XL2 Training

Audience: This guide is for attendees of XL Training.

Purpose: Learn key concepts, and see how XL reports can be used to drive improvement.

Firmware Version 2.8

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Vorne has an extensive network of international partners. More information can be found at www.vorne.com/about-us/xl-partners.htm.

XL Productivity Appliance™ Security Brief

About XL

The Vorne XL Productivity Appliance™ (XL PA) is a "bolt-on" smart device that provides manufacturing improvement data and tools that seamlessly scale from a single manufacturing processes to your entire enterprise. This brief applies to XL PA devices running software version 2.8.

XL Architecture

The XL PA is an embedded device built around a processing core that includes a Texas Instruments Sitara™ ARM processor, SDRAM and eMMC Flash. For a typical XL deployment, the integrated memory provides approximately one year of non-volatile on-board manufacturing data storage.

The XL PA operating system is a Yocto-based Linux distribution designed specifically for embedded and IOT devices. XL PA application software includes an embedded database and web server. These components are integrated into the XL PA and no software needs to be installed on your network.

XL Networking

The XL PA is intended to be deployed within your Local Area Network (LAN) and utilizes DHCP, DNS, HTTPS (outbound), ICMP Echo, and SNTP network-related protocols.

The following ports are open:

- **Port 22**: Hardened SSH port for in-network technical support.
- **Port 53**: Allows DNS resolution for SNTP and software updates.
- **Port 80**: Allows web browser HTTP queries to the web-server for the Web Page Interface.

XL Software Updates

XL software updates are digitally signed and hosted on a secured AWS cloud server. XL automatically checks for a new software update every twenty-four hours. If an update is available, XL will automatically download it. Once downloaded, updates are installed only when initiated by your XL system administrator.

Each software update includes one or more of the following:

Update	Purpose
Features	Provides new functionality for XL. Vorne regularly adds new features and functionality to the XL platform.
Defect Fixes	Provides fixes as well as usability and performance improvements.
Security Patches	Provides updates to the operating system and other software packages used by the XL PA. Security updates are based on the National Vulnerability Database (NVD), which is maintained by the United States National Institute of Standards and Technology. Vorne has a formal process and automated tools for reviewing the NVD to identify security patches that may be relevant to the XL PA.

Connect XL

Step 1 – Remove Access Plate

SHOCK HAZARD: This product has more than one source of power. Relay outputs may be at mains potential from a secondary power source. Always disconnect power from all power sources before installing or servicing the XL device, and before opening the user access plate. Do not reapply power until the access plate has been reinstalled and securely closed. Failure to follow these precautions could result in personal injury or death due to electric shock.

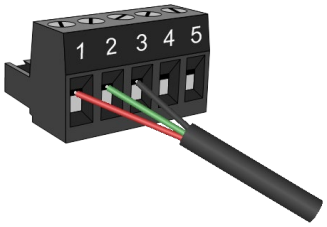
CAUTION: Take care to pass all wiring through the back panel knockouts using cable glands that meet local electrical code. Make sure that any unused knockouts are plugged using hardware that meets local electrical code.

1. Verify that all sources of power have been completely disconnected from the XL device.
2. Remove and save the screws holding the access plate (eight to ten screws depending on the model).
3. Gently pull the access plate away from the XL device. The access plate will remain connected to the XL device via its grounding strap.

Step 2 – Connect Barcode Scanner

XL is designed to interface to barcode scanners with an RS-232 output. The following instructions are based on XL Barcode Kits from Vorne.

1. Wire the XL barcode interface cable to the 5-pin terminal block marked "RS-232". This terminal block can be unplugged to make wiring easier.
   - Red wire to pin 1 (RxD1 ~ XL Receive Data).
   - Green wire to pin 2 (TxD1 ~ XL Transmit Data).
   - Black wire to pin 3 (GND ~ XL Ground).



2. Plug the male 9-pin D-sub connector at the end of the XL interface cable into the female 9-pin D-sub connector of the barcode scanner.
3. Plug the barrel connector of the AC adapter into its mating DC power receptacle in the barcode scanner:
   - Wired Scanners (the DC power receptacle is located on the back of the D-sub connector).
   - Wireless Scanners (the DC power receptacle is located on the base unit).
4. Plug the AC adaptor into an AC power outlet.

Step 3 – Reinstall Access Plate

Fasten the access plate to the back panel using the screws that were removed in Step 1.

Step 4 – Apply Power

WARNING: This product must be grounded. Never defeat the ground conductor or operate the product in the absence of a suitably installed ground conductor.

ATTENTION: This product is suitable for connection to a TN-S power distribution system (AC Hot and AC Neutral lines with a separate protective grounding conductor).

1. Apply mains power to the XL device (use the supplied power cord).
2. XL will cycle through a series of loading steps. After approximately two minutes, it will display the Line Down message. The format of the information will depend on the XL model.

Step 5 – Test Barcode Scanner

Scan the following barcode to test the barcode scanner and its connection to XL. You should see a green light and hear a beep from the barcode scanner and the XL display (XL800 shown) will show a message for five seconds indicating that the barcode connection test has passed.

XL Metrics

This is a quick reference to metrics provided by the XL Productivity Appliance™.

Category	Metrics
Count Metrics	• In Count • Good Count • Reject Count • Total Count • End of Line Count • WIP Count • Startup Rejects • Production Rejects • Percent Good • Percent Reject
Target Metrics	• Takt Time • Target Cycles • Target Count • Pace Timer • Average Takt Time • Percent Variance • Time Variance • Count Variance • Efficiency
Planning Metrics	• Goal Count • Good Count Left • Percent Done
Cycle Metrics	• Current Cycle Time • Previous Cycle Time • Ideal Cycle Time • Run Cycles • Small Stops • Partial Cycles • Total Cycles • Equipment Cycles • Ideal Time • Run Cycle Lost Time • Small Stop Lost Time • Partial Cycle Lost Time • Total Cycle Time • Avg. Ideal Cycle Time • Avg. Cycle Time • Avg. Run Cycle Time

Category	Metrics
Rate Metrics	• In Speed PPM • In Speed PPH • Good Speed PPM • Good Speed PPH • Reject Speed PPM • Reject Speed PPH • Total Speed PPM • Total Speed PPH • End of Line Speed PPM • End of Line Speed PPH
OEE Metrics	• OEE • Availability • Performance • Quality • Fully Productive Time • OEE Loss • Availability Loss • Performance Loss • Quality Loss • OEE Lost Time • Availability Lost Time • Performance Lost Time • Quality Lost Time
Six Big Loss Metrics	• Down Loss • Planned Stop Loss • Cycle Loss • Small Stop Loss • Startup Reject Loss • Production Reject Loss • Down Lost Time • Planned Stop Lost Time • Run Cycle Lost Time • Small Stop Lost Time • Startup Reject Lost Time • Production Reject Lost Time

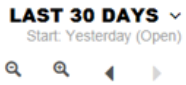
Category	Metrics
Production Time Metrics	• Run Time • Down Time • Planned Stop Time • Not Scheduled Time • Percent Run • Percent Down • Percent Planned Stop • Last Run Time • Last Down Time • Last Planned Stop Time • Last Not Scheduled Time • Target Time • Elapsed Time • Remaining Time • Remaining Percent • Production Phase Remaining Time • Manufacturing Time • Production Time • All Time • MTBF • MTTR • Run Confidence • Calendar Day Number • Production Day Number • Duration • Start Time • End Time
TEEP Metrics	• TEEP • Utilization • Schedule Loss • Schedule Lost Time • Hidden Factory Time • Production Loss • Production Lost Time

Reports

The XL Productivity Appliance™ includes a rich set of browser-based reports. This section introduces how to leverage these reports using a technique called IDA (Information, Decision, and Action).

Controls

The following are controls that are available on most report views.

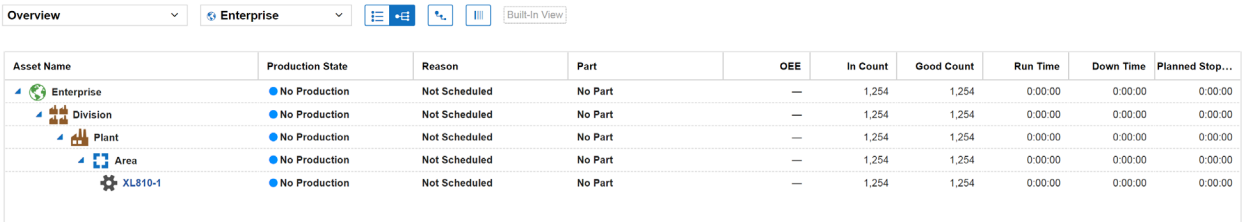
Control	Image	Description
Time Range		Selects the time range for the view. Also provides zoom and step controls for the selected time range.
Views		Many views have multiple ways of looking at information, through various controls on the page (e.g. the dimension, value, and filter controls). There are three types of views: ▪ **Built In** - Views that are shipped with the device. They cannot be modified or deleted to ensure that certain information is always available. ▪ **Shared** - Views created by a user and made available to others. They are stored in the device. ▪ **Local** - Views created for personal use. They are stored in browser-based local storage, and as such can only be accessed from that computer and browser.
Row		Selects one or more categories of information. This is one of three controls (Row, Column, and Filter) that "shape" your data.
Column		Selects one or more metrics or metric sets. This is one of three controls (Row, Column, and Filter) that "shape" your data.
Filter		Applies filters that limit or restrict the data. This is one of three controls (Row, Column, and Filter) that "shape" your data.
Level		Sets the view to only show up to the selected level of hierarchy. For example if set to Level 1 it is the equivalent of collapsing all hierarchies to only show the topmost level.

Monitor | All Production

Information

The All Production page provides a summary view of what is happening right now and historically across every manufacturing process monitored by XL, by shift, job, part, or hour. There are 21 built-in reports, each with a different perspective, such as Efficiency, Down Time, Cycles, OEE, Six Big Losses, and Hidden Factory.

All Production is an ideal page to identify which process or area should be receiving attention right now. Or use the Time Range Selector to view historical production and identify opportunities for sharing best practices.



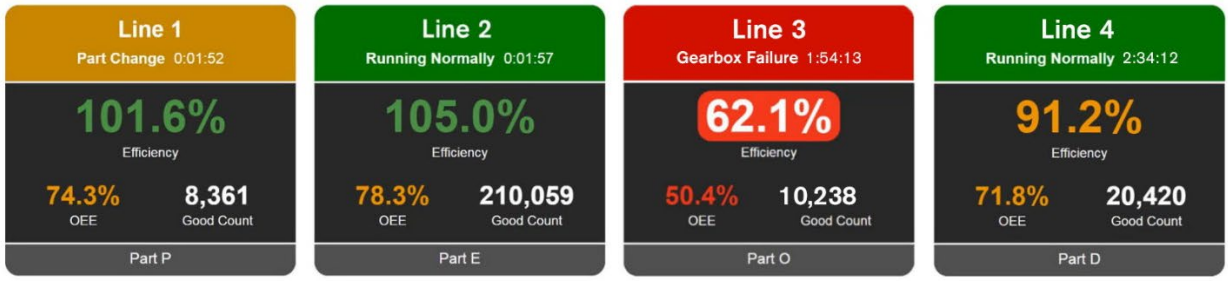
Decisions and Actions

Decision	Action
What should I focus on right now?	Select the **Six Big Losses** view. Set the Time Range Selector to **This Shift**. Look for the process with the greatest OEE Loss. Scan the Six Big Losses to identify the principal problem. Talk to the operator to identify potential immediate fixes. Identify if there is a problem that needs to be escalated to the appropriate engineering experts.
Which processes are not winning their shift?	Select the **Efficiency Overview** view. Set the Time Range Selector to **This Shift**. Look for processes with Efficiency significantly below 100%, as they are most likely to miss their production target. Encourage operators to "win the shift" (an Efficiency of 100% or more). Brainstorm one practical and simple change that will help them hit the target.
What are my best performing lines?	Select the **Efficiency Overview** view. Set the Time Range Selector to **Last 30 Days**. Look for processes with the highest Efficiency scores. These represent the manufacturing processes that are performing best as compared to expectations. Talk to the line supervisors and look for potential best practices (whether leadership, standard operating procedures, training, etc.) to share with others.

Monitor | Andon

Information

The Andon page provides an instant and highly visual summary of the current state of manufacturing across your enterprise. Each Andon image updates in real-time to reflect the current state, configurable shift metrics, and the part currently being run. For maximum impact, you can display this page on a large television in your office or meeting area.



Decisions and Actions

Decision	Action
Should I intervene?	Review the current condition of each process that you're responsible for and identify the process that needs your help right now. In the example above, Line 1 is in a changeover and Lines 2 and 4 have some minor losses. But Line 3 has had a gearbox failure for 1h 54mins, an efficiency of 62.1%. It needs your help!

Monitor | Timeline

Information

The Timeline page makes it easy to compare multiple assets across a synchronized timeline. Compare assets in an area, plant, division or across your entire enterprise. Select any dimension including production state, hour, and impact.

Decisions and Actions

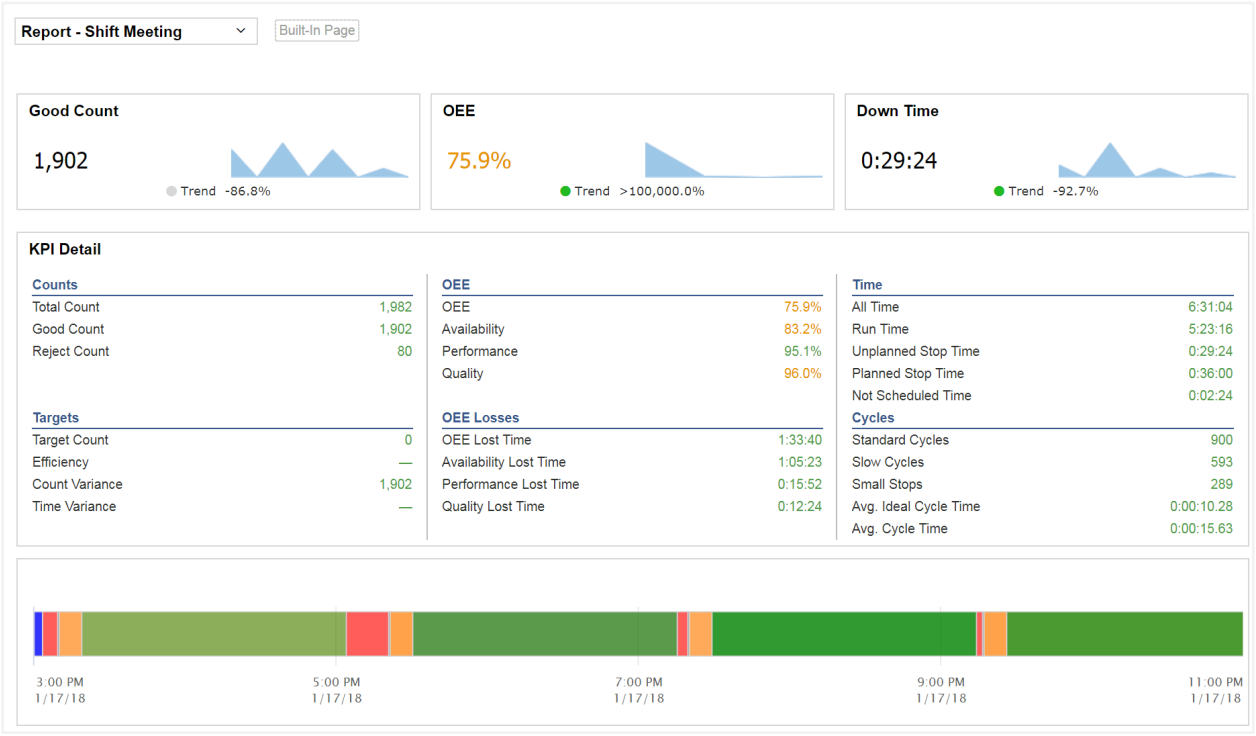
Decision	Action
Which line needs more resources or support?	Select **Yesterday** and compare how the lines ran. Identify: ▪ Any large or recurring down time events that still need a fix. ▪ Instances where teams aren't scanning down reasons. ▪ Blocks of down time before or after breaks and lunches. ▪ Patterns of running slow or running poorly after changeovers. After quickly comparing your lines to identify these losses, assign resources (engineers, operators, supervisors) to improve productivity today.

Monitor | Dashboards

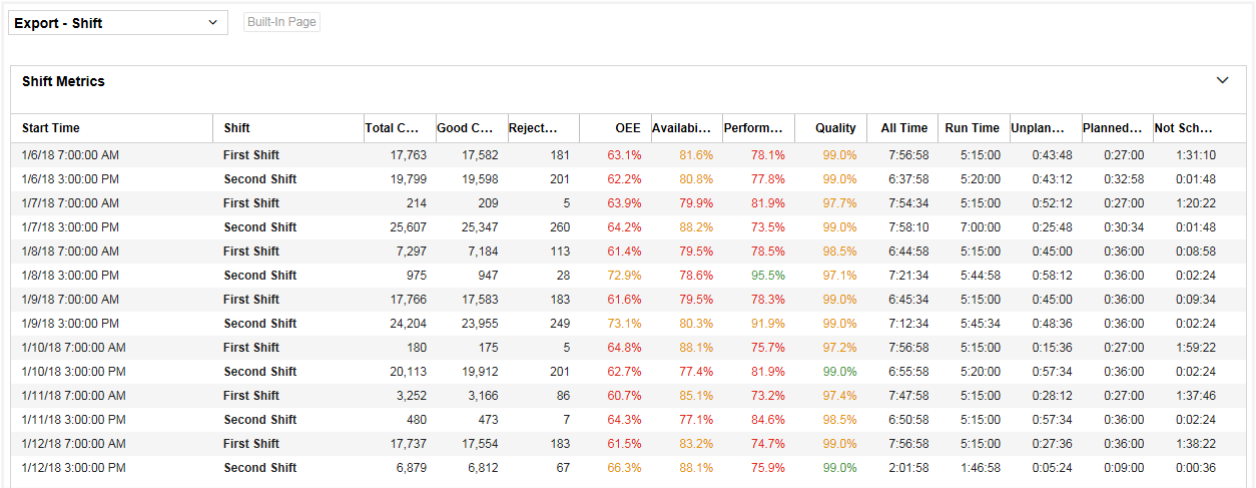
Information

The Dashboards page is your first stop for creating custom reports and exporting data.

Dashboards includes two built-in reports: Daily Meeting and Shift Meeting.



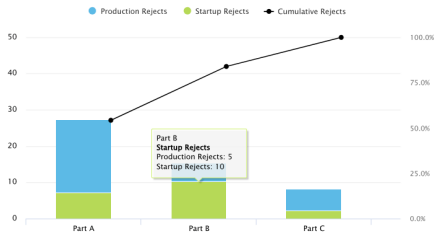
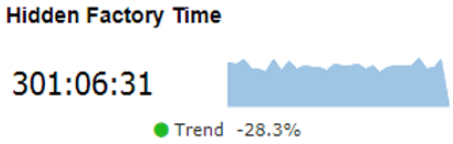
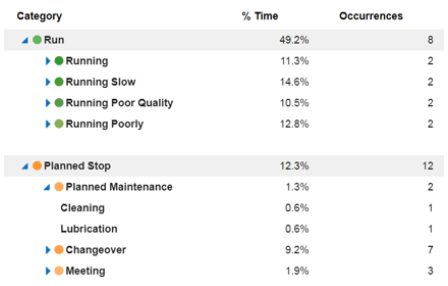
Dashboards includes three built-in exports: Shift, Part, and Process State.



Start Time	Shift	Total C...	Good C...	Reject...	OEE	Availabi...	Perform...	Quality	All Time	Run Time	Unplan...	Planned...	Not Sch...
1/6/18 7:00:00 AM	First Shift	17,763	17,582	181	63.1%	81.6%	78.1%	99.0%	7:56:58	5:15:00	0:43:48	0:27:00	1:31:10
1/6/18 3:00:00 PM	Second Shift	19,799	19,598	201	62.2%	80.8%	77.8%	99.0%	6:37:58	5:20:00	0:43:12	0:32:58	0:01:48
1/7/18 7:00:00 AM	First Shift	214	209	5	63.9%	79.9%	81.9%	97.7%	7:54:34	5:15:00	0:52:12	0:27:00	1:20:22
1/7/18 3:00:00 PM	Second Shift	25,607	25,347	260	64.2%	88.2%	73.5%	99.0%	7:58:10	7:00:00	0:25:48	0:30:34	0:01:48
1/8/18 7:00:00 AM	First Shift	7,297	7,184	113	61.4%	79.5%	78.5%	98.5%	6:44:58	5:15:00	0:45:00	0:36:00	0:08:58
1/8/18 3:00:00 PM	Second Shift	975	947	28	72.9%	78.6%	95.5%	97.1%	7:21:34	5:44:58	0:58:12	0:36:00	0:02:24
1/9/18 7:00:00 AM	First Shift	17,766	17,583	183	61.6%	79.5%	78.3%	99.0%	6:45:34	5:15:00	0:45:00	0:36:00	0:09:34
1/9/18 3:00:00 PM	Second Shift	24,204	23,955	249	73.1%	80.3%	91.9%	99.0%	7:12:34	5:45:34	0:48:36	0:36:00	0:02:24
1/10/18 7:00:00 AM	First Shift	180	175	5	64.8%	88.1%	75.7%	97.2%	7:56:58	5:15:00	0:15:36	0:27:00	1:59:22
1/10/18 3:00:00 PM	Second Shift	20,113	19,912	201	62.7%	77.4%	81.9%	99.0%	6:55:58	5:20:00	0:57:34	0:36:00	0:02:24
1/11/18 7:00:00 AM	First Shift	3,252	3,166	86	60.7%	85.1%	73.2%	97.4%	7:47:58	5:15:00	0:28:12	0:27:00	1:37:46
1/11/18 3:00:00 PM	Second Shift	480	473	7	64.3%	77.1%	84.6%	98.5%	6:50:58	5:15:00	0:57:34	0:36:00	0:02:24
1/12/18 7:00:00 AM	First Shift	17,737	17,554	183	61.5%	83.2%	74.7%	99.0%	7:56:58	5:15:00	0:27:36	0:36:00	1:38:22
1/12/18 3:00:00 PM	Second Shift	6,879	6,812	67	66.3%	88.1%	75.9%	99.0%	2:01:58	1:46:58	0:05:24	0:09:00	0:00:36

Create Custom Reports and Exports

You can create an unlimited number of dashboards, each with exactly the information you need. Dashboards are useful for creating custom reports and custom exports (every table can be exported). There are five types of elements that can be used in dashboards.

Element	Example	Configuration Options
Chart		Charts provide many different ways to visualize information (line, column, Pareto, stacked, or clustered). ▪ **Assets to View** – Which manufacturing processes should be included in the chart (choose one process, an area, or the entire plant). ▪ **Metrics** – The metrics to be charted. ▪ **Dimensions** – Either time or categories (e.g., shift). ▪ **Filters** – Further restrict the values that are shown. ▪ **Chart Type** – Select between different chart types (line, column, Pareto, stack, or cluster).
Chronogram		Chronograms are useful for visually showing category values over time (e.g., whether the process is running or down). ▪ **Assets to View** – Which manufacturing processes should be included in the chart (choose one process, an area, or the entire plant). ▪ **Dimension** – The information to be visualized. ▪ **Bar Height** – A chronogram can be short medium or tall.
KPIs		KPIs provide a lot of information about a single metric: average value, value over time (sparkline), and trend. ▪ **Metric** – The metric to be shown. ▪ **Filter** – Restrict the information (e.g., by shift or part). ▪ **Trend** – Show trend information, including a color disc and a percentage value.
KPI Group		KPI Groups show multiple metrics organized in a tabular fashion. ▪ **Field** – The metrics to be shown. ▪ **Formatting Elements** – Blank lines and headings.
Table		Tables enable showing tabular information either grouped (with drilldown) or chronologically (by event). ▪ **Assets to View** – Which manufacturing processes should be included in the chart (choose one process, an area, or the entire plant). ▪ **Rows** – The dimensions that result in rows. ▪ **Columns** – The metrics and dimensions shown as additional columns. ▪ **Filter** – Restrict the information (e.g., by shift or part).

Monitor | Total Production Timeline™

Information

The TPT (Total Production Timeline) page provides a visual overview of production. Green means running. Red means unplanned stop. Yellow means planned stop. Blue means not scheduled. Bars on top and bottom show shifts and parts. Tooltips provide additional information. Simple.

The TPT is an ideal page for addressing what is happening right now. It updates in real-time, and it is very easy to spot patterns based on shift, part and process state changes, as well as emerging issues in the current shift.

TPT Data

Production State | Hierarchical

Dimension	% Time	Occurrences	Total	Min	Average	Max
Run	86.2%	25	0:51:45	0:00:01	0:02:04	0:06:59
Running	68.3%	13	0:41:00	0:00:59	0:03:09	0:06:59
Running Normally	68.3%	13	0:41:00	0:00:59	0:03:09	0:06:59
Running Poor Quality	17.9%	12	0:10:45	0:00:01	0:00:53	0:01:00
Startup Rejects	1.7%	2	0:01:01	0:00:01	0:00:30	0:01:00
Production Rejects	16.2%	10	0:09:44	0:00:43	0:00:58	0:01:00

Decisions and Actions

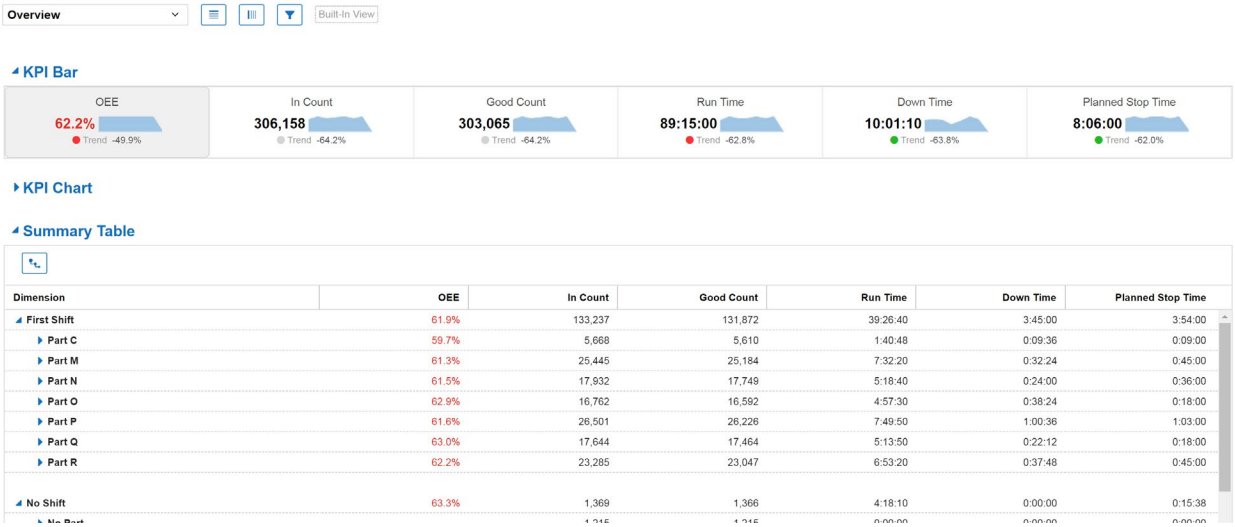
Decision	Action
What is the top cause of down time for the current shift?	Work with: ▪ Operators to identify an action that will reduce this loss in the next few hours (e.g., a stop-clean-fix event or adjusting equipment settings). ▪ Engineers or supervisors to prevent this loss from recurring (e.g., root cause analysis, operator training, kaizen blitz intervention, or updates to standardized work).
Is there down time between running and breaks?	Look for blocks of down time (red) between running (green) and breaks (blue). Work with operators and line supervisor to improve transitions between run time and planned stops.
Is there down time between shifts?	Look for blocks of down time (red) between shift transitions. Work with your team to determine if there are practical ways to keep the manufacturing process running during shift handovers.
Are down reasons being consistently scanned?	Check if **Missing Reason** is one of the top five down reasons. If it is, train operators to scan barcode reasons for every down event, even if the equipment has restarted.

Analyze | Advanced Analytics

Information

Advanced Analytics provides a unique combination of built-in and custom reporting. There are 21 built-in reports, each with a different perspective, such as Efficiency, Down Time, Cycles, OEE, Six Big Losses, and Hidden Factory. Data is charted, trended, and also presented in tabular formats.

Advanced Analytics is an ideal page for exploring your data. Dimensions (e.g. Shift), metrics (e.g., OEE), and filters are all configurable. When you add multiple dimensions Advanced Analytics automatically creates data drilldowns (e.g., looking at Part by Shift).



Decisions and Actions

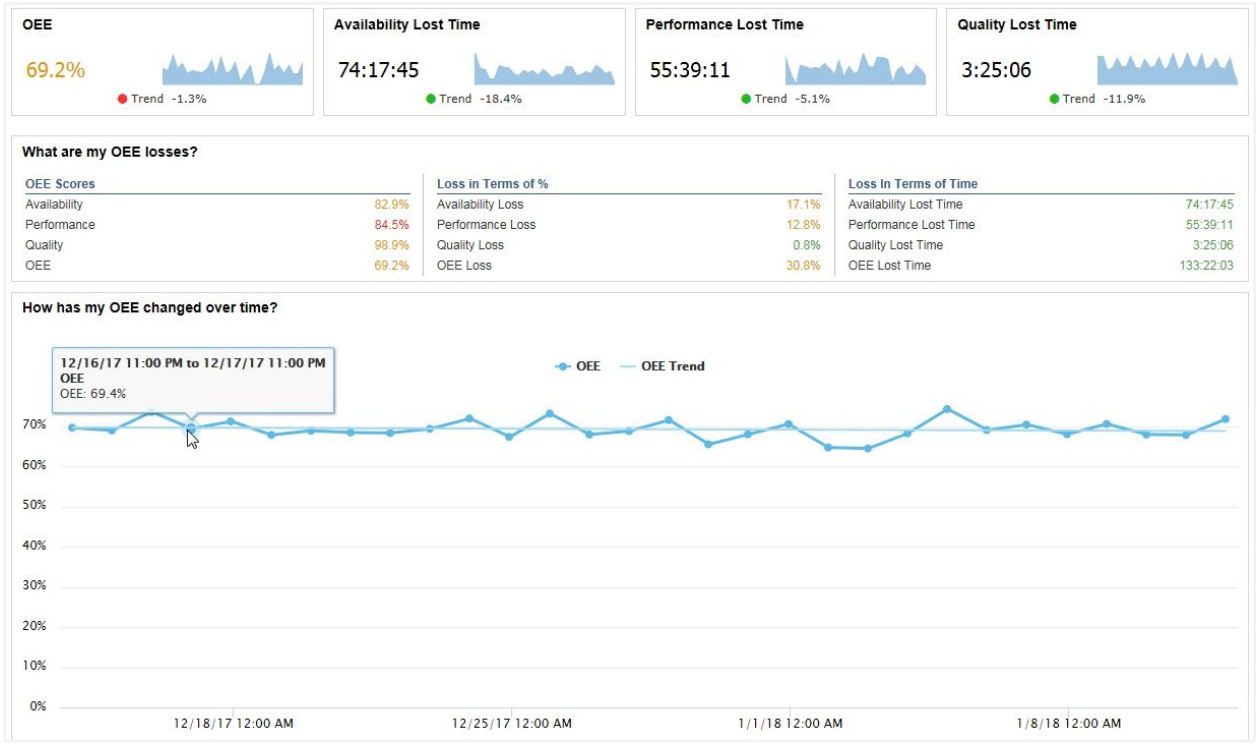
Decision	Action
Which shifts can I learn from?	Select the **OEE** view. Identify the best and worst performing shifts. Talk to the relevant shift teams to identify ways in which they run their equipment differently. Create standardized work instructions that capture best practices to be followed by every team.
What parts are problematic?	Select the **OEE** view. Click on the Dimension button and change it to view the data solely by **Part**. Identify two types of problematic parts: ▪ Identify worst-performing parts (lowest OEE scores) ▪ Identify emerging problems (select each part individually in the chart and look for instances where the OEE trend is sloping down) The next time a problematic parts is run, observe the process and talk to operators to identify problems. Brainstorm and apply countermeasures while the part is still running.
Are we running to the correct part standards?	Select the **Cycle Time Validation** views. Click on the Dimension button and change it to view the data solely by **Part**. Any part where Avg. Ideal Cycle Time is higher than Avg. Cycle Time has an ICT that is set too high. If needed, adjust the Ideal Cycle Time for a given part by logging in as Administrator and navigating to **Settings** | **Plant Floor** | **Parts**.

Analyze | OEE

Information

The OEE (Overall Equipment Effectiveness) page is your first stop for a quick, yet actionable overview of OEE.

The OEE page is an ideal place to identify OEE trends as well as compare OEE for parts and shifts.



Decisions and Actions

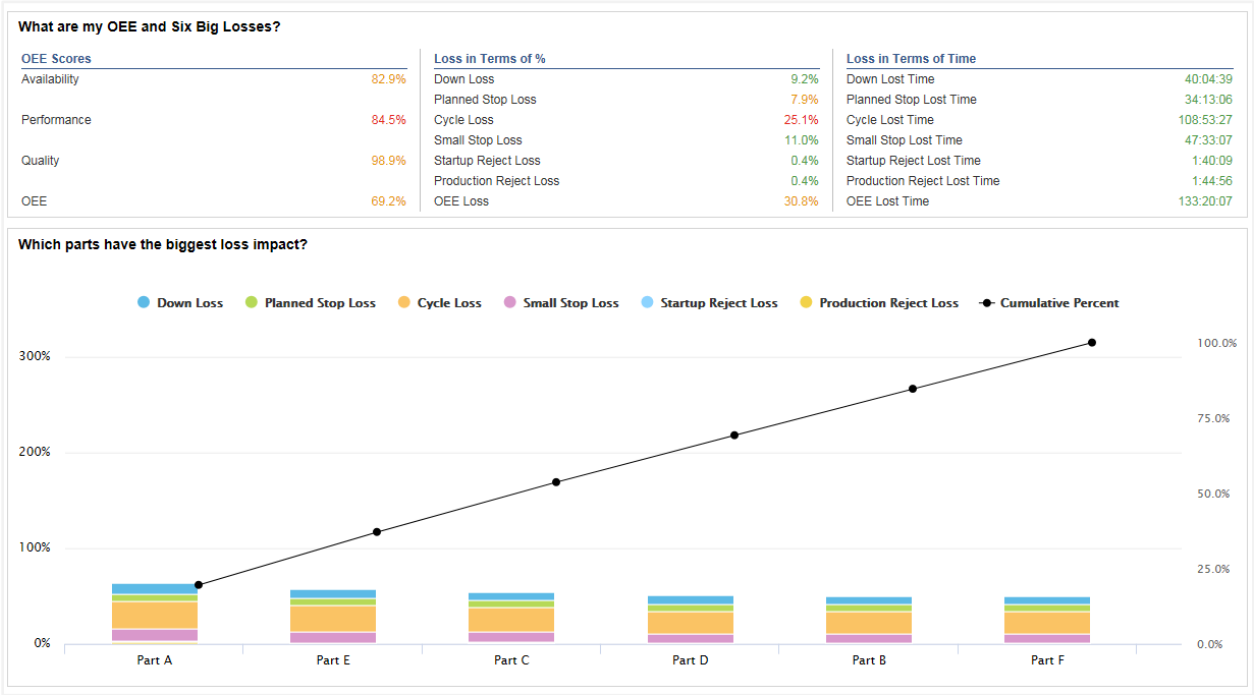
Decision	Action
What are my OEE losses?	Understand your OEE from a perspective of underlying losses.
How has my OEE changed over time?	Understand to what degree OEE is improving (or not improving) over time.
Which parts have the biggest loss impact?	Understand which parts are costing you the most productive time. This is particularly useful because it takes into account parts that have more impact because they represent a larger share of production time. You also get a quick understanding of which OEE loss (Availability, Performance, or Quality) is most impactful for each part.

Analyze | Six Big Losses

Information

The Six Big Losses page is your first stop for understanding your losses from a more detailed perspective (Down Time, Planned Stops, Cycles, Small Stops, Startup Rejects, and Production Rejects).

The Six Big Losses page is an ideal place for gaining a deeper understanding of the losses to OEE (each of the Six Big Losses aligns to an OEE Loss) including by part and shift.



Decisions and Actions

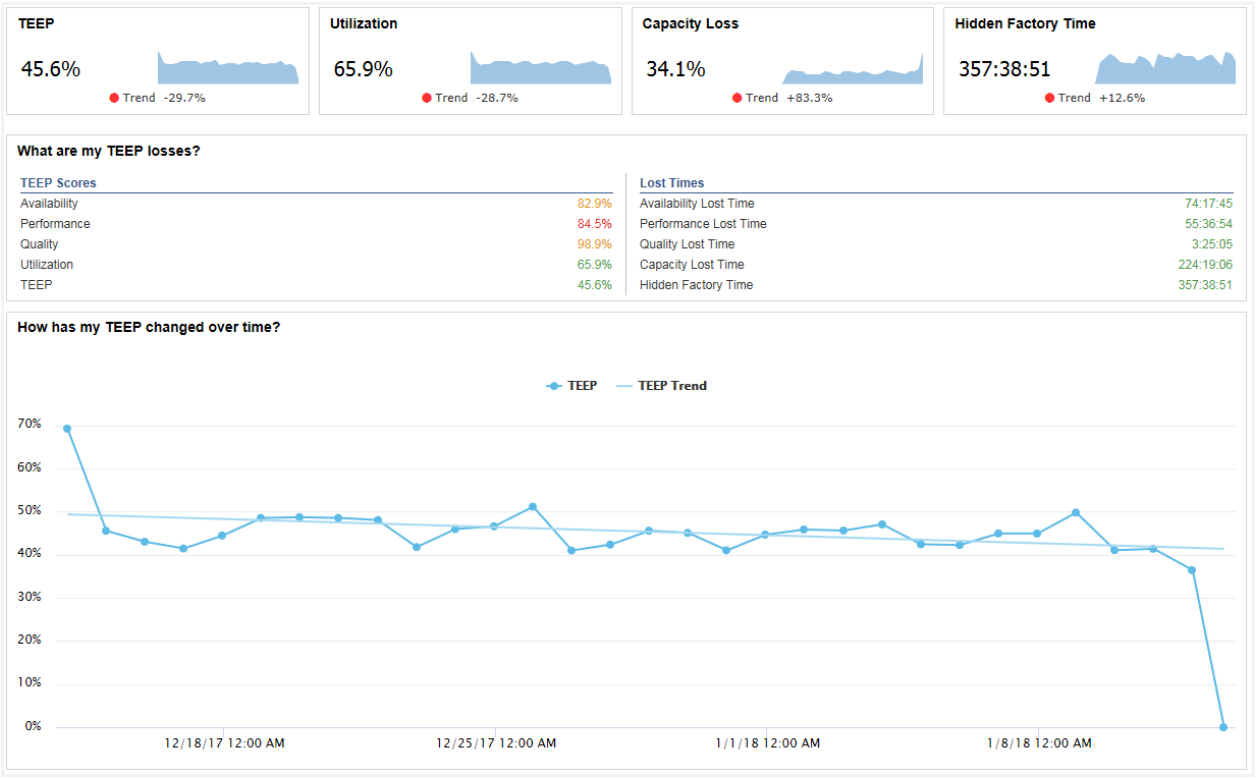
Decision	Action
How have my losses changed over time?	Understand to what degree each of the Six Big Losses is improving (or not improving) over time.
What are my OEE and Six Big Losses?	Understand how the Six Big Losses map to the three OEE factors.
Which parts have the biggest loss impact?	Understand which parts are costing you the most productive time. This is particularly useful because it takes into account parts that have more impact because they represent a larger share of production time. You also get an immediate understanding of which of the Six Big Losses is most impactful for each part.

Analyze | TEEP (Hidden Factory)

Information

The TEEP (Total Effective Equipment Performance) page is your first stop for understanding capacity and utilization and evaluating how much time you can reclaim for production (your hidden factory).

TEEP is an ideal page to identify opportunities for additional production capacity on your process. Adding new equipment can be very expensive. Before adding new equipment, understand your opportunities for improving production on your existing equipment.



Decisions and Actions

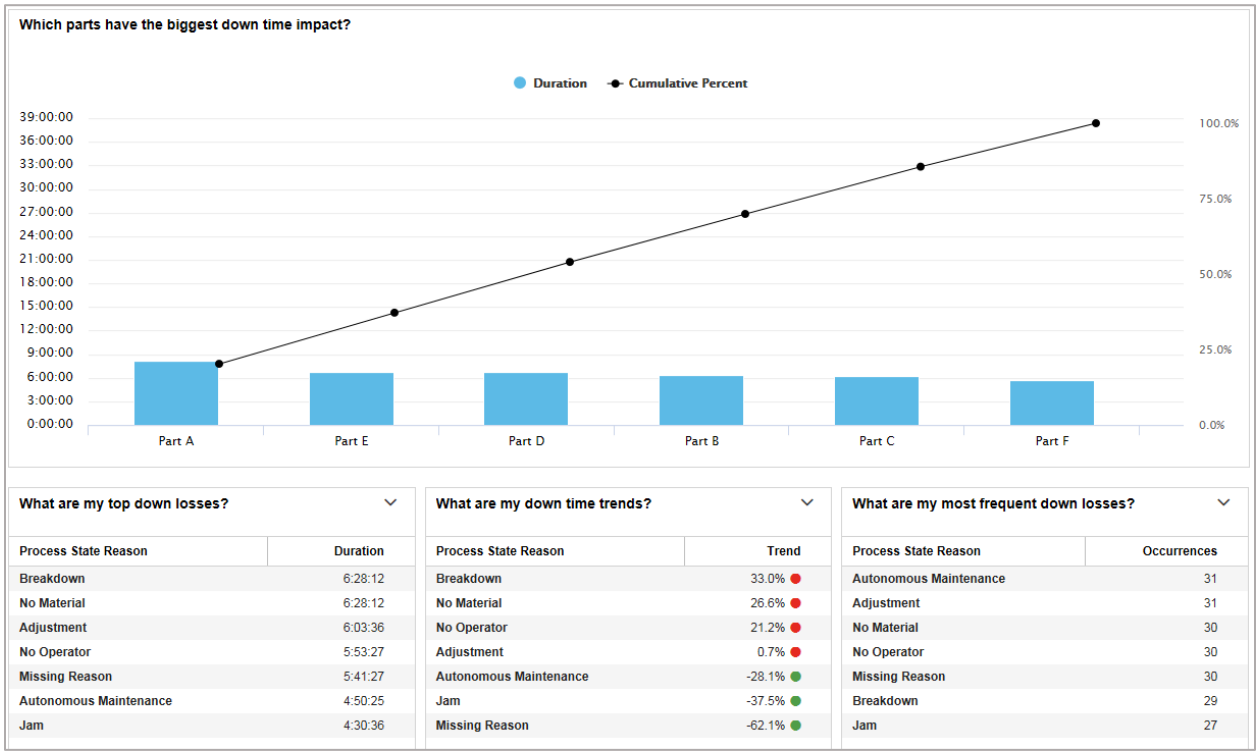
Decision	Action
What are my TEEP losses?	Understand the full spectrum of losses, including capacity loss.
How has my TEEP changed over time?	Understand to what degree your equipment is productive from a 24/7 perspective.
What time can I reclaim for my hidden factory?	Understand how the full spectrum of losses varies over time.

Analyze | Down Time

Information

The Down Time page is your first stop for understanding the underlying contributors to your down time (reasons, parts and shifts) and to identify emerging issues.

Down time is an ideal page for driving a Total Productive Maintenance (TPM) project, or for setting down time reduction targets for teams.



Decisions and Actions

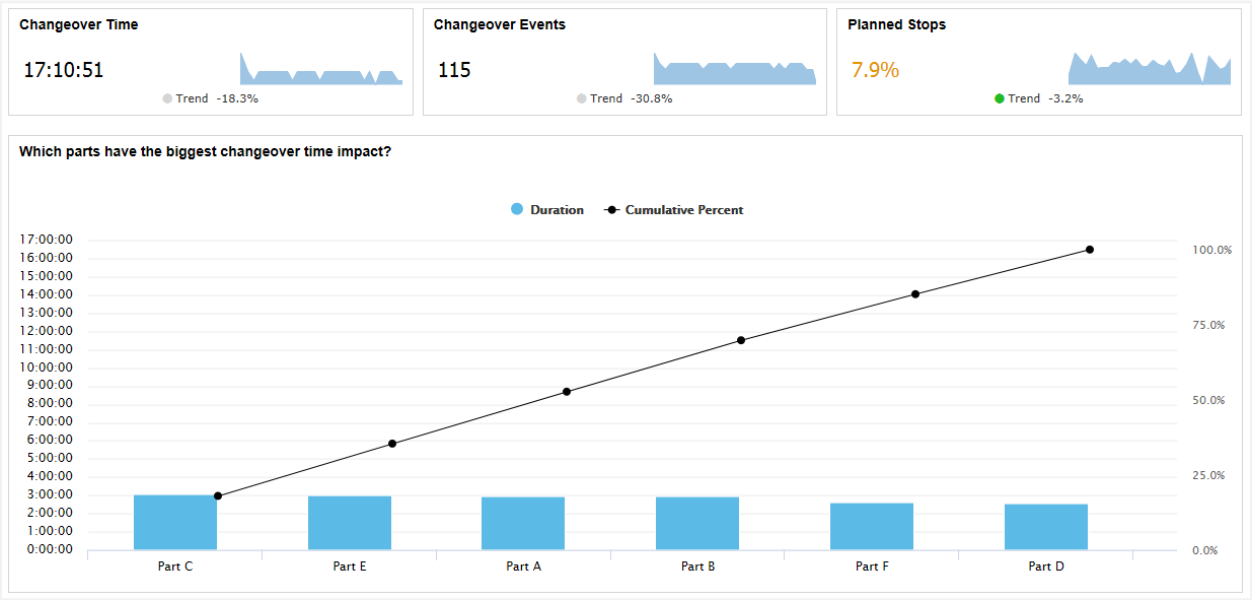
Decision	Action
What are the causes of my down time?	Understand the underlying reasons for down time. If **Missing Reason** is one of the top down time contributors be sure to coach operators on the importance of scanning down reasons and find out if there are reasons that need to be added in **Settings** | **Plant Floor** | **Reasons** and printed in **Settings** | **Plant Floor** | **Print Barcodes**.
Which parts have the biggest down time impact?	Understand which parts are generating the most down time. Keep in mind that this is absolute time, so parts that are run more often will tend to have a larger impact.
What are my down time durations, trends, and occurrences?	Understand the importance and impact of each loss type (reason) by comparing lost time (overall impact), trend (emerging problems), and occurrences (one-off versus recurrence).

Analyze | Changeover

Information

The Changeover page is your first stop for understanding the overall impact of changeovers as well as how your changeovers vary by part and shift.

The Changeover page is an ideal place for driving a SMED (Single-Minute Exchange of Dies) project and for determining changeover target times.



Decisions and Actions

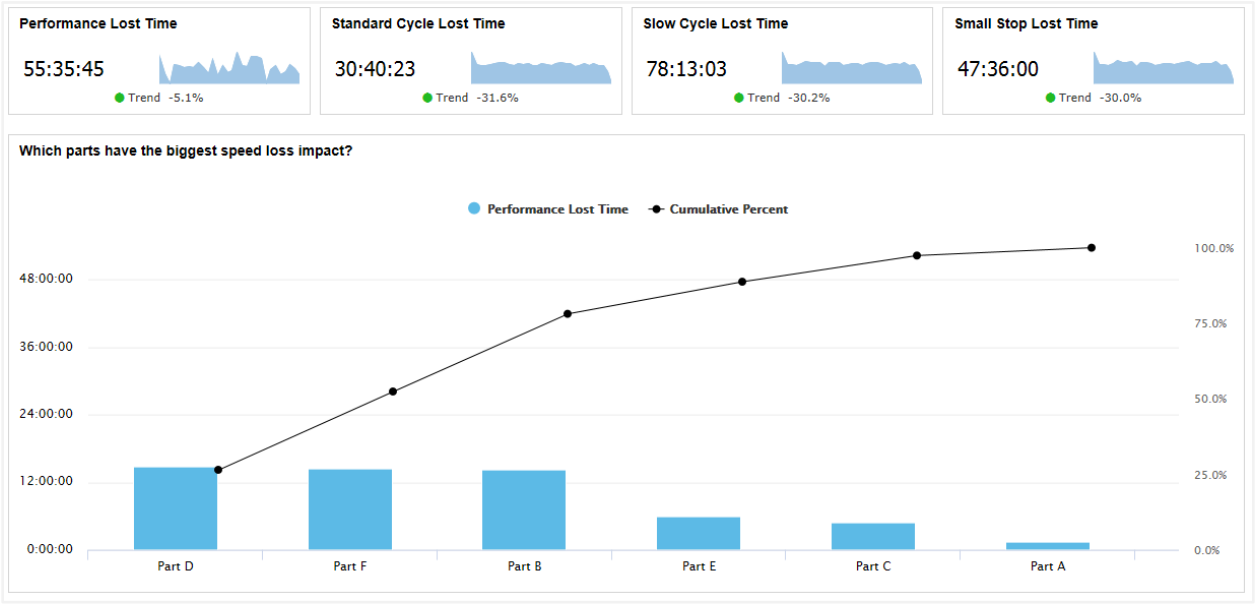
Decision	Action
Which parts have the biggest changeover time impact?	Understand which parts are generating the most Availability Loss through changeovers. Keep in mind that this is absolute time, so parts that are run more often will tend to have a larger impact.
Where should I focus my SMED improvements?	Spending time to select the optimal target area for your SMED program will improve the odds of a successful outcome. Teams often pick the process with the longest changeover. Instead, look for a process with the following characteristics: ▪ The changeover is short enough to fully grasp and long enough to have significant room for improvement (e.g., 30 to 60 minutes) ▪ There are large variations in changeover times (usually this indicates excellent potential for improvement) ▪ There are multiple opportunities to perform the changeover each week (so proposed improvements can be quickly tested) ▪ Employees in the prospective pilot area are engaged and motivated (enthusiasm and a desire to succeed are important enablers)

Analyze | Speed Loss

Information

The Speed Loss page is your first stop for a quick, yet actionable overview of losses to OEE Performance.

The Speed Loss page is an ideal place to explore speed loss from its underlying constituents (standard cycles, slow cycles, and small stops) as well as compare speed loss for parts and shifts.



Decisions and Actions

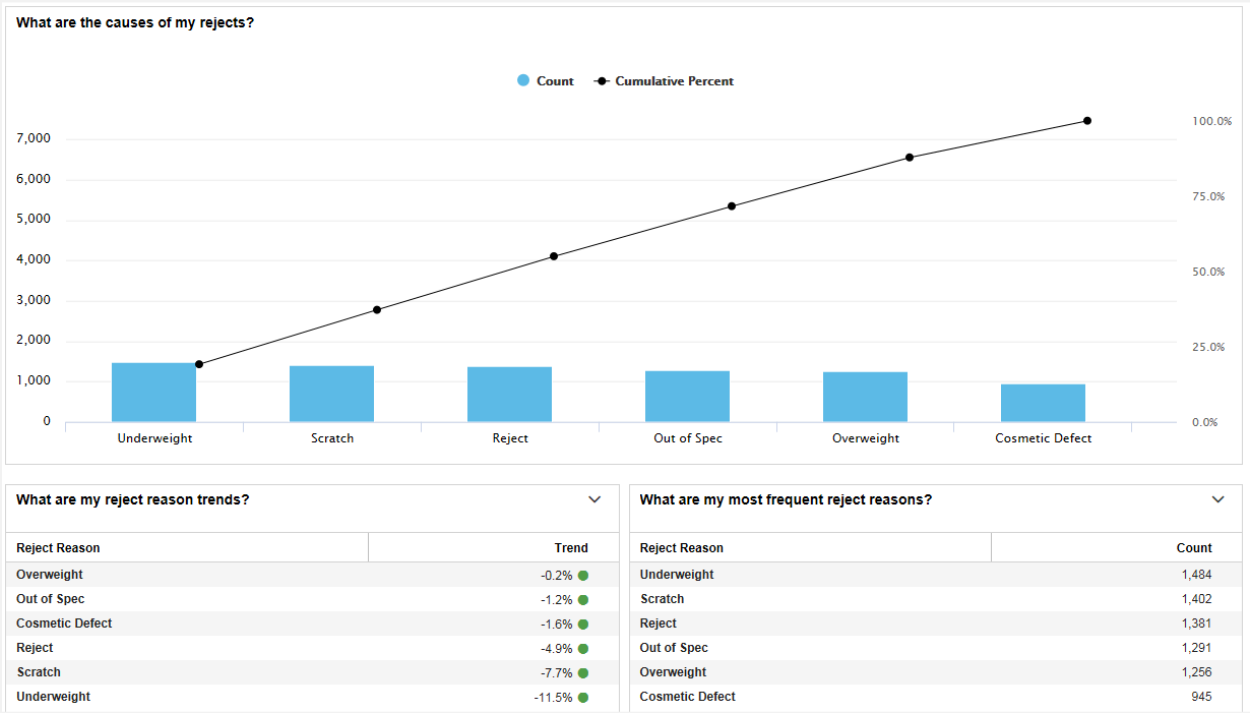
Decision	Action
What are the underlying contributors to speed loss?	Understand the underlying constituents of OEE Performance Loss (Standard Cycle Lost Time, Slow Cycle Lost Time, and Small Stop Lost Time). Look at absolute values as well as trends.
Which parts have the biggest speed loss impact?	Understand which parts are generating the most Performance Loss. Keep in mind that this is absolute time, so parts that are run more often will tend to have a larger impact.

Analyze | Rejects

Information

The Rejects page is your first stop for a quick, yet actionable overview of losses to OEE Quality.

The Rejects page is an ideal place to explore quality loss from its underlying constituents (reasons).



What are my reject reason trends?

Reject Reason	Trend
Overweight	-0.2%
Out of Spec	-1.2%
Cosmetic Defect	-1.6%
Reject	-4.9%
Scratch	-7.7%
Underweight	-11.5%

What are my most frequent reject reasons?

Reject Reason	Count
Underweight	1,484
Scratch	1,402
Reject	1,381
Out of Spec	1,291
Overweight	1,256
Cosmetic Defect	945

Decisions and Actions

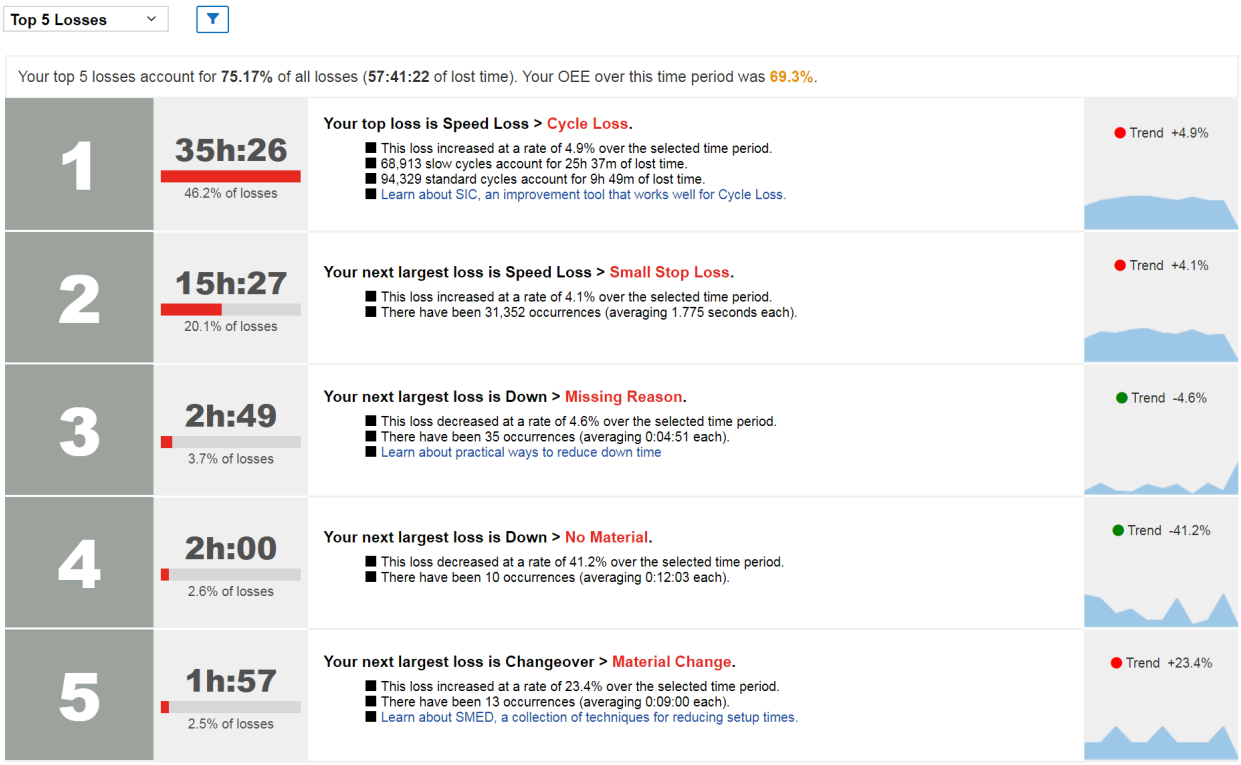
Decision	Action
Which parts have the most rejects?	Understand which parts are generating the most rejects. Keep in mind parts that are run more often will tend to have a larger overall impact on rejects.
What are the causes of my rejects?	Understand the underlying causes of rejects. If **Reject** is the only reason add reject reasons in **Settings** | **Plant Floor** | **Reasons** and either print as barcodes (manual reject detection) or assign to digital inputs (automated reject detection).
What are my reject trends and occurrences?	Understand the importance and impact of each loss type (reject reason) by comparing trend (emerging problems) and occurrences (largest impact).

Improve | Top Losses

Information

The Top Losses page provides detailed information about where production time is being lost. It prioritizes losses by time impact, identifies the reason for each loss, provides suggestions for suitable improvement techniques, and shows at-a-glance trend information.

Top Losses is an ideal page for identifying your next improvement project. One of the fastest ways to improve manufacturing productivity is to relentlessly focus on Top Losses. In other words, focus your attention on the smallest set of improvement actions that will yield big results.



Decisions and Actions

Decision	Action
What should be our next improvement project?	Select a Top Loss where your team has ideas on actions that they can take, minimal external resources are required, and actions can be taken straightaway. Create and post an action plan to reduce this loss in the next two weeks.
Are there any emerging problems?	Scan the trend column (on the right). Look closely at any losses with negative (red circle) trends. These are emerging problems. Talk to operators to identify what may have changed to make this loss worse.
Do we have too many down reasons?	Set the Date Range to **Last 30 Days**. Click Add Filter and select **Process State**. Select **Down** in the filter dropdown. Show **Top 10 Losses**. If the Top 10 Losses account for less than 50% of all losses, review your down reasons. There are probably too many (for most applications we recommend no more than 25 when getting started).
Are down reasons being consistently scanned?	Check if **Missing Reason** is one of the top five down reasons. If it is, train operators to scan barcode reasons for every down event, even if the equipment has restarted.

Error Codes

100 Codes – Fatal Error

Code	Name	Description
100	Unexpected Software Operation	The XL device software was found to be in an invalid state.
107	Unhandled Exception	The XL device software produced an exception for which no handler was found.

300 Codes – Non-Fatal Error

Code	Name	Description
300	Default Gateway is Invalid	The Default Gateway configured in Ports | Ethernet must be on the same subnet as the XL device IP Address in order for XL to communicate outside of your local subnet.
302	Non Fatal Hardware Failure	The XL device's hardware has experienced a significant failure, and is likely beyond recovery. The XL device may not behave properly and should not be used to monitor production in its current state.
306	Configuration Out of Range	The stored configuration data could not be loaded because it contained an out-of-range value. Default configuration data was loaded instead.
307	Program Command Error	A Program Command could not be completed because of an error in the Command. Data that this Command was intended to modify may not have the expected values. This is reported as an error when the Command itself is detected as incorrect, rather than data that the Command uses.
310	Module Configuration Corrupted	The XL device's configuration data was found to be corrupted. This data has been lost, and default configuration data has been loaded in its place.
311	Messages and Graphics Corrupted	The XL device's Messages and Graphics (part of its configuration data) were found to be corrupted. None of the Messages or Graphics can be displayed, and any "Program > Execute from Message" Commands will not have the expected results.
314	Unsupported Configuration Value	The XL device's configuration includes a value from a previous version that is no longer supported. This may cause the XL device to behave incorrectly.
317	Software Initialization Failure	Part of the XL device's software could not be properly initialized on power-up, preventing it from functioning properly.
318	Non Critical Software Failure	A non-critical part of the XL device's software experienced a failure. The XL device can continue to monitor production, but the affected part of its software will not function properly until the XL device is rebooted.
328	Remote Display Data Not Received	The XL device is configured to copy the display of another XL device, but was unable to communicate with that XL device. The display shows the last information that was received.
330	Flash Memory Near End of Life	XL has detected that the flash memory is nearing its expected lifetime.
331	Internal Temperature Exceeds 65°C	The internal temperature of the XL device is considerably higher than expected. The scoreboard display is being automatically dimmed to its lowest level to reduce power consumption (and internal temperature).
332	Reject Count Mismatch	XL Detected an unexpected condition related to your reject count.
333	Primary Input Queue Overflow	XL detected inputs at a higher rate than it could process them.
334	Secondary Input Queue Overflow	XL detected inputs at a higher rate than it could process them.
335	Low Storage Availability	XL device is low on storage.
336	Flash Memory Showing Unexpected Wear	XL has detected that the flash memory is wearing faster than expected.

400 Codes - Alerts

Code	Name	Description
400	Data Quality Alert (OEE Performance > 100%)	OEE Performance for the most recent part run exceeds 100%. This should not be possible, since 100% represents running continuously at the theoretically fastest possible cycle time.
401	Data Quality Alert (Suspect Cycles > 25)	There have been more than 25 cycles faster than the Ideal Cycle Time in the current part run. Since Ideal Cycle Time is the theoretically fastest possible cycle time there should not be suspect cycles.
402	Data Quality Alert (Many Slow Cycles and Small Stops)	There have been more slow cycles and small stops than standard cycles for the most recent part run.
403	Data Quality Alert (Efficiency ≥ 110%)	The Efficiency for the most recent shift was greater than or equal to 110%. It is unusual to run this far ahead of the target.
404	Data Quality Alert (OEE Quality > 100%)	OEE Quality for the most recent part run exceeds 100%. This should not be possible since 100% represents perfect quality (all good pieces).
405	Data Quality Alert (In Counts w/o Shift)	In Counts are being recorded without a shift being identified. All production time should be assigned to a shift for reporting and analytics.
406	Data Quality Alert (Missing Reason > 25% of Down Occurrences)	More than 25% of down events in the most recent shift have not had a reason assigned.
408	Data Quality Alert (In Counts w/o Part)	In Counts are being recorded without a part being identified. All production time should be assigned to a part for reporting and analytics.
450	Metric Alert - Caution	This metric crossed its notification threshold.
451	Metric Alert - Warning	This metric crossed its notification threshold.
452	Metric Alert - Critical	This metric crossed its notification threshold.

500 Codes - Warnings

Code	Name	Description
500	Slow Processing for Digital Inputs	XL took longer than expected to process one or more digital inputs.
501	External Command Invalid	A command was received from an external device (e.g. a computer, a PLC, etc.) that the XL device did not understand. No changes were made to the state of the XL device.
504	Web Server Command Failure	The XL device's web interface issued a command that the XL device did not understand.
505	DHCP Operation Failure	The XL device failed to obtain or renew an IP address from a DHCP server, and has been left without an IP address.
507	Time Server Unavailable	The XL device was unable to obtain valid time information from any of its time servers (i.e. the servers that it uses for automatic time updates).
523	Periodic Checkpoint Failure	The XL device tried to perform a periodic checkpoint and encountered a failure.
525	Sample Data Generated	The Web Page Interface was used to generate demonstration data.
526	Periodic Channel Update Failure	The XL device tried to perform a periodic channel update and encountered a failure.
527	Internal Temperature Exceeds 60°C	The internal temperature of the XL device is higher than expected. The scoreboard display is being automatically dimmed to reduce power consumption (and internal temperature).

700 Codes - Information

Code	Name	Description
700	Stored Data Erased	The specified type of stored data was manually erased by a user.
701	Device Updated	The XL device was updated.
702	No Production State to Enable	There are no enabled production states and no default production state was found.
703	Converted Down to Changeover	Changeovers preceded by a short down event with no reason, counts, or cycles are configured in this device to create a single event that includes the down time as part of the changeover.
704	Production Interval Reset	The specified production interval (Job, Shift, or Master) was reset.
705	Date Time Changed	The XL device's date and/or time settings were changed.
706	Network Setting Could Not Be Read	One of the network settings could not be read from the operating system.
707	Input Triggered Manually	A Reject Reason barcode was scanned.
708	Configuration Restored to Device	Configuration was restored to the XL device.
709	Configuration and Data Restored to Device	Configuration and data were restored to the XL device.
710	IP Address Changed	The IP address of the XL device was changed (e.g. a new IP address was assigned by the XL device's DHCP server).
711	Device Powered Up	The XL device was powered up.
712	Overdue Cyclic Database Update	The cyclic database update was delayed.
713	Device Powered Down	The XL device was powered down or otherwise rebooted.
714	Job Barcode References Undefined Part	A Job barcode was scanned with an unknown Part ID.
715	Job Started	A job was started.
716	Part Configuration Changed	Part configuration was changed on the XL device.
719	Entered Special System Mode	The XL device entered recovery mode. No real-time data is being gathered.
723	Password Changed	The password for one of the user roles was changed.
730	Flash Memory Wear Notification	XL has detected that the flash memory has reached a new wear level.
734	Production State Ended by Metric Value	A Production State was ended because a Metric reached its configured threshold value.
735	No Matching Part Found	A Serial Port is configured to Start Part Run. An unrecognized barcode was received through that port that has no matching Part ID in the Plan Parts page.
736	Network Settings Changed by Barcode	A barcode was scanned to change network settings.
737	Channel Events Cleared	The web page was used to clear stored channel events.
738	Converted Reasons	An administrator changed the reasons for one or more events.
739	Skipped Shift Scheduled for Previous Production Day	A shift was added to the time schedule after its associated production day already ended and as a result it was skipped.

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