

New CONNECTORS and FASTENERS meet a multitude of engineering and aesthetic needs

Joe Miller



Various connectors currently available in North America.
From left to right: a) Timberlinx A475 connector with threaded lag; b) ASSY SK washer head screw; c) ASSY VG continually threaded screw; d) Fastenmaster LogHog SR screw; e) Heco Topix CC double threaded screw; f) SFS Intec WT double threaded screw; g) GRK RSS pan head screw; h) GRK Caliburn concrete screw; and i) two piece Sherpa connector

When you think of fasteners and connectors for timber structures, you typically envision black metal side plates and big bolts. While these have performed, and continue to perform in many instances quite well, innovative new products – coupled with new approaches for effectively specifying and connecting timbers – have broadened the field of viable options to meet almost any engineering or aesthetic requirement.

Today there are countless innovative connectors becoming more and more available in the North American market. For the most part, the trend in connections is towards heavily engineered concealed fasteners for a specific use. These connections increase joint performance while reducing fabrication and installation effort and cost.

One example of this is the Canadian manufacturer Timberlinx, which is a concealed steel tension connector that uses a patented wedged dowel which requires the drilling of only a small number of holes to install.

Another concealed connector, used in place of the traditional visible joist hanger, is the Sherpa, produced by the Austrian company Harrer and available in North America. The Sherpa system consists of mating dovetail plates – secured during fabrication with screws into the connecting members – which are then just dropped into

place on site.

There are many other concealed connectors that fit most situations – from simple tension and shear, to some capable of resisting bending moments

– now produced in Europe. However, at this time, most are not available in the North American market, or with English literature. As an interesting side note, concealed connectors are insulated from fire by being buried within the wood, whereas exposed steel plates and bolts may be susceptible to reductions in capacities if directly exposed to high heat.

Screwed systems seem to be the biggest advancement in the timber connection industry. The advent of long, self-tapping screws with high strength steels and heat treating have really rewritten the nature of site-installed connection. Screws are quick to install, and, with myriad of product testing conducted by manufacturers, useable in most any situation. The main difference between “new” timber screws and the old-fashioned wood screws and lags is the thread. Screws and lags traditionally relied on a limited portion of thread along the length for withdrawal (pull-out) capacity paired with a large head or washer on the other head. New screws have longer threaded length portions – usually the entire length of the screw – with a very small head (just large enough to be driven), and rely on the threads about the entire length to generate withdrawal strength.

The traditional way of using screws and lags is to install them perpendicular to the interface between members, such that the shaft of the screw/lag carries shear force by bearing against the wood grain, which is actually fairly inefficient. New screws are regularly installed at an angle to the interface, such that shear force results in a tensile force within the screw. The long-threaded shaft length on the screws is very efficient, resulting in substantially higher capacity and stiffer connections using fewer fasteners. With the relatively small shaft and head sizes, they can be installed and countersunk without any pre-drilling. These screws can be employed with mating straps and hold-downs in conventional framing and have increased capacity and stiffness when compared to traditional nailed-in-place straps.

An interesting variation on these new screws are ones that have a slightly different thread pitch for half the screw length. When installed fully, they effectively pretension the screw, and pull mating faces of timbers together. These double-pitched screws can also be used to provide an engineered solution for reinforcing notches and holes in timbers in situ.

Most of these new screws are of European origin, but are readily available in North America. Several common manufacturers include Heco, SFS, and Würth, with more and more becoming available regularly.

Advances in connection design from the specification side include the Timber Frame Engineering Council’s new design standard that allows for the use of traditional mortise and tenon joinery connected with wood dowels. Despite a resurgence in demand for this style of connection, until recently the effective specifying of these connections has been left completely to the designer or engineer.

Perhaps a more substantial change in the connection discussion, and one that provides a framework for using and applying manufacturer recommendations for the multitudinous new products, is the slow, long-term trend in design codes toward resistance design. This methodology allows designers substantially more flexibility to design connections, without reducing safety, than the few limited cases specifically outlined within the code. Ultimately, this allows for connections that better match the loading conditions and visual intent required for each specific project. 

Joe Miller, Ph.D., P.E., P.Eng, is a principal at Fire Tower Engineered Timber, Providence, RI, a firm specializing in the engineering and design of timber structures and enclosure systems, including heavy and curved timber, glulam, log, timber frame, and post & beam structures throughout North America and beyond. For more information, please visit www.ftet.com.

