

Introduction to Pressure Vessel Inspection: ANSI/API 510

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Introduction

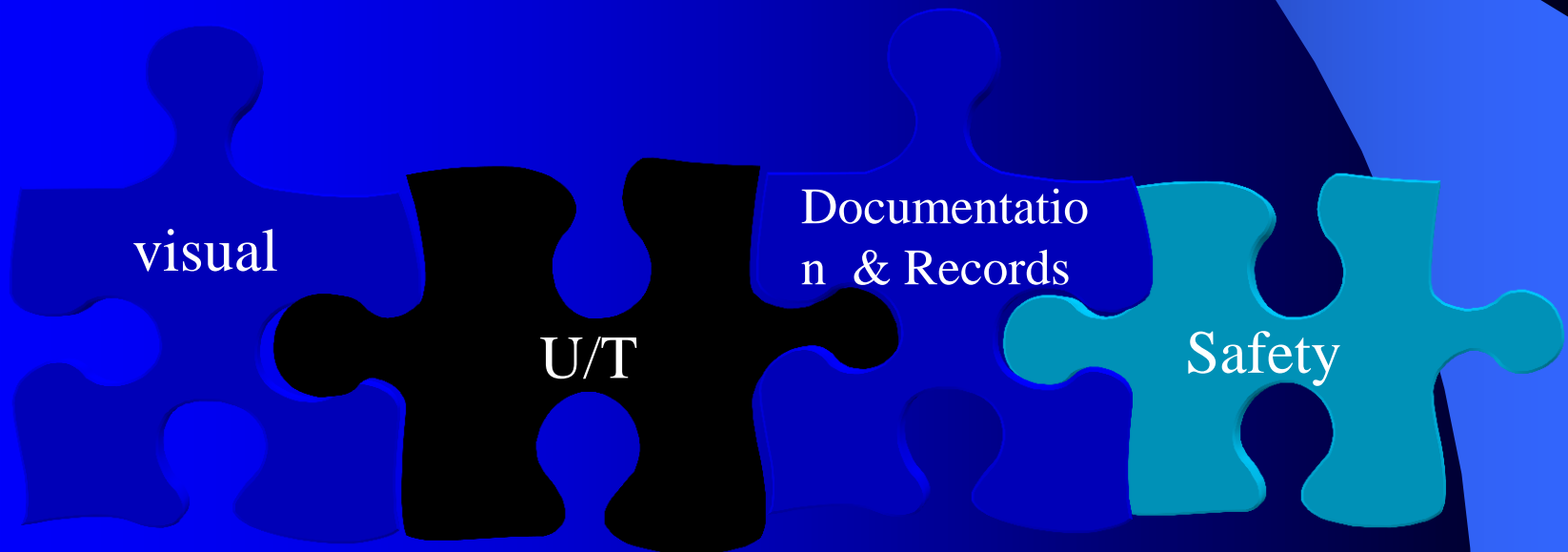
- Pressure vessels have the potential to effect safety and operational aspects of the facility
- The goal is to provide an introduction to the periodic inspection procedures for in-house vessels
- What information can help ISP address their requirements

Agenda

- Inspection Scope
- Ultrasonic Testing
- Frequency of Inspection
- Documentation
- Site walk-through / Hands-On
 - This can be at any time, though early may be most productive.

Overview

- The ANSI/API 510 standard provides guidance in the evaluation of vessels
- Each portion of the inspection process links to provide for continuous evaluation



Vocabulary

- Pressure Vessel: a container designed to withstand internal or external pressure, and as defined in the ASME Boiler and Pressure Vessel Code
- Authorized Inspector: a person qualified and certified to perform inspections under the ANSI/API 510 Code.
- Minimum Allowable Shell Thickness: the thickness required for each element of a vessel based on calculations that consider temperature, pressure and all loadings.

Inspection Program Goals

- Periodic inspection by facility-designated inspector
- Review any issues observed in conjunction with operation
- Define inspection interval (Daily, Monthly, Annual, 5-year)
- Review of data and results by Authorized Inspector
- Evaluate for any changes in inspection intervals

Visual Inspection

- A physical inspection of the vessel, either interior or exterior, evaluating for:
 - Corrosion activity
 - Leakage
 - Weld conditions
 - Appurtenance Conditions:
 - Relief valves
 - Piping / venting
 - Control equipment, alarms, etc.

Ultrasonic Inspection

- Ultrasonic Thickness (UT) Gauging equipment is used to determine remaining wall thickness.
- Thickness data is assessed in a pattern, to obtain repeatable data over time. The establishment of thickness measurement locations (TMLs)
- Proper calibration of the UT equipment is vital for continued accuracy and data integrity (over time).
- Data is recorded in a manner that comparisons over time can be established.

Frequency of Inspection

- Determine Minimum allowable wall thickness from design data, data plate, operational procedures, or engineering evaluation. Typically in accord with ASME B&PV Code.
- Gather UT data, determining average and minimum thickness, plus any pitting depths.
- Compare MRT with time interval to determine corrosion rate
 - Use original construction date for first inspection
 - Use time between inspections for following intervals
- Using corrosion rates, calculate time until reaching MAWT.
 - For safety use current, average and worst-case rates

Documentation

- All inspection work has limited value without proper documentation
- Establish a file for each vessel
- Develop a form for each periodic inspection to simplify documentation. A form for short-term (monthly/quarterly) and annual inspections are typical
- The short-term form might be more “check-box” oriented to simplify use
- Keep all inspection forms and data in the respective files.

Summary

- A properly applied inspection program can improve vessel safety and extend equipment availability
- A hands-on approach will help detect trends before a significant event occurs
- The Authorized ANSI/API 510 Inspector and/or Pressure Vessel Engineer provides support and review.

Where to Get More Information

- Other training sessions and certifications:
 - API 510, 570 & 653
 - ASNT-TC-1A NDT qualifications, exp Level 2:
 - UT, VT, RVT, PT, MT
- Resources:
 - ANSI/API 510 standard
 - API RP 572 (Inspection of PV)
 - ASME B&PV Code, especially sections II, V, VIII & IX
- PCA Engineering, Inc. (800) 666-7221

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- Discussion / Questions?

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