IVARA EXP - HELPING COMPANIES OPTIMIZE ASSET RELIABILITY

Background – the new approach to maintenance

Studies originally conducted in the airline industry and subsequently validated across other industries have shown that approximately 80% of all mechanical, electrical and structural failures are random in nature and cannot be effectively correlated to time or operating hours. While most industrial maintenance organizations have for decades relied on time-based preventive maintenance (PM) tasks, the recognition that most failures are random has caused many companies to re-evaluate their proactive maintenance programs. Invariably, the conclusion is that if time-based maintenance represents the majority of proactive activity, then the wrong work is being done. And it’s just not a question of using a tool such as Weibull analysis to fine tune the timing of age-related PM’s. Instead, leading companies are learning to develop the right kinds of proactive tasks to manage random failures.

Developing the right proactive work program is not simple, but there are many well documented methodologies such as Ivara’s (Aladon) RCMII, and Maintenance Task Analysis (MTA) which can assist firms in identifying the right work. These approaches look at all of the ways that an asset can fail (Failure Modes), and they take a different approach to failure management. Rather than attempting to use time-based tasks to manage the asset, this new approach to maintenance is focussed on mitigating the consequence of failure at the Failure Mode level. This approach looks at each specific Failure Mode, and determines the best proactive task or tasks to detect failure or prevent its consequences. Done properly, the result will be a high percentage (>80%) of tasks that require some form of condition monitoring, and a much lower percentage (<20%) that rely on time-based tasks, or tasks related to operating age. In addition, the failure analysis will identify the corrective work to be performed when early signs of failure are detected.

Condition monitoring tasks, driven by an understanding of failure modes, create a picture of equipment health from visual inspections, the appropriate use of predictive technology (thermography, vibration, non-destructive testing) and online equipment data (pressure, temperature, flow, amps, etc.). These condition-monitoring activities generate massive amounts of data related to the health of the equipment. To be of real value to maintenance and operations, the data must be effectively centralized, analyzed, and compared against pre-defined “normal” states, allowing users to focus on just the non-normal data. Done effectively, this management of condition information will lead to dramatic improvements in asset reliability.

Ivara EXP

Ivara’s EXP software acts as a single application with which to develop the complete Asset Reliability Program - the list of all proactive tasks for optimal maintenance of each asset. In addition, EXP is a tool to implement an Asset Reliability Program. EXP creates a single place for monitoring the effectiveness of these Asset Reliability Programs, collecting, analyzing and displaying all asset condition data. EXP supports developing and managing the Asset Reliability Program, and managing all of the sources of data that are needed to manage the health of an asset.

Building an Effective Asset Reliability Program

EXP provides a tool to capture the entire process of identifying the right work to proactively maintain assets. In many environments today, there is an opportunity to transition from the current informal work identification (Work ID) process, to a process that is more formalized. A typical informal Work ID process is shown in the figure. When the Work ID process is informal, we often find that work is identified through operations initiated Work Requests (signalling that a failure has already occurred), manufacturers generic time-based task suggestion, work that has always
been done but for which the justification is non-existent or not clear, as well as some level of predictive technology. In these environments, we also often paper records of condition inspections being conducted - but they rarely lead to new work being identified – instead they pile up on a desk and serve only as an after-the-fact reminder that a failure could have been prevented.

Ivara reliability consultants will help you to develop a more formal work identification process, so that all proactive work is tied directly to a failure mode. EXP is the tool used to systematically prioritize assets, document the work ID analysis, create the asset reliability program along with health indicators and alarm levels, and specify the recommended proactive corrective actions.

**EXP Supports the Work Identification Process**

**EXP Puts the Asset Reliability Program into Action**

Whether the correct proactive work was identified through Ivara’s Maintenance Task Analysis (MTA), through Reliability Centered Maintenance (RCM2) or some other methodology, Ivara EXP is the technology to put that proactive Asset Reliability Program into action. EXP records each task in the new Asset Reliability Program, linking all condition monitoring tasks directly to the indicators to be checked. From there, check sheets instruct the operations and maintenance personnel to conduct the inspections, and through the handheld devices, current data is collected and fed to EXP. EXP provides a single place from which to view and respond to any non-normal data that has triggered alarms.

A sound failure analysis will typically determine that about 33% of failure modes should be allowed to run to failure, while recommending redesign for about 4% of all failure modes. The remaining failure modes will be the focus of Asset Reliability Program, which is managed within EXP. Over 80% of the tasks in a well defined Asset Reliability Program will be made up of condition/state inspection tasks, while less than 20% of the tasks will be age-based. While all CMMS products can adequately handle triggering tasked based on operating age, EXP is the only tool designed to handle both age based and condition inspection tasks.

As condition monitoring tasks are defined, appropriate indicators are set up for the inspections, along with defined normal and non-normal states. For a temperature reading for example, the normal state may be defined by a range of temperature values. Various levels of non-normal states may also be defined to correspond to...
increasingly unacceptable temperature ranges. With each state, or temperature range in this case, a user defined alarm level can also be defined. As temperature readings are recorded, EXP compares the new value to the normal and non-normal states and triggers an alarm when non-normal values are recorded.

EXP collects condition and state data from a variety of sources, including visual inspections, predictive maintenance technologies, process controls, sensors and data historians. Data from predictive technologies such as vibration analyses, thermography and oil analysis is also utilized within EXP.

EXP tracks several kinds of condition indicators including:

- Simple numeric values
- Qualitative or descriptive information, with user-defined value lists
- Mathematical calculations
- Rule-based configurations

Ivara EXP uses single or multiple data points, applying rules and calculations to create a true picture of equipment health.

With the transition to an effective Asset reliability Program, maintenance and operations personnel will be collecting and managing an increasing number of condition based proactive tasks. In this environment, it’s critically important that the newly recorded readings be utilized immediately. EXP helps out with this data management challenge by sorting through the normal and non-normal data, and displaying the results in ways that are easy to understand, and utilize. Rather than requiring users to sift through piles of paper based inspection readings, as non-normal values are recorded, alarms are triggered and displayed, drawing attention to only the few data points that currently signal the potential for equipment failure.

The plant, all of its assets and failure-mode-specific health indicators can be displayed in two different ways. The first display method uses an Indicator Panel, a two-panel screen showing the entire plant hierarchy and all assets on the left side, and relevant health indicators on the right side. See screen to right.

The Indicator Panel in Ivara EXP allows you to monitor asset condition and, at a glance, see any indications of impending failures – before the failures occur. Flashing alarms are displayed when assets are moving closer to functional failure and alarm severities are readily understood based on the type of icon displayed. Corrective maintenance decisions can be made based on asset health and risk to the business, so that the right work can be performed at the right time.
The second way to display asset health indicators is through graphics, photographs and diagrams, as shown in the compressor example to the right. As non-normal data triggers alarms, the indicators begin to flash on the drawing. And since the alarms roll up the equipment hierarchy, a user could easily drill down from a higher level picture to the compressor in this case, to quickly zero in on the flashing alarm and the non-normal data. This capability makes it very easy for users to respond to data immediately as it is updated, without the need to review all data.

Asset Health Trend Plotting
Many companies have collected condition readings for years, but have lacked the tools to manage the data properly. Charting of asset health indicators allows trends in asset condition to be easily noticed. Bands of color graphically show alarm severity ranges.

This graphing capability dramatically improves management’s ability to proactively intervene to ensure that asset health is maintained and reliability is maximized.
Using Hand Held Devices to Collect and upload Condition Inspection Data

The software replaces the manual paper-based approach to collecting, storing and analyzing condition data, allowing inspection routes to be automated using simple hand held devices. In the case of subjective inspections, operators will be presented with a predefined list of observation values from which to choose, making the condition data more quantifiable and useful.

Capturing the Experts’ Knowledge about Asset Condition and Reliability Programs

Ivara EXP captures the knowledge of your equipment experts, the operators and maintainers who know the equipment best. In many companies, these employees have worked with the equipment daily for decades, and so their knowledge is invaluable. The challenge is to find a way to store this information so that all employees can take advantage of it for their daily work. EXP captures this knowledge and makes it available.

During the failure analysis, the maintainers and operators for the target asset will be asked to contribute their knowledge of the ways the asset fails and the ways that have been found for detecting or preventing failure. The condition monitoring detail that was previously carried around in personal pocket books becomes some of the critical knowledge stored in EXP, as the new Asset Reliability Program is defined. These employees usually know exactly how the equipment operates, and how best to perform the required condition checks. In the context of a well defined failure analysis, we’ll capture this knowledge, formalizing it by linking the proactive tasks to specific failure modes, and gaining agreement between operations and maintenance that we’re doing the right work. For example, the EXP screen shown below, captures the calculation to determine the effectiveness of a heat exchanger. You no longer need to remember the engineering calculation since EXP stores the expression, making it permanently available for all to use.

For more information, call 1-877-746-3787 or visit us at www.ivara.com.
Ivara EXP – Product Overview
Ivara EXP combines data from various indicators to determine the overall effectiveness of the heat exchanger and when a non-normal value is found, prompts the user with the predetermined corrective action. Visual or other sensory inspections are logged via hand-held data recorders (PDA’s). Non-normal readings will trigger alarms and follow up work tasks to suggest more rigorous inspections or corrective work.

**Personalized Software**

Ivara EXP is easy to personalize and is fully tailorable to meet your unique requirements. You can change screens and field labels, resize fields, and move or hide fields. You can add new fields for customer-specific data or add entire new pages and views. All of these changes can be made without any programming, and without impacting the Ivara support for the product.

**EXP Helps to Make Your EAM Successful**

Most companies have invested in a Computerized Maintenance Management System (CMMS) or Enterprise Asset Management system (EAM); for example, SAP EAM, Oracle, Indus, MRO, or Datastream. However, the challenge remains - you still need to identify the right work. EXP complements your EAM system to make it more effective by identifying the right work, on the right equipment, at the right time.

Ivara provides a certified interface to SAP Plant Maintenance through SAP’s NetWeaver platform. This interface is certified by SAP as “Powered by NetWeaver”.

Ivara SUPREEM Enterprise Asset Management software includes all of the features of a world class Enterprise Asset Management system (EAM) and extends to incorporate the unique reliability features of Ivara EXP.
Ivara’s approach to EAM software enables you to move to a proactive approach to asset management. Within Ivara SUPREAM, proactive work is triggered based on the current health of the asset. All resulting work links back to the failure analysis that was done to determine the right work, whether that analysis was done using Reliability Centered Maintenance (RCM) or Maintenance Task Analysis (MTA). This approach supports a fully proactive maintenance environment – doing the right work, effectively and efficiently.

**Superior Technology Makes Integration Easy**

Ivara takes advantage of the latest technologies making its software easy to install, easy to extend and easy to integrate with other applications. EXP leverages investments in CMMS as well as predictive technologies and process control equipment, both of which may be collecting meaningful data that help users create a complete profile of asset health.

Ivara has built-in integration to many applications – right out of the box. This out-of-the-box integration includes Online Data Collection Services for Predictive Technologies, Reliability Centered Maintenance (Aladon’s RCM2 software), and integration to SAP PM.

**Quick and Easy to Implement**

Features like Ivara’s quick-start database provide industry-standard templates, eliminating many hours of data entry. Ivara’s pre-defined desktops group role-based features together so you don’t waste time creating tailored screen layouts for each functional group of employees.

With Ivara’s unique WorkSmart implementation approach, we’ll have you up and running fast with a solution tailored to meet your needs – so you start realizing benefits quickly! We’ll also ensure that your reliability competency enables your improvement initiatives to be sustained.

> "Some of our best users are those who have never used a PC before. We started collecting and analysing condition data on the third day of the implementation."

**The Bottom Line**

Achieving and sustaining improved levels of reliability will help manage maintenance costs more effectively. Asset reliability improves output and uptime, creates higher customer service levels, creates a safe environment and enables companies to comply with environmental regulations.

Ivara EXP is today’s essential tool for maintenance and reliability professionals. For more information, call Ivara at 1-877-746-3787.