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# *Dissimilar Metal Weld*

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## **Program Development**

**Carl Latiolais**  
**Project Manager**  
**Piping & Bolting**  
**Performance Technology**  
**EPRI NDE Center**



## *Sample Evaluation*

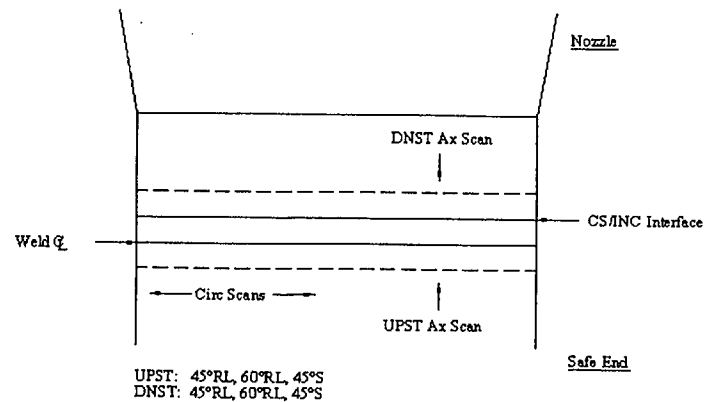
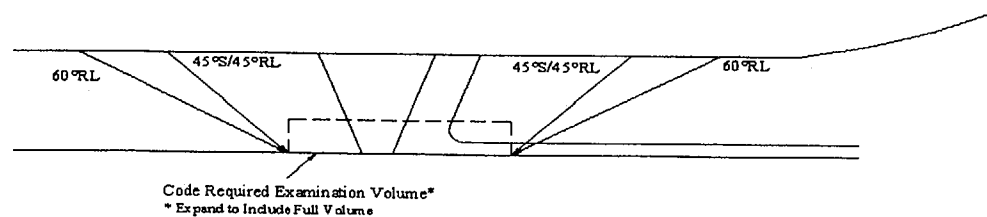
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- ▲ **19 Samples have been scanned with Automated Techniques**
  - 4.0" Diameter to 28.0" Diameter
  - 0.50" to 2.25" in Thickness
  - PWR inlet and outlet sample has yet to be scanned with conventional techniques , but sample was used at VC Summer to demonstrate procedures and personnel and the responses obtained from real defects looked comparable.
  - All Detection Data has input into Data Base for Easy Evaluation

# Sample Evaluation

## ▲ Approach

- Samples have been scanned from both sides of weld
- Techniques are those which are commonly used for field examinations





## *Sample Evaluation*

### ▲ Preliminary Findings

- Flaw Orientation, Location and Growth Direction Greatly Affect Detectability
- Incident Angles Sufficient to Impinge on Inside Surface (31-45 degrees) are proving to be effective for Axial flaws
- 45, 60 & 70 Refracted Longitudinal 2.0Mhz Search Units for Thicknesses from 0.5" to 0.75 " are being evaluated and the results are promising for circumferential flaws
- Combinations of 1.0 and 2.0 MHz are being evaluated for thicker welds >0.75" - 2.35".
- Some Flaws Less Than 20% **Not** Detected when access is limited to one side
- In-situ process may not be best flaw implantation method for axial flaws



## *Preliminary Findings*

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- ▲ Safe-end material and nozzle material have very little affect on sensitivity of examination (508, 316, 304 or Alloy 600)
- ▲ Greater affects noted if beam is initiated on top of weld material verses base material
- ▲ Orientation of flaw has much greater affect than base material type



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## *Sample Evaluation*

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### ▲ Ongoing Activities

- Limited Access Data Analysis (Automated)
- Evaluate Depth and Length Sizing Capability(Automated)
- Evaluate Phased Array Examinations on all samples (Automated)
- Evaluate Manual Techniques



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## ***PDI Sample Fabrication Activities***

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- ▲ **Material is being prepped for fabrication of samples**
  - 18 Safe-ends and Nozzle Sections have been cut and prepped more scheduled.
  - Preliminary Design and Layout Drawings will start in March 2001
- ▲ **Test Set Design underway**
  - Presently, diameters from 4.0" - 36" with thickness varying from 0.50" to 2.9" will be included in test set
  - Several 36.0" diameter samples will be designed specifically for inside surface examination and will also include Supplement 2 weld
  - Flaws will be implanted utilizing the in-situ process and HIP bonded flaws
  - Test samples will be ordered in 2001



## *PDI Sample Fabrication Activities*

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### ▲ Test Set Design

- Test Set will not cover every configuration that exists in field, but will be a cross cut of configurations
- Basis for sample selection will be based on the following;
  - Number of occurrences
  - Documented failures in field
  - Perceived degree of difficulty
  - Data evaluated on recently purchase samples
- A review of present Appendix VIII requirements indicate that very few changes will be required in order to implement Supplement 10 from outside surface, but this does not hold true for inside surface demonstrations





## ***PDI Sample Fabrication Activities***

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- ▲ **Efforts under way to assess feasibility of testing examiners only from safe-end side**
  - Greater than 90% of field configurations are limited to access from safe-end side only
  - Successful candidates would be qualified for examination from both sides (Nozzle/safe-end)
- ▲ **Site Specific Samples may be Required to Expand the Procedure and Candidate Qualifications**
- ▲ **Practical Demonstration may be coupled with Training**



## *Requested NRC Actions*

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### **▲ PDI Welcomes NRC Subject Matter Expert Involvement in process**

- Requested areas of involvement
  - Sample Design
  - Flaw Implantation Process
  - Test Set Design
  - Proposed Process for Testing
  - Addressing site specific guidelines