

# Holiday Detection by Imaging Fluorescent Coatings

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PACE 2006  
1 February 2006



# Presentation Overview

- U.S. Navy Goals
- Holiday Detection Challenge
- Optical Holiday Detector
- Summary

# U.S. Navy Goals

- Consistent 20 year tank coating life
- High quality coating application
- Data-driven application oversight

# Visual Inspection

- U.S. Navy tanks
  - Small spaces
  - Complex geometry
- Holiday detection
  - Done by visual inspection
  - Non-line-of-sight with mirror and flashlight

# Fluorescent Coatings

- Illuminate with UV light
- Emit intense color
- Enhanced defect contrast
- MIL-PRF-23236C



Non-Fluorescent Coating

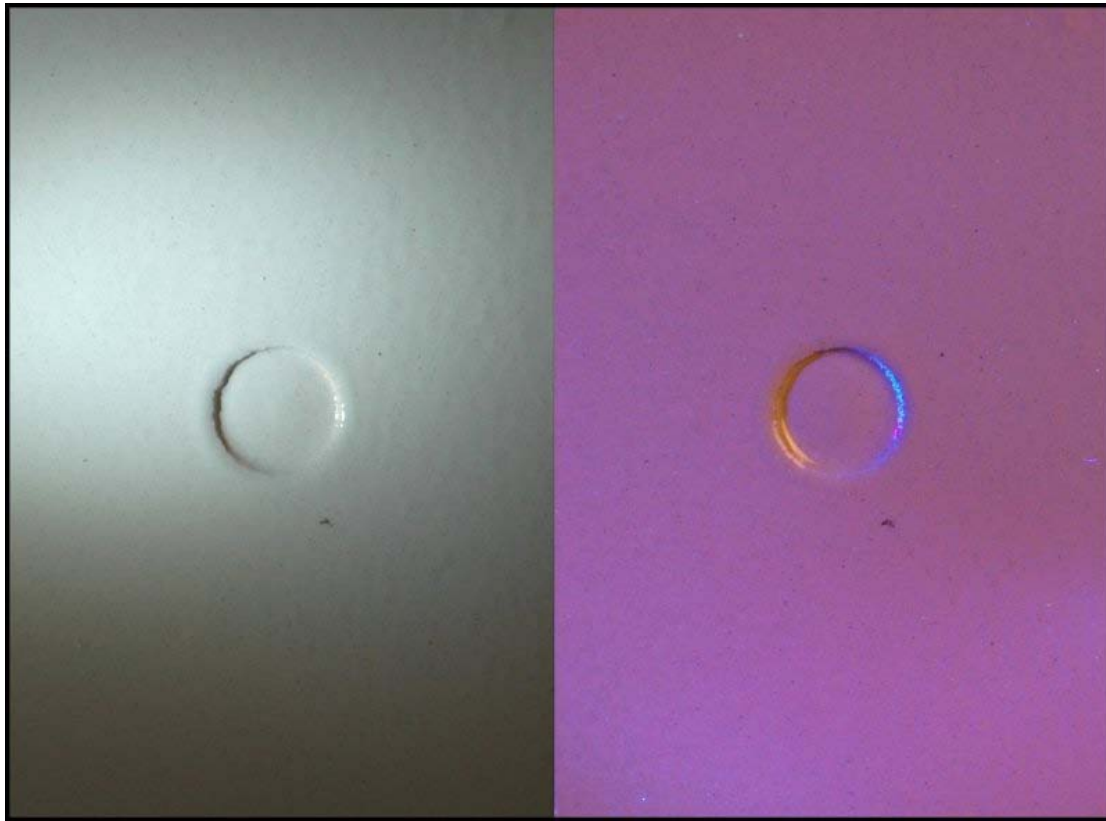


Fluorescent Coating

# Shipyard Inspector Results

- Enhances visual inspection
- Find defects that are invisible under white light inspection
  - Enhances contrast for holidays
  - Makes subsurface bubbles visible
  - Makes uneven application visible
  - No flashlight glare on glossy coatings

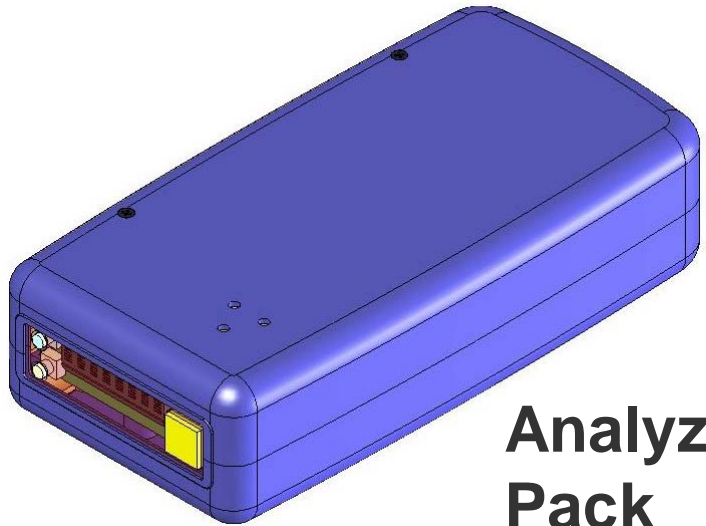
# Topcoat Holiday in Pit



# Holiday Detection Challenge

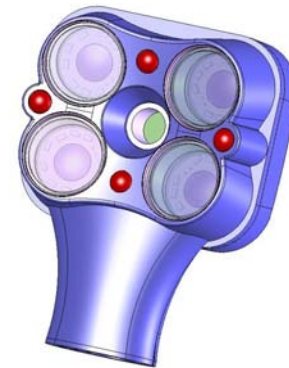
- Improve holiday detection ...
  - Along weld beads
  - Not line-of-site to spray gun
- Tank inspector needs ...
  - Compact and lightweight
  - No distractions
  - Instant feedback
  - High productivity

# Fluorescent Imaging Holiday Detector



**Analyzer  
Pack**

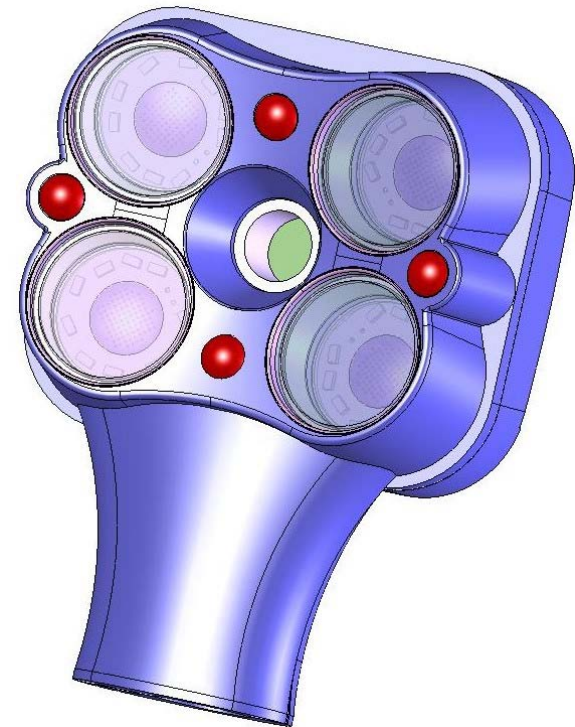
**Goggle  
Mounted Display**



**Sensor  
Head**

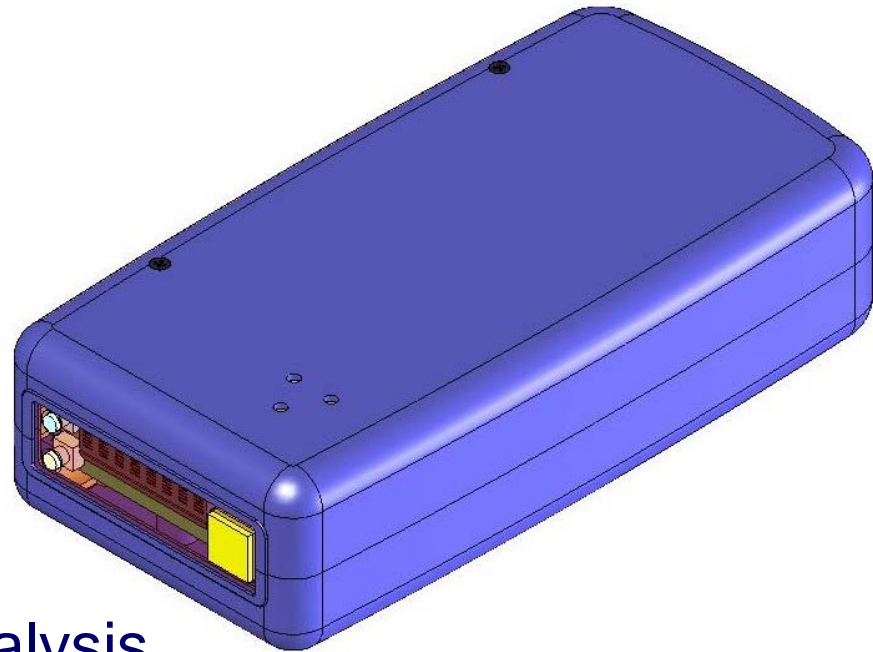
# Sensor Head

- Hand held
- Weighs 200 g
- Flash fluorescent imaging
  - Not sensitive to tank lighting
  - 4 powerful UV LED strobes
  - Filtering and focusing optics
  - High sensitivity sensor
- Power and control from Analyzer Pack



# Analyzer Pack

- Belt mounted
- Weighs 500 g
- Power
  - Battery powered
- Control
  - 2 button user input
- Detect
  - High speed image analysis
  - Audible buzzer alarm
  - Data and display outputs



# Display

- Goggle mounted
- Weighs 70 g
- No distractions
  - Heads up viewing
  - Operator aware of surroundings
  - Bright images in sunlight



# Speed and Resolution

- Productivity = 150 ft<sup>2</sup>/min.
- Speed = 7 to 10 ft./sec.
- Resolution = 0.5 mm pinhole holiday
- On detection of holiday
  - Audio beep
  - Display “flash”

# Summary

- Rigorous QA extends coating life
- Fluorescent coatings enhance defect detection
- Fast imaging holiday detector developed