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Production logistics improves productivity in the electronics industry

Being a manufacturer in the electronics industry is not easy. Customers are demanding more for less money and products quickly become mainstream commodities, making it easy to shop from someone else. And the electronics industry has delivered, making great technological improvements while cutting prices. But there is no reason to believe that customer demands will decrease.

The market's high expectations and the increasing competition have led the race to cut costs and raise productivity in all areas of the electronics manufacturing.

"In cases where a company produces single units, like different kinds of switches, we know that X85 and Youtilize™ present completely new possibilities for dramatically decreasing the throughput time and improving quality assurance."
Göran Abbestam R & D Manager

Challenges

"Smaller, faster, better, cheaper" is becoming the mantra of the electronics supply chain, as IPC (Association Connecting Electronics Industries) chose that as its slogan for the 2006 IPC Executive Market & Technology Forum. Simply put, the industry's focus is: improve technology while reducing costs.

Now that is easier said than done. The industry must deliver a greater volume of products in smaller batch sizes, with higher quality and with shorter life cycles. At the same time, these products must be cheaper than before. While technological breakthroughs can provide great leaps forward, improved production logistics solutions will drive the productivity development.

Small batch sizes, sometimes as small as one, are already produced in the personal computer industry, where customers can select on a website their desired PC configuration, everything from the processor speed to what software they want to have pre-installed. These are then assembled to order. This means every single computer in the production line will most likely be different from the previous one. By necessity, each individual item must be kept track of through the production line, which is preferably arranged in a single-piece flow solution. Each product has a different Bill Of Material (BOM), and its assembly kit must be filled with correct materials and components. Since products differ, so do the assembly operations involved and the cycle time, and the products must be routed to the right stations where operators perform specific operations or assembly.

Technology customers are early adopters, so technological breakthroughs must be quickly implemented. As soon as a technological improvement is done, older products are out and the new ones must quickly come to market. These 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.

Controllability of the process is a must, so line overview and communication with operators and machines must be easy and precise.

Customer's quality demands, as well as quality regulations pose great challenges to the electron-

ics manufacturer. Delivering inferior products can be very damaging to company image and lead to substantial waste. On top of that are all the resources spent on the inferior products, such as manufacturing, repairs or even replacing, involving huge direct costs.

Minimize waste

Eliminating production problems early in the process, is a major measure to reduce waste. Easy-to-use and automatic quality assurance systems enable quick detection and direct execution and logging of actions. With flexible routing, the product can be directed to re-work stations to remedy the problem.

Flexible routing also allows the line to be well balanced despite the different BOM's and operations involved. 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).

When preparing to implement 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, setting the basis for the machine set-up and line layout. 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 as the base for new implementations.

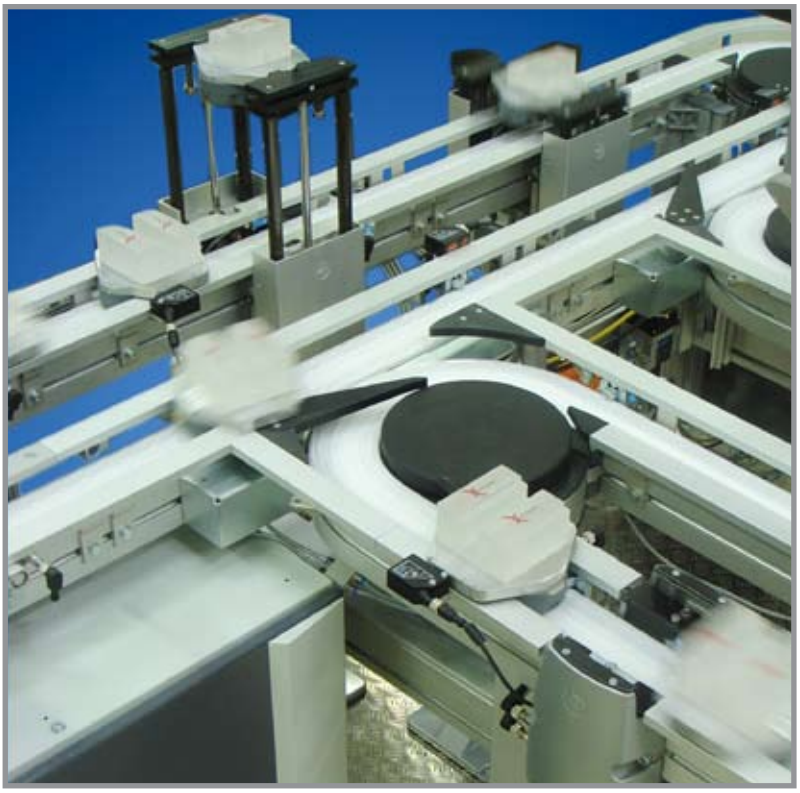
A well-designed and flexible assembly line can achieve major cost reduction. At the same time it shall be robust for its job and withstand non-stop production with the longest possible MTBF (Mean Time Between Failures). Maintenance shall be kept at a minimum, be predictable and easy to perform.

New developments

For many years, FlexLink has developed and sold production logistics solutions enabling the electronics 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 the entire 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, a 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. The X85 conveyor platform offers high flexibility, a rigid installation, smooth runs and a low noise level. The MTBF (Mean Time Between Failures) is significantly longer and power consumption lower than comparable systems in the market. Several patents, registered designs and further patent applications cover the pallet system and line control.



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

Efficiency

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

- a fast throughput time
- a product identity carrier for tracking and tracing
- 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 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 through the production process by RFID technology.

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.

Keeping track of every single item in real time combined with routing flexibility, allows the line to be balanced with the lowest possible throughput time and matching the demand rate. 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 products without the need to reset the line

The pallet, carrier of the individual product, comes in different configurations depending on the application. There are conductive, ESD-approved versions for the handling of products sensitive to electrostatic shocks. There are variants with low friction, and for clean environments as well as tough environments where contaminant particles appear.

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 enable continuous operation – highest possible utilization of the equipment.

Functions for line balancing

A major improvement has been achieved 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, greatly decreasing engineering time and adding flexibility to the line.

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 doubling 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.

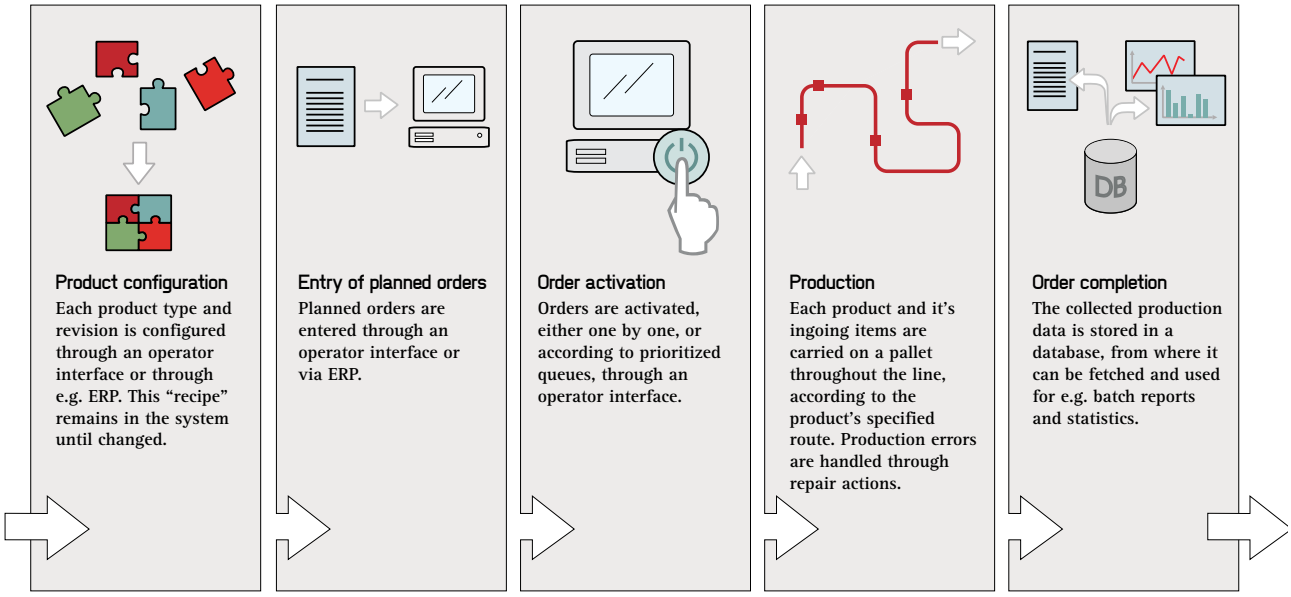
For fast operations there are locating modules with fast loaders where a cycle time of less than 1 second is required. For small and repetitive operations on one product or for multiple small products on one pallet, there are locating modules with indexing allowing two to three positions per pallet,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

Youtilize™ software

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

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. To reinforce the 'line pulse', production monitoring displays can be added. Today Youtilize™ is used to manage the production lines for laptops, pc's, phones, switches and medical devices and filters for base radio systems.

Efficient production logistics elements, like the X85 conveyor, pallet system, line control and Youtilize™, are crucial for electronics manufacturers 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.