



**STAY SAFE! >>>**

By MICHAEL L. SMITH

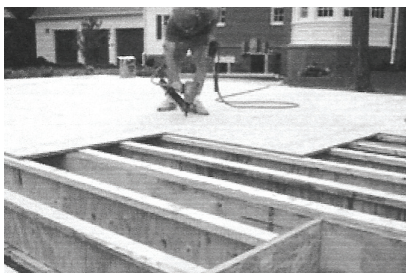
# Engineered Floor And Roof Joists

## Red Flags for Emergency Responders

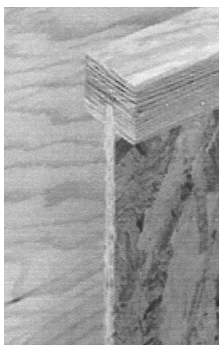
**W**hen we talk about wood framing within the Type V, wood frame, or Type III, ordinary construction, we usually use the terms conventionally framed or light-weight-truss construction methods. The conventional framing uses solid pieces of wood of varying dimensions (size and spacing according to your codes) to carry the weight of the structure from the roof line to the ground. This method has been in use for centuries.

The mass use of trusses in this country, especially for residential use, came into vogue after World War II. This was allowed for two reasons. After the war, approximately 12 million returning veterans wanted the home of their dreams and the use of performance codes permitted the forest and construction industries to introduce the use of trussed assemblies. The forest industry simply could not supply the required felled trees needed and the construction industry had become more mechanized and therefore could produce faster. The change from specification codes where the Authority Having Jurisdiction (AHJ) delineates exactly how an assembly will be constructed, including methods and materials, to performance codes, where the builders demonstrate how their way meets the requirements differently than what was specified, has had a dramatic impact on the safety of firefighting personnel.

Trusses are now referred to in the con-



Photos from author's collection



Joists must be covered perpendicularly with roof or floor substrate to stay strong.

Flanges have grooves cut into them to receive the web. The entire assembly is dependent on the strength of the glue.

struction industry as engineered products. They had consisted of a top and bottom referred to as chords and these were supported by smaller dimensioned pieces of wood arranged in geometrically shaped assemblies. The common identifying cues for assemblies within a building are if you see geometric shapes, suspect an engineered or trussed design. The varying pieces of the assembly were attached as one with the use of gussets. Originally, these gussets were constructed of plywood and adhered to the varying members with nails and glue. This method evolved into lightweight metal gussets that penetrated the surface of all wood members approximately 1/8 inch, or roughly the depth of a match head.

Trusses have now evolved further into products with brand names such as TGI, I-joist or TRU joist. These "systems" consist of a top and bottom "flange" with a plywood or oriented strand board (OSB) web. More manufacturers are using OSB for its economic strengths. The flanges are grooved (dados) to receive

the web and the assembly is held together with glue. The flanges can be solid sawn wood (dimensioned lumber – i.e., 1x2, 2x3 or 2x4) or manufactured from laminated plies with field splices (finger joints). They conform to the Engineered Wood Association's performance standard PRI-400. These assemblies are lightweight and easy to manipulate in the field. They can also be cut in the field as long as the flange still rests on its support and not the web.

The joists come with a few cautions for the carpenter:

1. Do not carry the assembly flat
2. Block between the joists
3. Do not stand or place loads on joists if they have not been covered with underlayment or sub roofing panels
4. Do not allow for the joists to become exposed to moisture

These cautions should raise very large red flags for emergency responders. The joists are fine against gravity for floors and roofs not exposed to fire, *but* when exposed to fire, all bets are off. Solid-wood members (conventional framed) ignite at approximately 300 degrees Fahrenheit and will continue to diminish at the rate of one-quarter inch per hour at that temperature, according to the National Fire Protection Association (NFPA).

Don't bet your life on "engineered" joists used for floors and roofs using the same time/temperature curve. They will fail when either the flanges lose their grip with the web or the web disintegrates. This will happen much faster than with solid-sawn materials.

The safest, most effective way to combat fires in buildings that contain these assemblies is if you suspect that fire is impinging on them, stay out and fight the fire with bigger lines from the outside. Structural failures are predictable, the same as flashovers, and we have killed enough firefighters illustrating these points. Stay safe!



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