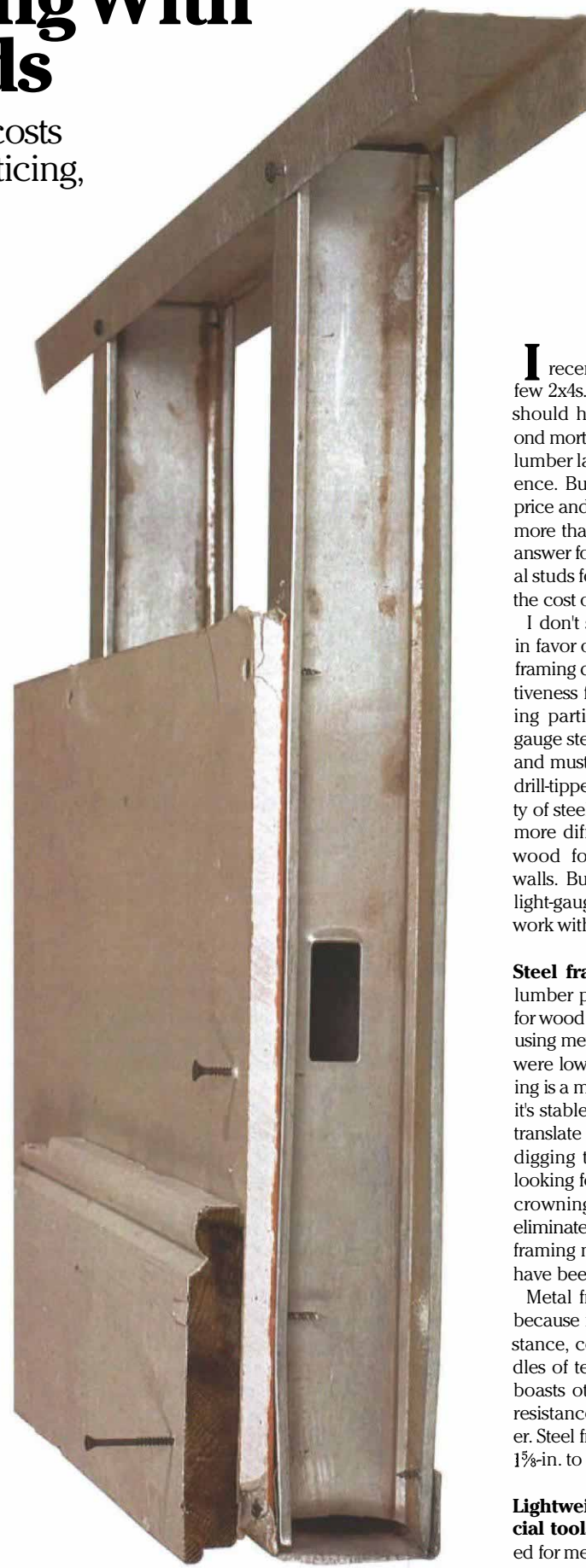
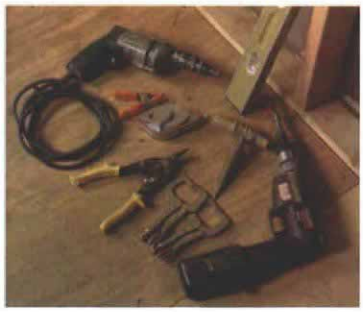
Remodeling With Metal Studs

Skyrocketing lumber costs make steel studs an enticing, easily installed alternative to wood

by Tom O'Brien





Tools for steel framing should look familiar. All the tools you'll need for framing with steel are probably already in your toolbox. They include spring clamps, a 2-ft, level, a chalkline, a plumb bob, tin snips and a cordless drill. A screw gun (background) and locking C-clamp pliers are also helpful.

I recently went into a lumberyard to pick up a few 2x4s. The bill left me wondering if maybe I should have stopped off at the bank for a second mortgage. Sadly, anyone who has purchased lumber lately has probably had a similar experience. But what alternative is there to the high price and dubious quality of framing lumber? For more than ten years metal studs have been the answer for me. In Virginia, lightweight 25-ga. metal studs for remodeling are a little more than half the cost of good quality 2x4s.

I don't suggest abandoning wood completely in favor of steel. Despite cost advantages, metal framing does have drawbacks that limit its effectiveness for total residential framing. Load-bearing partitions require a more costly, heavier gauge steel that has to be cut with special tools and must be welded or fastened with expensive drill-tipped screws. Also, the thermal conductivity of steel makes insulating a steel-studded wall more difficult. For these reasons I still choose wood for framing exterior and load-bearing walls. But for other framing applications, I find light-gauge metal faster, cheaper and easier to work with than wood.

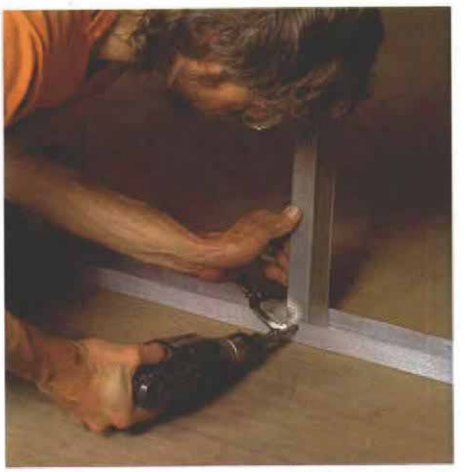
Steel framing is stable and uniform—Until lumber prices went out of sight, material costs for wood and steel were roughly the same. I was using metal framing then because my labor costs were lower. The reasons are simple. Metal framing is a manufactured product, which means that it's stable, straight and uniform. These qualities translate into time saved that would be wasted digging through piles of wood-framing stock, looking for acceptable material, and sorting and crowning at the job site. Product stability also eliminates the need to repair or replace metal-framing members that warp or distort after they have been installed.

Metal framing is easier to handle than wood because it weighs significantly less. Studs, for instance, come in easy-to-carry, interlocking bundles of ten (top left photo, facing page). Steel boasts other advantages over wood, including resistance to damage by fire, insects and weather. Steel framing is stocked in standard sizes from 1⅝-in. to 6-in, widths up to 20-ft. lengths.

Lightweight steel framing requires no special tools—Chances are most of the tools needed for metal framing are already in your toolbox.

Try carrying ten 2x4s like this. Steel framing weighs much less than wood, and studs come in interlocking bundles of ten, which makes them easier to carry.

Cutting lightweight steel is quick and easy with tin snips. After cutting through the flanges of the track, or stud, bend the waste end back and cut through the web with a slightly circular inward motion.



Clamping pliers aid assembly. Locking pliers with a C-clamp head keep the steel studs in place until screws are driven. Each stud gets one screw through each side, top and bottom.

These tools include a measuring tape, square, plumb bob, level (a magnetic level is handy but not necessary), chalkline and tin snips (left photo, facing page).

For most jobs, all that's needed to cut metal studs is ordinary, straight-cutting tin snips. Metal-cutting chopsaws that can slice through entire bundles of studs at one time are available for about $200. However, I've gotten along just fine all these years using tin snips to cut steel framing. Here's how I do it.

First, I mark the stud the same way I would a 2x4 except that I use a felt-tip marking pen (or a grease pencil) because it shows up better on metal than pencil does. I cut through the flanges on both sides of the stud with my tin snips, then turn the stud over and bend the cut end back. I then cut through the back of the stud (the web) with a slightly circular inward motion (photo top right). If you are unable to cut all the way through from one direction, just turn the stud around and finish the cut from the other side.

A VSR screw gun facilitates assembly—For fastening metal framing as well as attaching drywall, the one substantial tool purchase I would recommend is a variable-speed reversing (VSR) screw gun. This tool streamlines the assembly process. I prefer a 0-2,500 rpm model because it is geared lower for more power and better control, but a 04,000 rpm model works fine and is usually less expensive.

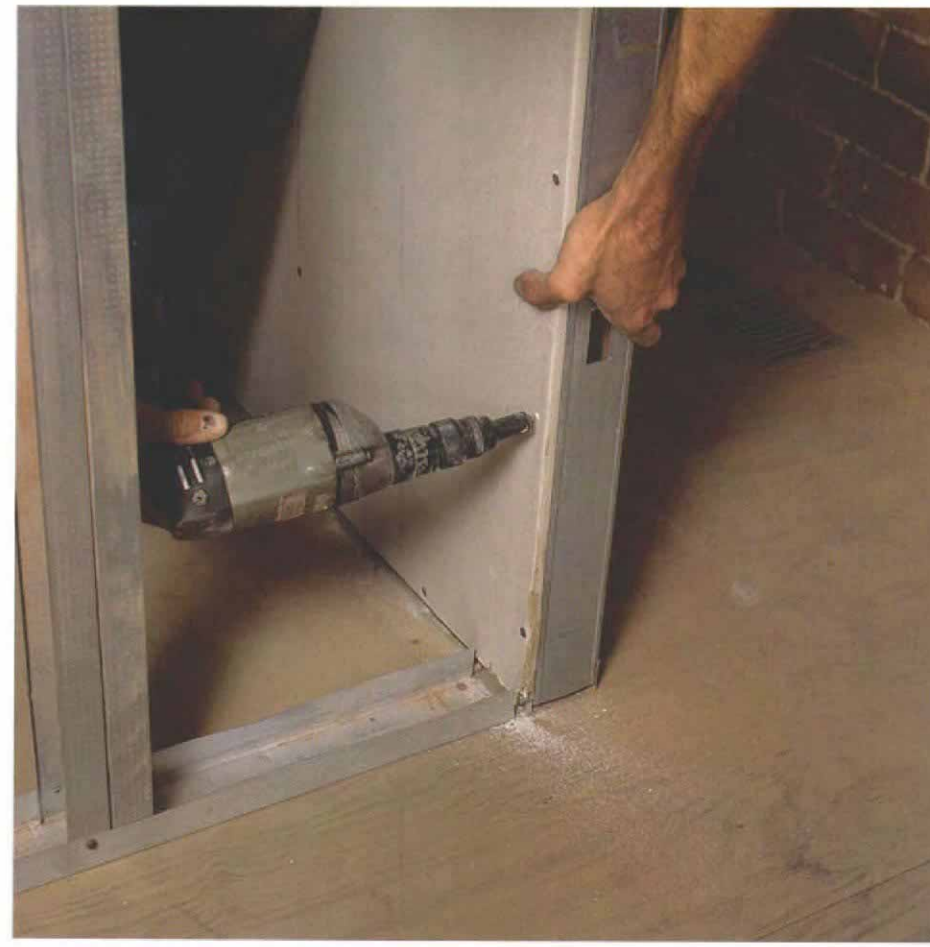
Another tool that makes framing with metal much easier is 4-in. locking C-clamp pliers made by Vise-Grip. A pair of these is well worth the small investment. I also keep a couple of 2-in, spring clamps handy for suspending my plumb bob from the ceiling-track flange.

Self-drilling screws connect steel framing members—Screws are the fastest and easiest way to fasten metal framing. Framing members are usually joined with 7⁄16-in. type-S self-drilling pan-head screws, commonly referred to as framing screws. Avoid type-S12 screws with drill-point tips, which are designed for fastening heavy-gauge steel. These screws are more expensive and tend to strip out light-gauge metal.

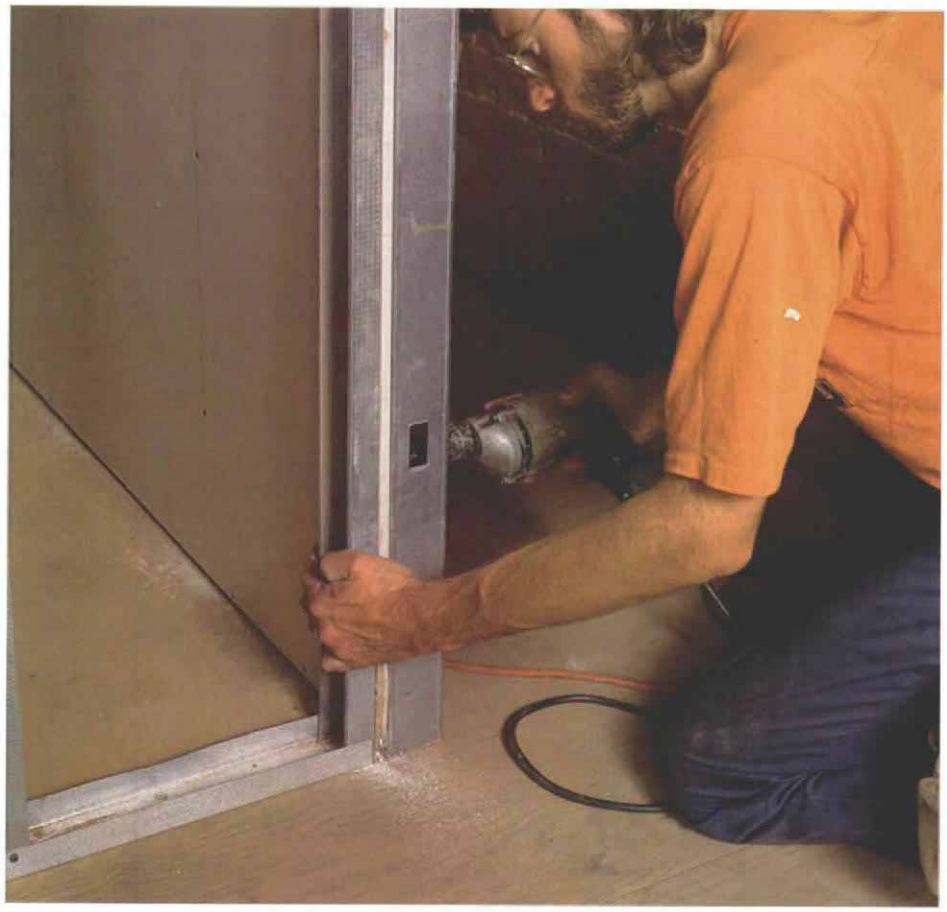
To join framing members, I first clamp the two pieces in place with my Vise-Grips (photo bottom right). Next I put a screw on the magnetic bit in my screw gun and hold it against the track, keeping the gun as perpendicular to the track as possible. I start the gun as if drilling a hole, and when the screw begins to penetrate, I back off slightly on speed and pressure and let the screw thread itself home. I advise using only a professional-quality #2 magnetic Phillips bit and changing the bit at the first sign of wear.

Drywall is attached to metal studs with type-S drywall screws, which have finer threads and sharper points than the type-W screws used with lumber. I use 1⅛-in. screws for single-layer drywall and 1⅝-in. screws where two layers are specified. I don't know anyone who still uses nails to install drywall, so hanging it on metal should not be a difficult transition; just remember to use a lighter touch on the screw gun.

Casing and baseboard can be nailed to wood blocking installed in the metal framing, but it is simpler to attach trim with finish screws, which look and work the same as finish nails. They have small, self-countersinking heads, which are designed to be driven below the surface of the wood and covered with putty. These days, most finish screws have square-drive heads that work better than Phillips heads but still require a bit of care to avoid strip cuts. Again, these screw tips should be changed at the first sign of wear. The lengths of trim screws most commonly used are 1⅝ in. and 2¼ in. The shorter ones are easier to



The drywall is an integral part of the corner. When building a corner of steel, the drywall on the inside is attached to the last stud of the bywall before the last stud of the adjoining wall is installed (right). That stud is fastened with screws driven through the drywall (below). This method simplifies construction and eliminates the need for extra framing in the corner.



work with but are just barely long enough to apply ¾-in. trim over ½-in. drywall. I try to keep some of the longer screws handy at all times.

It is possible to attach softwood trim to a metal-framed wall without predrilling, but you're probably asking for trouble. If you don't predrill, screws may bend, creating large, ugly holes as they go in, or they may refuse to countersink. It's also difficult to keep the wood tight to the wall and to keep it from splitting. I usually keep a ⅛-in. bit chucked in my cordless drill and alternate between that and my screw gun, although I have drilled and fastened trim using only my cordless drill with a quick-change bit system. When predrilling, it's necessary to stop before the bit hits steel framing. The screw should be driven so that the head is countersunk about ⅛ in.

Basic framing process is similar to wood— Except for a few simple differences, framing with metal is basically the same as stick framing with wood. Plates in steel framing are made of U-shaped channel, and the studs have a C-shaped profile (right photo, p. 72).

To frame a basic metal-stud wall, I start by laying out the bottom plate as I would with any wall. After establishing the two end points of the wall, I snap a line on the floor and mark on which side of the line I want the wall. I transfer this line to the ceiling using a plumb bob or a level alongside a steel stud and always check to make sure the top plate is marked on the same side of the line as the bottom. Next, I cut the top and bottom plates

Metal tabs connect the door header to the studs. Door-header stock is cut long, the flanges are cut, and the ends are bent to create tabs that allow the header to be attached without special blocking.

out of track stock, screw them into place and mark the stud layout on the tracks. At this point I take a few stud height measurements at various locations. If they differ by ½ in. or less, I subtract ⅛ in. from the shortest measurement and cut all studs to that length. Because the studs fit between the flanges of the track and are screwed in place, it is perfectly acceptable for stud height to vary by as much as ½ in.

After cutting the studs to length, I stand them up, setting the bottom of each stud inside the track lengthwise and tilting the top into its approximate position in the top track. Next, I twist the stud a quarter-turn so that the flanges of the track grip it and hold it in place.

All of the studs can be erected in this manner before they are fastened. After orienting the studs on the layout marks, I roughly split the gap in stud length between the top and bottom track and clamp the bottoms. The bottom of each stud gets fastened with a screw driven through each side of the track (photo bottom right, p. 73). Finally, I climb a ladder and secure the tops.

A couple of steel-framing quirks need to be pointed out. First, most metal studs come with prepunched holes to accommodate plumbing and electrical systems. These holes need to be aligned before the studs are cut. Some of these punch-outs also have a definite top and bottom, which means that all the studs must be measured and cut from the same end.

Second, the open part of the steel studs should face the beginning of the stud layout. This placement lets the drywall contractors know where to start their sheets. More important, it prevents the studs from distorting when the drywall is attached, which keeps the seams between the sheets flat and even.

No extra studs are needed in the corners—Framing with metal studs eliminates the need for special corner construction or extra framing because the drywall itself ties the intersecting walls together. When framing the corners of steel-framed walls, I first decide which wall will run by and which will butt just as in wood framing. I cut the track pieces for the bywall to the exact length and put them in position. Next, I measure and cut the track for the butt wall, leaving about a ¾-in. gap between the end of the track and the edge of the bywall track. This space is for the drywall. After cutting and positioning all the track, I double-check that each wall is laid out the same at the top and at the bottom and then anchor the track in place.

I lay out the studs for both the bywall and the butt wall, allowing for just a single stud at the end of each wall. Next, I cut and fasten all of the studs, except for the end stud of the butt wall. I leave this butt-wall stud floating until the drywall has been installed.

After the blocking is in place and plumbing and electrical lines are roughed in, the walls are ready for drywall. I start inside the room on a bywall and run the board through the corner to the end of the wall (top photo, facing page). Then I hold the floating corner stud from the adjacent butt wall against the drywall I just installed and fasten it with screws driven through the back of the drywall and into the web of the floating stud (bottom photo, facing page). The top and bottom of the floating stud now can be screwed into the stud's track. This procedure ties the corner together and uses fewer studs than wood framing. The corner is completed structurally when drywall is applied to the outside of the walls.

Framing the intersection of two steel-studded walls is essentially the same as framing a corner. Again, no special framing is required. The track for the intersecting wall is kept short, and the end stud for that wall is back-screwed on after the drywall is installed on the main wall. Sometimes it's not possible to get behind the bywall to back-screw the intersecting stud. In these cases, I slide the last stud of the intersecting wall into position against the drywall and shoot pairs of 1⅛-in. drywall screws through the inside corners of the stud into the drywall at opposite 45° angles. A pair of these screws every foot or so holds the stud in place nicely until the drywall is installed.

To give a metal-studded wall additional rigidity, I stagger the seams of the drywall so that inside and outside sheets don't break on the same stud. Taping and finishing the drywall is the same as always: messy and tedious.

Door framing is lined with wood for nailing—Framing for doors in a steel-studded wall requires extra effort. First, the studs must be at least 2½ in. wide to accommodate a door jamb. I start framing by locating the position of the door in the layout on the floor. I mark the centerline of the rough opening, and [measure half the rough-opening dimension in each direction.

I stop the track for the bottom wall plates at the edges of the rough door opening. However, I install the studs 1½ in. back from each side of the rough opening, which allows room to line the rough opening with 2x stock. This wood makes it easier to attach the door jamb and casing. I always check the door studs for plumb before screwing them in.

To complete the door frame, I measure the rough-opening height off the high side of the floor, then add 1½ in. again for blocking. I mark this point on the stud with my marker and com-

bination square, then use a level to determine the height of the other side. I cut the door header from a piece of track that's exactly 11 in. longer than the rough opening, and I square lines across the header 4 in. in from each end. This cut leaves me with the rough-opening width plus 3 in. for the blocking on both sides between my marks. I then make 45° angle cuts through the flanges of the track at both lines.

After making these cuts, I bend the 4-in, flaps down and install the header with the flanges facing up (photo p. 75). I clamp the tabs to the door frame at the correct height and screw through the tabs into the studs with two framing screws on each side. Finally I continue my stud layout on the header and install the cripples between the header and the ceiling track.

I complete the door frame by attaching 2x blocking to the inside of the door-frame studs (photo left). When I use 3⅝-in. studs, full-width 2x4s fit perfectly. But if I'm using 2½-in. studs to save floor space, I rip 2x6s down to about 2⅜ in. for the blocking. The blocking is then cut to length and attached to the steel studs with 1⅛-in. screws.

Steel framing is the best option for hiding masonry walls—Here in Virginia, I do a lot of renovations of old brick row houses. Concealing unsightly brick or masonry walls has always presented a problem. These wall surfaces are rarely smooth enough to accept drywall directly, and using furring strips usually requires a lot of fussing

Wood and metal work side by side. To create a proper rough opening for a door, 2x stock is added beside metal framing. Wood makes attaching doorjambs and casings easier.

Drywall scraps help stiffen the wall. Pieces of drywall screwed to the studs with their edges against the wall behind help solidify a steel-studded wall that's only 1⅝ in. thick. The excess drywall is trimmed off later. Wood blocking is installed between studs to accept kitchen cabinets. The flanges of the steel studs have been flattened where the blocking passes by to keep the blocking flush with the stud face.

and shimming. Framing with 2x4s held away from the wall is fine but costly in space as well as money, and 2x2 walls seldom remain straight. My solution to this renovation problem is to use 1⅝-in. metal framing, which stays straight and requires little space.

First, I lay out the bottom plate 2⅛ in. off the brick (1⅝ in. for the stud width plus an extra ½ in. to allow for variations in the wall surface). After snapping the chalkline, I check a few points along the line to make sure the wall can be plumbed without hitting the brick. I also adjust the line for squareness to the room to accommodate any cabinetry, floor tiles or intersecting walls. If necessary, the chalkline can be moved farther out.

When I'm satisfied with my layout, I use a plumb bob to transfer the layout to the ceiling for the top track. Next, I install both top and bottom track pieces. If I'm securing the track to wood floors or ceiling joists, 1⅛-in. drywall screws work fine. But if I'm attaching the track to a concrete floor, I use 1-in, powder-actuated fasteners. I finish framing the wall by cutting and installing the studs.

Compared with a 2x4 wall, an uncovered metal stud wall may seem downright flimsy. However, drywall applied correctly to both sides stiffens the wall. When I'm framing along a masonry wall, I can't apply drywall to the back of the studs. Instead, I install small scraps of drywall to act as stiffeners (bottom photo, facing page). I hold each drywall scrap against the brick and screw it to the web of the stud, taking care not to bow the stud out into the room. I leave the edges of the scraps long and trim them off after they have been installed.

If kitchen cabinets are being installed, it's necessary to add solid blocking to a metal-framed wall (bottom photo, facing page). This process can be done by first cutting up scrap 2x or ¾-in. plywood into 15¾-in. or 23¾-in. lengths, depending on the stud layout. Next, I mark all the pieces 1 in. from one end and cut a ¼-in. deep saw kerf on each side of the line at that depth. This double kerf slips over the lip of the stud flange and allows the blocking to be installed flush with the outside of the studs. I often use another method of installing blocking without making saw kerfs. For that method, I bend the stud flange flat where the 2x passes by. In either case the blocking is attached with two 1⅛-in. drywall screws driven through the flange of the stud on one end of the block and through the inside of the adjacent stud on the other end.

After all the blocking is installed, the plumbing and electric have to be roughed in before the wall can be closed. I try to hire subcontractors who are familiar with metal framing because some procedures differ slightly from wood framing. Plumbers must be sure to isolate copper pipe from the steel framing with plastic bushings or tape to prevent galvanic corrosion. Electrical boxes may be screwed to the sides of the studs, fastened to wood blocking or attached with clips made specially for metal framing. Many electricians choose to run conduit through metal framing, but it's unnecessary as long as bushings are used to protect the wire sheathing from being damaged by the edges of the studs.

Before drywalling the outside of the walls, I sometimes insulate to provide thermal protection or soundproofing. Because metal studs are C-shaped and hollow, conventional insulation ends up being 1 in. too narrow. Full-width insulation, 16 in. or 24 in., is available from your metal-stud supplier.

Framing soffits with steel is a breeze—When building interior soffits, I use metal framing almost exclusively. Whether it's a ceiling above kitchen cabinets, an enclosure for mechanical components or a transition between rooms with ceilings of different heights, I can build a soffit straighter and more efficiently with 1⅝-in. metal framing than with wood (photo below). Plus I don't need the arms of George Foreman to hold a section of lightweight steel framing over my head while driving screws.

For soffits, I use essentially the same framing procedure as I do with wood, although I prefer to build my soffits after the drywall has been applied to the adjacent walls and ceilings. This process makes layout easier, makes the soffit stronger and eliminates the need for blocking (nailers) at the corners. □

Tom O'Brien is a carpenter and remodeler in Richmond, Virginia. Photos by Roe A. Osborn.

Old technology meets new. A soffit is created of steel framing to conceal ductwork in the basement of an old house. The vertical members that will hold drywall are attached to sandblasted beams more than a century old.

More information on steel framing

Gold Bond Building Company
2001 Rexford Road
Charlotte, N. C. 28211
(800) 628-4662
Publishers of *Gypsum Construction Guide,* a 163-page booklet that offers technical information for steel framing; $12.95 paperback.

Unimast
6839 Southlake Pkwy.
Morrow, Ga. 30260
(800) 969-4110
Publishers *of Steel Framing Technical Information Catalog* (#UN 30) and *Construction Worker's Guide to Steel Framing* (#UN 81); free.