
# RELIABILITY-CENTERED MAINTENANCE

# RCM

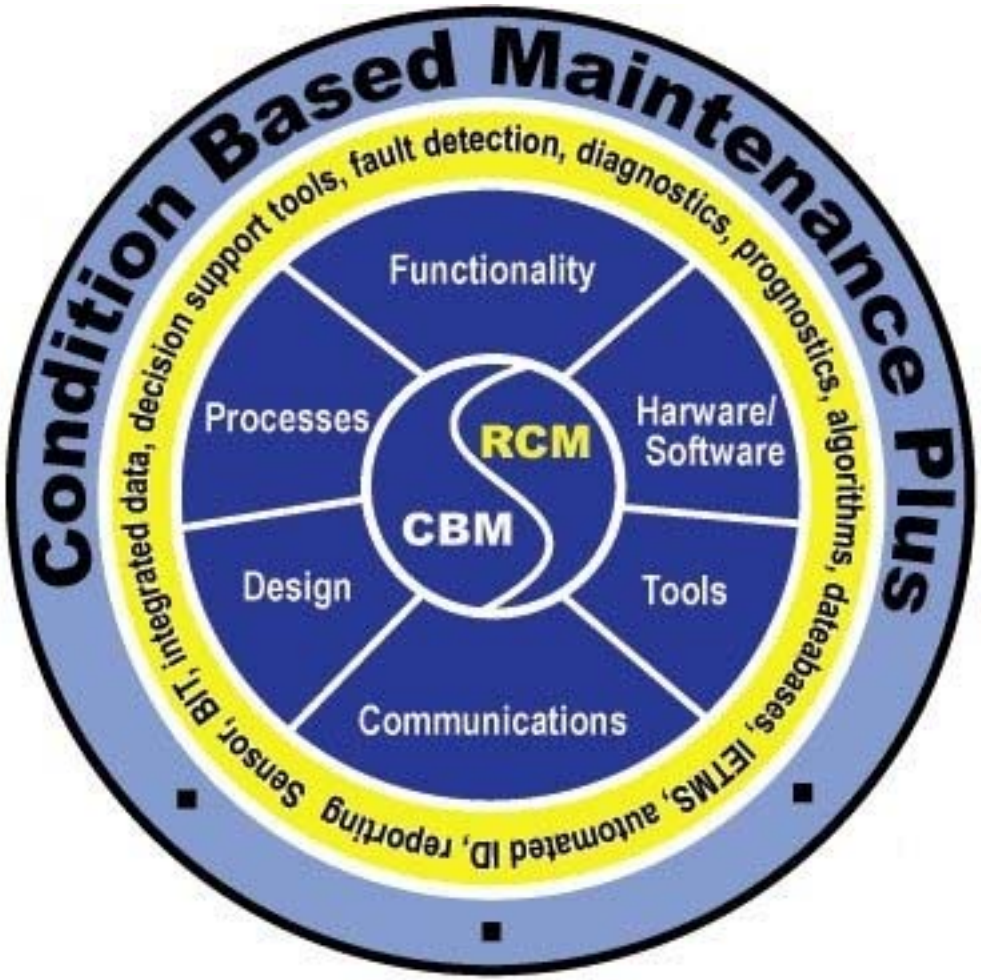

# CONDITION BASED MAINTENANCE PLUS

# 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+


Condition Based Maintenance Plus
Sensor, BIT, integrated data, decision support tools, fault detection, diagnostics, prognostics, algorithms, databases, IETMs, automated ID, reporting
Functionality
Harware/ Software
Tools
Communications
Design
Processes
RCM
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

**1965: FAA and Commercial Aviation Industry form group to study Preventative Maintenance.**

**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.

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

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**OPNAVINST 4790.16**

CBM Instruction

**OPNAVINST 4700.7**

Maintenance Policy for USN Ships

**MIL-P-24534A**

Planned Maintenance System Development

**CLASSIC RCM for Maintenance Developers (Certification)**
(5 Days)

**BACKFIT RCM (Certification)**
(2 Days)

**NAVSEA RCM Overview**
(2 Hours)

**ePMS Gateway**

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

**eRCM** (web-enabled)

**eWAIVER** (web-enabled)

**NAVSEA RCM Handbook**

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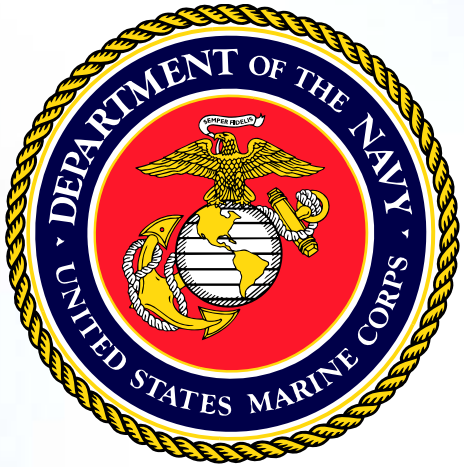
**OPNAVINST 4790.16**
CBM Instruction
**NAVAIRINST 4790.20**
RCM Program Instruction
**NAVAIR 00-25-403**
Naval Aviation RCM Process

**Fundamentals of RCM Analysis**
(3 days)
**RCM Management Brief**
(2-4 Hours)

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




MARINE CORPS SYSTEMS COMMAND

EQUIPPING THE WARFIGHTER TO WIN

**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)

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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

**MEA Enabler Suite**
(web-enabled, under development

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**ARMY REGULATION 750-1**

Army Material Maintenance Policy

**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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**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)