# Steel Mill Quality (QC Process and Issues)

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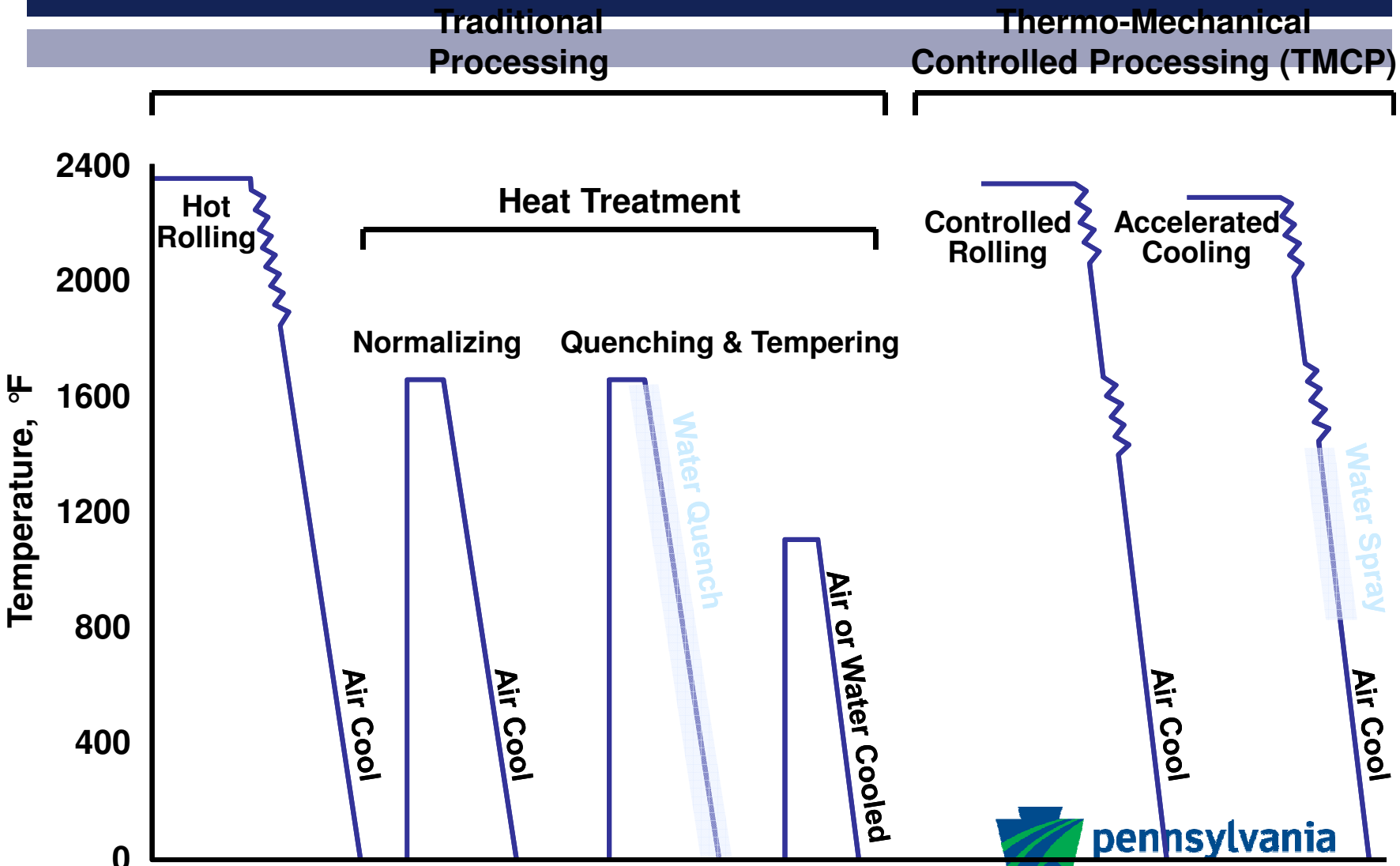
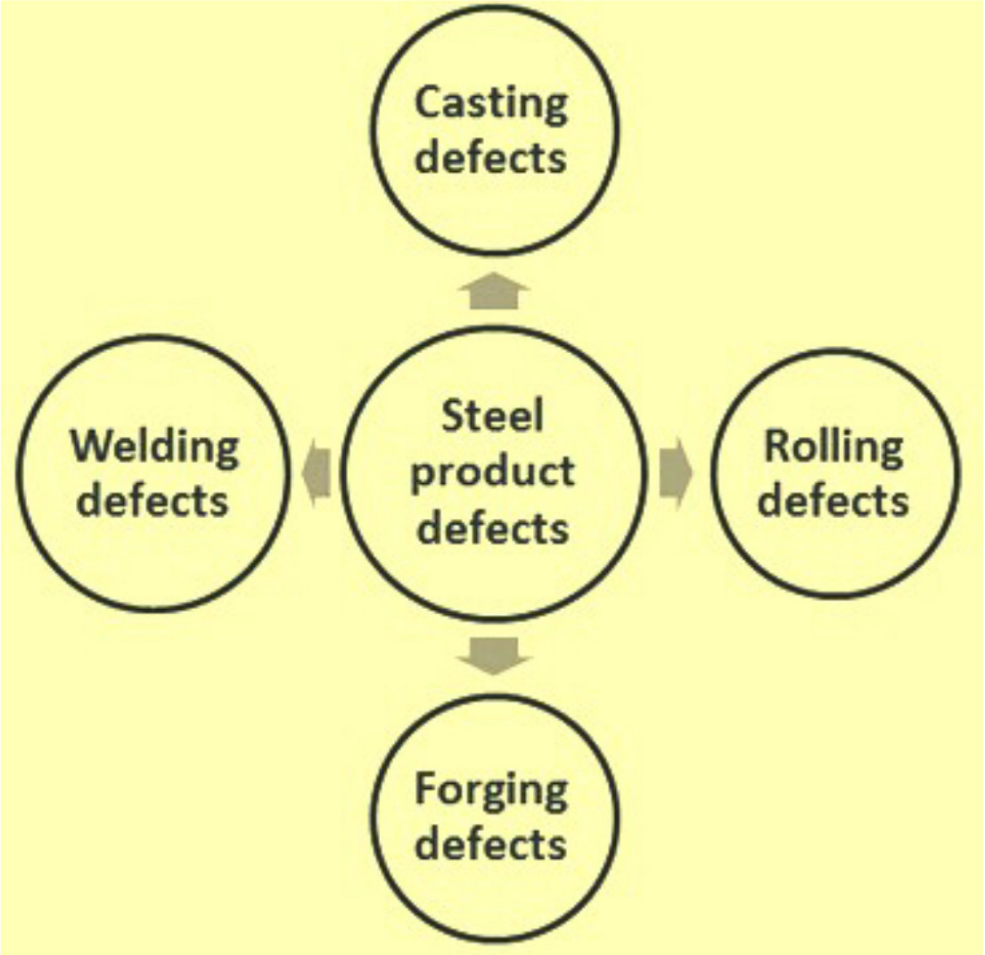
# Processes for Producing Plate Steels



# Steel Mill Quality (QC Process and Issues)

## Mill Defects

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# Steel Mill Quality (QC Process and Issues)

## Mill Defects

Defects in steel products are defined as deviations in appearance, shape, dimension, macro-structure / micro-structure, and/or chemical properties **when compared with the specifications given in the technical standards** or any other normative documents in force.

Defects are detected either through visual inspection or with the help of instruments and equipment.

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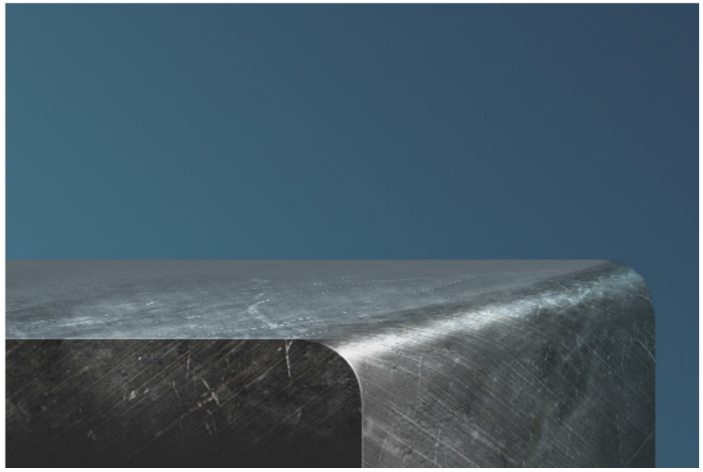
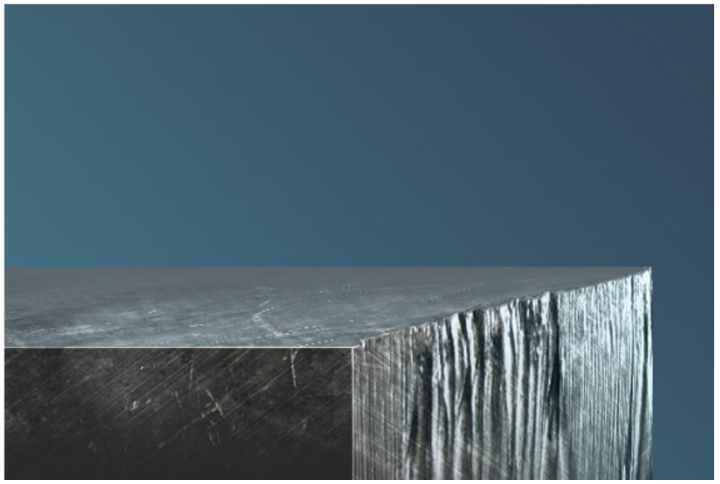
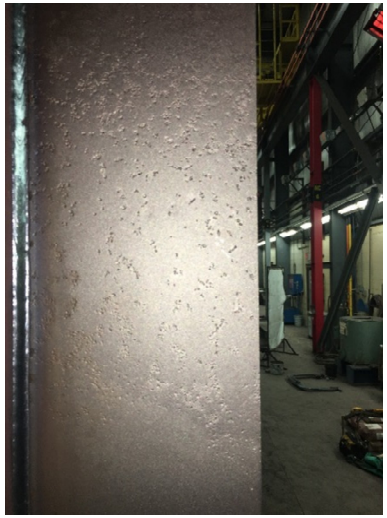
# Steel Mill Quality (QC Process and Issues)

## Mill Defects







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# Why Quality Assurance?

***Here is what happens without it.***

- no defined expectations
- no verification of history
- no inspection
- no certification
- No Guarantees




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# Steel Mill Quality (QC Process and Issues)

Industry quality standards require materials to be tested at the **manufacturer** and the results of these tests be submitted through a report, also called a **Mill Sheet, Mill Certificate or Mill Test Certificate (MTC).** The only way to trace a steel plate back to its Mill Sheet is the Heat Number. A heat number is similar to a lot number, which is used to identify production runs of any other product for quality control purposes.

# Steel Mill Quality (QC Process and Issues)

**ASTM A709-Standard Specification for Structural Steel for Bridges**

| Grade | Yield |
|---|---|
| 36 [250] | 36 [250] |
| 50 [345] | 50 [345] |
| 50S [345S] | 50 [345] |
| 50W [345W] | 50 [345] |
| HPS 50W [HPS 345W] | 50 [345] |
| 50CR [345CR] | 50 [345] |
| HPS 70W [HPS 485W] | 70 [485] |
| HPS 100W [HPS 690W] | 100 [690] |

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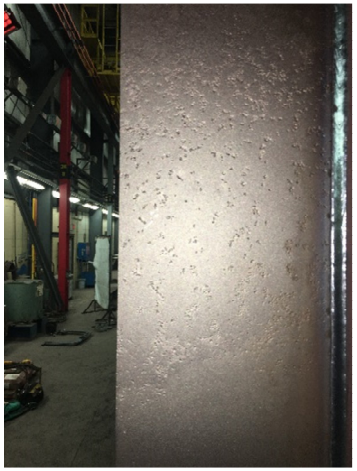
# Steel Mill Quality (QC Process and Issues)

Heat # 74277, the "7" indicates furnace number, "4" indicates Years of Melted Metals, and The last three is Melt number

# Why Inspection?



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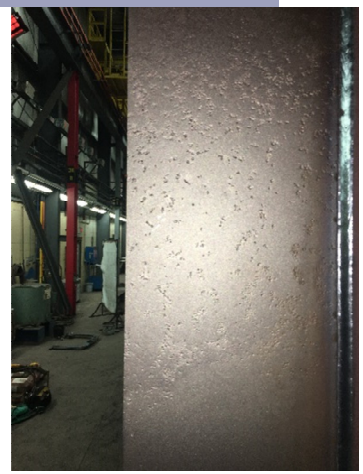
# Quality Assurance Program For Bridge Fabrication



Quality Assurance

- Steel Manufacturing
  - -Steel Beam Fabrication
  - -Rolled Beams
- Training

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# Why Inspection?

It is the Law.

Federal funding requires you to have a quality assurance program.

CFR 23

3 levels:

QC

QA

Independent QA

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# Quality Assurance Program For Bridge Fabrication

## Quality Assurance

### The Beginning

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# PennDOT's Quality Assurance Program For Bridge Fabrication

- Federal Regulation CFR 23, Part637 Section 637.207 Quality Assurance Program-
- Two Parts
  - Acceptance Program
  - Independent Assurance Program

# PennDOT's Quality Assurance Program For Bridge Fabrication

- Pennsylvania State Regulation:
  - Pennsylvania Statutes
    - Title 36. Highways and Bridges
      - Chapter 1A State Highway Law
        - » ARTICLE IV. Construction, Improvement, Maintenance and Repair of State Highways
          - » 36 P.S. Part 670
            - » Section 670.401: Duty on Department of Highways

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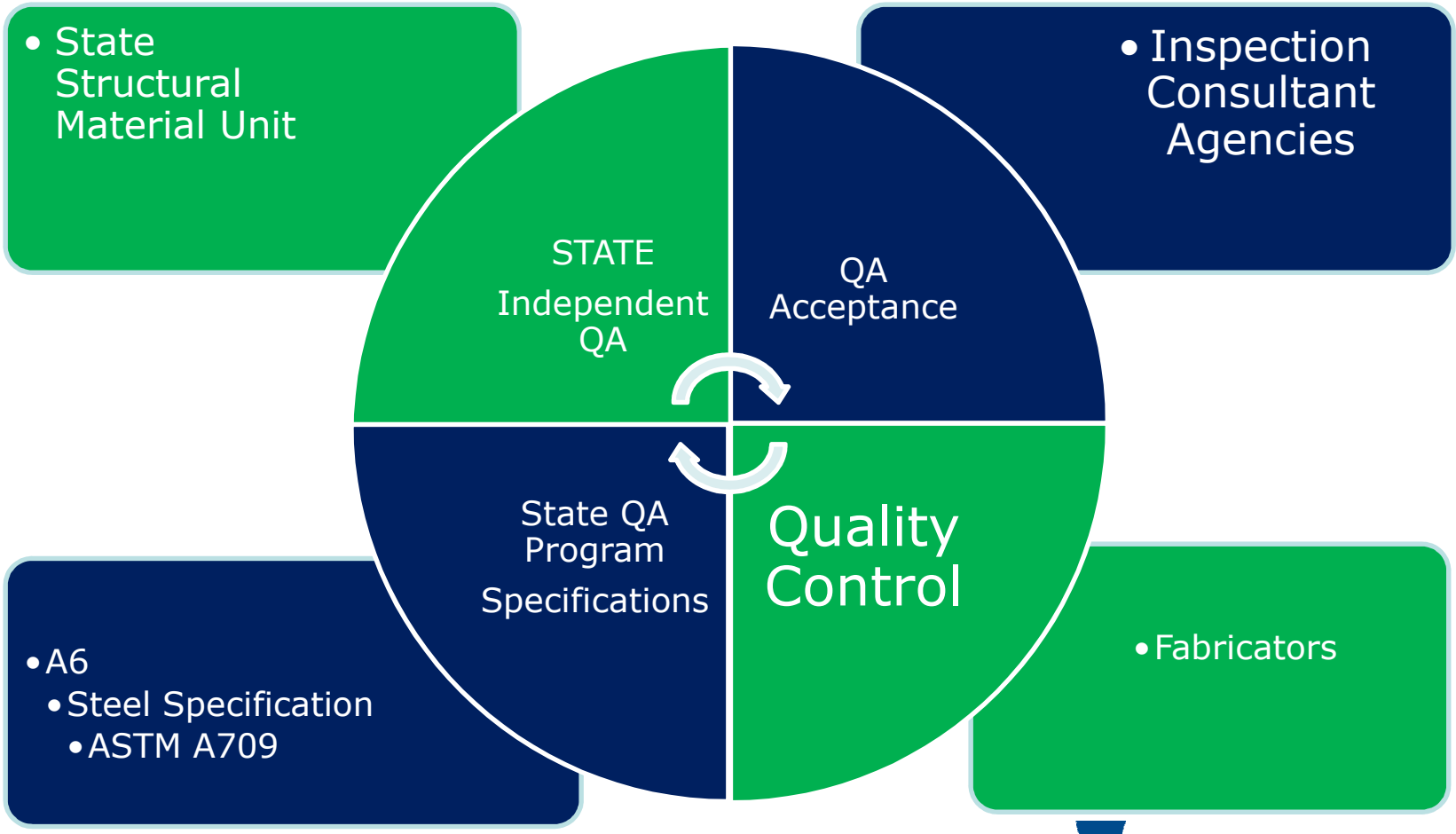
# Quality Assurance Program For Bridge Material Manufacturing/Fabrication

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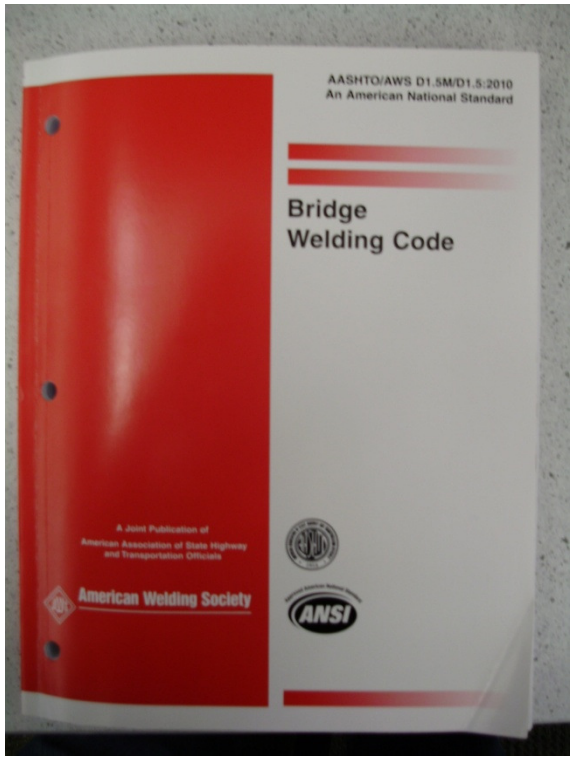
# Specifications

- PENNDOT PUB 408:2011 SECTION 1105
- AWS Codes
  - AWS D1.5 2008 Bridge Welding Code
    - Steel ASTM A709 GR 36, 50, 50W
  - AWS D1.1 2008 Structural Welding Code
    - Tubular



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# Welding Processes

- ESW (Electro Slag Welding)
- FCAW (Flux Cored Arc Welding)
- GMAW (Gas Metal Arc Welding)
- SAW (Submerged Arc Welding)
- SW (Stud Welding)
- SMAW (Shielded Metal Arc Welding)

# Metallizing Operation:

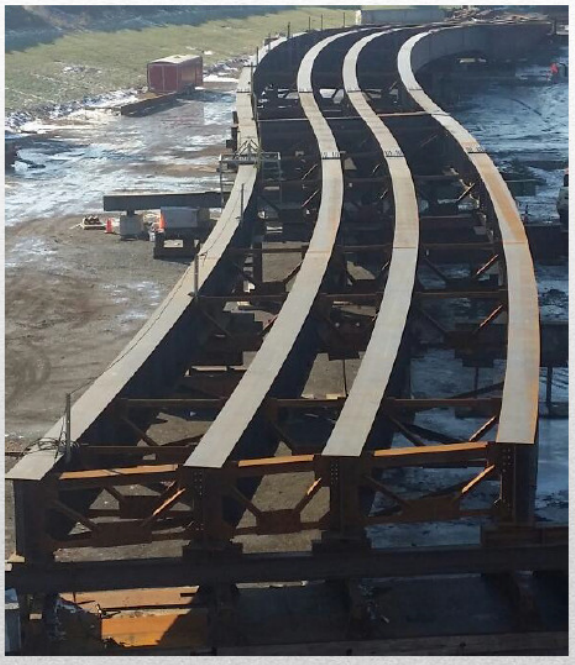
Surface Preparation

Metalizing

Seal Coat

# Cold Camber:

## Cold Camber Rolled



SOURCE: R. Bjorhovde "Cold Bending of Wide-Flange Shapes for Construction"

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# Training:

Design Consultant Training

Welding Inspection Training

NDT Training

Bolt Training

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# Issues – Concerns – Future Actions

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# Quality Assurance Program For Bridge Fabrication

- I AM WATCHING YOU

**MAKE ME HAPPY**

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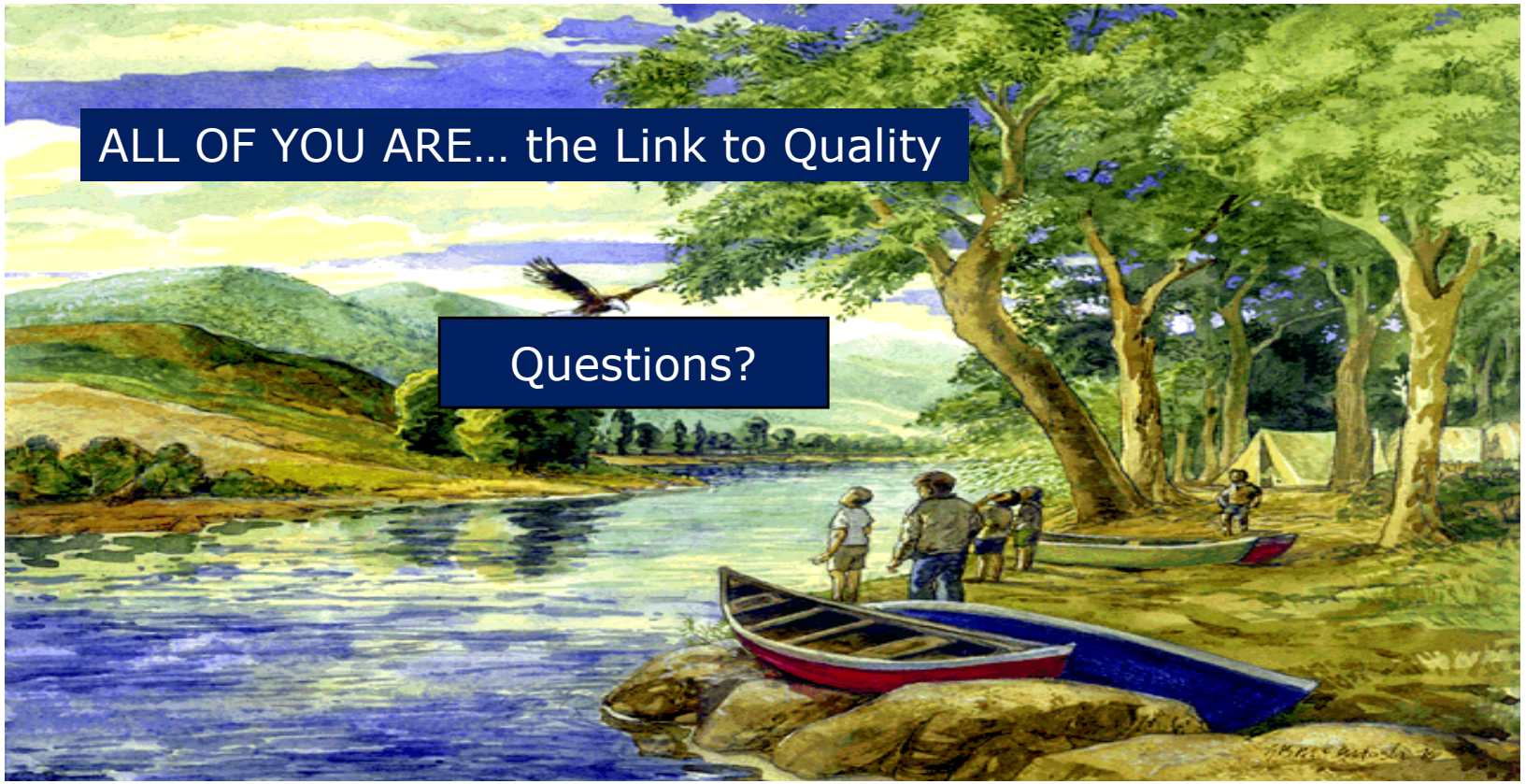
# PennDOT's Quality Assurance Program For Bridge Fabrication

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