“What’s under YOUR hood?”

Balancing cost against risk when sourcing pressure equipment

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Context

• Use of the ASME BPV Code and NBIC in Latin America
  – Spec’d absent formal certification (<10% of equip’t built to ASME is actually certified)
  – Little to no control over repairs/alterations (role of the National Board and NBIC not understood)
  – What drives the use of the Codes? (regulatory climate)
  – Who builds/repairs equipment?
  – How is compliance verified?

• Issues
  – Perception of NBIC and ASME Code usefulness
  – Impact on public safety and property
Bentley GT Convertible
Modified Chrysler Sebring
What’s the difference?

Sebring Bentley Conversion

- 2.7L Chrysler V-6
- 189 hp @ 6400RPM
- Fully-functional lighting
- Original Bentley badges
- Genuine exhaust tips
- $3000 wheel/tire pkg.
- $20,000 price (used)

Bentley Continental GTC

- 4L twin turbo V-8
- 520 hp @ 6000RPM
- Sports suspension w/continuous damping control
- 4-wheel ventilated ABS w/electronic distribution/assist and pop-up roll bars
- $64,000 (used)
What you see may not be what you get

• In Chrysler/Bentley example, low risk.
  – Easy to see what’s different.
  – The Chrysler *can’t* be operated like the Bentley, so the main risk is paying too much for what’s, essentially, a Chrysler.

• Extending the concept to pressure equipment;
  – Very difficult to determine quality from an external view of the constructed vessel/boiler.
  – Inferior equipment can easily be placed into service for which it’s not suitable.
  – Risk is that the equipment fails prematurely, and possibly catastrophically.
Cost is Key

• Nothing wrong with saving money, that’s important.

• *If you’re being promised equipment that’s the same as “certified,” but at significant savings, you need to take a closer look “under the hood!!!”*

• Understanding the methods manufacturers use to cut costs is critical.
  – Actions can be taken to determine in advance which substitutions/sacrifices are acceptable.

• We’ll explore methods commonly used by manufacturers to reduce cost and present some real-world examples of risks and mitigation...
## Ways for a Manufacturer to Cut Costs

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<thead>
<tr>
<th>Bypass expensive Code or spec rqmt's</th>
<th>Consequences</th>
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<tbody>
<tr>
<td>Use less expensive materials.</td>
<td>Premature failure (owing to corrosion, cracking and other failure modes for pressure equipment in service).</td>
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<td>Reduce in-process inspections (by mfr).</td>
<td>Production takes short cuts, failing to meet quality program.</td>
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<tr>
<td>Don't use qualified welders/procedures and/or misapply procedures/welders.</td>
<td>Welding defects (often not visible through other than volumetric examination/NDE).</td>
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<td>Fail to properly control filler materials.</td>
<td>Compromised properties of final weld.</td>
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<tr>
<td>Misapply NDE (methods, extent, personnel qualifications).</td>
<td>Unidentified defects, particularly subsurface.</td>
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<td>DO outsource critical activities (heat treatment, forming, welding).</td>
<td>Reduces control/verification of critical activities.</td>
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<td>Reduce calibration frequency.</td>
<td>May lead to erroneous test results (particularly for pressure tests).</td>
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<td>Don't keep sufficient records</td>
<td>Complicates asset repair/maintenance/sale.</td>
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<tr>
<td>Don't use qualified third-party inspectors</td>
<td>Reduces inspection effectiveness/impartiality.</td>
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Resulting Quality = Less than expected
Reality – Deficiencies Happen

- Distribution of findings from Certificate Holder audits
- QC Program implementation demonstration (QC Program content findings are common too, but not represented here)
- Certificate Holder is given several months to prepare
- Highly-trained auditor.
- Scope is limited to what can be found in 1.5 days.
Real-World Examples – Materials

- Boiler manufacturer substitutes welded pipe for seamless pipe required by construction code. Mfr’s inspectors pressured by production to accept substitution.

- Risk
  - Failure in service (lost production and/or damage to persons/property)

- Possible solutions
  - Buyer and/or third-party inspection by qualified inspectors.
  - Insist on full compliance with code of construction (including inspection requirements, if any).
  - Identify critical parts up front and ensure inspection and/or certification.
Real-World Examples – Materials/Parts

• Manufacturer convinces buyer to remove engineering requirement for certified welded parts. Welded heads received, but not certified.

• Risk
  – Welding deficiencies (were qualified procedures/personnel used?)
  – Was heat treatment required/performed?
  – How was forming performed/controlled?
  – What inspections were performed and by whom?

• Possible solutions
  – Insist on full compliance with spec.
  – Identify critical parts up front and ensure inspection and/or certification.
Real-World Examples - Welding

- **Weld Inspection**
  - Inspector rejects properly-qualified WPQ’s (requests that welders be qualified for each welded joint vs. accepting qualified ranges)
  - Inspectors accept PQR’s (while properly qualified, thickness to be welded falls outside qualified thickness range)

- **Risk**
  - Production delays as buyer’s engineering group evaluates
  - Mfr. looks for other ways to recover cost of unnecessary extra work

- **Possible solutions**
  - Buyer specifies qualification requirements for weld inspector.
  - Buyer insists on demonstration of inspectors’ proficiency (specific to welding standard(s) used).
  - Leverage welding qualifications mandated by applicable std’s.
Real-World Examples – NCR’s

• Non-conformities
  – Inspector arbitrarily rejects construction, mfr. disagrees.
  – Production halted while determination is made as to who can authorize mfr. to proceed (or not).
  – On hold as Buyer’s engineering department evaluates.

• Risk
  – Delayed delivery, pressure to justify accepting deficiencies, poor quality and/or cost overruns.

• Possible solutions
  – Clearly specify acceptance criteria (leverage codes)
  – Define methods for resolving conflicts, up front.
  – Insist on mfr demonstration of NCR handling (an absence of NCR’s should be a warning sign!!!!)
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<td>Define mandatory requirements up front</td>
<td>Certified parts/materials Acceptance Criteria</td>
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<tr>
<td>Demand that mfr identify the source of cost savings</td>
<td>Material/personnel substitutions Outsourcing</td>
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<tr>
<td>Help mfr reduce cost w/o sacrificing quality</td>
<td>Leverage best practices (monitoring, procedure/personnel reviews, etc.) Risk-based sampling vs. 100% inspection Eliminate redundant inspections</td>
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<tr>
<td>Verify mfr's activities</td>
<td>Second or Third-party Inspection Based on risk associated with activity</td>
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<td>Match qualification of the inspector(s) to the activities verified</td>
<td>Accreditation to the standard/spec used. Demonstration of proficiency/experience</td>
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<td>Push conformity assessment tasks to experts</td>
<td>Resolution of NCR's Establishing inspection points Coordination of inspection visits</td>
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**Reduced Cost while Maintaining Quality**
Summary

• Cost controls should be considered carefully in the context of final quality (compliance to spec./standard).

• Mfr should be asked to explain what’s generating significant savings
  – Quantify
  – Demonstrate equivalency for substitutions of material, services or personnel.

• Participate to ensure cost measures are acceptable

• Verification by the buyer or qualified third-parties is key for critical processes/equipment

• **The results you get are only as good as the effectiveness of your look under “the hood”!!!**
Take Aways

- Buyers are key to changing the current approach to use of the ASME BPV Code and NBIC.
- NBIC, in particular, can be leveraged to demonstrate added value of certification
  - Economic climate drives repair vs. replacement.
  - Construction Code is generally known, so NBIC rules can be followed to certify repairs/alterations.
  - Increases population of certified repair firms (and/or mfr’s) and provides an incentive for them to meet the Codes.
- Demonstration of value (and cost reduction) should feed increased market insistence on ASME and NBIC certification.
Thanks