

Night School 26: Developing an Eye for Connection Design

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webinar. We will begin shortly.
Please standby.



Session 1 – Basic Principles

June 22, 2021 | Larry Muir



**Smarter.
Stronger.
Steel.**

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Course Description

Basic Principles June 22, 2021

This session will introduce the course. The session will define connections, forces and how forces are transmitted. Then, it will discuss how connection design is based on first principles, without the aid of complex computer models and with little codification. The session will also look at how engineering has changed over the years with the use of computer. The session ends with the application of vigilance to steel design, from the design phase through the review of shop and erection drawings.



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Learning Objectives

1. Describe the importance of understanding basic engineering principles with the modern-day reliance on computers.
2. List the forces that can be transmitted through a connection.
3. Describe the importance of stability considerations in connection design.
4. Describe how forces are transmitted (load path) through connections.



Night School 26: Developing an Eye for Connection Design

Session 1: Basic Principles
June 22, 2021

Larry Muir, PE, Consultant



DEVELOPING AN EYE FOR CONNECTION DESIGN

by Larry S. Muir, PE



Who are You?

Do you spend your time:

- a) Mostly designing connections
- b) Mostly designing members
- c) Split evenly between designing connections & designing members
- d) Doing something other than engineering



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Who are You?

Submit your answer



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Who are You?

Do you work primarily for:

- a) Owners and architects
- b) Fabricators
- c) Split evenly between (a) and (b)
- d) Other



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Who are You?

Submit your answer



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What do you want?

This Night School is focused on the attendees.

About one-quarter of the Night School will be based on questions and topics received from the attendees.

In order for this to work, we need your input.

Submit connection design related questions and topics of interest to you via the chat or nightschool@aisc.org.



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In a nutshell



The increase in the use of computers and codification in structural steel connection design has changed the role of the connection design engineer from one in which most time is spent designing connections to one in which most time is spent overseeing designs produced by others (including computers) - from labor to a quality assurance role.

This presentation will discuss how a clear understanding of basic engineering principles interacts with this new paradigm.



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In a nutshell



This Night School will:

- In Session 1 introduce some basics of connection design and argument in favor of the thesis.
- In Session 2 explore the role of communication in the connection design process with practical recommendations.
- In Session 3 consider uncertainty and determination of force distributions that can be used to develop and/or evaluate designs.



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In a nutshell



This Night School will:

- In Sessions 4 and 5 introduce some basic concepts related to the behavior of bolts, welds, and bolted and welded joints.
- In Sessions 6 and 7 explore the implicit assumptions often made in design examples and computer programs that may or may not apply to specific conditions encountered in practice.
- We will also consider questions and topics submitted by the attendees with Session 8 dedicated entirely to attendee topics.



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What is a connection?

What is a structural steel connection?

From the Glossary to the *Specification for Structural Steel Buildings*:

“Connection. Combination of structural elements and joints used to transmit forces between two or more members.”



17

What is a connection?

What is a structural steel connection?

From the Glossary to the *Specification for Structural Steel Buildings*:

“Connection. Combination of structural elements and joints used to transmit forces between two or more members.”

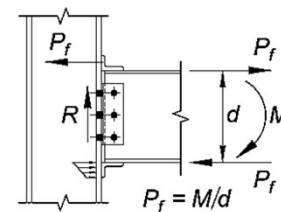
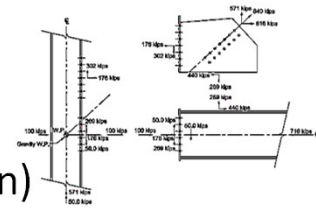
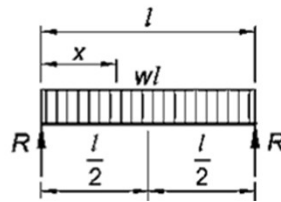


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What forces?

What Forces?

- Common forces from analysis
 - Beam end vertical shears
 - Member axial loads (tension and compression)
 - Moments
- Less Common forces from analysis
 - Beam end horizontal shears
 - Torsion



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What forces?

What Forces?

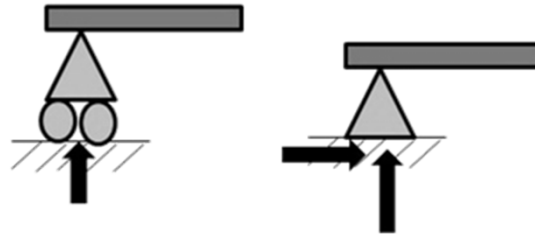
- Forces that are transferred but often not explicitly considered
 - Out-of-plane bracing forces
 - Restraint against rotation about the longitudinal axis of flexural members at points of support

It is easy to forget about these sorts of forces, but they are critical since they tend to be the forces that justify the basic assumptions the design of the members rely on.

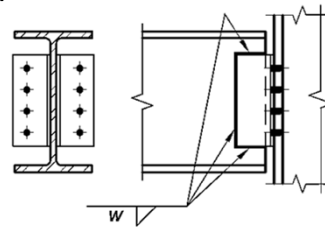
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How are Forces Transmitted?

How are the Forces Transmitted?



Specification Section B3.4a: “A simple connection transmits a negligible moment. In the analysis of the structure, simple connections may be assumed to allow unrestrained relative rotation between the framing elements being connected. A simple connection shall have sufficient rotation capacity to accommodate the required rotation determined by the analysis of the structure.”

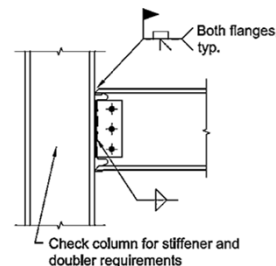


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How are Forces Transmitted?

How are the Forces Transmitted?

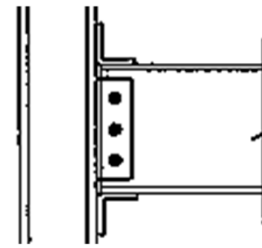


Specification Section B3.4b(a): “A fully restrained (FR) moment connection transfers moment with a negligible rotation between the connected members. In the analysis of the structure, the connection may be assumed to allow no relative rotation. An FR connection shall have sufficient strength and stiffness to maintain the initial angle between the connected members at the strength limit states.”

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How are Forces Transmitted?



How are the Forces Transmitted?

Specification Section B3.4b(b): “Partially restrained (PR) moment connections transfer moments, but the rotation between connected members is not negligible. In the analysis of the structure, the force-deformation response characteristics of the connection shall be included. The response characteristics of a PR connection shall be documented in the technical literature or established by analytical or experimental means. The component elements of a PR connection shall have sufficient strength, stiffness and deformation capacity at the strength limit states.”

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How are Forces Transmitted?

How are the Forces Transmitted?

Specification Section B1: “The design of members and connections shall be consistent with the intended behavior of the framing system and the assumptions made in the structural analysis.”



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How are Forces Transmitted?

How are the Forces Transmitted?

Specification Section B1: “The design of members and connections shall be consistent with the intended behavior of the framing system and the assumptions made in the structural analysis.”

This is the more general, more basic, and more important requirement. It is arguably the MOST important requirement in the *Specification*.

There is no equation associated with it and to my knowledge there is no computer program that can satisfy it.

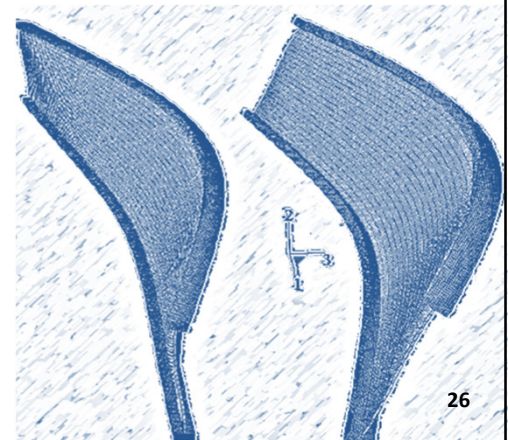
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How are Forces Transmitted?

Connections Must be More than Just Strong

The beam on the left has sufficient torsional restraint. The design equations in Chapter F can be used to predict the available strength of this beam.

The beam on the right does **NOT** have sufficient torsional restraint. The design equations in Chapter F **CANNOT** be used to predict the available strength of this beam.



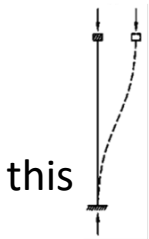
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How are Forces Transmitted?

Bracing Forces Are Real Forces

There is a big difference between the strength of this and



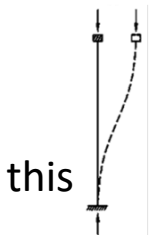
this and it all may depend on the stiffness of this



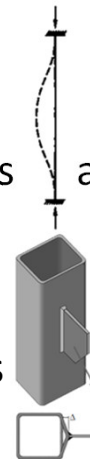
How are Forces Transmitted?

Bracing Forces Are Real Forces

There is a big difference between the strength of this and



this and it all may depend on the stiffness of this



Let's All Pause For A Moment And Let That Sink In...

Stability

The Mysterious & Magical World of Stability

Appendix 6 User Note: “Stability requirements for lateral force-resisting systems are provided in Chapter C. The provisions in this appendix apply to bracing that is not generally included in the analysis model of the overall structure, but is provided to stabilize individual columns, beams and beam-columns.”



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Stability

Just the Requirements Ma'am



Chapter C

The effects of all of the following on the stability of the structure and its elements shall be considered:

- (a) flexural, shear and axial member deformations, and all other component **and connection deformations** that contribute to the displacements of the structure;
- (b) second-order effects (including $P-\Delta$ and $P-\delta$ effects);
- (c) geometric imperfections;
- (d) stiffness reductions due to inelasticity, including the effect of partial yielding of the cross section which may be accentuated by the presence of residual stresses; and
- (e) uncertainty in system, member, and connection strength and stiffness.

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Stability

How is it all considered???

Let's just skip (a) for a moment

(b) 2nd-order effects - "considered either by a computational P- Δ and P- δ analysis or by the approximate method". The computer does this for me – Right?

(c) System geometric imperfections - direct modeling (Section C2.2a) or notional loads (Section C2.2b)

(c) Member geometric imperfections - stiffness reduction specified (Section C2.3) and member strength formulas



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Stability

How is it all considered???

(d) System stiffness reductions - stiffness reduction specified (Section C2.3)

(d) Member stiffness reductions - member strength formulas

(e) System uncertainty - stiffness reduction specified (Section C2.3)

(e) Member uncertainty - member strength formulas



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Stability

How is it all considered???

- (a) Consider flexural, shear and axial member deformations –
The computer does this for me – Right?
- (a) Consider all other component **and connection deformations**
– HOW???
- Commentary Table C-C1.1 suggests, “C2.1(a). Consider all deformations”.
- Does the computer do this for you?



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Stability

The Missing Piece

- (a) Consider all other component **and connection deformations**
– HOW???



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Stability

The Missing Piece

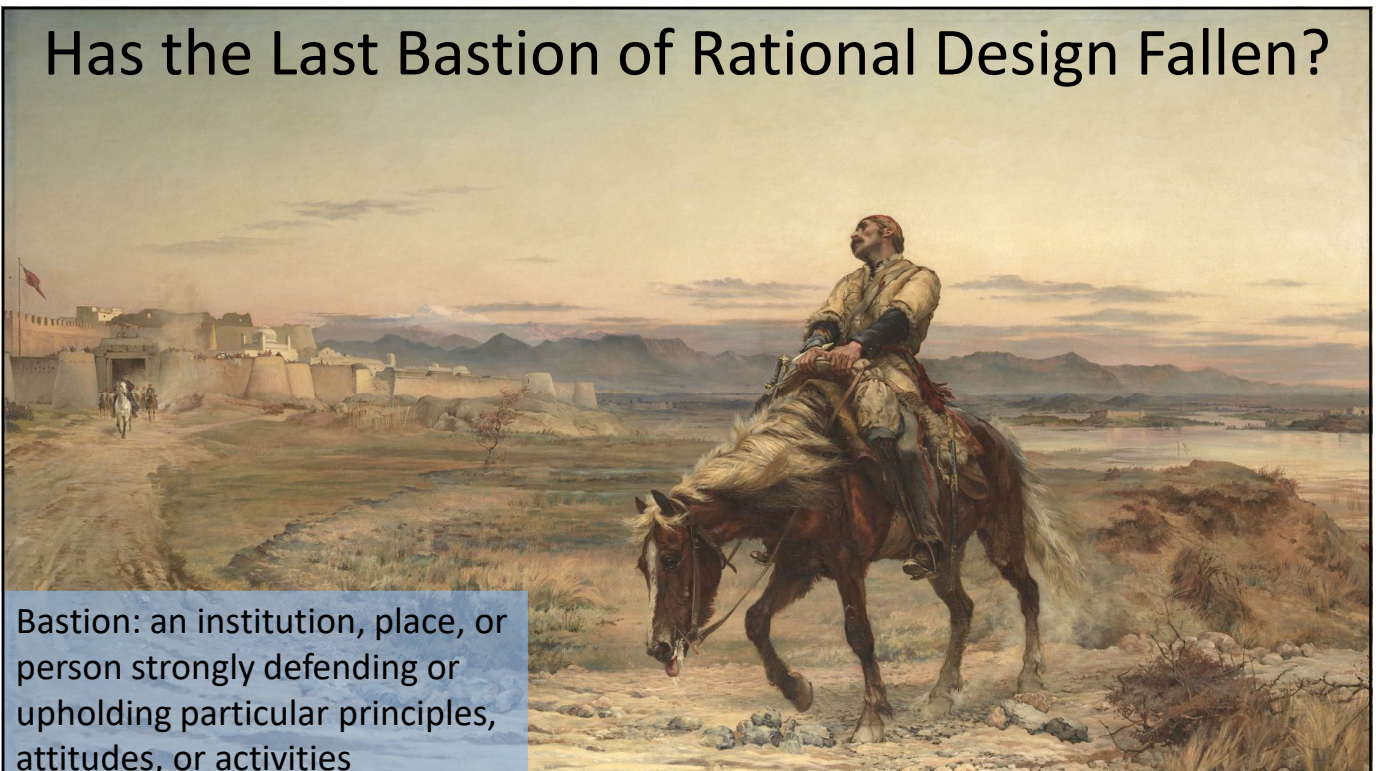
- (a) Consider all other component **and connection deformations**
– HOW???

More on this Later...



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Has the Last Bastion of Rational Design Fallen?



Bastion: an institution, place, or person strongly defending or upholding particular principles, attitudes, or activities



Connection Design

Bill Thornton refers to connection design as the

Last Bastion of Rational Design

Most connection design is accomplished

- with little codification
- without the aid of complex computer models
- based on first principles



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Connection Design

Bill Thornton refers to connection design as the

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Connection Design

Bill Thornton refers to connection design as the

Last Bastion of Rational Design

Most connection design is accomplished

- ~~with little codification~~
- ~~without the aid of complex computer models~~
- based on first principles



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The Last Bastion

My Computer Program likely:

- ✓ Determines member & connection forces (required strength)
- ✓ Determines member & connection capacity (available strength)
- ✓ Determines flexural, shear and axial member deformations
- ✓ Designs the members consistent with analysis assumptions.
- ✓ Does a 2nd-order analysis
- ✓ Considers geometric imperfections, stiffness reductions due to inelasticity, and uncertainty in strength and stiffness



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The Last Bastion

My Computer Program likely:

- ✓ Determines member & connection forces (required strength)
- ✓ Determines member & connection capacity (available strength)
- ✓ Determines flexural, shear and axial member deformations
- ✓ Designs the members consistent with analysis assumptions.
- ✓ Does a 2nd-order analysis
- ✓ Considers geometric imperfections, stiffness reductions due to inelasticity, and uncertainty in strength and stiffness

... at least it does so for some relatively wide, but ill-defined range of building-like structures.

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The Last Bastion

My Computer Program likely:

- COULD determine connection deformations
- COULD design connections consistent with analysis assumptions.



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The Last Bastion

My Computer Program likely:

- CANNOT Determine ALL other component deformations
- CANNOT Determine what is sufficiently building-like to be within the scope of the *Specification*.
- CANNOT Choose or Define the intended behavior of the framing system or determine if the analysis is sufficient for the application.
 - Therefore can only ensure that the design of members and connections is consistent with the intended behavior as described to it by the user or programmer.



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The Last Bastion

My Computer Program likely:

- CANNOT Determine ALL other component deformations
- CANNOT Determine what is sufficiently building-like to be within the scope of the *Specification*.
- CANNOT Choose or Define the intended behavior of the framing system or determine if the analysis is sufficient for the application.

Here lies the Last Bastion



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Stability
FlashBack

How are connection deformations considered back in the REAL world???

(a) Consider all other component and connection deformations –
HOW???

“Restraint cannot be easily quantified, and thus it can only be qualitatively described with terms like heavily and highly restrained. Restraint generally has to be identified by feel and experience.”

~~~Duane Miller

Design Guide 21

NOTE: Completely taken out of context

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Stability  
FlashBack

## How are connection deformations considered back in the REAL world???

“Restraint *often* cannot be easily quantified, and thus it *is often* only qualitatively described with terms like *unbraced or fully braced* . Restraint generally *is evaluated based on engineering judgment - by feel and experience.*”



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## Stability FlashBack

### How are connection deformations considered back in the REAL world???

“Restraint *often* cannot be easily quantified, and thus it *is often* only qualitatively described with terms like *unbraced* or *fully braced* . Restraint generally *is evaluated based on engineering judgment - by feel and experience.*”

When a condition becomes so unusual that it cannot be evaluated based on engineering judgment, then the condition should be abandoned or more rigorously evaluated.



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## Stability FlashBack

### Generally does not mean Always

“In general, adequate lateral bracing is provided to the compression flange of a simple-span beam by the connections of infill beams, joists, concrete slabs, metal deck, concrete slabs on metal deck, and similar framing elements.” *AISC Manual*

If a condition looks unusual, then the basic assumption should be reevaluated – perhaps using an unusual and more rigorous analysis.



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## Stability FlashBack

# The Magical World of Stability

Appendix 6 User Note: “Stability requirements for lateral force-resisting systems are provided in Chapter C. The provisions in this appendix apply to bracing that is not generally included in the analysis model of the overall structure, but is provided to stabilize individual columns, beams and beam-columns.”

Appendix 6 is a tool that can be used in evaluating conditions that fall outside one’s engineering judgment.



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## The Last Bastion

How are the Forces Transmitted?

Simple vs. Restrained and sufficient Stiffness to Brace members are not the only issues that affect HOW forces are transmitted by connections.

They are, however, probably some of the more common issues I see when I perceive there to be conflicts between the design of members and connections, the intended behavior, and the assumptions made in the structural analysis.



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## The Last Bastion

How are the Forces Transmitted?

Connections, the effect of the connections on stability, the interaction of the member design and connection design are worthy of consideration.

*“...stability failures and connection failures can occur instantaneously; such failures in steel structures can clearly be life threatening.”*

*~~~Jacob Feld*



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## The Last Bastion

How are the Forces Transmitted?

Connections, the effect of the connections on stability, the interaction of the member design and connection design are worthy of consideration.

It is all part of the Art and Science of Connection Design.



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The  
Modern  
Engineer

## Antiquated???

"Any fool can design a structure. It takes an engineer to design a connection."

~~~J.P Dowling

Past president

Institute of Structural Engineers

U.K.



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The
Modern
Engineer

New

2021 Revision: "Any fool with a computer can design a connection."

+

Proverb: "A fool and his money are soon parted."

A fool with a computer who designs connections...

and his _____ will someday be parted.

money

career

reputation

Garbage In = Garbage Out



The Engineer of the Future

Discussing why robots likely will not replace lawyers, judges and juries
Michio Kaku states:

“On the surface, laws may seem exacting and well-defined, with precise and rigorous wording and arcane-sounding titles and definitions. But this is only an appearance, since the interpretations of these definitions constantly shift.”

~~~ *Physics of the Future*



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## The Engineer of the Future

This could be rewritten and applied to engineering as:

“On the surface, *design standards* may seem exacting and well-defined, with precise and rigorous wording and arcane-sounding titles and definitions. But this is only an appearance, since the interpretations of these *definitions and requirements must be considered in the context of specific applications.*”



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## The Engineer of the Future

Interpretations of these *definitions and requirements must be considered in the context of specific applications.*

“this information should not be used or relied upon for any specific application without competent professional examination and verification of its accuracy, suitability and applicability by a licensed engineer or architect.”

~~~Pretty much every AISC document



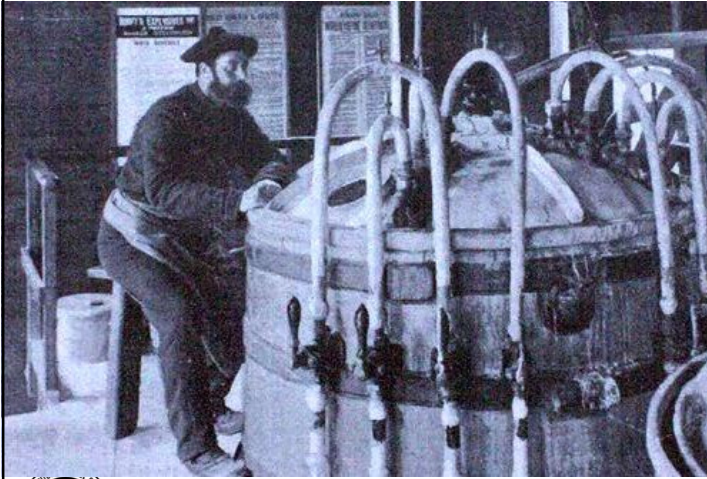
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The Modern Engineer as a Man on a One-Legged Stool



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Vigilance & The Man on a One-Legged Stool



“The surroundings are rather trying to sensitive nerves - your life depends, at every moment, upon a thermometer and a man on a one legged stool.”

~~~ H. J. W. Dam



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## Vigilance & The Man on a One-Legged Stool



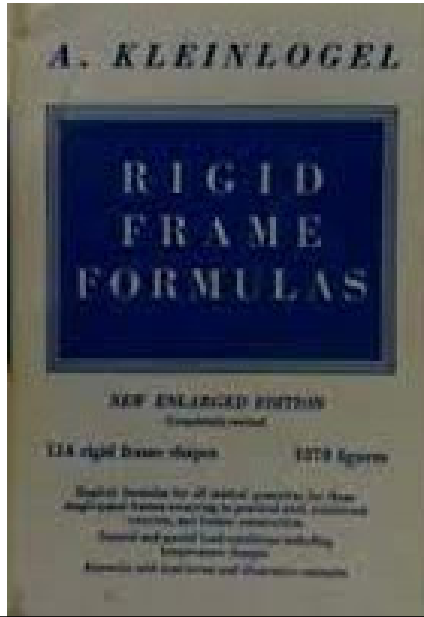
Most of the time this guy did nothing but watch a thermometer which stayed within the expected range, but it was vital that he remain vigilant.

The tank contained about 1,500 pounds of nitroglycerin.



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## The Engineer of 1950s



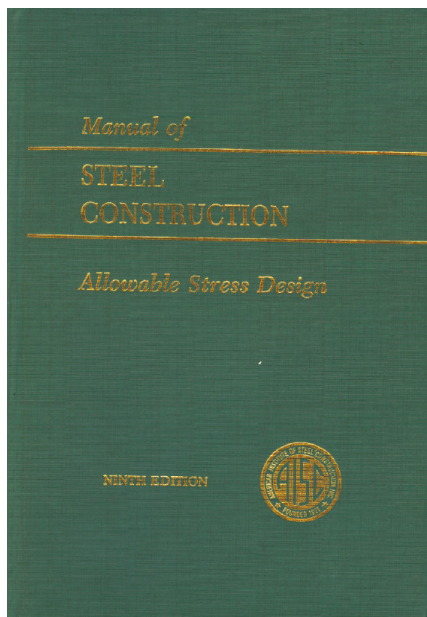
There was a time when engineers spent far more of their time determining forces.

The book shown here is more than 400 pages long and does nothing more than provide solutions to statics problems.

You could not sell such a book today.

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## The Engineer of 1990s



When I started my career engineers spent a lot of time determining strengths.

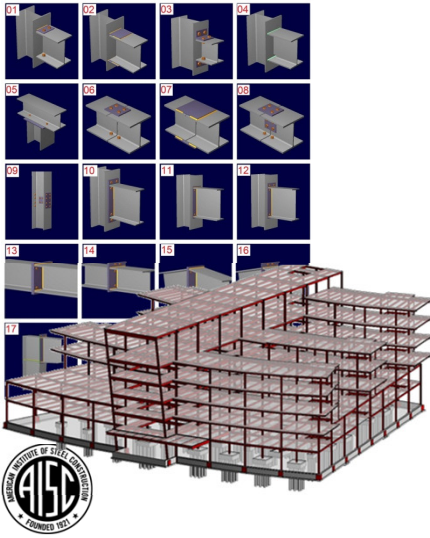
Over time member design was increasingly done using spreadsheets – and then eventually was incorporated into analysis-design software.

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# The Engineer of Today

Modern computers have an incredible amount of power and as discussed previously analysis and design programs perform many tasks for the engineer.

What is left for connection design engineers?

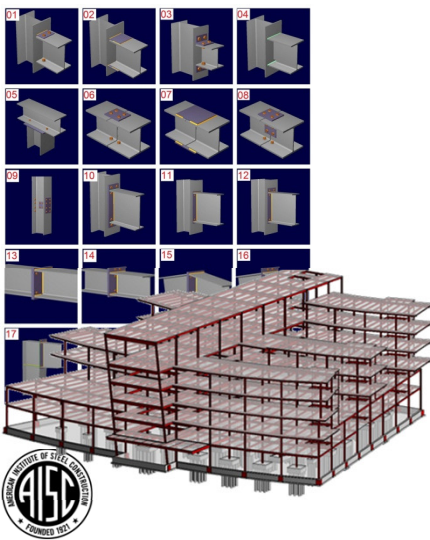


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# The Engineer of Today

What is left for connection design engineers?

- Consider connection deformations
- Determine what is sufficiently building-like to be within the scope of the *Specification*.
- Ensure that the design of connections is consistent with the intended behavior as described by the Engineer of Record.



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## The Modern Engineer as a Man on a One-Legged Stool

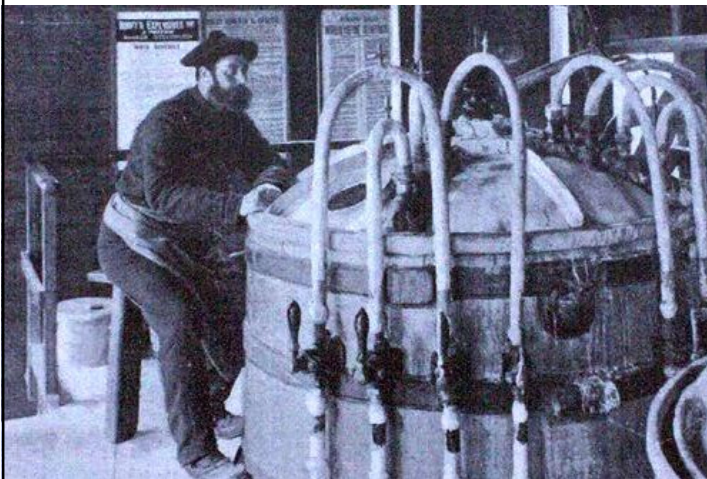


If engineers have any value it lies in their ability to apply their knowledge and experience - their engineering judgment - to a wide range of applications to determine where the common design methods are sufficient or insufficient for the task.



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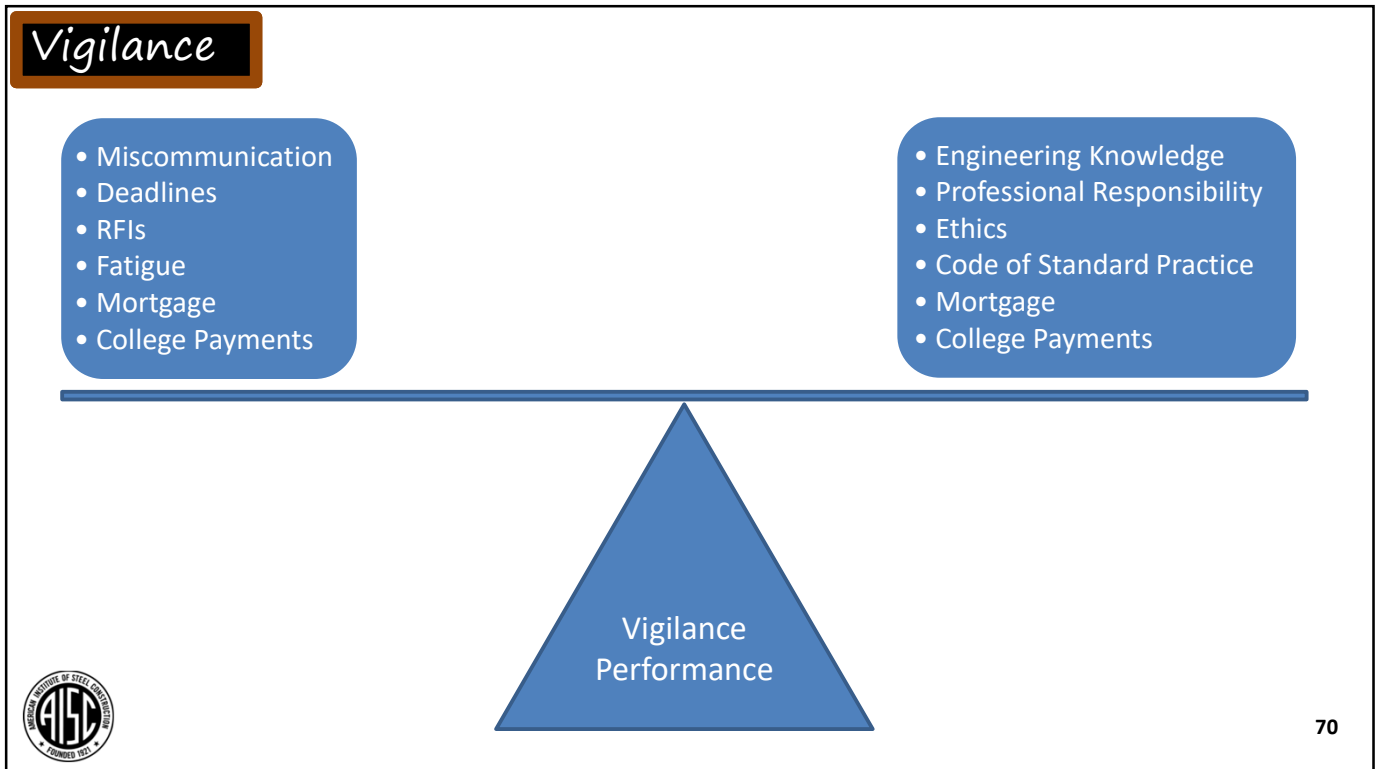
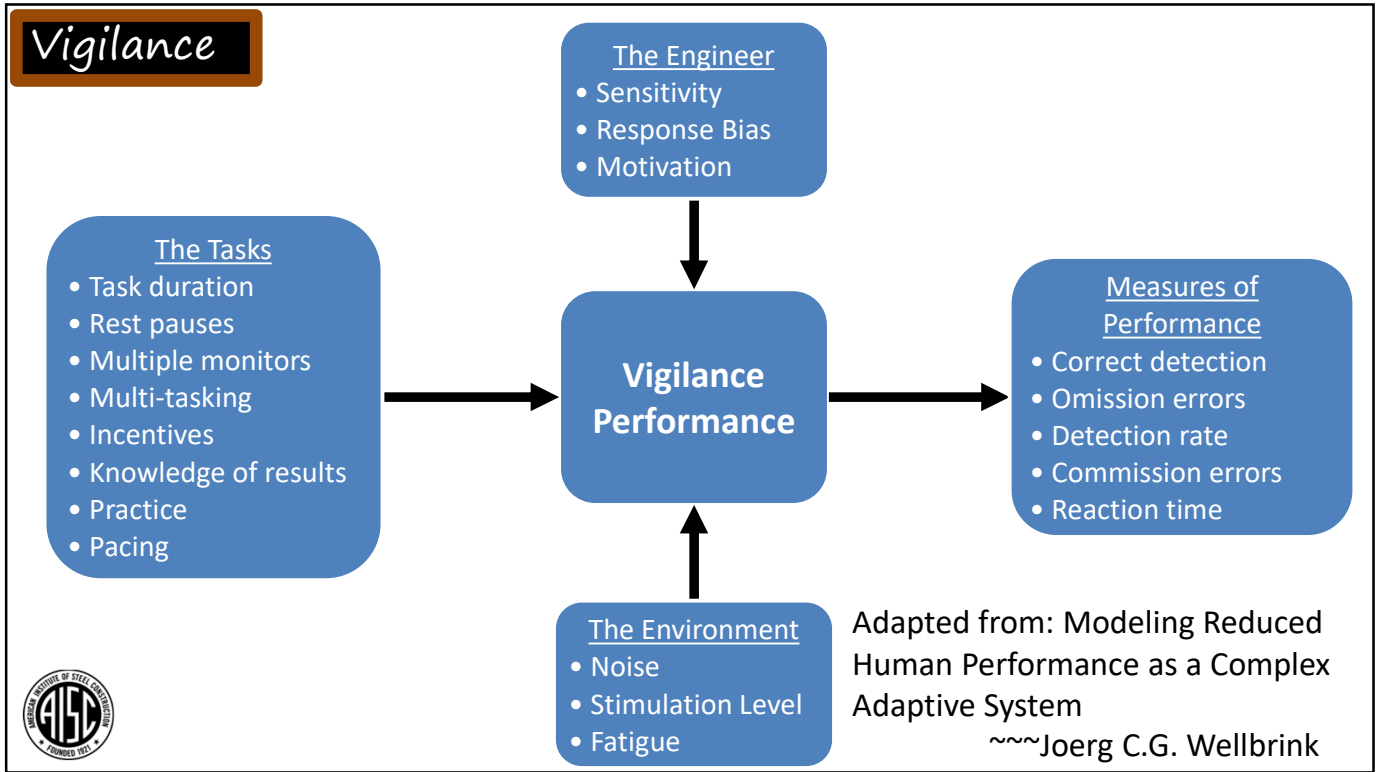
## The Modern Engineer as a Man on a One-Legged Stool



The engineer's task is in many ways more difficult than and more dangerous than that of the man of the one-legged stool.

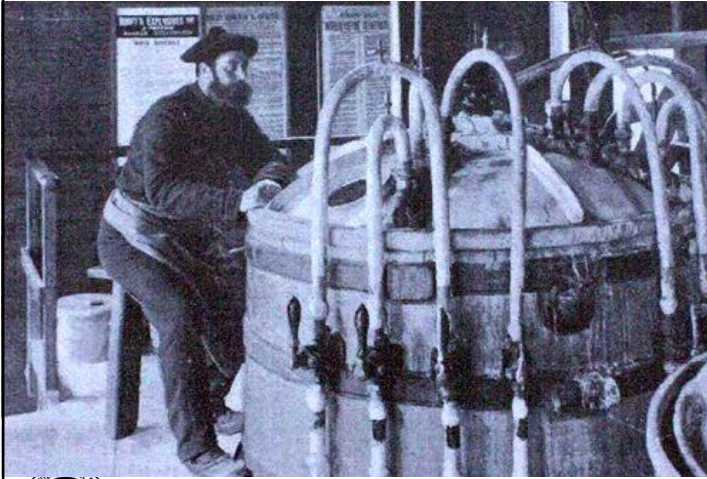


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**Vigilance**

## The Modern Engineer as a Man on a One-Legged Stool



The man on the one-legged stool is dealing with a pretty simple model:

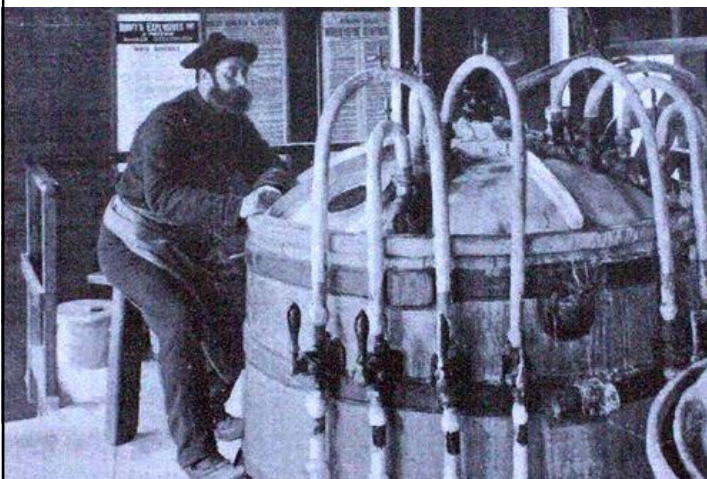
High Temperature = BOOM!!!



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**Vigilance**

## The Modern Engineer as a Man on a One-Legged Stool



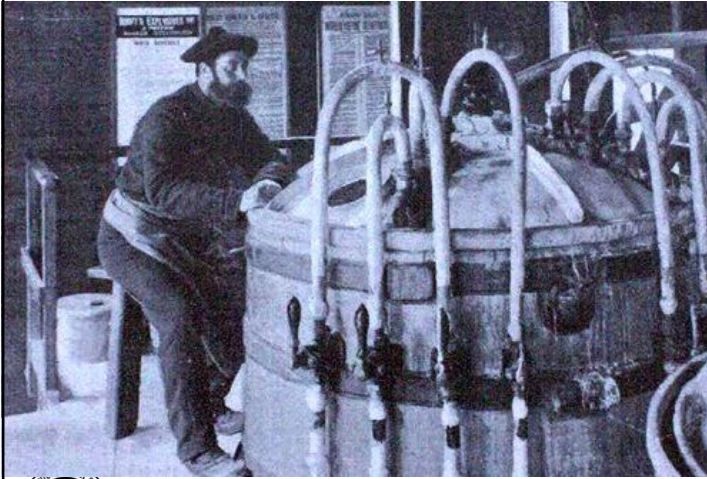
“Engineering is the art of modeling materials we do not wholly understand, into shapes we cannot precisely analyze so as to withstand forces we cannot properly assess, in such a way that the public has no reason to suspect the extent of our ignorance.”

~~~Dr. A. R. Dykes



Vigilance

The Modern Engineer as a Man on a One-Legged Stool



The man on the one-legged stool's feedback is provided in an immediate and definitive manner.

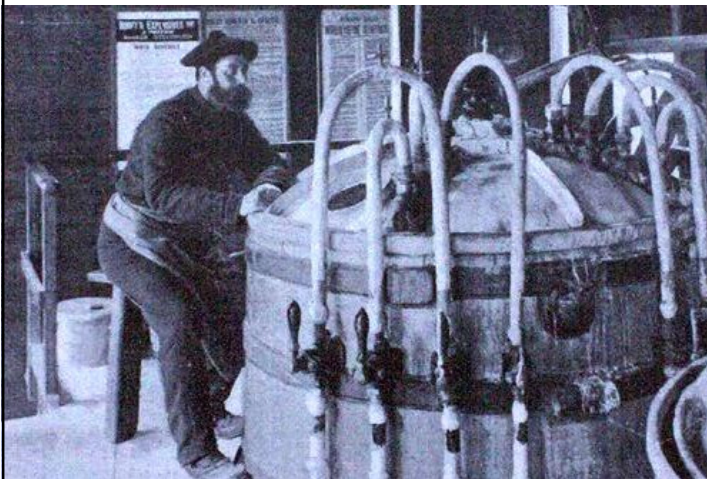
Not Dead = Good Job



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Vigilance

The Modern Engineer as a Man on a One-Legged Stool



Not so for engineers.

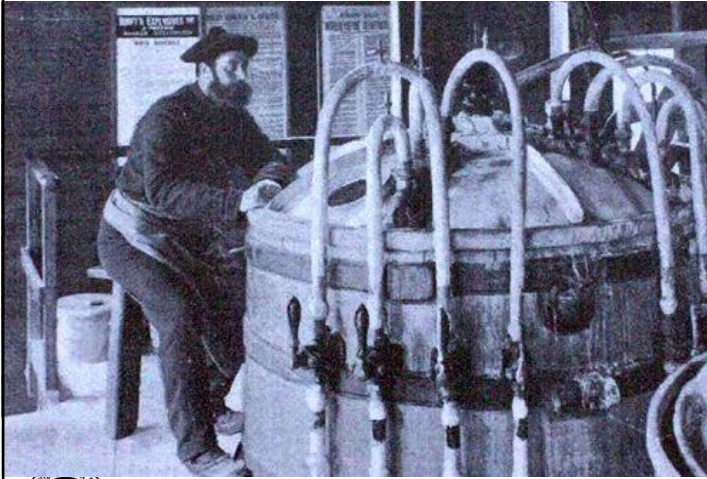
Our designs are based on return periods measured in decades.



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Vigilance

The Modern Engineer as a Man on a One-Legged Stool



On the other hand I suspect this was a stressful working environment that probably violated a few OSHA rules.

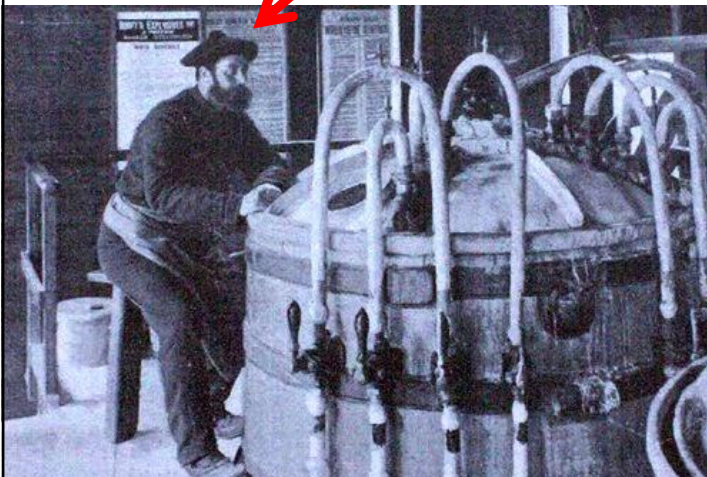


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Vigilance

The Modern Engineer as a Man on a One-Legged Stool

No
Hardhat



On the other hand I suspect this was a stressful working environment that probably violated a few OSHA rules.



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Vigilance

Vigilance

“Attending goes beyond simply “seeing” something to analyzing its importance... *Safe attending* requires:

- 1) Seeing or observing in some way (using one or more of the five senses)
- 2) Understanding the significance of what is seen
- 3) Acting or not acting on the situation.”



~~~ Darnell Lattal

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## Vigilance

# Vigilance

Seeing or observing in some way

- Draw Free-Body Diagrams
- Draw Details to Scale
- If It Looks Wrong; It May Be Wrong
- Think About Boundary Conditions
  - Before You Design The Members and Connections
  - After You Design The Members and Connections
  - When You Review the Shop and Erection Drawings



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## Vigilance

Understanding the significance of what is seen



“This is a major advantage of highly developed mental representations: you can assimilate and consider a great deal more information at once... see... data not as isolated bits of information but as pieces of larger patterns...”

~~~Anders Ericsson “Peak”

“identified by feel and experience” ~~~ Duane Miller Design Guide 21₇₉

Vigilance

Vigilance

Understanding the significance of what is seen



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Vigilance

Vigilance



Understanding the significance of what is seen

There will be a lot more on this topic throughout the Night School.

Note that I firmly believe no one can teach you a “feel” for a subject.

There are reasons to believe that you can work to develop a “feel” for a subject.



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Vigilance

Vigilance



Acting or not acting on the situation

- Verify do not assume
- Most people want to do a good job – Assume the best
- Approach controversies
 - As potential misunderstandings
 - An opportunity to learn
 - An opportunity to educate



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Vigilance

Vigilance



Acting or not acting on the situation

- Try to keep commercial and technical issues separate.
- Be willing and able to defend your design decisions.
- Accept that you may not have perfect information.



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Vigilance

Vigilance



Acting or not acting on the situation

COSP: “The *owner’s designated representative for design* is the final authority in the event of a disagreement between parties regarding the design of *connections* to be incorporated into the overall *structural steel* frame.”



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Vigilance

Final Engineering Authority

“The *owner’s designated representative for design* is the final authority in the event of a disagreement between parties regarding the design of *connections* to be incorporated into the overall *structural steel* frame.”

The Engineer of Record can impose any requirement he or she deems necessary at any point in the project.

If new requirements are imposed after a bid is accepted, this likely represents a revision to the contract. Know the COSP -- it is your friend.



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OH NO!!! HOMEWORK!!!

- Submit Your Questions & Topics
- Feel free to submit any questions & topics you wish via the chat or email to nightschool@aisc.org.
- Submit Priority will be given to:
 - Questions & topics shared by multiple attendees
 - Questions & topics related to material presented in this Night School
 - Questions & topics directly related to connection design
 - Questions & topics of interest to the presenter



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THE END



Individual Session Registrants

PDH Certificates

- All WFH individuals associated with a group registration will be issued a certificate.
- All individuals attending at your connection: you will receive an email on how to report their attendance from: registration@aisc.org.
 - Be on the lookout: Check your spam filter! Check your junk folder!
 - Completely fill out online form. Don't forget to check the boxes next to each attendee's name!



8-Session Registrants

PDH Certificates

One certificate will be issued at the conclusion of all 8 sessions.



8-Session Registrants

Access to the quiz

Information for accessing the quiz will be emailed to you by Thursday. It will contain a link to access the quiz. EMAIL COMES FROM NIGHTSCHOOL@AISC.ORG.

Quiz and attendance records

Posted Thursday mornings. www.aisc.org/nightschool -- Click on Current Course Details.

Reasons for quiz

- EEU – You must take all quizzes and the final exam to receive EEU.
- PDHs – If you watch a recorded session, you must pass quiz for PDHs.
- REINFORCEMENT – Reinforce what you learn tonight. Get more out of the course.

Note: If you attend the live presentation, you do not have to take the quizzes to receive PDHs



8-Session Registrants

Access to the recording

Information for accessing the recording will be emailed to you by Thursday. The recording will be available for four weeks. (For 8-session registrants only.) EMAIL COMES FROM NIGHTSCHOOL@AISC.ORG.

PDHs via recording

If you watch a recorded session, you must take *and pass* the quiz for PDHs.



8-Session Registrants

Night School Resources

Find all your handouts, quizzes and quiz scores, recording access, and attendance information all in one place!



8-Session Registrants

Night School Resources

Go to www.aisc.org and sign in.



Login

If you're an existing customer, please enter your username and password.

| | |
|---|---|
| <p>USERNAME</p> <input type="text" value="Enter your username"/> | <p>DON'T HAVE AN ACCOUNT?</p> <p>My AISC allows you to access Engineering Journal articles and Design Guides you have downloaded from the bookstore.</p> <p>REGISTER NOW</p> |
| <p>PASSWORD</p> <input type="password" value="Enter your password"/> | |
| <input type="checkbox"/> Remember Me | |

8-Session Registrants

Night School Resources

Go to www.aisc.org and sign in.

- IN THIS SECTION
- Edit Profile
- My Downloads
- My Pending Quizzes
- My Events
- Order History
- Course History
- Course Resources

MyAISC

MY PROFILE

Update your contact and address information.

[EDIT PROFILE](#)

MY PURCHASED DOWNLOADS

Access articles and documents that you have purchased.

[VIEW DOWNLOADS](#)

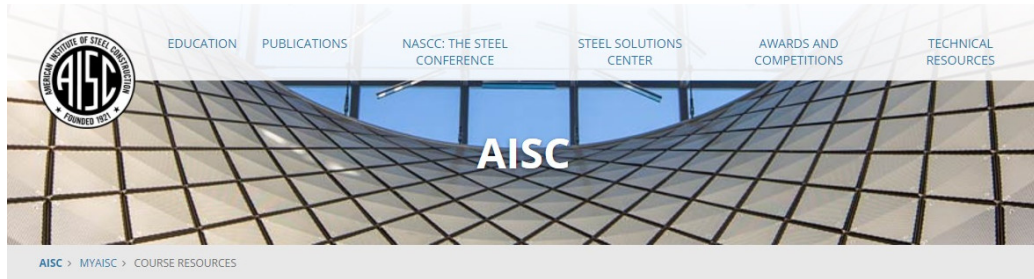
MY COURSE RESOURCES

View online resources for Night School and Live Webinar package registrations.

[VIEW RESOURCES](#)

8-Session Registrants

Night School Resources



Course Resources

| Event | Start Date |
|--|----------------------|
| NS 13 8-Session Package-Night School 13 - Design of Industrial Buildings | 1/30/2017 7:00:00 PM |
| NS 14 8-Session Package-Night School 14 - Fundamentals of Stability | 6/5/2017 7:00:00 PM |

8-Session Registrants

Night School Resources



Night School 13: Design of Industrial Buildings

8-SESSION PACKAGE RESOURCES

| Event | Date | Handouts | Video | Quiz | Attendance |
|--|----------------------|--------------------------|---|------------------------------|------------|
| NS13 - Design Criteria | 1/30/2017 7:00:00 PM | Handouts | View
Passcode: NS13DSN | Pass
Score: 80 | Pending |
| NS13 - Economic Considerations | 2/6/2017 7:00:00 PM | Handouts | Available 02/08/2017 5pm EST | Available 02/08/2017 5pm EST | Pending |
| NS13 - Lateral Load Systems and Details | 2/13/2017 7:00:00 PM | Handouts | Available 02/15/2017 5pm EST | Available 02/15/2017 5pm EST | Pending |
| NS13 - Preliminary Design Procedures | 2/27/2017 7:00:00 PM | Handouts | Available 03/01/2017 5pm EST | Available 03/01/2017 5pm EST | Pending |
| NS13 - Crane Girder Design and Frame Analysis | 3/6/2017 7:00:00 PM | Handouts | Available 03/08/2017 5pm EST | Available 03/08/2017 5pm EST | Pending |
| NS13 - Frame Member and Connection Design | 3/13/2017 7:00:00 PM | Handouts | Available 03/15/2017 5pm EST | Available 03/15/2017 5pm EST | Pending |
| NS13 - Transfer Crane Girder & Longitudinal Bldg Bracing Dsn | 3/27/2017 7:00:00 PM | Handouts | Available 03/29/2017 5pm EST | Available 03/29/2017 5pm EST | Pending |
| NS13 - Buildings Envelope and Bracing Design | 4/3/2017 7:00:00 PM | Handouts | Available 04/05/2017 5pm EST | Available 04/05/2017 5pm EST | Pending |

8-Session Registrants

Night School Resources

- Weekly “quiz and recording” email.
- Weekly updates of the master quiz and attendance record, found at www.aisc.org/nightschool26. Scroll down to Quiz and Attendance records.
 - Updated on Friday mornings.



8-Session Registrants

Night School Resources

- Webinar connection information
 - Reminder email sent out Tuesday mornings
- Links to handouts also found here





AISC | Thank you



Smarter.
Stronger.
Steel.