



“The Authorized Inspector - Manufacturer Relationship in a Mass Production Shop”

Michael Pischke – Alfa Laval Inc.

Discussion Topics

- **Traditional Vessel Manufacturing**
 - The Shop Inspection Process
 - Inspector & Quality Manager Roles
- **Pressure Vessel Mass Production**
 - Characteristics/History in the ASME Code
 - Code Requirements
 - Quality/Inspection Strategy
 - Everyone’s Roles

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Traditional Vessel Manufacturing



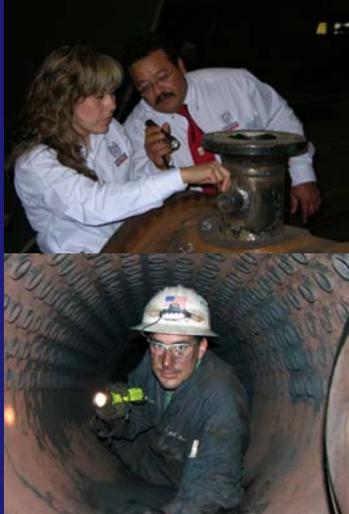
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The Shop Inspection Process

- Review Design Calculations
- Establish Hold Points
- Verify Material Marking and Documentation
- Witness Weld Joint Fit-Up
- Inspect Final Welds
- Verify PWHT and/or NDE Results and Records, if Applicable.
- Witness Pressure Testing and Final Stamping
- Monitor Quality System

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The Authorized Inspector



- Trained by Employer or National Board
- Tested by the National Board
- Follows Inspection Criteria Based on Code
- Works Closely with the Quality Manager
- May Not Want to Wear White!

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The Quality Manager



- Reads the Code Books
- Company Liaison to the AI
- Often a Former Inspector
- Perhaps NDE Experience
- QC vs QA Background
- High School Guidance Counselor Never Warned Him About Such a Job

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Pressure Vessel Mass Production



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Characteristics of “Mass Produced”

- Designs are Standardized; Often Modular
- Materials Purchased in Quantities at Limited Sources (Strategic Supply)
- Repetitive Fabrication Processes
- Large Experience Base: Good or Bad
- Requires a Different Quality Approach

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History of Vessel Mass Production in the ASME Code

- Originated in the Code in 1962
- Found a Home in Section VIII-1, UG(90)(c)(2)
- Known as “Multiple – Duplicate” for Many Years
- Revised in 08 Addenda with Appendix 35
- Name Changed to “Mass Produced”

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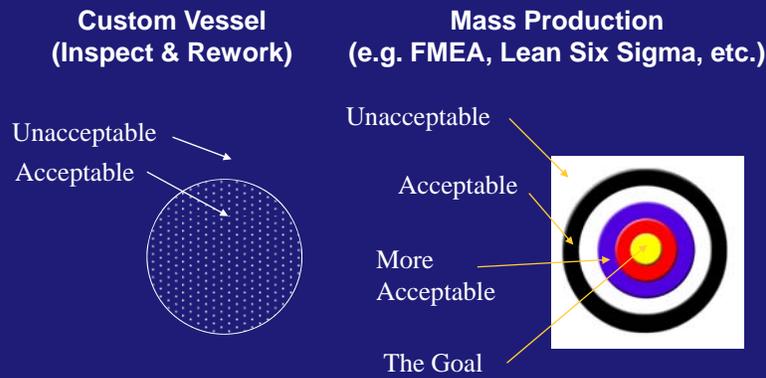
Current Code Requirements

Section VIII -1 Appendix 35:

- Minimum Full Time Inspector (40 hr/week)
- Rate of Production that Makes it “Impracticable”
- “Shall be Identical Except”
- Minimum Two Vessels per Shift
- Required Quality Control Procedures
- Provisions for Data Reports
- Special Rules for Pneumatic Testing

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Quality Strategy for Mass Production



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Inspection Strategy for Mass Production

“Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.” - W. Edwards Deming

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100% Inspection of Mass Production

- How Effective is 100% Inspection?
- Only 80%-85% Effective
- How about 200% Inspection?
- As Low as Only 60% Effective

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Mass Production Inspection



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What Processes to Inspect?

- Same Critical Elements and Processes:
- Incoming Material Reliability
- Prep and Fit-up Operations
- Welding Processes
- Welding Operators
- Examination and Testing
- Any Other Critical Process Related to Product

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How to Inspect?

- Understand the Manufacturing Processes and Know Their Variability
- Develop a Sampling Plan
- Adjust Plan Based on Changes in Materials, Personnel or Processes
- Inspect the Product as a Measure of the Process

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Communicate Inspection Needs



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The Finished Products



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Summary

The Manufacturer and Authorized Inspector Need to Work Together to:

- Identify the Critical Components and Processes that Produce the Vessels
- Shift from Inspecting Individual Vessels to Inspecting Production Processes
- Spot Check the Product at Different Stages of Production
- Focus on Areas of High Variability
- Communicate Changes

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Questions?



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