



**UNIVERSITY
PROGRAMS**

PowerPoint Slides: Basics of Steel Connection Design

Instructions for Instructors

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Overview

Steel connection design and detailing is an important aspect of structural design that often does not get very much attention within the steel curriculum at many universities. These materials aim to provide resources for instructors to include within their curriculum, with emphasis on simple (shear) connections.

This teaching aid contains PowerPoint files for instructors to use as lectures during class. These slides are intended for structural engineering students, but portions can be used for construction management and/or architecture students as well.

This document provides an overview of the content and organization of the slides, as well as suggestions for implementation in the classroom. We hope that you find these slides to be helpful in your class!

Module Content

There are three modules, and each file includes slide notes that provide talking points for the instructor as well as background information for most slides.

1 – Introduction and Basic Principles – This module begins with introductory information on connections: the concept of load paths; basic definitions of connections; overview of the AISC provisions for connections; and introduction to connection types (tensile, compressive, shear, moment). It then walks through limit states using a tensile connection example. No numbers are used but the example works through the load path and shows examples of limit states and the equations for the different types of limit states that can occur. The intention of this approach is to give students exposure to the limit states and the concept of connection load paths without bogging them down with specific numbers. Finally, additional limit states that present in the tensile example (such as eccentric bolt/weld groups, prying action, Whitmore section, etc.). If you plan to cover connections more briefly, it is recommended that you remove the “Additional Limit States” section.

2 – Connection Basics: Bolts & Welds – This module discusses basic background information for bolts and welds. Bolt information includes grades, connection types, installation methods, bolt sizes and hole sizes, and dimensional limitations. The weld information includes weld processes, weld types, dimensional limitations, and weld symbols for drawings.

3 – Constructability Considerations – This module discusses various aspects of constructability, including bolt inspection and weld safety and inspection. It also introduces some other connections that are important to constructability, such as base plates and splices. Basics of erection and fabrication tolerances are discussed, followed by some best practices for ease of constructability.

Note: This slide set originally included six modules. Due to the volume of material generated, only three modules are available at this time. If you would like access to the other modules

which includes design of shear connections in much more detail, as well as basics of moment connections, you may email Rachel Chicchi (rachel.chicchi@uc.edu). These additional modules are listed below. Please note that they have not been technically reviewed by AISC.

- 4 - Connection in Tension: Example
- 5 - Simple Shear Connections
- 6 - Moment Connections

Intended Audience

These slides can be used in an undergraduate or graduate steel design class, depending on the availability within the course curriculum. Modules can be cut to cover pertinent topics as deemed necessary by the instructor.

All three modules in this set can be adapted for students in civil engineering, architecture, and construction management courses. Note that Module 1 (Introduction and Basic Principles) is intended for structural engineering students, as it includes an overview of AISC provisions and limit states.

Estimated Durations

Below is a list of estimated course time needed to cover the content in each of the slides (with the assumption that one class is approximately 50 minutes long). Again, the slides can be tailored to fit your specific needs. In this case, we felt that providing more content would be helpful and it would be easier to cut back material than to add additional material.

- 1 - Introduction and Basic Principles (4 classes)
- 2 - Connection Basics: Bolts & Welds (3 classes)
- 3 - Constructability Considerations (2 classes)

Code/Provisions

These modules were created in 2020-2021 so they reference the following codes and provisions:

- AISC *Specification for Structural Steel Buildings* (ANSI/AISC 360-16)
- AISC *Steel Construction Manual*: 15th Edition
- RCSC *Specification for Structural Joints Using High-Strength Bolts*: 2020

Note that the 15th Edition of the AISC Steel Construction Manual includes the 2014 version of the RCSC *Specification for Structural Joints Using High-Strength Bolts*. An updated version was published in 2020, which includes updated bolt group classifications. In order to give students the most up-to-date information, we have chosen to include information from the 2020 RCSC instead of 2014 as part of these modules. For those wishing to teach from the RCSC 2014, notes are provided in the slides to distinguish changes between the two editions. It is our hope that these modules will be maintained and updated within reason with each updated code change.