Q: Where can I find a copy of the slides?

A: You can download a PDF copy of the slides from our website. You can also download a recording of the full presentation on our website and view the short video on rope effect on YouTube.

Q: Do you have a CLT Connection Guide for use with EC5?

A: The upcoming Design Guide will only be for USA according to the NDS. Soon, we will have the same guide available for design in accordance with CSA O86.

Q: In the video that demonstrates rope effect, a fastener is shown with its head end set out and then pulled in to engage the head. I assume that the screw was not a fully threaded fastener, but a partially threaded one. Is that right?

A: Yes, the fastener shown in the video is a partially threaded washer head fastener (ASSY SK). The threaded part of the fastener is completely embedded in the main member, so no axial resistance is assumed for the side member until the heads start to engage. The head pull-through capacity will then force the rope effect, which is why we could see the gap close.

Q: What is the relative ductility between a screw at right angles in failure mode IV versus screws installed at an angle where the axial effect is large?

A: We will see very high initial stiffness for fasteners installed at an angle compared to fasteners in pure shear, which show more ductile behaviour. In ultimate stages we will see only very small deformations (about 1/8"), whereas with fasteners in pure shear, an ultimate displacement of 2" and more is possible. Compared to steel and concrete, there is less information available concerning the ductility in timber structures. Therefore, there is no established method of quantifying ductility and we must consult empirical data.

Q: Is the American Wood Council looking into adding capacity to connections to account for the rope effect in future editions of the NDS?

A: We do not know about this. However, the Yield Limit Equations apply great conservatism with large safety factors, therefore inclusion of the rope effect would make sense. The rope effect in the NDS is conservatively ignored, more on this can be read in Technical Report 12 (TR 12) section 2.1.1. Knowing axial resistance values like head pull-through, withdrawal and fastener tensile design values from our ICC evaluation reports, we can determine a more precise prediction of the strength contribution through axial resistances. We are generally open to investigate further research in this direction.

Q: How do I get continuing education credits for P.Eng? Is there a review test?

A: Unfortunately, we do not offer continuing education for our webinars yet.

Q: In all your illustrations, you show a fastener positioned perpendicular to the members being fastened. What would be the results if the fasteners were inserted at a 45-degree angle, and/or, inserted at alternating 45-degree angles?

A: If the fastener is inserted at an angle to the shear plane, the characteristics of the connection change significantly. Depending on the fastener type used, significant capacity and stiffness increases will occur. We will address exactly this case in one of our next webinars.

Q: Are there adjustments for fasteners in a lateral application?

A: All adjustment factors for dowel type fasteners need to be considered, including adjustment factors C for the NDS (Table 11.3.1) and modification factors K and J in accordance with CSA O86, (12.2)

Q: Did you discuss cyclic loading?

A: We have conducted various tests on cyclic loading. Whitepapers on this loading scenario can be downloaded on our website.

Q: Is there an ASTM Standard for testing the bending yield strength? Or is it based on a calculation method?

A: Testing methods for obtaining bending yield strengths are outlined in AC233 and ASTM F1575.

Q: The rope effect would seem to be activated only after significant slippage occurs, but in US practice, capacities are often set based on keeping movements small. How would the adoption of rope effect benefit?

A: This is correct, and in the video we show exactly this. The screw head was left proud of the timber surface on purpose to show how the fastener is pulled in. If the screw head is driven flush, it will engage the wood fiber right away and reduce slip, possibly even creating higher overall stiffness. Using fully threaded fasteners may increase both overall ultimate capacity and stiffness likewise.

Q: Is there a quantification of the decrease in ductility caused by the 'rope effect'?

A: The rope effect can have considerable influence on the ductility of the connection, and since fully threaded screws are optimized for axial loading, large ultimate ductility ratios can be achieved using fully threaded screws in shear. Similar to connections with inclined screws, axial forces in the screw produce a normal force between the members. This normal force generates friction, which further increases connection strength while decreasing ductility. At this point however, it is relatively hard to estimate the exact decrease in ductility.

Q: On CCMC 13677-R, only the withdrawal resistance and lateral resistance are prescribed in equations. I've noticed that some ETA provisions also include axial buckling. Do you have guidance regarding this axial compressive capacity?

A: There are a few different approaches for this. One for instance uses the allowable fastener tensile strength *0.8 and specifies this as the compressive resistance. The other option would be to do actual testing and determine the exact buckling resistance. For now, the first mentioned approach shows enough conservatism. The CCMC reports do not include this yet.

Q: Will you be covering ASSY screws going in pairs at 30~45 degrees as shear connections in the upcoming webinars?

A: Yes, fasteners installed at an angle will be the topic of one of the upcoming webinars.

Q: What happens if the diameter is too thick for the wood?

A: All timber members should always comply to the specified end and edge distance requirements. This is typically a multiple of the fastener diameter or a minimum penetration length, for instance 6D where D is the outer thread diameter. This minimum member thickness avoids splitting and allows us to develop the fastener capacity. More info on these requirements can be found in the Structural Screw Design Guides on our website.

Q: What typical failure load / design load ratio do you see in test connections?

A: This really depends on the connection we are looking at. The ratio varies between a factor of 3 and 10: 3 being on the lower side where steel (i.e. tensile resistance of the fastener) controls, 5 where wood (i.e. withdrawal resistance failures) controls and 10, where we need to do work on a more precise design model, as a safety factor of 10 indicates that the design method is not quite matching the reality.

Q: How do I get a copy of the design guides?

A: Please follow the direct download link here:

Structural Screw Design Guide US Edition

Structural Screw Design Guide CAN Edition

Q: Interesting overview of the different codes - The large lateral capacity (1500lbs) value obtained for the EC5 calculation seems too high - the 'd' used for EC5 is 1.1 x root diameter, not the outer thread diameter. These rules can be seen in 8.7.1 of EC5 (laterally loaded screws)

A: That is correct for the general approach outlined in EC5, however for proprietary systems like self-tapping wood screws, certain ETA approvals allow the use of the outer thread diameter. Please refer to the ETA-11/0190 report for ASSY screws section A.1.2.1.

Q: Does the head of the screw also contribute to the axial force between the members?

A: Yes, this capacity is the so-called head-pull through capacity. Tested fastener capacities can be found in the Structural Screw Design Guides on our website.

Q: Do your design guides include the rope effect?

A: The rope effect is not yet included as it is not a standard procedure for self tapping wood screws in North America.