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HOLTEC'S LASER PEENING DEVELOPMENT PROGRAM & IMPLEMENTATION PLAN FOR MULTI-PURPOSE CANISTERS

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Presentation to U.S. Nuclear Regulatory Commission

Chuck Bullard
Manager, Soil & Solid Mechanics

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Meeting Objectives

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- To update the NRC staff on the progress and outcome of Holtec's laser peening development program
- To familiarize the NRC of Holtec's plan for peening MPCs under the provisions of 10CFR72.48, including the equipment set-up, qualification process, procedural controls, etc.

Introduction

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- Holtec, with support from Curtiss Wright and Hill Engineering, has carried out an eight-month development program beginning in October 2016 for peening of MPC canister welds
  - Holtec has investigated and/or tested a number of peening options, including laser peening, ultrasonic peening, and water jet peening
  - Development program consists of both physical coupon testing and independent numerical analysis
  - Previous NRC meeting held on November 14, 2016
- Laser peening has been found to offer significant advantages in terms of compressive depth obtained relative to other peening methods
  - Consistently produces compressive depths greater than 2mm for all MPC weld geometries
  - Other peening methods typically yield compressed layer depths closer to 1mm

Laser Peening

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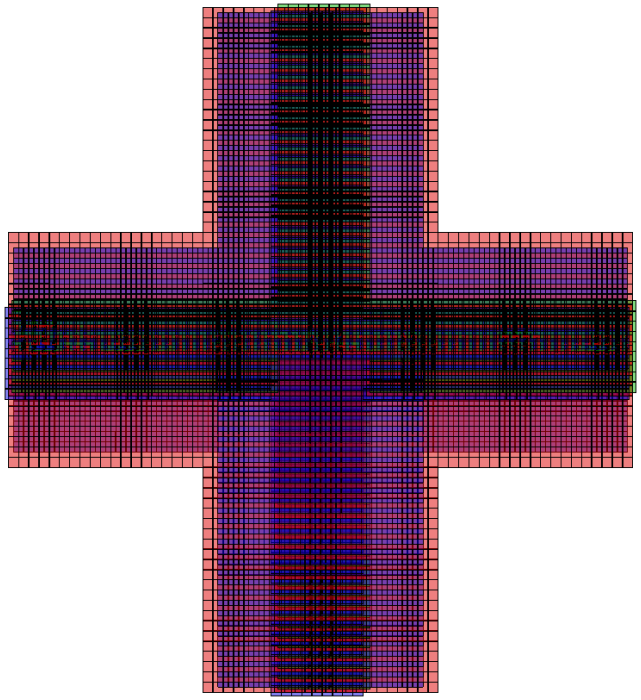
- Laser peening is a well-established process for enhancing a component's long-term resistance against stress corrosion cracking (SCC)
  - Currently being used by nuclear and aerospace industries
  - Establishes a thin layer of compressive stress on the target surface
- Key laser peening parameters are the energy density, time duration, number of layers, and the use of ablative tape
  - These parameters are designated by the standard notation as follows: "4-18-5T" technique consists of 4 GW/cm^2 energy density for a duration of 18 nanoseconds with a total of 5 passes using ablative tape



Conclusion

- Based on the accumulated data (via coupon testing and numerical analysis), that development program has led to the conclusion that laser peening will provide a positive benefit to the MPC by enhancing its long-term resistance to SCC
- Data indicates that a *minimum* depth of compression of 2mm can be reliably achieved for all MPC weld geometries