RELIABILITY-CENTERED MAINTENANCE

RCM
CONDITION BASED MAINTENANCE PLUS

CBM+
DoD CBM+

CBM+ is the application and integration of appropriate processes, technologies and knowledge-based capabilities to improve the reliability and maintenance effectiveness of DoD systems and components. At its core CBM+ is maintenance performed on evidence of need provided by Reliability-Centered Maintenance (RCM) analysis and other enabling processes and technologies.
DoD CBM+
RELIABILITY-CENTERED MAINTENANCE (RCM)

• A logical, structured process used to determine the optimal failure strategies for any system.

• Based on system reliability characteristics and the intended operating context.
RELIABILITY-CENTERED MAINTENANCE (RCM)

• RCM defines what must be done to a system to achieve the desired levels of safety, reliability, environmental soundness, and operational readiness at best cost.

• RCM is to be applied continuously throughout the life cycle of any system.
RCM HISTORY


1968: Becomes Maintenance Steering Group, produces MSG-1 first applied to Boeing 747.

1972: U.S. Navy applies MSG principles to aircraft and submarines.

1978: “Reliability-Centered Maintenance” (Nowlan and Heap) released.
The RCM Process
A DoD-approved RCM process includes identifying the following items in sequence.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Functions</td>
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<td>The desired capability of the system, how well it performs, and under what circumstances</td>
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<td>2</td>
<td>Functional Failures</td>
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<td>The failed state of the system (e.g., the system falls outside the desired performance parameters)</td>
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<td>3</td>
<td>Failure Modes</td>
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<td>The specific condition causing a functional failure</td>
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<td>4</td>
<td>Failure Effects</td>
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<td>Description of what happens when each failure mode occurs, detailed enough to correctly evaluate the consequences of each</td>
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<td>5</td>
<td>Failure Consequences</td>
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<td>The description of how the loss of function matters (e.g. safety, environmental, mission, or economics)</td>
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<td>6</td>
<td>Maintenance Tasks and Intervals</td>
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<td>The description of applicable and effective tasks, if any, performed to predict or prevent failures</td>
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<td>7</td>
<td>Other Logical Actions</td>
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<td>Including, but not limited to, run-to-failure, engineering redesigns, and changes/additions to operating procedures or technical manuals</td>
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</table>
CLASSIC RCM for Maintenance Developers (Certification)  
(5 Days)
BACKFIT RCM (Certification)  
(2 Days)
NAVSEA RCM Overview  
(2 Hours)

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OPNAVINST 4790.16
CBM Instruction

OPNAVINST 4700.7
Maintenance Policy for USN Ships
MIL-P-24534A
Planned Maintenance System Development

ePMS Gateway
https://altair.seajax.navy.mil/epmsgateway

eRCM (web-enabled)
eWAIVER (web-enabled)
NAVSEA RCM Handbook
Fundamentals of RCM Analysis
(3 days)
RCM Management Brief
(2-4 Hours)

IRCMS (client server)
IRCMS (web-enabled)
RCM Scorecard
RCM Task Analysis Worksheets

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OPNAVINST 4790.16
CBM Instruction
NAVAIRINST 4790.20
RCM Program Instruction
NAVAIR 00-25-403
Naval Aviation RCM Process
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MIL-HDBK-502
Acquisition Logistics
MCO 4790.1
Marine Corps Maintenance Policy (MCMP)
MCO 4000.57
Maintenance/Support Policy for Ground Systems

RCM Practitioner Course
(15 Days)
RCM Facilitator Course
(10 Days)
RCM Introductory Course for Physical Assets
(3 days)
RCM General Course for Requirements Analysis, Policies, and Processes
(1 Day)
Marine Corps RCM Overview
(4 Hours)
Marine Corps RCM Executive Overview
(1.5 Hours)

MEA Enabler Suite
(web-enabled, under development)
ARMY MATERIAL COMMAND

Army RCM Facilitator Training
(2 Weeks)

Army RCM for the Warfighter
(2 Days)

Army RCM Overview for Management
(1.5 hours)

RCM Scorecard
PM/FM Matrix
CBM Gap Analysis

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ARMY REGULATION 750-1
Army Material Maintenance Policy
POC: Maryann Kaczmarek
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AFI 21-101
Maintenance Management of Aircraft

AFI 63-107
Integrated Product Support Planning and Assessment

AFMCINST 21-103
Reliability -Centered Maintenance Programs

PCOE BP 99-4
Best Practices for Application of RCM for USAF Gas Turbine Engines

LOG 032: RCM for In-Service Engines
(4 Days)