

Production logistics improves productivity in the automotive industry

The automotive industry has always been extremely competitive. Now more so than ever. With production lines being established in low-cost labor countries, a global overcapacity of as high as 20% according to a recent survey of auto-executives conducted by KPMG, automakers have to cut every unnecessary cost. This results in extreme cost-saving and productivity demands on their suppliers.



"The new X85 pallet system with functions, like the tunnel locating module, and Youtilize™, offers new possibilities to manufacturers. It offers a straight forward layout, still endorsing high flexibility and full process control."
Göran Abbestam R & D manager

Challenges

While huge markets are opening up with the rise of the economies in East Asia and Eastern Europe, these tend to be very price sensitive. Delivering to growing markets normally requires setting up manufacturing plants locally in order to adapt to the local market, keeping costs down and being able to offer short delivery time.

Quality demands on the automotive industry are rigorous. Stronger environmental regulations demand that manufactured goods are produced consistently with high reliability. Meanwhile, the factory environment must also comply with stiffer environmental regulations, regarding waste disposal, energy consumption and the work environment for operators.

At the same time, manufacturing lines must be kept operating. The challenge is to produce greater volumes at lower prices with shorter product life cycles. Lean production has become the mantra of the au-

tomotive industry. The leader in lean production, Toyota, has shown the way in the chase for an optimal flow of goods in production, with a minimal cost and with the highest quality standards.

In productivity terms, this means to increase throughput, yield, reduce throughput time, minimize changeover time, and avoid equipment breakdown. In the automotive industry, improved production logistics solutions are important drivers of the productivity development.

Increasing volume does not always mean increasing the speed of production lines, although they may come hand in hand. Even more important is to be able to balance the line so the workstations and machines are utilized in the best way. This can be done if the conveyor system offers flexible routing in order to adapt manufacturing flow to maintain the highest possible throughput and in balance with the demand.

Such flexible solutions, accompanied by control software, can automatically re-route products to alternative stations in case of a machine breakdown, or if an operator is temporarily away from their station. Only in an ideal production line in an ideal world, are workstations equally highly utilized. But even in the harsh situation today, we can come very close with flexible systems, so called FMS solutions (Flexible Manufacturing System).

Shorter life-cycles introduce great flexibility demands on production lines. The manufacturing lines must allow for flexible routing, minimal and simple re-setting in order to achieve high line efficiency. Machines and equipment must be as easy to install or move as possible. Control of the process is a must, so line overview and the communication with operators and machines must be easy and precise.

Customers' quality demands and tougher environmental regula-

tions pose great challenges to the auto parts manufacturer. Delivering inferior products can be very damaging to a company image and lead to substantial losses in the form of expensive recalls. On top of that are all the resources spent on the inferior products, and adjustments made before the products leave the factory. Eliminating production problems early in the process is a major measure to reduce losses. Easy-to-use and automatic quality assurance systems enable quick detection and direct execution and logging of actions. With flexible routing, the product is directed to re-work stations to remedy the problem.

Solutions

When preparing the implementation of a new production logistics solution, a thorough mapping and analysis of the processes involved set the basis for the line layout. Parameters to consider are the takt time and the flexibility required. A good advice is to perform a value stream analysis, mapping the material and information flow covering all logistics from dock to dock to identify bottlenecks, throughput time, productivity and use it as the base for new implementations.

A well-designed and flexible assembly line can achieve major cost reduction results, and at the same time be robust for its job and withstand non-stop production with the highest possible MTBF (Mean Time Between Failures). Maintenance should be kept at a minimum, be predictable and easy to perform.

For many years, FlexLink has developed and sold production logistics solutions enabling the automotive industry to meet the rising challenges in the best possible way. In the latest development, a host of aspects of the production line have been improved. From the design of the conveyor system, to the pallet system, to an efficient line control and intelligent software which

control every area of the production process.

The new X85 conveyor, pallet system and line control makes a solid platform for high efficient logistic solutions of products up to 10 kg. On top of this, the production logistics software - Youtilize™ - enables the management of all resources available in the production line.

A high performance conveyor system, robust and flexible is the platform for an efficient logistics system in a manufacturing line. Developing a state of the art conveyor may sound easy but in fact, details

make the difference to the user and it is not an easy task.

Several patents, registered designs and further patent applications cover the pallet system and line control.

The X85 conveyor platform offers high flexibility, a rigid installation, smooth runs and a low noise level. The MTBF is significantly longer and power consumption is lower than comparable systems in the market. Improvements to the conveyor system include a stronger chain with increased wear resistance and a smoother run, slide rails with much larger wear volumes



Tunnel locating modules can in pair serve one robot, or machine, enabling continuous operation – highest possible utilization of the equipment.

and longer service life.

Additionally, the conveyor platform has newly designed stiffer beam brackets, achieving noise reduction and a cleaner environment. The X85 pallet system complies with clean room regulations (class 7 acc to ISO, US class 10.000 FED Std 209). Tunnel locating modules can in pair serve one robot, or machine, enabling continuous operation – highest possible utilization of the equipment.

Efficiency

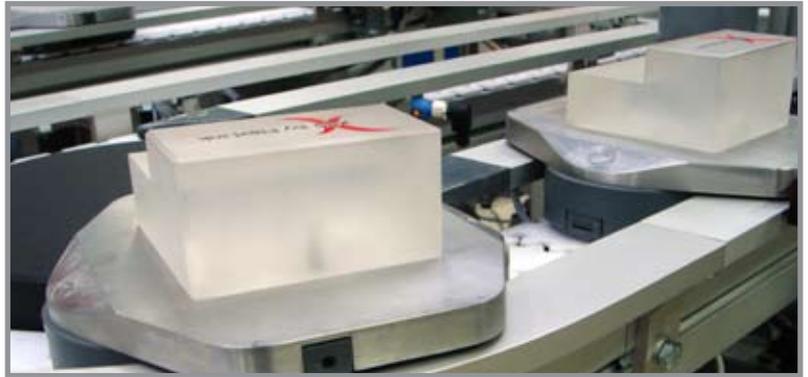
An efficient pallet system should handle each product, or cluster of products if they are small, individually, thus offering:

- a product identity carrier for tracking and tracing
- a fast throughput time
- protection of the product
- minimal machine and equipment re-setting

Fast throughput is achieved through a single-piece flow, meaning a controlled flow of individual products through the manufacturing process, with a minimum of losses and waiting time. After a completed operation, the pallet goes directly to the next station in a pull-flow according



Individual work stations for manual or automatic operations, testing etc can easily be added to a line.



The pallet is prepared for RFID communication with the line control and MES system. Tunnel locating modules can in pair serve one robot, or machine, enabling continuous operation – highest possible utilization of the equipment.

to the Kanban principles. This enables controllability of the manufacturing line process, a short throughput time and minimum of WIP (Work In Process). The logic is managed through Youtilize™, the production logistics software controlling the complete process for each individual product, the machines and the support functions. It communicates with the pallets carrying the products and the handling functions for routing, pallet location etc.

RFID technology offers a dynamic identity method for communication in real time between the product, the process and the production logistics software. The state of the art X85 pallet system is prepared for RFID communication. The pallet is a standardized carrier of the product, thus enabling handling being unchanged irrespective of the product distributed through the line.

The pallet handling functions such as locating modules, tunnel locating modules, merge/divert modules, and elevators all have readers for identifying the pallet and communicate with the line control, which may be linked to the overall manufacturing software.

Pallets come in different configurations, depending on the application, for example as ESD-approved, for low friction or for tough or clean environment. Keeping track of every

single item also allows the line to be balanced, in real-time if necessary, for the lowest possible throughput time and WIP. This raises throughput and productivity. Products are kept separate during transport and assembly, minimizing potential damage to the product. Since products are uniquely identifiable, machines can perform different operations on different product without the need to reset the line.

Functions for line balancing

The major improvement comes in the modularity of the conveyor, pallet and control system. All necessary pallet handling functions, such as merge/divert modules, locating modules, elevators and tunnel locating modules come as functional modules. Standardized control and power boxes can easily be added for as many maneuver and safety zones as needed. This greatly decreases engineering time and adds unsurpassed flexibility to the line and achieves a very fast ramp-up.

The tunnel locating module introduces the possibility to create parallel processes in a sequential layout. Two machines can be placed after the machine calling for the product, combining capacity for different product variants in the same line or to achieve a dou-

bling of the capacity. The first one can be activated elevating the pallet to the machine above, letting the second pallet pass by under and reach the second tunnel module, where it is elevated to another machine. This way, it is very easy to balance capacity of operations with a long cycle time, or to introduce a complimentary machine for product variants.

It is also possible to have two working positions, one per tunnel locating station, for one machine or robot. This way it can work on one position while the pallet is exchanged on the other, allowing the machine or robot to work continuously. This solution drastically increases the utilization of the equipment involved.

For fast operations there are locating modules with fast loaders where a cycle time of less than 1 second is required. For small and repetitive operations on one product or for multiple small products on one pallet, there are locating modules with indexing allowing two to three positions per pallet, dependent on the pallet size.

Controlling a manufacturing

process efficiently requires sophisticated software solutions. FlexLink offers Youtilize™, a comprehensive production logistics software. It allows product configuration and creation of the production order directly, or can import it from the factory ERP system.

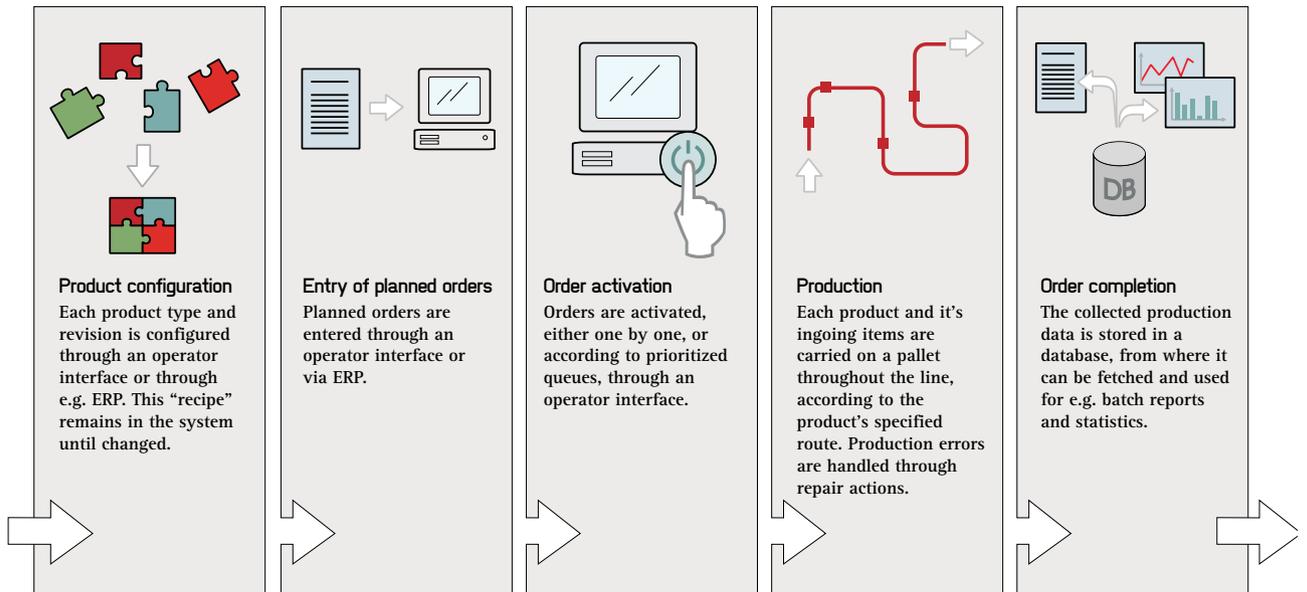
Youtilize™ handles the planning, the processes, the routing, and the order execution including communication between the product and the manufacturing control system, it comprises automatic QA (Quality Assurance) and closes the order after completion. At each workstation, the operator gets his or her interface with work instructions for the respective product and real time statistics. This enables easy standardization of operations and creates a basis for the improvement activities. Super users can plan and edit the product configurations, orders, routings and workstation content.

All this improves reliability and consistency. The automatic QA, reporting features and integration with existing ERP system makes validation much easier.

To reinforce the 'line pulse', pro-

duction monitoring displays can be added. Today, Youtilize™ is used to manage the production lines for products as diverse as glasses, computers, and ball bearings.

Efficient production logistics elements, like the X85 conveyor, pallet system, line control and Youtilize™, are crucial for the automotive industry to keep up with customer demands, today and tomorrow.



Youtilize™ is a MES (Manufacturing Execution Software) for the management of the entire manufacturing process. From the establishment of the manufacturing sequence, the execution of the production, to the closing of the manufacturing order.