

INDUSTRY: OIL SANDS_

SMARTSIGNAL MEETS CANADIAN OIL SANDS
AVAILABILITY AND EFFICIENCY CHALLENGES



SKILLED LABOR SHORTAGES AND AN INABILITY TO MAINTAIN AND EFFICIENTLY RUN EQUIPMENT IN A HARSH ENVIRONMENT LIMIT THE GROWTH OF THE CANADIAN OIL SANDS INDUSTRY.

OIL SANDS EQUIPMENT AVAILABILITY OPERATES AS MUCH AS TEN PERCENTAGE POINTS BELOW THAT OF PLANTS EMPLOYING SMARTSIGNAL'S ADVANCED ASSET ANALYTICS. EVERY PERCENTAGE POINT OF LOST AVAILABILITY TRANSLATES INTO TENS OF MILLIONS OF DOLLARS OF LOST PRODUCTION. EVERY POINT OF REDUCED EFFICIENCY TRANSLATES INTO SUBSTANTIALLY INCREASED EXPENSES. THIS PAPER ILLUSTRATES HOW SMARTSIGNAL® REMOTELY PREDICTS, DIAGNOSES, AND PRIORITIZES OUR CLIENTS' EQUIPMENT AND PROCESS PROBLEMS AND HELPS THEM RECOVER THEIR AVAILABILITY LOSSES AND REDUCE THEIR ENERGY CONSUMPTION.

INDUSTRY CHALLENGES

Each Oil Sands operation is composed of one or more of four production operations:

- _ power and steam generation,
- _ mining,
- _ in situ production, and
- _ bitumen processing and/or upgrading.

Many plants have used traditional condition-monitoring tools to try to control their equipment and process problems. But, problems still persist. Traditional tools fall short because they:

- _ require a great deal of expertise to deploy, maintain, and use,
- _ analyze only a part of the problem,
- _ provide too many false alarms,
- _ are difficult to calibrate to changing ambient conditions and loads, and
- _ miss the unique characteristics of each individual piece of equipment.

THE SMARTSIGNAL SOLUTION

SmartSignal advanced asset analytic solutions solve these issues and work on all critical rotating and non-rotating Oil Sands equipment. They identify the most critical and high-value faults, including, among others:

- _ overhead condenser fouling,
- _ reciprocating compressor valve failure,
- _ electrical submersible pump erosion,
- _ mining truck engine performance loss,
- _ hydro-transport pump failure,
- _ diluent stripper bitumen carryover,
- _ centrifuge motor overheating,
- _ coker cutting water pump thrust bearing failure, and
- _ gas turbine combustor failure.

SPECIFICALLY, SMARTSIGNAL:

- _ predicts impending Oil Sands equipment and process failures,
- _ diagnoses the causes of the failures, and
- _ prioritizes the severity of the failures.

SmartSignal remotely analyzes all critical equipment 24/7 and provides plant personnel with notifications of issues.

It works on an exception basis and directs plant O&M personnel to only the equipment they need to review. It focuses their efforts on problems only, reduces their workload, and maximizes their results.

Across all ambient conditions and loads, SmartSignal understands each piece of equipment's unique operating characteristics. It works on all equipment, all OEMs, with all sensors. It can take readings at

any time, including different time slices for different pieces of equipment. And, importantly, it works seamlessly on top of our data infrastructure partner, OSI PI®.

SmartSignal's solutions were developed with input of operations and maintenance personnel working in hundreds of facilities in the power generation, oil & gas production, mining, refining, and pipeline industries. These industries represent the major components of any Oil Sands operation.

SmartSignal overcomes the deficiencies of traditional condition-monitoring tools. It addresses the top three concerns of the people SmartSignal serves.

SMARTSIGNAL PROVIDES:

- _ operational relevance: high-quality, actionable intelligence,
- _ speed-to-value: quick implementation, within a matter of weeks, and payback within a matter of months, and
- _ ease of use: SmartSignal deploys, tunes, and maintains the software and notifies plant personnel of impending problems.

"SmartSignal gave us a heads up so we could take the unit down and initiate maintenance in an orderly manner instead of having it come crashing down."

_ POWER PLANT MANAGER



BENEFITS

SmartSignal provides the intelligence to eliminate the failures that trouble Oil Sands operations' most critical pieces of equipment. It allows O&M personnel to reduce unplanned maintenance and lengthen maintenance intervals. This translates into:

- _ increased equipment availability and efficiency,
- _ improved profits and return on capital employed, and
- _ improved EHS outcomes.

EXAMPLES OF SMARTSIGNAL'S SUCCESS

What would it mean to your availability, efficiency, profits, and safety record if you could eliminate problems with your critical equipment? Here's what it meant for some of our clients:

- _ A major power generator and steam supplier achieved its highest level of fleet availability after it implemented SmartSignal.

_ A Super Major saved 4.3 million dollars within a three-month period of use on one oil platform.

_ A refinery eliminated a problem that would have shut down half its production for over one week. The bottom line was millions of dollars of profits saved and a potential EHS incident avoided.

ROAD FORWARD

SmartSignal can work with your team to evaluate how our advanced asset analytics can improve your performance. Through a straightforward process that requires little of your time, SmartSignal can enable your team to ascertain what SmartSignal can do for your Oil Sands operation. There are three phases to the process:

1. Discovery Analysis: The goal of the Discovery Analysis is to allow your team to find out more about SmartSignal and for the SmartSignal team to find out more about your plant(s), assets, and business processes. Based on the outcome of this analysis, a decision to proceed or not to proceed to the next phase is made.

2. Value Analysis: The goal of the Value Analysis is to develop an initial value premise for your company's asset base. SmartSignal employs a methodology that identifies the major asset opportunities and then quantifies expected value based on annual savings and revenue improvement.

3. Test Drive: The goal of the Test Drive is to allow your team to experience SmartSignal before making a decision to invest in it. SmartSignal has implemented over 60 Test Drives, and the feedback from our customers is that a Test Drive is a highly efficient and effective way for a team to conduct a detailed assessment before making a "go/no go" decision.

WHAT THEY'RE SAYING ABOUT SMARTSIGNAL

SmartSignal's clients and partners and industry consultants and analysts have applauded the success of SmartSignal. A sampling of their comments follows:

"We have 120 guys here around the clock, and nobody noticed these problems, and there were no alarms. I think it's pretty cool that SmartSignal could detect the problems sitting up there in Chicago."

_POWER PLANT MANAGER

"SmartSignal analyzes every 10 minutes what it used to take 65 engineering hours to do."

_OPERATOR OF 33 POWER PLANTS

"There is plenty of science but not much fiction behind this company."

_THE WALL STREET JOURNAL

Awarded SmartSignal its international Technology Innovation Award in 2006

"We invested tens of millions of dollars in our data-collection and control system. SmartSignal takes the mountain of data it produces and delivers early warning of critical equipment and process failures. We're getting much greater value from our data-collection assets through SmartSignal."

_REFINERY EXECUTIVE

"One of the powerful features of the technology is that it is broadly applicable. It models the normal operation of whatever the system is and then is able to, in real time, detect very small departures from normal operation, which often are early warnings of failure."

_INDUSTRY ANALYST



ABOUT SMARTSIGNAL_

SmartSignal maximizes worldwide industry equipment performance, availability, and reliability by predicting, diagnosing, and prioritizing equipment and process issues before they become costly failures. Drawing on 45 patents, SmartSignal turbocharges basic similarity-based modeling and delivers specific, relevant, and actionable intelligence that makes people more proactive and productive. SmartSignal serves customers in power generation, oil and gas, mining, refining, aviation, pulp & paper, and other process industries worldwide.

Over the years, SmartSignal and its clients have won over twenty awards for excellence, including the *Wall Street Journal* Technology Innovation Award.

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