SCADAware

transforming automation for continuous improvement

OEE SOLUTION

CUSTOMER GUIDE

The Six Building Blocks of Overall Equipment Effectiveness

OEE = Availability x Productivity x Quality

Overall Equipment Effectiveness (OEE) is calculated using a formula which takes into account several aspects of the equipment's process, or cycle. There is a minimum amount of data that is necessary to perform a basic OEE calculation and several pieces of optional data that can make OEE reports more detailed. The required data can be broken down into six categories: *In-Cycle Time, Non-Op Time, Down-Time, Part Count, Part Quality* and *Cycle Time*. Each of these categories is explained below with information on the types of optional data that may be collected.

IN-CYCLE TIME

This time can be generally defined as time when a piece of equipment is engaged in the tasks that it was intended to perform. It is scheduled to be running and is actively producing parts. If it is a welder it may be welding. If it is a lathe it may be cutting.

Optional In-Cycle States

A machine may perform a number of different tasks during the time that is considered *In-Cycle*. Examples would include: tool change, pallet change, feed hold, etc. The monitoring of these states will produce more detailed reports that show a breakdown of *In*-Cycle time into each of these sub-states.

DOWN TIME

If a machine is not *In-Cycle* it is usually considered to be in a *Down Time* state. This is time where the machine is not running and therefore is not producing any parts.

Optional Down Time States

There can be a large number of different reasons for a machine to be down. The operator may be at lunch, there may be no raw material, or the machine may have a broken tool, just to name a few. Just as with the *In-Cycle* reasons, collecting more details about why the machine is down will help to produce more detailed reports.

NON-OP TIME

If a machine is not *In-Cycle* but is also not in a *Down Time* state it is considered to be in *Non-Op* time. Two typical examples are scheduled preventative maintenance, and not scheduled to run. *Non-Op* time is not a requirement for OEE. Some consider any time that isn't *In-Cycle* to be *Down Time*.

PART COUNT

Part Count is the total number of parts produced by a machine.

PART QUALITY

Each part is considered either good or bad and this is recorded as the *Part Quality*.

CYCLE TIME

Cycle time is broken down into two categories: *Ideal Cycle Time* and *Actual Cycle Time*. Ideal cycle time is the amount of time that it should take to complete a cycle if everything is operating properly and is used as a benchmark against which the actual cycle time is compared. The actual cycle time can be calculated from the start of a cycle to the end of that cycle or from the start of one cycle to the start of the next cycle.

Determining What to Capture

The best way to start is usually to think about the steps a machine goes through during a cycle. These steps make up the possible *In-Cycle* states. Writing these down along with a list of reasons the machine is typically down will provide a complete set of states to choose from.

WHAT NOT TO CAPTURE

When considering which states to capture for reporting, keep the list manageable. The more states that are captured the more detailed the reports can be, but if too many states are captured the reports may get too complicated and "busy." Capture those states that you feel are necessary to produce the level of detail you want in reports, but don't capture everything just because it is possible to do so. It is good practice to keep each category (*In-cycle, Down Time and Non-Op*) to no more than 8-10 states.

Remember, the six basic categories are all that is required for OEE reporting. Capturing more detailed states is optional. It is even possible to simply capture *In-Cycle* with no further details while capturing multiple *Down Time* reasons on the same machine.

Automatic vs. Manual Entry

Depending upon several factors such as the communications method and type of control system of the machine, it may not be possible to capture all of the desired information automatically from the machine. Any information that can't be captured automatically will have to be entered manually by the machine operator. The preferred method for operator

entry is the StatusWatch PC Interface. This software is installed on a PC near the machine and provides a means for the operator to enter machine states, part number, part quality and part complete information. It also provides real-time visual and audible feedback to the operator about the current state of the machine. Optionally, a barcode scanner can be used to enter data into the PC interface which eliminates the need for a keyboard or mouse.

A second method for manual entry of data is to mount a small HMI (Human Machine Interface) near the machine. These interfaces typically consist of a 4 line LCD display, 3 indicator lights and 5 buttons for operator interaction. They require the installation of a PLC to drive the display and handle communications. This method is favored in areas where a PC cannot be installed.

Discovery Worksheet

With the knowledge of what information is needed for OEE and what you would like to capture from each machine, the next step is to complete the StatusWatch Customer Discovery Worksheet. Follow the instructions contained within the worksheet to complete a list of machines that you would like StatusWatch to monitor. Basic information about each machine and the list of states you would like to monitor are needed for SCADAware to provide you with an accurate quote. If you have any questions regarding the Discovery Worksheet or to obtain one, please contact you StatusWatch representative.