

Stainless Steel in Structures - 5th International Experts Seminar

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The Use of ASTM A1010 – A Dual-phase Martensitic/Ferritic Stainless Steel for Bridges in the US

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Outline

- Brief History
- Material Properties
- US Bridge Projects
- Future Work

ASTM A1010 Steel History

- UNS S41003
 - ArcelorMittal-US Market
 - Marketed as Duracorr®
 - Corrosive Applications
- Attractive for Bridges
 - Improved corrosion resistance
 - Economical



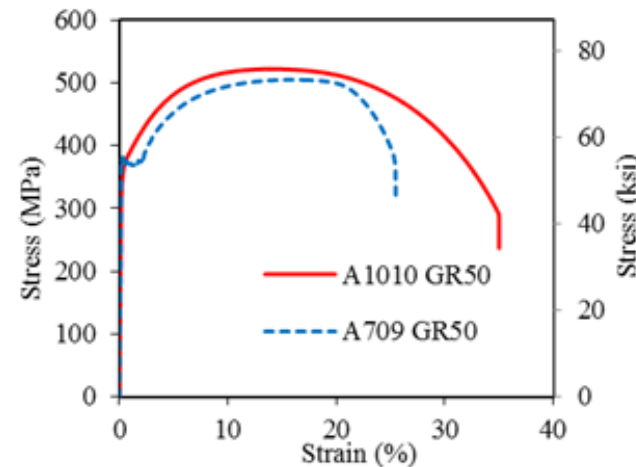
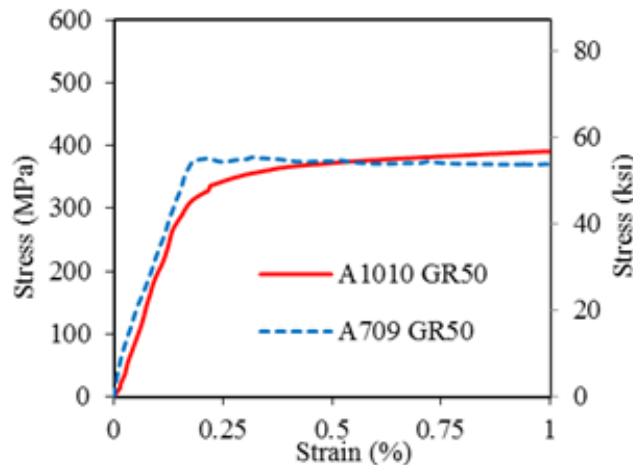
(ArcelorMittal, 2015)



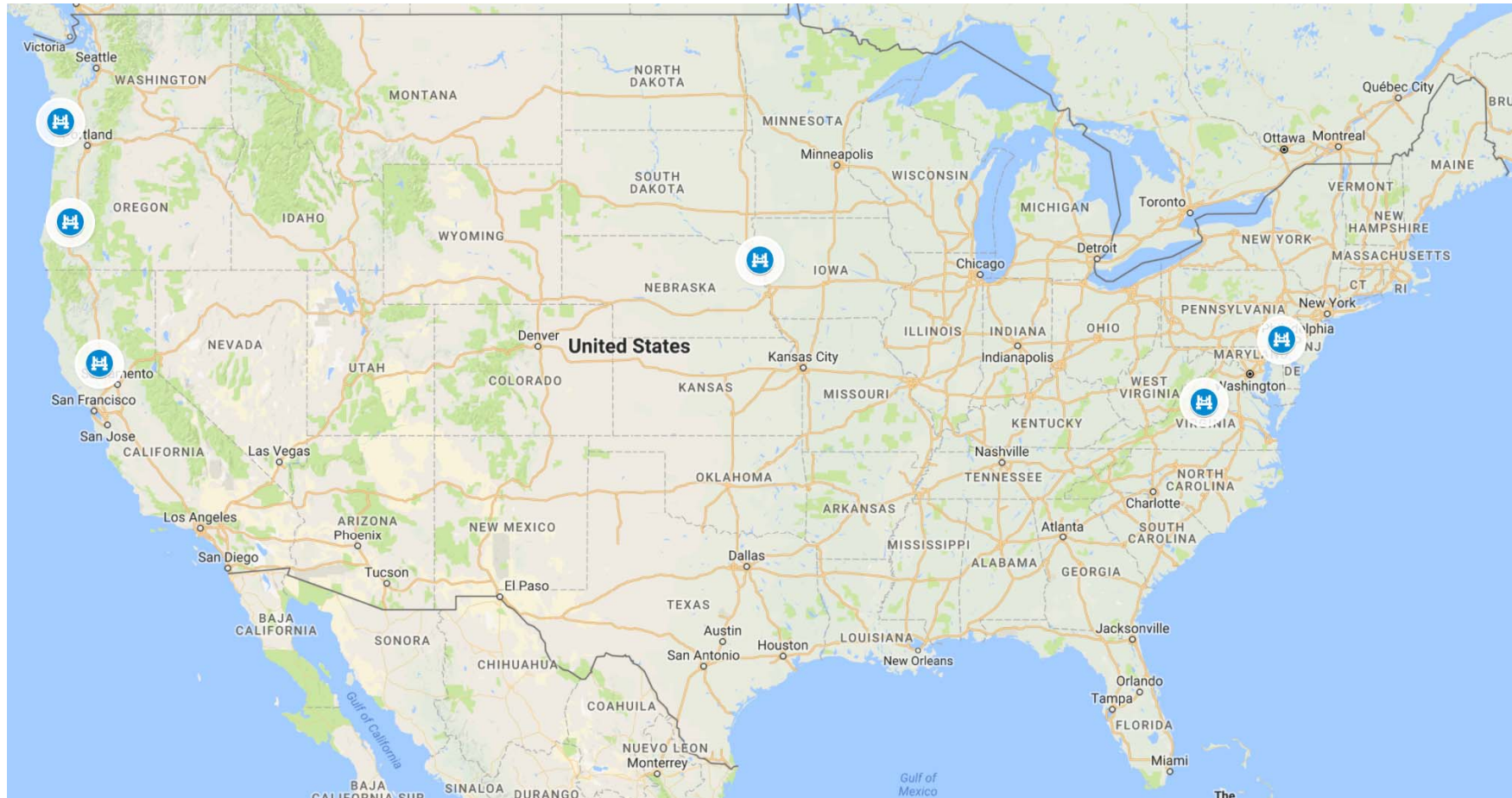
(ArcelorMittal, 2015)

ASTM A1010 Steel Properties

- Dual-phase Stainless Steel
 - Ferrite/Tempered Martensite
 - 10.5% - 12% Chromium
 - 1.5% Nickel
- Similar Mechanical Behavior as A709



A1010 Bridge Projects (US)



Fairview Road Bridge

- Colusa County, California, 2004
- FHWA IBRC program
- Multi-cell Bridge Girder modules
 - 4mm (0.16in) plates
 - 50% weight reduction



ArcelorMittal Bridge

- Coatesville, Pennsylvania, 2012
- 1st A1010 plate girder bridge in US
- Plate range: 9.5mm-38.1mm (0.375in-1.5in)
- E309L weld material



Dodge Creek, Mill Creek Bridges

- Sutherlin, Oregon, 2012, 40.4m (132.5ft)
 - High time-of-wetness (TOW)
- Astoria, Oregon, 2013, 37.5m (123ft)
 - Columbia River estuary



Salix Interchange Bridge

- Salix, Iowa, 2016
- 4-span bridge, 6 girder lines
 - 2 A1010 girder lines (fascia, 1st interior)



A1010 Girders

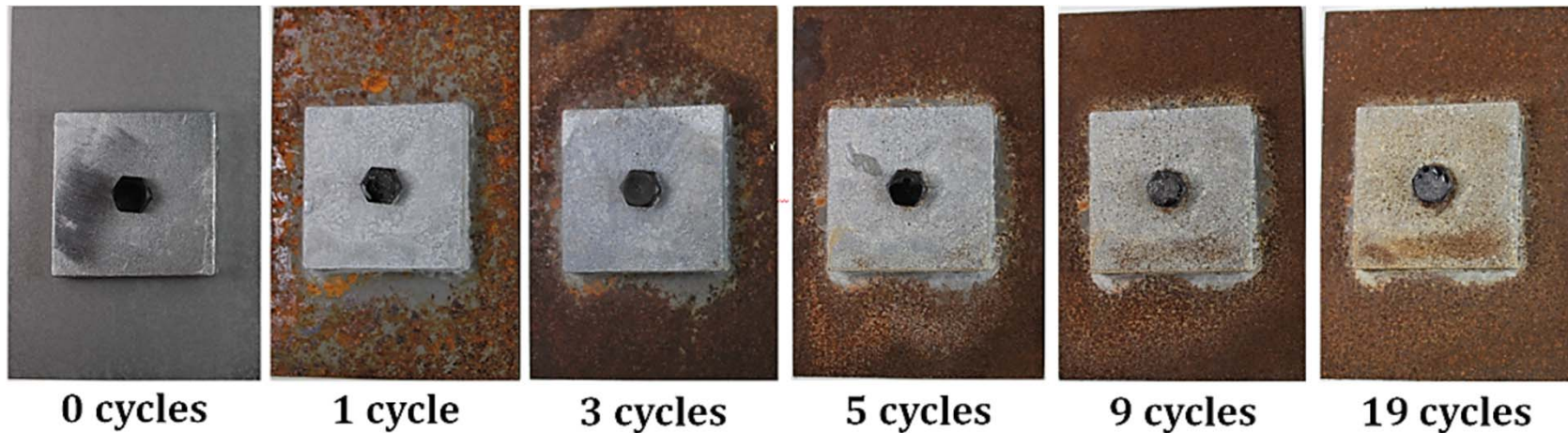
Route 340 Bridge

- Waynesboro, Virginia, 2017
- 2-span, variable depth girder bridge
- A1010 cross frames
 - Bent shapes (angles and channels)



Recent A1010 Research

- Corrosion testing (FHWA, 2011; ODOT)
- Weldability/fabrication (ODOT)
- Galvanic corrosion (Virginia Tech, 2016)
- Friction coefficient (VTRC, 2017)



Ongoing/Upcoming Research

- Weldment material properties
- Fabrication concerns
- Hybrid applications
- Galvanic corrosion of welds
- Corrosion resistant bolts
- Welded beam end repairs
- New bridge construction/repair projects

Conclusions

- Growing interest in Stainless Steel in the US bridge market
 - Challenges
 - Corrosive environments
 - Targeted applications?
 - Achieve desired design life
 - Balance initial vs. lifecycle cost

Questions?



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