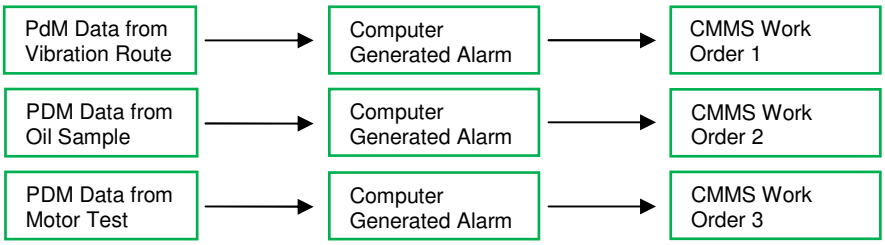
Getting From PdM Data To Successful Repair

Often it is difficult for a plant to consistently move from condition data that indicates a machinery problem to successful, timely repair of the equipment. Problems that interfere with the process are the usual suspects: Information integration, communications, and accountability. Many large industrial facilities have wrestled with these problems and over time evolved strategies for improving their condition based maintenance execution. The following work order generation scenarios discuss the evolution of using equipment condition information to drive maintenance work.

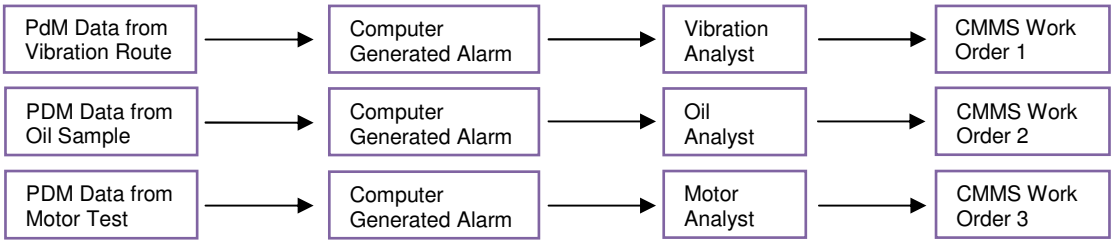
Scenario 1: Automated Work Order Generation



Since the development of computer maintenance management systems (CCMS), the dream has been for PdM data to go into a computer, and then have work orders generated automatically for equipment in alarm. Many sharp process control people propose this solution because they don't understand that the analysis of condition data is both objective and subjective. As such, a PdM analysis must interpret equipment conditioning data using his training and experience in order to determine problem severity, cause, and recommendations.

Scenario 1 is not practical, as a trained and experienced analyst must first interpret data to determine problem severity, cause, and action needed.

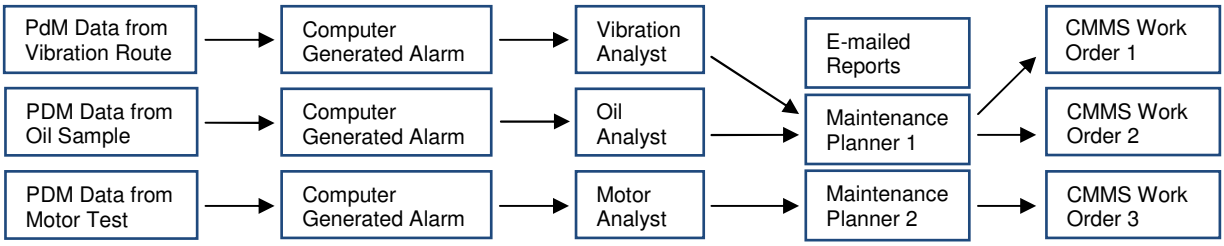
Scenario 2: Work Orders Generated Directly by Condition Analysts



Some plants use a strategy where PdM analysts enter repair work orders directly into the plant CMMS following data analysis. These plants report that their greatest problem is poor visibility of known condition problems. The poor visibility of active condition problems and lack of ability to manage and analyze reliability information leads to poor work prioritization and scheduling along with lack of accountability for preventing failures in service.

In addition, not all identified equipment condition problems warrant a work order. Many PdM problems are identified at an early stage and need additional verification using other technologies or inspections. Another possible circumstance is that a problem is at low or moderate severity, allowing more run time and flexibility in repair scheduling. This scheduling flexibility allows the plant to work on the machine if downtime is available, if not it will be allowed to operate longer before a work order is issued. For these reasons, a dashboard of condition problems need to be needs to be available to allow work prioritization. Another problem with the Scenario 2 approach is the inability of plant contractors such as PdM Service Companies, to enter work orders. When contractors outside the plant are used, their results are typically transmitted by independent reports.

Scenario 3: Work Orders Generated from E-mailed PDM Reports

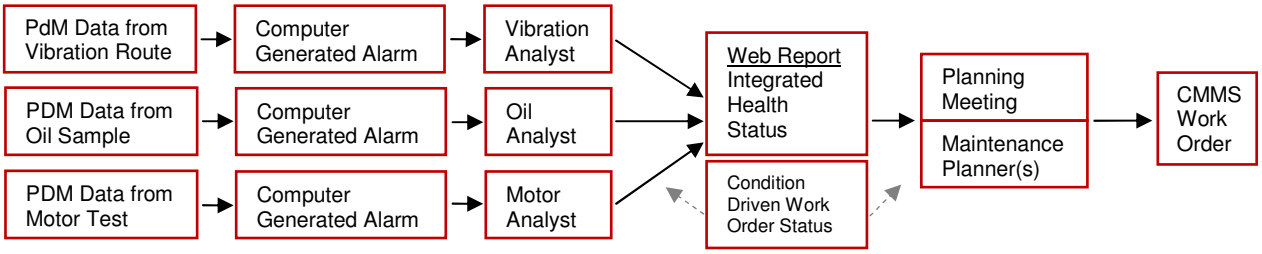


Using e-mailed reports to summarize and present the condition problems from each technology to maintenance supervisors and planners is a common method of distributing PdM results.

The greatest weaknesses of this approach are the lack of integration among multiple PdM technologies (since each technology reports independently) and poor visibility of all the information available for a specific machine. Lack of good communication and accountability is common. This approach results in "dropped balls," meaning that problems are overlooked or forgotten, allowing the equipment to fail in service.

Scenario 3 introduces the concept of work prioritization and gate-keeping by using a weekly planning meeting. This approach allows a meeting of managers, planners, reliability engineers and maintenance supervisors to review equipment problem severity, planned outages, production requirements and decide which critical problems receive the priority this week. The greatest problem with this approach is providing visibility to all open problems and their criticality.

Scenario 4: Integrated PDM Results Driving Work Order Generation & Follow-up



Plants using scenario 2 or 3 generally mature in their condition based monitoring programs to where their condition monitoring and analysis capabilities are excellent, but their integration, communication, visibility, and accountability of the information is a weakness preventing full success of condition based monitoring. Scenario 4 utilizes a web based reliability information management package to solve these weaknesses. Integration of PDM results through a web-hosted database allows easy standardization of reporting by all monitoring teams. Browser based reporting provides easy access to the information by all plant users who need condition status information.

Tango™ provides a web based condition management system which allows condition analysts to enter each condition problem and then integrates their results with information from other technologies, providing a complete view of the equipment condition. The Tango™ Reliability Dashboard displays all pending critical problems, their severity, aging and work order status.

Tango™ provides a standardized condition entry form (Figure5) for analysts to enter their evaluation of equipment problems. The condition entry form is the same format for all condition technologies and analysts results in actionable information which is ready for use by plant maintenance and management.

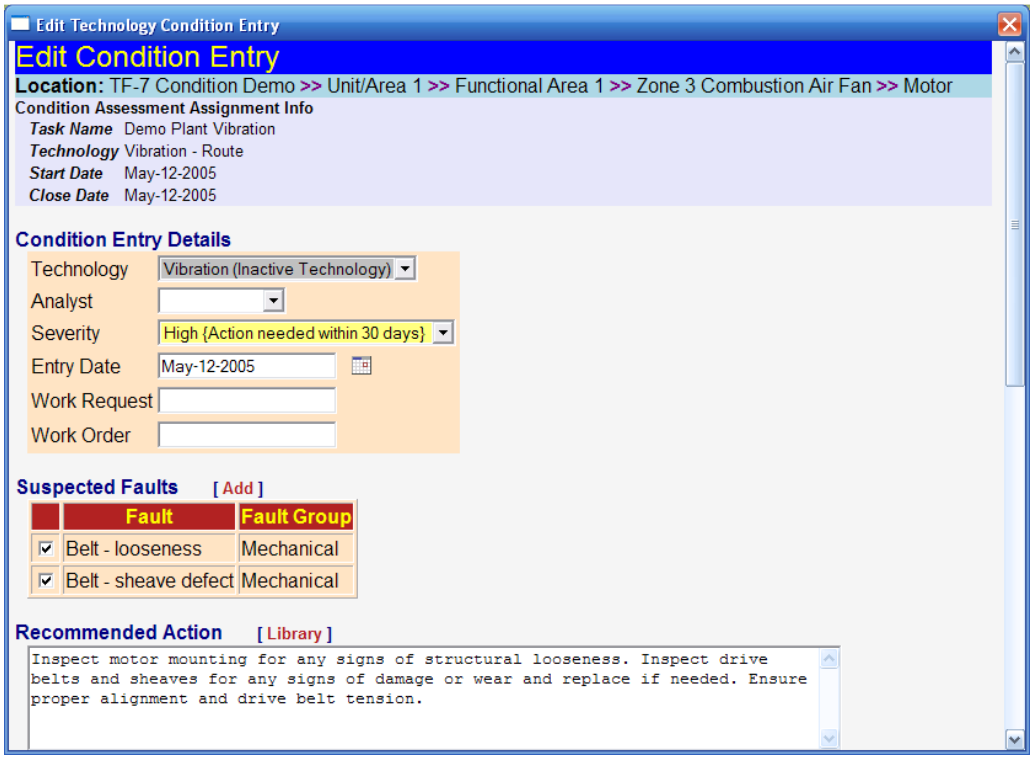


Figure 5:Condition Entry Form

From the condition entry information, Tango™ generates an "Integrated Condition Report Status Report" providing a condition dashboard for plant equipment. This report provides an overview of all plant equipment condition problems, their severity and work order status.

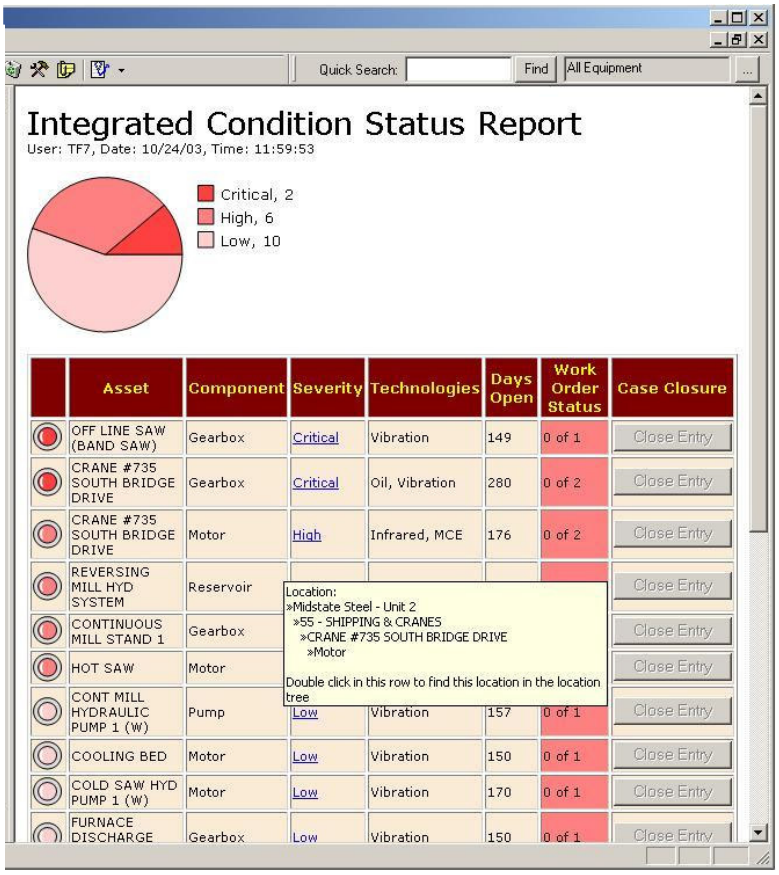


Figure 6: Integrated Condition Report

Plants using Tango™ typically use the Integrated Report (Figure 6) as a planning and prioritization tool. Often this report is projected in weekly staff meeting and reviewed in detail. From the Tango™ Integrated Condition Report Details view, Tango™ allows a maintenance planner to create a work order by copying information from Tango™ into the plant CMMS or by an automated interface which creates a work order and receives the resulting work orders.

Once a work order is created, there may be many operational and logistical reasons it is not immediately scheduled for execution. Tango™ provides and easy to view summary of open work orders, the length of time since the condition problem was entered and the work order number for each condition problem. Using the ICR as an accountability tool assists the plant in assuring that known condition problems are repaired before they fail in service.