FreePoint™
Technologies Inc.

Measuring & Monitoring Value

Application Notes

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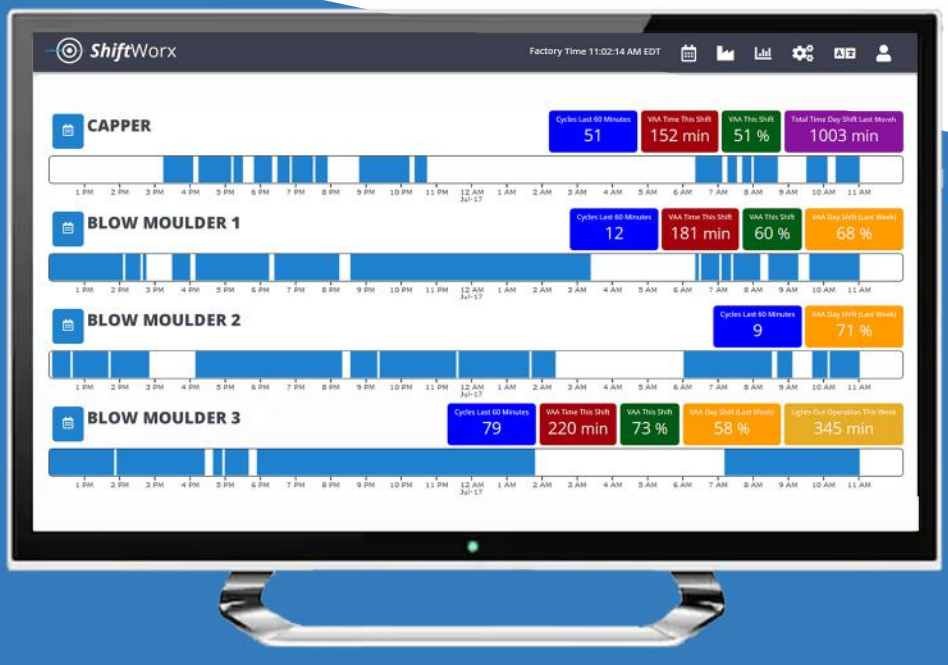
Value-Adding Activites in Manufacturing

DEFINING VALUE

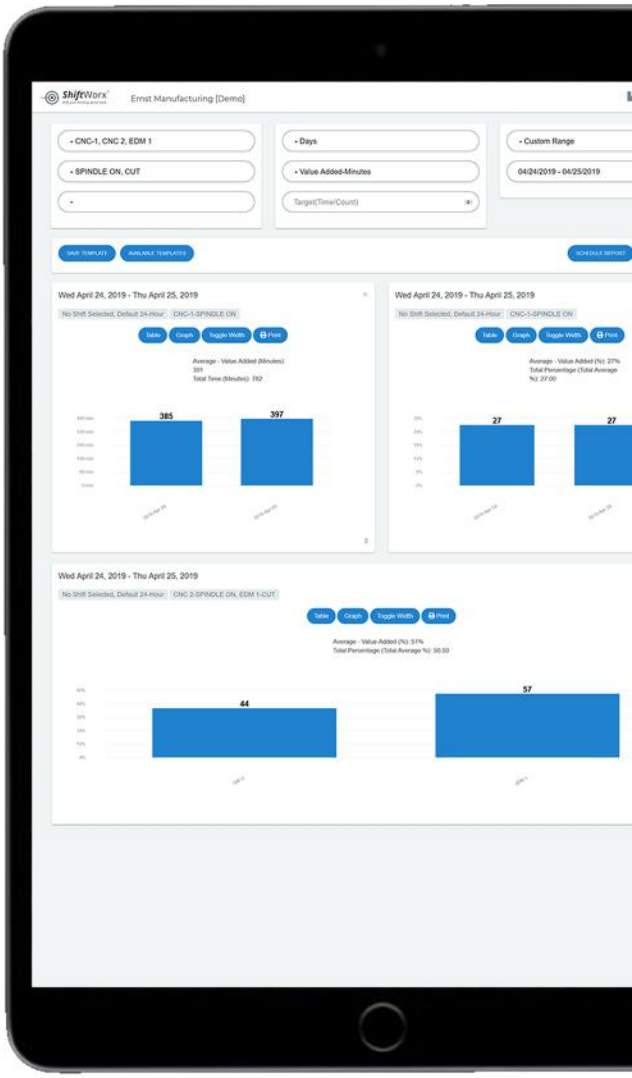
Manufacturing is a process of adding value to a product, from its initial, raw material state, to its eventual finished state.
However, measuring value added to a product in process has proven to be a challenge. Many manufacturers have instead measured all the non-value adding activity and have used that as an indirect (inverse) measurement of value. Others have relied on the information generated by their ERP or accounting systems, but this information is not delivered in real-time and is often not empirical; it is not taken from the machine but recorded manually, after the fact.

The first step in measuring value-added activities is identifying what actions or activities actually add value to the product.

> *Value-adding activities (or "VAA") can be defined as **any action that adds value throughout the production process.***



Examples of
Value-Adding Activities



Welding Industry
In the welding industry, it is common for your value-adding activity to be the actual weld-time or the actual number of spot welds or tack welds.

CNC Machine Industry
Spindle time is usually an accurate indication of value adding activity. Axis in motion, “machine in cycle” & “end of cycle” are often good secondary indications.

Stamping Presses
Any signal that indicates a press cycle has occurred, including stroke, brake/clutch, bottom dead center or top dead center. A useful secondary signal could be auto/manual.

Molding
Any signal that indicates an injection cycle has completed, including dies open/closed, or the injection solenoid.

Other Applications
Through beam sensors on a conveyor, part present sensors, test complete outputs – all of these could be indications of value adding activity being performed by the machine or manual or automatic assembly station.

Measuring Value
Time vs Cycles

Value-added activity is measured by:

- Tracking Time (typically Minutes, but could be hours or seconds)
- Counting Cycles or Parts (Cycles / Time or Counts / Time)

Each industry will have a primary and secondary measurement for value-added activity which will always be measuring time or counting cycles.

TRACKING TIME

Typically, the tool & die industry (CNC machine), custom shops, tooling, and mold shops use time as the primary method of measurement for an input such as spindle or axis.

Measuring time is typically measured as a percentage value.

To measure time as a percentage, use the following equation:

Running Time (Min) / Total Time

Running Time is made up of a sum of multiple run time segments, followed by one or more periods of inactivity, followed by more running time and inactive segments. If you were to calculate “uptime” or “utilization” using the time option, the equation would look like:

Uptime (Shift)=
Total Spindle Running Time (shift) / Scheduled Time (shift)

Uptime (last 60 minutes)=
Total Spindle Time (last 60 minutes)/60

Secondary measurement for time can be:

- Spindle Running reported in minutes (for defined period)
- Axis in motion (as an alternative to spindle)
- M60 (Code-end of program) to count completed cycles
- “In cycle” output (when available) to determine total VAA

Measuring Value Continued
Time vs Cycles

COUNTING CYCLES

The auto industry, production shops, injection molding, filling stations, bottling stations and presses performing repetitive operations typically use the cycle option as the primary method for measurement.

Measuring cycles is typically measured by Rate using the following equations:

Rate = Cycles / Period of Time

Uptime = (# of minutes where cycle counter > set point)/time period

If secondary signals are available, yield can be determined:

Yield = Output (downstream) / Output (upstream)

Measuring & Visualizing
Value-Added Activity

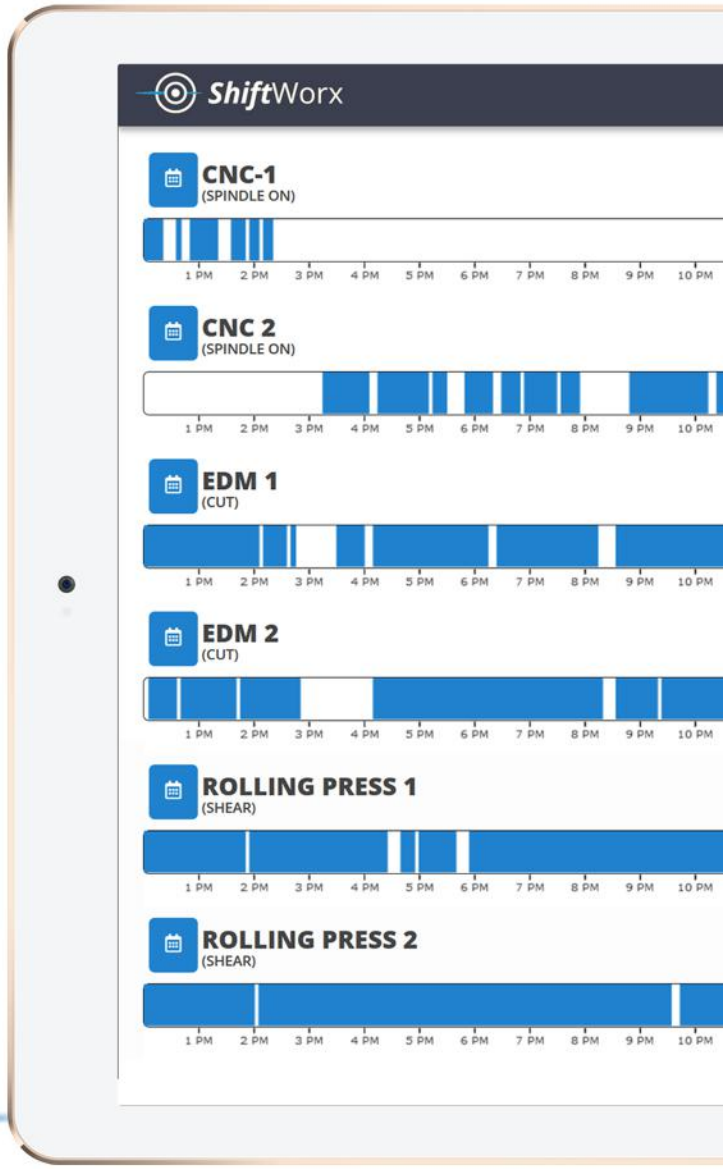
The key to FreePoint's approach is to first make value-added work measurable and visible to everyone. This provides empirical data and makes everyone accountable for their "Value-Added Activity" today, this shift, this hour, or this period.

Measuring and displaying value-added activity in real time typically leads to productivity improvements by virtue of the 'Hawthorne Effect', and usually results in improvements ranging from 10-15%, and even higher in operator influenced operations.

> Everyone is accountable to themselves and their peers first, and then to management.

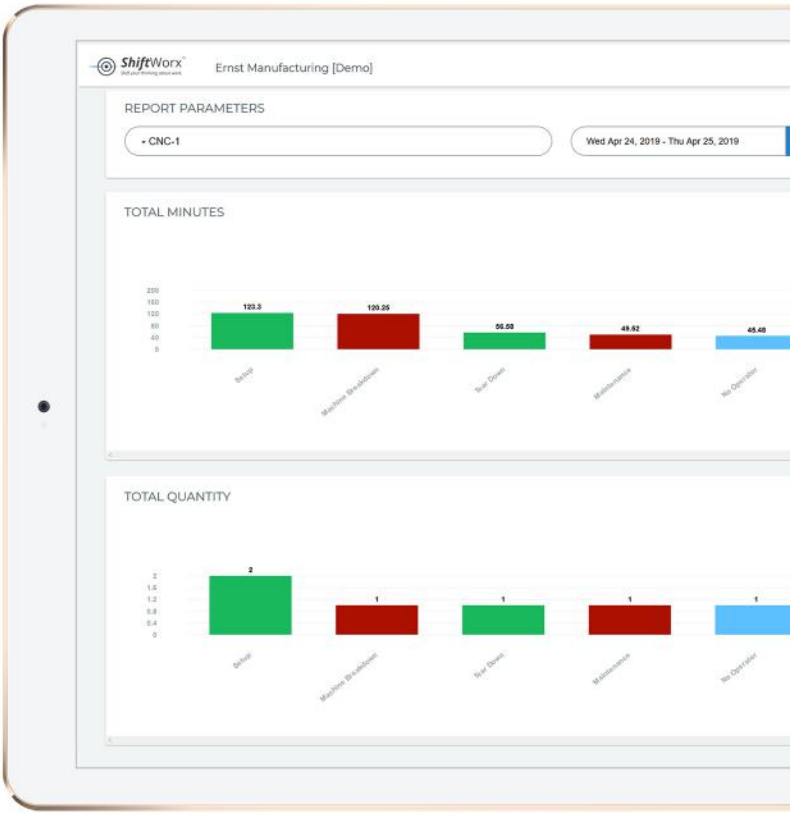
The Hawthorne Effect
Definition

That which is being measured gets improved.



Measuring & Visualizing
Non-Value-Added Activity

FreePoint uses the "Narrative" Module to measure and visualize non-value-added activity using reason codes and reporting tools. Narrative reason codes help explain machine downtime. The reason codes can be put in categories to help interpret the data and gain insights quickly.



For instance, reasons for a machine not running generally fall into one of the following general categories:

- Set up
- Scheduled occurrences
- Unscheduled occurrences
- Administration reasons
- Quality reasons

The insight gained by the use of Reason Codes is helpful to management to make decisions and investments to improve processes, upgrade or replace equipment, improve training, or adjust production or maintenance schedules.

When the insights gained from tracking the non-value-added periods are put into action, manufacturers can typically expect to see additional productivity improvements ranging from 10-15%.

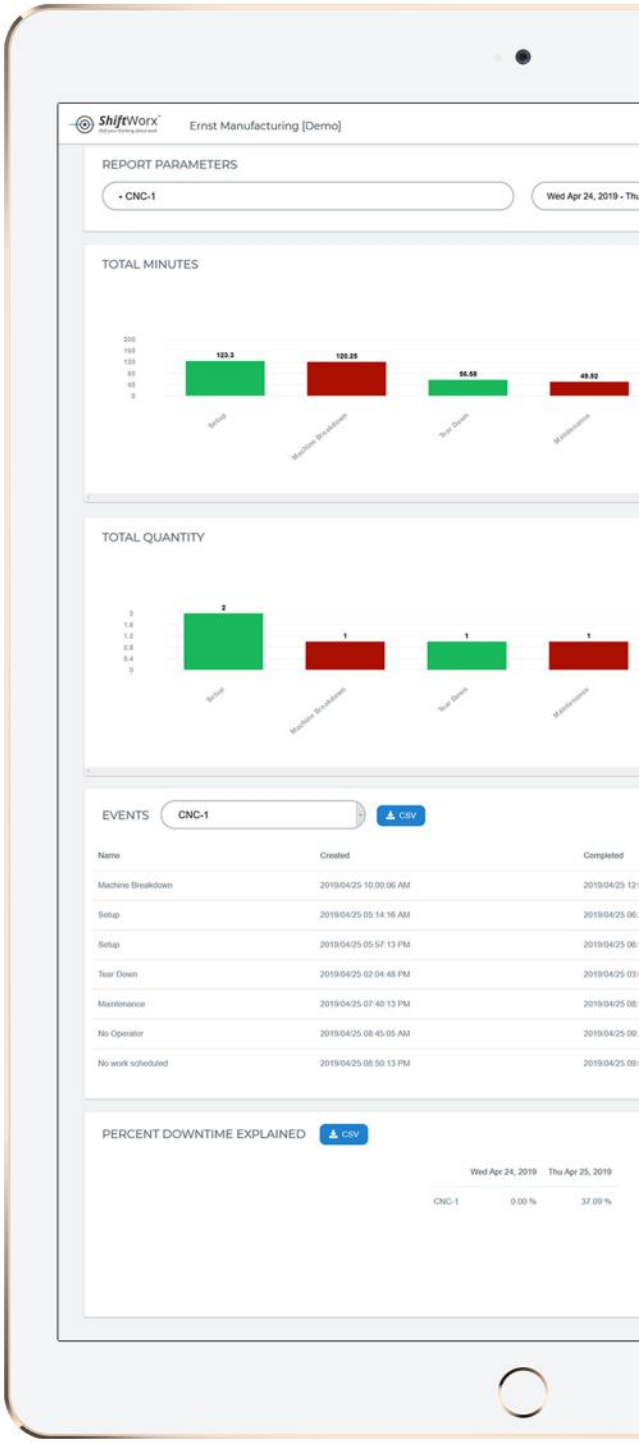
Establishing Baselines

Every manufacturing process has its own "rhythm and cadence" and it is important to know what "normal" or "healthy" looks like.

As far as Running Time, Uptime, or utilization time is concerned, a higher number is not always a better number. For instance, an old machine, running at a slower rate, will likely have a higher uptime and utilization time than a new machine.

It is important to know why a machine is not running, and why its numbers may be low, whether its maintenance, no work scheduled, completed jobs early, or being set up for a new job.

> **Knowing the VAA (value added activity) of the machine is important. Knowing the reasons for the non-value adding activity is equally important.**



Interested in an IIoT Solution?

Reach out to us today to speak with an Account Manager.

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