



Dissimilar Metal Weld

Program Development

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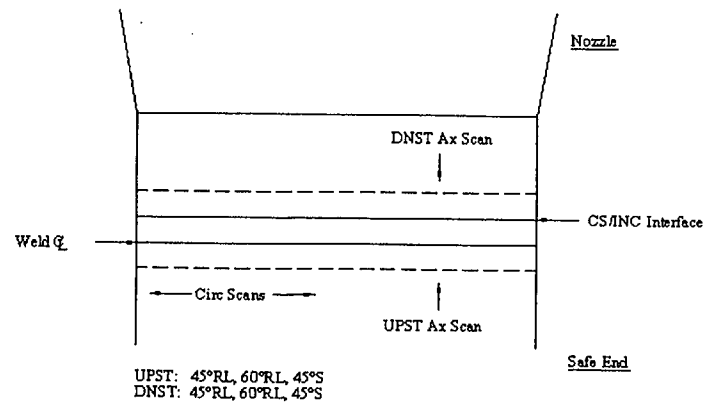
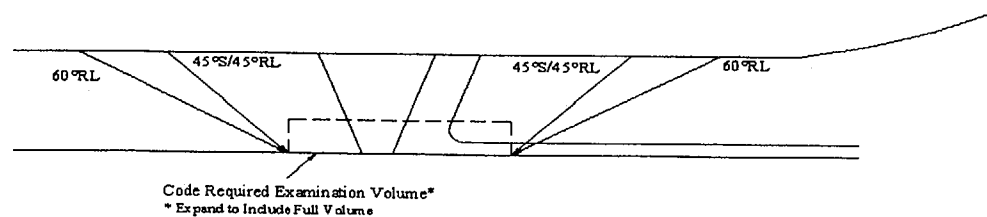
Sample Evaluation

- ▲ **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

- ▲ 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



Sample Evaluation

▲ 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



PDI Sample Fabrication Activities

- ▲ **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

▲ 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

- ▲ **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

▲ 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