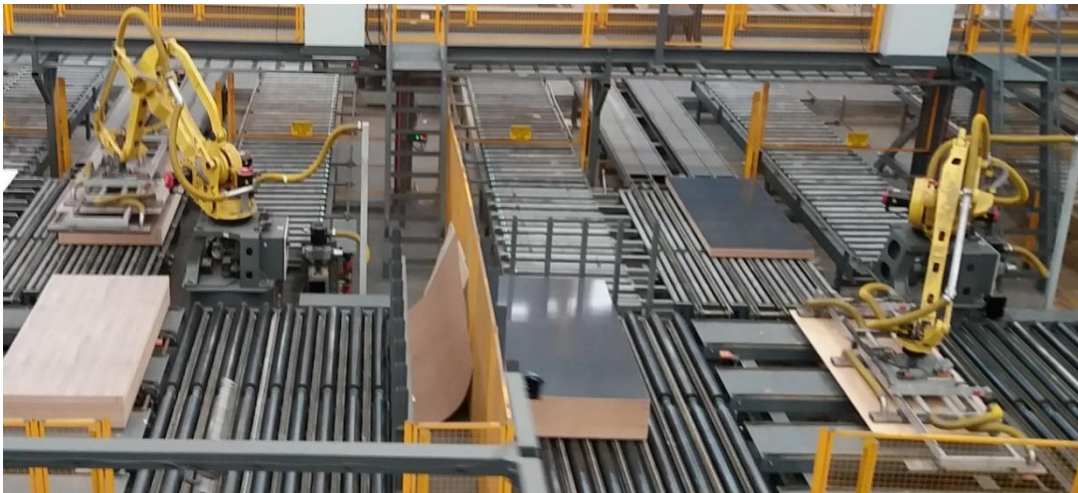


Figure 1 – The WES Solution Stack – Wonderware Components

## Features

Crossmuller delivered a fully automated warehouse solution which integrates three Fanuc Robotic Stacking Cells, five ASRS Cranes and a multitude of transfer lifts, trolleys and conveyors into a single optimised demand-driven warehouse. The system's flexibility to integrate with a variety of downstream users and underlying systems is highlighted by the fact that the automated warehouse concurrently handles the supply of (a) outgoing finished goods for customer delivery; and (b) raw materials for the two new press lines to maintain production at full capacity.



*Figure 2 – Fanuc robots assembling stacks of finished goods orders*

The WES makes decisions in real-time to satisfy the competing priorities of:

- Finished goods demand for Pick List Work Orders (Takeouts)
- Raw material demand for Production Work Orders (Takeouts)
- Manual demand from operators (Takeouts)
- Replenishment (Putaways)
- Optimisation of stock to ensure efficient putaways and takeouts (Shuffling)

The system keeps the business level data up to date with ERP interfaces for real-time goods receipting and work order reporting.

The WES makes use of the latest Schneider Model Driven MES concepts in one common platform. Built on the Wonderware product suite as its foundation, it utilises:

- Wonderware MES functions to direct plant operations; in conjunction with
- Wonderware System Platform for interfacing with several underlying control systems
- Wonderware Workflow as a business rules engine; but also for reporting and work order visualisation
- Wonderware Recipe Manager Plus for handling press line production parameters
- Wonderware InTouch as the plant HMI



*Figure 3 – ASRS Cranes in the main warehouse storage section*

### **Benefits**

The complete integration of the Borg warehouse via the Crossmuller WES has delivered a range of benefits to the client:

- Reduced the manning requirements for the preparation of outgoing orders, with only a single operator sufficient to supervise its activities
- Improved personnel safety by eliminating the need for constant personnel presence in high risk areas
- Has significantly sped up the process of assembling customer orders
- Being a unified system implemented on a common Wonderware core, it is highly maintainable, eliminating the need for interfacing multiple disparate vendor-supplied item tracking databases which often come pre-packaged with individual plant equipment items (e.g. ASRS cranes)
- Provides complete and up to date records for the warehouse, which facilitates data analysis for the continued optimisation of warehouse layout, identification of bottlenecks and justification for future improvement projects

Pack Store Goods InOut					
WES Web UI Home API					
<input checked="" type="radio"/> GoodsIn <input type="radio"/> GoodsOut		Date Time From	2017-05-16 09:52:00	Date Time To	2017-05-17 09:52:00
Item Id					
Export		469			
Item	ItemClass	ItemDesc	WOType	QtyReqd	
10588	Board Decorative	MDF 182412 SS Alabaster Gloss MR E0	GR	30	
10588	Board Decorative	MDF 182412 SS Alabaster Gloss MR E0	GR	30	
10588	Board Decorative	MDF 182412 SS Alabaster Gloss MR E0	GR	18	
10588	Board Decorative	MDF 182412 SS Alabaster Gloss MR E0	GR	30	

Figure 4 – Goods tracking web interface integrated into the Enterprise Console

The screenshot shows the 'Enterprise Console' interface for 'Locations Data Management'. At the top, there's a navigation bar with 'Pack Store Transfer' and 'WES Web UI Home API'. Below this, a legend on the left side defines the status of locations: Available (84), Used (39), Dirty (0), Pending (0), and Reserved (0). The main area is a grid of location codes, each with a corresponding colored box indicating its status. The codes include R.C5130, R.C4190, R.C4140, R.C3710, T3810, R.C5120, R.C4180, C.C4130, R.C3110, R.C3120, R.C5110, R.C4170, R.C.C4120, R.C3720, R.C5615, R.C5610, R.C5625, R.C4290, R.C.C4240, R.C3730, R.C5220, R.C4280, C.C4230, R.C5645, R.C5210, R.C4270, R.C.C4220, R.C3740, R.C7155, R.C7145, R.C7140, A7130, R.C7125, R.C7120, R.C7115, R.C7110, R.C3310, R.C3320, R.C7150, R.C7135, R.C4390, R.C.C4340, R.C3750, R.C3330, R.C2400, R.C2200, R.C5320, R.C4380, C.C4330, R.C4351, R.C3451, R.C5310, R.C4370, R.C.C4320, R.C3760, R.C3410, R.C3420, R.C3452, R.C3462, R.C3581, R.C3582, R.C1110, R.C1115, R.C1130, R.C2110, R.C2115, R.C2120, R.C2125, R.C2130, R.C2135, T3820, R.C3520, R.C3530, R.C3540.

Figure 5 – Locations Data Management – via a real-time web interface