

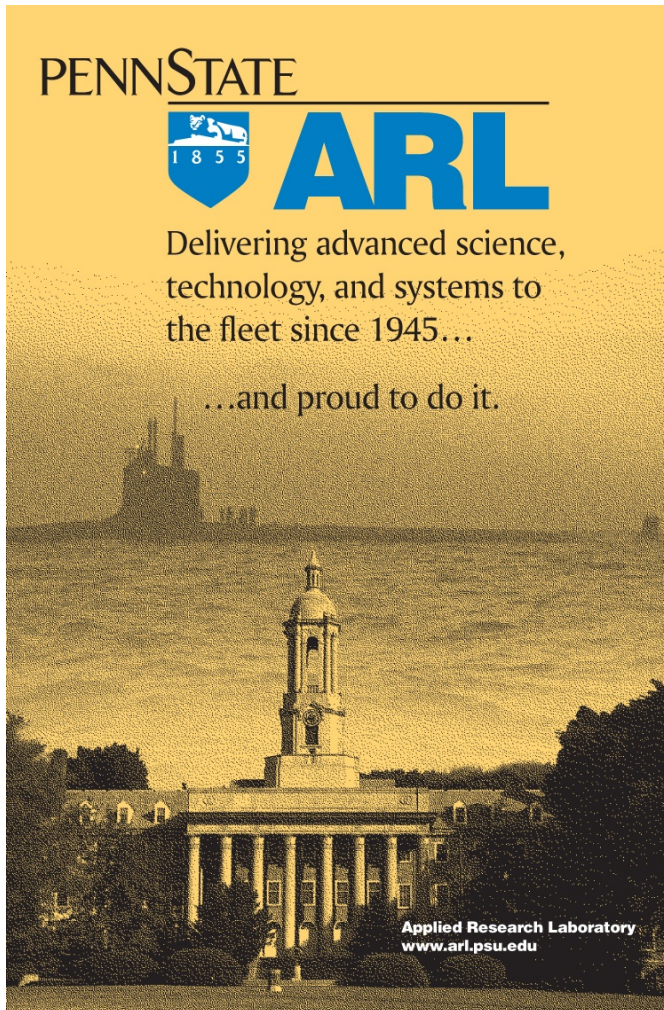


# **INSTITUTE FOR MANUFACTURING AND SUSTAINMENT TECHNOLOGIES**

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Presentation to the 30 July 2019  
Joint Technology Exchange Group  
(JTEG) telecom

# ARL Penn State Overview



As a DoD designated University-Affiliated Research Center (UARC) ARL Penn State...

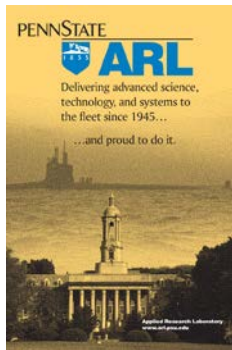
**“...maintains a special long-term strategic relationship with DoD.”**

Characteristics of this relationship include:

- Responsive to evolving needs
- Comprehensive knowledge of needs and problems
- Access to information and proprietary data
- Corporate knowledge and technical memory
- Objectivity and independence from commercial interests
- Quick response capability
- Current operational experience
- Freedom from real and perceived conflicts of interest

UARC: 10 USC 2304 (c)(3)(b) “...to establish or maintain an essential engineering, research, or development capability to be provided by an educational or a federally funded research and development center and are designed UARC by the Director, Defense Research and Engineering (DDR&E).”

# ARL Penn State Core Competencies

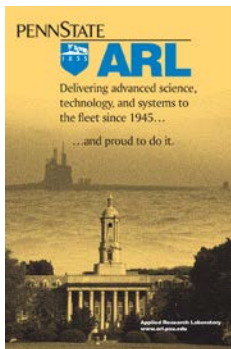


- Guidance, navigation and control of undersea systems, including simulation and modeling for design and performance prediction of undersea platform guidance and control systems.
- **Advanced thermal propulsion** concepts and systems for undersea vehicles, including systems modeling and dynamic simulation for torpedo propulsion systems.
- **Advanced propulsors** and other fluid machinery for marine systems, and submarine/surface platforms, including the hydrodynamic, hydroacoustic and structural acoustic analysis, performance prediction, noise prediction, testing and evaluation, and specification of such devices.
- **Materials technology and manufacturing technology** to meet unique requirements of Naval systems and components.
- **Atmosphere and defense communications** systems research that supports and complements maintained capabilities.
- **Mission related and public service** oriented research, technology development, test evaluation and systems analysis required to provide a quick response to rapidly evolving DOD and other government agency requirements, along with the complementary capabilities of the other divisions of The Pennsylvania State University.



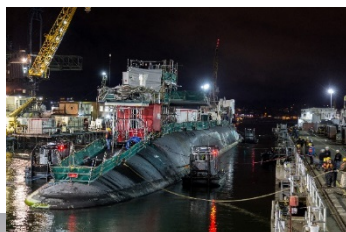


# iMAST Overview



**Institute for Manufacturing and Sustainment Technology (iMAST) established February 1995 as one of the Navy ManTech program's Centers of Excellence**

**Located at Penn State's Applied Research Laboratory, iMAST partners with industry, DoD, and OEMs to solve advanced weapon and systems issues.**



iMAST provides a focal point for the development and transition of cost saving **Manufacturing Technology** innovations, processes and hardware,

iMAST supports the Navy with life cycle cost reduction projects within the **Repair Technology** (RepTech) in support of shipyards and DON depots.

iMAST supports **Accelerated Capability** projects aimed at maintaining the Navy's technical superiority



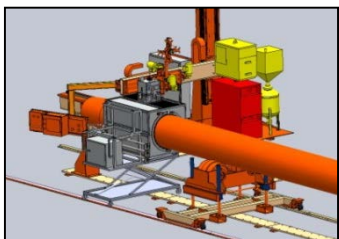
# iMAST Process Map

- **ManTech Projects** **FY19 = 14 Projects**
  - Identified by Ship and Aircraft builders
  - Evaluated and ranked by program offices and ONR ManTech (O3MT)
  - Reviewed by iMAST/ARL Divisions for capability, interest and capacity
  - Project plan and Transition plan drafted by ARL PI and submitted through iMAST to ONR
  - KPP = ROI or cost reduction per hull
- **RepTech Projects** **FY19 = 11 Projects**
  - Identified by public shipyards, depots and PI's
  - Championed by SYSCOM (NAVSEA, NAVAIR, MARCOR)
  - Presented to RepTech Working Group (SYSCOM Rep's) by ARL PI
  - Project plan and Transition plan drafted by ARL PI and submitted through iMAST to ONR
  - KPP = ROI based on cost avoidance and improved  $A_0$
- **Accelerated Capability Projects** **FY19 = 4 Projects**
  - New project category for FY 19/20
  - Identified by ONR, ARL, Navy Systems Development organizations
  - Focused on early development and fielding of new enabling technologies, capabilities, operational advantage
  - Project plan and Transition plan drafted by ARL PI and submitted through iMAST to ONR
  - KPP = Time compression to fielding, improved  $A_0$

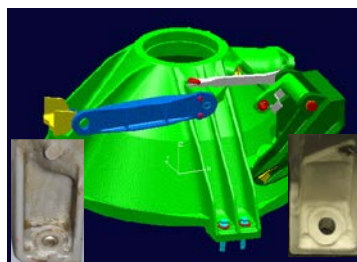


# Repair Technology

- Repair Technology (RepTech) Projects: Addresses repair, overhaul and sustainment functions that emphasize manufacturing processes and advancing technology as a component of Navy ManTech.
- RepTech projects target fielded weapon systems and provide the process and equipment technology needed to repair and maintain fleet assets. Implementation of RepTech projects target naval depots, shipyards, Marine Corps logistics bases, intermediate maintenance activities and contractor facilities responsible for the overhaul and maintenance of fleet hardware.



VCS  
Shaft  
Repair



Transmission  
Housing  
NAVAIR  
FRC East



Cougar H  
Oshkosh  
MRAP



VLS Tube Repair  
NAVSEA PH Shipyard



ARBSS  
NAVAIR  
FRC East



**MATERIALS AND MANUFACTURING OFFICE**

**Additive Manufacturing Repair**

**Evaluation and development of and Additive Manufacturing repair process for geometry critical and obsolete aircraft engine components**

Team: iMAST, NAVAIR

Achievements: Successfully developed and tested AM as a method to add material to otherwise unrepairable parts.

Implementation focus: AV-8C

Status: Completed

Goals: Successfully demonstrated repair of geometry critical components. Previous attempts using conventional weld/clad failed for distortion. First approved NAVAIR AM repair.



**Cold Spray Technology for Combat Vehicles**

**Develop a repair process to restore the hydraulic steering unit (HSU) of the Assault Amphibious Vehicle (AAV) to the original dimensions without changing the wear properties or inducing any adverse affects such as thermal stresses or warping**

Team: iMAST, LOGCOM PPA

Achievements: Developed, tested and demonstrated an improved process to restore geometric form of otherwise unrepairable AAV components, cut 18 month (minimum) procurement lead-time to three weeks repair and return to service.

Implementation focus: AAV/other GCV's

Status: In Transition

Goals: Prove viability of Cold Spray as economical means to repair obsolete parts.



**Portable Hatchable Cold Spray Repair**

**ManTech partnership with SBIR and Tactical Innovation and Implementation programs to develop Cold Spray systems and components capable of shipboard use**

Team: iMAST, PSNSY, NAVSEA 04, SBIR, TII

Achievements: Development of an enclosure with flexible design to facilitate transport to and use within tight ship and sub spaces.

Implementation focus: Ships and Subs

Status: Active

Goals: Develop and integrate a system to conduct Cold Spray repair of ship's components that are difficult to remove for in-ship repair.



**Marine Corps Depot Workflow Modeling**

**Development of an automated and enterprise integrated planning tool to facilitate workload planning for overhaul of USMC armored vehicles**

Team: iMAST, Marine Depot Maintenance Command, PP Albany

Achievements: Identified critical data, (both existing and needed) and identified critical nodes in the depot overhaul process to facilitate programming for simulation and planning.

Implementation focus: Ground Combat Vehicles

Status: Active

Goals: Improved planning tool integrated into LOGCOM and PP Albany enterprise planning system.



**MATERIALS AND MANUFACTURING OFFICE**

### 3-D Tape Measure

**Development of a three dimensional tool to facilitate, fast, adequately accurate measurement by non-metrology trades for use in shipbuilding and maintenance**

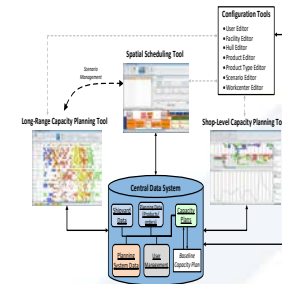
Team: iMAST, PSNSY, NAVSEA 04, HII-Ingalls  
 Achievements: Early testing and development verified the potential and accuracy in bread board terms. Working to complete alpha prototype design and then integrate for live testing.  
 Implementation focus: All large scale shipbuilding, maintenance depot level tasks  
 Status: Active  
 Goals: Facilitate common trades uses to verify, validate and streamline metrology processes.



### Shipyard Capacity Planning at BIW

**Commercial enterprise tools fall short of accommodating many of the yard and shipbuilding planning requirements needed to facilitate workload planning.**

Team: iMAST, BIW  
 Achievements: Developed new planning capability to integrate into existing yard long-range and shop-level workload planning processes.  
 Implementation focus: DDG-51  
 Status: Implemented  
 Goals: Develop a shipyard-wide planning system that results in more robust and achievable plan/schedules while meeting ship delivery requirements.

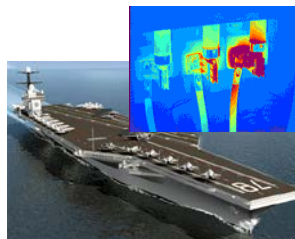


### Acoustic Sensing

#### Through Electrical Enclosures

**Technology evaluation, modification and insertion of a handheld acoustic sensor capable of detecting air-borne frequencies unique to early electrical component failure**

Team: iMAST, PEO Carrier, PSNSY, NAVSEA 04/05  
 Achievements: Testing of COTS system in lab, pier-side and onboard successfully completed. Acoustic signature of progression of connection release and impending failure proven at NNSY and onboard ships.  
 Implementation focus: All high power systems  
 Status: Transitioned, awaiting final 05 approval and shipboard authorization  
 Goals: Early detection of progressive failure, eliminate requirement to shut down high power systems prior to visual inspection.



### Diagnostic Monitoring of Equipment & Capacity Planning

**Incorporation of advanced machinery health monitoring technologies for critical facilities equipment with integration of CBM data into OEM planning systems**

Team: iMAST, GD-EB, PEO Subs  
 Achievements: Evaluation of current maintenance practices, supporting data focuses on identification of candidate capital equipment for implementation of a Reliability Centered Maintenance solution.  
 Implementation focus: Submarines  
 Status: Active  
 Goals: Early detection of critical systems or infrastructure breakdown with input into the yard planning system to allow opportune repair.





**Thanks!**



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