Enter a World of Zero Unplanned Downtime
Power Plant Case Study

Objective

Precog was recently implemented at a power plant that supports a complex of chemical plants. The customer's objective was to improve reliability and availability at the plant, which is critical for the smooth operation of the entire complex. After reviewing many optional solutions, the customer selected Precog.

The customer had two requirements:

- To be provided with meaningful alerts in advance that will be actionable;
- No "noise".

Background

The power plant is the heart of the chemical production. It burns residuals, provides steam at the right pressure levels and often generates electricity. It includes multiple boilers, turbines and a complex piping and water\steam heat control system. The system works 24 hours a day, 365 days a year. It includes multiple redundant systems that allow the team to plan continuous maintenance.

Precog

Solution Architecture

In this project Precog receives the information collected by the PI historian system. The customer created a process in which PI puts out an hourly CSV file containing all the tags (about 2000 tags) to the Precog server. The historian was selected as the source of data, although it does not collect all sensors measured by the control system. For Precog itself, the customer installed a virtual Linux machine with Hard drive of 500 Giga (including OS), 16 Giga RAM and 4 processors of 3.5GHZ. The communication between the server (which was installed on the customer's server farm) and the plant was via secured FTP for data and HTTPS for access to the Precog alerting system. File transfer over secured FTP was selected as the mode of operation because of its simplicity and the security it provides (ensures read-only mode).

Implementation

The Precog team supported the customer during the two-week implementation process. During this time the team performed the following two activities:

Building the system model

The operation team (mainly experienced engineers) spent 11 days creating a model of the plant by using Precog user interface and methodology. Thanks to Precog's simple and intuitive user interface, the team managed to build the model themselves after only a few minutes of training. For their work the team used the piping and instrumentation diagram (PI&D) and descriptions existing in PI. First the team divided the plant into 7 major subsystems. Each subsystem was divided into smaller systems, components and parts. The team also described what is measured

for each element. Then the team divided the processes that take place at the plant into sub-processes, and connected them to the elements that participate or are affected by the process. In their work the team followed the method dictated by ISO 19450, which is incorporated within Precog. After 110 days the model consisted of more than 2000 elements, representing the entire plant with a sufficient level of details.

Fitting
Simultaneously, the customer provided a year's worth of data at one-minute intervals from its PI system. Since this plant includes many redundant systems that are rarely operated, the algorithm needed a full year's worth of data. In other cases, where the system is more stable, a shorter period may be sufficient.

Results

Precog is currently being used by the reliability team, which is reviewing the results on an hourly basis. This team is responsible for determining the follow-up or preventive actions that need to be taken for each alert. Alerts that were handled are moved to the archive. Precog has demonstrated that it can detect faults and leakages, even in areas that are not measured directly, by concluding from the surrounding network of sensors.