



**11 modules  
+ 8 flatbeds  
+ 3 days =**

## **1 custom-built house**

Modular used to be code for small, cheap, and boring.

Not anymore. Today's factory-built housing is designed as well, looks every bit as good, and uses the same quality methods and materials as houses built one stud at a time.

Plus, it often costs less. Here's a look at how this house went from the factory to home sweet home

BY JOE CARTER  
PHOTOGRAPHS BY JOHN GRUEN



**From boxes to beautiful.** With the foundation prepped and ready, a crane lifts and sets each module (FAR LEFT), while human hands guide their precise placement. It took one long day for the 11 boxes that made up this house to be put into place. Then came a few months of finish work: trim, shingles, shutters, and paint on the outside; paint, flooring, tile, and fixtures on the inside. When it was all done, those boxes were transformed into an architect-designed, 4,000-square-foot, Shingle-style house.

**M**Y HOUSE ARRIVED AT AROUND 1:00 A.M. on a cool March night. The scene at the job site was mildly chaotic: diesel tractors hauling long flatbeds, flashing lights, beeping back-up signals, workers shouting, floodlights throwing long shadows across a hodgepodge of large boxes. There were 11 boxes in all, some of them 45 feet long, and, come daybreak, they were going to be assembled into one enormous box—a brand-new modular house.

I had been preparing for this day for months, meeting with my partner in the project, architect Michael Stein; arranging for the excavation, formwork, and concrete pours for the footings and foundation; selecting the factory to build the boxes; and finding a contractor who could handle the “set,” or basic assembly, that would have the structure up (if not running) in just two or three days.

Along the way, I got a crash course in the benefits and pitfalls of building modular. I also learned how far factory housing has come from the ticky-tacky boxes of the past. Modular manufac-

**“When I went inside a custom modular for the first time, I said, ‘Oh my God. Why am I stick-building?’ In five days, that house can be up and watertight.”** —BRIAN DEAN, BUILDER

turers now compete at the highest levels of an industry dominated by traditional “stick,” or site-based, building. No longer tethered to their own limited portfolios of unimaginative designs and quirky floor plans, they’re willing to build just about anything you can envision, whether it’s 8 boxes for a 3,000-square-foot Colonial or 30 boxes for a grand mansion. The house on these pages is a case in point: A 4,000-square-foot Shingle-style, it was custom-built from our blueprints, with the details and finishes we specified. The results are all but indistinguishable—in quality as well as style—from a house built one stud at a time.

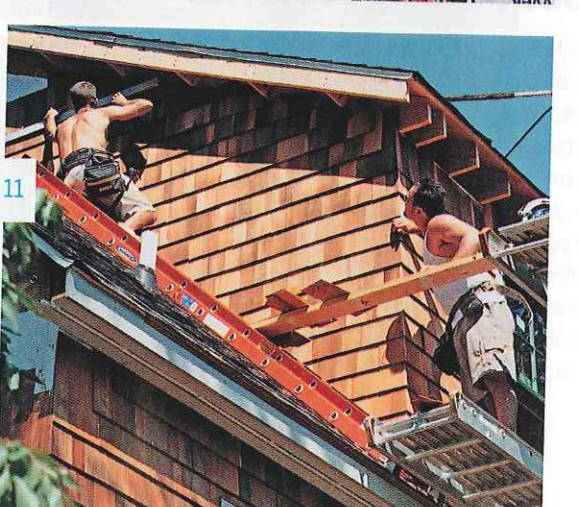
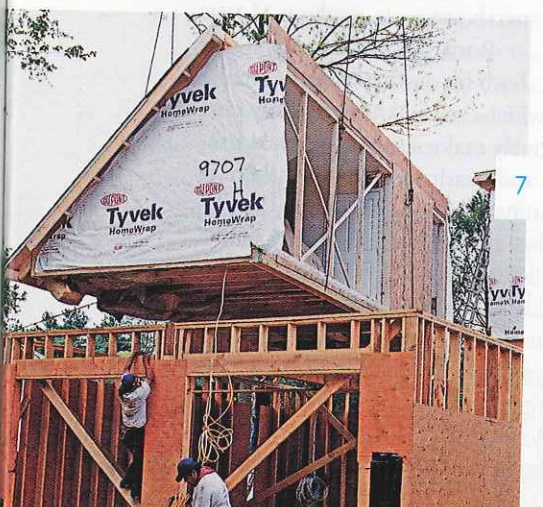
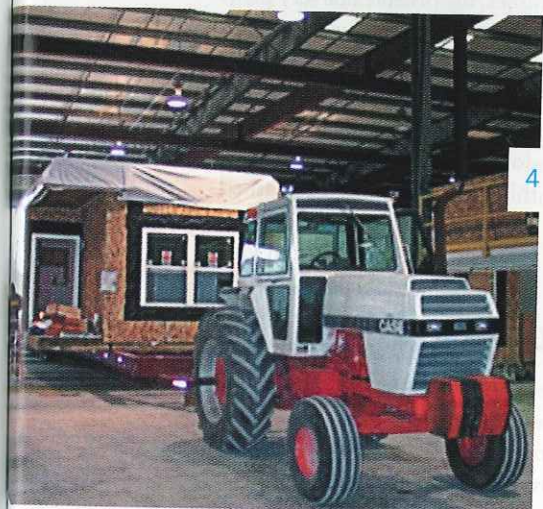
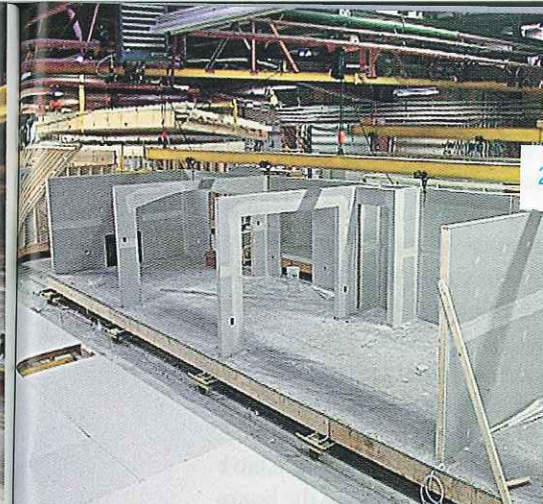
#### MADE-TO-ORDER MODULAR

“When I went inside a custom modular for the first time, I said, ‘Oh my God, why am I stick-building?’” says Brian Dean, owner of Bryan & Brian Construction in Redding, Connecticut, and a modular builder who’s been assembling and finishing boxes for more than 15 years. “These houses are built inside a controlled environment and never see a day of weather. In five days, that house can be up and watertight.”

Things move so quickly on-site because the boxes are delivered so fully finished. A modular factory is the house-building equivalent of a Detroit assembly line. Floors, walls, ceiling panels, and roof sections are all built with forms that keep everything precise, square, and flat. Openings for windows, doors, and stairs are framed just as they would be at a job site. Toward the end of the line, all the big pieces are hoisted into place and joined to form the boxes. Then come windows and doors, wiring and plumbing, insulation and drywall. You can outfit the interior with your choice of trim, flooring, tile, cabinets, and plumbing and lighting fixtures. The finished boxes are wrapped in plastic and taken out to a storage yard to await delivery day, when they’re loaded onto flatbeds and trucked to their destination. A crane stacks them in place,

online  
exclusive

For a look at how modular is helping rebuild New Orleans, go to [thisoldhouse.com/shortcuts](http://thisoldhouse.com/shortcuts)



#### Fresh from the factory.

1] Each module starts as a set of interior and exterior walls built on broad platforms and then moved down the assembly line to be joined with the floor and ceiling structures. 2] After the walls are erected, wiring, electrical boxes, and plumbing lines are roughed in and insulation is pressed into exterior walls. Then the drywall can be screwed in place, taped, and sanded.

3] Roof structures can be built to their full, upright design, but for ease of transportation, rafters can also be “hinged” and then swung up to full height after they’re placed on the house.

4] A finished module, complete with windows, doors, and weather protection, is set on a flatbed trailer and hauled outside to the storage yard to await delivery day. 5] While the modules for this house were being fabricated, the foundation and basement were being readied at the job site. Once delivered, the boxes are hoisted by a crane and put in place, then bolted to the foundation and to one another. 6] The guest room floats above the dining room on its way to being set. Each module has its own floor and ceiling structures, resulting in “double” framing between the first and second floors for greater strength and reduced noise transmission. 7] One half of the house’s playroom is carefully lowered onto the garage, which was framed on-site because of a relatively complicated connection to the main part of the house. Since the garage is unheated, insulation was factory-installed under the playroom floor.

8] Not all modules are boxes. After the hinged roof sections were raised and braced, this wall section was put into place to complete a gable end. 9] Metal straps create a rigid connection between two modules and are later hidden behind a drywall patch. 10] Some roof sections come from the factory already shingled and need only patching to complete the job. 11] When all the boxes are in place, a modular house is just another house that has to be trimmed, sided, and painted. This house has pre-oiled cedar shingles, for good looks with minimal maintenance.

PHOTOS: (1,2,3 & 4) COURTESY OF PROFESSIONAL BUILDING SYSTEMS LLC



**Finishing touches.** The living room (ABOVE) boasts a traditional stone fireplace, which was built after the module was put in place. Cabinets for the kitchen (RIGHT) were installed at the factory, ready for the stone counters, tile backsplashes, and stainless-steel appliances and fixtures.



Because the modules must travel highways, they can only be so large. In America's wide-open spaces, they can be up to 18 feet wide, 17 feet high, and 90 feet long—and that's a piece of a mighty big house. In more urban areas, overpasses and narrower roads reduce the maximum width to 14 feet, ceiling height to 9 feet, and overall length to 60 feet, which is still quite ample. In our town of Norwalk, Connecticut, we were able to have a 9-foot ceiling on the first floor but only 8 feet on the second because top-floor boxes also carry the roof structure (it's all about getting under bridges). A modular builder will be able to tell you whether you'll have a problem accessing your site or accommodating the boxes once they're delivered. Sometimes, unsolvable delivery problems alone can force a project into site-building.

#### INSIDE THE BOXES

Seeing a section of a house rolling down the road might make you think that the rooms are flatbed-shaped on the inside. Not so. In fact, modular designs can yield generous interior spaces. Getting beyond that 14- or even 18-foot limit is simply a matter of specifying that flush headers be built into the joists to preserve a flat ceiling where boxes are set side by side. The great room in the house we built, for instance, is two boxes wide, or about 31 feet.

and a "set crew" bolts them together and raises the roof. Then comes a flurry of work—hooking up electrical, plumbing, and HVAC systems, patching, painting, and installing whatever wasn't ordered from the factory.

Building for transport has its quirks. "If you've got to ship the house 400 to 500 miles on a flatbed, it's going to be built a little different," says Steve Like, chairman of the National Modular Building Council, whose members delivered some 40,000 houses last year. For example, drywall is both fastened and bonded to studs and joists. Factories use industrial-grade fasteners, in some places screws instead of nails. In addition, each box has its own floor and ceiling structures, which results in double framing between floors for greater strength and less sound transmission.

## If You're Thinking About Going Modular

Modular may be a different construction technique, but finding the factory to build the boxes and the contractor to assemble them requires the same due diligence that you'd bring to any construction project. "You want someone who's done this day in and day out," says modular contractor Brian Dean. "Plus you've got to feel comfortable with the guy; you're going to be working with him for months."

You can often find a factory through an area contractor who does modular construction. Or, if you've found a factory you like, ask for a contractor referral. In a few cases, the factory handles everything, including fabrication and finish, but most only build and ship the boxes, leaving the set to the contractor.

For more information, contact the National Modular Housing Council ([modularcouncil.org](http://modularcouncil.org)) or the NAHB's Modular Building Systems Council ([nahb.org](http://nahb.org)).

room inside for a finished attic, which can yield relatively low-cost living space. Factories also routinely make shed and gable dormers to increase top-floor space and headroom. Here or there, a small box, such as one containing a box-bay window, can be attached to a large one to produce a more interesting, articulated facade. "There are really no stylistic limitations on what a modular can be," says architect Michael Stein.

Where modular does meet its limits is with curved shapes and interior spaces that are two stories tall, or where the structural gymnastics simply get too extreme. Sophisticated software lets modular designers solve pretty gnarly structural problems, but at some point site-built framing becomes more practical. And mixing in a little conventional building isn't entirely uncommon. In ours, for example, it was easier to frame the two-car garage on-site and plop a modular bonus room on top of it. Porches, decks, and breezeways are also commonly built on-site.

When it comes to choosing things like windows, doors, and cabinets, a factory may be aligned with a manufacturer or two, or it may be willing to install whatever brand you want. The same goes for trim, lighting and plumbing fixtures, even tile and appliances.

You'll likely get a better deal if you go with factory-supplied appointments instead of buying them yourself; most builders offer a few options, at different quality levels.

Some finish elements may be best left off the order sheet. Leaving off the siding is common for all but the simplest designs, because filling in the seams where boxes meet could never be done with wood shingles or clapboards in place. Hardwood flooring can't be installed at the factory because of the need to make seamless transitions between boxes (carpeting, however, can be almost invisibly seamed). Going with factory trim and tile is simply a call based on whether the factory offers the styles or quality levels you want. The tile isn't grouted until after the house is set, though; that's one item that might not survive the road trip.

#### MODULAR TIME, MODULAR MONEY

All other factors being roughly equal, the main reason for going modular is that it's going to cost less. A big part of the potential savings comes in the form of time. Simply put, while site work—clearing, excavating, footings, foundation—is under way, the house

is already being built. If everything's properly timed and sequenced, the house could be delivered right after the concrete cures. "The factory I use takes about 12 weeks from order to shipping," says Dean. "Then, depending on the size of the house, I need 10 to 20 weeks to finish it. For a 4,000-square-foot house, it's 10 weeks."

The schedule for a site-built equivalent could be four or more months longer: the time it takes to frame, sheath, roof, plumb, wire, insulate, and drywall. Saving that kind of time will certainly save some kind of money, mainly on the interest cost of the construction loan and the cost of owning your current home or renting temporary digs. Whether the house itself will be cheaper than the site-built equivalent depends on local construction costs. The only way to be sure is to get quotes from both sides of the equation. From a modular builder, you should get a price not only for the boxes but also for the delivery and the set, both of which will total thousands of dollars. For that 4,000-square-foot house, says Dean, delivery alone would be about \$27,000, and the set would cost about \$12,000.

Paying \$40,000 just to get a house to its final destination does not necessarily make modular any more expensive than building on-site. Barring complicated prep work (such as having to carve level land out of a slope) or through-the-roof finish materials and products, it's safe to say that a nicely done modular can come in at \$200 a square foot or less—a lot less if the design is relatively simple. Here in Fairfield County, a bastion of high-priced housing, custom stick-building routinely exceeds \$300 per square foot.

When our house was finally done, wrapped in oiled cedar shingles and forest-green trim, it was, with all due bias, solid, good-looking, energy-efficient, and very livable. Since this was a house built to be sold, we got immediate feedback from brokers and house hunters. The floor plan was "normal," we heard, with a nice flow from room to room. In the end, it took 11 months from shipping our blueprints to the factory to getting a certificate of occupancy from our town's building department—about as long as it would have taken to site-build, and a good six months longer than we'd planned. Most of the delay was due to rookie mistakes, like not having the blueprints absolutely final. Our design tweaks kept the house off the assembly line for at least three months.

Would I build modular again? You bet. When we added up the advantages—factory-controlled construction quality, a closed-up house in a handful of days, costs that equaled or beat those for stick-building, and the ability to construct a one-of-a-kind design—buying a house made from big and little boxes made a whole lot of sense. ■

## The Many Moods of Prefab

Time was, if you went with prefab, you had to settle for what the factory offered. While plain, two-box ranchers still attract buyers, the real growth in the market is in custom designs, says Connecticut-based architect Douglas Cutler, who has specialized in modular construction for 20 years. Along with more sophisticated catalog choices, factories these days will build just about any size or style of house you want. The waterfront Georgian (TOP LEFT) is made from eight modules; the boxes were assembled on the mainland and floated to the island by barge. Other faces of modular (CLOCKWISE FROM TOP RIGHT): A seven-module, 4,200-square-foot Shingle-style; the Lewistown, a 3,200-square-foot Cape Cod from builder Patriot Homes; Cutler's own contemporary-style residence.



PHOTOS: (CLOCKWISE FROM TOP LEFT) DOUGLAS CUTLER ARCHITECTS (2); NATIONAL MODULAR HOUSING COUNCIL; DOUGLAS CUTLER ARCHITECTS

STYLING: REBECCA NEWMAN