Value Based™ Reliability Centered Maintenance

WHY VB-RCM?

With utility companies facing increasing customer focus and stronger competitive forces, all operating expenses, including preventive maintenance programs, are coming under intense scrutiny.

- **Value Based RCM can help optimize maintenance spending by balancing the value of reliability with the cost of maintenance**
- **VB-RCM presents preventative maintenance from the business perspective**
- **VB-RCM typically saves 40% of maintenance costs while maintaining or improving reliability**

VB-RCM IS A PROVEN TOOOL

VB-RCM builds on several proven technologies and successfully integrates these technologies into a powerful maintenance optimization tool.

A Brief History of RCM :

- First developed by the airline industry in the 1960s
- Adopted by the US military in the 1970s
  - Further developed and applied in the nuclear industry by EPRI in the 1980s
    - RCM has been accepted in thermal and hydro generating plants
      - RCM is being applied in transmission and distribution. RCM is being applied in the manufacturing and petrochemical industry

WHAT IS VB-RCM?

Value Based RCM is a systematic, objective and well documented approach to maintenance optimization. Classical RCM builds on the accepted concepts of risk assessment. As an extension**, Value Based RCM allows for a monetary comparison of the cost of maintenance with its benefit.** Value Based RCM incorporates power system reliability and value based engineering concepts into the maintenance task selection process.

VB-RCM allows for the full integration of maintenance into the asset/infrastructure management framework. Maintenance is seen as one of the means of supplying power to customers with an adequate level of quality and reliability. Maintenance decisions may thus be made on a level playing field with the decisions to replace, upgrade or redesign infrastructure. Maintenance planning and system planning can thus be performed in an integrated manner using a philosophy consistent with current management practices.

ADVANTAGES OF VB-RCM

- Value Based RCM allows direct comparison of maintenance spending with the dollar benefit to the utility and its customers.
- Value Based RCM allows integration with planning and operating functions.
- Value Based RCM allows overall maintenance optimization.
- Value Based RCM aids in **budget preparation and justification in terms of dollar comparisons** – an approach supported and understood by today's management.
- Customer impact can be explicitly considered.

- VB-RCM can form a framework for an incentive based regulation.
- VB-RCM is adopted and supported by the management, engineering and maintenance craft personnel.

VB-RCM IS READY FOR DEREGULATION

VB-RCM is the only form of RCM which is inherently ready for deregulation or re-regulation of the utility industry. Due to its focus on monetary cost benefit analysis, VB-RCM can be used to set incentive regulation targets or optimize the maintenance plan once the transmission performance targets (and the penalties for failing them) have been established.

STAGED APPROACH

Power System Solutions Inc. (PSS) has developed a unique staged approach to the implementation of VB-RCM. In working with numerous utility and industrial clients, PSS has fine tuned the application of VB-RCM to minimize resource and time requirements while maximizing the benefits, staff learning, and universal acceptance of the VB-RCM approach.

STAGE 1: TRAINING

The first step in implementing VB-RCM is to ensure that engineering staff, maintenance craft personnel and management have a good understanding of the VB-RCM technique. In particular, it is important they understand what VB-RCM can and cannot deliver, how it ties in with other operating functions of the company, and what commitment is required to implement it. The training session may also serve as a kick-off meeting for the VB-RCM project. PSS recommends allocating time to present a summary of VB-RCM to management and to request that management to endorse the project in front of all project participants.

The training course is structured into two days.

STAGE 2: GAP ANALYSIS

The primary purpose of the gap analysis is to assess requirements for the initiation of the VB-RCM program. To that end, PSS reviews the existing organizational structure, assesses maintenance planning practices, support tools, personnel attitude towards change and level of management support.

The results of the gap analysis are summarized in a report which serves as a high level guide for the validation project and full scale VB-RCM implementation.

The topics addressed in the report include:
- Summary of client's maintenance optimization efforts.
- What VB-RCM is and how will it advance maintenance optimization at your site.
- Synergies between VB-RCM and other operational and planning activities.
- Key management support required for the success of the VB-RCM program.
- VB-RCM organization and road map for the VB-RCM validation project.
- Validation project site selection.
- Resource requirements and schedule for the VB-RCM validation project.

The gap analysis typically takes one month.

STAGE 3: VALIDATION

The VB-RCM validation project consists of analyzing the systems selected in the stage 2. The objectives for the validation are:
- To prove the VB-RCM potential.
- Develop optimized PM procedures for all equipment within the pilot site.
- Verify time and resource requirements.
- Estimate the benefits to be gained by full scale VB-RCM implementation
- Prepare a schedule and project plan for the full scale VB-RCM implementation

The validation project typically takes three to five months

STAGE 4: IMPLEMENTATION

Full scale implementation of the VB-RCM project consists of extending VB-RCM from the validation sites to the rest of the utility infrastructure. Many results from the validation study can be directly used in the full scale implementation, including all equipment templates.

The primary objective of the full scale implementation is to optimize the entire infrastructure maintenance program and, in parallel, to implement changes in the client's PM program.

The full scale implementation includes:

- Implementation of condition based maintenance with the required condition testing and monitoring.
- Integration of the VB-RCM databases with the other maintenance and accounting information systems.
- Analysis of all systems.
- Summary of the results in terms of actual maintenance savings and savings resulting from fewer equipment failures and system outages.

The time required for the full scale implementation depends on the amount of resources allocated to the project. Typical full-scale implementation time frame is between one and two years.

STAGE 5: VB–RCM AS A LIVING PROGRAM

The primary objective of the post implementation stage of VB-RCM is to monitor equipment and system performance to ensure that the results expected during the analysis stage are met. The maintenance program must be corrected if the actual results deviate from the expected results. The analysis must also be modified for any significant changes in system configuration, introduction of new equipment or technologies, and changes in size and criticality of load.

The effort required for the VB-RCM as a living program is small when compared to the full scale implementation. The living program is best addressed by the maintenance planning group.

STAGE 6: AUDIT

The purpose of the VB-RCM audit is to verify that the concepts and principles of VB-RCM are "living" in the organization after completing the full scale VB-RCM analysis. The audit is an optional, yet useful, step that should be performed one or two years after completing the VB-RCM full scale implementation.

VB-RCM audit will:

- Verify that the conclusions of the VB-RCM analysis have been adopted by the field
- Assess the interaction between groups or individuals responsible for maintenance planning, maintenance scheduling and maintenance performance functions.
- Assess the utilization of the data from the field; such as the actual failure rate data, root cause analysis, etc.
- Assess the utilization of the Computerized Maintenance Management System (CMMS) and how it interacts with the VB-RCM Living Program.
- Verify that both the preventive and corrective maintenance spending are monitored and that savings identified during the VB-RCM analysis are confirmed.
- Assess the overall level of satisfaction with VB-RCM concept and application among involved parties.
- Recommend any changes or additional work required to correct any identified short-comings
- Identify areas of future opportunities such as integration with planning and design functions.

We have all the tools needed to make VB-RCM implementation a success.
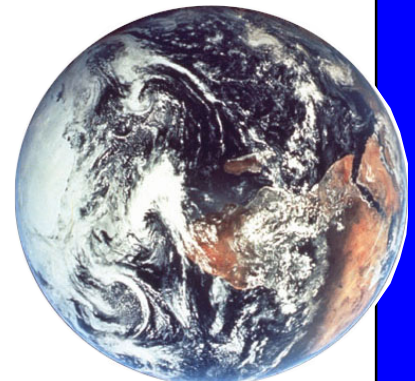
QUESTIONS AND ANSWERS

Q: Will the CMMS do the RCM?

A: Computerized maintenance management system (CMMS) is complementary to VB-RCM. VB-RCM will help you to determine what maintenance tasks are needed and why. Once these tasks are entered into the CMMS, the CMMS will help you to package, schedule and implement the tasks in the most efficient manner. A good CMMS will also provide feedback about equipment performance and preventive and corrective maintenance costs that can be used in RCM as a living program to verify and fine tune the analysis.

Q: What is the difference between the VB-RCM and condition based maintenance?

A: VB-RCM is not a type of maintenance, but rather it is a framework for determining optimum cost effective maintenance tasks. Condition based (or predictive) maintenance is a type of maintenance task, when the maintenance is done just-in-time based on monitoring equipment state. VB-RCM approach favors condition based maintenance since it is often the most cost effective approach to preventive maintenance.

Q: Is VB-RCM a computer program?

A: VB-RCM is not a computer program, rather it is a framework for identifying effective maintenance tasks and determining cost effective triggers for these tasks.
VB-RCM is made much easier and is greatly accelerated by the use of user friendly database programs.

Q: Is a Value Based approach to RCM more tedious than other forms of RCM?

A: In our experience, the Value Based approach actually saves time since the decision whether to perform each maintenance task is based mostly on cost benefit analysis (dollars). Hence, the subjective approach to the final maintenance task selection that is required in other forms of RCM is largely eliminated. In our experience, this step was the most time consuming and frustrating in other forms of RCM.

Q: What should be included when calculating the value of maintenance?

A: Value should include the reduction in corrective maintenance cost (both the failed equipment and other affected facilities), cost to restart the pro-

duction, cost of production downtime such as lost revenue, penalties etc. The value can also include the impact on the customer which is often high. For example, for electrical utilities this may be the end user, or another business unit that is being supplied.

Q: Are savings from VB-RCM application "real"?

A: VB-RCM typically results in reduction of both preventive and corrective maintenance spending. These savings are "real", meaning that less resources are needed to do the maintenance. Based on our past experience, utilities have often utilized VB-RCM to resolve the backlogs of maintenance work resulting from layoffs or redirecting of maintenance staff to other parts of company.

Q: Can VB-RCM be used to specify work for contractors?

A: While VB-RCM is impartial to who is performing the maintenance, it is very suitable for preparing a maintenance program if the execution will be performed by another party. The cost benefit analysis that is integral part of VB-RCM then forms an unbiased foundation for selecting the tasks to be performed from the list presented by the contractor.

CONTACT