

ProcessLink[®]

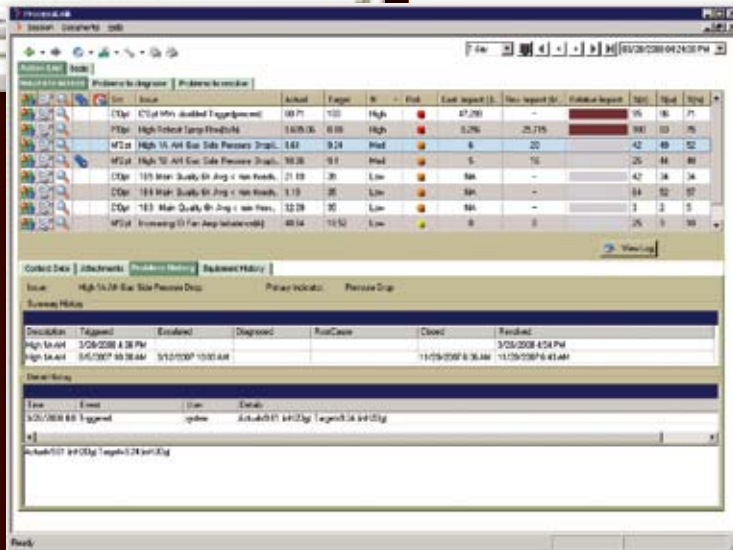
MaintenanceOpt[®]

MaintenanceOpt Benefits

- Minimizes likelihood of catastrophic failures
- Increases unit uptime
- Improves unit efficiency
- Shortens the issue detection-through-resolution life cycle
- Customizes to meet your workflow and resource requirements
- Integrates with existing maintenance infrastructure



Action lists display which problems have the greatest impact on efficiency and availability and provide structured information and workflow for effectively resolving issues.



Equipment Health Monitoring & Diagnosis

Why MaintenanceOpt?

When problems occur with plant equipment, tell-tale signs are recorded by the data historian. However it is difficult for operators and engineers to monitor such data and identify problems in real-time across an entire plant. Early warning systems based upon simple threshold logic alarming fall short since the threshold bounds are often set generously wide in order to prevent false alarms. In many cases, equipment problems are not detected until the equipment fails.

MaintenanceOpt minimizes the likelihood of being blindsided by such unpleasant surprises. Its reliable models are continually on the lookout for equipment health problems, quickly bringing them to the attention of plant staff. The Optimizer's diagnostics engine also helps to determine the problem's root cause and inform remedial actions.

Anomaly Detection

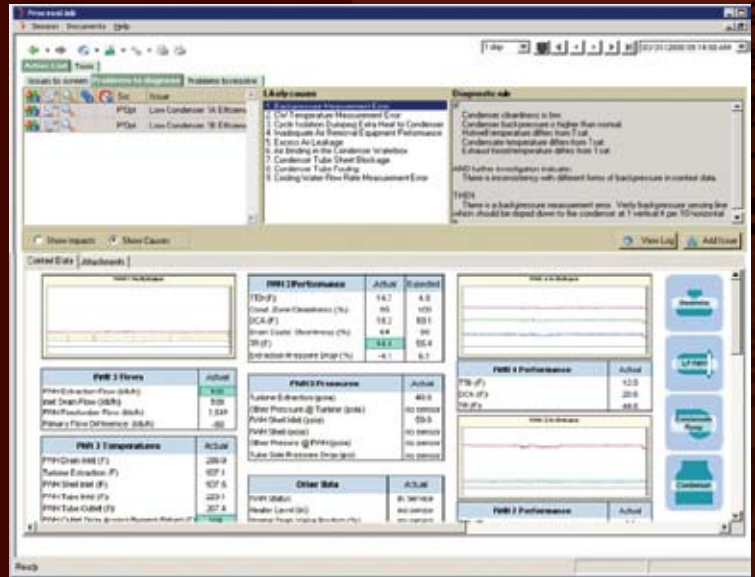
MaintenanceOpt employs adaptive neural network models that monitor plant data in real-time, constantly searching for anomalies that point to equipment health problems. The system predicts expected values for signals under current operating conditions, compares them to actual values, and, when the difference between the predicted and actual values exceeds an appropriate threshold, generates an alert to notify users of a potential equipment problem. Its high quality models are automatically evaluated and updated, ensuring that problems are identified as soon as a deviation occurs and resulting in fewer false alarms than with other detection systems.

Problem Diagnosis

MaintenanceOpt helps O&M staff manage the entire lifecycle of equipment health problems more efficiently and effectively. It typically takes considerable time to determine whether identified anomalies point to an actual equipment health problem and if so, what the root cause is. MaintenanceOpt's embedded diagnostic support system accelerates this process by providing users with all relevant historical and real-time contextual data, models

of expected performance, and a list of potential causes and corrective actions. The criticality and cost impacts assessed by the Optimizer enable action prioritization.

MaintenanceOpt provides an expandable knowledgebase of contextual information, potential causes, and diagnostic rules that allow users to efficiently identify root causes and specify remedial actions.



The homepage provides summary insights into problems across their lifecycles and identifies missed opportunities by benchmarking performance.

Remediation & Knowledge Capture

Once the root cause of the equipment problem has been diagnosed, the Optimizer continues to facilitate the problem resolution workflow by allowing users to select, customize, and direct the necessary remedial actions toward the appropriate individuals, depending on the nature of the problem and required resources. Problems are logged throughout the problem lifecycle from detection through diagnosis, action specification and remediation. Supporting documents or images can be attached at any point and all information is organized such that it is available and easily searchable in the future. MaintenanceOpt can also be customized to integrate with existing maintenance infrastructure such as a computerized maintenance management system (CMMS), which it augments by providing a mechanism for the identification of needed yet unplanned maintenance activities.

Deep Insight from an Expanding Knowledgebase

MaintenanceOpt becomes more powerful over time. Users benefit from an ever-expanding knowledgebase

as additional root causes, heuristics and appropriate corrective actions are identified by NeuCo, its partner, Black & Veatch, and its customers. The heuristics knowledgebase can also be customized to account for site-specific situations. MaintenanceOpt maintains a searchable record of past anomalies and how they were diagnosed and resolved so that staff can learn from past events, analyze performance trends, and achieve deeper operational insights.

MaintenanceOpt & the ProcessLink® Suite

Because of the tight integration enabled by the ProcessLink platform, MaintenanceOpt is even more powerful when combined with other ProcessLink Optimizers. All conditions triggered by all optimizers are displayed by the MaintenanceOpt user interface. The ability to view combustion, boiler cleaning, thermal performance and equipment health alerts through a single lens makes multiple manifestations of a problem quickly apparent. Together the Optimizers cover the key reliability (equipment and process), efficiency and emissions issues of an entire generating unit.



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