Reducing Downtime with Cloud MES

Manufacturing Business Technology
IT FOR MANUFACTURING EXECUTIVES

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Operations managers shudder at the thought of equipment downtime. Downtime is the enemy of virtually every Key Performance Indicator (KPI) used to measure manufacturing effectiveness, with throughput, overall equipment effectiveness and cost metrics particularly vulnerable.

Most efforts at minimizing or eliminating downtime focus on machine maintenance and upgrades, or better production planning. Little is said of the impact of software on a line's efficiency and uptime — and that's a shame, because the right manufacturing execution system (MES) can have a dramatic effect on uptime.

If a factory runs dozens of high-speed surface mount technology (SMT) lines, each produce thousands of PCBAs per hour. One of the most common obstacles to running machines at maximum uptime is stock out — one or more reels of surface mount components being depleted without its replacement being immediately available. A stock out on the SMT line triggers immediate downtime, driving lower line utilization. In a factory with dozens of these lines, downtime results in significant financial impact — and an opportunity for improvement.

With a modern, cloud-based MES solution, improvements in machine capability and machine-to-machine and machine-to-human communication enables the creation of a closed loop system to ensure components are available at the SMT lines when required:

- Output signals from an SMT machine offer a status on the supply and usage of all components loaded on the machine. When a component needs to be replenished, the machine sends a signal to the MES, which immediately forwards a replenishment order to the warehouse picking system.
- The component is shown on a priority screen for the warehouse operator. The operator locates the component in the warehouse and triggers the replenishment procedure in the inventory management system.
- The component is then placed on a bus station and an automatic intelligent vehicle — a small, autonomous robotic vehicle — collects and transports it to the SMT line where it is needed. In the past special tracks would have been laid in the factory floor allowing the automatic guided vehicle to navigate its route through the factory. Today this is accomplished using cloud-based navigation, making the system much more flexible and allowing re-configuration of the facility as business needs change.
- When the robotic vehicle leaves the stockroom, a text alert is sent to a technician, so he or she is ready at the SMT line to load the material when the reel of components arrive at the line.

This scenario is a real one: at one customer's factory the deployment of cloud-based MES helped drive the virtual elimination of stock out conditions in the SMT lines, which in turn helped drive a 7 percent increase in uptime. In a factory where each line can cost in excess of $5 million, a 7 percent increase in uptime can translate to millions of dollars saved over time.

In another example from the electronics industry, a factory had previously managed components, work-in-process (WIP), and finished sub-assemblies on a production floor by supervisors manually recording data. Production planners, component buyers and customer service personnel who need information about the quantity and location of components, work-in-process and finished sub-assemblies relied on data from a material requirements planning (MRP) system. The old MRP system had consumed or decremented inventory at discrete points in the manufacturing process, and these transactions were then completed by production personnel.

Using an older MRP system in a batch manufacturing environment, components were issued to production and consumed as products were manufactured. The warehouse operators provided individual components to the production team for specific work orders. As the work order progressed through the sub-assembly build the production planners consumed the components and integrated their value into the product. Notice the large number of people this process is dependent upon.

In traditional batch manufacturing environments, once components are consumed in production, an operator, supervisor or scheduler has to "consume" them in the MRP system, online. This consumption is part of a process called "backflushing." It is a critical step in the conversion of component value and labor value into the price of finished product. Financial statements use the data from this critical step, and production and materials teams depend on the information to manage the production and material supply process.
A common problem is that these "backflush" transactions can be late, because of the large number of people involved. In a factory with over one thousand employees and 25 production lines, communications can be a complex issue. One of the problems this can cause is that production schedulers and planners may believe they have enough components to meet production schedules that day, but they are looking at "pre-backflush" data. The impact of this is that in the worst case,

dozens of production operators may have to be sent home for the day, and production lines stand idle due to lack of visibility of inventory levels among the production planners.

With a modern, cloud-based MES system, when a product completes automatic optical inspection (AOI), its serial number is sent by the AOI machine to MRP for backflushing — IMMEDIATELY. This eliminates the previous manual communication from the shop floor to the planner (and the associated delay and inevitable errors) and consumes material product by product as each is completed. In the year before this automated system was implemented, the factory had lost the equivalent of 17 days of production due to inaccurate inventory and WIP data.

At the same time, executives and operations personnel can see — at any time, from any location — the current status of every machine and every line in their plant, giving them greater visibility into — and confidence in — their operations.

In both of these examples, the real-time communications between machines, and between machines and humans, is enabled by the cloud-based manufacturing execution system. That real-time communications drives greater efficiency, prevents errors, and drives greater uptime. So next time you're making plans to further reduce downtime, look beyond machine maintenance and think about how software can help.