

MRP Inspection TAC Report Out



Dale Brown, Southern Nuclear Operating Company
MRP Inspection TAC Chair

NRC / Industry NDE Technical Information Exchange Meeting
Bethesda, MD
January 21, 2026

Outline

- Membership Status
- Deliverables
- Key Technical Topics
 - MRFA 1 – RPV Internals Management
 - MRFA 3 – Nickel-base Alloys
 - MRFA 5 – Fatigue
- New Projects for 2026
- Questions / Discussion



Membership Status

MRP Inspection TAC Contacts

- **Dale Brown, Southern Nuclear**

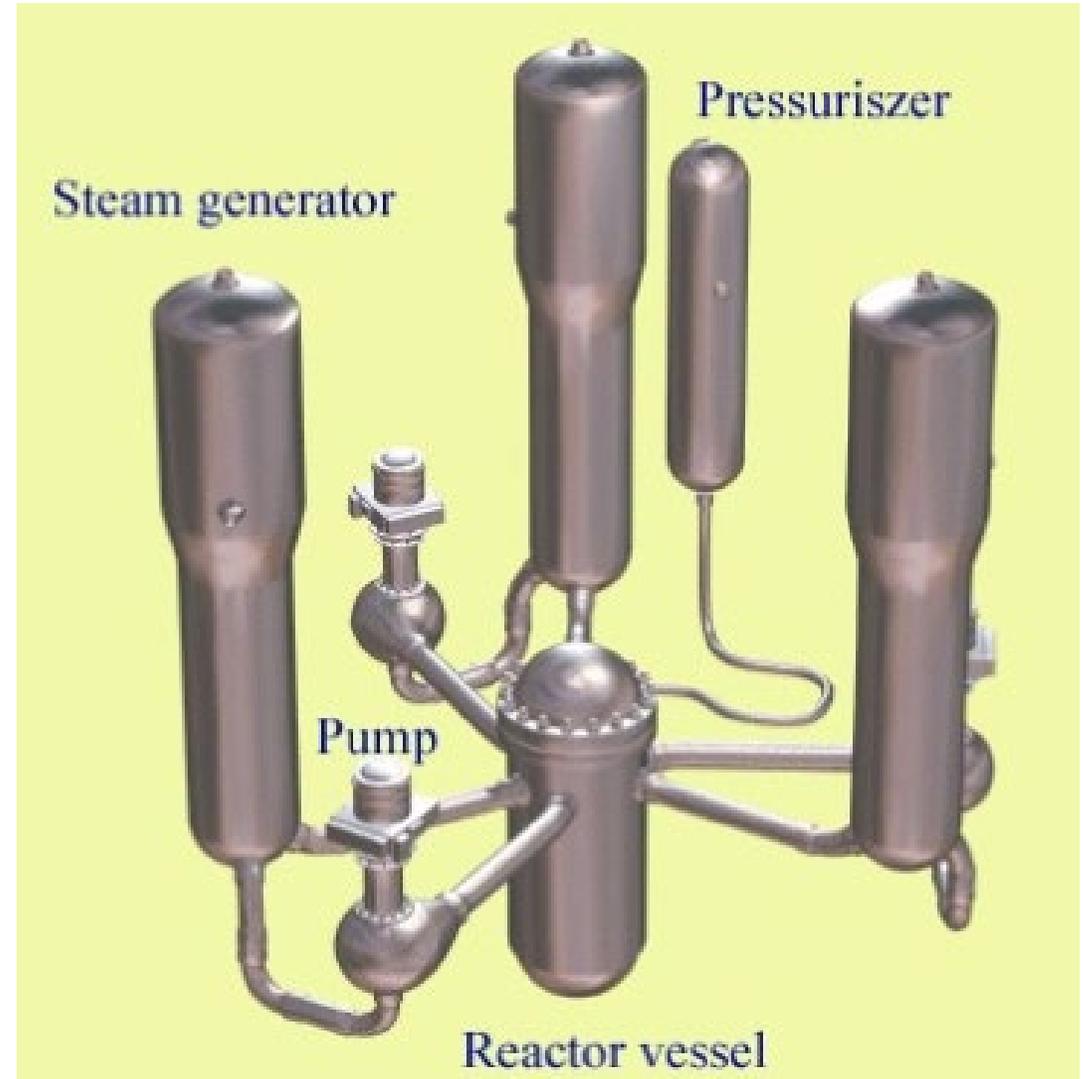
- TAC Technical Chairman
- NDE Specialist
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- **Todd Davis, Constellation**

- TAC Technical Vice-Chairman
- NDE Specialist
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- **Robert Grizzi, EPRI**

- MRP Inspection TAC Project Manager
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Inspection TAC Membership (1/2)

Name	Company	Role
Toshiya Akiyama	Shikoku Electric Power Co., Inc.	Primary
Salem Almheiri	Nawah Energy Company	Alternate
Toru Oumaya	The Kansai Electric Power Co., Inc.	Primary
Joshua Baldock	EDF Energy Nuclear Generation, Ltd.	Primary
Justin Bozic	Nuklearna Elektrarna Krsko	Alternate
Adam Burke	PSEG Nuclear, LLC	Alternate
Dale Brown	Southern Nuclear Operating Co.	Chairman
Brandon Calvery	Tennessee Valley Authority (TVA)	Primary
Walter Chatterton	American Electric Power Company, Inc.	Primary
Todd Davis	Constellation Energy Generation LLC	Vice Chairman
Rachel Doss	Duke Energy Carolinas, LLC	Alternate
David Duxbury	Rolls-Royce Submarines Limited	Primary
Aaron Guckenberger	Northern States Power Company (Xcel)	Alternate
Kresimir Gudek	Nuklearna Elektrarna Krsko	Primary
Matija Gulis	Nuklearna Elektrarna Krsko	Alternate
Alan Guy	Kernkraftwerk Beznau	Primary
Kevin Hacker	Dominion Energy, Inc.	Primary
Hiroataka Isomi	The Japan Atomic Power Company	Primary
Ola Johansson	Ringhals AB	Primary
Brian Kandell	Duke Energy Carolinas, LLC	Primary
Kondoh Keisuke	Hokkaido Electric Power Co., Inc.	Primary
Christopher Koehler	Xcel Energy Services, Inc.	Alternate
Bradley Langston	Southern Nuclear Operating Co.	Alternate
Cristina Ledesma	Iberdrola Generacion Nuclear S.A.U.	Primary

Name	Company	Role
Taehun Lee	Korea Hydro & Nuclear Power Co., Ltd.	Primary
Wei Liu	CNNP Nuclear Power Operations Research Institute, Ltd.	Alternate
Bruno Lopes	Eletronuclear S.A.	Primary
Scott Malec	PSEG Nuclear, LLC	Primary
Jordan Briley	Entergy Services, LLC	Primary
Jay Miller	Constellation Energy Generation LLC	Alternate
Nicholas Morgan	Pinnacle West Capital Corporation	Primary
Joshua Morton	Vistra Corp.	Primary
Naoki Nakamura	Kyushu Electric Power Co., Inc.	Primary
Ryo Nakazaki	The Kansai Electric Power Co., Inc.	Primary
Keith Bull	Entergy Services, LLC	Primary
Michael Parrott	Rolls-Royce SMR Limited	Alternate
Damon Priestley	Tennessee Valley Authority (TVA)	Alternate
Amy Krauser	NextEraEnergy, Inc.	Alternate
Robson Santos	Eletronuclear S.A.	Alternate
Donna Slivon	Florida Power & Light Co.	Primary
Sean Smith	Nawah Energy Company	Primary
Jason Swan	Rolls-Royce SMR Limited	Primary
Sam Tulloch	Rolls-Royce Submarines Limited	Alternate
Ryo Watanabe	Shikoku Electric Power Co., Inc.	Alternate
David Van Allen	Pinnacle West Capital Corporation	Alternate
James Williams	STP Nuclear Operating Company	Primary
Mike Wetteland	STP Nuclear Operating Company	Alternate
Jerry Wren	Xcel Energy Services, Inc.	Primary
Vito Carnevale	Vistra Corp.	Alternate
Cheng Yang	Research Institute of Nuclear Power Operation	Primary

5 New Members - WELCOME!!!

Inspection TAC Membership (2/2)

- 50 TAC Members
 - 25 US / 25 International
 - 50% / 50%
- 30 Utilities Represented
 - 14 US / 16 International
 - 47% / 53%
- November 2025 Attendance
 - Total = 52%
 - US Only, NEI 03-08 = 92%



2025 Inspection TAC Deliverable Review
<*For Reference*>

2025 Deliverables (1/3)

- MRFA #1 – Internals Management
 - MRP In-Vessel Inspection (IVI) Training Course (Product ID: 3002031606)
 - July 22 – 24
 - November 4 - 6
 - MRP-228, Revision 6 – December 2025
 - TAC wants to postpone to 2026
 - MRP Core Barrel UT Protocol, in conjunction with CB mockups - December 2025 (MRP 2025-021)



2025 Deliverables (2/3)

- MRFA #3 – Nickel Based Alloys
 - Design and Fabrication of (10) Core Barrel UT demonstration specimens (priorities based on interim guidance implementation) **in conjunction with CB Protocol**
 - 6 Open Procedure Specimens - **October 2025**
 - 4 Blind Personnel Specimens - **December 2025**
 - VE Training Module for BACC Program – **December 2025**
 - Update to RVUH Penetration UT qualification specimen technical basis, flaw fabrication and UT response (EDM Flaws) – **Q1 2026**

2025 Deliverables (3/3)

- MRFA #5 – Fatigue

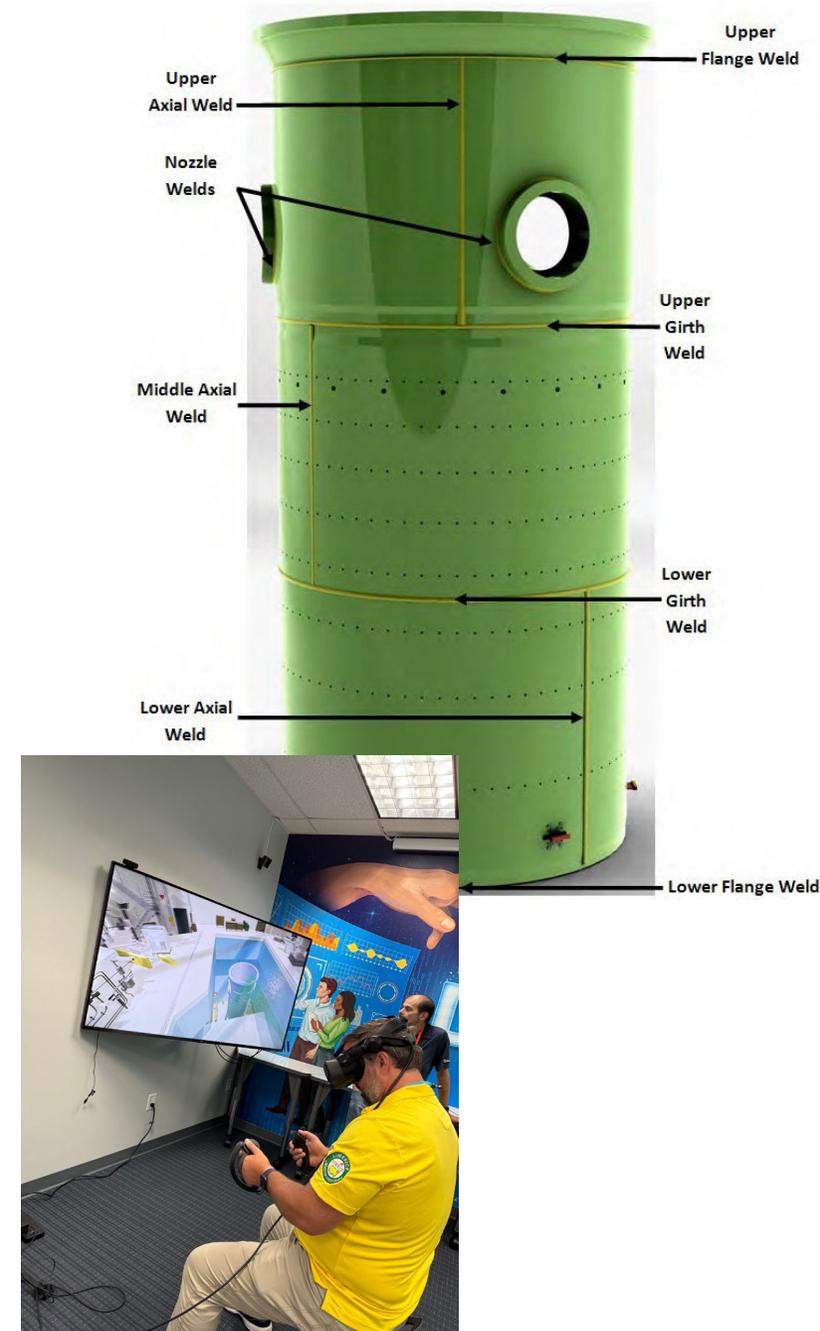
- MRP-23, **Revision 4** - “*Materials Reliability Program: NDE Technology for Detection of Thermal Fatigue Damage in Piping*”; **Product ID: 3002023884**
 - **Delayed until 2026 due to technique development and validation**
- MRP-36, Thermal Fatigue Training CBT – **December 2026 (Delayed)**
- Socket Weld UT Technique Development – Update to MRP-350 – **Delayed until Q2 2026**



Key Technical Topics

Key Technical Topics – Inspection TAC

- MRFA 1 – RPV Internals Management
 - Core Barrel Interim Guidance Inspections
 - Development and issuance of Core Barrel UT Protocol
 - Remote Visual Inspections
 - Continued development and implementation of AI for remote visual exams
 - 2 field trials this Fall 2025; Cofrentes (Spain) & St. Lucie
 - Results were primarily positive
 - Lessons learned pertaining to larger FOV exams for VT-1 and VT-3 applications; the AI model is not necessarily useful for these exams, as-is
 - Will work with TrueFlaw to adjust/train AI model for potential wear items
 - Continued enhancement and development of PWR Virtual Reality environment
 - Adding flaws / cracks / damage features to components



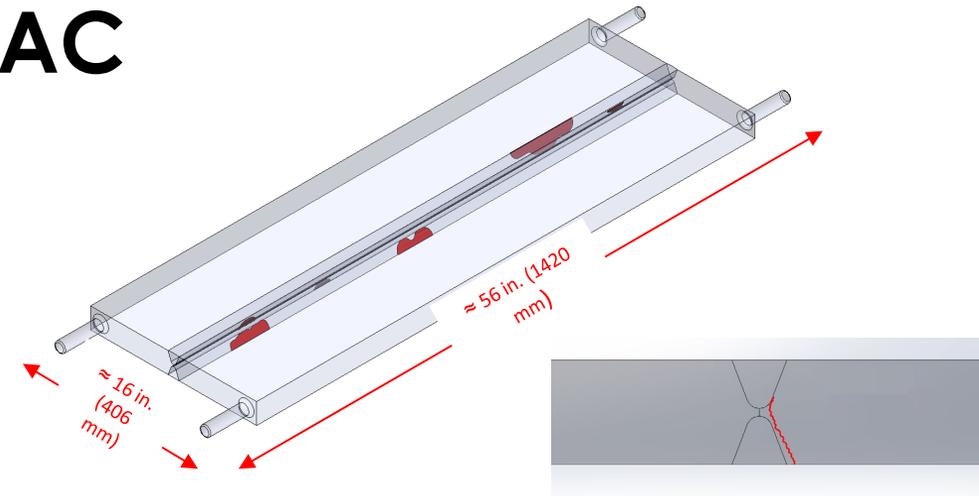
Key Technical Topics – Inspection TAC

- MRFA 3 – Nickel-based Alloys

- Core Barrel Specimen Design and Fabrication
- RPV Upper Head Penetration UT Exams

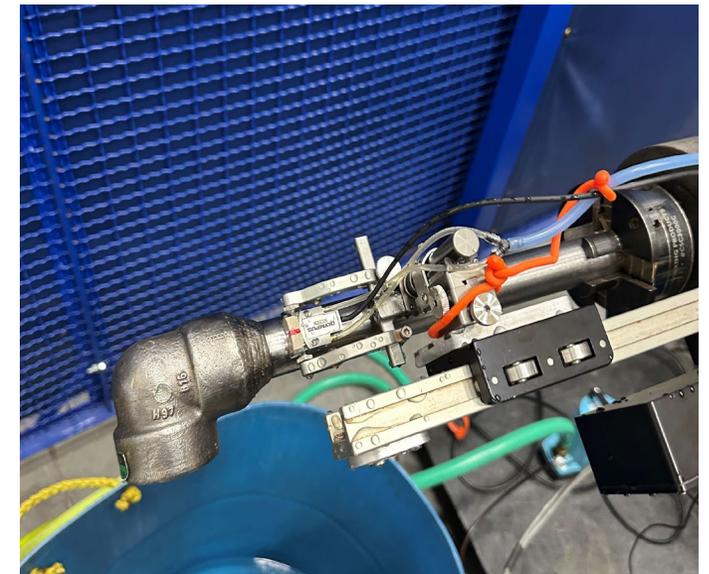
- Success in Sweden

- Swedish Qualification Centre (SQC) approved the use of EPRI’s RPV Upper Head Penetration UT qualification program for implementation at Ringhals
 - Ringhals championed the successful qualification of an AI model for RPV Upper Head Penetration UT data analysis through SQC protocol
- Erroneous leak path UT signals experienced at multiple utilities, in both Spring and Fall 2025, on Alloy 690 heads
 - Offering, in early 2026, “Advance Analysis Utility Oversight for Upper Head UT Exams” training course for utilities



Key Technical Topics – Inspection TAC

- MRFA 5 – Fatigue
 - Weld Overlay Mitigation of Thermal Fatigue Degradation
 - Support of Code Case N-894 “Alternative Rules for Repair of Classes 1, 2 and 3 Austenitic Stainless-Steel Piping with Thermal Fatigue (TF) Cracking” inspection requirements
 - Revisions and updates to MRP and NDE (PD) procedures
 - PDI-UT-8; Manual Conventional Weld Overlay
 - EPRI-WOL-PA-1; Manual Phased Array Weld Overlay
 - PDI-UT-16; NEW!! Manual Phased Array to include Thermal Fatigue specimens
 - Inclusion of results in MRP-23, **Revision 4** - “Materials Reliability Program: NDE Technology for Detection of Thermal Fatigue Damage in Piping”
 - Update to mandatory 4 hour Thermal Fatigue Training, CBT MRP-36
 - Socket Weld UT
 - Established a length sizing RMS for procedure





Proposed and Accepted New 2026 Projects

New Project Idea for 2026

Reactor Internals Bolting – SCC Flawed Specimens

▪ Issue:

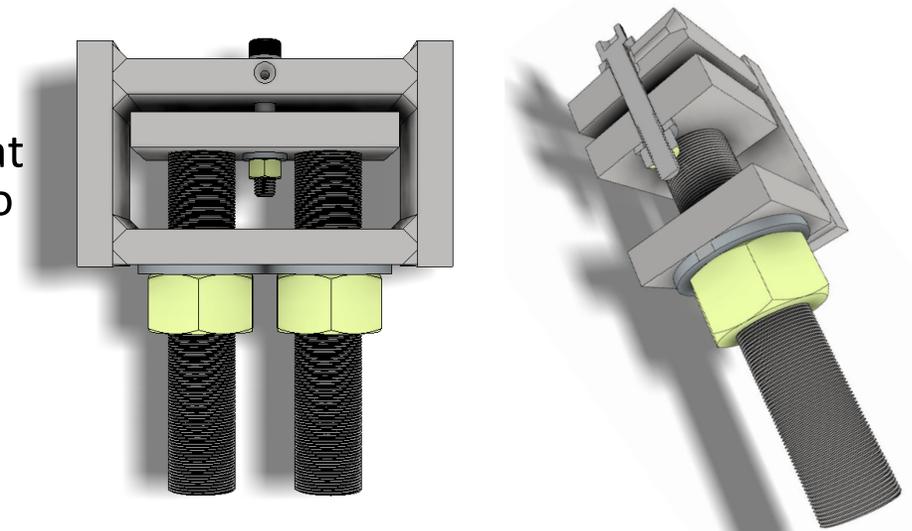
Various reactor internals bolting components present indications that are relevant according to the procedure “but don’t look like flaws” to the UT examiners based on their experience with current flawed specimens used to technique development and TJs

Scope & Objective:

Procure ~10 identical internals bolts from 304H material from the inspection vendor(s) EPR would sensitize them, then on 10 consecutive days, load into fixtures and grow the SCC flaws until the first head pops off one of the earlier bolts. We would then remove all the remaining bolts from the fixtures before they reached 100% failure. There are facilities in Charlotte that offer industrial CT machine services, so we could then have them provide CT scan images of each of the un-failed bolts as a fingerprint verification before UT is applied.

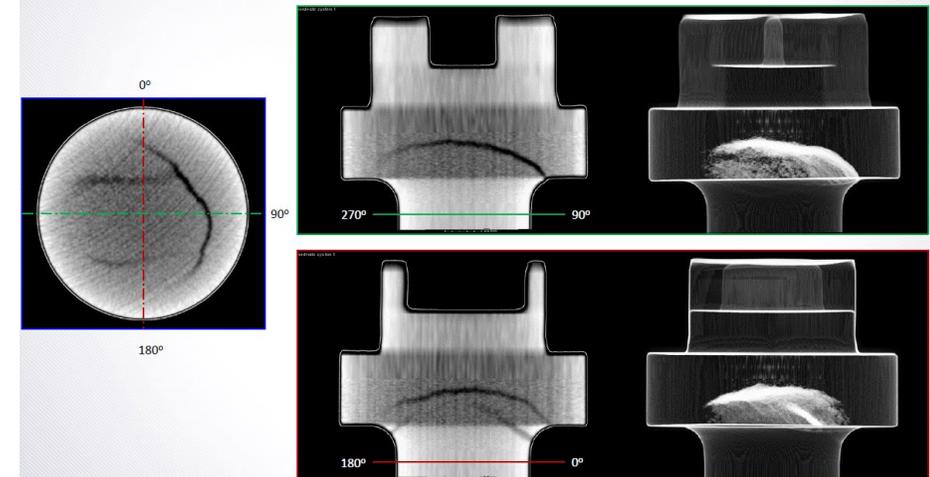
▪ Tech Transfer / Deliverable:

Provide the industry with a means to obtain bolts that are acoustically very similar to the various in-vessel bolt configurations, which have actual SCC flaws. The SCC flaws should yield UT responses that appear very similar to the flaws out in the field, when compared to the EDM notches. Inspection vendors could still use the existing bolts, the SCC bolts would simply be used to supplement their TJs.



2D-3D Tomography (X-ray CT)

- X-ray CT performed on the bolt with indication A15



New Project Idea for 2026

Socket Weld UT

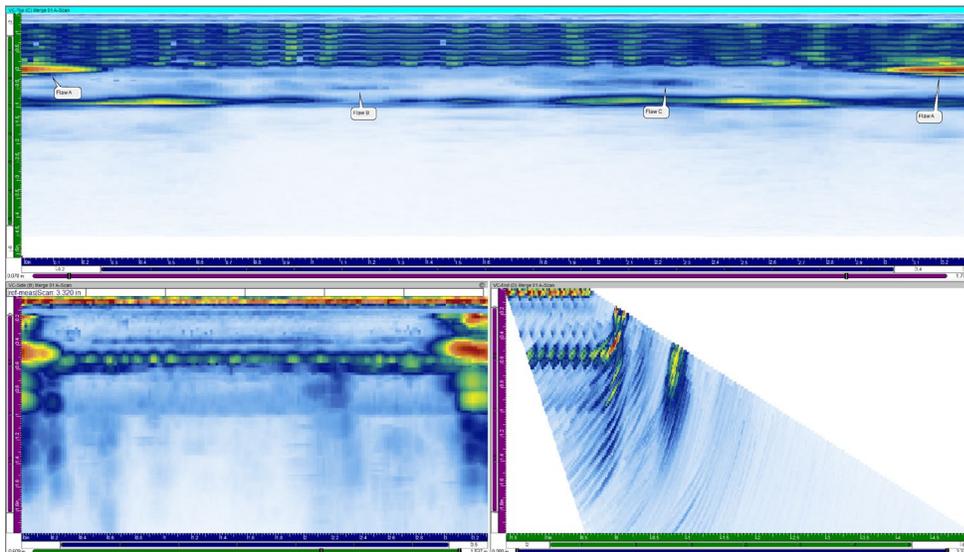
■ Issues

- Outdated equipment
 - OmniScan MX and Topaz 32
- Focal law creation is cumbersome (Word-pad file)
 - No onboard Focal Law Calculator in UltraVision 1
- Creating groups of focal laws can produce **3X or 6X** the amount of data
 - 6 focal law groups for 0.75" samples
 - 3 focal law groups for 1.0" >
 - Acquisition speed limited
 - 0.75" samples scan speed less than 0.5" per second, **unnatural by hand**
 - Data drop out is inevitable

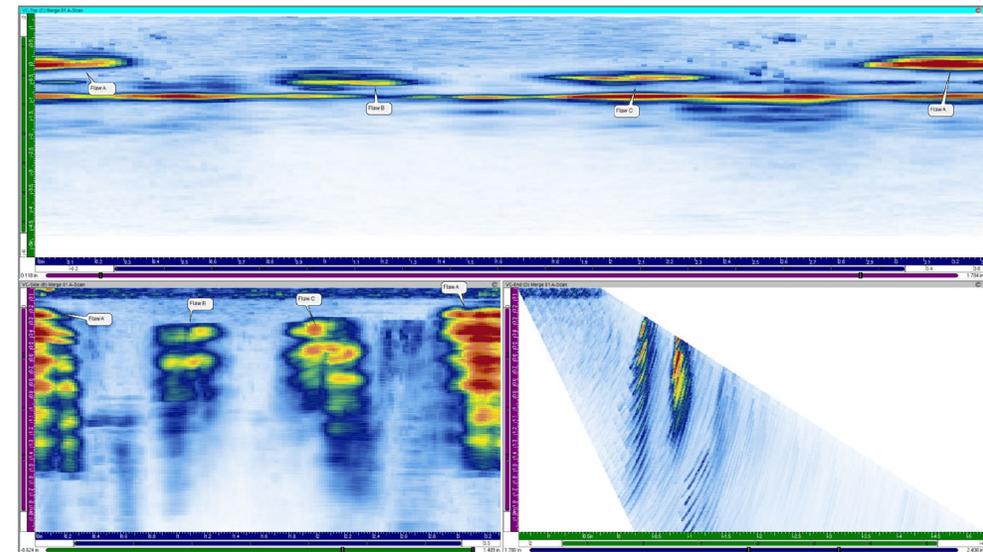
New Project Idea for 2026

Socket Weld UT – Proposal (1/2)

- Proposed Updates – Simplified UT Setup
 - Full aperture sweep of 40° to 70° Shearwave – **cleaner UT for easier analysis**
 - Currently 30° to 70° / 30°-40° angles are of no benefit, standing noise seen in data
 - No more “groups” of focal laws – all samples scanned with same UT setup
 - Easier focal law creation & allows for faster scan speeds
 - No error traps for UT settings based on diameter or schedule
 - Probe frequency selection
 - Improve to allow flexibility for all samples (some diameters, procedure states 2 probes!)



Current Procedural Data of 0.75" Sample-A

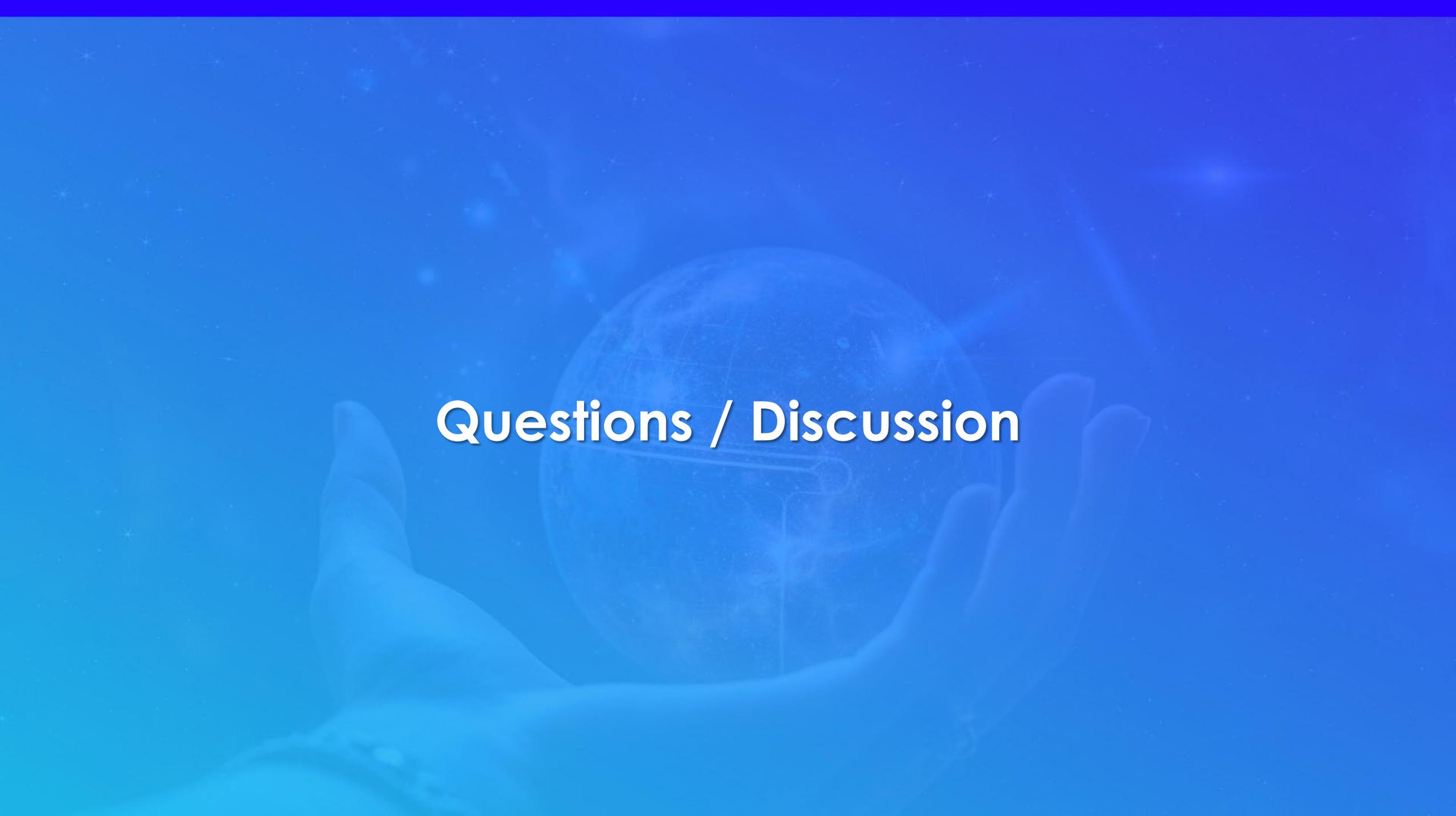


Proposed UT Technique Data of 0.75" Sample-A

New Project Idea for 2026

Socket Weld UT – Proposal (2/2)

- Utilization of newer UT systems...
 - Current procedure begs a procedure revision to add a new system, meaning an Addenda for each system, this is not efficient
 - Proposed improvement
 - Update layout to mirror PDI format and implementation
 - Table 1 – Equipment
 - Table 2 – Settings
 - Will need to decide where to store and access the tables

The image has a monochromatic blue color scheme. In the center, a pair of hands is shown from the wrists up, cupping a globe of the Earth. The globe is semi-transparent, revealing a grid of latitude and longitude lines. The background is a deep blue with a subtle pattern of white stars and faint, glowing lines, suggesting a cosmic or digital theme. The overall composition is symmetrical and centered.

Questions / Discussion



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