Track 3 – Equipment Reliability Abstracts

Paper: Team Root Cause Analysis-A New Approach
Level: Advanced
Presenter(s): Chris Eckert, Apollo Associated Services & Mike Mastic, Dow Chemical
Abstract:
Team Root Cause Analysis- A New Approach to an Old Problem

Root Cause Analysis (RCA) has been a primary improvement tool for most reliability professionals for years, and at Dow, formal RCA has been in place for nearly two decades.

Because RCA is integrated throughout all work processes in our entire organization, including reliability, manufacturing, EH&S and supply chain, it has considerable impact on our overall performance and competitiveness.

When you are busy, it is difficult to find the time to improve existing programs like RCA. After twenty years, due to growing variation in application, we felt the need to scrutinize our program and its results. One of our business units decided to take a fresh look at our program to strengthen its impact on performance and competitiveness.

As we examined the current state, we found sufficient justification to improve our existing program. Our results were not what we knew was possible; we knew we could do better. So over a twelve-month period, we gave our RCA program an overhaul.

This paper will review:
• how our business unit took a long-standing RCA program, compared to best RCA practices, and re-tooled to elevate the value of our program
• our case for change
• "before" and "after" metrics, including repeat events and the costs of unplanned events
• seven measures for RCA effectiveness that we developed which now guide our efforts our start-to-finish process for initiating, conducting, and documenting our RCA's
• other valuable learnings such as what we report to the business team, leveraging results, event validation, proactive RCA, and engaging the workforce

Paper: Implementation of Reliability during Engineering Design Projects
Level: Advanced
Presenter(s): Dennis Edwards, Sr., Fluor Global Services
Abstract:
Many design engineering firms have documented, practiced & mastered the various elements of capital project executions. However, these same firms typically have little or no understanding of the various aspects of Maintainability & Reliability and the manufacturing impact when these are overlooked. Equipment reliability, while becoming a major focus within ongoing oprations, is typically difficult to implement during the various engineering design phases of a project. For

Paper: Reliability Applications - Outside the Plant: Building Maintenance and Control
Level: Advanced
Presenter(s): Allan Hines, Absolute Thermography & Joe Cobb, Predictive Service, LLC
Abstract:
This paper introduces several methods identifying how Infrared Thermography, along with complementing predictive technologies, will increase the safety and operating performance of buildings such as hotels and hospitals. When these combined strategies are applied, building maintenance managers have increased reliability awareness and better overall control of their facility.
Infrared thermal imaging has been used almost exclusively to identify electrical anomalies in buildings throughout the world for some time; however, this science can be applied in other areas for additional benefit. This paper will show examples and case studies of both old and new buildings. Buildings, such as a hospital, are as important as any manufacturing facility and they are quite capable of getting sick themselves. With today's advanced technology and application knowledge, we can find the building's ailments before the symptoms become critical and result in costly repairs.

The exterior envelope of any building is designed to keep the elements out and provide shelter and comfort. Discovering breaches in the outer part of a structure usually happens after the water has left its obvious mark somewhere. The hidden problem with this is that water may have been getting in and pooling for some time and structural issues, rot and mould, are now involved. Infrared Thermography can identify water or air infiltration at its earliest stages, preventing larger costly repairs whether it's on a roof or a side wall. Mechanical applications are the same as in any manufacturing facility with equipment such as cooling towers, compressors, chillers and boilers, to name a few. Examples of these and more will be showcased.

By using proper inspection methods you can effectively control your building's heating / cooling efficiency. Air-flow management and comfort / temperature control is vitally important due to today's environmental responsibilities and reduced management budgets.

Paper: The ABC's of Failure – Getting Rid of the Noise in Your System
Level: Fundamentals
Presenter(s): Winston Ledet, The Manufacturing Game
Abstract:
It has become apparent over the past 20 years through the process of gathering, analyzing, and condensing data from manufacturing sites all over the world that maintenance and reliability can be simplified into the basic ABC's. A – the Aging of equipment, B – Basic wear and tear and C – Careless work habits account for all of the production loses and equipment down time experienced by our industry. There are very simple ways to address the ABC's. Unfortunately the Planned Domain, pursued by most industry in the Western World will not get organizations to the goal they are trying to achieve since it is an unstable state of existence. Achieving a high degree of Planned and Scheduled work is a consequence of working correctly not the goal for which we should aim. In order to achieve Best in Class performance a site needs to be able to get rid of 40% of the existing work. The work that must be eliminated is the unplanned and unscheduled work that continually keeps you in the Reactive Domain. You must eliminate the "noise" in your system if you expect to make a real and sustainable change….

Paper: Reliability Centered Processes Drive Technology
Level: Fundamentals
Presenter(s): Gail Petersen, Datamasters Software House, Inc.
Brian DeMeulle, UC, San Diego, A&PS
Abstract:
Auxiliary & Plant Services (A&PS) of the University of California, San Diego set an objective to become a customer-centric performance-driven organization through business process renewal. At the same time Facilities Management (FM) chose to replace their legacy CMMS. A determined IT Director was convinced the benefits of new technology could best be realized if the technology implementation was driven through renewed business processes. This presentation tells the story of FM's successful maintenance business process renewal illustrating the story with revealing breakthrough examples.

The journey of discovery began with understanding how FM did business and an analysis of FM's processes to uncover the root causes of failure. Using a powerful reliability centered business process reference model, FM then launched into a redesign of their processes and quickly configured the model to match its business. A&PS' and FM's performance indicators and objectives were then merged with the model's Balanced Scorecard. FM's reliability goals were aligned with A&PS's business goals and traceability from strategic intent through business processes to performance was realized. The renewed processes drove the CMMS configuration and implementation, and the KPIs provided a guide for the CMMS to capture key data. This initiative represented A&PS' first significant step towards its objective to become a customer-centric performance-driven organization.

FM's business process solution first drove the implementation of its CMMS, and now provides a reliability centered roadmap to grow into over the next years. The renewed processes, designed for reliability to sustain the life of UCSD's assets, will lead to a powerful defect-free solution over time.

Paper: Reliability Centered Maintenance applied to the CH-47 Chinook Helicopter – Universal principles that go beyond Equipment Maintenance

Level: Fundamentals

Presenter(s): Nancy Regan, The Force, Inc.

Abstract:

"Reliability Centered Maintenance (RCM) was performed on the CH-47, the US Army's heavy lift helicopter and transformed the aircraft's maintenance concept. Phase maintenance tasks were reduced by 73% and takes 50% less time to complete. In August 2007, three years after the initial implementation of RCM results, the aircraft achieved its readiness goal of 75% Fully Mission Capable for the first time since it was fielded! But RCM has allowed the CH-47 platform to achieve even more.

The CH-47 program has used RCM principles to identify solutions in other areas such as system health monitoring and management using embedded sensors, Special Tools and Test Equipment (STTE), and Item Unique Identification (UID). As the DoD moves toward an automated maintenance environment, RCM plays a key role in determining when it would be safe, technically appropriate, and cost effective to implement sophisticated monitoring devices in lieu of scheduled maintenance inspections to detect potential failures. Additionally, the concept of maintenance stations is changing which causes the distribution of, and the types of STTE to change. RCM principles were used to analyze what and how many tools are required at various locations in the field. As a result, the CH-47 PMO was authorized $5 million per year for STTE. Finally, in 2003 the DoD mandated that specific legacy parts be marked with a two-dimensional barcode. This requirement raises concerns: how and where to mark and how to ensure that the introduction of new medium to a part (ex. a label or dot peen) does not adversely affect safety or performance. RCM principles were employed to identify a technically appropriate, safe, and cost effective marking technique for each part considered. To date, over 1,000 marking field procedures have been issued.

This presentation will explore the outstanding results RCM has achieved for the CH-47.

Paper: Effective Asset Care Program
Level: Fundamentals
Presenter(s): Sunil Thekkepat, Texas Instruments, Inc
Abstract:
Implementing an effective asset care program in multi-factory environment can be time consuming and resourse intensive. However by forming a cross functional and cross organizational team to perform a comparative analysis can highlight non-value added maintenance practices and gaps in current maintenance programs. Steps of the this program will be
1)Develop a master list of equipment and maintenance programs associated with it.
2) Determine the criticality of the equipment and the system.
3) Confirm if the level of asset care matches the criticality.
4) Eliminate non-value added inspections and maintenance.
5) Identified common metrics to determine and track PM effectiveness across site.
Results from one year of review of five factory process resulted in net reduction of over 2000 man-hours and net Cost reduction of $145k along with overall improvement in reliability. It will also assist in transforming maintenance from an experienced based practice to a more knowledge based discipline.

Paper: Running a Successful Condition Monitoring Program
Level: Fundamentals
Presenter(s): Jason Tranter, Mobius & Tod Baer, Minnkota Power Cooperative Inc
Abstract:
Too many condition monitoring programs fail because of the lack of management support, insufficient training, and poor planning. This paper discusses the challenges faced by condition monitoring program management and technicians, and offers a number of suggestions for ways to run a successful program. The paper is broken into four parts: how to start a new program, how to improve a mature program, a discussion of a survey of condition monitoring programs, and a case study of Minnkota Power (presented by Tod Baer).

Paper: Optimizing Production for Critical Equipment Systems using Monte Carlo Simulation and RCM techniques
Level: Advanced
Presenter(s): Pedro Paulo Vasconcellos, Braskem & Antonio Portella, Braskem
Abstract:
Production loss due to equipment failure is becoming far less acceptable for large companies that seek to compete in the global market. As a result, Reliability engineers, maintenance and operational resources must rely on their experience to choose the best of the many tools available to aid them in reaching their objective.

This article presents the use of Monte Carlo Simulation and RCM techniques to reduce multiple failures probability of a system, modeling a critical pump system with spare pump testing.

This system is made up of three pumps: Two turbine-pumps and one motor-pump. This system's function is to pump fuel oil for several boilers. To achieve this, the system needs only one active pump. When system fails, the boilers, and consequently the plant, will shut down, losing five million dollars in Braskem case.

The system reliability will be presented using two production scenarios: The first uses one active turbine-pump with the second on standby, and the second uses two active turbine-pumps.

In the first case, the motor-pump is immediately activated until the standby turbine-pump is brought online, at which time the standby turbine-pump takes over and the motor-pump is turned off; whereas in the second case, both turbine-pumps would have to fail before the motor-pump is activated. Should this occur, the motor-pump assumes the function until one turbine-pump is repaired and brought back online.

In the first case, the motor-pump operates at about one day. Is there any difference in the system reliability when the operating time of the motor-pump is changed? What is the best frequency to test the motor-pump in order to reduce the probability of multiple failures of the system? All these questions will be answered and the results shown in this presentation. Also, we will show which production scenario is better, the first or second.