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Continuing Education Course #219  
Repair Techniques for Metal Plated Wood Trusses  
Part 1: Introduction and Simple Repair Concepts

1. What is a truss bearing?
  - a. The direction the truss is pointing.
  - b. The location of the truss within the structure.
  - c. The structural support for the truss.
  - d. A specific connection between two top or two bottom chord members.
2. Which definition best describes a mono truss?
  - a. A Symmetric or nearly symmetric triangular shaped truss.
  - b. A roof truss that takes the shape of a right triangle, usually half or less the size of a common truss.
  - c. A roof truss with a flat region on the top
  - d. A truss that is usually placed on top of a wall and the inside members are either in a vertical or horizontal orientation.
3. What is the highest point on either the top chord or bottom chord profile?
  - a. Web
  - b. Heel
  - c. Overhang
  - d. Peak
4. What is a scab?
  - a. A member applied to the side of a wood member.
  - b. A vertical member at the end of the truss connecting the top and bottom members.
  - c. A defect in the lumber.
  - d. A triangular shaped piece installed at the heel between the top and bottom chord
5. It is generally accepted practice within the wood truss industry to attempt to repair a truss involved in a fall-down event.
  - a. True
  - b. False
6. What is a wood gusset?
  - a. A new truss that is fabricated for the repair and applied to one or both faces of the truss.
  - b. A wood sheet product such as plywood or OSB (Oriented Strand Board) that is cut to the necessary shape and applied to one or both faces of the truss.
  - c. A member that begins at the truss heel and runs for some distance below the top chord member.
  - d. An interior member of the truss that provides intermediate support for the top and bottom chord members.
7. For the purposes of this course, what are the differences between a scab truss and a spider truss?

- a. The scab truss is a one piece truss whereas the spider truss is fabricated as multiple pieces and must be field spliced together.
- b. The scab truss is designed to work with the original truss whereas the spider truss largely replaces the structural function of the original truss.
- c. The scab truss is often shorter than the span of the original truss whereas the spider truss usually must span from one bearing to another.
- d. All of the above.

8. A photograph of the damaged truss provides all of the information required to design a truss repair.

- a. True
- b. False

9. What is the most common connector for truss repairs?

- a. No. 12 wood screw
- b. 6d nail
- c. 10d nail
- d. 1/4" (6.4 mm) hex-head bolt with washers

10. What is the allowable Duration of Load (DOL) increase for floor truss repairs?

- a. 1.00
- b. 1.15
- c. 1.25
- d. 1.60

11. What does it mean to clinch a nail and what advantage, if any, does it provide?

- a. To cut the part of the nail that protrudes through the truss member and OSB gussets as a safety precaution.
- b. To bend the part of the nail that protrudes through the truss member and OSB gussets to gain a double shear connection.
- c. To install the nail at an angle greater than 32 degrees from perpendicular so that the nail does not protrude through the truss repair.
- d. It means that the nail was not driven all the way into the repair members because it was bent on the way in and the nail must be replaced to get the full connection value.

12. Practically, what is the minimum recommended spacing for nails in a roof truss repair to reduce the possibility of splitting of the wood members?

- a. 1/4" (13 mm) o.c.
- b. 3/4" (51 mm) o.c.
- c. 3" (76 mm) o.c.
- d. 5" (127 mm) o.c.

13. In Example 4-1 on page 19, 2x4 (38 x 89 mm) scabs that were 5' (1.52 m) long were applied to both sides of the broken web member when, according to the calculations, 4' (1.22 m) long scabs would have been sufficient. Why?

- a. To provide tolerance in the application of the repair.
- b. To account for the possibility that the length of the damaged region may be as much as 12" (0.30 m) in length.
- c. To dampen any vibrations that may develop in the truss member.
- d. Both A and B

14. In Example 4-3 on page 21, the development length of the OSB gussets on the right side of the damaged region was deemed to be sufficient even though the length along the top chord in that area was not long enough to develop the full load. Why?

- a. The increased stiffness of the box beam
- b. The reinforcing block

- c. The web nailing
- d. The fact that less than half of the width of the top chord was damaged
- e. All of the above

15. What is CSI?

- a. Crime Scene Investigation - to determine the cause of the repair
- b. A particular class of lumber deficiencies that includes Cupping, Splits, and Incised members
- c. Combined Stress Index which is the sum of axial and bending stress indices and should be less than or equal to 1
- d. Chord Splice Inset is the distance that the truss plate is inserted into the wood member and should be as close to 1 cm as possible.

16. What was the solution to the bowed down top chord in Example 4-6 on page 24? And Why?

- a. The web was cut, the top chord was pushed out to the desired location, and scabs were applied to the both sides of the web. This was done so the connection between top chord and roof sheathing would not be severed.
- b. Lumber scabs were applied to both sides of the top chord member to get the roof to plane out because this solution was determined to be the easiest to install.
- c. OSB gussets were applied to the top chord joint because the bow affected the plate embedment at joint 5.
- d. It was determined that no repair was necessary because the bow was insignificant.

17. In Example 4-7 on page 25, the length of the web was too short to develop the required connection. What was the solution?

- a. A lumber scab was used with high strength screws as the connector.
- b. OSB gussets were used so that the development length could be spread into the other members at joint 23.
- c. A metal strap was used.
- d. No solution was found.

18. What was likely the cause of the crack found in Example 4-8 on page 26?

- a. The truss was initially installed out of plumb and then forced into the correct position causing the crack.
- b. The truss plate crushed the wood when it was installed causing the crack.
- c. The nails from the hurricane clip caused the crack.
- d. A delivery truck drove over the corner of the truss.

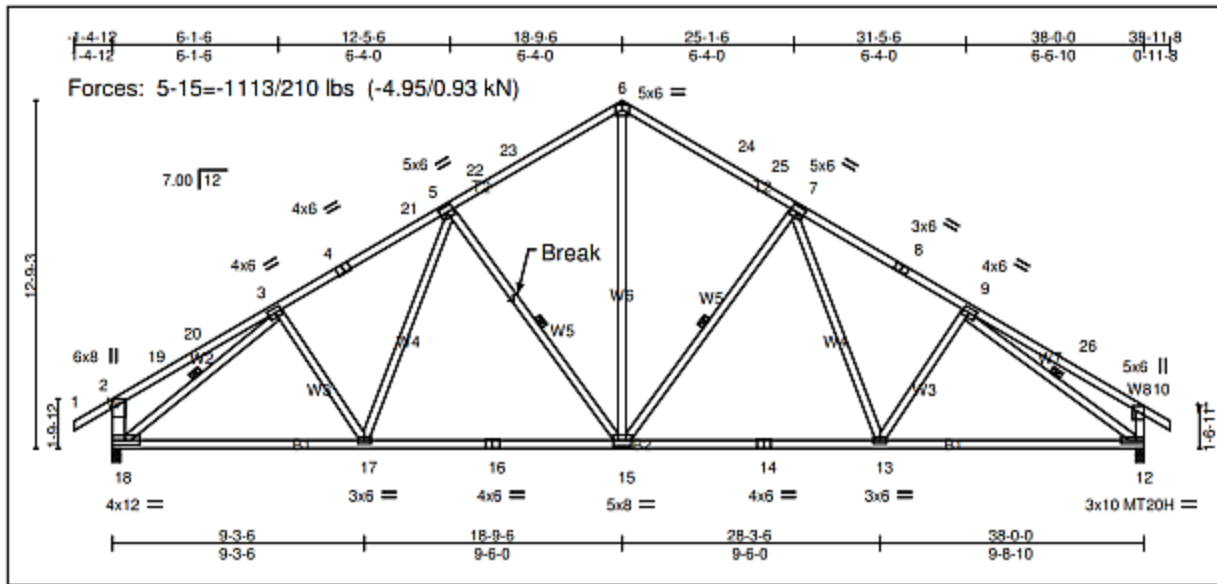
19. In Example 4-10 on page 28, why were the forces so much higher than Example 4-3?

- a. The truss in Example 4-10 was nearly three times longer than the truss in Example 4-3.
- b. The truss in Example 4-10 was a girder truss with a large point load coming from above.
- c. The truss in Example 4-10 was approximately half the height of the truss in Example 4-3.
- d. The truss in Example 4-10 was designed to support a corridor in a multi-family dwelling where the required design loads are substantially higher than what is required for a residential structure.

20. In Example 4-10, what was the purpose of repair steps 1-6?

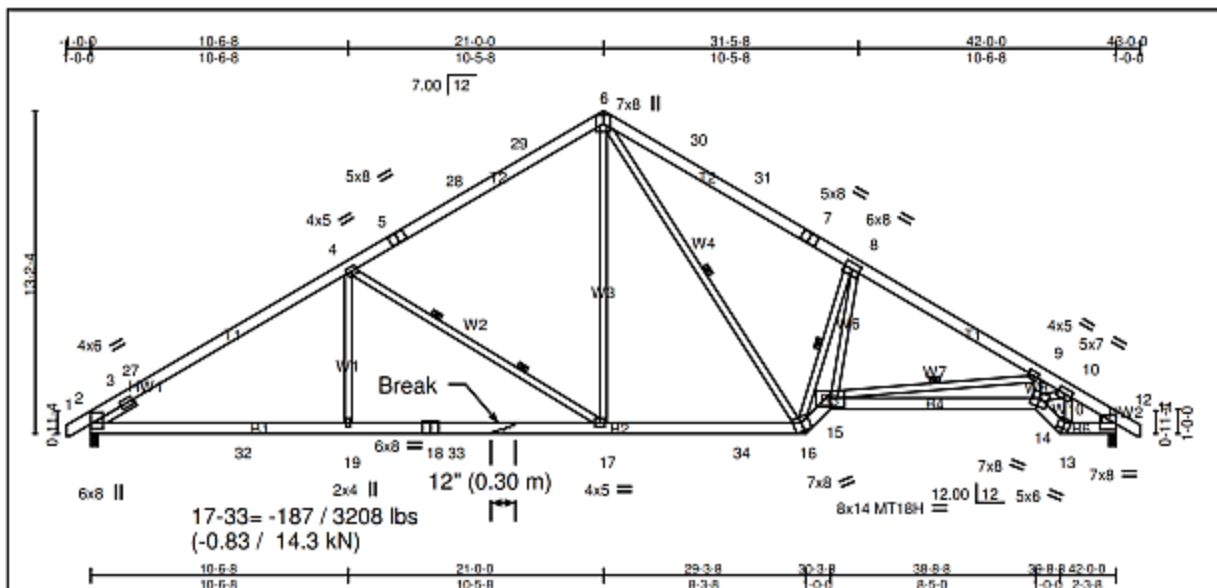
- a. To provide a surface for attachment of the plumbing that was passing through the truss.
- b. To pad out around the plumbing so that the scabs that were installed in step 7 would clear the pipes.
- c. Those steps are an alternate repair to the lumber scabs found in step 7.
- d. Those steps provide needed bracing to the truss.

21. The web identified as W5 in the truss shown has a break that is nearly perpendicular to the length of the web and near the middle of web. The web member is a 2x4 (38 x 89 mm) and is made of Southern Yellow Pine (SP) lumber. The maximum compression and tension forces in the member are respectively -1113 lbs (-4.95 kN) and 210 lbs (0.93 kN). It has been determined that 2x4 (38 x 89 mm) Spruce-Pine-Fir (SPF) lumber scabs should be applied with one row of 10d nails 3" o.c. to both sides of the truss member. Using the nail values from Table 3-1 on Page 15 and the information provided in Chapter 4, what would the minimum recommended length be for the scabs?



- a. 2' (0.61 m)
- b. 4' (1.22 m)
- c. 6' (1.83 m)
- d. 8' (2.44 m)

22. The bottom chord member is a 2x6 (38 x 140 mm) made of SP lumber and is broken between joints 17 and 33. The horizontal projection of the break is approximately 12" (0.30 m) in length. The maximum forces are -187 lbs (-0.83 kN) in compression and 3,208 lbs (14.3 kN) in tension. 2x6 (38 x 140 mm) SP scabs are to be applied to both sides of the truss member using 2 rows of 10d nails 3" o.c. Using the nail values from Table 3-1 on Page 15 and the information provided in Chapter 4, what would the minimum recommended length be for the scabs?



- a. 2' (0.61 m)
- b. 4' (1.22 m)
- c. 6' (1.83 m)
- d. 8' (2.44 m)

23. In Example 5-2 on page 32, why were the OSB gussets not centered on the joint?

- a. To avoid the attic room
- b. To avoid HVAC ductwork
- c. Because of the unusual configuration of the of the truss members
- d. The forces in the top chord member to the right of the joint were substantially higher than the forces in the top chord member to the left of the joint.

24. What is the most readily available OSB sheet size?

- a. 18" x 36" (0.46 x 0.91 m)
- b. 32" x 64" (0.81 x 1.63 m)
- c. 36" x 72" (0.91 x 1.83 m)
- d. 48" x 96" (1.22 x 2.44 m)

25. If a truss plate is missing or damaged on one side, it is appropriately conservative to assume that plates are missing or damaged on both sides of the truss.

- a. True
- b. False

26. What usually governs the size of OSB gussets on a gable truss?

- a. The forces in the members
- b. The geometry of the joints
- c. The overall height of the gable truss
- d. The top chord slope

27. What should the first step be when replacing a member that has been broken out of the truss leaving jagged pieces?

- a. Use metal strapping to wrap around the jagged pieces to make a smooth edge
- b. Pre-drill holes in the jagged pieces to allow for the bolted connection
- c. Square cut the remaining jagged pieces to provide a clean splice joint
- d. Use glue to try put the original member back into the truss

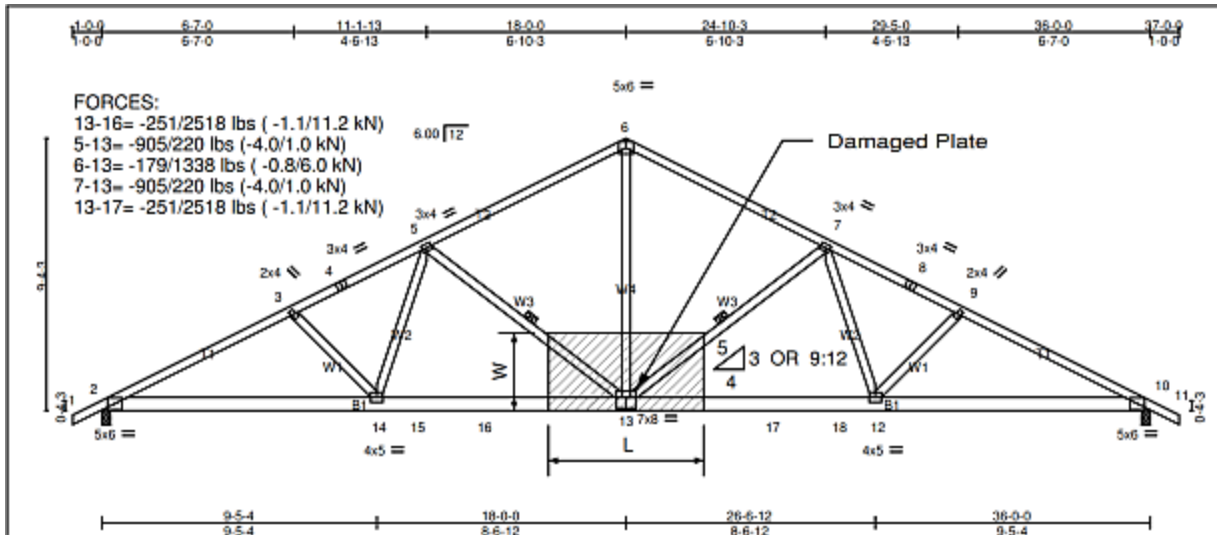
28. When a plate is pulled off leaving tooth holes in the wood and is replaced with a new plate, what percentage of the plate grip value can be claimed for the new plate in the area of the tooth holes?

- a. 0%
- b. 25%
- c. 50%
- d. 75%

29. Which statement best describes a strong-back?

- a. A strong-back is a structural member that passes through multiple trusses and acts as a beam that distributes concentrated loads to the adjacent trusses, so that no truss is overloaded and deflects more than the adjacent trusses.
- b. A strong-back is a pre-fabricated truss that is applied to one or both sides of the truss to allow for a volume ceiling modification.
- c. A strong-back is a rectangular opening in a floor truss for the purpose of allowing the passage of HVAC duct work or other utility runs.
- d. A strong-back is a replaced web member where the original member was cut cleanly close to the joint.

30. The symmetric roof truss shown below has a damaged plate at joint 13 which is also a bottom chord splice joint. The bottom chord of the truss is 2x6 (38 x 140 mm) SP allowing for 2 rows of nails and all webs are 2x4 (38 x 89 mm) SP allowing for only one row of nails for the repair. The W3 webs are at a 9:12 pitch, 7/16" (11 mm) OSB gussets are to be applied to both sides of the truss, the nails are to be spaced at 3" o.c. (76 mm), and the forces for each member are shown in the truss design drawing. Using the appropriate shear capacity for a 10d gun nail from Table 3-1 and the information provided in Chapter 5, what would the minimum recommended L and W dimensions be for this OSB gusset repair?



- a.  $W=16''$  (0.38 m),  $L=32''$  (0.81 m)
- b.  $W=32''$  (0.76 m),  $L=64''$  (1.63 m)
- c.  $W=48''$  (1.22 m),  $L=96''$  (2.44 m)
- d. The forces in the members cannot be developed in 4'x8'x7/16" (1.22 m x 2.44 m x 11m) OSB gussets, therefore scab trusses should be fabricated.

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