

## **A L E R T** – The diagnostic tool

**ALERT** (*Adaptable Leading-Edge Reliability Techniques*) is designed and developed by MCARTEch, Inc., USA. It helps predict abnormal behavior of critical machinery and industrial systems, enabling safe and timely remedial response. Guided by custom built rule-based diagnostic logic, corrective actions are supported by **ALERT** to prevent or mitigate the consequences of serious abnormalities in critical plant machinery.

Proper prediction of Machinery and System performance requires analysis of historical trends of relevant signals from equipment and sometimes from the processes. Applying knowledge, experience, and past history, abnormal trend signatures can be correlated to machinery problems. Such signatures, in coordination with other dynamic conditions detected by sensors, can provide valuable insight into the current health and future behavior of machinery. This type of equipment diagnosis proves invaluable in avoiding downtimes leading to revenue loss, serious health and safety consequences and the exorbitant cost associated with unplanned stoppages.

**ALERT** provides an affordable and *adaptable* platform to develop and customize the most appropriate diagnostic rule, applicable to detect significant machinery abnormalities. The possible problem scenarios and their targeted counter-measures are pre-configurable.

The strength of **ALERT** lies in its ability to predict a multitude of possible abnormalities and provide timely notification with guidance for recommended remedial response. In short, **ALERT** provides a platform to model the Failure Modes and their Detection methods.

**ALERT** diagnostic notifications are designed to guide users to act safely and correctly. Diagnostic recommendations can include drawings, pictures, written SOPs, audio or video guidance (in local language) on how to safely navigate to the location of the problem and perform the job correctly, timely and safely. The architecture of **ALERT** is essentially a cloud-based application that permits features requiring a large amount of memory. The delivery of diagnostic recommendations on a “Personalized” Dashboard via portable smart devices allows real-time multiuser access and collaborative problem solving.

**ALERT** is designed to help alleviate potentially troublesome situation before it gets serious. The personalization of the **ALERT** notification will be in accordance with the nature and magnitude of the predicted abnormality. Such targeted and pre-processed notification will prevent inadvertent loss of critical information with an assurance of correct and timely action.

## **A L E R T – How it works**

The functionalities of *ALERT* are based on real-time data acquired from the plant. A Gateway computer called the *ALERT* Gateway (AG) will be installed in the plant to collect relevant analog and digital signals required for the purpose of diagnostics. The signals are sourced from the existing sensors connected to the PLCs or data hubs available in the plant where *ALERT* gets deployed. If the required signals are non-existent, the MCARTEch team is highly qualified to help assess the sensor requirements and installation methods. In cases where a suitable PLC is not available, MCARTEch will provide all the necessary hardware to deliver a fully functional system.

The AG hosts a database that gets populated by the real-time data acquired from the plant. The AG in turn validates and packages the data for onward transmission to the *ALERT* cloud, utilizing internet or a cellular connectivity. The database in the *ALERT* cloud receives the analog and digital information, updates itself and shares the data with the various Functional Modules, such as –

- a) Machinery Essential Information Record (MEIR Trending)
- b) *ALERT* - Predictive Diagnostics - functional
- c) Dashboard - functional
- d) *ALERT* - Troubleshooting – design completed, under software development
- e) *ALERT* - Machinery Condition Monitoring (Inspections) – design completed, future development
- f) *ALERT* - Smart Fault Tracking – design conceptualized, future development

The predictive Diagnostics module performs its task as per the defined algorithms programmed (Failure Mode Models) utilizing the acquired data. *ALERT* Predictive diagnostics outputs gets generated when all the conditions in any specific algorithm gets satisfied. Immediately upon detection, the diagnostics gets published on the *ALERT* Dashboard and Notifications are issued. The notifications received through text messages and emails are short messages for a quick and short information. The user is then expected to log-in to the *ALERT* application and access the Dashboard to get the complete details of the problem detected.

Based on the severity of the diagnostics, the user will access the Guidance support or other analysis tools provided in the MEIR module to understand what exactly needs to be done to normalize the abnormality detected. *ALERT* predictive diagnostics keeps a watch on the anomaly and reports back when the specific anomaly gets normalized. *ALERT* Dashboard keeps a list of all the diagnostics triggered over various time slots.