



CH-46D/E "Sea Knight"



Laser Paint Stripping of Helicopter Blades at NADEP CP

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Background

- **NADEP Cherry Point:**
Refurbish 400+ Blades per Year (*CH-53 Sea Stallion, CH-46D/E Sea Knight, HH-60 Sea Hawk*)
- **Depaint Required**
- **Existing Methods can Damage Substrate**
- **Existing Methods are Labor Intensive**
- **25 ft²/hr Removal Rate →**
Net Cost Avoidance of \$182k per Year

Preliminary Depainting Technologies

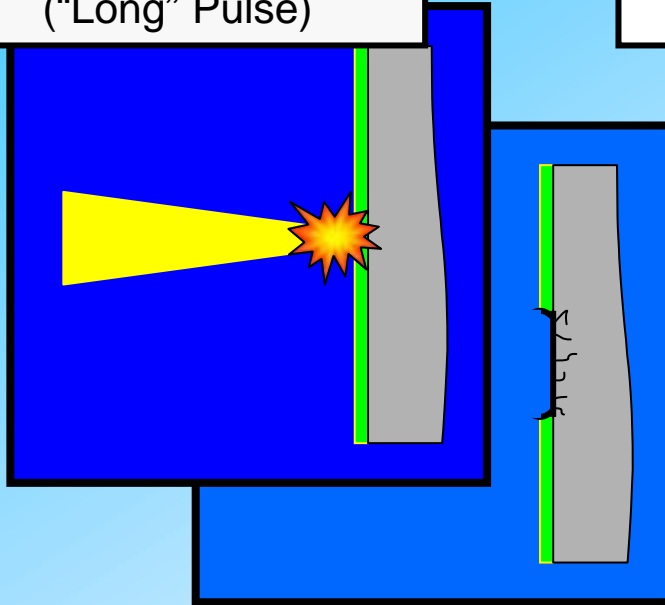
- **Hand Sanding**
- **“FlashJet”**
- **Soft Media (Sponge) Blast**
- **Carbon Dioxide Pellet**
- **Sodium Bicarbonate**
- **Others...**
- **Laser-based Depaint**

Advantages of Laser-Based Depainting Technology

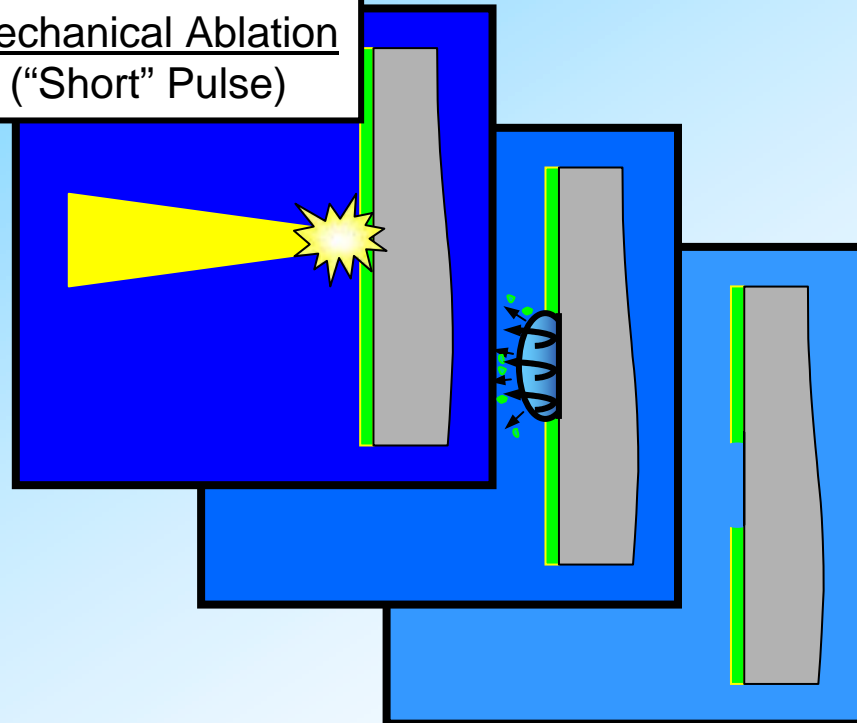
- **Improved Depaint Quality**
- **Improved Throughput**
- **Improved Shop Artisan Morale**
- **No Secondary Waste Generation**
- **Lower Health Risk**
- **Low Noise / Dust**
- **Easy to Automate**

Laser Depaint: Removal Mechanisms

Thermal Decomposition
("Long" Pulse)



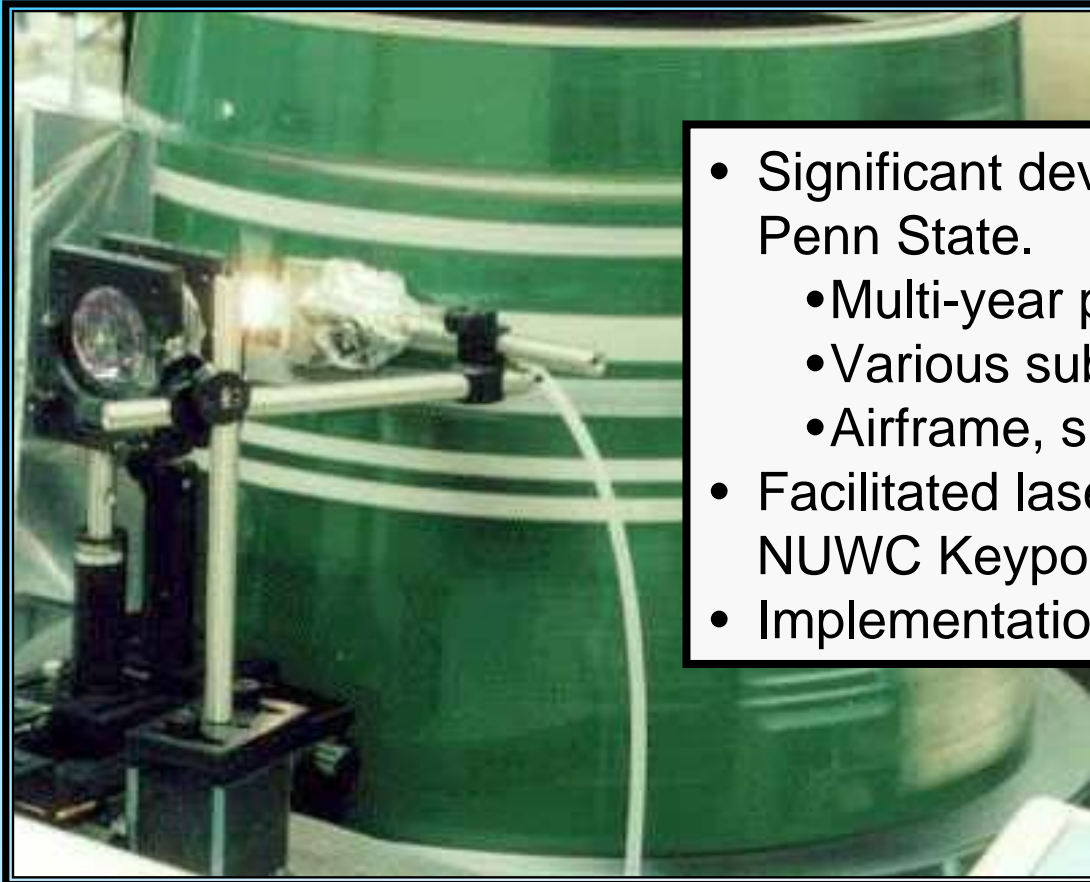
Mechanical Ablation
("Short" Pulse)



Continuous Wave Laser
Thermal Decomposition - "Burning"

Q-Switch "Fast" Pulsed Laser
Mechanical Ablation

Laser Paint Stripping of Naval Components



- Significant development at ARL Penn State.
 - Multi-year projects
 - Various substrates and coatings
 - Airframe, shipboard, torpedo, etc.
- Facilitated laser purchase decision at NUWC Keyport
- Implementation in FY02.

Helicopter Blade Refurbishment: Plan

Phase I. Compare Alternative Technologies And Develop Test Plan

Task 1. Technical Background Investigation

Task 2. Identify Technical Assistant & Stakeholder Team

Task 3. Qualification Test Identification – Component and Process

Task 4. Preliminary Cost Analysis of Selected Depaint Technologies

Task 5. Compilation of Project Plan

Helicopter Blade Refurbishment: Plan

Phase II. Process and Test Alternative Depainting Technologies

Task 1. Obtain NADEP Cherry Point Helicopter Blade Samples

Task 2. Arrange depainting of samples from selected vendors

Task 3. Evaluate samples utilizing qualification tests developed in Phase I

Helicopter Blade Refurbishment: Plan

Phase III. Cost Analysis and Alternative Technology Downselect

- Task 1. Perform Final Cost Analysis of Selected Depaint Technologies**

- Task 2. Down-select Process Based on Technical and Cost Requirements**

Helicopter Blade Refurbishment: Plan

Phase IV. Design Manipulator and Develop System Specification

Task 1. Select System Integrator

Task 2. Develop System Specifications

Helicopter Blade Refurbishment: Plan

Phase V. Implementation

Task 1. Develop Implementation Plan

Task 2. Facility Equipment Acquisition

**Task 3. Assist Cherry Point in Qualifying Chosen
Technology**

Task 4. Support Personnel Training

Task 5. Monitor Initial Operations

Helicopter Blade Refurbishment: Metrics

- **Eliminate Health monitoring requirement**
- **2 Blades per day consistent rate**
- **1000 Blades per year process capability**
- **Eliminate Rework requirement**
- **Reduce Patch process >50%**
- **Improve downstream processes, TBD**

Helicopter Blade Refurbishment: Schedule

	Task Name	Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Compare Technologies & Develop Test Plan	█											
2	Process and Test Depainting Technologies		█	█	█								
3	Cost Analysis and Technology Downselect				█								
4	Design Manipulator and Develop System Specification					█	█	█					
5	Implementation								█	█	█	█	