

# MESH Living RCM Certified

**MAINTENANCE AND RELIABILITY  
PRODUCTIVITY  
CONSULTING**

Living Reliability (LR) consults in reliability and maintenance improvement using the Living RCM Certified methodology.

We focus on enhancing maintenance decisions by capturing knowledge in order to transform data into value.

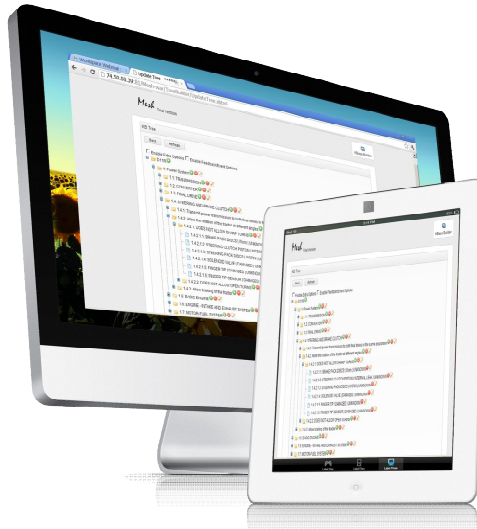
Living RCM Certified is a new process and strategy for managing maintenance information with the objective to increase the profitability of your business. The methodology is based on developing, monitoring, and continuously improving maintenance decision policies called "optimization models". These models support maintenance decisions on where to allocate maintenance resources day to day. The methodology relies on applying sound robust analytic methods applied to work order and condition monitoring data.

The main features are:

- Correct work order data entry (failure mode and failure event type)
- Dynamic update of the (RCM) knowledge base.
- EXAKT Reliability Analysis for optimal maintenance decisions.

[www.livingreliability.com/en](http://www.livingreliability.com/en)

## MESH Living RCM Certified is the missing link to achieving reliability from data



Managers and maintenance engineers have a responsibility to ensure the acquisition and proper analysis of accurate and relevant data. Today, Maintenance and Reliability Engineers must acquire and extract the "right" data. The degree to which they succeed is measured by their ability to perform reliability analysis. Analysis always precedes policies (called models) for optimal maintenance decision making.

Our Living RCM Certified offering includes:

1. Training: live and eLearning course "Achieving Reliability from Data"
2. MESH cloud software for implementing the Living RCM Certified process.
3. Consulting services to mentor reliability engineers as they perfect their skills in applying the Living RCM Certified process. your business .

## MESH Living RCM Certified Cloud

Consists of 7 modules:

- Downtime Administrator System (DAS) module
- Knowledge Builder (KB) module
- Work order user interface module
- Feedback Manager - RCM knowledge feedback module for continuous improvement of the RCM knowledge base
- RCM Knowledge Trail module to track evolving depth of RCM knowledge
- Analytics dashboard
- Synchronization module ensuring three way synchronization among EAM, RCM knowledge base, and field reality.
- Reliability Analysis and CBM Optimization

ID	EQUIPAMIENTO	ALI	REP	ESTADUS	SEVER	SEV	COB	RECURSOS	FECHA	LOCALIDAD	OPERADOR	MOD	AREA	CC	LA	ALL
20001	801010	801010	800	201110	201110	201110	201110	single problem	Operativa	single issue						
20002	801010	801010	800	201110	201110	201110	201110	single problem	Operativa	single issue						
20003	801010	801010	800	201110	201110	201110	201110	single problem	Operativa	single issue						
20004	801010	801010	800	201110	201110	201110	201110	single problem	Operativa	single issue						
20005	801010	801010	800	201110	201110	201110	201110	single problem	Operativa	single issue						
20006	801010	801010	800	201110	201110	201110	201110	single problem	Operativa	single issue						
20007	801010	801010	800	201110	201110	201110	201110	single problem	Operativa	single issue						
20008	801010	801010	800	201110	201110	201110	201110	single problem	Operativa	single issue						
20009	801010	801010	800	201110	201110	201110	201110	single problem	Operativa	single issue						
20010	801010	801010	800	201110	201110	201110	201110	single problem	Operativa	single issue						

ID	FEEDBACK	DATE	EXTRA INFORMACION	justificacion	ESTADO	ACTION
20001	FEEDBACK	201110		single issue not present correct data per central DAS	PENDING	Approve X Delete
20002	FEEDBACK	201110		single issue not present correct data per central DAS	PENDING	Approve X Delete
20003	FEEDBACK	201110		single issue not present correct data per central DAS	PENDING	Approve X Delete
20004	FEEDBACK	201110		single issue not present correct data per central DAS	PENDING	Approve X Delete
20005	FEEDBACK	201110		single issue not present correct data per central DAS	PENDING	Approve X Delete
20006	FEEDBACK	201110		single issue not present correct data per central DAS	PENDING	Approve X Delete
20007	FEEDBACK	201110		single issue not present correct data per central DAS	PENDING	Approve X Delete
20008	FEEDBACK	201110		single issue not present correct data per central DAS	PENDING	Approve X Delete
20009	FEEDBACK	201110		single issue not present correct data per central DAS	PENDING	Approve X Delete
20010	FEEDBACK	201110		single issue not present correct data per central DAS	PENDING	Approve X Delete

# MESH Living RCM Certified

## Modules

*MESH Living RCM Certified is aimed at companies that seek to optimize their maintenance process for maximum productivity.*

### INTEGRATED SOLUTION

Living RCM Certified integrates seamlessly with the EAM system

The cloud application is complements the the EAM and APM software by ensuring RCM knowledge updates and analysis grade age data from the work order.

### CONTINUOUS IMPROVEMENT

Living RCM Certified is a process of continuous improvement.

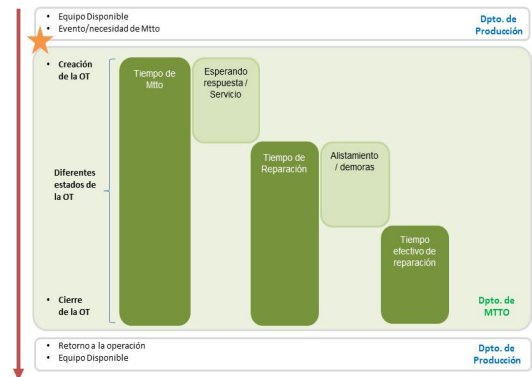
It provides a simple and understandable approach to the management of maintenance information.

- ✓ Improving the RCM knowledge base dynamically and incrementally in response to active work order experience
- ✓ Ensuring accurate and consistent data on the work order for subsequent reliability analysis

### Downtime administration system (DAS)

This DAS module is a dynamic table synchronized with the EAM and is the gateway to the Living RCM Certified work order process.

The EAM integrated DAS may interacts with an automated work order creation system. When an event requiring a maintenance service is triggered (automatically or manually) a work order is tracked through all its stages culminating in its the asset's return to service with the assurance of analysis grade data for subsequent predictive modeling by the Reliability Engineer.



*This MESH Living RCM Certified module identifies and records the changing states of the work order (awaiting parts, tools, repair time, delays etc) where precise measurement and analyze of downtime is required. Dashboards report time bottlenecks impeding the effectiveness and productivity of maintenance.*

Equipment unit requiring maintenance      Work order synchronized with the EAM system      Resource allocation, Observations, Related work orders

ID	EQUIPMENT	ALT REF	STOPPAGE	START	END	CODE	DESCRIPTION	STATE	LOCATION	OPERATOR	RWO	LRCM	CC	LB	ALL
205919	0220250	022-250	000	11-03-14 11-02-20		WOA10735	demo	Demora producción	demo	Geraldine Aguirre	4				
205924	0220255	022-255	000	11-03-14 11-20-31		WOA10740	comentario de orden	Demora producción	demo	Geraldine Aguirre	0				
205923	0220254	022-254	000	11-03-14 11-18-48		WOA10739	demo	Demora producción	demo	Geraldine Aguirre	0				
205921	0220252	022-252	000	11-03-14 11-13-27		WOA10737	demo	Demora producción	demo	Geraldine Aguirre	0				
205920	0220251	022-251	000	11-03-14 11-11-30		WOA10736	demo	Demora producción	demo	Geraldine Aguirre	0				
205925	0220256	022-256	000	11-03-14 11-27-51		WOA10741	PRUEBA DE COMENTARIO DE CIERRE	Demora producción	demo	Geraldine Aguirre	0				
205922	0220253	022-253	000	11-03-14 11-16-18		WOA10738	prueba WOA10738	Demora producción	demo	Geraldine Aguirre	0				

Symptom description of fault event      Monitoring states of the work order

### Main features of the module:

- Opening and / or close work order from this module
- Manage status changes of the Order, Skills and respective labor times
- Manage parts and labor resources
- Geographically locate the equipment unit
- Check for and incorporate timely PM tasks into the downtime repair

# MESH Living RCM Certified

## User Interface Module

The Living RCM Certified UI module delivers two primary functions:

1. Accurate, consistent work order failure mode selection and the failure mode life ending event type indispensable for reliability analysis.
2. The ability to provide suggestions for improving an RCM knowledge element, including text changes and the deletion or creation of an RCM knowledge element. Such contributions are vital to the evolution of the knowledge base so that it evolves ever closer to reality.

Continuous improvement in the effectiveness of maintenance depends on the quality of observational information returned by the technician onto the work order. Unlike a conventional EAM user interface, this module infuses precise RCM thinking into the work order data entry procedure. Living RCM Certified makes it almost impossible to select an incorrect EAM catalog value. At the same time Living RCM Certified eliminates the usual frustration and lost time associated with drop down lists of ambiguous failure codes. Accurate data as a result of Living RCM Certified enables the Reliability Engineer to conduct reliability analysis reliability and build optimal maintenance decision models for practical day to day deployment.

The screenshot displays the user interface of the MESH Living RCM Certified system. At the top, there are tabs for 'Jerarquía', 'Modos de falla seleccionados', 'Sugerencias sin aprobar', and 'Sugerencias de usuario'. Below these is a search bar with 'Palabras clave' and a 'Buscar' button. The main area shows a hierarchical tree view of failure modes for 'MOTONIVELADORAS CATERPILLAR 16H (1)'. The tree structure is as follows:

- MOTONIVELADORAS CATERPILLAR 16H (1)
  - 1. SISTEMA DE POTENCIA (1)
    - 1. MOTR - MOTOR BASICO (1)
      - 1. Entregar 290 HP en el volante del motor a 2000 RPM (1)
        - 1. No suministra potencia (Motor no funciona) (1)
          - 1. EJE LEVAS DESGASTADOS debido a DESCONOCIDO (1)
          - 2. PIÑON ROTO debido a DESCONOCIDO (1)
          - 3. MOTOR DIESEL BLOQUEADO debido a DESCONOCIDO (1)
          - 4. CIGUEÑAL ROTO debido a SIN LUBRIFICACION (1)
          - 5. CIGUEÑAL ROTO debido a BLOQUEO HI (1)
        - 2. Suministra menos de 554 HP a 1750 RPM (Baja rotación) (1)
          - 1. MOTOR DIESEL DESCOMPRESIONADO debido a DESGASTE NORMAL (1)
          - 2. AMORTIGUADOR DETERIORADO debido a DESCONOCIDO (0)
      - 2. Contener 9.2 galones de aceite limpio (0)

A context menu is open over the '2. PIÑON ROTO' item, showing options: 'Ver', 'Seleccionar', and 'Sugerencia'. A separate menu is also visible with options: 'Falla potencial', 'Falla funcional', and 'Suspensión'. Blue arrows point from the tree view to the text 'RCM Knowledge Base (Tree view)' and from the context menu to the text 'Selection of a Failure Mode instance and its Live Ending Event (PF, FF, S)'. A blue arrow also points from the text 'Knowledge feedback (suggestion) capability' to the 'Sugerencia' option in the context menu.

## Knowledge Builder Module

This module enables you to construct and maintain the RCM knowledge base

- Supports the development of RCM
- Tree view designed for speed and simplicity
- Tool Tips to assist in the use of Mesh extended options
- Image gallery associated with each failure mode for accurate communication of failure, potential failure and suspension standards
- user configurable criticality analysis
- Excel exports..

### HUMAN ORIENTED

Living RCM Certified is a people-oriented process. It sets a motivational model whereby management may appreciate and recognize employee contributions to leading performance indicators.

### SINCHRONIZATION

MESH Living RCM Certified functionalities are intimately synchronized with those of the EAM (SAP, Ellipse, MAXIMO and others)

# MESH Living RCM Certified

## Feedback Manager Module - Management of knowledge suggestions

Your organization's maintenance knowledge is dynamic, ever changing, and growing. Therefore it should be updated as a built-in continuous process. This module allows you to manage the suggestions by technicians, evaluate them and update the knowledge base accordingly as new experiences and observations accrue. This creative approach to maintenance knowledge management results in the PM plan to respond immediately with an optimal set of consequence mitigating tasks.

This module capitalizes on an important human component. It is the motivational factor that recognizes maintenance personnel contributions to the knowledge base in relation to management's objectives, visibility, and key performance indicators (KPIs).

Get all the suggestions made in the field with its respective justification

The RCM knowledge manager (Reliability Engineer) analyzes and manages suggestions fed back from the field and shops.

OPERATION TYPE	DATE	EXTRA INFORMATION	JUSTIFICATION	STATUS	ACTION
FMMODIFY	14-01-13 10:05:35		code does not exist please create new part called XXXX.	PENDING	Approve Decline
FMMIMAGE	14-01-13 09:49:07		picture missing	PENDING	Approve Decline
FMMODIFY	13-11-22 12:03:27		More appropriate effects	PENDING	Approve Decline
APPEND	13-11-20 15:45:59	Node to append: FMO - (FMO) - P. TOPES CENTRADORES TOLVA. D. DESGASTADOS. C. DESGASTE NORMAL/VIDA UTIL.	pq si	PENDING	Approve Decline

## Knowledge Trail

This module keeps track of (audits) the changing state of RCM knowledge including changes to the Knowledge Base (creators, rejected changes and accepted). Reliability engineers and managers can see the evolution of the knowledge base in its entirety. The history of knowledge associated with failure mode from its inception to the present may be investigated following safety and other major incidents.

## Synchronization module

This module ensures that RCM knowledge base are in perfect synchronization with the EAM catalog (failure code). This functionality is currently lacking in all maintenance EAM organizations which are therefore unable to ensure perfect representation on the work order of failure modes observed by the technician.

# MESH Living RCM Certified

## Reporting module

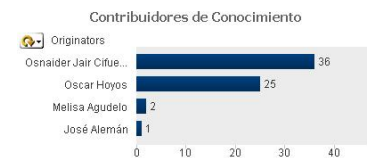
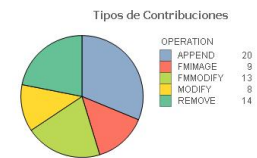
Flexible configurable analytics dashboards for viewing initial and evolving RCM knowledge progress, current CBM remaining useful life predictions, failure modes, mitigation tasks, and criticality analysis versus maintenance effort comparisons. These dashboards are unique in that they are based on analytical grade age data assured in the Living RCM Certified process.

KPIs low level: Relate directly to team performance. They measure everyday activities that impact high level performance.

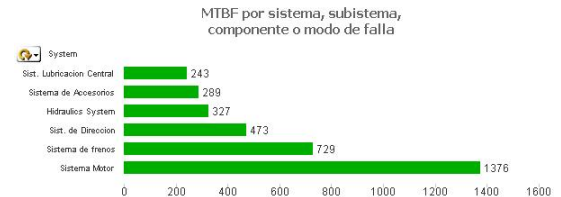
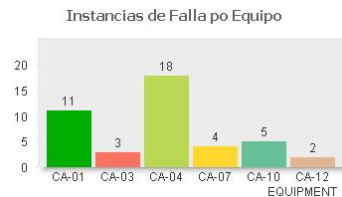
- Number of suggestions made to the Knowledge Base
- Number of reliability analyses performed and decision models implemented.
- Number of potential versus functional failures
- Information Quality on the work order

Lagging (high level) KPIs: Employees have no direct influence on these.

- Availability
- Reliability MTBF
- Maintainability MTTR
- Costs



How to set up and make effective use of low-level (leading) KPIs that support high-level (lagging) performance?



## Tech Requirements

Mesh Living RCM Certified is recommended as a convenient and affordable Cloud service, in which case there are no hardware or software requirements.

If desired, Mesh can reside on your company's intranet in which case

The MESH hardware requirements are:

- 2 GB min. RAM available.
- 2 to 4 processors / cores available.
- 20 GB of disk space for storing files in the application and the application server.

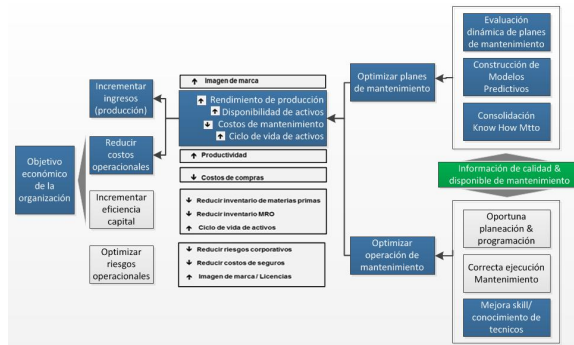
- For intranet deployment, the MESH software requirements are:
- Application Server Java Enterprise Edition v6 - 3.1.2.2 Oracle Glassfish, community version.
- Java Development Kit 7, preferably the latest update recommended by Oracle.
- Oracle Database 11g - Standard Edition.

# MESH Living RCM Certified

## Benefits

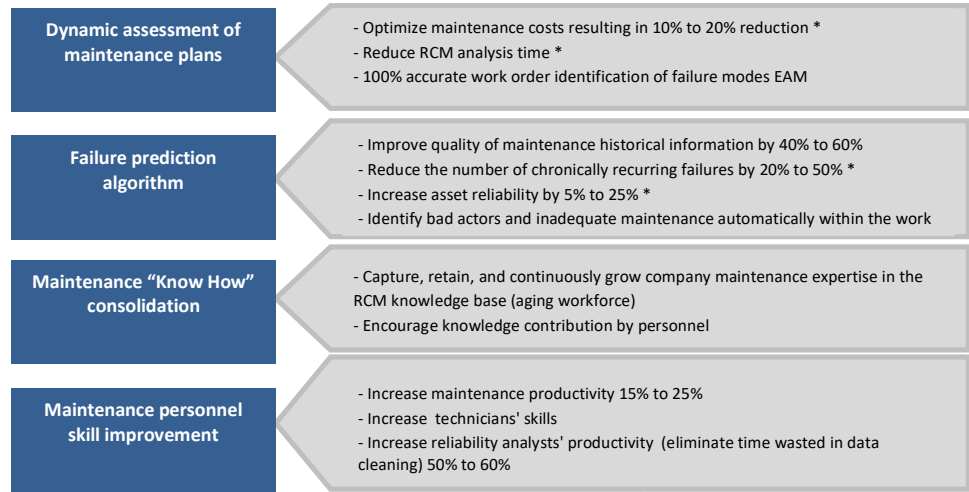
MESH Living RCM Certified procedures contribute directly to the reduction of maintenance costs and increased asset availability.

How much improvement will MESH Living RCM Certified bring to maintenance?



- Three sources of all maintenance improvement:**
1. a dynamic high quality RCM knowledge base
  2. Perfect work order data
  3. Reliability analysis

## MESH Living RCM Certified ensures high quality maintenance information,



\* Percentages may vary depending on industry

## Cost effective solution

- Generate payback of from 10 to 100 times the value of the investment by predicting and preventing failure.
- Living RCM Certified investment returns are evident within 4-8 weeks, in terms of business performance at ground level.

## Continuous improvement



- RCM standard SAE JA-1011 compliant
- Know the evolving maintenance performance using the dashboard audits (safety, environment, cost criticality)
- Align leading and lagging KPIs