

Availability Analysis and Monitoring Using Data Mining from On-Line Information Systems

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The paper presents new approach to availability analysis and continuous monitoring developed by the authors and based on data mining from on-line information system such as PI (or similar systems) that provides continuous process control at all system levels. The basic guidelines of our approach could be presented as follows:

- Production chain mapping and critical equipment identification
- Analysis of every critical unit and identification of both controllable feeding equipment before this unit (input control) and controllable unloading equipment after this unit (output control)
- Construction of the table describing 2^3 possible situations from the operating point of view (three production units and two possible states – operate/not operate)
- Assigning the status for every situation, taking into account that there are four possible choices:
 - Productive Work
 - Non-Productive Work (unit operates but doesn't provide any output)
 - Repair (due to some failure)
 - Wait (due to some external reason)
- Data mining from the on-line information system for the analyzed units (operating and non-operating time), determination of hours for every status at the shift level and checking the results (sum of hours versus shift duration)
- Calculation of three availability components as well as overall availability using the obtained status estimates:
 - Physical Availability – measure of mechanical or electrical problems
 - Technological Availability – measure of accepted technology and critical unit design
 - Operational Availability – measure of operational efficiency
 - Overall Availability
- Comparative analysis of the availability components and dynamic analysis of these components using the Shewart control charts
- Root-cause analysis of both the average level of the availability components (global problems) and the problematic patterns on control charts (local problems)
- Recommendations intended to availability enlargement

All results of the proposed approach implementation at the plants of Chemicals for Israel showed significant availability improvement.