

2026 Bridge Week

Structural Steel: Fabrication and Inspection

Fabrication Inspection Flow

Shop Drawing Submittal

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graph TD; A[Shop Drawing Submittal] --> B[Notice of Fabrication]; B --> C[Write Work Assignment];
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Notice of Fabrication

Write Work Assignment

Shop Drawing Submittals

Reviewed by Structural
Fabrication Unit (SFU)

Must Include Weld Procedure
Specifications (WPS)

- Fabricators can only use MDOT reviewed and approved WPSs

Notice of Fabrication

Fabricator is required to provide notice at least 14 days prior to beginning fabrication

SFU verifies that the fabricator is certified by the American Institute of Steel Construction (AISC)



Work Assignment

- SFU writes a work assignment for a consultant quality assurance inspector (QAI)
 - Work assignment contains basic project information and inspection test plan (ITP)
 - Consultant PM selects a QAI
 - Prefabrication meeting is scheduled
 - Welder qualification testing is scheduled

Welder Qualification Testing

Fabricator submits
Welder Qualification
Test Request Form
0571

SFU reviews request
and supporting
documentation

MDOT requires welder
to be qualified in
accordance with AWS
prior to taking our test

Continuity is verified

Welder Qualification Testing (continued)

SFU approves 0571

- Fabricator and consultant are notified

QAI assigned to administer testing

- Test plates are sent to lab for testing

Welder Qualification Test Request

Michigan Department
of Transportation
0571 (04/2024)

| |
|----------------|
| Clear Form |
| REQUEST NUMBER |
| |

WELDER QUALIFICATION TEST REQUEST

To be completed by the Fabricator or Contractor prior to Qualification testing.
Naming Convention: 0571 MDOT ID-JN MMDDYY Welder Qualification Request.pdf

| | |
|---|----------------|
| FABRICATOR | DATE |
| | |
| QC MANAGER | MDOT ID |
| | |
| BASE METAL SPECIFICATION | JOB NUMBER |
| | |
| QUALIFICATION CODE (D1, 1D1 S/D1.2, etc.) | DATE REQUESTED |
| | |

WELDER QUALIFICATIONS REQUESTED

| WELDER NAME | WELDER ID | TEST TYPE | PROCESS | POSITION | STATUS * |
|-------------|-----------|--------------|--------------|------------|------------|
| | | Select one ▼ | Select one ▼ | Select a ▼ | Select a ▼ |
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COMMENTS

FORM INSTRUCTIONS

- 1) Complete this form and save as PDF file.
- 2) Save this form as follow: 0571 MDOT ID-JN MMDDYY Welder Qualification Request.pdf.
- 3) Attach all AWS qualification supporting documents (welder performance qualification records, test WPS, and welder continuity records) for MDOT's review prior to testing. Submit form and supporting documents to MDOT-StructuralFabrication@Michigan.gov.

* STATUS options:
 Initial: First time testing for that process and position.
 Retest: A qualification test due to failure of an initial test.
 Renewal: A qualification test due to expiration of a previous qualification.

MDOT Welder Endorsements

MDOT Welder Qualification Program

- MDOT uses third-party laboratories to perform
 - MDOT pays for the initial weld test
 - Contractor responsible for cost of additional testing if welder fails initial test
- Qualification testing in accordance with AWS D1.5 and MDOT Special Provision 20SP-707(A)

Welder permitted to weld on:

- Bridge main members
- Other non-main member bridge elements
- All items endorsed in the Welder Certification Program

MDOT Welder Endorsements (continued)

Qualification period

- Two years for field welding; three years for shop welding
 - Unless not engaged with welding for three months, or
 - Reason exists to question welder's ability

Program guidelines:

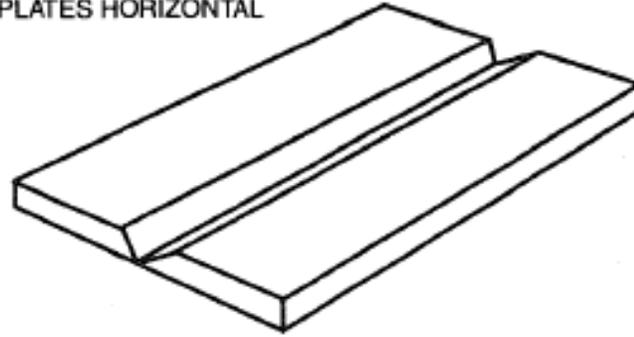
- Qualify for field and shop welding separately
- Must complete a field welding plan (Forms 0394 and 0395)
- Do not weld below 40 degrees F (heating and housing can be approved by engineer)
- Preheat surface in accordance with 707.03.E.7.d for AWS D1.5 and AWS D1.1 welding

Welder Qualification

- Welder must be qualified for different welding positions
- Welder must follow the MDOT-approved WPS
- Weld positions:
 - 1G or 1F - Flat groove or fillet weld
 - 2G or 2F - Horizontal groove or fillet weld
 - 3G or 3F - Vertical groove or fillet weld
 - 4G or 4F - Overhead groove or fillet weld

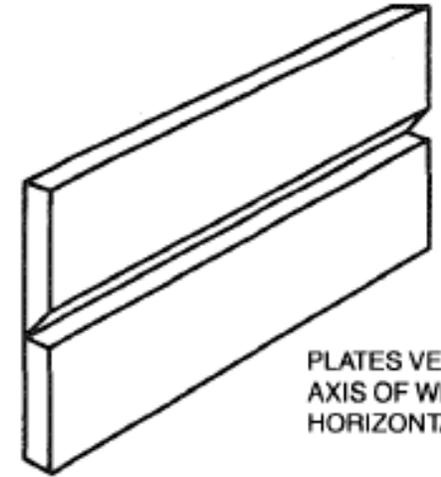
Positions of Test Plates for Groove Welds

PLATES HORIZONTAL



(A) TEST POSITION 1G

PLATES VERTICAL;
AXIS OF WELD
HORIZONTAL



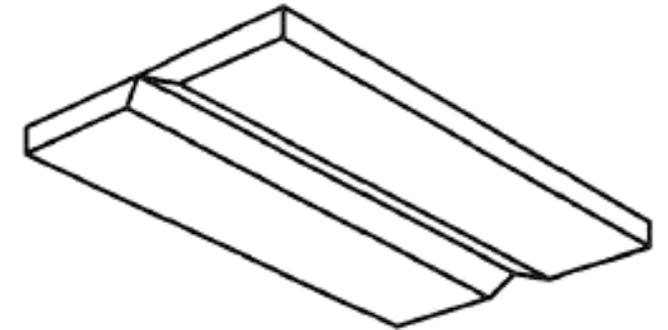
(B) TEST POSITION 2G

PLATES VERTICAL;
AXIS OF WELD
VERTICAL



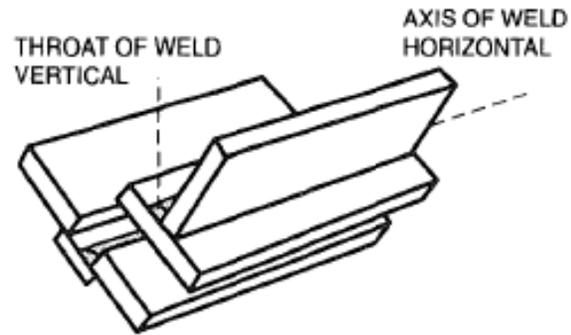
(C) TEST POSITION 3G

PLATES HORIZONTAL

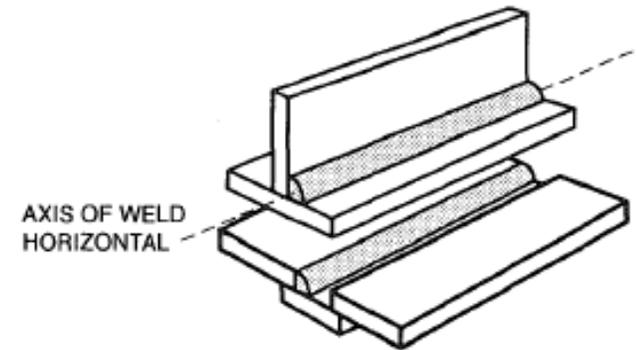


(D) TEST POSITION 4G

Positions of Test Plates for Fillet Welds

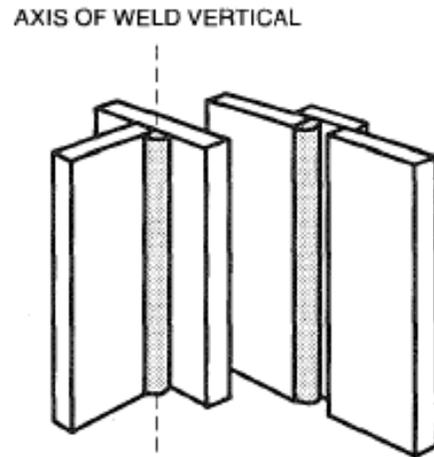


(A) FLAT POSITION 1F

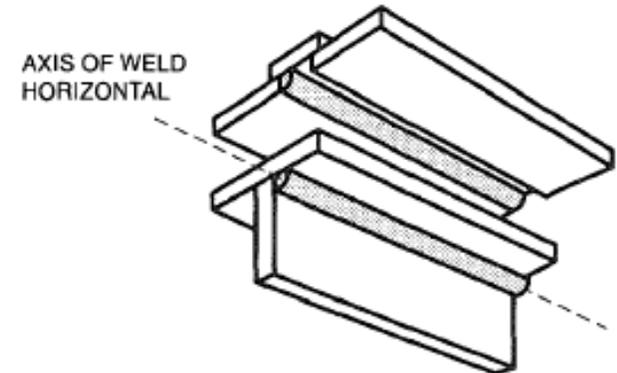


NOTE: ONE PLATE MUST BE HORIZONTAL

(B) HORIZONTAL POSITION 2F



(C) VERTICAL POSITION 3F



NOTE: ONE PLATE MUST BE HORIZONTAL

(D) OVERHEAD POSITION 4F

Prefabrication Meeting

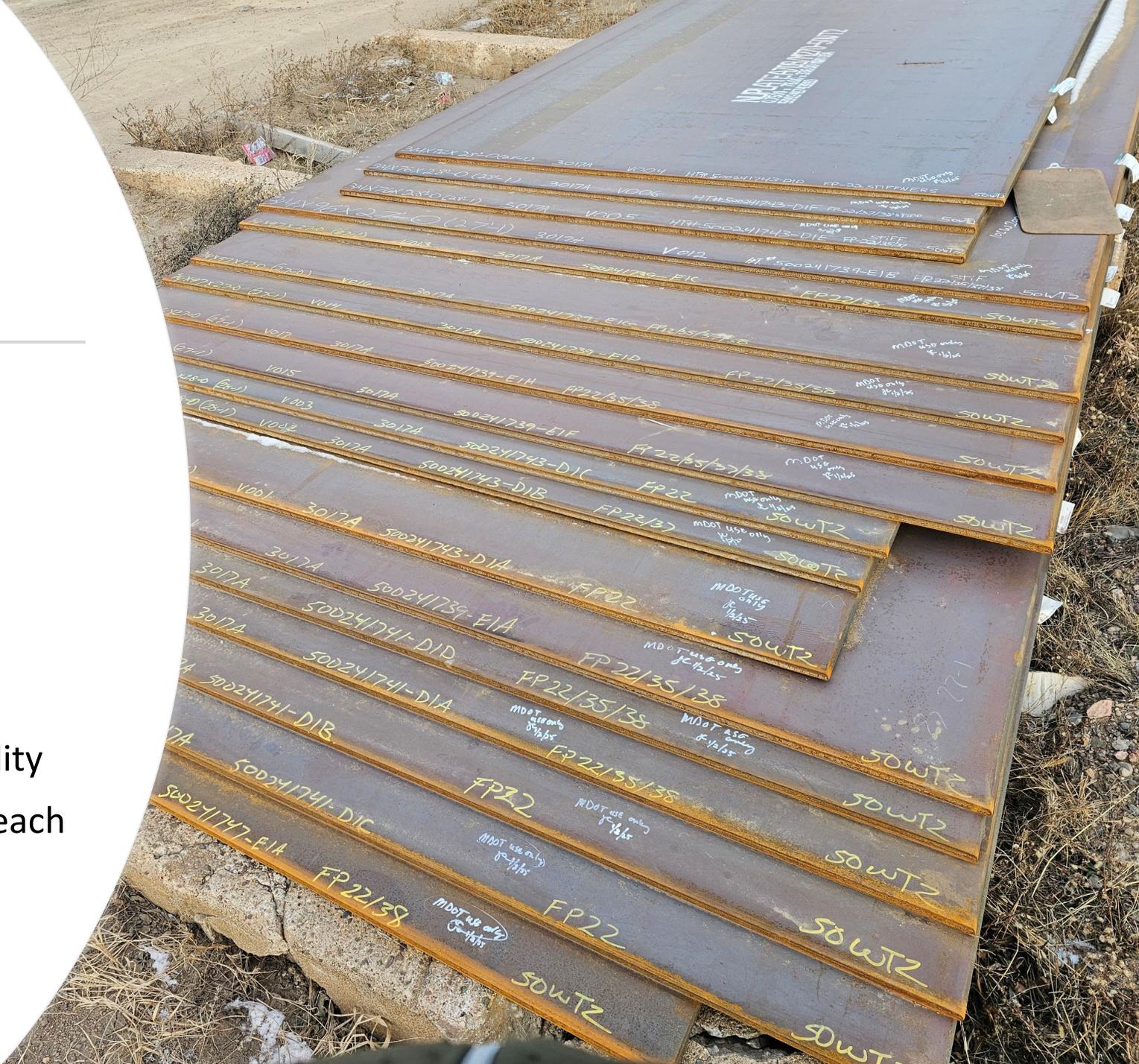
- Discussion Topics:
 - Fabricator Documents
 - Shop Drawings
 - Progress Schedule
 - Project Specifications
 - Material and Sampling Requirements
 - General Fab Requirements
 - Coating Requirements
 - Shipping and Handling
 - QA Hold Points (Per the ITP)

QA Hold Points (minimums)

- Material Inventory
- Pre-Welding Final Review
- Visual Weld Inspection (Post QC)
- Ultrasonic Testing (UT)/Radiographic Testing (RT) Review
- Shop Assembly of Field Connections/Splices
- Coating Inspections
- Loading and Shipping - QAI Acceptance

Material Inventory

- QAI collects material test reports (MTR) from fabricator
 - Steel
 - Coatings
 - Welding consumables
 - Hardware
- Heat numbers on material are cross referenced with MTRs to verify traceability
- Must be performed prior to first use of each material



Pre-Welding Final Review

- Prior to first weld of each joint type, process, and position
- Performed at suitable intervals afterward



Visual Weld Inspection

- Performed on the first weld for each WPS
- Acceptance criteria set forth by contract documents and AWS D1.5 Bridge Welding Code
- Suitable intervals afterward



Visual Testing (VT)

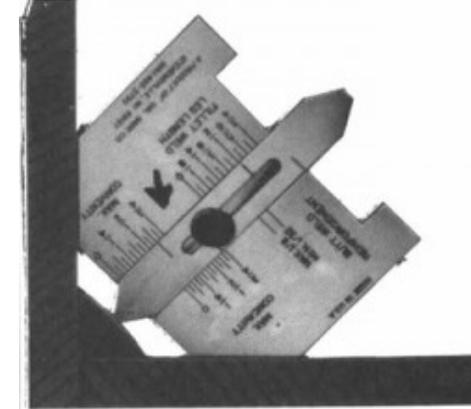
- Powerful tool before, during, and after welding
- Requires good eyesight and lighting
- Main tool = flashlight and weld measuring gauges
- **All** welds are required to be visually inspected



Flashlight



Fillet Weld Gage
(verifying weld size)



AWS Gage
(Fillet weld size,
reinforcement, underfill)

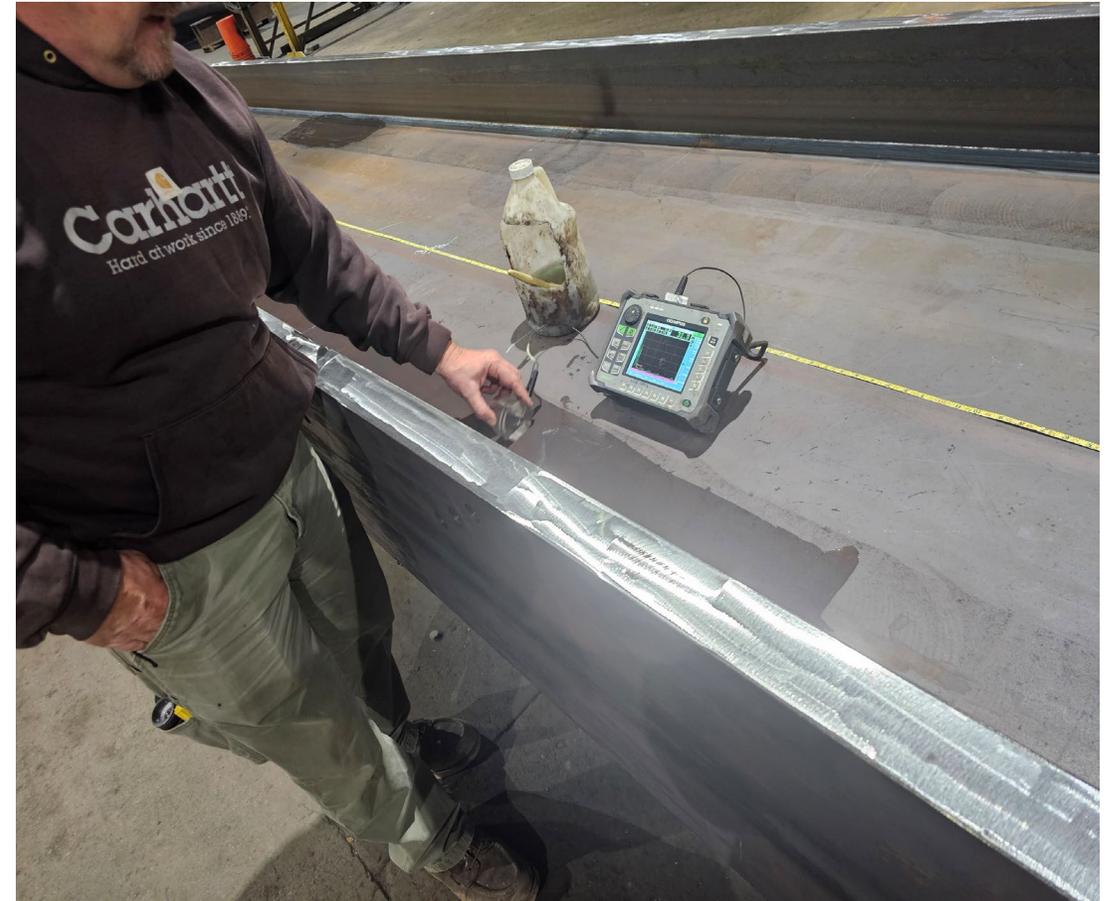


Fillet Weld Gage
(verifying weld is not concave)

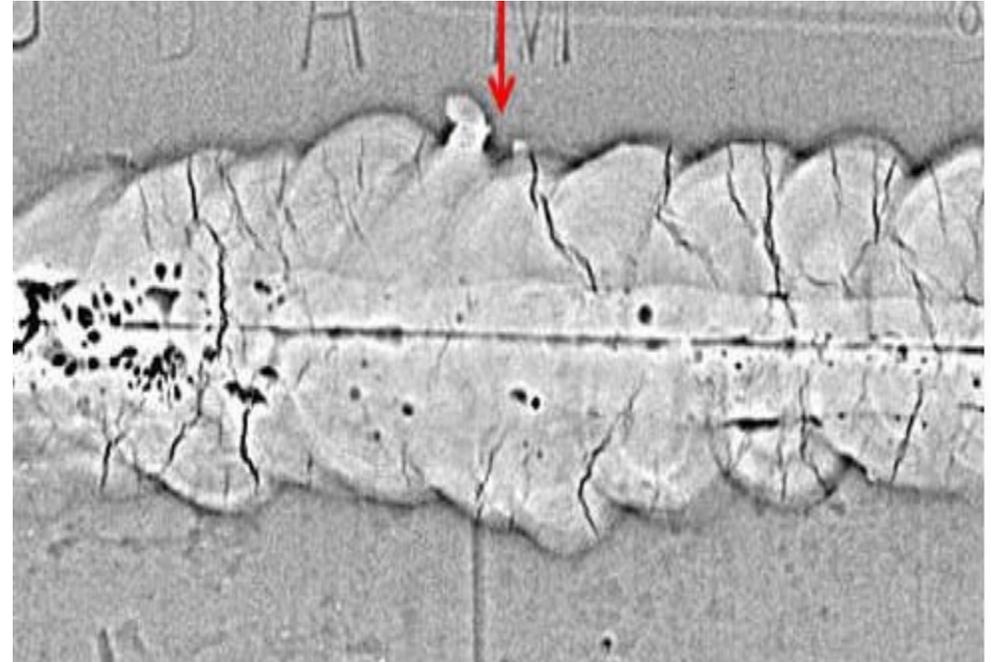
Ultrasonic and Radiographic Testing Review

- Flange, web and other specified areas
- Review NDT reports and QC interpretations of the reports
- If there are disagreements in the interpretations between QC and NDT technician, it needs to be brought to the attention of the PM
- Performed prior to welding web to flange

Ultrasonic Testing (UT)



Radiographic Testing (RT)



Shop Assembly of Field Connections/ Splices

- Review fabricator's camber diagram
- Review and approve:
 - Camber
 - Alignment
 - Accuracy of Holes
 - Fit of Milled Joints
 - Field Splice Gaps
- Performed on each girder line



Assembly

- Set on specified bearing points
- Camber measured with survey equipment and stringlines
- Bolt holes fit up with cross frames and stiffeners



Coating Inspection

- Perform dry and/or wet film thickness inspections
- Confirm proper cure times between coats
- Confirm approved coating repair procedures are followed
- Ensure QC test reports and documents are in conformance with specifications
- Verify that coated materials are properly handled and stored for shipping
- Performed on all main members, at suitable intervals for secondary





Coating Inspection

Loading & Shipping- QAI Acceptance

- Inspect structural members after loading for storage and handling defects
- Verify no unauthorized or undocumented repairs have taken place
- Verify receipt of QC documentation
- Stamp the accepted members and copies of bills of lading after inspection
- Perform on each member prior to shipping



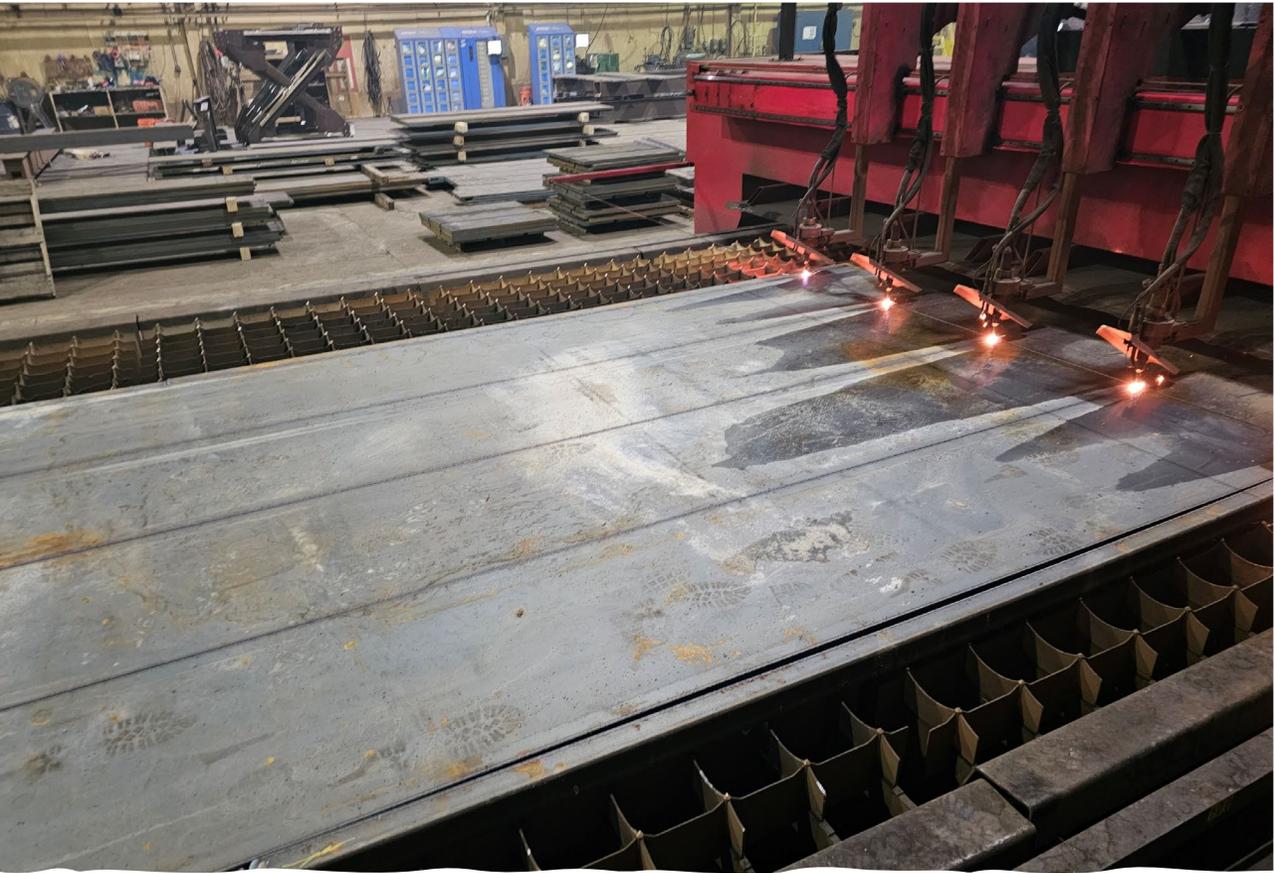
Loading and Shipping

Girder Fabrication

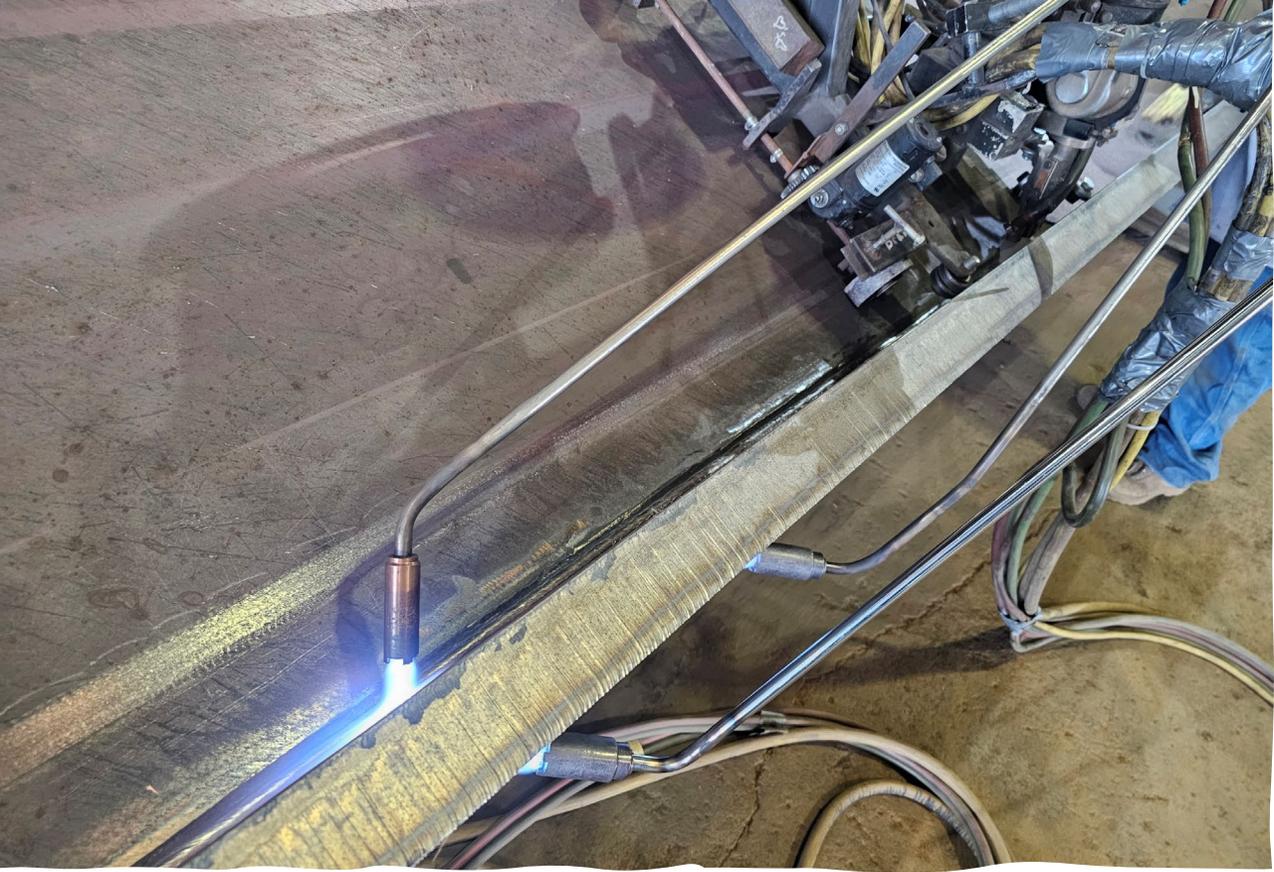




Material Verification

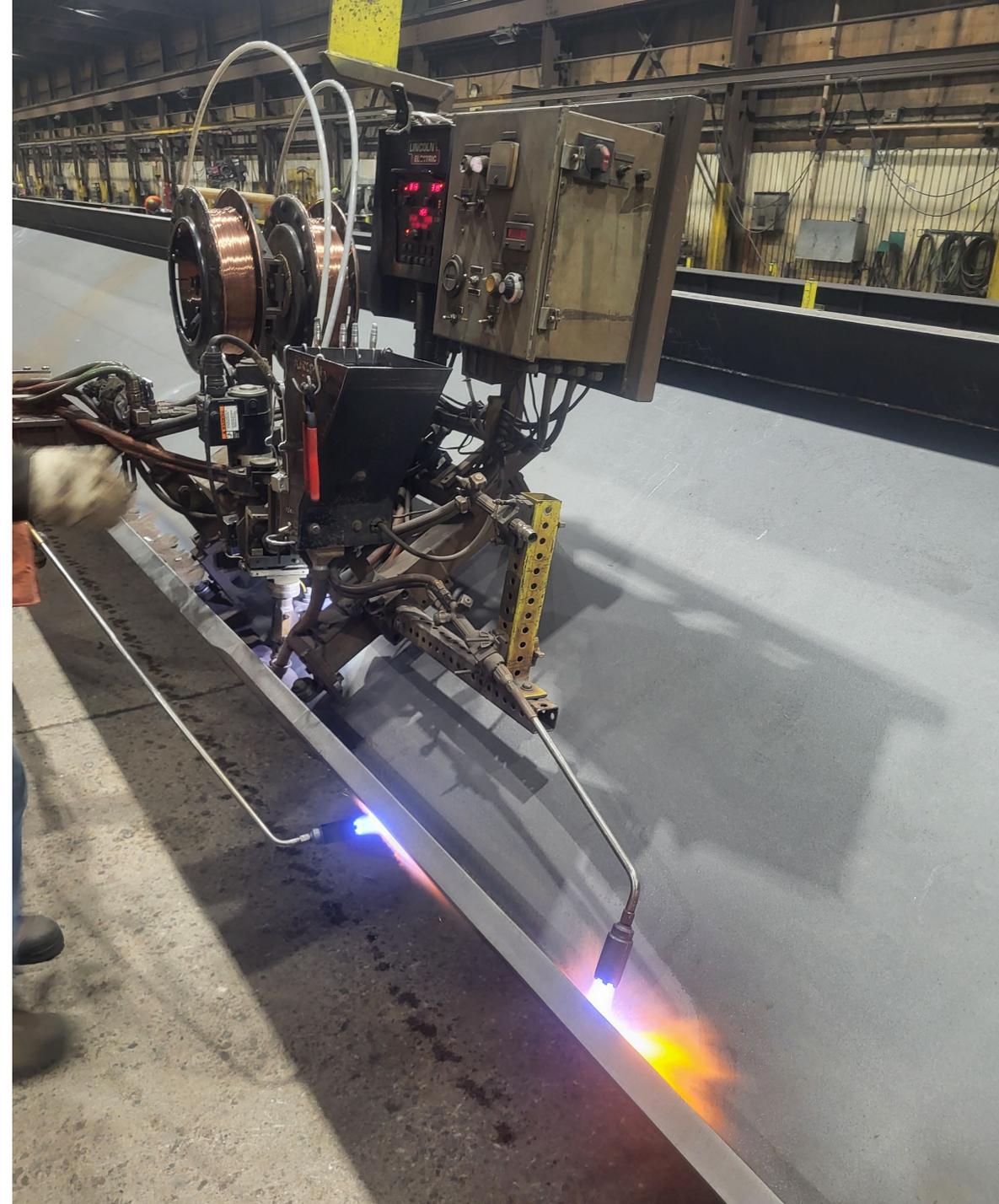


Cutting/Burning Plate



Web to Flange Welds

Web to Flange Welds



Ultrasonic Testing





Stiffeners



Magnetic Particle Testing

Assembly



Blasting

- Preparing surface for coatings



Coatings

- Three-coat system
- 4-8 mils for primer
- 3.5-7 mils for intermediate
- 2 mils minimum for top coat



Coatings



Coatings

- Dry film thickness checks



Loading and Shipping



Loading and Shipping



Questions?

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