

# Laser Ablation



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# Laser Ablation



## Problem

- DoD is experiencing unplanned maintenance costs impacting:
  - Asset availability – National Security
  - Cost – impacts strained budgets
  - Safety concerns – planned maintenance goes on hold
- Main issue is \$9B cost due to Corrosion/Paint Adhesion
- Traditional methods used are:
  - Slow
  - Generates Hazardous Waste
  - Air Particulate impacts Operator Safety

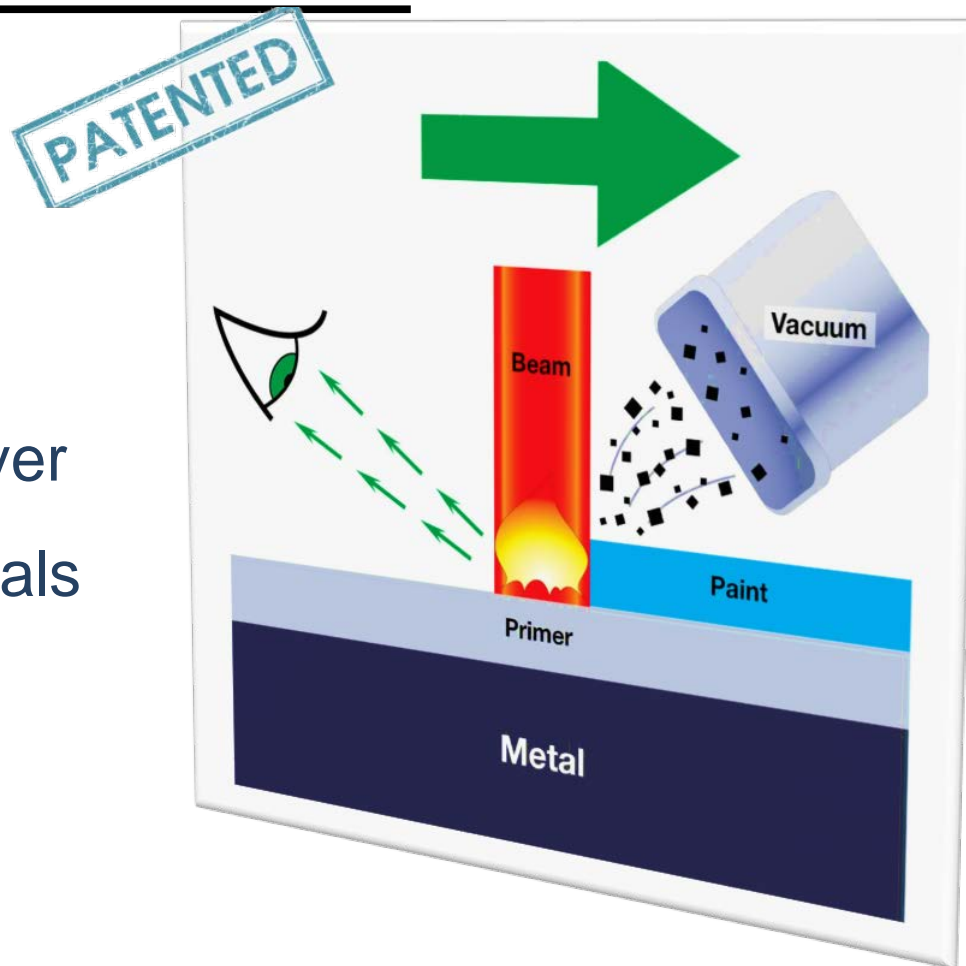


# Laser Ablation



## SurClean Solution

- Precise Stripping by Layer
- 16x Faster than Chemicals
- No Hazardous Waste



**SurClean IP is Protected  
by Global Patent!**



# Laser Ablation



## *SurClean Mobile Laser Cleaning System*

**A patent pending mobile cart is designed for SMR Handheld and will support:**

- Laser (desired Watt)
- Chiller
- SurClean LPC
- Generator
- Air
- Exhaust

**The mobile cart requires a conditioned space to keep the temperature consistent but is flexible for use in:**

- Trailers
- Containers
- Boxcar
- Commercial Truck

# Laser Ablation



## Benefits

- Selectively removes paint, oxides, debris
- Improves coating adhesion
- Paint ready – no secondary processing
- Safe for use on steel, aluminum & carbon fiber (must be same manufacturer)
- Energy Efficient
- No hazardous waste
  - Saves Labor on cleanup, set up and logistics
  - Little to no air particulate generated
- No moving parts results in low maintenance
  - Breakeven is 300 machine hours
- 80 dB noise vs 120 dB noise for sandblasting
- Laser power rising – costs are decreasing



# Laser Ablation



## Innovator Challenges & Risks

- Need a Champion
  - Transition to an Active Program
  - DoD Community Awareness/Exposure
    - Not all lasers are equal – what may work on thin materials will not work well on thicker material
- Funding
  - Commercial investors do not typically invest in long lead sales
  - Investors want to see an order to validate the need in the market
  - More work needs to be established with composites – not all resins contain the same materials
- What are the risks for SurClean?
  - Too much time to get the first sale
  - Competition has deeper pockets

# Laser Ablation



## Vision / Final Thoughts

- Other countries are automating not only maintenance processes but are utilizing laser ablation in manufacturing of high dollar assets
  - Aluminum cleaning – scarfing
  - Automated hull maintenance
    - Inspect, de-paint, inspect, re-paint and final inspect
    - Data capture by hull number for predictive analysis
    - Addresses human capital
    - Improves time to build



# Laser Ablation



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# Laser Ablation



## Task

- Identify qualification requirements and barriers to transition and employment of laser ablation in support of the CVN 70 maintenance availability.
- Projected requirement for 70% overtime for paint shop personnel due to exhausted resources and existing methods available to conduct preservation activities.
- Surface coating inspection, removal, and reinstallation are often the critical path in ship maintenance.
  - Coating removal requires use of mechanical methods and extensive labor
  - Failed inspection and retreatment adds significant cost and adversely affects schedule
  - Abrasive blasting produces significant HAZMAT

# Laser Ablation



## Problem

- A clearly defined process for transition and sustainment of new maintenance technologies within the NAVSEA Enterprise does not exist.
  - Existing capabilities are unable to meet maintenance demands for in-service ships and submarines
  - Identifying and developing new technologies is not clearly tied to maintenance requirements
- Efforts for identifying, developing, testing, and qualifying new maintenance technology is not coordinated within the NAVSEA Enterprise.
- Vendors and private shipyards conducting R&D have no roadmap for transition and sustainment.

# Laser Ablation



## Solution

- Identify the requirements for successful qualification and fielding of technology.
  - Clearly identify processes and ownership for technical (SEA05) and process (SEA04X) approval (transition)
  - Identify sustainment requirements for additional qualifications and expanded use across the NAVSEA Enterprise (GOV/CTR)
- The solution requires coordinated efforts between NAVSEA04, NAVSEA05, Naval Shipyards, Warfare Centers, and the Regional Maintenance Centers.
- Establishes a link between developing technology and clearly identified requirements to support pull of technology, reduction of qualification and implementation costs, and increases competition.
- Rapid innovation and implementation of new technologies to supplement existing capabilities: expands the toolbox.



# Laser Ablation



## Opportunity to Influence

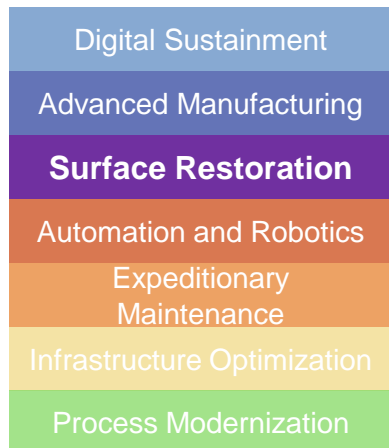
## Enhancing $A_0$ via Sustainment

## Transition

## Sustainment



### Sustainment Technologies



### Critical Technologies

- Leading edge research & technology

### Technologies

- Technical Authority Approval (Red and Blue)

### Processes

- Training and Certification
- Operational Process (UIPI)

### Safety

- OSH
- Environmental Qualification

### Cybersecurity

- PIT Waiver
- Accreditation

### System Engineering

- Joint Test Protocol for New Substrate and System Qualification
- Hardware & Software Updates
- Engineering Agent / Process Ownership

### Shipyard Operations

- Material Management

### Contracting/Procurement

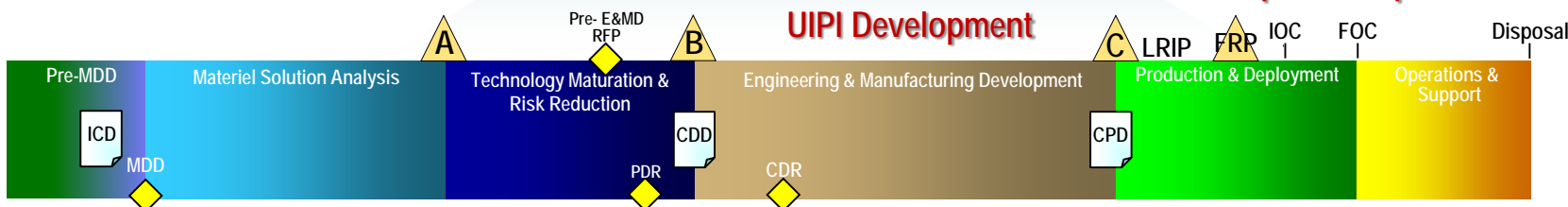
- Procurement Guidance

## Process Selection

## Operational Use

## Process Qualification / UIPI Development

## Expanded Operational Use



# Laser Ablation



## Benefits

- Coordinated efforts as identified with laser ablation efforts will reduce costs due to redundancy by both the vendor and the Navy for other technologies.
- Enables R&D organizations to identify both a goal/objective for use and requirements for transition.
- Defines a process to implement capabilities and determine ROI for expanded use.
- As with all new technologies, laser ablation will identify safety requirements to reduce and mitigate more inherently dangerous operations, reduce repetitive tasks that are injurious to the work force, and are environmentally compliant.
- Environmental permitting and industrial hygiene testing and requirements will be identified and provided to all concerned.

# Laser Ablation



## Challenges & Risks

- Protecting the rice bowl; resistance to collaboration.
- Approval of technologies by Technical Authority as appropriate to application.
- Limitations on procurement costs for material solutions.
- No process to clearly identify maintenance gaps.
- Aligning capability with maintenance need.
- Program management for new technologies across the NAVSEA Enterprise.
- Sustainment requirements and establishing/identifying the Engineering Agent to manage future development.



# Laser Ablation



## Innovation Status

- The qualification process will identify and guide technology development to meet TRL 7 requirements for transition through modeling DoD acquisition practices (DODI 5000.02).
- Initial fielding at PSNS or lead process owner through SEA04X Communities of Practice to all NSYs, WFCs, RMCs, and NSRP partners and technology innovators.
- Obstacles to overcome include policy regarding environmental requirements, ownership, and NAVSEA bureaucracy.
- SEA04X programmatic management with other technology sponsors will bridge the valley of death.

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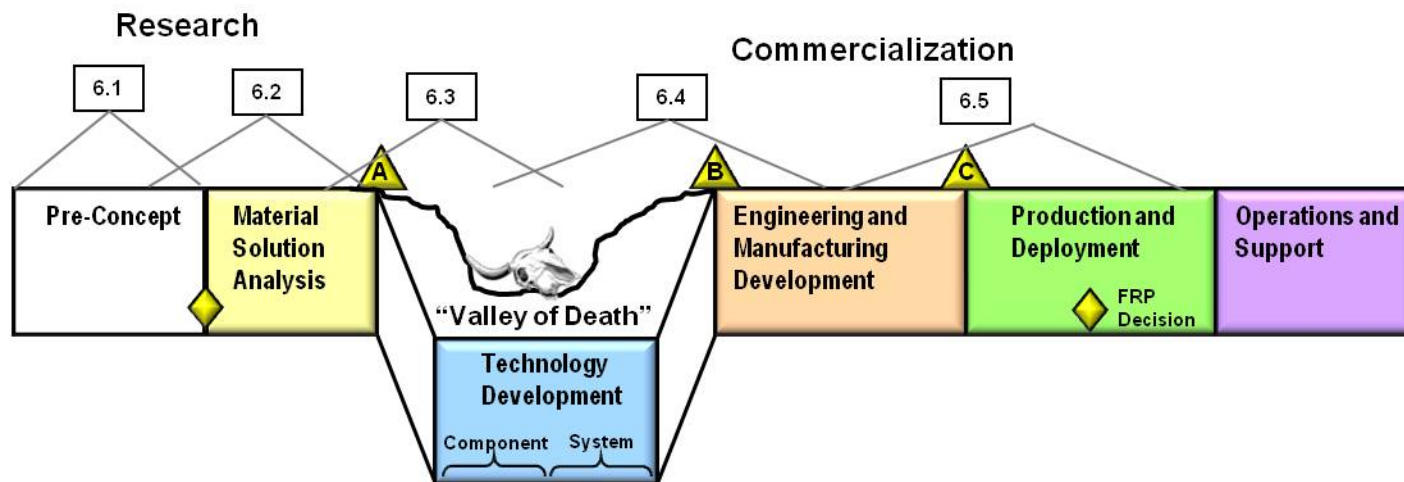
## Vision / Final Thoughts

- Laser ablation will be fielded for limited use on qualified substrates in support of the CVN70 availability.
- As ROI for specific maintenance needs are identified additional laser systems and substrates will be qualified for use across applicable Systems Commands and private shipyards.
- This transition model will be applied to other new technologies to support technology development and rapid fielding.

# Laser Ablation



- SEA04X programmatic management with other technology sponsors will bridge the valley of death.





2018 DoD  
Maintenance  
Innovation  
Challenge

# Laser Ablation



## Questions