Expert Stories

Moment Connections: Wide flange to HSS Column by SCADD, Inc.

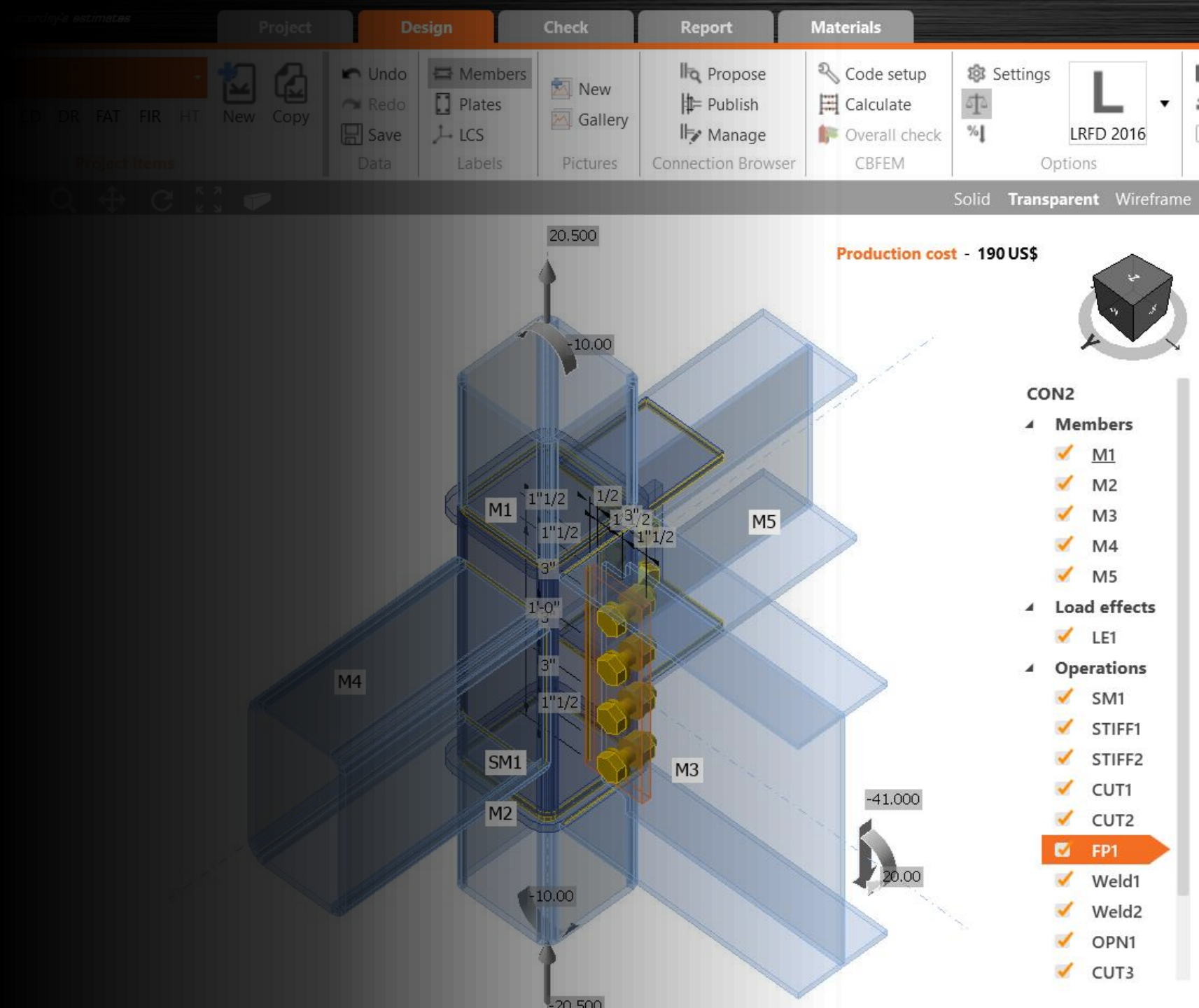
February 22,2023
12 pm EST

SCADD INC

IDEA StatiCa®
Calculate yesterday's estimates

Agenda

- Introduction
- IDEA StatiCa used in Residential project
- Model, analysis and results of moment connections Wide flange to HSS column
- Q&A



SCADD INC

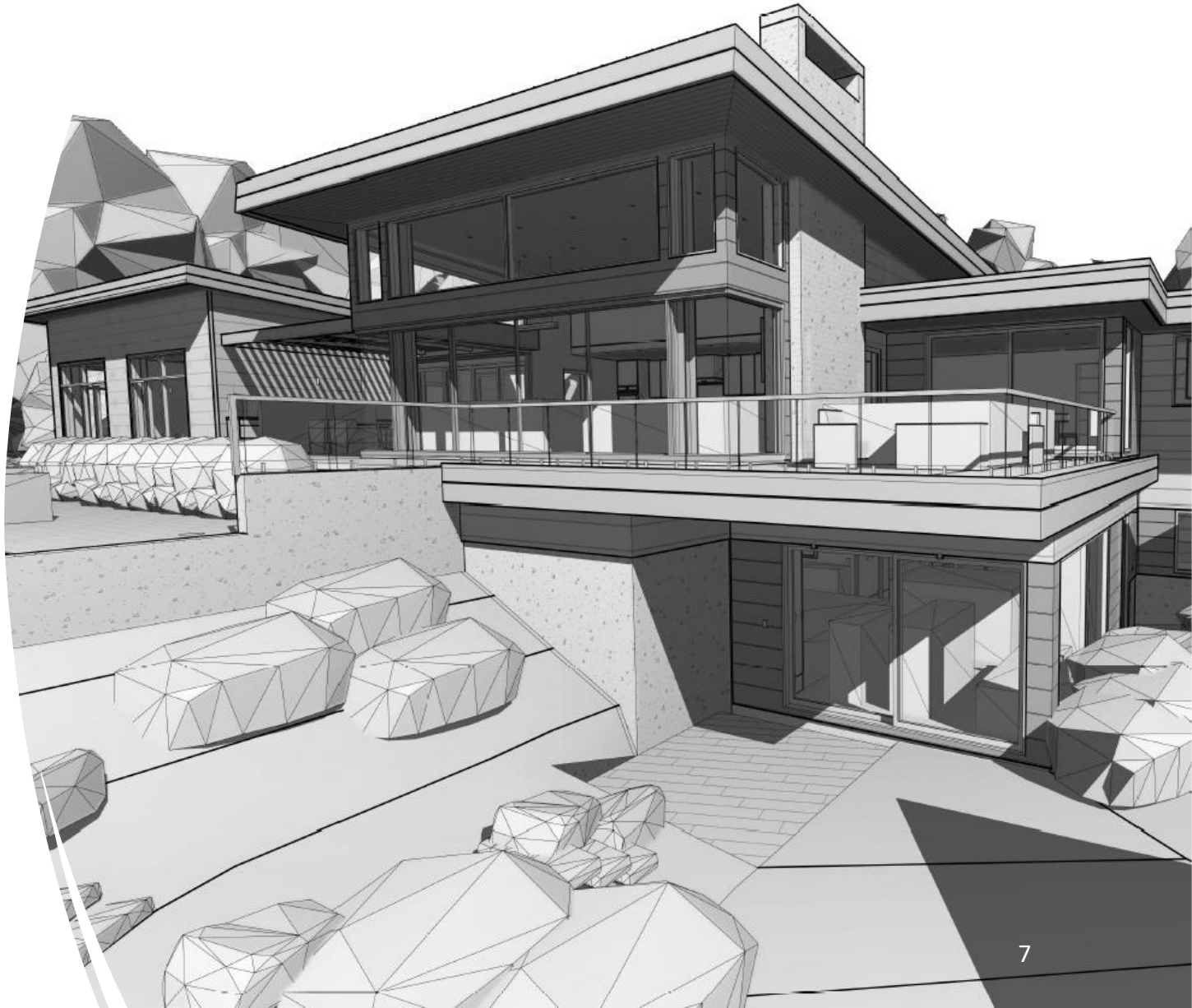
www.scadd.com

Bringing Structural Engineering Expertise
To The Construction Industry For Over 25 Years

Founded in 2003 by William B. Supino, P.E.,
SCADD, Inc. has achieved recognition for design excellence in an extensive range of construction design projects, including; commercial, industrial, educational, multi-use and much more.

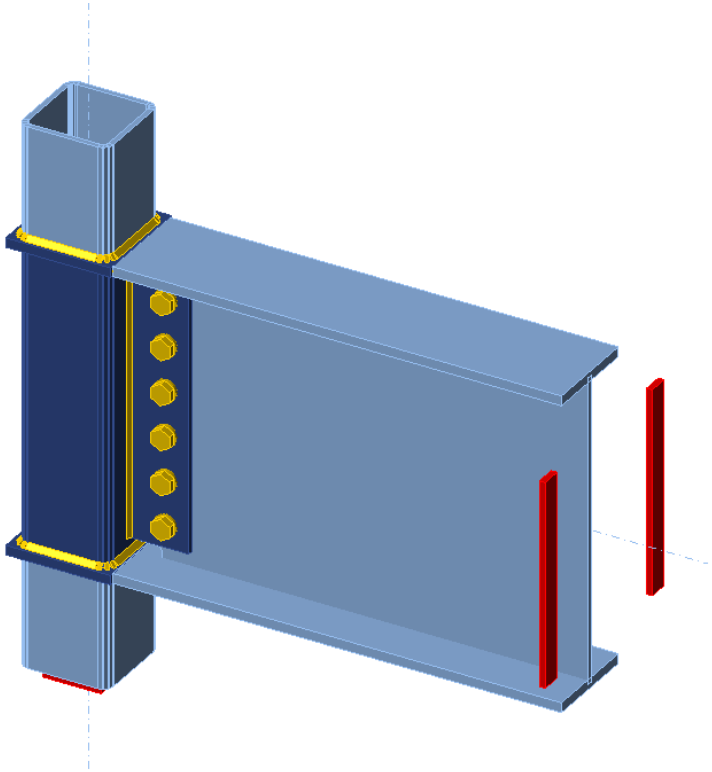
Residential project

- Location: New Hampshire
- Summary of the project: High-End modern residential project in the style of a cantilevered “Frank Lloyd Wright” home.
- SCADD – Structural design

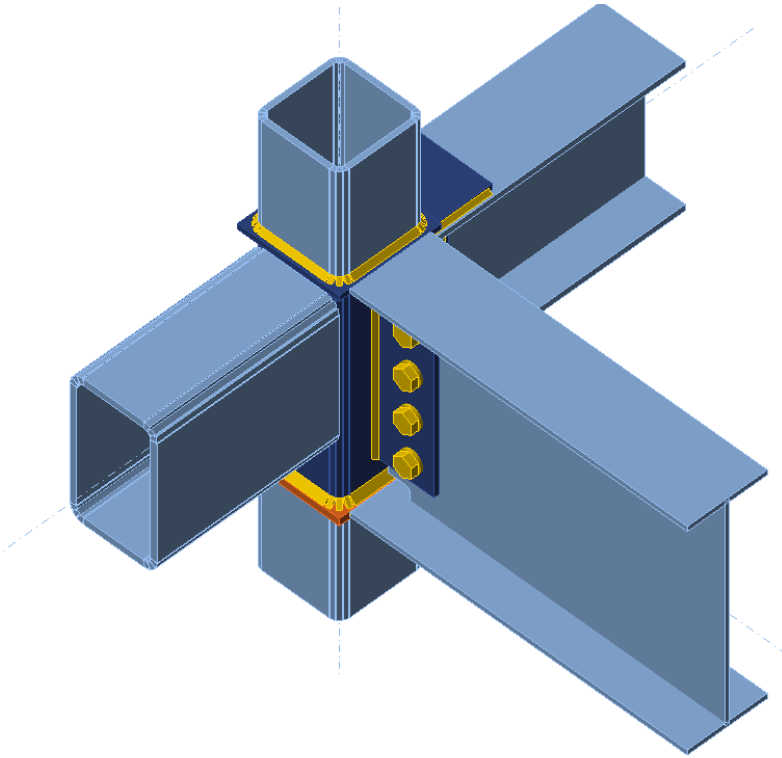


Live demo

CON 1

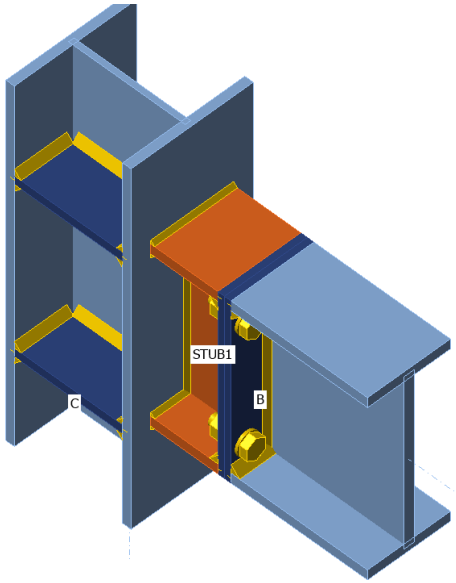


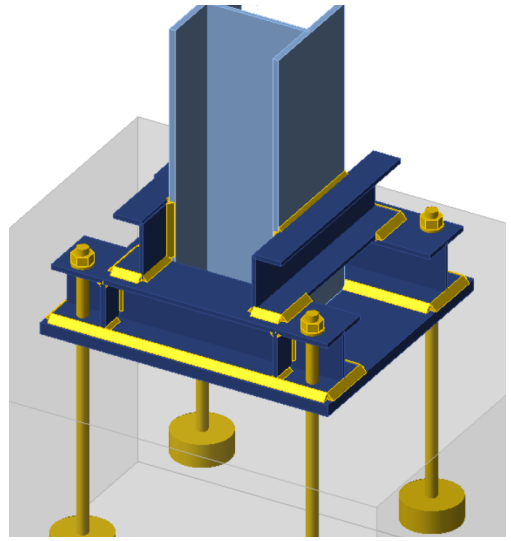
CON 2

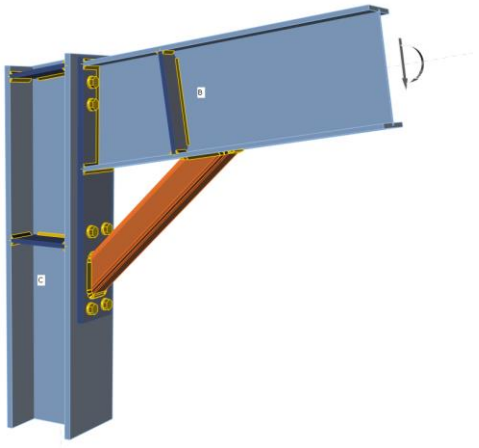


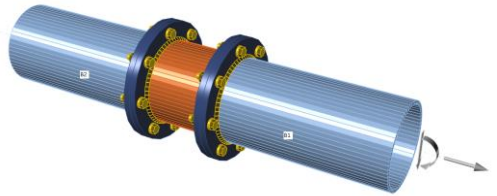
Stiffening member operation

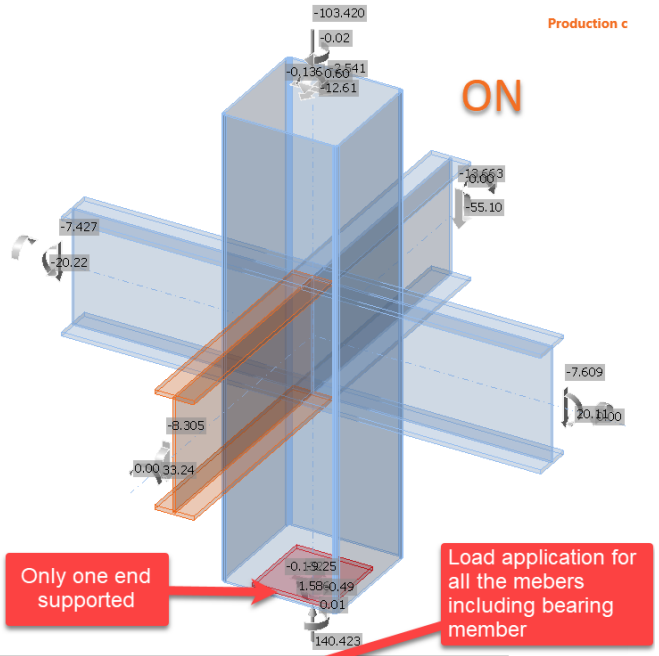
- Stiffening members are used to simulate a joint element with cross-sections.
- The basic difference between a standard member and a stiffening member is, that we can not input any internal forces on the stiffening member.
- A stiffening member is not a part of your original FEA 1D member analysis model.











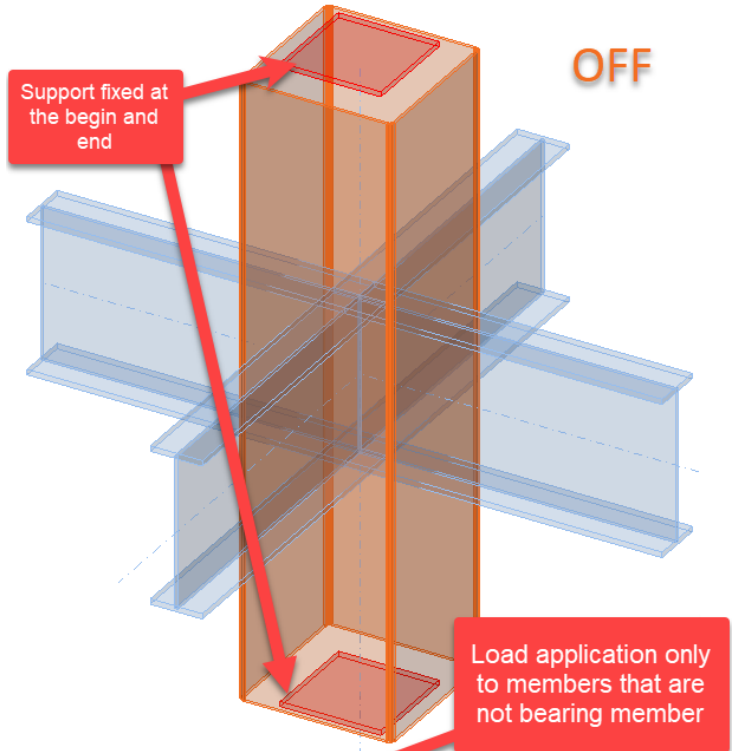
160:S7 [Load]

	Member	N [kip]	Vy [kip]	Vz [kip]	Mx [kip.ft]	My [kip.ft]	Mz [kip.ft]
>	M242 / Begin	0.000	0.000	-7.427	0.00	-20.22	0.00
	M175 / Begin	140.423	1.586	-0.132	0.01	-0.49	-9.25
	M175 / End	-103.42(	-2.541	-0.136	-0.02	0.60	-12.61
	M238 / End	0.000	0.000	-8.305	0.00	33.24	0.00
	M243 / End	0.000	0.000	-7.609	0.00	20.11	0.00
	M2662 / Begin	0.000	0.000	-13.663	0.00	-55.10	0.00

Unbalanced forces

X [kip]	Y [kip]	Z [kip]	Mx [kip.ft]	My [kip.ft]	Mz [kip.ft]
0.268	-0.955	0.000	0.00	0.00	-0.01

Joint statics check



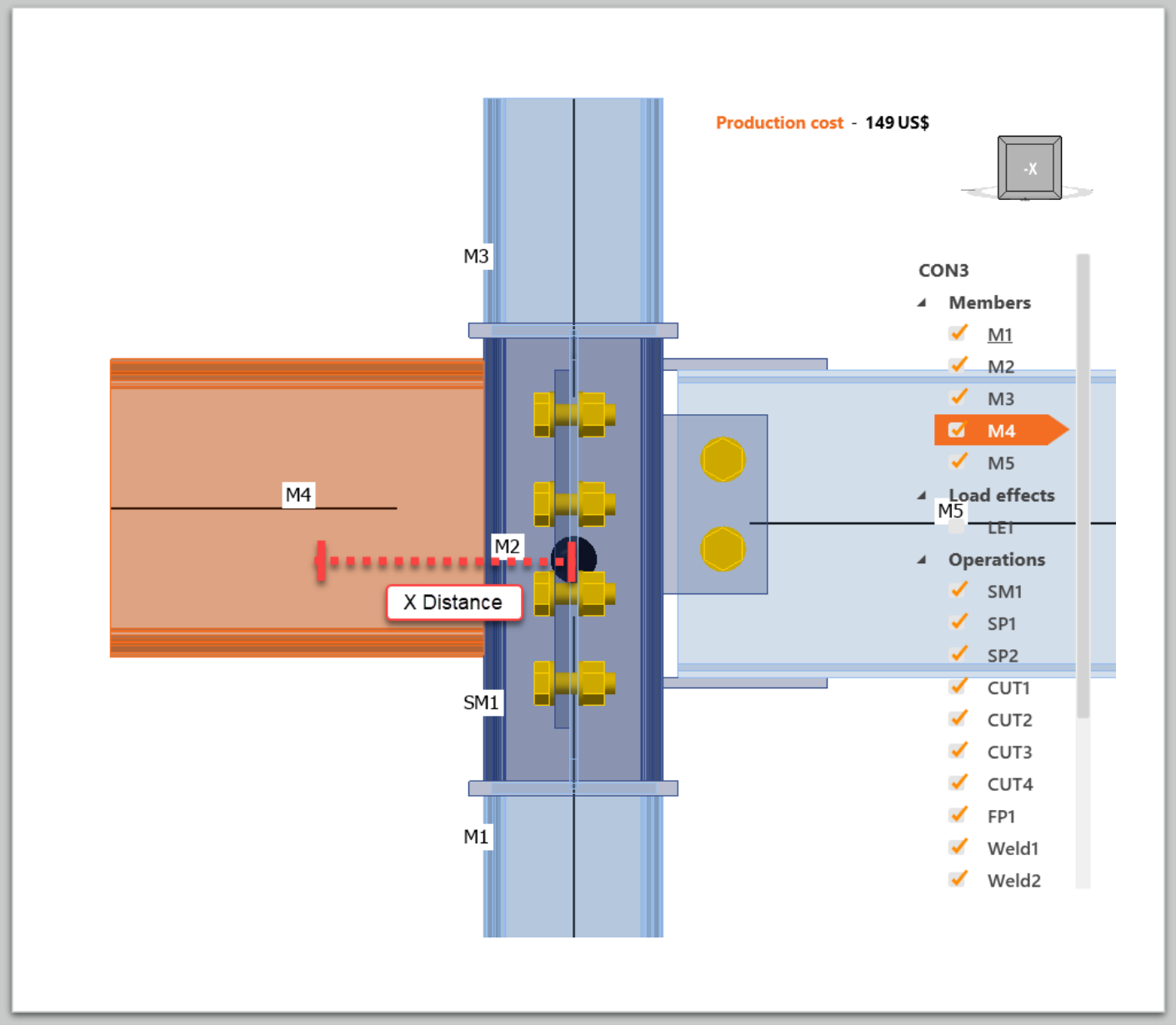
160:S7 [Load]

	Member	N [kip]	Vy [kip]	Vz [kip]	Mx [kip.ft]	My [kip.ft]	Mz [kip.ft]
>	M242 / Begin	0.000	0.000	-7.427	0.00	-20.22	0.00
	M238 / End	0.000	0.000	-8.305	0.00	33.24	0.00
	M243 / End	0.000	0.000	-7.609	0.00	20.11	0.00
	M2662 / Begin	0.000	0.000	-13.663	0.00	-55.10	0.00

Loads in equilibrium: On/Off

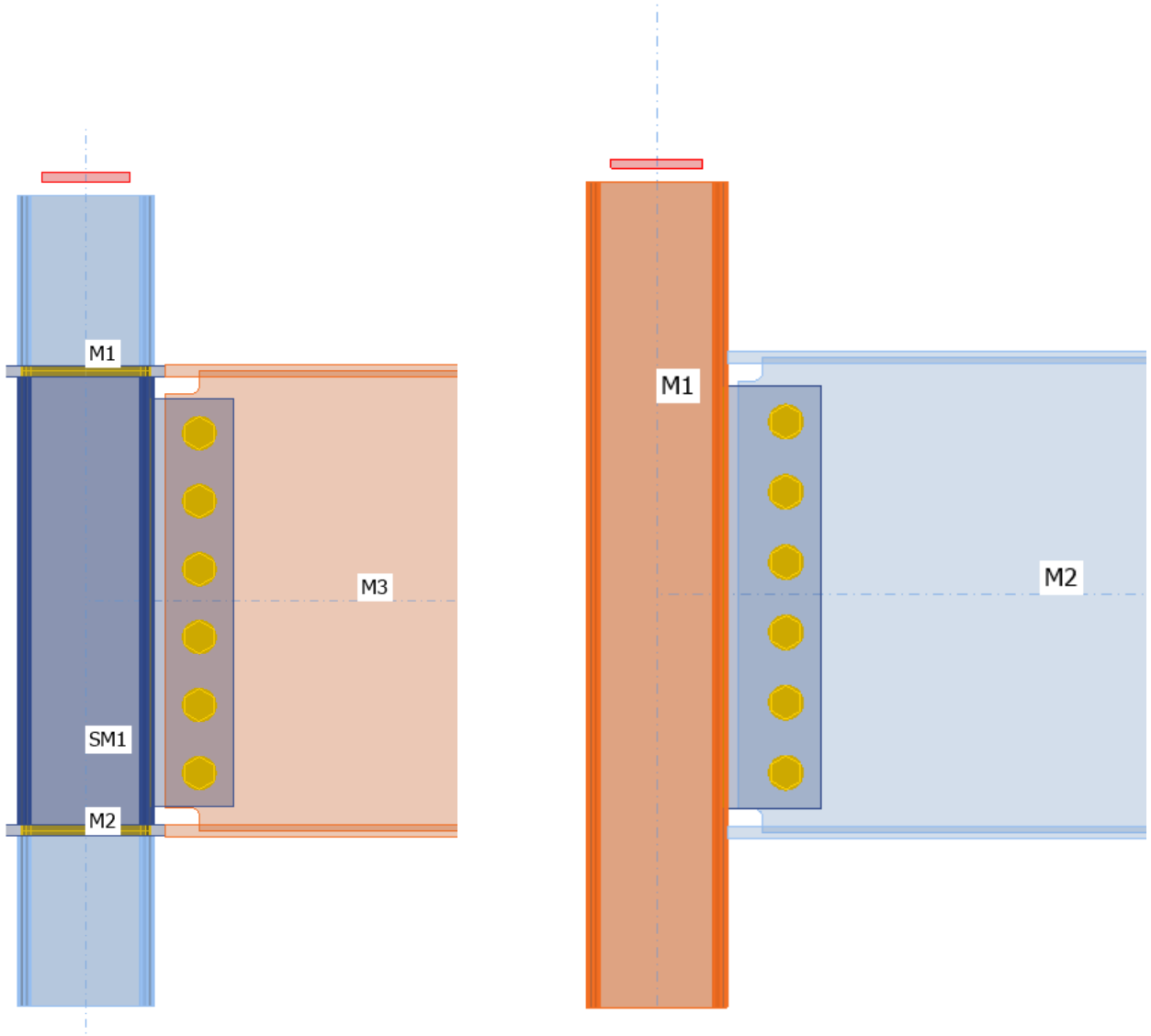
Load position

- Distance along the member to indicate the load position
- Distance is taken from the starting point of the member



Why modeling the stub?

- To verify:
  - Continuity
  - Welds at the joints of the main member
  - Plates at the top and bottom of the stub
- Recommended analysis
  - Loads in equilibrium to verify the internal stresses of the column and prove that the stub will work ok



Conclusions
Q&A

Coming next…

- How to load a connection? – March 29
- Stiffness analysis – April 26
- Concrete Detail application – May 31