Roof trusses

A roof truss is an engineered building component designed to span longer distances than dimensional lumber without relying on interior partition walls for support. The most common truss, a 2x4 Fink truss, is designed to support several different loads. On pp. 66-71 of this issue, Paul Johnson and Nathan D. Young show how to build complex roofs with trusses. Whether you’re framing a new roof or remodeling an existing truss roof, it’s important to know what components make up a truss and how it works.

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Truss performance by the numbers  In a truss, the bottom chord and the top chord are under tension and compression forces as a result of the loads on the roof. Which chord carries tension and which carries compression depends on the direction of the overall loading on the truss. The loads on the truss are generally in a downward direction, but may turn upward during extreme wind. The numbers below are the actual compression and tension ratings of a truss that has been modeled with a combined dead, live, and snow load of 40 lb. per sq. ft. They illustrate the push-pull relationships of all the truss members.

The consequence of cut webs  There is no redundancy in a roof truss, and as such, it is significantly compromised if any of its members are cut or damaged. Unfortunately, it is common to see trusses that have had webs and chords cut to accommodate attic access, skylights, or HVAC ductwork. A few cut trusses don’t necessarily lead to catastrophic roof failure, because the roof acts like a large diaphragm and because partition walls below usually pick up some of the roof loads. However, the deflection that can occur when truss members are incorrectly altered can be substantial, which can lead to damage of interior finishes and materials.