



# *EXPANSION CRITERIA UTILIZING PLANT SPECIFIC MOCK-UPS*

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## ***Industry Actions***

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- ▶ **Industry Executives through NEI directed all materials programs to perform a self assessment**
- ▶ **The NRC commented on PDI's assessment and stated that it needed executive oversight**
- ▶ **In an effort to align PDI with other industry materials objectives and provide this oversight PDI has been combined with the EPRI NDEC program**
  - PDI is now an active standing group that reports to the NDEC Steering Committee
  - The NDEC Steering committee's job is to coordinate with other industry groups working on materials issues
    - (MRP, BWRVIP, NEI)



# *Industry Actions*

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## ▲ **PDI Mission**

- Continue to manage the Performance Demonstration Program
- Coordinate with MRP in addressing the inspection issues with regards to Butt Welds in PWR's
- Coordinate with BWRVIP in addressing similar issues BWR's



## ***First Challenge***

- ▶ **The MRP Butt Weld Working Group of the Alloy 600 Issues Task Group has issued guidance (MRP 2003-39) to the industry regarding Inconel butt welds**
- ▶ **This letter recommends;**
  - Direct visual inspection of the bare metal (either through removal of insulation or remote visual examination inside the insulation) or equivalent alternative examination be performed at all Alloy 600/182/82 locations in the primary system within the next 2 refueling outages at each plant, unless performed during your most recent refueling outage
  - Gathering of useful plant-specific information on joint configurations and access to prepare for future volumetric examinations is highly recommended
    - Applicability to qualified Procedures
    - Access to examination (Automated/Manual)



## **MRP 2003-39**

- ▶ **Each plant will ultimately need to develop a planned inspection program for Alloy 600/82/182 taking into account**
  - Relative likelihood of leakage and the safety and economic risk of leakage.
- ▶ **In the Long Term, these plans will be based on the industry recommended programs (Such as PDI for qualification of ultrasonic examination)**



## ***Is PDI Ready?***

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- ▲ **PDI program was designed to qualify procedures and personnel for the examination of Class 1 and 2 dissimilar metal welds and technical basis relied heavily on the use of site specific mock-ups to bridge qualifications**
- ▲ **MRP action may require examination of welds that were previously excluded from volumetric examination**



## ***Present Code Requirements***

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- ▶ **The specimen set shall include examples of the following fabrication conditions:**
- ▶ **(1) geometric and material conditions that normally require discrimination from flaws (e.g., counterbore or weld root conditions, cladding, weld buttering, remnants of previous welds, adjacent welds in close proximity, and weld repair areas);**



## ***Present Code Requirements***

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- ▲ **(2) typical limited scanning surface conditions (e.g., weld crowns, diametrical shrink, single-side access due to nozzle and safe end external tapers for outside surface examinations; and internal tapers, exposed weld roots, and cladding conditions for inside surface examinations). Qualification requirements shall be satisfied separately for each examination surface.**





## ***Present Code Requirements***

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- ▲ **PDI test sets include all of the above conditions but,**
  - PDI realized that more criteria was needed to address unique configurations and included site specific mock-ups part of their technical basis



## ***Is PDI Ready***

- ▶ **Numerous variations of dissimilar metal welds exist in the industry and many are not included in test sets**
  - Geometry varies from one weld to another
    - Search unit angle and focal depth may need to be changed in order to properly exam weld and cover examination volume
  - As-built contours vary from plant to plant and may be different than design
  - Scanning obstructions may force modifications to configurations
- ▶ **Site specific mock-ups provide provisions to assure adequate examination**
  - Search unit selection
    - Proper angle
    - Correct size
  - Adjustments in scan pattern
  - Familiarization with signals associated with weld geometric profile



## ***PDI Actions***

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- ▲ **A detailed checklist will be developed to aid industry in gathering information on the specific configurations and will include;**
  - Weld Crown condition
  - Access to automated examinations
  - Scanning limitations
  - Tapered surfaces
  - Evidence of weld repairs
  - Contour information
  - As-built information
  - Dose Rates
  - And More



## ***PDI Actions***

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- ▲ **Revise examination procedures to incorporate lessons learned and provide clear guidance and criteria for the need/use of site specific mock-ups**
- ▲ **Develop/Modify/Issue criteria for use/need of site specific mock-ups**
  - Underway
  - This criteria will be reviewed by MRP and BWRVIP Inspection committees and issued to industry
- ▲ **If configuration does not allow effective examination with ultrasonics alternative/supplemental techniques may be required**
  - Radiography
  - Eddy Current
  - Visual



## ***PDI Actions***

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- ▶ **Evaluate gathered configuration data to determine;**
  - Are critical configurations covered under present program
    - High temperature welds
  - Are clear outliers that are common to many plants left out?
- ▶ **Fabricate additional PDI samples if needed**
- ▶ **Assist in the design of site specific mock-ups**
- ▶ **Stay plugged in with MRP and BWRVIP and Materials Initiative**



## **Summary**

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- ▶ **MRP/BWRVIP/NDEC/PDI are acting now to provide guidance to the industry to prevent non uniform implementation**
- ▶ **Criteria (Not Guidelines) for the need and use of site specific mock-ups must be issued now (Code Process Too Slow)**
- ▶ **The use of site specific mock-ups builds on the qualification and will assure adequate examinations are being performed**
- ▶ **Site specific mock-ups aid the examiners in doing a good job**
- ▶ **Site specific mock-ups allow the industry to be timely in addressing the growing inconel problem**