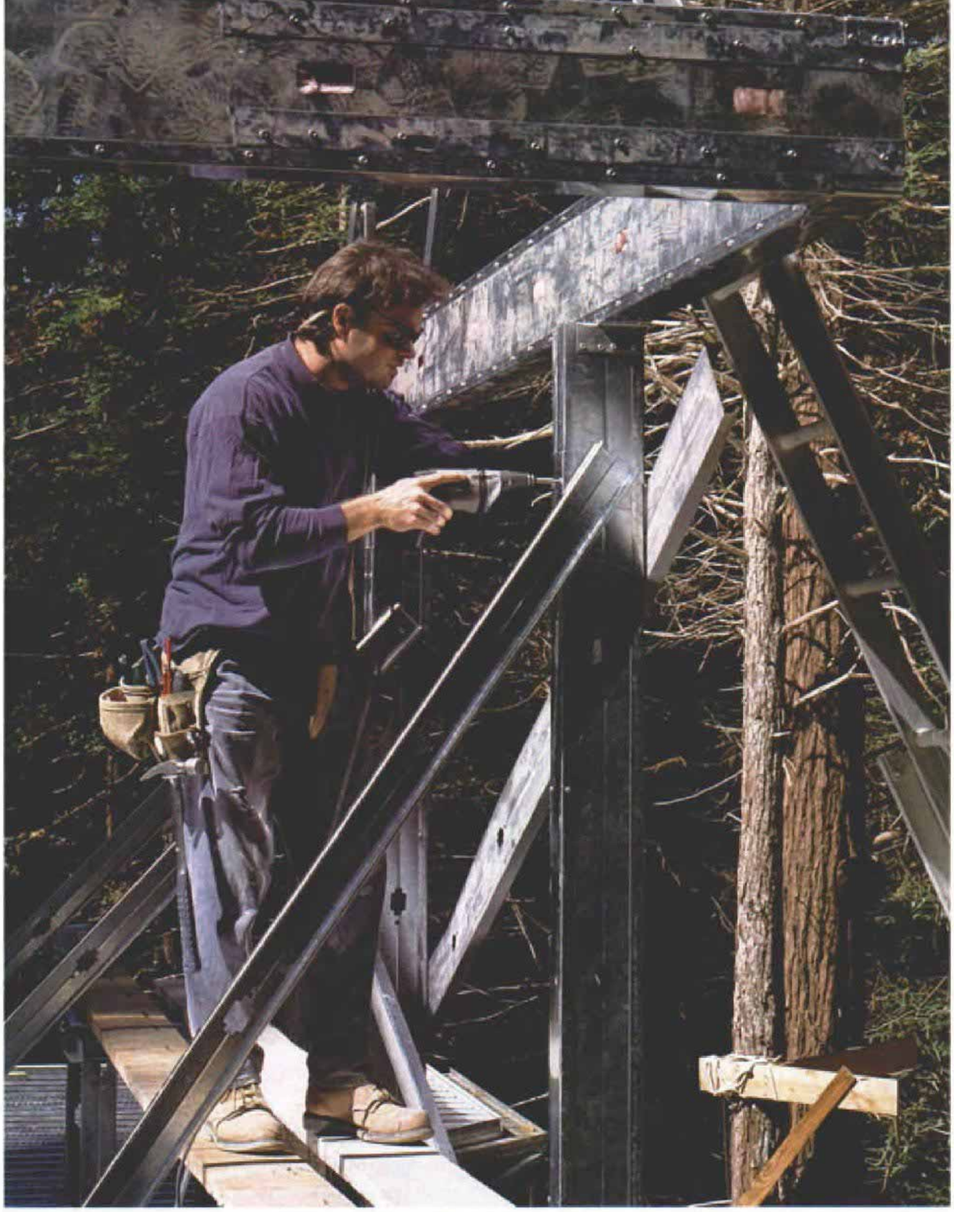


Posts can be assembled in place. The author screws a track onto a pair of studs to complete a built-up post. To his right, a pair of cantilevered headers meets at an outside corner. The headers are stuffed with insulation and anchored to one another with steel straps.

Framing With Steel for the First Time

A builder accustomed to wood framing tells about the differences between wood and steel construction

by Robert McCullough

Until two years ago, I'd spent my construction career building houses of wood. Then I got a tempting offer. My father-in-law, architect Berle Pilsk, wanted me to build his new house at Sea Ranch, California. The thought of spending a year living on the northern California coast and building a house in a redwood grove was enticing. The only hitch: The house was to be of steel.

Berle is convinced that steel-frame houses represent the next advance in residential construction. A steel frame doesn't rot, insects won't eat it, it won't bum, it resists earthquakes well, the parts are of uniform dimension, and—perhaps best of all—at this writing the cost of steel components is substantially less than comparable wood components on the northern California coast.

But I was skeptical. I like working with wood. It smells good, and it's easy to cut, shape and fasten. So before I took on the job, I spent a lot of time with Berle, going over the hypothetical construction of the house. I found a couple of steel houses that were under construction and studied them. I learned that a steel-frame house is essentially the same as a stick-frame house—the parts are just made of different materials. But there are some significant differences that you should be aware of if you're familiar with wood construction and if you're contemplating your first steel-framing project. For information on specific construction details, get in touch with the American Iron and Steel Institute (800-797-8335). The group's technical-data brochure, ***Low-Rise Residential Construction Details*** ($20), is filled with easy-to-decipher assembly drawings. What's more, that phone number will hook you up with their technical-advice hot line.

A 2x6 is really 6 in. wide—Steel-framing members consist of two basic components that are C-shaped in section, with a couple of important differences. Studs, joists and rafters are made with members that have flanges folded inward about ¼ in. at their open comers (top photo, facing page). These folds, while almost insignificant dimensionally, add stiffness to the members and make it easy for a stud to stand vertically. Studs come with prepunched holes in their webs for electrical conduits. Joists and rafters can have solid webs or be prepunched.

The other basic components are tracks. They have solid webs and lack the folded corners on the legs. Tracks work both as sill plates and top plates, and as part of posts or headers when combined with studs. Tracks also can be used for blocking and backing.

Like wood components, studs, joists, rafters and tracks come in various dimensions that differ in regular increments. But unlike wood, the dimensions are a net figure. In other words, 6 in. means 6 in. Studs are measured from their outside dimensions, and tracks are measured from the inside of their legs. So a 6-in. stud fits snugly into the track as shown in the photo. Self-tapping screws driven through the legs of the track and the legs of the stud hold the assembly together.

Steel-framing members come in many different sizes and gauges. We were able to order and receive floor joists and rafters in excess of 30 ft.

They were all the same length, and they were all perfectly straight. There is no sorting through the pile looking for the "perfect timber," although I must confess to picking up a stud from time to time and absentmindedly sighting down its length. Old habits are hard to break.

Steel components are surprisingly light for their strength. Without much difficulty, one person can carry a 30-ft. rafter. Studs are shipped nested together in bundles of ten. One person can pick up and carry a bundle of 10-ft. studs with relative ease. They don't take up much space, and it doesn't matter how long they sit. They will never dry, warp, split, rot or burn.

I had no problem with getting my hands on the stuff. Deliveries were prompt and on schedule, and our supplier needed a minimum of advance notice. The steel usually comes on a large flatbed with many small bundles banded together into several large and heavy bundles. The driver can't just drop the load as with lumber because steel distorts and bends when it hits the ground. A forklift is the best tool for unloading the material. In addition to making quick work of the job, a forklift allows you to keep large bundles together until you need the materials.

By the way, our steel came coated with a water-based lubricant that made it tricky to handle. Gloves are required. Once the steel sits out in the weather, it loses the slippery quality, but gloves are always a good idea. A word to the wise: When ordering, order carefully because you can't run down to the lumberyard and pick up a few more sticks—yet.

One of the attractive things about framing in steel is its amazing strength. You can increase the strength, and hence the load-bearing capabilities of the member, simply by increasing the thickness, or gauge, of the metal. You don't have to increase the dimensions of the member. When you increase the thickness of a steel member, the gauge number gets smaller. For example, a 12-ga. stud is beefier than a 20-ga. stud.

Screws hold it all together—The numbering system works the opposite way for the screws that hold a steel frame together. A #8 screw is much smaller and does not provide as much strength as a #14 screw.

Screws have either Phillips-head recesses, square-drive recesses or hexagonal heads. We used all three. Phillips and square-drive screws work best for thinner materials. When we had to screw through anything thicker than 14 ga., we used hex-head screws because it's tough to deform a hexagonal screw head, even under the constant, intense torque it takes to get a screw into thick sheet metal. By the way, it is important—almost mandatory—to keep a hex-head screw perpendicular to the material when you're driving it home. If you angle a hex-head screw as it is driven, it will simply spin out of the drive socket. A Phillips-head screw, on the other hand, can be angled into the work and still be driven, which allows you to get in some tight places. Pan-head screws are designed to be used in places that will be covered with drywall, where the fatter hex-head screws would cause a bulge.

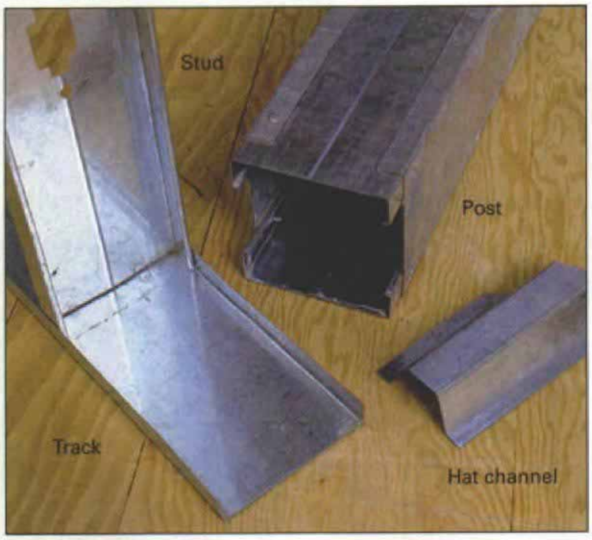
Screwing steel-framing components to one another is not difficult. It is, however, time-consuming. For example, the basic screw for anchoring a stud to a track on our job was the #8, ½-in. pan-head self-drilling screw (middle photo above). Over the course of building this house, we went through 20,000 of these screws. Let's say we dropped 1,000 on the ground. This leaves 19,000 screws. On the average, it takes about 30 seconds to drive one of these screws. Convert 9,500 minutes into workdays, and you get almost 20 eight-hour days.

A new set of tools—You can get material precut to specific lengths, but we decided to cut the components on site because of the intricacies of the house. The cut-off saw (photo p. 60) is the best tool for the job. After researching the field, I concluded that all the saws are pretty much the same and ended up buying the Makita.

Although the saws are similar, there is a big difference in the blades. After trying every available metal-cutting blade we could find, we concluded that the ones made by Norton lasted the longest (Norton Co., 1 New Bond St., Worcester, Mass.

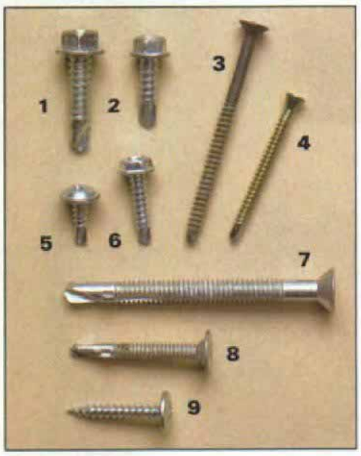
Components and fasteners

Framing members



The parts are folded sheet metal. The basic components in a steel-frame house are C-shaped in section. On the left, a stud nests in a track. Note how the legs of the stud curl inward, strengthening the form. The prepunched hole in the stud is for wiring. In the middle, a built-up post is composed of two studs and two tracks. The part on the right is a hat channel. It's typically used for purlins.

Fasteners



Choose the right screw for the job. Most steel-framing screws have self-drilling tips that eliminate the need for drilling a pilot hole (see photo below). Phillips-head and square-drive screws are good for 20-ga. and thinner metal. Hex-head screws are best for thicker metal. Use the wing-tip screws for attaching wood to metal.

1. #14, 1¼-in. hex washer-head screw.
2. #12, 1-in. hex washer-head screw.
3. 2¼-in. Phillips bugle-head screw.
4. 1⅝-in. square-drive flathead trim screw.
5. #8, ½-in. Phillips pan-head screw.
6. #10, 1-in. hex washer-head screw.
7. #12, 2½-in. Phillips flat countersunk-head screw with wings.
8. #10, 1½-in. Phillips flat wafer-head screw with wings.
9. #8, 1-in. Phillips pan-head screw.

Screw tips

Self-tapping and self-drilling tips. You can drive a self-tapping screw (the pointy tip on the left) into the thinner steel components. If the steel is thicker than 20-ga., however, use a fastener with the self-drilling-type tip on the right. The screw in the center, which is used to affix wood to metal, has a self-drilling tip with little wings between the tip and the threads. The wings carve the hole in wood, then break off when they encounter steel.

Fastener photos: Robert Marsala

Take the studs to the saw. A cut-off saw with a composition blade is the standard method of cutting steel-framing components. Cutting sheet metal this way demands adequate safety protection.

01606; 800-5434335). On a day of cutting, it's easy to go through a couple of 14-in. sawblades.

Cutting metal tracks and studs is a noisy job that produces steel slivers that can get in your eyes and clouds of acrid smoke that can sting your lungs. Protect yourself with earmuffs or earplugs, eye goggles and a respirator. Also, have a first-aid kit with plenty of Band-Aids, antibiotic ointment and eye wash. It is important to wear the eye protection because a metal sliver is nothing like a wood one. A steel sliver tends to stay in the eye, where it immediately starts to rust.

We used Porter-Cable screwguns for assembling the components and a Bosch battery-powered drill with a long extension to reach the nearly inaccessible places that needed screws (a cordless drill seems to work better than a standard drill if you can't hold the tool perpendicular to the work).

I never did find a store-bought hex-head driver for the #10s that would magnetically hold the screw. The head depth of the #10 is shallower than the #12, so the magnet doesn't quite engage the head of the screw. We solved the problem by adding a thin magnet to the driver socket.

Here's the lineup of tools for steel framing that I carry in my belt: two large Vise-Grip C-clamps, spare Phillips and hex-head screwdrivers, a Stringline, plumb bob, magnetic torpedo level, end nips for changing the driver bits in my screwgun and removing backed-out screws, a utility chisel, three pairs of metal snips (straight, right hand and left hand), a 4-in-l screwdriver, a utility knife, a tape measure, a speed square, my cat's paw and, finally, my hammer, for balance if nothing else. I'd say the whole kit weighs about 25 lb.

The layout has to be impeccable—A steel house is put together in small pieces, just like the typical platform-frame house of wood. The foundations are the same for wood or steel, but with steel it is important to trowel smooth the top of the foundation because the steel track is not as forgiving as a wood mudsill atop a layer of sill sealer. We used traditional 5/8-in. foundation bolts for the typical stretch of foundation. Where the engineer called for heavier connections to the foundation, we used 1/4-in. steel plates affixed to the foundation with 7/8-in. bolts. The plates were then connected to the frame by way of diagonal braces made of 16-ga. steel.

One of our first problems to solve was how to cut the holes in the track for the foundation bolts. At first I used a bimetal hole saw, but I found this to be difficult and sometimes painful. A hole saw has a tendency to bind in the kerf and then jerk your wrist. I finally found a stepped drill bit, which is cone-shaped and starts small enough not to need a pilot hole but ends up big enough to create a 1-in. hole. This tool also came in handy when it was time to install plumbing and electrical. Although the studs came prepunched, we sometimes needed to make holes in built-up posts and headers to run wires and pipes.

Accurate layout of framing members is important no matter what the material, but with steel layout accuracy takes on greater importance. Rafters must be over either a post or a double stud. If the house is more than one story tall, posts and studs must bear on a plate that is supported either by a joist or a short piece of stud called a web stiffener placed in the joist track directly under the post or stud (top photo, facing page). These loads must be transferred to the foundation by corresponding posts and studs in the lower floors. So when we were laying out first-floor walls, we were also laying out roof framing.

Frame the walls in place—A carpenter typically lays out the parts of a wood wall on the subfloor, frames the wall in the horizontal position and then lifts it into place. A steel-frame wall requires that the screws be driven from both sides of the track into the legs of the stud. So we framed the walls, which have their studs on 24-in, centers, in place rather than flip the partially completed wall to gain access to the other side (for another approach, see sidebar p. 62-63).

After marking the position of the stud (pencils worked fine), we placed a stud in the track. Then we clamped it in place with the Vise-Grip C-clamp and tapped the stud firmly downward to make sure it was seated correctly. This is an important step. The American Iron and Steel Institute recommends a gap of no more than 1/16 in. between a stud and its track. If the gap is larger, the screws end up as the bearing points.

After tapping the stud down, we ran the appropriate screw through the track and into the leg of the stud. Then we clamped the other side of the stud and screwed it to the track. For bearing walls, we found it easiest to install all the studs and then come back and add the top track. Walls that intersect at corners are attached with screws through the abutting studs and by straps that wrap around the tracks at the top of the wall.

Partition walls were easier to build by positioning the top and bottom tracks and then filling in the studs. This step should be done only with nonbearing walls because it's tough to make sure there aren't gaps larger than 1/16 in. between

The view from the crawlspace. Joists at 4 ft. o. c. carry the corrugated metal deck of the main floor. Each joist is carried by a pair of studs. At the pony wall in the background, web stiffeners midway between the joists carry the loads from the walls above. Note how the joists are blocked at the rim tracks by short sections of steel studs and at midspan by blocking made of steel studs.

studs and tracks. Because we were building on a sloping site, we had to erect pony walls (sometimes called cripple walls or jack walls) of various heights to establish a level top plate. Then we were ready to lay out our floor. Incidentally, we sprayed the cut ends of any framing members in the crawlspace with some zinc-rich Rustoleum paint.

Rolling out steel joists goes really fast. First, we installed a rim track (a 20-ga. track stood on end) on top of the pony walls and then screwed the joists to the track on 48-in, centers. Halfway between the joists we installed web stiffeners in the track to pick up the load of the studs to come.

We also installed web stiffeners adjacent to each joist, screwing into the side of the joist as well as into the inside of the rim track. The stiffeners are analogous to blocking in this application, supporting the sides of the joists and adding rigidity to the rim track.

A metal deck supports a slab floor—At this point most houses would be ready for a subfloor. But our project has a radiant-slab concrete floor poured over a metal deck. So our next step was to install a 20-ga. metal angle around the inside perimeter of the walls (photo right). Called a closure strip, this metal angle acts as a flange that supports the metal deck at the edges while simultaneously working as a screed for the concrete and a strap tie at the corners to hold the wall tracks together.

Once the closure strip was installed, we laid the 3-ft, by 12-ft, pieces of 20-ga. decking perpendicular to the joists. The corrugations in the decking nest inside one another, and they overlap one corrugation at their edges. This overlap has to be crimped by a tool that looks like a big pair of bolt cutters. Called button-punching, this operation goes quickly once you have the tool. It took an hour to do the crimps and two days to find and fetch the tool from the rental yard.

This floor deck hangs on a closure strip. A metal angle called a closure strip supports the edges of the corrugated floor decking and acts as a screed to control the concrete's thickness. In this photo, you can see the closure strip at the outside corner, just inside the overlapping tracks that secure the intersecting walls.

If the sections of metal decking, or pans, needed to be cut to length, we used a circular saw fitted with an 8½-in. Norton blade. We affixed the decking to the joists and the closure strips with screws. Screwing the pans to the floor joists really tied the whole platform together, giving us a rigid deck for the main floor of the house. By the way, the light coming off the deck was blinding. We all had to break out the tinted safety glasses when the sun cleared the trees.

If you have occasion to install a metal-pan deck, here are a few things to consider. First, the corrugations in the deck make it tough to keep clean. Debris can be swept into piles along the flutes, but you can't get a dustpan in there. Make sure to have a vacuum on hand. Rain on an unswept metal deck makes a real mess that's tough to clean up. Also, a metal deck isn't much fun to walk on. In our case, the slab was going to be stained and polished to become the finished floor. So we waited until the end of the project to pour the slab. If the slab were to be covered with some kind of finish, say tiles or slate, I certainly would have poured it as soon as possible.

Making headers and posts–Once we had a platform to work on, we made a cut table and mounted the cut-off saw on it. If you build a steel-

Tips from a veteran steel builder

by Steven Jacobs

During my 16 years in the building business, I've worked as designer and inspector on jobs that ranged from office buildings to a wind tunnel for NASA. That experience prepared me well for my current career, which is designing and supervising the assembly of steel houses on the Olympic Peninsula in Washington state. In the past three years, I've detailed plans for more than 50 houses and been the general contractor for a half-dozen homes.

I like framing with light-gauge steel because for about the same price as wood, you end up with a more structurally sound, termite-proof, rot-proof, rodent-resistant, straight and true structure. What's more, instead of burning waste or paying to dump it, you can recycle nearly all the leftovers. But working with steel, you must be fastidious at every stage of construction. If you just slap a house together, steel framing will be your worst nightmare. I strongly suggest that builders who are new to steel but familiar with wood construction hire an experienced steel framer to work alongside the crew during its first steel project.

Buy extra, and start out dead level—We order approximately 90% of our steel to be delivered cut to length. Track (wall plates) is best ordered in standard 10-ft. lengths. I always order at least 10% more track, and 50 to 100 extra structural wall studs. We use standard stud lengths just as in wood framing, but with steel the studs are 97 in. long. I keep a small stock of the most common studs and joists so that I always have a few extra available. I find that a magnetic level (at least 4 ft. long) is essential, and a 50-ft. to 100-ft. long water level helps immensely in leveling the top plates of the walls.

A flat, level foundation is critical when framing with steel. We make that condition clear to our concrete subs, and we retire and rehire them accordingly.

When the steel is delivered to the site, we lay out the components in an orderly fashion. First we assemble all the headers and beams required to erect the first floor, and we pack them full of fiberglass insulation. Then we lay out the bottom tracks that are to be connected directly to the concrete foundation. We put these tracks atop a ⅛-in. thick, 6-in, wide strip of polystyrene sill sealer. This step prevents electrolysis between the concrete and the steel. At this point we roll out the floor joists and sheathe the floor with plywood. We use #6 Grabber brand self-drilling bugle-head screws to affix the plywood, along with construction adhesive glue.

We lay out all our studs 24 in. o. c., and we frame and sheathe our walls while they are lying on the subfloor or slab. We check every bottom-to-top track dimension at each stud as we assemble the wall, and we clamp a long floor joist to the bottom track to keep it straight as we assemble the wall. Then we check the wall for squareness.

At this point only the two end studs are screwed to then tracks. All others are being held with Vise-Grip clamps. After the wall is squared, we screw off the rest of the connections and sheathe the wall with ½-in. CDX plywood. The plywood sheeting provides shear value as well as acts as a thermal barrier. The wall is now

frame house, I strongly suggest you do the same. Instead of taking the saw to the woodpile, you bring the steel to the cut table.

Posts are made up of two studs and two lengths of track. All our posts were made of 20-ga. material. The studs are placed vertically, with their legs pointing at one another, in the bottom track of the wall. The distance between the studs is equal to the inside dimension of the track that will unite them. I found it easier to install the top track of the wall, and then come back and screw the tracks onto the studs to complete the posts (photo p. 58). Before screwing the tracks onto their studs, stuff the post with insulation. You can't do it after the pieces are assembled.

A header is made the same way as a post, but it's easier to build the header on the ground and then lift it into place rather than to try to build the thing in the wall. The headers we made were 10 in. by 3⅝ in. They are remarkably strong. Because of the strength of the steel, Berle designed a number of corner windows that required no center posts. The roof loads are carried by impressively cantilevered headers.

The rafters don't need bird's mouths— Unlike most wood rafters, a metal rafter doesn't require a bird's mouth because the rafters are held in place atop the wall by a metal angle clip. The angle clip is placed directly over a double stud or post and then screwed to the side of the rafter so that the rafter's load is transferred down through the clip.

Our rafters were attached to our ridge beam with the same type of angle clip. Because of this connection, it was only necessary to cut our rafters to within ¼ in. of the ridge beam. There was no need for an exact measurement between the wall plate and the ridge beam, so this portion of the project went quickly. At the eave line, a track that's screwed to the ends of the rafters acts as blocking.

Purlins anchor the roof deck. Purlins made of steel hat channel run parallel with the ridge on 24-in, centers to make a regular layout for affixing the plywood decking to the roof.

The spacing of our rafters is irregular, so to gain a consistent layout for the plywood decking, we screwed purlins made of 20-ga. hat channel to the rafters (photo above) at 24 in. o. c. The purlins provide support for sheathing and create a ventilation channel above the insulation.

Wood sheathing and nailers for shingles and windows—Even though the skeleton of this house is steel right down to the foundation, we still found it convenient to skin it with plywood for the roof deck and for the shingled exterior walls. We used #8, 1-in. self-tapping pan-head screws to affix the plywood decking to the 20-ga. purlins. We used self-tapping screws instead of self-drilling screws on the roof deck because it's easier to get force behind the drill when you're pushing down on it.

We used our nail guns to affix the plywood wall sheathing to 2x4 nailers. Attaching the nailers to the steel studs gave us a chance to use yet another kind of specialized screw: a self-drilling screw with wings (bottom photo, p. 59). This screw has a pair of cutters above its self-tapping tip that bore a hole in the wood larger than the diameter of the threaded shank. This larger hole keeps the threads from engaging the 2x4 when the screw spins without penetrating the metal as the tip cuts a hole in the stud. With an ordinary self-drilling screw, the 2x4 climbs the shank as the screw spins. Once the stud is penetrated, the wings break, and the threads drive into the metal.

A magnetic drill press helps with the big holes—In some places we were able to reduce the number of screws required by using larger fasteners. For example, the plans called for ¼-in. self-drilling screws to tie the 16-ga. X-braces to the steel-plate hold-downs. The hold-downs were ¼ in. thick—too much to expect a self-drilling screw to penetrate. Because we had to predrill the holes anyway, we talked it over with the engineer and redesigned the hold-down using ½-in. machine bolts. But how could we drill the holes efficiently? The answer turned out to be a

ready to stand and be temporarily braced. We do not screw off the interior-side connections until all the bearing walls are completed and in place. This step allows us to fine-tune alignment and height of all the walls all at once, minimizing our top-plate height variations while maintaining our ⅛-in. allowable tolerance.

We have framed roofs both with site-built steel trusses and with factory-built wood trusses. And we've learned that complicated roofs, low-pitch roofs and most hip roofs can be built with wood for less cost than steel. Because wood-truss assemblies are standardized and are factory built, they are less expensive to buy and take less labor to install. But if you want the advantages of steel framing, almost all roofs can be framed with steel if you have the time and the budget.

Use commercial subs; they're used to steel—Here on the Olympic Peninsula, there are quite a few commercial contractors willing to work on steel-framed residential projects. So we have found it fairly easy to find plumbers, electricians and mechanical contractors who are willing and able to do our projects at a competitive price.

Insulating steel-frame homes is no big deal. I advise our clients to use the Blown in Blanket System (Ark-Seal, 2190 S. Kalamath, Denver, Colo. 80223; 800-525-8992). It's a fiberglass insulation blown into wall cavities, filling voids in studs, around wiring and electrical boxes, and around plumbing. The fibers are laced with a glue that holds the insulation in place, preventing settling. Installers use hot glue to stick nylon mesh to the studs. The nozzle that delivers the insulation is then poked through small holes cut in the mesh.

If you just slap a house together, steel framing will be your worst nightmare.

We don't use a plastic vapor retarder between the studs and the drywall. Instead, we finish the drywall with vapor-barrier paint, which limits the transfer of moisture through the walls. If you choose a plastic vapor retarder, however, you can adhere the plastic to the studs with hot glue.

If you want to get your feet wet without risking much, try using steel studs for your interior nonbearing walls. Steel studs will save you money on material costs, and they will give your framers a chance to get used to the material.

Designers can learn more about detailing steel houses by contacting the American Iron and Steel Institute (800-797-8335). Ask for their handbook RG-930, *Residential Steel Framing Manual For Architects, Engineers and Builders* ($40). Finally, steel manufacturers all have span tables and engineering-specification books free for the asking. You should be aware that some steel manufacturers' span tables assume that you are using web stiffeners at ends and at centers of joist spans, and some span tables don't.

—Steven Jacobs is vice president of Cottage Steel Industries in Port Orchard, Washington.

Milwaukee Electromagnetic Portable Drill Press (photo right), which we rented for the occasion. Flip the switch, and the baseplate on this baby grabs hold of the workpiece with the grip of death. Using this tool made it quick and easy to drill the 110 holes for the braces.

Casings, drywall and baseboards—Unlike the windows, the door openings weren't wrapped with wood. Instead, I screwed a track onto the studs on each side of a door opening, and then screwed the jambs of our prehung doors to the tracks. I used yet another kind of screw in this instance—a square-drive trim screw with a self-drilling point (center photo, p. 59). I used these screws because they don't leave much of a hole in the jamb to fill. But the jambs will climb right up the shanks of these screws if you don't clamp the jambs to the studs.

There is some debate among designers and builders about condensation in the walls of houses that are framed with metal studs. Some folks believe that warm, moist interior air might go from a vapor to a liquid on the steel frame under certain conditions.

We decided to install a 6-mil poly vapor barrier on the inside of the frame. This became a hassle. You can't just hammer tack the stuff to the studs and joists. Instead, we tried getting it to stick by coating the studs with 3M spray adhesive. That didn't work. Both the studs and the plastic were too slippery. So we put duct-tape patches on the plastic over the studs and ran pan-head screws through them. This had to be one of the most frustrating parts of the project. My guess is that the airtight drywall approach, which uses foam gaskets behind drywall coated with vapor-barrier paint, is a better way to solve this problem.

This drill is self-supporting. An electromagnetic drill press clamps onto a workpiece. Here the author drills ½-in. holes in a ¼-in. steel hold-down and a 16-ga. diagonal strap.

My advice is to leave the hanging of the drywall to the professionals who have commercial experience. If you decide to hang your own drywall, be sure to use bugle-head screws with self-drilling points. A standard, pointed-tip drywall screw will penetrate a 20-ga. stud, but we learned that by the time the screw goes into the stud, the spinning screw has excavated a hole in the drywall that is larger than the head of the screw. We trimmed the bottoms of the walls with MDF baseboards. We used the square-drive self-drilling trim screws to attach them, along with a continuous bead of construction adhesive.

So how do you like working with steel?— Faster assembly is one of the advantages of steel construction that turns up in most of the articles and brochures on the subject. That may be true for a simple house, but in my experience it just isn't so for a complicated custom house. The labor cost was double what we thought it was going to be.

The cost of the steel, however, was a lot less than the materials would have cost for the house to be framed of wood. All the steel, plus the fasteners required to assemble the frame, cost about $17,000 for this 1,800 sq. ft. house. The same parts in wood penciled out at about $40,000. That's a pretty impressive difference. I easily could build a simple house of steel, knowing what I know now, for less than a comparable house of wood.

For me, though, building with steel just isn't much fun. I think part of the problem is that it takes so long to fasten the frame together. When I think back on this job, there is one thing that really sticks out in my mind: There was never a time when the job took off. With wood construction there are times when changes come slowly, but then there are sweeping changes when the walls are lifted into place and the sheathing goes on. Steel construction just seems to plod along. I expect all that will change when somebody comes up with the steel-framing equivalent of the nail gun. □

Robert McCullough is a custom builder living in Seattle, Washington. Photos by Charles Miller.