

NEED FOR SPEED!

Increasing the speed of steel construction by 50% by 2025

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Learning Objectives

- List recent innovations that increase the speed of designing, fabricating, and erecting steel buildings
- Explain how the SpeedCore and FastFloor systems decrease construction time
- Describe how connection design can be simplified based on new research and available software
- Explain how new robotic technology is increasing the speed of steel fabrication



AISC's NEED FOR SPEED Initiative







aisc.org/needforspeed

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Goal:

Increase the speed at which a steel project (building or bridge) can be designed, fabricated, and erected by 50% by the end of 2025

AISC's NEED FOR SPEED Initiative









AISC's NEED FOR SPEED Initiative





We often consider cost. Why focus on speed?

- The material selection is often based on the time to completion
- Increasing speed drives innovation and industry advancements
- Faster construction has downstream impacts
 - Owners can occupy earlier
 - Reduced time on site
 - Efficiency with other trades
 - More projects completed annually



The NEED FOR SPEED projects

(well...some of them - there are many more!)

Bridge Projects:

- Achieving Speed in Steel Bridge Fabrication
- Uncoated Weathering Steel Reference Guide
- Standard Designs for Straight I-Girder Bridges
- Lean-on Bracing Reference
 Guide

Building Projects:

- SpeedCore
- FastFloor
- SpeedConnection
- Asymmetric Shape Optimization
- The Use of Intumescent Paints Applied Offsite for Fire Protection



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"Coupled Composite Plate Shear Walls / Concrete Filled" (CC-PSW/CF)



SpeedCore – Motivation for the project







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Images courtesy of Magnusson Klemencic Assoc.

SpeedCore – Motivation for the project



What if we could...

- ...erect the core concurrently with other steel operations?
- ...have less complex connection interfaces? (remember, cost vs. complexity?)
- ...utilize a composite system that minimizes (or eliminates) concrete creep?
- ...prefabricate modules that can be shipped to site and then filled with concrete?

And the idea of SpeedCore was born!



SpeedCore – what is it?





Rainier Square, Seattle, WA

Project overview

- 1.4 million square feet
- 850 ft tall
- 58 story, office and residential occupancies

Project innovations and results

- SpeedCore used for lateral force resisting system
- Erected 43% faster than a conventional concrete core system
- Saved the owner approximately \$10M





Image courtesy of Magnusson Klemencic Assoc.

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Rainier Square, Seattle, WA







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Rainier Square, Seattle, WA















Rainier Square, Seattle, WA





Rainier Square – Full fireproofing (no research at the time)



200 Park St. – Fireproofing at connections based on new research



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Images courtesy of Magnusson Klemencic Assoc.

SpeedCore – Ongoing research







SpeedCore – Bolted Splice Connection Research Dr. Michel Bruneau – University at Buffalo





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SpeedCore – Where to learn more

Design Guide 38: SpeedCore Systems for Steel Structures



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FastFloor – Motivation for the project

- Many buildings utilize composite floor systems (concrete slab over metal deck, attached to steel beams with shear studs)
- What if we could...



- ...eliminate the process of installing metal deck and pouring concrete?
- ...eliminate concrete curing time?





Traditional composite steel-concrete floor system





FastFloor – Inspiration for the project







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FastFloor – Commercial office option

Typical construction

- Use steel plates supported by W shapes
- Target spans of up to 40 ft
- 10 ft wide modules
- Typically requires a raised floor system
- **Project status**
- Initial designs have been developed
- Experimental tests ongoing including serviceability considerations







FastFloor – Commercial office option





Partial Framing Plan – Option 2



Option 3: 5 ft. Module w/ Filler Plates



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FastFloor – Commercial office option







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Technology Integration

(again...some of them!)

Collaborative Robots!

A "Cobot" interacts with a human for a collaborative workspace

- Not a fully automated system
- Ability to increase speed of fabrication
- Ability to produce high quality, complex welds









Technology Integration

(again...some of them!)

Augmented Reality (AR) for Fabrication

Augmented Reality and Smart Glasses in Steel Construction and Fabrication

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Thank you!





