



Ready-to-Install Wood Structural Framing Reduces Waste, Improves Building Efficiency and Quality

By Bob Mang

If you visit a typical home construction site today, one of the most prominent features you'll see is a large dumpster for holding construction waste. Among other items, these massive bins are often filled with wood waste from the structural framing. Framing practices have largely remained the same for decades and it's not uncommon for several feet to be left over from a single board, beam or joist after it is cut to size. Considering the thousands of board feet of framing materials needed to build a home, the waste, and associated costs, add up substantially.

For the most part, homes are framed from scratch. Builders order lumber and engineered wood products in commonly available lengths and cut the materials on site for wall studs, floor and roof joists and all other elements of the structural frame. This approach creates numerous areas for potential product waste, from the specification phase through design, delivery and installation.

To help reduce waste throughout the construction process, as well as cut down on costs, increase the speed of construction, and improve quality, more builders are using ready-to-install framing, including pre-cut and pre-built components and systems. The goal isn't just to reduce waste on the job site, but to optimize the use of materials throughout the supply channel – including manufacturers, building material dealers and builders.

Areas of Framing Material Waste in Residential Construction

- Poorly specified product (not using the right product for the application)
- Performance issues due to poor specification (e.g., bouncy floors)
- Extra product due to poor design (extraneous members)
- Excess product shipped for field trim
- Poor material management and utilization
- Extra product shipped to cover "shrink" at the job site
- Damaged product during shipping or installation
- Incomplete layout plans for proper product placement
- Incorrectly installed product

Ready-to-Install Framing

Ready-to-install framing can mean several things, each of which plays a role in reducing waste. At the most basic level, it means that builders can order packages of pre-cut, bundled and labeled framing materials for rapid installation at the job site. Building material dealers cut and precision end-trim the products, reducing or eliminating the need for cutting by the builder. Because dealers are working with a wide range of inventory, they can plan the cuts to make the best use of available materials. For example, instead of a builder cutting individual six-foot boards from eight-foot 2X4s on the job site, the dealer can cut the six-footers from 12-foot lumber, eliminating two feet of scrap from each board cut. Multiplying efficiencies such as this across the entire frame can help reduce waste dramatically.

Benefits of Panelized Construction

The Partnership for Advancing Technology in Housing (PATH) – led by the U.S. Department of Housing and Urban Development – reports a number of benefits to builders of using panelized construction techniques:

- Generate less material waste
- Reduce costs by shortening cycle time
- Decrease risk of theft and vandalism
- Reduce on-site labor time and costs and have access to a wider labor pool
- Improve quality and durability versus stick-built construction
- Reduce risk for injuries, especially from falls

At the highest level, ready-to-install framing means the use of pre-built framing components. Known as panelized construction, large floor, wall and roof framing sections are manufactured in a factory setting and installed on site using cranes. This approach allows for very careful control of the use of materials from design through product specification and construction. All of the individual members of the

frame can be planned, specified and pre-cut to ensure the maximum use of each board. In addition, panelized construction helps reduce waste by eliminating a builder's need to order extra product to cover on-site losses due to framing errors, material damage or theft.

Advances in Services and Design Software

Ready-to-install framing is made possible by a range of support services and advanced design and fabrication software tools.

Structural frame design software, in particular, has improved dramatically in recent years. While previous programs did a good job of analyzing floors, walls and roofs individually, software is now available that can specify optimized combinations of engineered wood products and dimension lumber for all parts of the frame – all in a single platform. Three-dimensional modeling, state-of-the-art CAD capabilities, and customizable design tools provide the power to track vertical loads, design structural frame members, and specify products from the ridge to the foundation. Using these tools, building material dealers are able to provide builders with an integrated framing solution – a true whole house frame.

For example, iLevel by Weyerhaeuser's Javelin® design software – powered by OptiFrame – can quickly and accurately transform an architect or builder's drawings into detailed framing layouts that specify the amounts and types of materials needed throughout the structural frame. The software allows for analysis of vertical loads across roofs, walls and floors to help ensure a strong and solid frame, while at the same time helping to avoid using more materials than needed.

Modern whole house software helps work out optimized framing solutions during the design phase, rather than during construction. The frame can be examined from all angles using detailed construction drawings and built-in analysis tools can be used to identify where there are framing conflicts. Where there are conflicts, builders and dealers can make changes before the materials are ordered, cut or delivered. The result is more efficient use of building materials, fewer framing errors, and reduced risk of wasteful and costly on-site changes to plans.

In addition, other specialized software enables building material dealers to minimize waste within their cutting activities by providing material cut packs that have been precision end-trimmed for rapid installation on the job site, and to support design and fabrication of panelized framing components and systems.

Ready-to-Install Framing in Practice

Builders of all sizes are increasingly using ready-to-install framing. One North American homebuilder that is using panelized construction in more of its homes is Toronto-based Mattamy Homes. Through a separate panel manufacturing company known as Stelumar, Mattamy Homes is substantially increasing its floor and wall panel production capacity over the next several years, with the eventual goal of using panelized components in all of the homes they build. Mattamy is Canada's largest builder – since 1978 the company has constructed more than 25,000 homes in the Greater Toronto Area (GTA).

Stelumar and other Mattamy divisions work closely with their material suppliers to make panelized construction possible. For its panelized floor units, Stelumar is increasingly using iLevel® software to take the guesswork out of framing and reduce the risk of framing errors.

Mattamy Homes reports that pre-cut materials reduce framing errors by about 50 percent. Because carpenters on site don't need to measure and cut, there are fewer mistakes, which cuts down on waste. Design software allows the Stelumar manufacturing plant to deliver materials that are pre-cut to 1/16" length tolerances. For non-panelized floor materials delivered to the job site, joists are pre-cut to three or four-inch tolerances (given the variability in tolerances for concrete-poured foundations), versus the typical one or two foot-tolerance for standard framing practices.

Reducing waste is not only good for the environment, but it is also good for builders' bottom lines. The all-in costs associated with inefficient build practices can easily total more than \$750 - for the floor system alone - on an average 2,500 square-foot home. When a builder improves their processes from having the jobsite materials delivered in standard chainsaw-cut lengths to precision end trim (PET) job-packs, they can realize savings in labor, material, disposal costs, theft, call-backs, and cycle time.

The benefits of pre-cut framing materials and pre-built frame components go beyond reduced waste and greater cost savings. Such materials provide high-quality performance and consistency, helping achieve high customer satisfaction. Mattamy Homes has experienced this first hand – the company was rated highest in new homebuyer satisfaction in the Greater Toronto Area in a 2006 J.D. Power and Associates consumer survey.

With ready-to-install framing, the days of the large construction waste dumpster at new home building sites – and at building material dealer yards – may be limited. The implications for green building are clear: Advanced framing techniques help reduce the amount of material used to begin with, as well as the amount of waste that ends up in landfills.

Environmental Advantages of Wood Structural Framing

Although other framing materials are available, wood continues to be the most widely used. Both conventional lumber and engineered wood products provide a number of environmental benefits:

Energy Savings

The Consortium for Research on Renewable Industrial Materials (CORRIM) found that wood framing used less energy than steel and concrete construction for a typical house. Wood also generated less greenhouse gas emissions than steel and concrete, and less of other air pollutants.

Renewable Resource

Wood is renewable and forests that are managed in a sustainable manner are carbon-neutral, meaning that the CO₂ a wood product emits is offset by the CO₂ that is absorbed by new tree growth. In addition, wood products store carbon during their useful life, limiting the amount of carbon dioxide in the atmosphere.

Efficient Use of Material

Engineered wood products can be made from logs that are too small for standard lumber, as well as from plentiful, fast-growing trees. The manufacturing process uses virtually every portion of every log to produce strong, straight and consistent framing members.

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About iLevel by Weyerhaeuser

iLevel is Weyerhaeuser's integrated residential framing business resulting in a seamless, unified solution for residential builders through dealers – offering a coordinated network of support for all structural framing materials. By combining Weyerhaeuser's high-quality products and services from well-known brands like Trus Joist and Structurwood, with its distribution and technology capabilities, iLevel efficiently supplies customers with all the necessary components for building the residential structural frame, and solving builder and customer needs around that frame.

About Weyerhaeuser

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