



**FORWARD DEPLOYED
REGIONAL MAINTENANCE CENTER**

24/7 Deployed Maintenance for the Fleet

**PRESENTED BY CAPTAIN BRIAN KAROSICH, USN
COMMANDING OFFICER, FORWARD DEPLOYED REGIONAL MAINTENANCE CENTER
NAPLES, ITALY | ROTA, SPAIN | MANAMA, BAHRAIN**

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Regional Maintenance Centers: The Force Behind the Fleet

Regional Maintenance Centers (RMCs) execute maintenance and modernization of U.S. Navy ships around the world, providing real warfighting advantage to our global U.S. Navy Fleet:

- This includes **contract management oversight (CMO)**, **intermediate-level maintenance**, **fleet technical assistance (FTA)**, and **readiness assessments of homeported ships**.
- **Voyage Repair (VR)** including mid-deployment voyage repairs (MDVR) and emergent VRs of deployed ships
- **Maintenance and modernization of other assets** (Military Sealift Command (MSC) ships and Aegis Ashore sites)
- The U.S. Navy operates **two forward-deployed RMCs responsible for 24/7 deployed maintenance** as well as maintenance, modernization and assessments for homeported ships in their areas of responsibility:
 - Forward Deployed Regional Maintenance Center servicing U.S. Fifth and Sixth Fleets
 - Ship Repair Facility Japan servicing U.S. Seventh Fleet





FDRMC's Mission Impact In Theater

FDRMC's Strategically Vital Role

- FDRMC is the only forward-deployed RMC supporting **two numbered fleets**, serving **three combatant commanders**, and **conducting work on three continents**.
- **Force of 300+ Dept. Of Navy personnel** across three locations: Manama, Bahrain (U.S. Fifth Fleet); Naples, Italy and Rota, Spain (U.S. Sixth Fleet).
- Provide **maintenance, modernization and readiness assessments** for the **homeported ships** (DDGs, MCMs) in Spain and Bahrain and **MSC ships, the Expeditionary Sea Bases** as well as **Aegis Ashore sites** in Poland and Romania.
- Provide **24/7 emergent support and maintenance for all forward-deployed ships** operating throughout U.S. Fifth and Sixth Fleets.

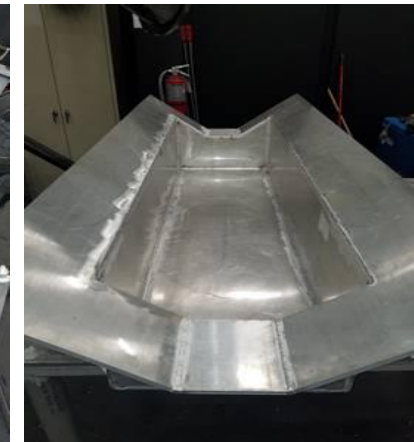




FDRMC's Mission Impact In Theater

In-Theater Capabilities

- **Subject matter experts for critical systems** deployed in theater to provide distance support or on-board technical assistance
- **Intermediate-level maintenance facilities** providing critical repair capabilities to include welding, inside machining, pump overhauls, and flexible hose fabrication
- **Fully-equipped dive locker** that can deploy throughout the 5th and 6th Fleets when needed
- **Project managers and shipbuilding specialists** that execute contract management oversight
- **Quality assurance experts** that ensure adherence to U.S. Navy standards
- **Waterfront-based Technical Warrant Holders** that support rapid engineering decisions
- **Additive manufacturing tools** that allow for unique solutions to repairs when available





Key Efforts To Expand Forward Deployed Maintenance

FDRMC is known throughout the Fleet for successfully executing maintenance and repairs across our area of operations.

To remain a **warfighting advantage for the Fleet**, we must continue to **expand our efforts and capabilities**. Specifically, we are focused on:

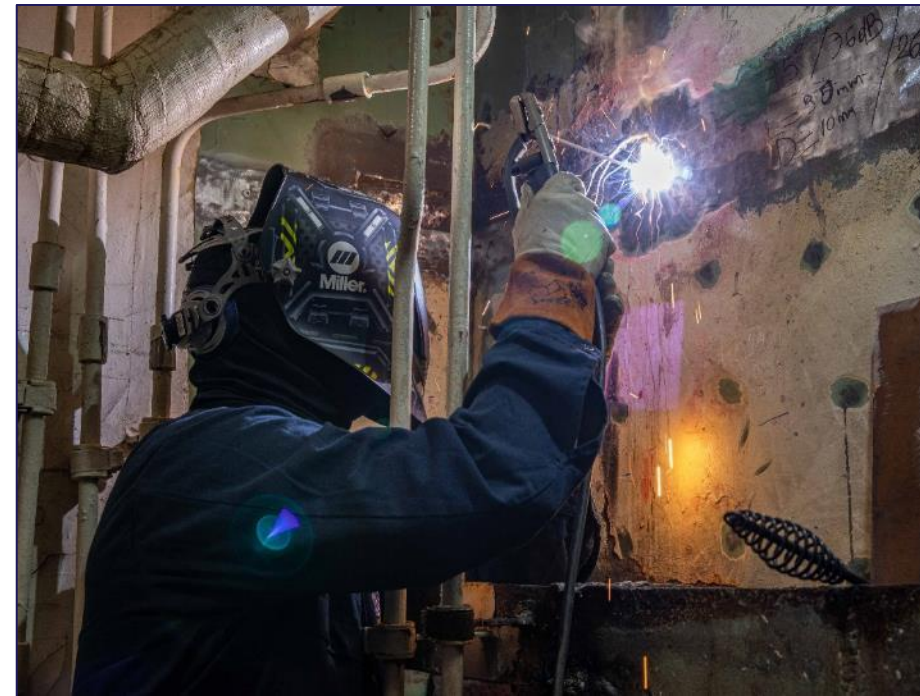
- Conducting maintenance outside of traditional sites and growing relationships with industry partners in key areas throughout each theater
- Fleet engagement when selecting maintenance locations
- Expanding Intermediate-level maintenance capabilities
- International standards and specifications compared to U.S Navy requirements and engagement with maintenance providers to secure certifications for key services



Successfully Executing Forward-Deployed Maintenance

Warfighting Readiness Through Planned And Emergent Maintenance

- With three locations across two numbered fleets, FDRMC **provides resources to ships whenever and wherever needed** - most importantly, we regularly **operate outside of our waterfront locations**.
- Through both planned and emergent maintenance efforts, we keep the Fleet ready for whatever tasking may come.
- **Planned maintenance** includes availabilities for homeported ships in Europe and the Middle East as well as mid-deployment voyage repairs for deployed vessels.
- **Emergent maintenance** including Fleet Technical Assistance through distance support and on-board technical assistance as well as emergent voyage repairs.

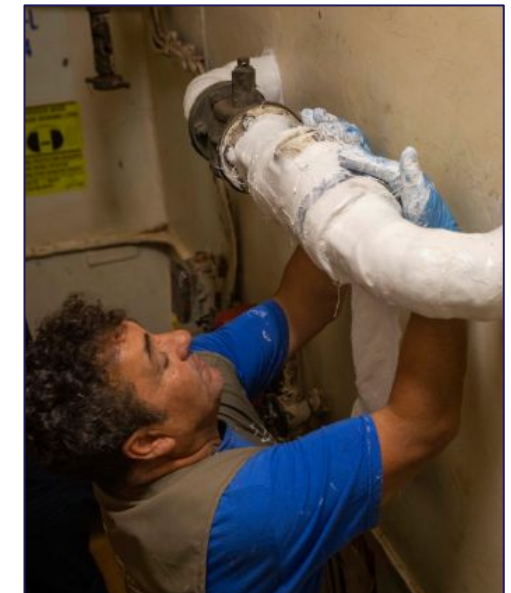




Successfully Executing Forward-Deployed Maintenance

Successful Planned Availabilities

- Deployed ships typically receive one mid-deployment voyage repair (MDVR) period per deployment.
- **Proactive engagement** with the ship and port engineer at the start of deployment.
- Provide **comprehensive list of capabilities and repairs** we are equipped to execute.
- **Clear communication** to develop **right work package** so the ship receives maintenance required to continue its deployment fully mission-capable.
- **Maintaining timeline** is critical for a successful contracting process and to secure necessary parts or materials required for the work.
- **Flexibility to adapt** if challenges arise:
 - Most recently, a DDG MDVR was executed fully by FDRMC SMEs and intermediate-level maintainers when a maintenance provider could not be secured.





Successfully Executing Forward-Deployed Maintenance

Emergent Support and Repairs

- More than 50% of FDRMC's work is providing **Fleet Technical Assistance** (distance support and on-board technical assistance)
- Successful FTA requires a **proactive team and process** to address deficiencies quickly.
- FDRMC's **casualty reporting database** tracks the status of each report and allows quick assessment for next steps.
- FDRMC project team members, maintainers and divers are always prepared to **rapidly deploy to any location required** to execute substantial repairs
 - Twice in less than a year, FDRMC team members from **all three sites swarmed to support two major weld repairs**, returning both ships on-mission in time to support significant Fleet tasking.





Fleet Focus: Additive Manufacturing (AM)

Additive Manufacturing's Warfighting Advantage

- **Limit vulnerability in supply base** by de-risking with AM.
- **Enhance capabilities** through mission-tailorable solutions and employment of designs not otherwise possible.
- **Maintain operational availability** by improving self-sufficiency capability at the point of need.

Key Initiatives

- **Technical Authority:** Develop technical publications for repeatable processes; Collaborate with industrial base
- **Afloat/Undersea Deployment:** Deploy & integrate advanced AM equipment; Provide engineering support
- **Digital Integration:** Identify file securing/transiting/storage solutions; Incorporate AM equipment to secure DoD IT infrastructure
- **Supply System Integration:** Incorporate components into logistics database; Enable part identification



Valve installed on a CVN



Example qualification build plate

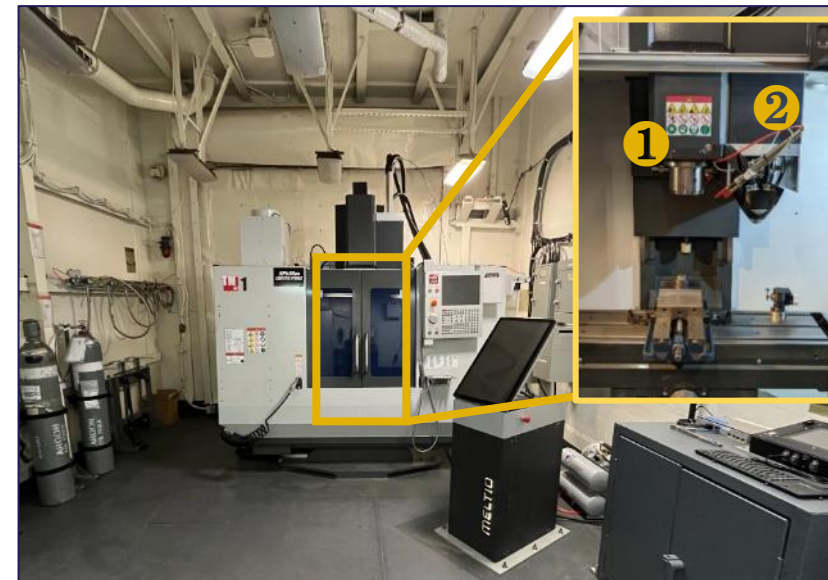


Component designed with lattice structure



AM Deployed in the Fleet

- As a first step, **polymer printers** were installed on several carriers, surface ships and a Virginia-class submarine.
- In November 2022, **hybrid metal AM capability and polymer AM capability** was installed on amphibious ship USS Bataan (LHD 5).
- Shipboard Hybrid Metal AM **combines additive and subtractive processes**
- Installed aboard Bataan is a **Phillips Additive Hybrid Laser Metal Wire Deposition (LMWD) Hybrid AM technology**
 - Wire-fed laser DED AM system (Meltio Engine)
 - CNC milling machine (Haas TM-1)
- Bataan's Polymer AM system, **Markforged X7 Thermoplastic Material Extrusion AM system**, was selected for its **ease of use and high reliability**, which makes it ideal for prototyping and tooling applications.



Phillips Additive Hybrid Aboard USS Bataan – November 2022
Laser Metal Wire Deposition System
Inset: 1) CNC Tool Spindle, 2) Deposition Head



A/C Flange Application
As-built near-net shape (top)
Machined (bottom)



Fire Spanner Wrench Application
Machining (first pass)



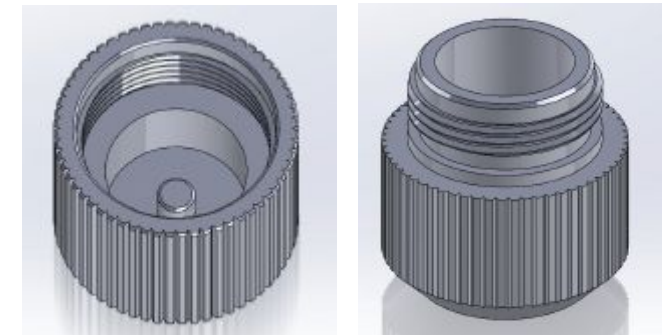
AM at FDRMC

FDRMC's AM Program Drives Creative, Quick Solutions

- AM systems and equipment in use in Spain and Bahrain.
- FDRMC's AM program **saved significant time** awaiting parts:
 - A recent example included manufacturing parts in Bahrain for a critical repair that delayed the ship getting underway.
 - Regular repair with an ordered part could have delayed the repair 1-2 months
- AM efforts have also **provided significant cost savings**:
 - Our Rota team created dust caps for receptors in junction boxes.
 - Ordering the part would have cost \$100/cap.
- AM program **developed non-existent tools** that provide significant time savings for maintenance evolutions like critical gas turbine inspections.
- FDRMC's AM program provides **immediate emergent support** where **creative and quick solutions** are needed for our ships and other commands.



Value control part manufactured to execute required repair prior to underway



Dust caps designed and manufactured generating significant cost savings (original part was \$100/cap)



Preparing for Conflict

Exercising Battle Damage Assessment And Repair

- Exercising our battle damage and repair efforts is **critical to preparing for the future**.
- BDA/R events have occurred in the U.S. including Hawaii with a renewed focus on **exercising procedures and processes** to understand our capabilities and limitations.
- Unique to our forward-deployed environment, we must **actively engage with our Allies and partners** to execute a successful evolution.
- Last year, we partnered with UK SALMO and others to execute a Battle Damage Assessment exercise in the UK.
 - The exercise included an on-site assessment of a decommissioned ship to simulate a real-life event.
- As we iterate on our BDA/R exercise, we will continue to **expand our partnerships and further integrate** with the Fleet and other stakeholders.





Forward-Deployed Impact & Future

The ability to execute forward-deployed maintenance throughout our AOR provides our Fleet an asymmetrical advantage.

FDRMC remains **focused on today's mission** while working to **adapt for tomorrow's Fleet** by:

- Growing capabilities and maintenance locations alongside our Allies and partners
- Staying flexible and employing innovative processes like AM
- Preparing for future conflict

Questions?





Delivering and maintaining mission-ready ships

