# How Production & Process Monitoring Improve Your Manufacturing Process

**E B O O K**

# Table of Contents

# Introduction

The global manufacturing industry is facing a harsh reality of the "new-normal" outlook as disruptions from pandemics to tech evolution to political unrest impact operations and create rapidly changing business conditions. A shrinking workforce, technological disruption and tighter globalized competition have forced companies to sharpen their production strategies and do more with less.

While many manufacturers have found ways to maintain and even improve efficiency during this global disruption, others struggle to address rapid changes in demand. Now more than ever, manufacturers must leverage new, technologically advanced solutions to maximize ROI, cut waste and get the most out of their equipment, capital, and people.

# The Solution

Manufacturers are now able to deploy digital information systems that connect, monitor, and manage complex manufacturing systems and data flows on the factory floor: this is the basis of a Manufacturing Execution System (MES). The main goals of MES are to ensure effective execution of manufacturing operations, improve productivity and to measure and ensure quality.

An MES collects and provides data for use by manufacturing, quality control, management, accounting, and financial systems. MES provides users and management teams with key information about the manufacturing process as well as the Overall Equipment Efficiency (OEE) of the equipment being monitored. Having accurate data on all aspects of the manufacturing process allows for better, faster decision-making and improves OEE.

**A robust MES streamlines manufacturing process holistically with a variety of features such as:**

- Job Scheduling
- Operator Tracking
- Real-Time Data & Reporting
- Real-Time Manufacturing Dashboards
- Parts Counting including Rejects/Scrap
- Process Monitoring and Statistical Process Control

- Uptime/Downtime Tracking and OEE
- Exception Alerts & Actions
- Labeling and Barcoding
- Comprehensive Event Logging and Audit Trail
- Remote Access and Availability
- ERP Integration

MES reduces downtime by keeping even the most bare-bones team informed with actionable data and exception alerting using real-time machine data collection and deeper downtime/scrap reporting. In addition, automated job scheduling and remote monitoring reduces labor requirements, helping manufacturers to weather the coming employment storm.

> **"Manufacturers with ERP and MES are 44% more likely to enable collaboration between manufacturing operations, customer service, logistics and delivery."**
>
> *Source: Reduce the friction in manufacturing operations planning with ERP and MES-Aberdeen Group, Inc.*

# The PlantStar Difference

**THERE ARE MANY UNIQUE ADVANTAGES IN UTILIZING THE PLANTSTAR MANUFACTURING EXECUTION SYSTEM ACROSS ALL YOUR FACTORIES. HERE ARE A FEW ADVANTAGES ON WHY YOU SHOULD SELECT PLANTSTAR FOR YOUR FIRST OR REPLACEMENT MES.**

### 50 years of industry experience.

With customers in the United States, Mexico, China, and Europe we have seen almost every imaginable customer headache and created solutions for manufacturers of all kinds. Our team is staffed with plastics industry experts with extensive machine knowledge. Over 40% of our customers have been with us for more than 20 years!

### Enterprise Pricing.

PlantStar works with manufacturing companies of all sizes. However, we have a lot of customers that have multiple facilities. Multi-site customers can add additional sites at reduced cost and allow administrators and supervisors to collect and view data for all locations.

### Collecting Process Variable Data from Machines.

One of the largest benefits of utilizing PlantStar is our experience with all different makes and models of machines and controllers. Most companies will have a mix of "older" machines and PlantStar can provide options to connect via Machine Interface, Direct wire, OPC UA, Modbus, or Analog Interface. Our abilities are unmatched so do not hesitate to challenge us with your machine list.

### Extensive list of Standard and Available Features.

Most MES companies will have an "out-of-the-box" approach when providing an MES. PlantStar 4.0 provides a full featured scheduling and production monitoring package, including email and text alerts in the standard package. Process Monitoring / SPC is just one of many popular add-on packages available.
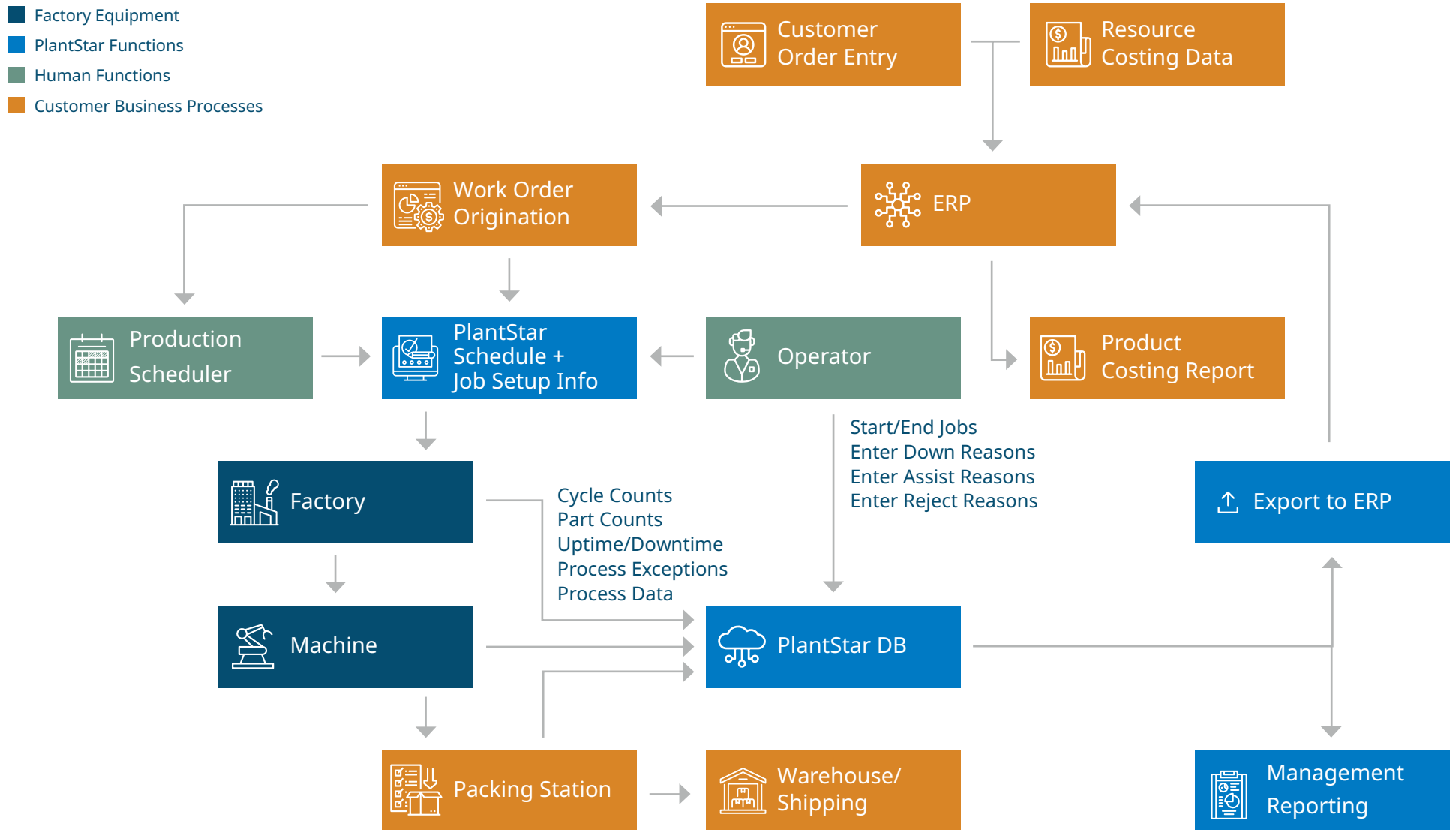
### Flexibility and Customization.

Manufacturing solutions are anything but one-size-fits-all.  Our decades of experience have produced solutions for virtually any integration challenge our customers have proposed. Have an unusual application? We'll customize a solution for you.

### Lower cost hardware.

PlantStar eliminates the need for 3rd party equipment as we produce our data collection hardware at our headquarters in South Bend, Indiana. This reduces cost, lead time and ensures the most robust hardware in the industry. Most MES companies require dedicated hardware at every machine or station. The PlantStar Data Collection Module allows you to connect to up to 16 machines on a single DCM, significantly reducing hardware costs when purchasing a PlantStar MES.

# PlantStar Difference Diagram

**Legend:**
- Factory Equipment
- PlantStar Functions
- Human Functions
- Customer Business Processes

Customer Order Entry

Resource Costing Data

Work Order Origination

ERP

Production Scheduler

PlantStar Schedule + Job Setup Info

Operator

Product Costing Report

Factory

Cycle Counts
Part Counts
Uptime/Downtime
Process Exceptions
Process Data

Start/End Jobs
Enter Down Reasons
Enter Assist Reasons
Enter Reject Reasons

Export to ERP

Machine

PlantStar DB

Packing Station

Warehouse/ Shipping

Management Reporting

# The PlantStar Process of Excellence

We understand that it is important for you to receive a fast, reliable solution when it comes to addressing your manufacturing needs. The PlantStar process of excellence allows customers to receive a budgetary proposal quickly, and due to our many years of experience, it may not require an on-site visit. We listen to your needs and propose a detailed plan to exceed your expectations. Below we outline the steps of excellence when a potential customer is looking for a reliable Manufacturing Execution System.
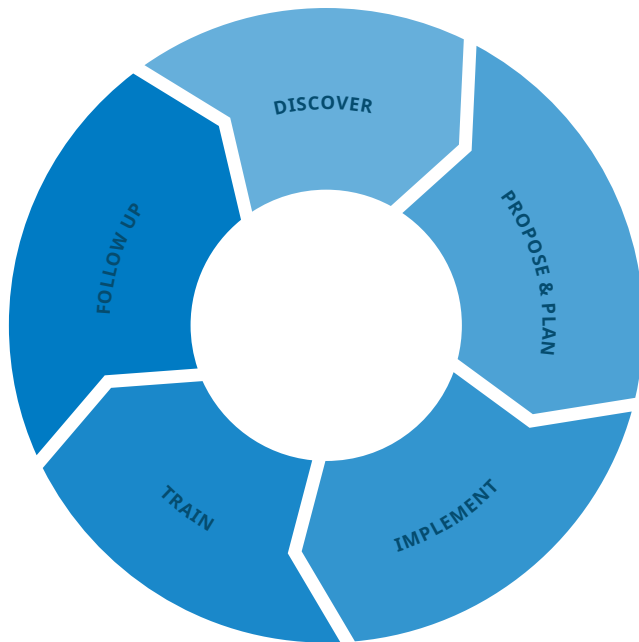
## DISCOVER

Quantify the customer needs with a brief introductory phone call. PlantStar can provide a full system demo from the comfort of your home or office. For **Production Monitoring** we would simply need the following to deliver a fast budgetary proposal.

1. # of machines or stations to be monitored
2. # of Human Machine Interfaces (HMIs) required
3. Is there a current ERP system integration that would be performed?

When a customer is looking for both Production and **Process Monitoring**, we would dive a little deeper into the specific machines to determine the best source for connectivity.

1. How many of the machines would need Process Monitoring?
2. What and how many Process Variables are you looking to monitor?
3. The make, model, year, and controller on all machines.

## PROPOSE & PLAN

1. Provide detailed Plan (SOW) and cost model.
2. Specify PlantStar and Customer responsibilities (potential turn-key approach)
3. Define Project Timeline

## IMPLEMENT

1. Installation and commissioning of System
2. Test and verify the system functionality as desired.
3. Customer & PlantStar confirm completion.

## TRAIN

1. Administrators, Supervisors, and Operator Training
2. On-site or remote system training included with every installation.

## FOLLOW UP

1. Remotely monitor usage of the system
2. Software License & Maintenance Agreement includes 24/7 support, lifetime warranty on all hardware, and upgrade opportunities to new systems.
3. Discuss Future Needs

# The PlantStar Approach to MES

SYSCON PlantStar MES platforms address two different but intertwined processes: Process Monitoring and Production Monitoring.  Customers can add both Production and Process Monitoring utilizing the same software and hardware. This can be done from the first phase or PlantStar can establish a multi-phase approach. This provides customers with a long-term growth path for PlantStar to exceed their manufacturing needs.

―――――

# Production Monitoring

Production monitoring platforms are developed for specific monitoring capabilities including OEE tracking, real-time production summary, cycle time, reject percentage, downtime tracking, email/text alerts, job setup sheets, enhanced drag and drop scheduling, customizable charts/reports/dashboards, and ERP integration.

**There are two fundamental pieces of data applied to production monitoring – number of good/bad parts and time. Virtually all monitoring information involves or uses these two pieces of data to report on the progress and performance of a job:**

## PARTS

The first fundamental production monitoring quantity is part counting. Gross parts are accumulated by counting closures of the primary contact. A standard multiplier can be entered in the job's work order. It defines the maximum number of parts produced per machine cycle for a job. The actual multiplier reports the number of parts currently produced per machine cycle.

Reject parts are counted within your system to keep track of scrap vs good parts. Rejects can be entered in one of three ways:  By an operator at a keypad or DCM, by a user at a workstation, or by automated equipment using contact inputs to the DCM.

## TIME

The second fundamental production monitoring quantity is time. Production time is divided into up time, down time, and idle time, all of which become essential factors in calculating OEE and other important production metrics.

Down time is accumulated based upon cycle time exceeding the down time threshold. Parts, possibly including good parts, can be produced while down time is accumulating. Down threshold and standard cycle time parameters can be defined separately for each job or machine, and down time quantities may be adjusted by a user at a workstation.

Assist time is accumulated in parallel with production time. Operators may call for assistance at any time by selecting one of the available assist reasons without impacting the production monitoring of the machine. Assist notifications and other alerts can be delivered by text, email, light stacks and even audio paging.

# Why Production Monitoring?

**A RESEARCH PAPER FOR THE 8TH CIRP CONFERENCE ON INTELLIGENT COMPUTATION IN MANUFACTURING ENGINEERING TITLED "MONITORING SYSTEMS FOR ZERO DEFECT MANUFACTURING" INCLUDES THE FOLLOWING:**

> "In the past, and to a large extent today, the machine operator served as the primary machine monitoring system. The operator monitored the performance of the tools by means of sight and sound; based on his/her experience, the operator knew that certain key signals and sounds (such as a shower of sparks or a straining spindle motor) were symptoms of a process malfunction.
>
> Today, industry is developing and using more sophisticated and higher-speed machining systems controlled by computers and/or other automation devices. These high-speed machines provide higher removal rates and ensure an increased productivity and the possibility of reducing the number of scrap or defected parts."

Clearly, the deployment of a next-level production monitoring system maximizes ROI and greatly curtails waste and floor errors.

# Process Monitoring

Process Monitoring software captures measurement and process data from all machines on the floor. Data can be collected across all shifts and individual machines can be isolated to enhance peak performance.

Quality process monitoring solutions collect data for most any process variable parameter—cycle time, fill time, charge time, injection start pressure, maximum injection pressure, take-out time, screw speed, barrel zone temperatures and more.

Process Monitoring data, captured, analyzed and acted on in real-time, is the critical element for real-time Statistical Process Control.

As engineering professor Kevin Dunn explains:

> **"Any variable can be monitored. However, the purpose of process monitoring is so that you can react early to bad, or unusual operation. This implies we should monitor variables as soon as they become available, preferably in real-time. They are more suitable than variables that take a long time to acquire. We should not have to wait to the end of the production line to find our process was out of statistical control."**

## WHY PROCESS MONITORING IS IMPORTANT

By leveraging data via a process monitoring tool, your team can chart data sets directly in an intuitive dashboard, providing a visual overview of machine health. Production data inputs may include machine/tool cycles, good/bad part counts, uptime/downtime, reject/assist/downtime events, and reasons. As raw data is transformed into visual insight, manufacturers gain control over every aspect of the manufacturing process--purchasing, quality control, machine operation and maintenance.

Because process monitoring automatically oversees processes and activities, manufacturers gain improved operational efficiency. This, in turn, enhances factory floor accuracy with a reduction of human-interaction errors. The bottom line? Manufacturers realize superior quality and reduced costs with a reduction in defects, rejects, product returns (warranty claims) and reworks while deploying actionable intelligence to best control processes ahead of possible costly issues. With predictive capabilities inherent in next-level data analysis, your operations floor will make more effective use of resources based on real-world, real-time performance modeling.

# SYSCON PlantStar:

# Industrial Strength MES for Production & Process Monitoring

Nearly every machine in your factory produces valuable production and process data. The problem is that *this information is only available if you are standing in front of the machine watching what is happening.* In most plants, the machine operator is not equipped to monitor or take action based on this information. To make this data truly useful to the people that can actually do something with it, a plant-wide data collection and reporting system is required.

PlantStar includes the features you need to deploy an industry leading MES solution in your factory. Job Scheduling provides quick and easy access to your production calendar. Operator Tracking helps you keep operators accountable for activity at each machine. Real-Time data and at-a-glance dashboards keep you informed of machine and job status across your plant.

Part and scrap counting with downtime and reason assignments give insight into factors impacting your Overall Equipment Effectiveness. Process Monitoring with real-time data logging, limit thresholds and alerts give you the SPC information you need for a provable quality assurance solution.

Integrated label/barcode printing lets you tag, and label finished products with ease. Front-end and back-end ERP integration lets you import work orders or entire schedules and export finished goods information for and end-to-end information system solution.

Having all that information and insight at your fingertips – including via remote access - improves operator tracking and training, often resulting in more than 50-percent savings in operator training costs. By integrating the tools available in a superior MES, managers experience faster time-to-value – in some cases, as much as six-figure in savings via optimized capacity. In short, real-time data drives proactive action.

Utilizing functionality such as drag-and-drop job scheduling, real-time dashboard reporting and customizable alerts, PlantStar ensures you are always informed about what is happening with your production activities and process variables in real time.

PlantStar provides insight into job-specific details on every machine so you can keep track of upcoming projects, potential downtime, and more:

# Production Summary

The Production Summary allows you to slice and dice your data quickly and efficiently. Choose from any machine, station, or a specific group of equipment to find pertinent information. Export your data to share with specific team members. Your production data is now at your fingertips.

**SYSCON PLANTSTAR** PRODUCTION EVENT LOGGER : PRODUCTION SUMMARY | 👤 Change User (Syscon)

Machine Groups:

IM - Injection Molding

⬦ Export

| Machine | Status | Job | Product | Time Remaining | Tools | Number Of Parts Remaining | Number Of Reject Parts Made | Number Of Good Parts Made | Estimated Number Of Good Parts Per Second | Number Of Good Parts Per Second | Reject % | Performance % | Average Cycle Time In Seconds | Standard Cycle Time In Seconds |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boy 22D 25 Ton | Running | Medical Clip, 1 Gram | Medical Clip | 2 hours 27 minutes | Petri Dish: T7F8T60T, Cooling Line: DUFF9XAK, Uniloy Milacron 70 Ton Barrel: 6UXIZNEC, Mokon Portable Chiller: 34LFIUG1, MK Conveyor: 9U1WOXCB | 929 | 276 | 1236 | 0.11 | 0.1 | 18.254 | 86.77 | 29.97 | 30 |
| ROBOSHOT α-S165iA/α-S165iA-g 165 Ton | Running | Cell Phone Case, 130 Grams | Cell Phone Case | 0 hours 13 minutes | Petri Dish: LPPVX3BJ, Cooling Line: JFSPDOOJ, Uniloy Milacron 70 Ton Barrel: ODS95KMY, Mokon Portable Chiller: HP8T3ZG2, MK Conveyor: 33FNRY41 | 130 | 342 | 1542 | 0.16 | 0.15 | 18.153 | 80.84 | 29.96 | 30 |
| Sumitomo SE220EV-A HD 247 Tons | Running | Water Bottle Cap, 1.2 Grams, 96-Cavity | Water Bottle Cap | 4 hours 10 minutes | 1-Gallon Bottle Mold: Q14IUBAJ, Maguire Weigh Scale Blender: ZALQ0KRM, MK Conveyor: U7EOU9AW, NovaDrier Membrane Resin Dryer: NJHYAQOM | 1982 | 345 | 1795 | 0.13 | 0.13 | 16.121 | 80.05 | 29.97 | 30 |
| ARBURG 2000 88 Ton | Running | Plastic Cups, 340 Grams | Plastic Cups | 1 hour 18 minutes | 1-Gallon Bottle Mold: GMCFNKH8, | 764 | 216 | 1962 | 0.16 | 0.16 | 9.917 | 82.46 | 29.97 | 30 |

# Job Scheduler

Customers can schedule jobs through PlantStar or PlantStar will integrate with the customer's current ERP system. Creating and editing jobs is a breeze and the PlantStar job scheduler allows a drag and drop approach to quickly apply changes on the fly. The Job Scheduler is also available as a read only view for all shop floor personnel.

# Job Summary

The job summary provides a quick, up-to-date picture of what is happening on any machine. You can view a single machine, all machines, or a particular machine group. Scroll buttons allow you to find information on the various sub-jobs associated with the job currently running on the machine. A machine status dashboard displays real-time information on the status of any machine, which include Running, Down, Alert, Idle, Process Exception, Process Warning, Overrun, High Rejects, Slow and Fast. You can also choose to end, pause, or start any job in the queue for any machine by selecting the associated touch buttons. Quickly review real-time data such as OEE, average cycle time, standard cycle time, average cycle time of past 4 cycles, estimated time remaining on the current running job and the required-by date and time.

# Job Setup Sheets

When configuring jobs, you have the option to include valuable information that will show up on the shop floor. This information could be videos, pictures, plain text, and anything that might be helpful to someone standing at the machine while a job is running. This feature is useful for training, product standards/data sheets and part images.
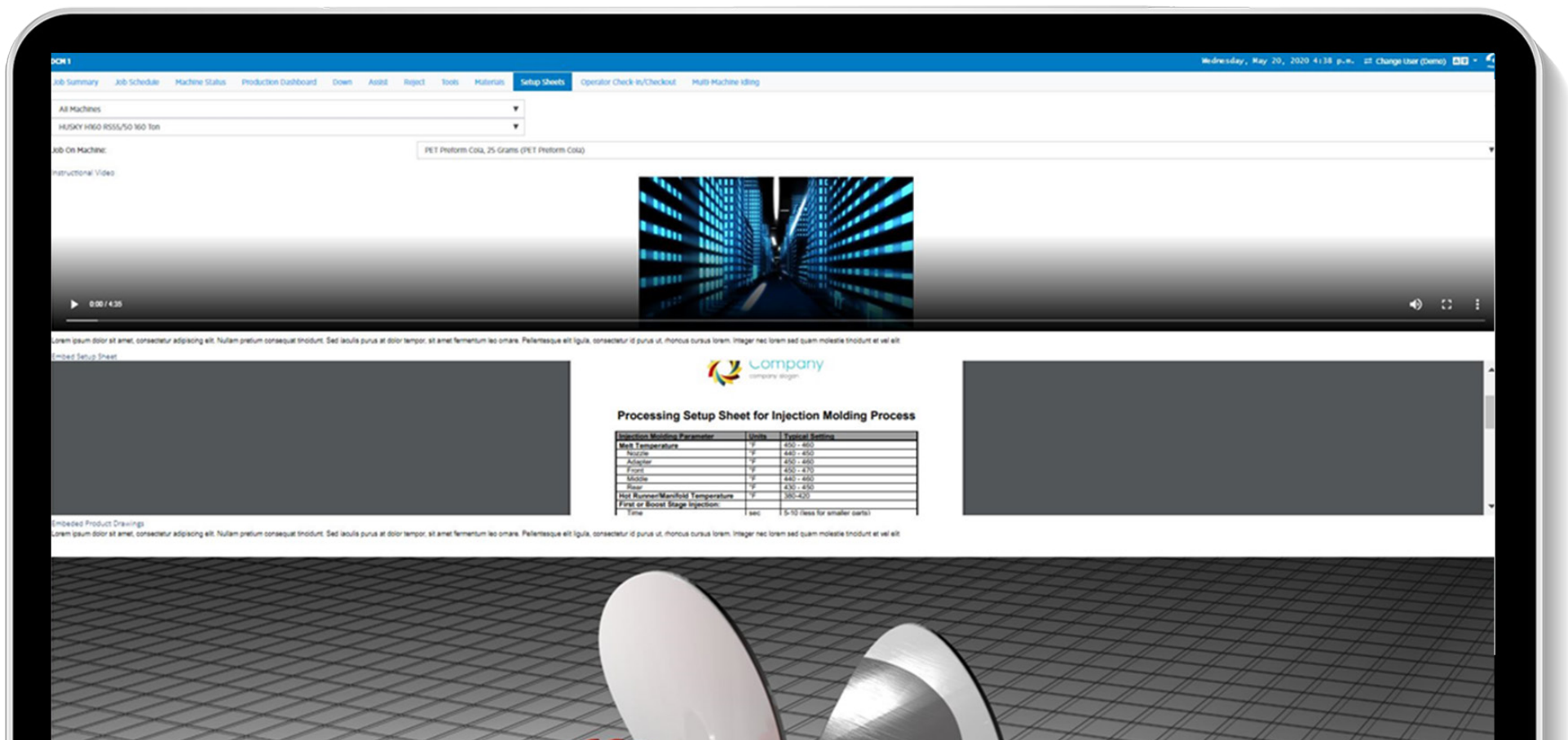
# Customizeable Charts & Reporting

PlantStar empowers you to create and customize your own charts in minutes. These charts can then be viewed by anyone using the Production Dashboard. Separate spreadsheet and report configurations can be created to customize different information for different users. Examine specific time intervals within any machine, job and add a specific Data Category. Automate your reports to be available at specific and recurring dates and times.
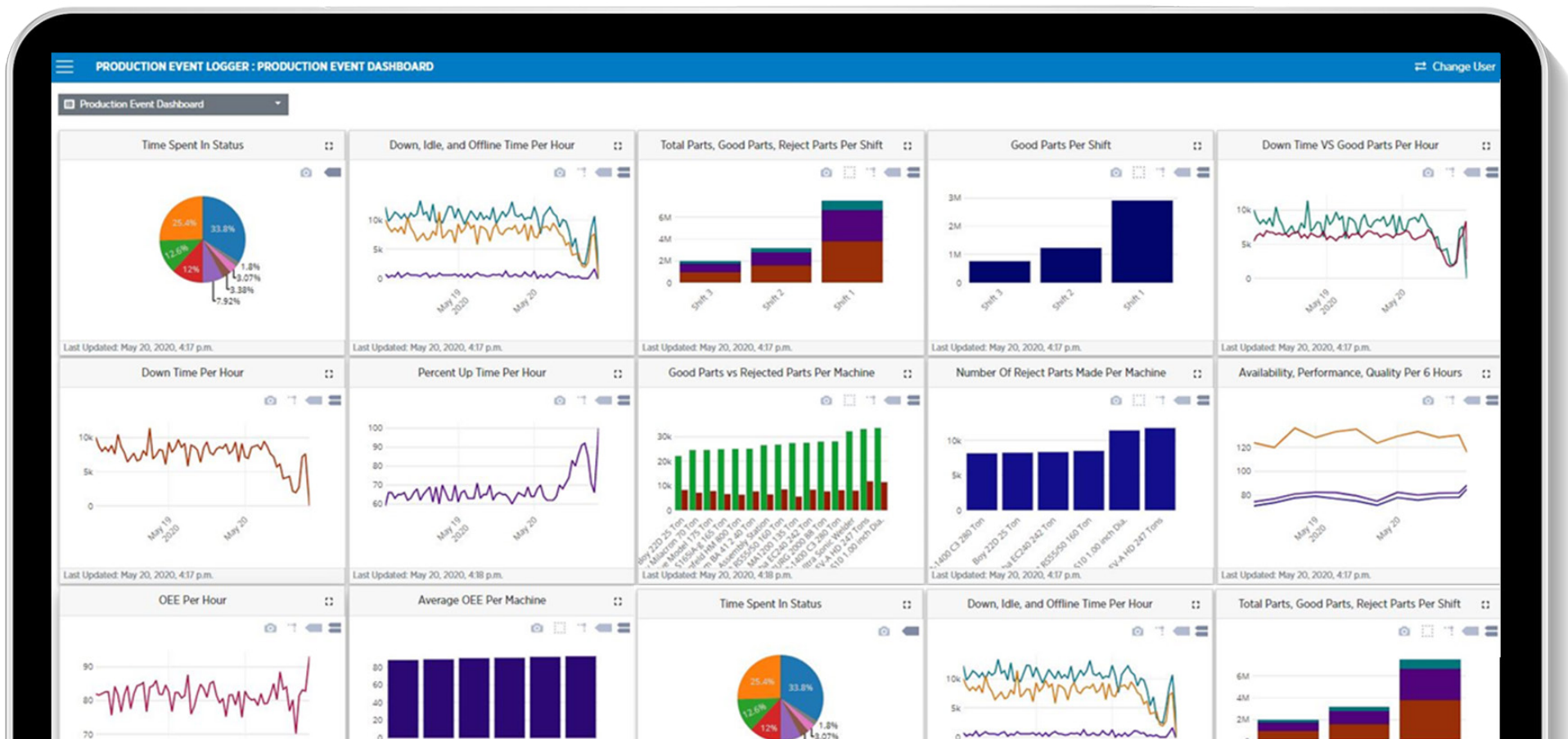
# Real-Time Dashboards

View all your dashboards from any device connected to your network. The Machine Status dashboard provides a quick look at every machine in your factory. Color codes create an easy view of the priority status of each machine. Drill down to view good parts versus rejected% and parts per hour for every machine.
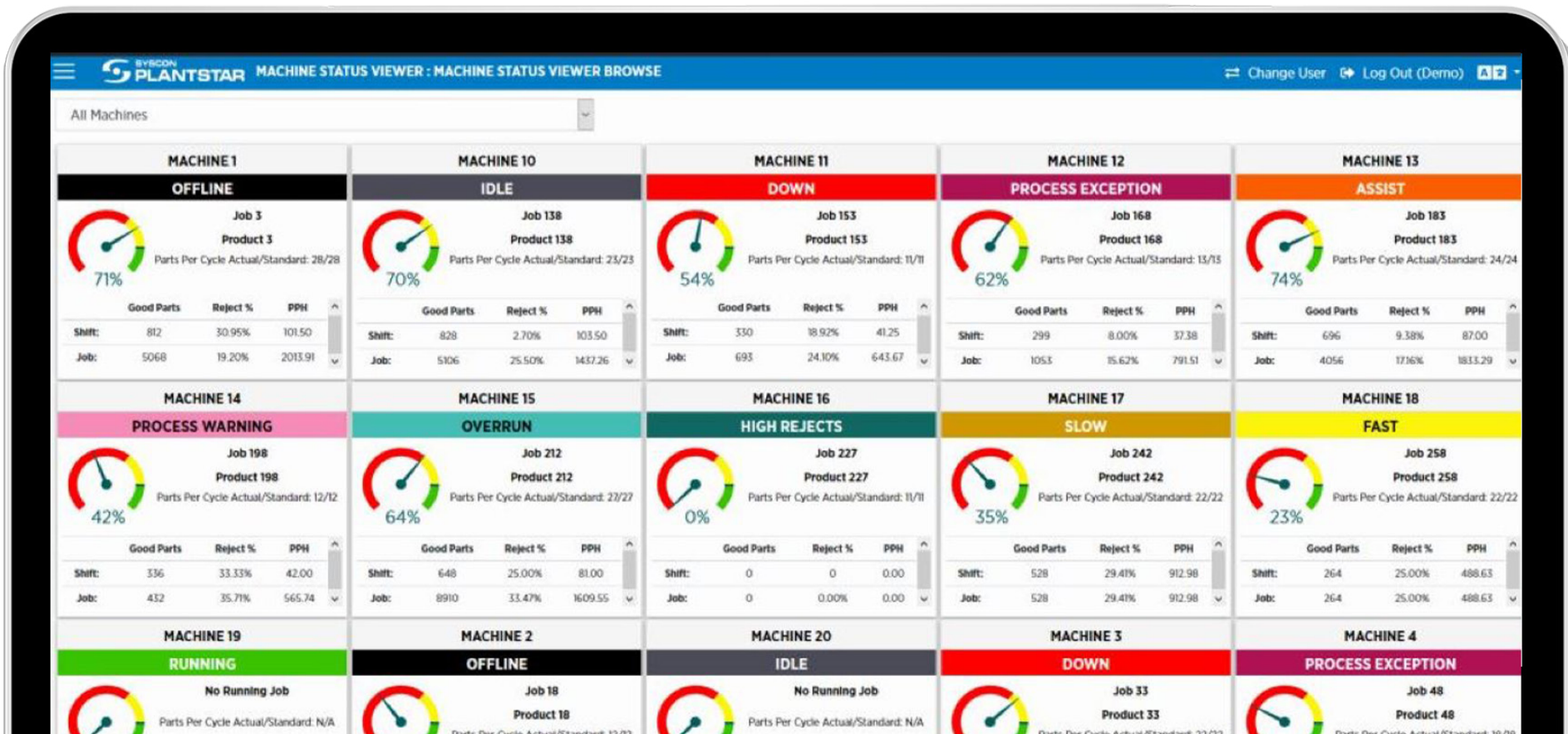
# Downtime

For the current running job, the down screen shows the amount of time during the current shift and during the current running job that the selected machine has been in Down status. Select between a single machine, all machines, or a particular group of machines. Operators can quickly select a specific down reason and log downtime. Down time reasons include Force Down, Auto Up, Auto Scrap, and/or should ignore cycles. Easily review down time reason data via a handy pie chart showing the top 5 down reason for the current shift and the current job.

# Reject/Scrap

For the current running job, the down screen shows the amount of time during the current shift and during the current running job that the selected machine has been in Down status. Select between a single machine, all machines, or a particular group of machines. Operators can quickly select a specific down reason and log downtime. Down time reasons include Force Down, Auto Up, Auto Scrap, and/or should ignore cycles. Easily review down time reason data via a handy pie chart showing the top 5 down reason for the current shift and the current job.

# Machine Performance

Features like Machine Performance and Machine Usage are used to quickly extract information related to a current running job on any machine and view priority statuses in real-time. Both features have the ability to be exported.
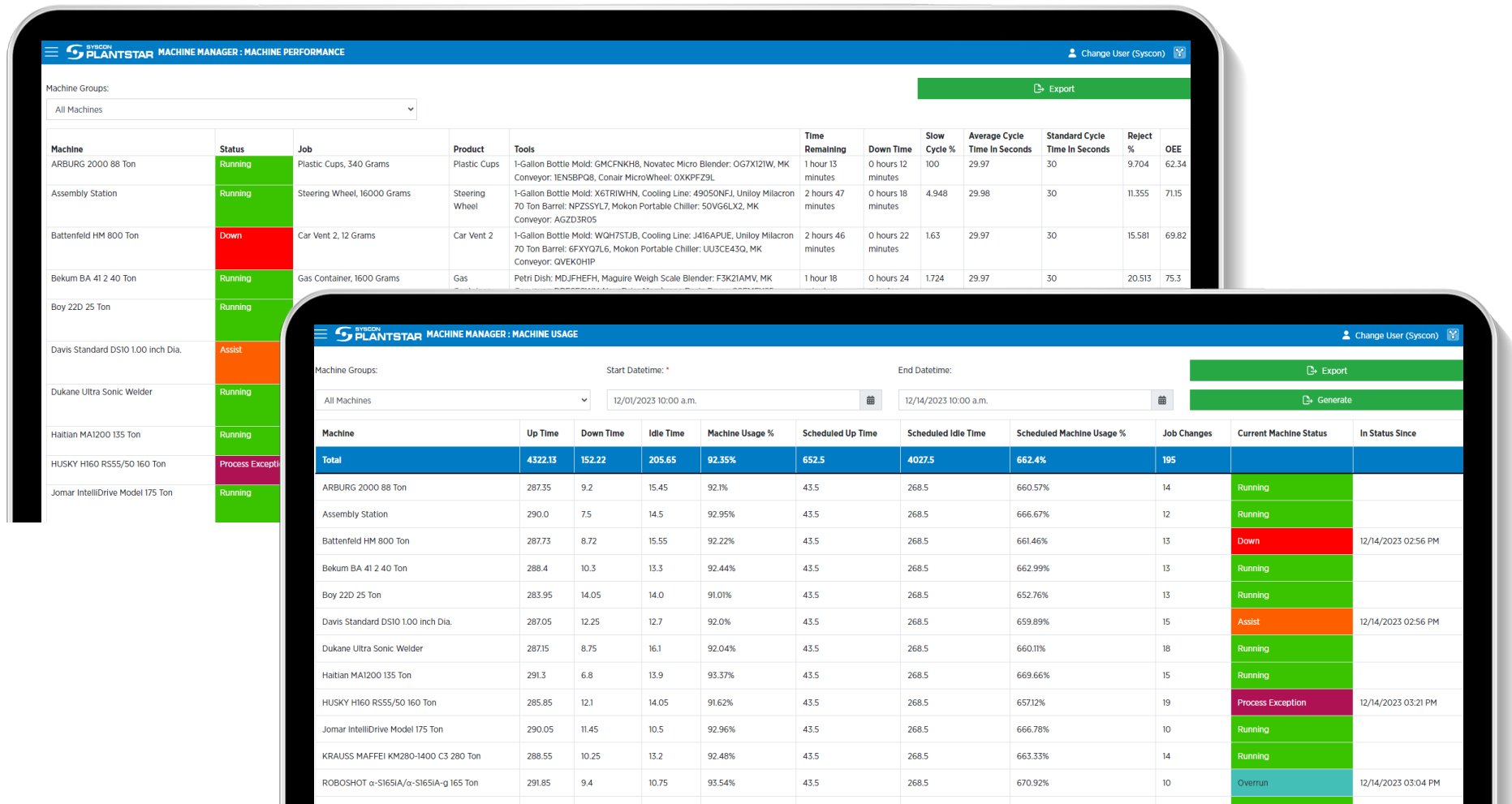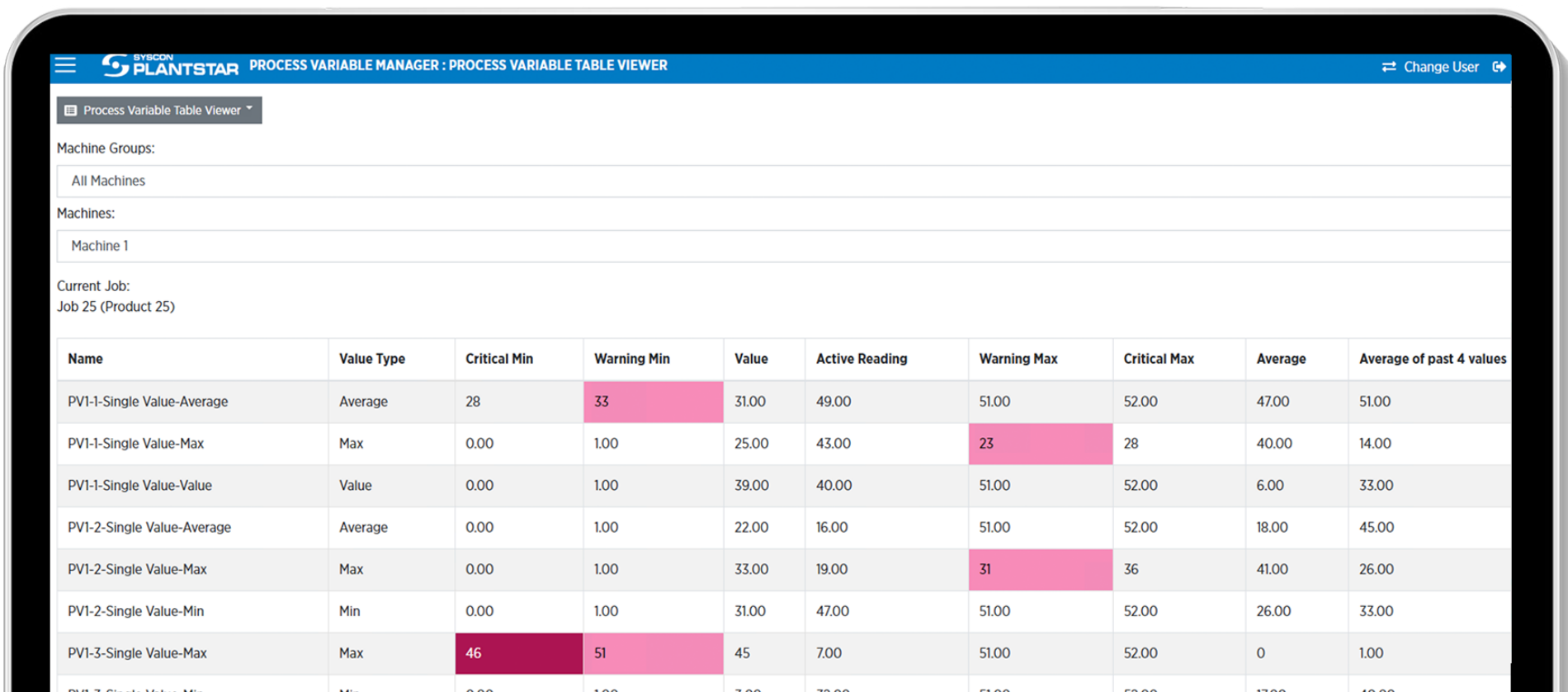
# Instant Alerts

PlantStar can provide email, text, and/or voice (PA) alerts. With PlantStar you are in control of your MES. You set up your alerts to customize your system. Receive emails, text, or voice alerts when machines are down, high rejects, specific process variables that are out of tolerance, and much more.

# Process Monitoring

Collect and display unlimited process variables, including the ability to profile multiple variables simultaneously to explore and analyze interdependent behavior. Troubleshoot and optimize configurations using SPC tools including averages, high/low/last, X bar & R bar charts and exception limits. Measure specific time, temperature and pressure Process variables and receive instant alerts when they are out of tolerance. PlantStar can utilize a physical interface or a plethora of machine protocol interfaces such as OPC-UA and EUROMAP.
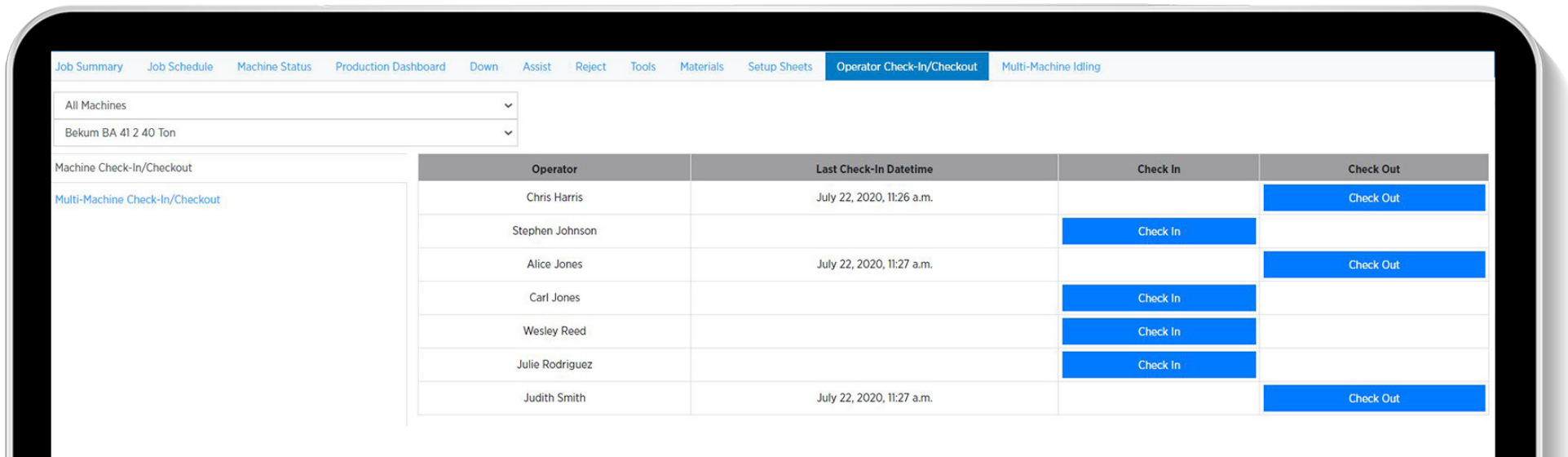


| Name | Value Type | Critical Min | Warning Min | Value | Active Reading | Warning Max | Critical Max | Average | Average of past 4 values |
|------|-----------|--------------|-------------|-------|----------------|-------------|--------------|---------|--------------------------|
| PV1-1-Single Value-Average | Average | 28 | 33 | 31.00 | 49.00 | 51.00 | 52.00 | 47.00 | 51.00 |
| PV1-1-Single Value-Max | Max | 0.00 | 1.00 | 25.00 | 43.00 | 23 | 28 | 40.00 | 14.00 |
| PV1-1-Single Value-Value | Value | 0.00 | 1.00 | 39.00 | 40.00 | 51.00 | 52.00 | 6.00 | 33.00 |
| PV1-2-Single Value-Average | Average | 0.00 | 1.00 | 22.00 | 16.00 | 51.00 | 52.00 | 18.00 | 45.00 |
| PV1-2-Single Value-Max | Max | 0.00 | 1.00 | 33.00 | 19.00 | 31 | 36 | 41.00 | 26.00 |
| PV1-2-Single Value-Min | Min | 0.00 | 1.00 | 31.00 | 47.00 | 51.00 | 52.00 | 26.00 | 33.00 |
| PV1-3-Single Value-Max | Max | 46 | 51 | 45 | 7.00 | 51.00 | 52.00 | 0 | 1.00 |
| PV1-3-Single Value-Min | Min | 0.00 | 1.00 | 3.00 | 72.00 | 51.00 | 52.00 | 17.00 | 40.00 |

# Operator Action Security

Provides the ability to control access to and log actions taken by Operators and other system users. Audit trail records can be reviewed for track and trace of critical system events.

# Tool Life Tracking

Tool Tracking can be used to coordinate tool scheduling and maintenance based on coordination of tool type job setup information and recording of actual tool usage. Using this information, PlantStar can provide Tool Maintenance Events, Tool Changes, and Tool Type Change Schedule.



**Tool Life Tracking Menu**

- Tools
- Tool Types
- Tool Type Groups
- Tool Groups
- Tool Maintenance Event Types
- Tool Maintenance Configurations
- Tool Maintenance Events
- Tool Usage Events
- Tool Type Change Schedule
- Tool Usage By Maintenance Event

# Material Tracking

By combining job setup, scheduling and production information, PlantStar can provide Material Usage Reporting, Material Lot Tracking, Material Type Change Schedule, and Material Forecasting.

## Materials Menu

- Material Types
- Material Component Template Groups
- Material Usage

| Material Type | Runner Weight | Good Parts Weight | Reject Parts Weight | |
|---|---|---|---|---|
| HDPE | 0.0 Pounds | 206995.8 Pounds | 55252.5 Pounds | |
| LDPE | 0.0 Pounds | 334085.9 Pounds | 88848.5 Pounds | |
| PP | 0.0 Pounds | 148722.25 Pounds | 46031.25 Pounds | 194753.5 Pounds |
| PolyStyrene | 0.0 Pounds | 208211.15 Pounds | 64443.75 Pounds | 272654.9 Pounds |
| Filler | 0.0 Pounds | 91573.2 Pounds | 28716.8 Pounds | 120290.0 Pounds |
| Polyurethane | 0.0 Pounds | 137359.8 Pounds | 43075.2 Pounds | 180435.0 Pounds |
| Phenol Formaldehyde Resin | 0.0 Pounds | 228933.0 Pounds | 71792.0 Pounds | 300725.0 Pounds |
| Polypropylene | 0.0 Pounds | 53535.2 Pounds | 17391.0 Pounds | 70926.2 Pounds |
| PVC | 0.0 Pounds | 174671.6 Pounds | 49965.5 Pounds | 224637.1 Pounds |
| Thermoplastic | 0.0 Pounds | 60040.8 Pounds | 18215.0 Pounds | 78255.8 Pounds |
| Nylon | 0.0 Pounds | 90061.2 Pounds | 27322.5 Pounds | 117383.7 Pounds |
| Polycarbonate | 0.0 Pounds | 75051.0 Pounds | 22768.75 Pounds | 97819.75 Pounds |
| Polyimide | 0.0 Pounds | 105071.4 Pounds | 31876.25 Pounds | 136947.65 Pounds |
| Polyester | 0.0 Pounds | 62026.2 Pounds | 15193.6 Pounds | 77219.8 Pounds |
| Polyphenylene Sulfide | 0.0 Pounds | 93039.3 Pounds | 22790.4 Pounds | 115829.7 Pounds |
| Polystyrene | 0.0 Pounds | 155065.5 Pounds | 37984.0 Pounds | 193049.5 Pounds |
| Acrylonitrile Styrene Acrylate | 0.0 Pounds | 49743.2 Pounds | 16010.2 Pounds | 65753.4 Pounds |
| Polyvinylidene Flouride | 0.0 Pounds | 74614.8 Pounds | 24015.3 Pounds | 98630.1 Pounds |
| Acetal | 0.0 Pounds | 62179.0 Pounds | 20012.75 Pounds | 82191.75 Pounds |
| Liquid Crystal Polymer | 0.0 Pounds | 87050.6 Pounds | 28017.85 Pounds | 115068.45 Pounds |

With SYSCON PlantStar software, you are in control of your manufacturing environment. Our system empowers you to collect and analyze all shop-floor data, delivering complete visibility that lets you make proactive decisions—and THAT improves the bottom line. With down-to-the-second insight, SYSCON PlantStar provides an analytical platform to collect and, more importantly, utilize data from your machines in real-time. PlantStar informs the entire team—manufacturing, quality control, management, operators and executives.

# How can I see a full demo of the PlantStar system?

Contact our sales team **online** or give us a call at 1-574-232-3900. We can provide a full system demo over the phone, which you can enjoy from the comfort of your home or office.

SCHEDULE A DEMO

# Which MES system is right for me?

**With 50 years of industry experience, SYSCON continues to provide the highest-quality of manufacturing execution systems. Our solutions focus on what's important to your operation:**

### Safety

Get real-time alerts for conditions that may cause human injury and take a proactive, instead of reactive, approach to machine maintenance.

### Efficiency

Maximize the potential of your people and your machines while still delivering the superb quality products your customers depend on.

### Quality

Reduce scrap and keep your products within tolerance parameters to ensure top-notch production quality.

**READY TO BRING THE POWER OF NEXT-LEVEL MES TO YOUR FLOOR?**

**CONTACT US TODAY TO SCHEDULE A DEMO.**

SYSCON PLANTSTAR

# FAQs

**What is a manufacturing execution system (MES)?**

A MES is a digital information system that connects, monitors, and manages complex manufacturing systems and data flows on the factory floor. The main goals of an MES are to ensure effective execution of manufacturing operations and to improve productivity.

**What benefits can I expect when implementing SYSCON PlantStar's MES?**

The benefits of PlantStar begin with the ability to schedule and manage every aspect of every production or manufacturing job. PlantStar provides easy to use drag-and-drop real-time scheduling, full production floor visibility, and enterprise resource planning (ERP) system integration. Visibility of production and process data from all available machines, tools, and materials allows administrators and plant supervisors to have real-time, actionable information at their fingertips. The ability to analyze accurate data collected at each manufacturing process and work center allows managers to review and improve manufacturing processes and productivity.

**How does an operator log in to your system?**

There are multiple operator security models that you can choose from. Operators can use an access code, operator ID, username or password, or badge scan, or their log in can remain open with no requirements for log in or log out. The customer can choose which is best suited for their environment and how they want operator tracking to be established.

**What is live production scheduling?**

A live, "machine-connected" schedule is always up to date, running in real time. PlantStar is hard wired to the machines, so it constantly gathers and records machine data as production is happening on the floor.

# FAQs cont.

**How do you calculate overall equipment effectiveness (OEE)?**

This is a common question among our customers, and opinions differ about how it should be calculated. OEE is a tool to measure the performance of individual equipment or an entire process. OEE can be used to measure losses caused by poor quality, equipment problems, or non-optimal run rates.

The standard calculation for OEE is:

**% OEE = % Availability x % Productivity x % Quality**

Typical items measured by OEE will be actual vs. planned downtime, slower than standard production rates, defects, and minor but important problems. The Emerson Company offers the following guidelines for target OEE based on industry/process.

| Process Type | Quartile | | | |
|---|---|---|---|---|
| | Worst | 3rd | 2nd | Top |
| Continuous | <78% | 78-84% | 85-91% | >91% |
| Batch | <72% | 72-80% | 81-90% | >90% |
| Chem/Power | <85% | 85-90% | 92-95% | >95% |
| Paper | <83% | 83-86% | 87-86% | >94% |

**Availability** considers downtime or stoppages—time the machine is not running as scheduled. Availability is defined as actual production time/planned production time, operating time/planned production time, or the percentage the equipment is available for production. Availability can be affected by changes in process variables, preventive maintenance, and machine failure detection.

PlantStar defines availability as: $\dfrac{\text{Uptime}}{\text{(Uptime + Downtime)}}$

Idle time (when a machine is not available when idle for whatever reason) is not a part of this calculation. Idle time can be scheduled or non-scheduled.

**Productivity** (or performance) considers speed loss. Productivity is defined as actual production/optimum capacity or (minutes/part) / (total parts/operating time), or ideal cycle time/ (operating time/total parts), or (total parts/operating time) / ideal run rate, or parts per time to produce. Material availability, operator training, equipment breakdowns, and machine speeds affect productivity. If production was planned for a machine and it is down, the productivity clock is still running.

PlantStar defines productivity as:

$$\frac{\text{Gross Parts Products}}{\text{Uptime}} \times \frac{\text{Standard Cycle}}{\text{Standard Multiplier}}$$

**Quality** considers bad parts or waste. Quality is defined as (product produced – rejects)/product produced or good parts/total parts. It is affected by changes in process variables, material quality, and equipment performance.

PlantStar defines quality as: $\dfrac{\text{Net Pieces}}{\text{Gross Pieces}}$

# FAQs cont.

**Why are spreadsheets a poor option for planning production?**

Spreadsheets are typically static; they do not update automatically. They are out of date from the moment they are created.

- Spreadsheets are heavily labor intensive.

- Spreadsheets are vulnerable to human mistakes.

- Paper spreadsheets are not easy to share, and changes are not easily communicated.

- Spreadsheets are not agile enough for real-time planning and analysis.

**What is the typical ROI from installing a SYSCON PlantStar at a facility?**

- 30% average increase in productivity (OEE)

- Reduced initial scheduling time by an average of 2 or more days per month and 20+ hours reporting time per week

- Average 95% increase in machine utilization

- One plant reported operational savings of over $400k in one year.

- Another site reported generation of 15% more revenue with a 20% smaller workforce.

- On average for PlantStar customers, every 1% improvement in OEE is worth approximately $50k per year.

- Time is money, and it is vital to improve the production performance of expensive capital equipment on the floor.

**What is the different between ERP and MES?**

ERP systems manage the front office of the business, e.g., financials, inventory, and customer demand information. Manufacturing execution systems (MES) manage the shop floor side of the business; they monitor and report on manufacturing. An MES system extends the value of the ERP by providing real-time visibility to production order status and scheduling. This provides better business decision support, planning, and collaboration across the organization. If you have spent a great deal of money on an ERP system, why not leverage the benefits and investment in that ERP by supplementing it with a world-class MES solution?

# FAQs cont.

**What type of machines can you connect to, how do you connect to machines?**

We have the experience and knowledge to connect with a wide range of machines and controllers. When a customer is looking for production monitoring, we would direct signal from machine to PlantStar DCM via isolation relay. When we are monitoring a variety of process variables, we would need a machine list from the customer to determine the best form of connection. With our experience and knowledge, we would advise the customer how to connect based on the make, model, and controls of the machine. The most common are machine interface or direct thermocouples to the PlantStar DCM.

## Machine Interface

PlantStar will utilize functionality on each machine to collect data directly from the machine controller via network connection and the agreed upon data transfer protocols. **Below is a list of some of the machine interfaces available on the PlantStar system:**

| | |
|---|---|
| Arburg | Kraus Maffei |
| Battenfield | Kawaguchi, |
| BMB | izhu |
| Brankamp | MACO |
| Bransen Welders | Mitsubishi |
| Camac | Mosaic |
| Cincinnati Milacron | NISSEI |
| Engel | OPC-UA |
| GE Fanuc | Siemens |
| Gammaflux, | Sumitomo |
| Graham | TMC |
| HPM Host | TOYO |
| Husky | Texas Instruments |
| IMD Vision System | UNILOG |
| JSW | VanDorn |

## Analog Interface

Analog interfaces are used to directly connect analog sensors, like thermocouples or transducers, to the PlantStar system. These are commonly used to collect process variable data from older machiens that do not support modern machine interface protocols. PlantStar can provide up to 24 analog interfaces per DCM.

Digital Inputs from Machine to PlantStar DCM via Isolation Relay

PlantStar utilizes standard digital signal inputs to capture duration time process variables based on 24VDC or other outputs from the machine. For this method, the outputs must be identified from existing machine control outputs or added via additional hardware from the machine vendor. Each PlantStar DCM provides 16 digital inputs.

## Digital Output

The PlantStar system can be configured to activate external devices via digital output signals. The digital outputs can be configured to activate based on simple or complex logic derived from production and process data. Each PlantStar DCM provides 8 digital outputs.

## Rotational Encoder Signal to DCM

To capture revolutions-per-minute measurements from a machine, installation of rotational encoder is required. This will provide an analog voltage signal connected directly to a DCM analog interface.

# FAQs cont.

**What is the difference between production monitoring and process monitoring?**

## PRODUCTION MONITORING

Production Monitoring refers the set of information and functionality every plant needs to operate efficiently. These features typically include enhanced drag-and-drop scheduling, job setup sheets, OEE tracking, real-time production summary, cycle time, reject percentage, downtime tracking, email/text alerts, customizable charts/reports/dashboards, and ERP integration. Virtually all production monitoring involves or uses two fundamental pieces of data, # of parts and time, to report on the progress and performance of a job.

**Parts**

The first fundamental production monitoring quantity is part counting. Gross parts are accumulated by counting closures of the primary contact. A standard multiplier can be entered in the job's work order. It defines the maximum number of parts produced per machine cycle for a job. The actual multiplier reports the number of parts currently produced per machine cycle.

Reject parts are counted within your system to keep track of scrap vs good parts. Rejects can be entered in one of three ways:  By an operator at a keypad or DCM, by a user at a workstation, or by automated equipment using contact inputs to the DCM.

**Time**

The second fundamental production monitoring quantity is time. Production time is divided into up time, down time, and idle time, all of which become essential factors in calculating OEE and other important production metrics.

Down time is accumulated based upon cycle time exceeding the down time threshold. Parts, possibly including good parts, can be produced while down time is accumulating. Down threshold and standard cycle time parameters can be defined separately for each job or machine, and down time quantities may be adjusted by a user at a workstation.

Assist time is accumulated in parallel with production time. Operators may call for assistance at any time by selecting one of the available assist reasons without impacting the production monitoring of the machine. Assist notifications and other alerts can be delivered by text, email, light stacks and even audio paging.

# FAQs cont.

**What is the difference between production monitoring and process monitoring? cont.**

## PROCESS MONITORING

Process Monitoring software captures measurement and process data from all machines on the floor. Data can be collected across all shifts and individual machines can be isolated to enhance peak performance.

Quality process monitoring solutions collect data for most any process variable parameter—cycle time, fill time, charge time, injection start pressure, maximum injection pressure, take-out time, screw speed, barrel zone temperatures and more.

Process Monitoring data, captured, analyzed and acted on in real-time, is the critical element for real-time Statistical Process Control. By leveraging data via a process monitoring tool, your team can chart data sets directly in an intuitive dashboard, providing a visual overview of machine health. Production data inputs may include machine/tool cycles, good/bad part counts, uptime/downtime, reject/assist/downtime events, and reasons. As raw data is transformed into visual insight, manufacturers gain control over every aspect of the manufacturing process--purchasing, quality control, machine operation and maintenance.

Because process monitoring automatically oversees processes and activities, manufacturers gain improved operational efficiency. This, in turn, enhances factory floor accuracy with a reduction of human-interaction errors. The bottom line? Manufacturers realize superior quality and reduced costs with a reduction in defects, rejects, product returns (warranty claims) and reworks while deploying actionable intelligence to best control processes ahead of possible costly issues. With predictive capabilities inherent in next-level data analysis, your operations floor will make more effective use of resources based on real-world, real-time performance modeling.

# FAQs cont.

**What hardware is needed to install PlantStar at my factory?**

SYSCON manufactures the PlantStar system hardware at our headquarters in South Bend, Indiana. The basic building blocks of the system include data collection modules, human machine interfaces (HMIs), and the PlantStar APU server. Our data collection modules can reduce hardware cost due to a single DCM being able to connect up to sixteen machines.

**Can PlantStar create dashboards that we can view throughout our facility?**

Our system allows you to view charts from any device that is connected to your network. Our most popular display page is the Production Dashboard. This provides you up-to-date comparisons of data about different machines, periods of time, productivity, processes, shifts, and statuses. You can also create your own charts and set your permission levels for which users you would like these charts to be visible.

Administrators and supervisors also love our Machine Status chart/dashboard. This is a real-time dashboard that shows all machines in your entire facility and is often used on overhead or large screen displays. You can view real-time OEE, parts per hour or per shift, reject percentage, and more all on one screen. PlantStar 4.0 is web based so all data can be viewed from any device connected to the network.

**What is a PlantStar data collection module (DCM)?**

PlantStar's DCM is an industrial-grade data acquisition device used to collect production and process information from machines and transmit data in real time. A single DCM can connect up to sixteen machines for production monitoring, which reduces hardware costs. Process monitoring customers can perform continuous monitoring of process variable data, which typically requires one DCM for every four machines, depending upon the number of process variables being monitored. Each DCM has 16 digital inputs, up to 24 analog inputs, 8 digital outputs, and can support multiple machine protocol interfaces via ethernet or serial connection. Even with no available network connection the DCM can continue to operate autonomously and collect up to 30 days' worth of data.

# FAQs cont.

**What are the PlantStar APU database server specifications?**

**The minimum hardware specifications for a PlantStar Panorama APU are:**
CPU: 3.8Ghz 4 Core 8 Thread
RAM: 8Gb 2400Mhz
Disk: 1Tb HDD 7200 RPM 111Mbs Sequential Read

**The recommended hardware specification for a PlantStar 4.0 APU are:**
CPU: 3.8Ghz 12 Core 24 Thread
RAM: 64Gb 3200Mhz
Disk: 1Tb SSD 560Mbs Sequential Read 510Mbs Sequential Write 95k Random Read 90k Random Write 103Mbs Sequential Write

**What are HMIs and what types are available? What is needed to connect to PlantStar from a desktop, laptop, or phone?**

HMIs are touch screen interface devices designed to connect to the PlantStar system from the factory floor. We can provide 15" ruggedized industrial HMIs, 15" touchscreen display monitors, or portable tablet computers, depending on the customer application. After discussing your shop floor layout, we can recommend a specific HMI to best suit your factory floor. Customers can also utilize the PlantStar system from any desktop, laptop, or mobile phone running the Chrome browser.

**Can you integrate with ERP/MRP systems?**

Absolutely. Almost every installation that we complete has an integration between the customer's ERP system and PlantStar. PlantStar typically imports job setup information, and sometimes scheduling information, from the customers ERP and exports product data back to the ERP at the end of every day/shift.

**How does PlantStar benefit shop floor personnel?**

Operators and shop floor personnel using PlantStar become more empowered to be part of the manufacturing management process. Operator training can be performed directly at the machine (HMI). Operators can log downtime and defects, view real-time scheduling, track OEE, view charts/reporting in a real-time environment, and much more. Operator actions are tracked within the system so administrators and supervisors can utilize real-time reporting to track and trace.

# FAQs cont.

**Tracking downtime is important to us. How can PlantStar help?**

Focusing on improving downtime visibility ensures optimal use of resources and is the most direct route to improve productivity and profitability. PlantStar allows you to track downtime accurately, categorize downtime reasons, expose downtime in real time, and attack the largest sources of downtime with reports and charts that can be viewed in real time.

**How can we track and manage scrap?**

The PlantStar reject screen shows the up-to-date number of rejected parts per job, both for the current shift and total for the job, as well as the number of rejected parts per sub-job. Operators can quickly choose between all machines or a particular machine group. A drop-down list will automatically populate with the corresponding machines. Simply select a reject reason to enter scrap. You can manually enter the number of parts to reject. A reject reasons graph is always updated in real time and provides a pie chart of the top five reject reasons for the current job and the current shift.

**Is tool life tracking an option within your system?**

Tool life tracking is available with PlantStar 4.0. Tool management and scheduling are also available.

**Does PlantStar have a built-in alert system?**

PlantStar provides alert capability via email, text, and even voice paging. Operators can log an assist request, and the system can create an alert in real time. Downtime can be logged with detailed reasons, which can conditionally generate alerts as well. All alerts are immediately placed on a real-time pie chart that can be viewed from any device.

**Can you perform label printing?**

Yes. PlantStar can print customized bar code or other labels for anything from individual components to completed cartons or batches.

**How does PlantStar benefit IT staff and and upper management?**

PlantStar helps reduce labor and increase efficiency with an easy-to-use system that provides immediate results across your shop floor. Production dashboards allow management to review all data in real time from any device. Many of our customers have multi-site PlantStar systems, which allow fantastic streamlining for larger companies in addition to attractive enterprise pricing.

# FAQs cont.

**What resources can you provide to help keep us trained?**

Our MES systems have easy-to-access built-in manuals and help features. We also provide detailed training for admins and users before completion of installation. Our customer support team is available for additional training on request.

**How do you determine a customer is a correct fit for a PlantStar system?**

Within our stages of excellence, we always begin with a brief introductory call with a potential customer. We ensure that we understand the customer's needs and explain how PlantStar can address their challenges. After this brief call, we can set up a product demonstration over a webinar and perform a site survey if needed. Our site survey is extremely detailed and usually takes a few hours, depending upon the number of machines involved. Our technical team can review all machines and quickly explain how each of your machines or controls would connect to the PlantStar system. We are committed to providing fast turnaround on customers proposals so they can quickly see the advantages of our cost structure and capabilities for both production and process monitoring.

**What separates PlantStar from their main competitors?**

With 50 years of experience behind us, PlantStar serves a wide range of customers, from single-plant installations to global operations. We are able to provide our customers several distinct advantages.

- Lower hardware costs
- Faster ROI
- Consistent upgrades
- Trade-in value to upgrade to new releases
- Unmatched process monitoring capabilities
- Reduced software costs for multi-site locations
- Reliable customer support team that is consistently evaluated based on customer satisfaction

**Where is your customer base?**

We have performed more than 300 customer installations in various industries throughout the United States, Mexico, China, and Europe.

**Can you offer multi-site pricing?**

A large percentage of our customers have multiple facilities utilizing our system. We offer discounted enterprise pricing for multi-site customers.

# FAQs cont.

**What is your lead time for a new installation?**

PlantStar has a production team located at our headquarters in South Bend, Indiana. This alleviates the need for third-party involvement. On average, hardware takes about four to six weeks to build and ship. The customer has the option for a turn-key or a remote self-installation after the hardware arrives.

**What is PlantStar's cost per user?**

PlantStar 4.0 comes with unlimited users! You no longer have to pay for blocks of added users or worry about managing the amount of user capability.

**Can you explain your annual software license and maintenance agreement?**

PlantStar supplies an immensely valuable software license and maintenance agreement. The agreement provides a continuous warranty on all system hardware and includes all software upgrades, which can be remotely installed to the customers system. A built-in chat function allows our customers to chat directly and promptly with our support team 24/7, and customers receive discounts through PlantStar's trade-in policy when new systems are launched.

# FAQs cont.

**What MES system is right for me?**

With 50 years of industry experience, we have developed many different versions of MES. SYSCON PlantStar has produced five levels of shop floor data collection systems. Many customers are moving towards the PlantStar Panorama and PlantStar 4.0. Three of these systems support plant floor production information, and three support both production and process information. We have sized and targeted our systems to meet a variety of customer needs.

**Quickshot**

This is a basic system that supports twelve to 48 production machines. It's used by manufacturers who are interested in basic shop-floor metrics, featuring twenty pre-configured reject and down reasons. This system has limited upgrade capability.

**Snapshot**

Snapshot is an upgradeable, mid-entry level system for shop-floor production information. Many manufacturers who are interested in basic shop floor data metrics use it as a starting point.

**Portrait**

Portrait is our medium-sized product. It is an expansion to the Snapshot environment that incorporates many new functions, such as SPC data collection, that are not available in Snapshot.

**Panorama**

This enterprise-level product, commonly used to integrate multi-site, multi-process environments, allows manufacturers to organize all their worldwide manufacturing assets under one system. Popular among customers who are looking for enhanced process monitoring capabilities, Panorama is frequently used in industries such as medical, automotive, and plastics.

**PlantStar 4.0**

PlantStar 4.0 is another enterprise-level product used by multi-site facilities that need a production monitoring system with many added features included in the software cost. T**he most recent system includes the following features:**

- Unlimited users
- Unlimited machine capacity
- Fully browser based
- Modern looking UI
- Unlimited process variables per job
- Unlimited process profiles
- Built-in convertible unit system
- Supports cycle times of as low as 70ms (850 parts/minute)