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Cycle Time Reduction

**By Integrated Control &
Information Systems (ICIS) Ltd**

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ICIS strategies for Cycle Time Reduction in a manufacturing process utilising Automation data with lean manufacturing methodologies

*i*cis **Bridging the Gap Between
Data and Knowledge**

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Introduction

Many companies embark on process improvement projects to increase yield and throughput on sites without first putting in place analysis tools to measure where their resources and budgets would be best served. On many sites the fire fighting of day-to-day performance and targets takes precedence over the need to take a step back and review where the site is in terms of quality, efficiency, production capacity and equipment utilisation.

Utilising Lean Manufacturing techniques production facilities can get a more complete understanding of their processes, which will aid in the isolation of excessive production steps and redundant work practices. Analysing manufacturing processes through a value stream map enables a site to take a fresh review of a production facility that may have been in operation for a number of years, without anyone knowing how efficient it actually is. Project teams can review work practices and standard operating procedures over a period of time to aid in the process, however utilising data from the process control system will add an extra dimension in terms of consistent measured data and results for true plant operation and performance analysis.

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Automation Data

Process control systems provide the true raw data for plant cycle time analysis. The systems, be they Data Historians or SCADA / DCS applications record the majority of the required data used in cycle time calculations. Those that do not can be reviewed and modified accordingly to capture the necessary data that will open up a new world of information that provides a site with accurate measurement and performance results that will be used in cycle time applications.

The Information Transfer

Once the value stream map has been completed for a production process a site can begin to extract the required data from their control system. Automation data resides in the data repositories of a Historian or SCADA / DCS system.

This data can be accessed via standard interfaces to repositories with the necessary pieces of raw data extracted into the cycle time analysis application.
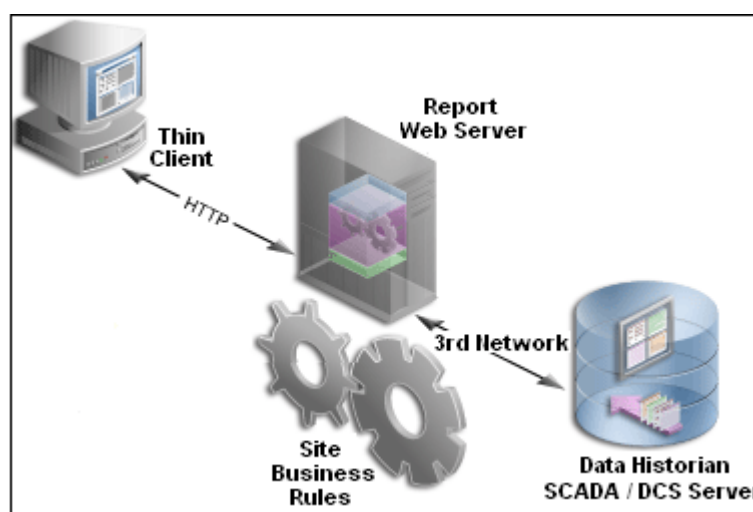
Automation Information Transfer

Once the required data is sourced the site can begin to develop its business rules and decide on the type of performance calculations they wish to execute using cycle time techniques.

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Cycle Time Design

On completion of the automation interface a site needs to begin the task of establishing the cycle time application. A number of steps are involved in this, but upon completion of the task a site will have a tool that enables them to accurately review the operational and performance characteristics of a production process. This will in turn aid in process improvements and help identify process and operational inconsistencies.

Business Rule Definition

Surprisingly, sites under estimate the importance of the business rule definition during the initial review of a manufacturing process. Well-defined business rules are vital for the successful design and building of a sites cycle time analysis system in order to filter out any inconsistent data generated through process trials and maintenance activities. Incorrectly designing them will lead to inconsistent analysis results that will not be of benefit to the site, and leave end users with a potentially inaccurate system that they will not use. Once the rules have been correctly identified the site can move on to define what data they wish to display in the system using the value stream map as the bases of process cell identification and unit linkage.

Cycle Time Calculations

Cycle time calculations are mapped through the following stages:

Process Cycle → **Equipment Cycle** → **Process Cell Cycle**

1. At the lowest level the process cycle incorporates the individual process steps and events of a unit.
2. The equipment cycles are used to establish the cycle time of the complete processing cycle events of a unit.

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3. The process cell cycle results are the combination of information from the unit results within the specified cell.

Once the cycle time calculations have been created a site can incorporate the front end to display the results and provide users with an interface for plant analyses.

The Power of the Front End

The front end application for users embarking on cycle time reduction projects is as important as the previous work executed in building the site business rules and calculations. The front end will be a users window into the performance results and must be designed in such a way to allow ease of use for a diverse range of users. The ICIS Plant Performance toolset allows not only for the business rule definition and cycle time calculations, but also for a Management performance overview and an Engineering analysis tool all in one.

By utilising tabular and graphical displays users can quickly review plant performance and isolate under performing areas, units, processes and production steps.
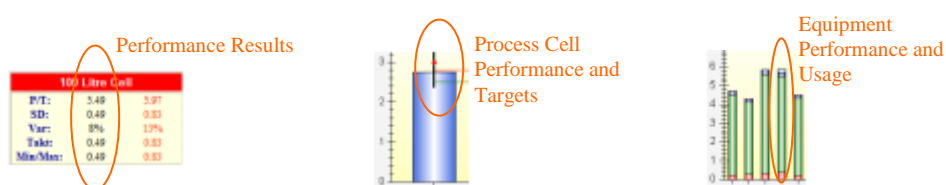
Sample Front End Results

Cycle Time Reduction

Upon completion of the application role out a site can begin the job of plant analysis and cycle time reduction. The cycle time tool allows for instantaneous plant reviews to help kick off your improvement programs. Teams can be established to review process cells and units in their production areas. As the tool does not require high-level Automation or process understanding, teams from within the operational groups of a site can become involved. This leads to a sense of ownership from operational personnel, which leads to a more supportive and productive role for non-engineering groups in process improvement programs.

What a Site will gain

By using the cycle time analysis tool a site will begin to develop a real understanding of its performance and utilisation of production equipment within its processes. In summary a site will obtain:

1. A live review of process targets and whether production is meeting them
2. Isolate variability's in the production process
3. Identify under performing units and inefficient production steps
4. Develop real scheduling based on accurate through-put results
5. Identify inconsistent process steps and operational tasks
6. Utilise operational teams to generate performance reports for process improvement programs with engineering
7. Create a real understanding of a sites performance characteristics
8. Drive costs down and yields up by analysing the production environment

These benefits and more can be generated by the successful implementation of a cycle time reduction project.

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About Us:

*i*cis provide custom Data Historian and SCADA / DCS reporting solutions for a variety of systems. As we are not affiliated with any specific vendor and have crossed the divide in terms Automation Integration and Enterprise Reporting we can provide unbiased consultancy reviews and recommendations for your best path forward in terms of plant reporting. Contact us to see what we can do for you in terms of a site / system design review and study.

For further information, queries and questions on this article or *i*cis please contact us at info@icissoftware.com or visit our website at www.icissoftware.com

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