INTERSTACKS

Operational Visibility

Monitoring machines and industrial processes with Interstacks

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Accessing real-time data to find actionable insights is key to improving the efficiency, productivity, and quality of business processes and products. This becomes challenging when you need data from a mix of different machines or sensors, and when rigid technology adds complexity to workflows instead of supplementing and improving existing ways of working.

Interstacks is modular from the ground up, in both hardware and software. The hardware can be installed on a factory floor in under an hour, and MyStacks dashboards can be tailored to provide exactly the information you need to monitor a single machine, oversee a factory floor, or summarize productivity in multiple facilities around the globe.

Because Interstacks is extremely flexible, we provide a consultative approach to customer support. We are always available to discuss questions such as, what insights would most help me impact my business metrics? What data sources or sensors are best suited to track them? How does a data-driven approach to improving productivity differ from reducing maintenance costs?

This document outlines some proven applications and ideas from our case studies, and offers a jumping off point for thinking about your own enterprise processes.

Measuring what matters

Overall Equipment Effectiveness (OEE) is a powerful composite metric for measuring overall productivity that accounts for:

- **Availability**: Is a machine available to produce when it should be?
- **Performance**: When running, is the machine producing as fast as it should?
- **Quality**: How much of what is produced is acceptable?

Although details vary for each business, the following common measures will help you answer these questions and take action to improve your operational efficiency.

Machine uptime and downtime

Tracking machine uptime and downtime helps to quantify machine availability, and monitoring power consumption is one of the easiest ways to track this metric. By clamping a current transducer (CT) sensor to a power line that goes to a machine, you can sample power consumption second by second to capture how long a machine is off, idle, or actively working.

This single sensor allows you to understand:

- The percentage of time a machine was online
- Time spent loading material into a machine
- Average time to recover after a work stoppage
- Relative productivity across different shifts, hours, days, or even quarters

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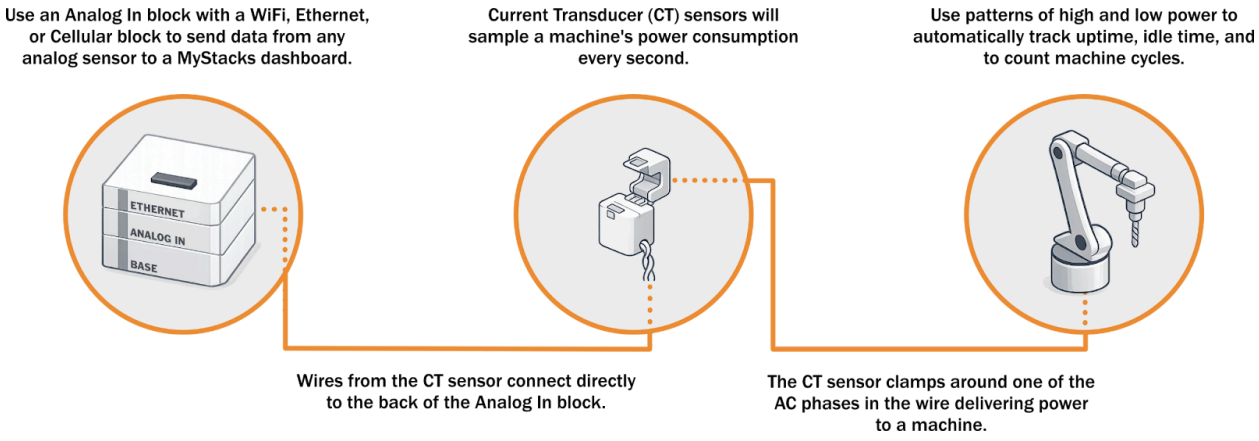
Easily add uptime / downtime monitoring to any machine



Counting throughput

Counting production events such as finished parts, machine cycles, or open/close machine operations provides a direct window into manufacturing performance. Depending on the specific machine and process, these repeated patterns can be detected in several simple and reliable ways.

A switch that captures a machine opening and closing, an optical beam counting parts passing along a conveyor belt, or a spring-loaded roller tracking the amount of sheet metal or other linear materials can help you track:

- How many parts are produced each hour, shift, or day
- Whether machines are running at expected cycle rates
- The number of machine actions per work cycle, such as cuts per hour
- The quantity of parts or material from inventory used each day

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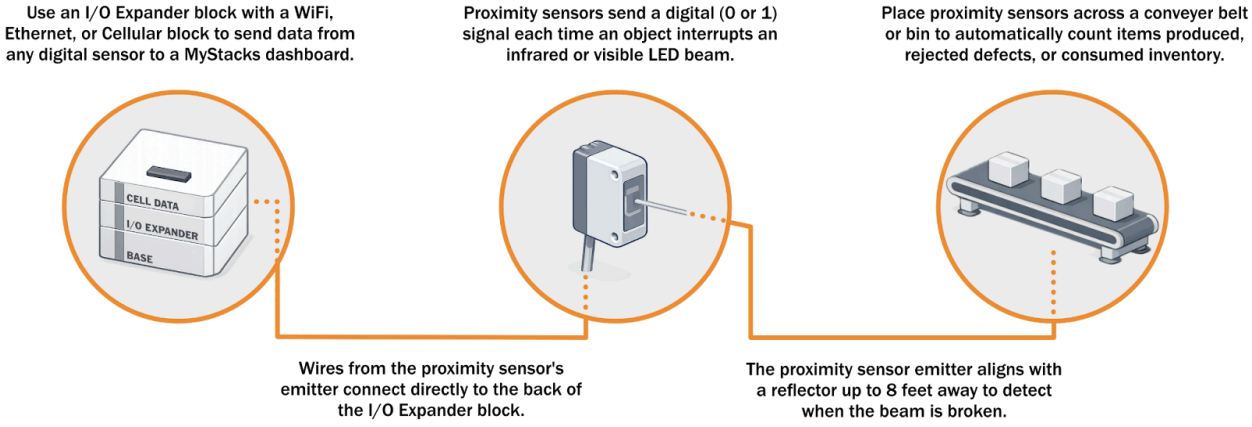
Automatically count products made, or track consumed inventory



Quality assurance

Unlike uptime or throughput, QA often requires intervention from human operators or inspectors in addition to data feedback from testing equipment. Depending on the business needs and workflow, options for passive or active QA tracking exist. Examples of passive QA include counting the number of parts or weighing the total quantity of waste material passed through to a reject bin. Active tracking may include human operators pressing a switch to count malformed products, or using a barcode scanner or keypad to capture additional details. Interstacks can also drive an alarm, indicator, or display on the factory floor to flag the need for attention.

Capturing this data consistently makes it possible to understand:

- Where quality failures cluster within a manufacturing process
- If defects correlate with specific machines, materials, or operating conditions
- Indicators of maintenance needs, such as a slow downtrend in quality
- Which raw materials or feedstock perform the best over the long-term

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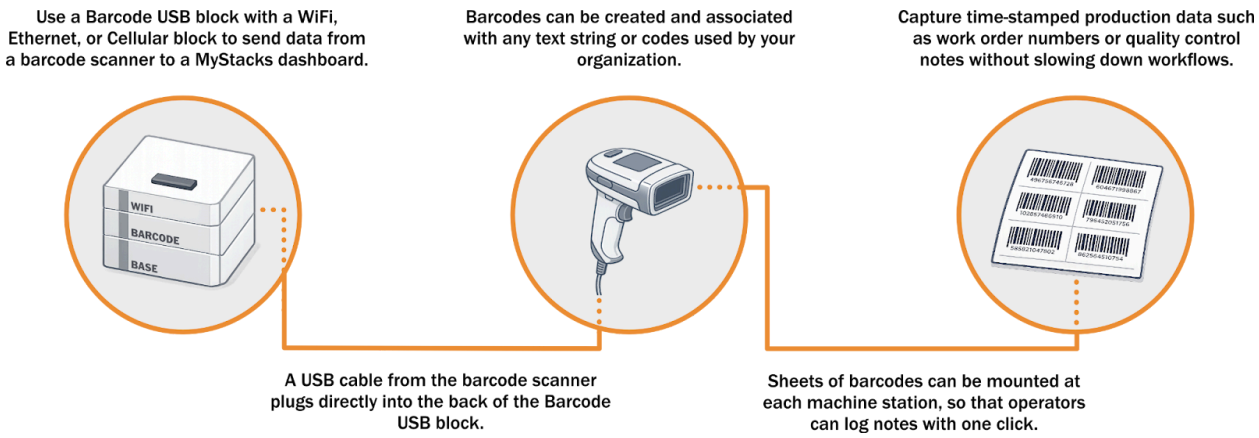
Capture detailed QC information, eliminate data entry time



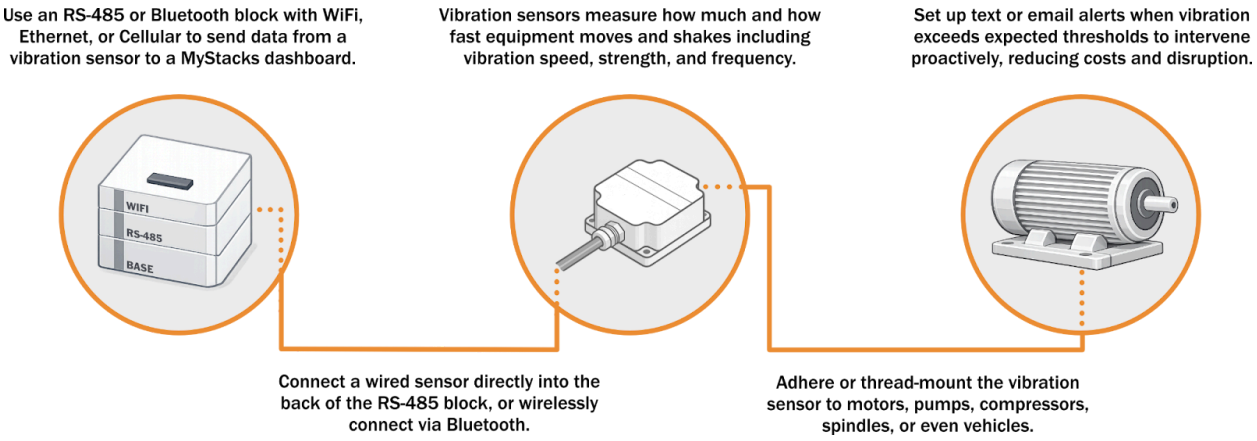
Reliability and preventative maintenance

Unplanned failures are among the most expensive events in manufacturing. They disrupt schedules and create cascading delays, often costing more in lost productivity than the repair itself. This makes insights around reliability particularly valuable, the goal being to find patterns from indicators like temperature or vibration to predict maintenance needs and intervene before an unplanned failure occurs.

Help your organization run faster and more predictably by knowing:

- Mean Time Between Failures (MTBF) for critical equipment
- Which machines fail most often, and whether frequency is increasing or decreasing
- Early warning signs that maintenance may be required

Predict and prevent equipment failures



Data signals and sensors

The Interstacks platform is built to work with virtually any sensor and any machine, allowing you to capture the signals that are most meaningful to your business and workflow. We have touched on several of the most common examples: Power monitoring, event counting, user inputs via buttons or barcode scans, and environmental monitoring. Below is a general summary of our commonly used sensors:

Voltage and current

Measure power consumption to track patterns of machine activity, or monitor energy levels in solar panels and battery systems

Low- and high-voltage AC power sensors for creating machine power consumption profiles

Switchable 30/60/120A AC power sensor for diverse machine types

'Smart' DC voltage and current sensors for solar panels, batteries, generators

Environmental monitoring

Measure light levels, temperature/humidity, or chemical concentrations to track anything from room occupancy to monitoring air or water contaminants

Temperature sensors for use in air or liquids from -50 to 105 °C

Combination CO2, temperature, and humidity sensor for general air quality

Light sensors for capturing luminosity

Chemical sensors for tracking ammonia gas levels

Object and proximity detection

Use visible light, infrared, or mechanical means to detect objects crossing a threshold or count linear quantities of material

IR or visible light optical switches for counting when the light beam is interrupted

Rod-and-roller limit switch for triggering a signal when it comes into contact with an object

External GPS receiver for reporting outdoors position within 7 ft

Vibration, pressure, and flow

Measure the frequency and intensity of mechanical vibrations, rate of flow, or fluid/gas pressure to detect slow leaks or sudden changes

2- and 3-axis vibration sensors, wired or wireless over Bluetooth

Flow sensors output a digital pulse proportional to the fluid flow rate

Fluid pressure sensors for water, oil, and gas up to 100 PSI

I/O devices

Accessories for data input or output

General purpose LCD displays for showing short status messages

Various general purpose dry-contact buttons

Wired or wireless barcode scanners for easy data entry

If your workflow includes PLCs, controllers, or industrial devices with serial data ports, Interstacks can also ingest that structured data directly without the need to add additional sensors. If needed, we will work with you directly to customize the software in your stacks to fit with your process.

RS-485 and RS-232 data feeds

Many industrial devices expose operational data through serial interfaces such as RS-232 or RS-485. These data ports are often available on industrial valve controllers, generators, motors, scales, and various other data loggers or custom devices.

Interstacks can connect to these devices directly via protocols such as Modbus-RTU to read measurements, status values, fault indicators, and internal states exactly as the machine reports them.

PLC integrations

We support several approaches to capture operational data from PLCs, including:

- Programming a PLC digital, analog, or dry contact output to signal an operation to the stack
- Using Modbus registers to track counts, alarms, modes, or other variables

Tapping into these existing signals allows Interstacks to incorporate pre-processed information such as cycle completion or fault conditions into the MyStacks dashboard alongside sensor-based data, seamlessly integrating legacy equipment and modern systems in a single monitoring platform.

Instant awareness, long-term analysis

Interstacks is designed to support roles at every level of your organization, from individual operators on a mobile device to leadership monitoring the overall business from a conference room TV. To address these diverse use cases, all data sent to the MyStacks IoT cloud dashboards is encrypted in transit and at-rest, time stamped, and saved. This allows us to address immediate awareness, recurring reports, and occasional deep-dives into business intelligence.

Real-time alerts

Real-time text and email notifications can be triggered based on any criteria an application needs. This allows immediate intervention when an issue arises, even when away from the machine or offsite. The Alert History widget on dashboards shows a scrolling historical list of triggered alerts, providing a summary of recent events.

Automated reports

Automated recurring reports can be created to provide managers with daily, weekly, or monthly roll-ups. Choose one or more data sources, define a window of data for export, and set up the cadence at which to trigger the emailed reports.

Historical reviews

Longitudinal data is encrypted and stored indefinitely. Use our Export Tags feature for occasional reports or multi-year data windows. All reporting and data can be downloaded to CSV files for importing into external tools.

Taking action

When the right data is available at the right time, teams can respond faster, reduce waste, prevent failures, and continuously improve efficiency. The Interstacks platform provides quick access to performance data and insights for operators, managers, and leadership. If you're exploring how better data visibility could support your operation, contact us to talk about your process, your challenges, and what meaningful measurement could look like for your team.

To learn more about how Interstacks can help you harness your data and insights to drive better business outcomes, visit www.interstacks.com or contact our team directly at info@interstacks.com to discuss your business operations and goals.

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