WHITE PAPER

MANUFACTURING CONTROL STARTS AT THE PLANT FLOOR

AT A GLANCE

Control requires insight into real-time, accurate production data, planned production schedules, quality checks, machine breakdowns, inventory levels, and more.

Truly integrated information lets manufacturers increase productivity, decrease scrap, reduce total work-in-process inventory, reduce premium freight charges, and gain dramatic increases in production throughput.

A comprehensive manufacturing software solution offers a clear view of what is happening on the plant floor, delivering much needed connectivity, process automation, tracking, and analysis.

The Power of the Plant Floor

Today's manufacturing enterprise gains a key competitive advantage by implementing an extremely strong plant-floor control system, **also known as a manufacturing execution system (MES)**, to advance their smart manufacturing journey.

Many ERP software companies claim to support manufacturers, but their solutions do little more than accounting, order entry, and other office tasks. They are not suitable for use on the plant floor, and they provide little value to the manufacturing process. Many manufacturers indicate that traditional ERP software actually hinders manufacturing, rather than helps it.

The key is to implement a solution that allows manufacturers to take control of the plant floor. This solution must include job/production management, process instructions, production scheduling, ultra-detailed real-time inventory control, tool tracking, production tracking, traceability, part genealogy, labor tracking, PLC machine integration, and much more.

With smart manufacturing, you have a single digital platform that's purpose-built for manufacturing, delivering the above capabilities and a whole lot more.

Baseline Capabilities

When assessing an MES system, baseline capabilities should include:

- Simple, easy-to-use design for plant-floor personnel.
- Real-time information reflecting up-to-date processes.
- Online for ease of access via a browser.
- Built-in barcode labeling.
- Built-in support for mobile/wireless handheld units.
- Built-in integration with machine PLCs. Built-in integration with weigh scales, packaging machines, and other equipment.

An MES delivers functionality supporting smart manufacturing in two main areas, **engineering** and **production tracking**.

"Capturing shop floor activity as it happens is a powerful way to increase overall visibility."

Engineering

Manufacturing engineering determines product design, the parts making up a product, how those parts are assembled, and the processes required from plan to completion.

Part List

Robust plant-floor reporting must track a master list of parts, including all associated part data, such as part description, part type, and revision. This includes an easy-to-use mechanism to upload small digital photos of each part. The part list also provides links to many other areas of the system where applicable, such as key part dates, customer part numbers, advanced product quality planning (APQP) checklist, inventory, shipment history, problem history, and so on.

Process Routings

A process routing is the series of steps required to manufacture or process a given part. This function defines those steps. It includes the operation number, operation name, approved workcenters and suppliers, crew size, weight, container type, and other key routing data.

Bill of Materials

Each manufacturing process has a distinct bill of materials (BOM) which defines the components that make up a part. A flexible BOM function offers indented BOMs, exploded BOMs, drilldown BOMs, and a variety of other methods for visualizing and editing BOMs.

Multi-Part Production

An IT system must identify and control manufacturing processes where multiple parts are produced from a single operation. This is a critical capability for stampers, multi-part die forgers, injection molders, and other manufacturing processes.

CAD Integration

Many manufacturers benefit from a special feature within their CAD system to number and name each dimension on the part drawing. Then, whenever the drawing is saved, it synchronizes the dimensions and their tolerances to the part specification list, which in turn drives the control plan, checksheet, and data collection systems. The CAD integration subsystem saves manufacturers from having to enter dimensional data and adds a high degree of advanced integration among engineering, quality, and manufacturing.

Production Tracking

Robust production tracking provides tracking of machine production, including detailed and summarized reports. Data is more valuable when it is highly integrated with inventory, tool tracking, and scheduling.

Control Panel

Control panels offer a simple-to-use yet powerful user interface for plant-floor personnel to track and control machine status, labor hours, production, inventory, tooling, and much more.

Workcenter Tracking

A workcenter log provides a detailed history of all events that occur at a machine, including all production, maintenance, and downtime. This function provides reports on uptime, availability, and machine efficiency. Far-reaching benefits result when integrating this function with other business processes including production tracking, inventory, labor tracking, tool-life tracking, and control plans.

Job Tracking System

This system tracks jobs and work orders within the manufacturing facility. It depends on the situation, but usually a job represents an instruction to the plant floor to produce a certain quantity of a certain part number by a specific due date. The system is the foundation for production scheduling and can be used for simple scheduling on its own.

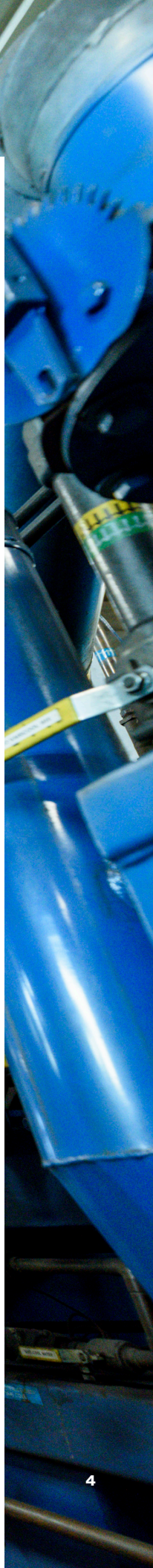
Job Tracker

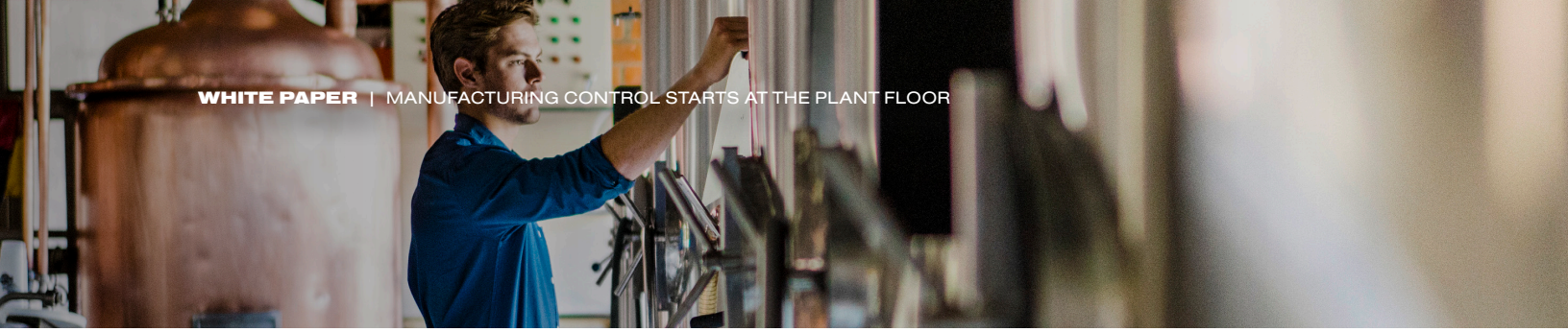
Job trackers offer a simple-to-use, yet powerful way for plant-floor personnel to retrieve instructions, track activities, and record production against jobs as they are processed.

Setup Tracking

Setup tracking provides a place to record workcenter setup times and issues, including detailed data on reasons for setup delay. This helps shorten setup times and improve setup consistency.

“Drive smart manufacturing adoption with an industrial multi-tenant cloud SaaS MES system that will improve management of materials, quality, scheduling, tool tracking, production, and more.”





Production Information Visibility is a Must

In addition to IT systems covering engineering and production tracking as noted above, a robust MES system must give a manufacturer visibility and management of materials, quality, scheduling, tool tracking, and inventory management in order to track individual containers or individual parts on the plant floor. For example, full process traceability is critical in high-precision, high-liability manufacturing such as automotive or aerospace. An MES's advanced features must automatically track the complete genealogy of all inventory containers, providing both an upstream and downstream trace, even in complex assembly & manufacturing environments. You need this to track down and isolate all parts created from a defective lot or tracking down exactly who/what/when/where a defective part was produced.

Additional Communication Technology Needs

Other advanced technologies for plant floor control include integrated barcode printing and reading capability for inventory, gage control, time and attendance, and user log-in cards. Wireless networking, touch-screen functionality, integrated radio frequency identification (RFID), and automated notification capabilities are also key for plant-floor control.

Controlling the Plant Floor is a Must

Smart manufacturing is critical to meeting manufacturing needs and enabling the end-to-end visibility required to run an effective, efficient enterprise. A multi-tenant cloud SaaS solution inherently offers greater connectivity to a consolidated set of data from the entire enterprise. Cloud's digital nature enables automated processes both within and upstream of production to ensure critical data is gathered and shared to operators, plant-floor managers, and corporate for insights into continuous improvement opportunities. The tracking and analysis of material and processes, combined with **greater automation and connectivity** delivered by modern manufacturing software solutions, offer greater quality management, business visibility, and ultimately control of the entire enterprise.

ABOUT PLEX

Plex Systems, Inc., a Rockwell Automation company, is the leader in cloud-delivered smart manufacturing solutions, empowering the world's manufacturers to make awesome products. Our platform gives manufacturers the ability to connect, automate, track and analyze every aspect of their business to drive transformation. The Plex Smart Manufacturing Platform includes solutions for manufacturing execution (MES), ERP, quality, supply chain planning and management, Industrial IoT and analytics to connect people, systems, machines, and supply chains, enabling them to lead with precision, efficiency, and agility. Learn more at **www.plex.com**