



SIEMENS DIGITAL INDUSTRIES SOFTWARE

Improving shop floor productivity

Four ways to make the most out of your existing electronics manufacturing assets

Executive summary

Over the years, we've spoken to many electronics manufacturers who are looking to improve operational productivity and yield and are considering whether or not to invest in new infrastructure. Often they express the belief that efficiency levels are already so high there is no alternative to purchasing additional equipment. This white paper presents four proven steps for improving the bottom line by raising line and machine utilization levels.

I abstract

This white paper describes four methods for increasing utilization of existing electronics manufacturing assets. It is recommended reading for manufacturers who are considering purchases of additional machinery in order to improve production yields.

1. Know your current level of efficiency

Do you know your overall equipment effectiveness (OEE) level? Being able to accurately gauge OEE is the first step to improved efficiency.

There are plenty of OEE calculators available online and below is a highly simplified model.

Traditionally, the data used to calculate OEE was acquired using a stopwatch and processed in an Excel spreadsheet. Today, OEE data is collected and calculated without human intervention using automated shop floor collection techniques.

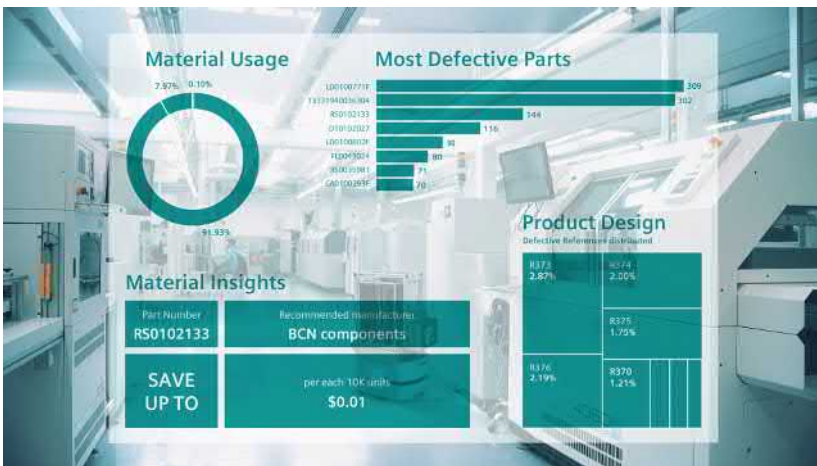
Automatically calculated OEE levels are often surprisingly different than the manually generated levels, which are subject to many kinds of contextual interpretations and sometimes to just plain tweaking. In one extreme case, a manufacturer computed their OEE levels to be at 80 percent or higher. Following an analysis using Siemens' Opcenter™ Execution Electronics IoT software data collection platform and Opcenter Intelligence Electronics analytics software, the OEE level was determined to be around 50 percent, leading them to rethink additional equipment purchases. Opcenter Execution Electronics IoT and Opcenter Intelligence Electronics are part of the Xcelerator™ portfolio, the comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software.

2. Use a scheduler to improve resource utilization

An automated scheduling generator can significantly improve utilization of shop floor resources. It creates optimized manufacturing plans based on customer orders while taking into account production constraints such as line capacity and personnel availability.

A good scheduling system should, at minimum, be able to receive and process crucial data, including:

- Automated input of work orders, including quantities and shipping deadlines
- Constraint definition – line/machine capacity and personnel availability, as well as support for downtime scenarios
- Availability of required materials and their source within the supply chain
- Direct interface with enterprise resource planning (ERP) systems





The automated scheduling system uses these parameters to generate a production plan that includes groups per line, static feeder settings, trolley usage, Kanban/work-in-process (WIP) and resource allocation.

Advanced scheduling systems let you control critical parameters – such as deadlines, production time and changeovers – allowing you to optimize performance by comparing multiple what-if scenarios. They also allow you to make on-the-fly adjustments following the issuance of unplanned work orders or material shipment delays.

3. Implement JIT methodologies

The goal of just-in-time (JIT) logistics is to select materials from the warehouse and deliver them to the machines so the correct quantity and quality of materials will arrive right on time.

In a connected, Industry 4.0 manufacturing environment, this goal is accomplished using an automated bill-of-materials (BOM) aware system that receives “pull” signals from the machines, which in turn have access to work orders that are derived from the ERP system. As a result, all necessary materials remain in the warehouse – ready to be selected for immediate use on the machines with no pre-kitting of materials required.

Additional time can be saved verifying materials. Instead of verifying materials during the logistics process, this step can be performed while setting up the materials on the machines. An automated digital management system prevents the machine or any other process from working until all of the materials have been correctly set up as defined in the work order. The verification starts with material IDs and associated attributes and continues with quality checks. For example, component moisture-sensitive device (MSD) levels are checked, providing a warning and preventing program execution if contamination is discovered. This type of advanced verification process helps reduce material setup errors and improves product quality while reducing scrap and rework issues.

Finally, a network connection that ties together the machine processes is required to follow the progress of production in real time, tracking the quantity of materials that are either used or rejected.



4. Reduce changeover times

One of the simplest and most effective ways of improving productivity is to reduce changeover times.

This goal can be achieved using an automated materials management software, such as Valor™ Materials Management software. The Valor solution, which helps improve operator and line efficiency, includes a changeover guidance feature, which enables continued use of the material currently mounted on the machines for the next work order. The feature provides a step-by-step guide for material picking and put away that dramatically reduces the time required to set up machines for the next production program.

Using the system, customers report a 50 to 80 percent reduction in changeover times. For example, one factory reduced changeover times, which ranged from 45 to 100 minutes, to an average of 12.5 minutes. Typically performing 15 changeovers a day, the factory reported an increase of machine utilization time of 20 percent, improving the bottom line by \$1.4 million per year.

Later on, the same factory reported a further doubling of productivity, and was able to shorten the work day from 22 hours in three shifts to 16 hours in two shifts. In addition, they were able to increase line utilization from 72 to 91 percent and reduce surface mount technology (SMT) inventory by 15 percent.

Conclusion

The decision of whether or not to purchase new manufacturing equipment is complex and risky. However, by conducting an analysis of shop floor operations, it may be possible to significantly improve production yields using current infrastructure resources.

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