

Know your enemy: Disposable structures

Lightweight wood frame structure fires are among the most dangerous types of incidents for firefighters

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Photo Gary Bowker

Today's lightweight wood frame structures include commercial buildings which can be massive in size, creating huge un-sprinklered void spaces with the entire structure being wrapped in foam insulation.

Today's residential structure fire is not your daddy's residential structure fire. Today's lightweight wood frame structure is burning faster, failing sooner, and often doing so with tragic results, much quicker than traditional wood frame structures built in years past.

In just the past few months we have seen three separate fire incidents in Fargo, N.D, Coatesville, Pa., and Harrisonburg, Va., that have involved large wood frame apartment buildings, which resulted in close calls and firefighters being injured.

Each of these incidents occurred in lightweight wood frame "disposable" structures. As the OI Professor, the late [Francis Brannigan](#) taught "The Building is your Enemy, Know your Enemy." Today the lightweight wood frame structure fire is the enemy. It has evolved into one of the most dangerous types of structure fires you will encounter.

A fire in today's lightweight wood frame structure is a structure fire on steroids and can devastate anyone and anything in its path, including unsuspecting firefighters. To understand why this is occurring, we must first look at the history of wood frame construction in our country and define what a "disposable" structure is.

We must know where we have been in terms of construction and culture in the American fire service in order to understand and appreciate where we are going. Fire officers must understand the nature of the risk we face in order of effectively managing it.

Origins of the constructions

Wood frame (Type V) construction has been used extensively in this country since the 19th century for homes and businesses. During the great American expansion westward, many prairie towns were built exclusively of wood frame material.

Lumber was plentiful and cost effective but the fire problem it posed was significant. As building and fire codes evolved, Ordinary (Type III) construction usage increased for business and industrial use. Quick recovery after a fire was essential for economic survival. Most homes though continued to be built of wood frame construction well into the 20th century.

It is essential to understand that wood frame structural members used in home construction during that time period utilized full dimension lumber, which yielded more mass for structural support during a fire. Floors and roofs were typically built using a minimum dimension of 2 x 8 and 2 x 6 inch solid wood. The walls and ceilings were typically covered with plaster and lath, giving the structure reasonably good resistance to a room and contents fire.

These structures were built to last a lifetime and could survive a moderate to serious fire, generally speaking. Typical fire loads used during that era consisted mainly of natural materials for furnishings and contents, which continued into the 1950s.

It was also during this time that traditional aggressive interior firefighting operations were becoming well established or "hard-wired" into our fire service culture. However, in the 1970s, a significant shift began to occur in the wood frame construction dynamic, with the introduction of smaller 2 x 4 inch lumber use in floor and roof truss support systems.

With the use of smaller dimension lumber in structural supporting systems, "lightweight" construction was born, and has continued to evolve into lighter, cheaper materials with less mass for structural support. Less mass means quicker failure. The combustibility of lightweight building components has also greatly increased from those used in traditional wood frame construction.

The vast majority of new homes and apartments, fast-food restaurants, hotels, and commercial buildings constructed in the past 20 years are lightweight wood frame. Lightweight or engineered wood frame support systems include smaller than 2 inch dimension wood products that are not solid lumber.

Glued and finger-jointed wooden trusses, and Truss/Joist I-Beams (TJIs) made of wood chips or particle board that are pressed together with combustible adhesives to eliminate waste, are commonly found today.

In addition most of these newer wood frame structures are wrapped in synthetic insulating material, which adds to the fuel load, speed, and toxicity of a fire. Wood frame structures today are not built to last like the wood frame structures were prior to the 1970s. Today's wood frame structure is "disposable."

Much in our society has become disposable, from diapers to appliances to homes. Time is money and less material and waste is money. So it should come as no great surprise as to why this has occurred within the building industry.