



GENERAL DYNAMICS
Electric Boat



Welding & NDT Session

SIBC Seminars

February 25, 2025

Why Focus on Weld & NDT?



USS San Francisco (SSN-711)

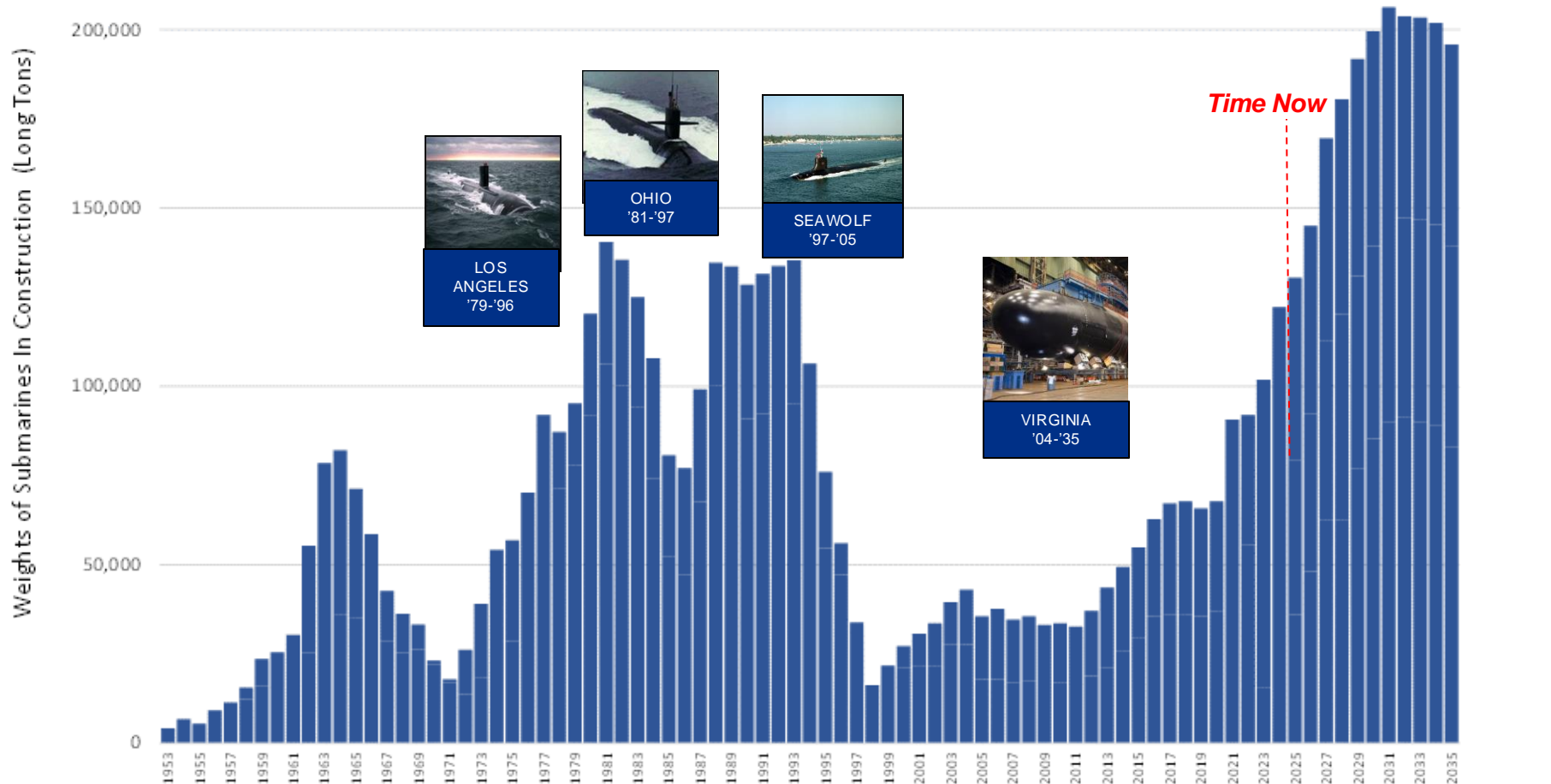


USS Hartford (SSN-768)

The NAVY relies on the performance of our welds to bring our sailors home safely

Growth in Submarine Tonnage

Delivered Submarine Capability Each Year



The Submarine Industrial Base is in an Era of Historic Growth

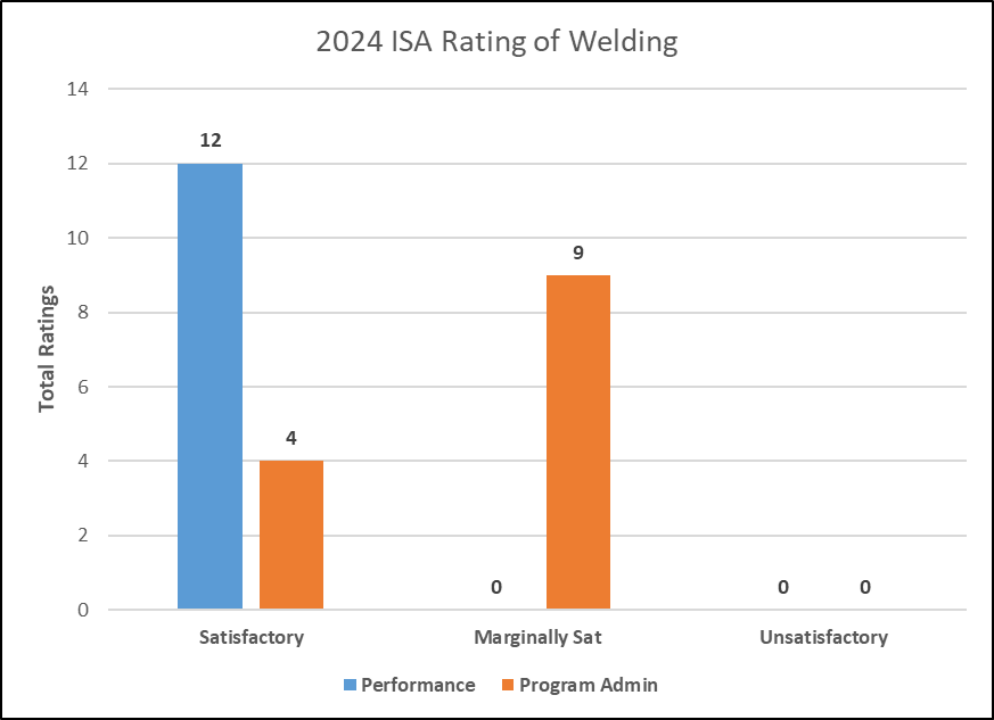
Agenda

- **Supply Base Performance**
 - ISA/Audit Results & Trends
 - Key Deliverables First Time Quality
- **Enterprise Improvement Initiatives**
 - Shipbuilder & Government NDT Working Group
 - Advanced Technology Developments
- **Shipbuilder Outreach & Education**
- **Lessons Learned**
- **Q&A**

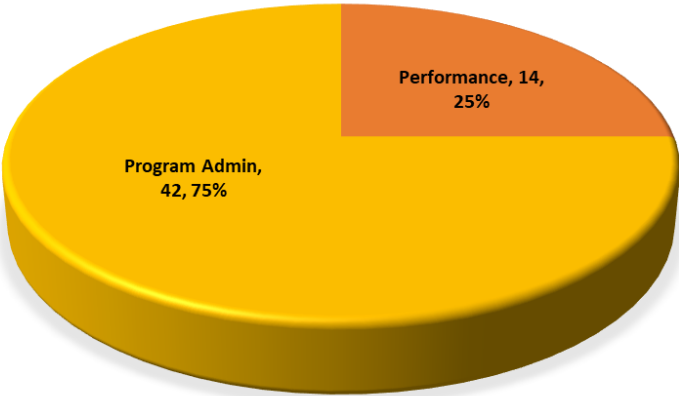
EB In-Depth Supplier Assessment (ISA) / Audit Results & Trends

EB ISA/Audit Results – Welding

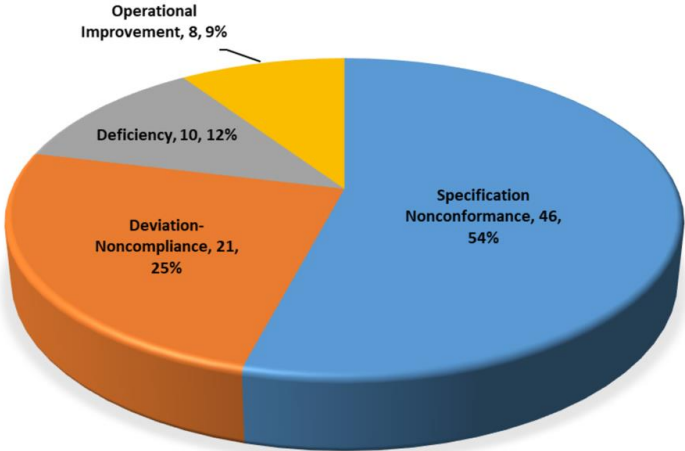
Supply Base is Marginally Satisfactory and Improving



Total Cards per Category



66 Total ISA Cards



EB ISA/Audit Trends – Welding

Common Program Administration Observations

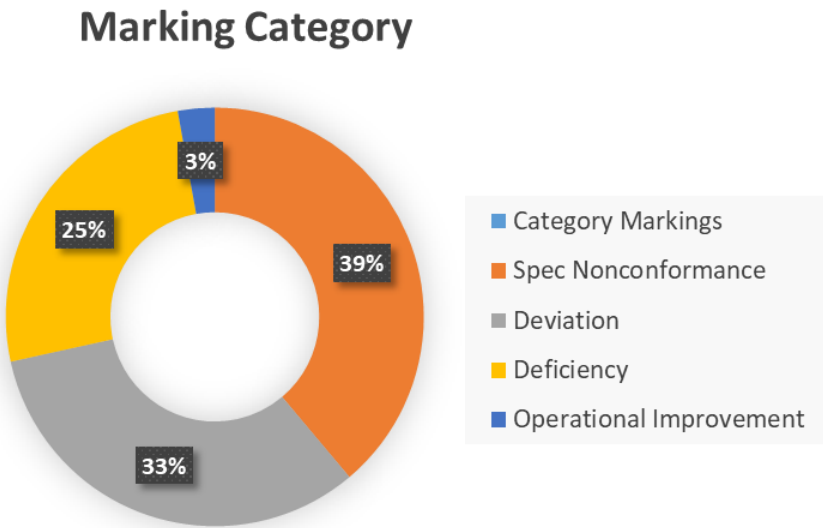
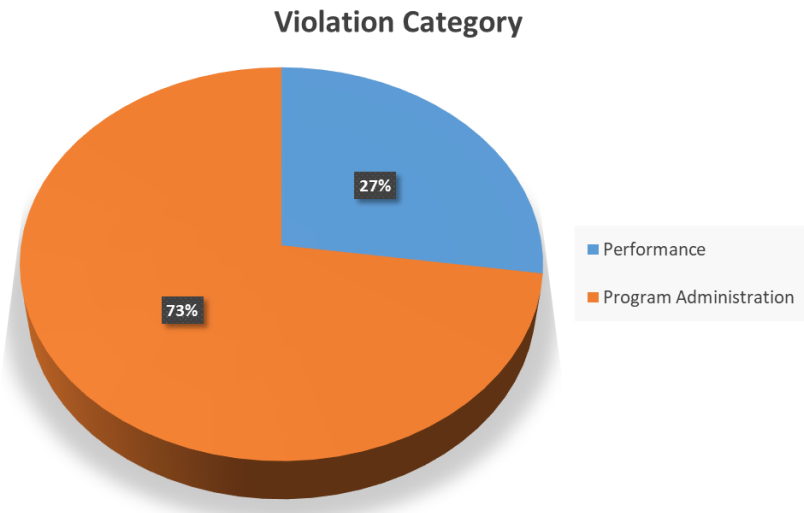
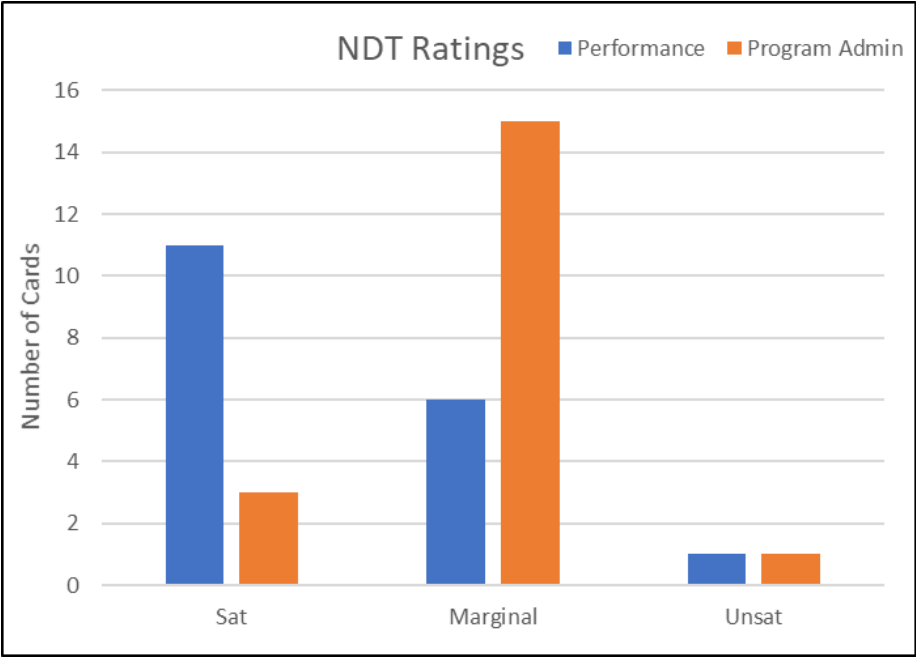
- Qualification Document TP248
 - Non-conformances with documentation that supports performance qualification
- Welder Performance Qualification TP248 Observations Modified by EB4186
 - Vision tests were not performed in the required timeframes (Annual)
 - WWT material (procedure/training/exams) not approved and Audits not conducted every 2 years by the Level III NDT Examiner or other NAVSEA-Approved individual
 - WWT examinations were not performed in the required timeframes. (Every 3 Years)
 - Maintenance of welder qualifications are not performed every calendar quarter or once every three months
 - Welder performance qualifications were missing required information
- Fabrication Document TP278/1688
 - Filler Material Handling and Control
 - In-Process Monitoring records missing required attributes
 - Multiple issues for incorrect weld procedure revision used or steps performed not in procedure

Common Performance Observations

- The amperage/voltage range was outside the allowed range as required by the weld procedure. (Manual Process)
- Level 1 weld wire not being disposed of in accordance with EB-2678
- Foreign material not being removed within one inch of the weld edge from the base metal surface
- Welding above the qualified weld procedure heat input limit
- Preheat/interpass temperature violations

EB ISA/Audit Results – NDT

Supply Base is Marginally Satisfactory and Improving



EB ISA/Audit Trends – NDT

Common Program Administration Observations

- Issues with documentation missing or non-conforming relative to Examiner (Level III) qualification
- Written Practice not reviewed and approved by Level III
- Written Practice incorrect or missing necessary requirements from ASNT TC-1A
- Issues with Level II and Level III certifications
- Missing or inadequate procedure demonstration
- Non-conforming Examinations for Level II and Level III personnel
 - Wrong QTY or wrong type of questions
 - Verbatim questions from ASNT study guides
 - Allowance for exams to be “open book”

Common Performance Observations

- Measuring devices for VT not calibrated or traceable to a calibration
- Incorrect acceptance criteria used for VT
- MT yoke leg spacing and coverage non-conforming
- Pie gauge during MT not used correctly
- Dry wipe not conducted during PT inspection
- Penetrate during PT not allowed proper dwell time
- Inadequate cleaning during PT inspections
- 25% overlap not achieved between passes during UT inspections
- Instrument settings modified without recalibrating during UT inspections

EB ISA/Audit Summary

What are internal audits and surveillances identifying?

- Are internal audits identifying weaknesses and opportunities for improvement?
- Do you ask “Where else” in your problem solving approach?
- What drives continuous improvement?
- What are your quality goals?

Is your company ready for an ISA?

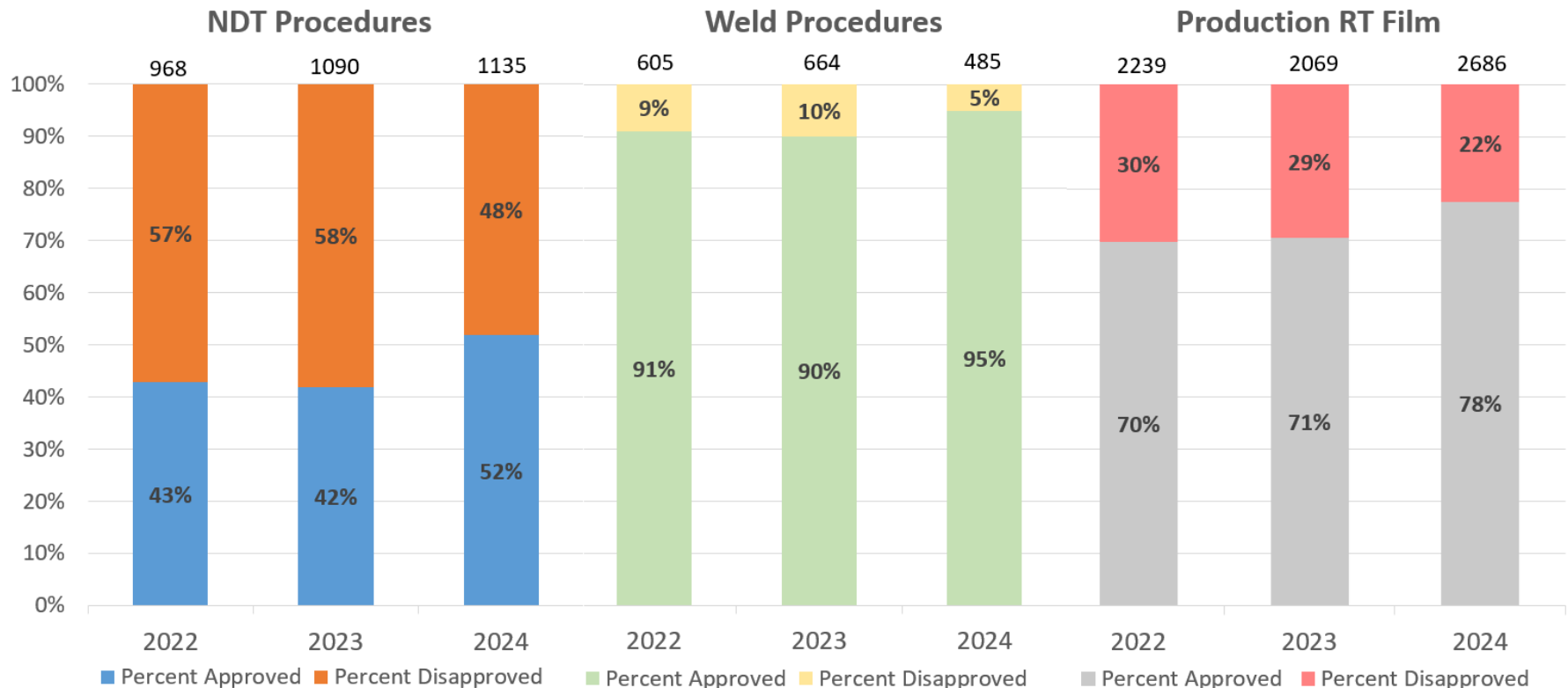
- How do you know they are ready to be audited?

How do you know your Welding & NDT Program is healthy?

- What metrics exist?
- What inputs are you providing to your training program?

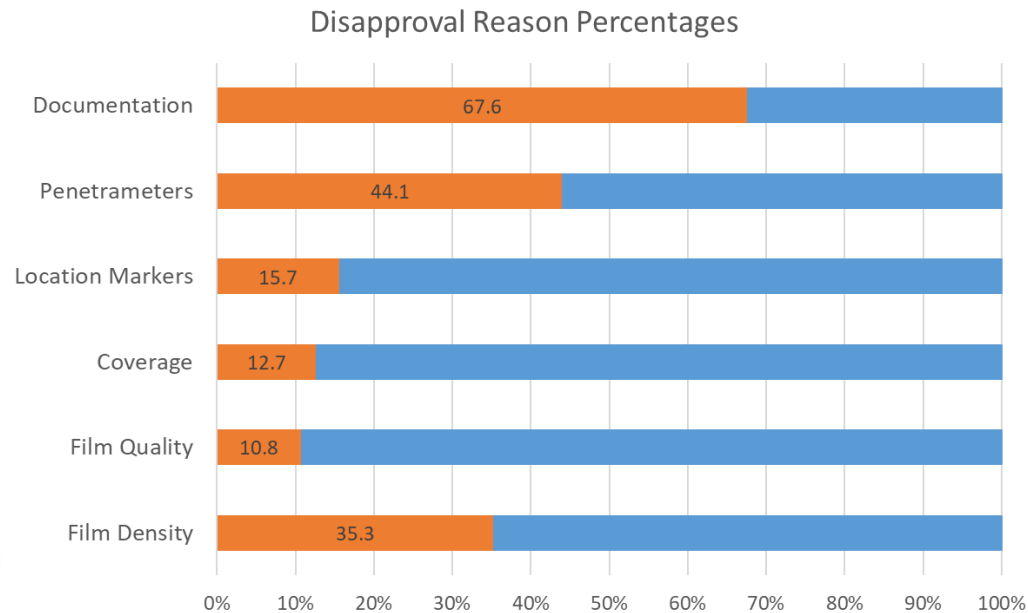
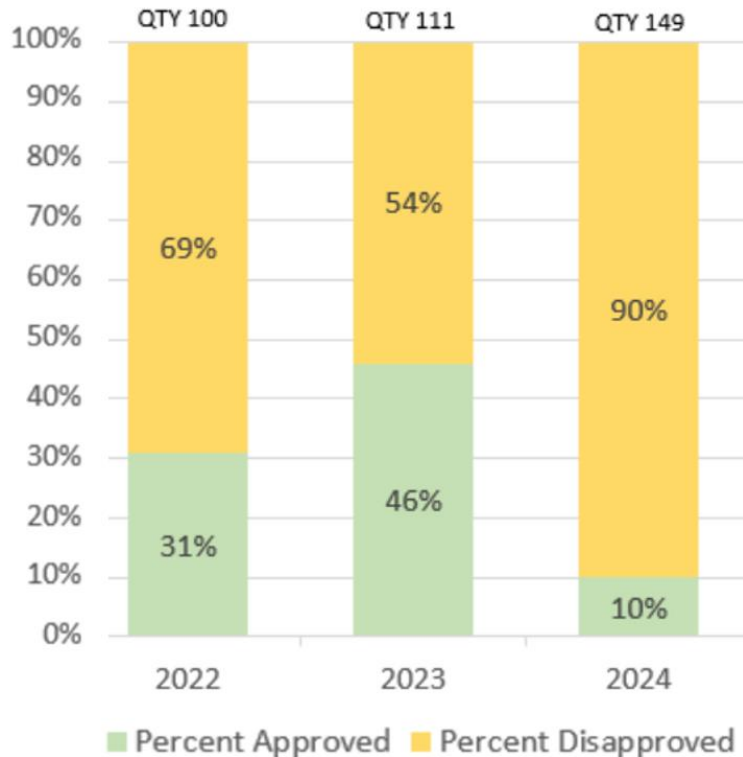
EB Key Contract Deliverable Performance

- NDT Procedure Submittal Volume Plateauing – Overall FTQ Needs Improvement
- Weld Procedure Volume Peaked in 2023 – Overall Approval Rate Satisfactory and Steady
- Production RT Film Volume Increasing – Overall FTQ Marginally Satisfactory & Needs Improvement to get over 90%



EB Key Contract Deliverable Performance

Radiographic Shooting Sketch (RSSS)



- RSSS Submittal Volume Increasing – Overall FTQ Needs Urgent Step Change Improvement
 - Average duration from original submittal to approval was approximately 280 days
 - Average 3.5 resubmittals to achieve approval
 - 67.6% of disapprovals had documentation issues
 - 71.6% of disapprovals had technical issues

Key Contract Deliverable Performance Summary

- Lack of thoughtful planning and active management of key contract deliverables across enterprise is eroding schedule margins and causing impacts
 - RSSS and Procedures submitted late in contracts
 - Previous approvals being submitted unnecessarily
- Supply Base must focus on improving first time quality and proficiency in this area
 - Application of learning needs to be broadly applied
- Shipbuilders are committed to continue to improve on consistency of submittal requirements and management of review and approval process

Resources provided by Shipbuilders are not being consistently leveraged

Enterprise Improvement Initiatives

NDT Working Group - Updates

Charter: The Shipbuilder & Government NDT Working Group developed additional processes and controls for the Supply Base NDT Program to ensure stable, predictable performance and delivery of quality conforming products

- Shipbuilder and Government experts assembled into 5 subgroups to define corrective actions
 1. Centralized Certification and Training
 2. Sub-contracted NDT Services
 3. Aligned Auditing Approach
 4. Re-inspection Requirements
 5. Examiner Roles and Responsibilities
- Shipbuilders provided recommended corrective actions in 2022 which were endorsed by NAVSEA in 2023
- Shipbuilders working through formal Spec Change Proposal process which includes invocation of NAVSEA Tech Pub 271 Rev 1 and expected to receive final approval to flow down to supply base by 4Q25

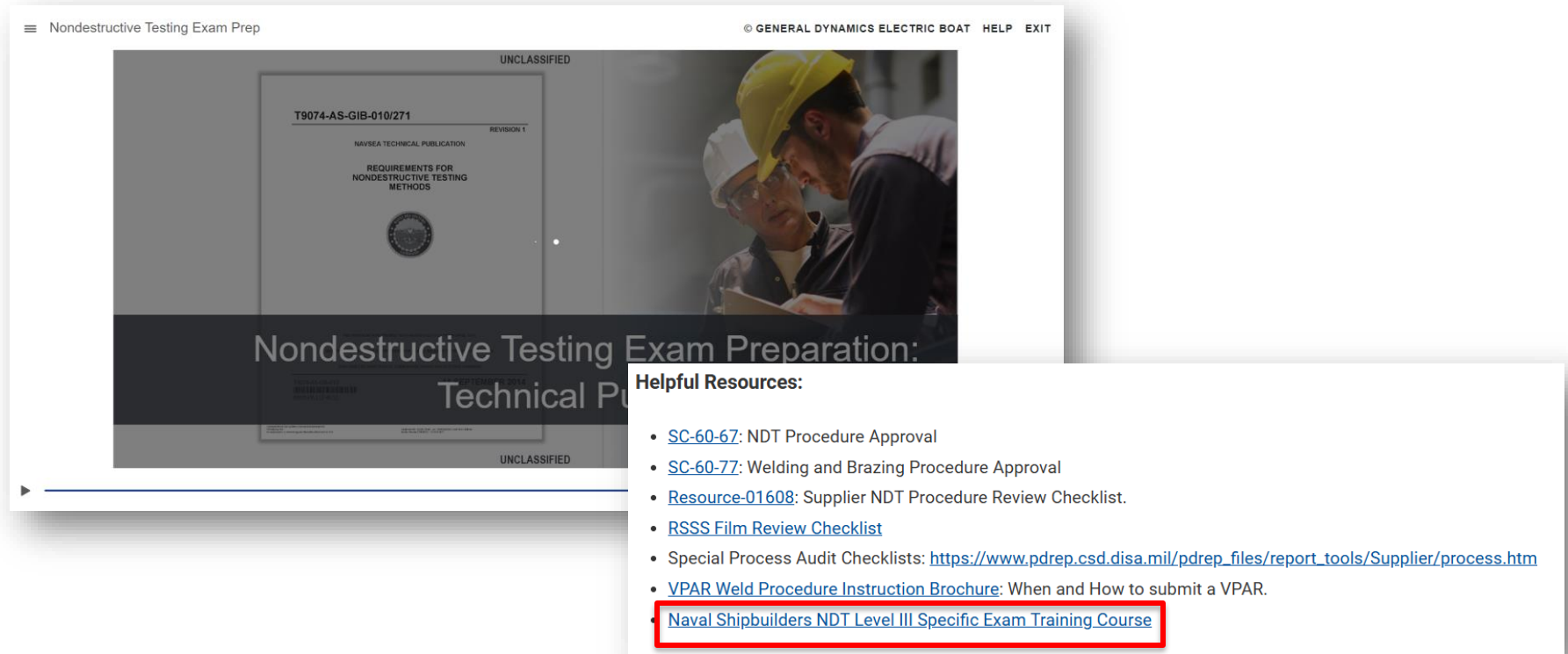
NDT Working Group - Centralized Cert. & Training

- Variability was identified in the current requirements and ability for employers to self-certify
- Supply Base Examiners will be required to pass the specific examination every five years
- The team developed a Requirements Document for ASNT to develop a process to administer a Level III / Examiner Specific Exam to the supply base
- A 50 question Specific Exam will be required for each applicable NDT method (VT, PT, MT, ET, RT, UT)
- Computer based exam and will be available at ASNT approved test centers (Pearson VUE, etc.)



NDT Working Group - Centralized Cert. & Training

- Computer based training course has been developed by Shipbuilders for Supply Base Level III's supporting the Specific Exam
 - Course is live on Electric Boat's Supplier Webpage
 - Optional to be used to prepare for the Specific Exam but mandatory if exam is failed on first attempt



Nondestructive Testing Exam Prep

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UNCLASSIFIED

T9074-AS-GIB-010/271 REVISION 1

NAVSEA TECHNICAL PUBLICATION

REQUIREMENTS FOR NONDESTRUCTIVE TESTING METHODS

Nondestructive Testing Exam Preparation: Technical P

UNCLASSIFIED

Helpful Resources:

- [SC-60-67](#): NDT Procedure Approval
- [SC-60-77](#): Welding and Brazing Procedure Approval
- [Resource-01608](#): Supplier NDT Procedure Review Checklist.
- [RSSS Film Review Checklist](#)
- Special Process Audit Checklists: https://www.pdrep.csd.disa.mil/pdrep_files/report_tools/Supplier/process.htm
- [VPAR Weld Procedure Instruction Brochure](#): When and How to submit a VPAR.
- [Naval Shipbuilders NDT Level III Specific Exam Training Course](#)

https://gdeb.com/suppliers/12_weld_ndt/U_eLn_NondestructiveTestingExamPrep/

NDT Working Group - Centralized Cert. & Training

Uncontrolled Unclassified Information (UUI)

Supplier Quality Alert (NDT Level III / Examiner Specific Exam)

Problem Statement

Huntington Ingalls Industries-Newport News Shipbuilding (HII-NNS) and General Dynamics Electric Boat Corporation (GDEB) identified an opportunity to standardize and improve the overall consistency in how shipbuilding suppliers administer Level III / Examiner Specific Examinations to NDT Level III personnel.

All Level III / Examiners that perform work for HII-NNS and GDEB are required to pass a Level III / Examiner Specific Examination per NAVSEA T9074-AS-GIB-010/271. The current requirement allows for inherent variability with the quality of the exams as well as how they are administered.

Improvement Objective

A combined Government/Shipbuilder NDT Working Group determined administering a Level III / Examiner Specific Examination was required in order to improve supply base performance with the following considerations:

- Identified the benefits of utilizing a third party to administer a standardized Level III / NDT Specific Examination to the supply base.
- Administering the exam by a third party will accomplish the following:
 - Ensure the examination meets the highest standards and validates competencies of the Level III / Examiner
 - Add consistency & rigor to the examination administration process across the supply base
 - Provide a centralized database of certified Level III / Examiner personnel who have passed the examiner specific examination.
 - Eliminate the need for suppliers to administer a Level III / Examiner specific examination, saving time and money.
- The Level III / Examiner Specific Examination will be based on Revision 1 of NAVSEA T9074-AS-GIB-010/271
- This alert is intended to inform of an upcoming change that will be contractually flowed down in the near term

Important Information Related to the Application Process

All applicants will be required to complete an application which will be found on the ASNT website. The following are some key points to be aware of when filling out the application:

- Provide ASNT ID Number if previously certified by ASNT
- Provide documentation (signed by a Level III / Examiner or qualified representative) which shows the current certification was completed by examination administered by ASNT, employer, or other entity
- Identify that a vision test has been successfully administered in the past 12 months
- Identify that a color vision test was successfully administered in the past 5 years
- Testing will be given at ASNT testing centers

Follow this link to the exam: <https://certification.asnt.org/certification/naval-shipbuilders-ndt-level-iii/application>

NOTE: Training is available on the EB Supplier Website: https://gdeb.com/suppliers/12_weld_ndt/. This can be used as a preparation tool for taking the Level III / Examiner specific exam and will be required if there is a failure to pass the exam.

Screening of Candidate for Reexamination

If an applicant fails to pass the exam the first time, the following step will be required to retake the exam:

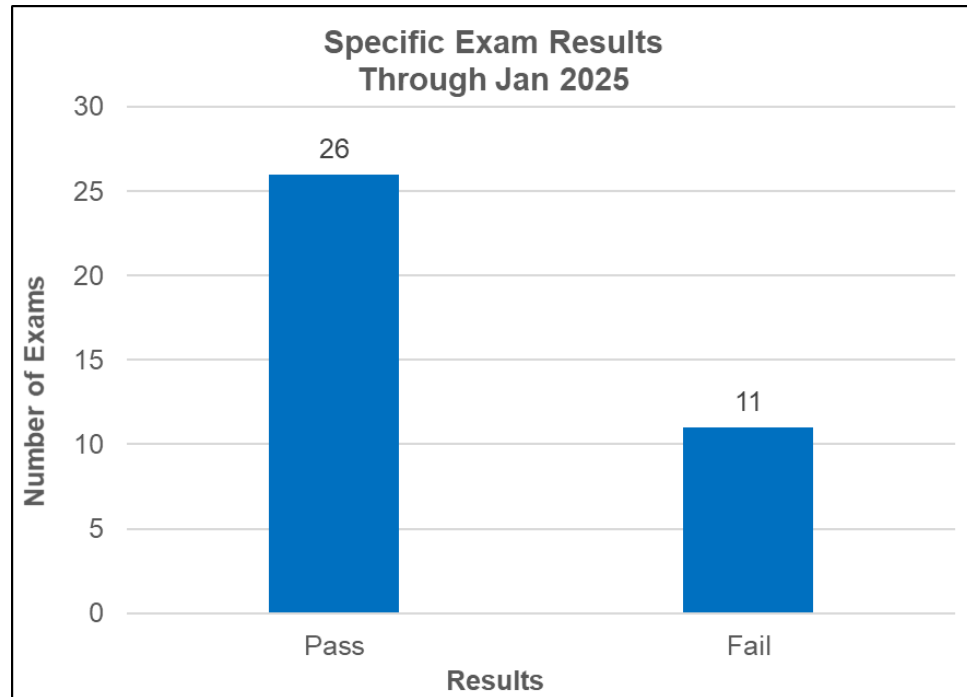
- A candidate requests for re-examination following the first failure. The examination administrator will require evidence that they have completed the provided shipbuilder training before the candidate will be allowed to schedule a second examination.
- If the candidate fails a second time, there will be a 30-day cooling off period before they will be allowed to take the third exam, and they must take it within 90 days. Failure to take the examination within this time period will result in a suspension to perform work per NAVSEA T9074-AS-GIB-010/271.
- If the candidate fails a third time, they shall be suspended from performing work per NAVSEA T9074-AS-GIB-010/271.
- Request for retake after the third failure will require cognizant shipyard administrator approval.

Uncontrolled Unclassified Information (UUI)

Uncontrolled Unclassified Information (UUI)

Timing for all Supplier Level III / Examiners to take the exam will be subsequently flowed down but targeting the 2nd Quarter of 2025. If you have any questions, please contact Gary Zimak - gary.zimak@hii-nns.com or call at 757-688-6799 or 757-817-5533 or EBSupplierNDTSupport@gdeb.com.

10/22/2024



Highlights

- VT - 100% Pass Rate (10)
- UT – 90% Pass Rate (6)
- PT – 40% Pass Rate (6)
- MT – 43% Pass Rate (3)
- RT – 33% Pass Rate (1)

Bulletin Issued 10/23/24

NDT Working Group – Written Practice Audit Program

- **Problem Statement:** Common audit findings on Shipbuilder In-Depth Supplier Audits (ISAs) have been related to lack of verbatim compliance of Written Practices to ASNT TC-1A and NAVSEA Tech Pub 271 requirements
- **Solution:** Shipbuilders will be requiring Supply Base to send Written Practices through a third party review via ASNT
 - Shipbuilders recognized that ASNT Employer-Based Certification (EBC) Program is a good fit to assist the shipbuilding community in auditing suppliers Written Practices
 - Shipbuilders working in collaboration with ASNT to implement a similar audit program to audit the supply base Written Practices in 2024



- **Benefit:** Upgrade Supply Base Written Practices and associated certification programs to verbatim requirements and eliminate identifying during audits

Key Project Milestones

- Establish Joint EB/NNS/ASNT Checklist – Complete
- Round Robin Reviews of Sample Written Practices – [In Work] ECD 2Q25
- Roll Out to Supply Base via Contract Requirements – ECD 1Q26

Advanced Technology Developments

Advanced Technology Developments

Shipbuilders working with Navy and strategic Supply Base partners to implement new technology in 2025

- **Robotic Welding – COBOTs**

- EB Briefed the supply base during a lunch and learn session on January 22nd and 23rd on Tech Pub 248 Appendix R requirements.
 - Appendix R developed with NAVSEA to implement standardized requirements for robotic systems and facilitates Authorized Representative (SUPSHIP) approval
 - Implemented into Supply Base via Revision E of EB Spec 5341

- **Radiographic Film Scanning (Digitizing Film)**

- Shipbuilders evaluating potential to expand use of scanned RT film to support Shipbuilder validation of Supply Base RT packages by 2Q25

- **Computed Radiography (CR)**

- Shipbuilders utilizing NAVSEA provided guidance and leveraging industry expertise to develop CR qualification process for welds to be distributed to the Supply Base by 3Q25



Shipbuilder Outreach & Education

Supplier Outreach & Education

Conferences

- “Lunch and Learn” Welding Series
 - New topic discussed on monthly cadence
- Quarterly NDT Series
 - New topic discussed on quarterly cadence; *RT/RSSS Summit at EB Planned 2Q25*

Bulletins

- Weld and NDT Lessons Learned Bulletins
 - Continually issued to flow common issues and relevant learning from shipyard
- Supplier Information Bulletins (SIB)
 - Regular contributions to articles with Supplier Quality team

Resources

- Revision C of the Electric Boat Welding VPAR Brochure Issued 10/24/22
- NavWeld & NavNDT Software
- Emails for general inquiries on welding and NDT direct to subject matter experts (SMEs)

The Industrial Base is Encouraged to Leverage the Training and Resources Provided by Shipbuilders

Supplier Outreach & Education

Supplier Website Updated in 2023

- Dedicated “Welding and NDT” page added as a resource for conference content, bulletins, and other relevant information

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HOW TO SELL TO EB
PROSPECTIVE SUPPLIERS
ISUPPLIER PORTAL & SPARS
PURCHASE ORDER INFO
SHIPPING INFORMATION
STANDARD CLAUSES
SECURITY
FORMS
TERMS & CONDITIONS
VISITING EB/CONTRACTORS
BUYING FROM EB
QUALITY

Suppliers and Strategic Sourcing

Department 341 Welding and NDT Engineering has a dedicated group that focuses on supplier support, Suppliers and Strategic Sourcing.

Contact Information:

- EBSupplierWeldingSupport@gdeb.com: for general inquiries and correspondence concerning welding
- EBSupplierNDTSupport@gdeb.com: for general inquiries and correspondence concerning NDT

Group Breakdown:

341 Welding and NDT Engineering –
Suppliers and Strategic Sourcing
The suppliers and strategic sourcing group oversees supply base welding and NDT activities through quality, review and

WELDS

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Supplier Welding Bulletins

Supplier Communications:

- [NDT Bulletins](#): NDT Engineering's Supplier Bulletins
- [Supplier Conferences](#): Supplier Conference presentations

Lessons from the Shipyard

Welding Engineering Supplier Support, a collaborative effort between Welding Engineering Supplier Development and Supplier Oversight, has released Supplier Welding Bulletins (SWB), to the supply base detailing various lessons learned from on-site welding activities.

SWB Number	Title	Topic
SWB-0001	Flowmeters: What's in a Scale?	Importance of proper use and installation of shielding gas flowmeters
SWB-0002	Who's Got Your Back?	Identification of integrated backing in weld joints for preheat and heat input requirements
SWB-0003	Shiny is Clean	Cleaning of filler material helps prevent oxide inclusions in the weld puddle
SWB-0004	Welding Preheat: Why Preheat? It's Already Hot in Here	Preheat Part 1: Impact of quality preheat, or potential lack thereof
SWB-0005	I'll Have Mine Rare	Preheat Part 2: Necessity of stable, uniform, through-thickness preheat
SWB-0006	Don't Come Up Short	Preheat Part 3: Best practices for thorough and frequent monitoring of preheat
SWB-0007	Char-Broiled	Preheat Part 4: Torch preheat techniques for ensuring quality preheat
SWB-0008	Where Did It Go?	Copper loss from contact tips and gas cups is an indication of weld quality issues.
SWB-0009	Don't Be Shocked	Checking equipment for electrical hazards avoids unsafe

[SWB-0006](#)

[SWB-0007](#)

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Supplier NDT Bulletins

Supplier Communications:

- [NDT Bulletins](#): Lessons from the Shipyard, Welding Engineering's Supplier Bulletin series
- [Supplier Conferences](#): Supplier Conference presentations

NDT Supplier Bulletins

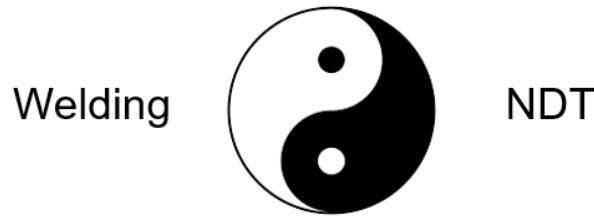
Welding Engineering Supplier Support and Supplier Oversight have released NDT Supplier Bulletins to inform the supply base of various lessons learned from VIR and VPAR Processing. These bulletins aim to provide clarity and resources to improve quality of NDT submittals.

Bulletin Number	Subject
S9074-AR-GIB-010A/278 Casting RSSS Reference Radiographs	
	Clarification on Submitting Radiographic Standard Shooting Sketches (RSSS)
	Safety and Prescription Glasses
	Deviations from Electric Boat Approved Radiographic Shooting Sketches
	Documentation of Visual Inspection for T9074-AS-GIB-010/1688 Applications
SNB-0006	NDT Procedure Submittal Documents, Requirements, and Best Practice Information
SNB-0007	Clarification of NDT Procedure Transfer Requirements of T9074-AS-GIB-010/271 ACN-1

Lessons Learned

Lessons Learned – Integration of Weld & NDT Program

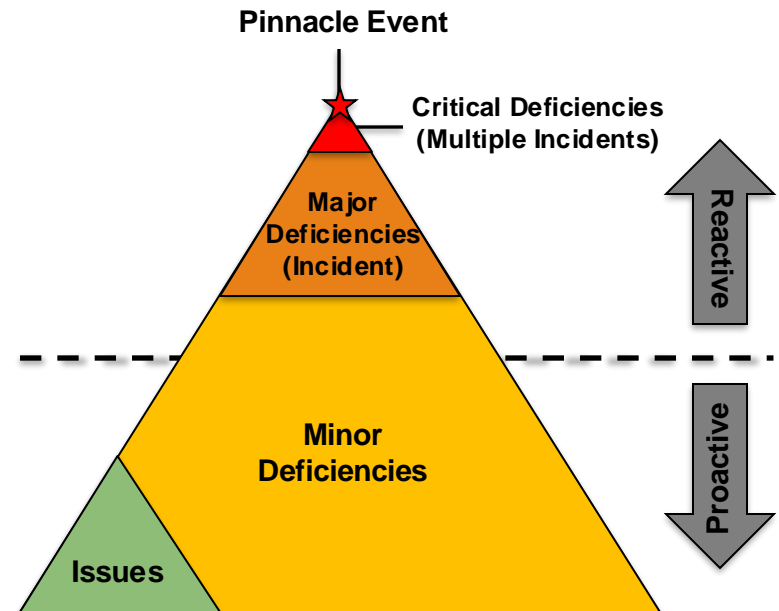
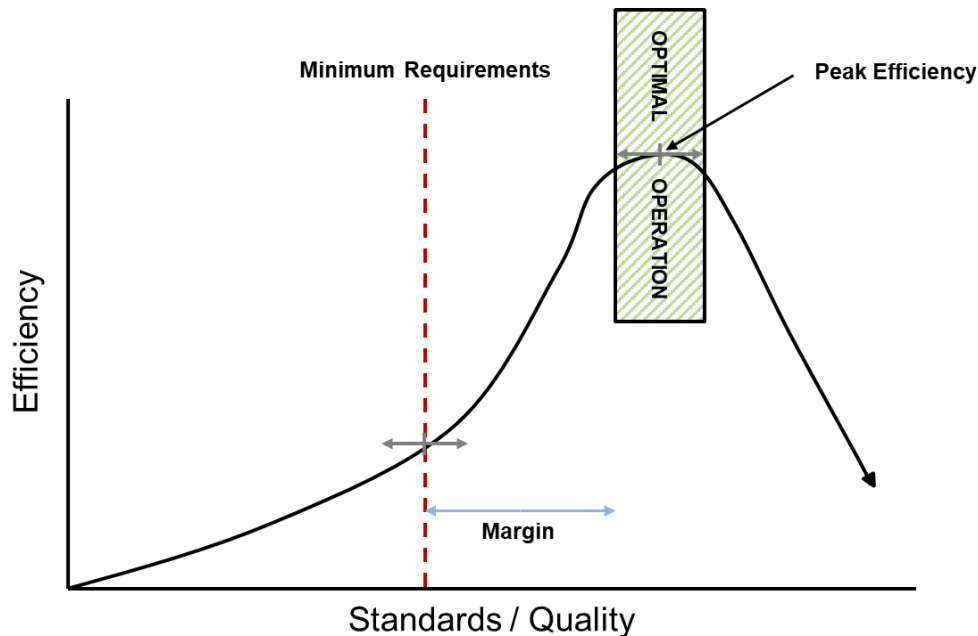
- Specifications between welding and NDT are **complementary**
 - Both functional disciplines need to provide each other feedback



- Recognize that Welding & NDT are human based processes which require constant maintenance & oversight
- NDT's function is not to inspect quality into the product, but rather to validate the product meets quality requirements
- Key Questions for you to Consider
 - Have you met your Examiner or Weld Engineer?
 - What oversight is provided when Welding or NDT is contracted?
 - Have you had a Weld or NDT issue in the past? ***If not . . .***

Lessons Learned – Program Margin

- Margin requires a program culture and mindset supported by procedures
 - Investment & Commitment from leadership which flows down to workers
- Proactive vs. reactive mindset; limits impact when problems arise



- Resolve Issues when they are small
- Work on Minor Deficiencies

Successful Programs Operate with Margin

Questions?