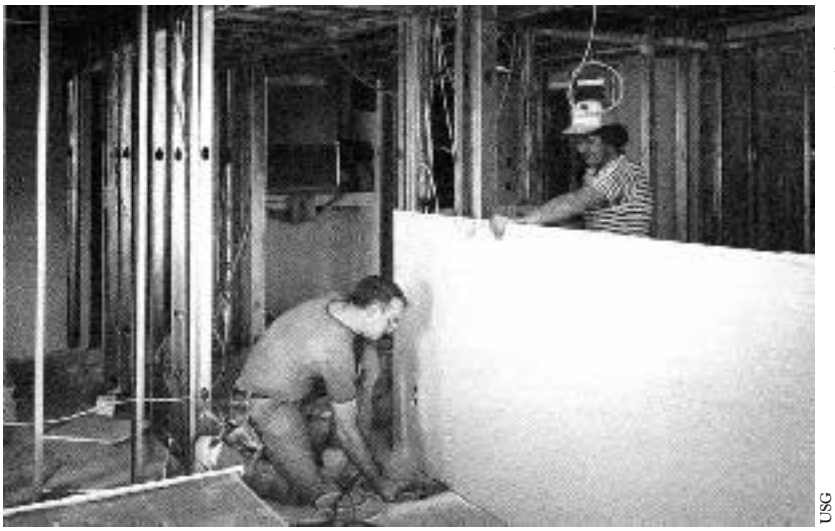
Steel-Stud Partitions

by John Gaal



USG

It's the drywall that gives a typical steel-stud partition its stiffness and stability.

Steel studs are a good choice for many remodeling jobs — residential as well as commercial

Most remodelers would frame up a basement family room or new bedroom with wood studs and wood plates. And why not? This is the way we've done it for years. However, I've found that in many cases steel-stud framing, normally reserved for commercial jobs, costs less and takes less time.

The 25-gauge steel studs I use come in bundles of ten and cost about $1.52 per 8-foot stud, which is very competitive with the $1.50 2x4 studs we buy here in St. Louis. Once you get familiar with the materials and the way they're installed, you'll be able to save on labor compared to building with wood.

Steel studs are commonly categorized either as non-load bearing (NLB) "drywall studs" or load bearing (LB) "structural studs." The profile of the drywall stud is narrower than the structural stud, and one flange of the drywall stud is narrower so studs can be "nested" for bundling (see Figure 1).

Steel studs come in different gauges, which are similar to the differences in lumber grades for wood studs (see "Ordering Steel Studs," next page). The 25-gauge NLB steel studs meet the needs of most residential partitions. Steel runners, used instead of top and bottom plates, come in 10-foot lengths and should be at least .0179 inches thick.

Installation Overview

As with wood, your objective with steel is to build a partition wall that is securely anchored to the floor and the joists above. Start by placing the bottom runner; then plumb up to install the top runner. Finish by installing the studs.

Bottom runner. If you are building the partition wall on a wood frame floor, just screw through the bottom runner into the floor joists. In the case of a concrete floor, there are several options. The fastest method is using a powder-actuated tool (PAT) such as a Ramset D-60 (ITW/Ramset/Redhead, 1300 N. Michael Dr., Wood Dale, IL 60191; 708/350-0370). Be sure to follow all manufacturers' instructions whenever operating a PAT.

If a PAT is not available, or if the concrete is soft and shatters from the blow, you can use a roto-hammer or a hammer drill and some type of lead anchor or a Tap-Con (ITW/Ramset/Redhead, see above) fastener.

As a last resort, you can use construction adhesive or mastic, but you must clean both the concrete and metal track prior to application. Use soap and water on the concrete and paint thinner on the metal. I wouldn't recommend this method for a wall with a door, though, because the swinging of the door can displace the bottom runner.

Whichever anchoring method you choose, United States Gypsum (550 N. Brand Blvd., Glendale, CA 91203; 818/956-1882), a company that markets steel studs, suggests that track be fastened 24 inches on-center and within 2 inches of an end.

Top track. Once the bottom track is in place, you can plumb up with a plumb bob or straightedge and level; then snap chalk lines for the top track.

Anyone considering working with metal studs and track must invest in a screwgun, either AC or cordless. If you are installing a room in the basement, fasten the top (ceiling) metal track to the first-floor wood joists with 1-inch Type W, bugle-head, drywall screws with a Phillips head. These screws have threads designed to penetrate wood. In remodeling, using screws sure beats pounding 12d nails through 2x4 plates into 20-year-old floor joists and eating the dirt from above.

Installing studs. The third step is to anchor the studs to the track. Phillips-head TEK screws are the most popular screw for fastening metal studs to track. One screw on each side of the stud at the top and bottom is ideal. The most commonly used TEK screw is the 8-18 x 1/2-inch TEK1. The "8" refers to the screw gauge, #8; the "18" indicates 1/8 inch diameter; "1/2 inch" signifies the length of the fastener; "TEK" denotes the drill point; and "1" implies a point for penetrating sheet metal. Although the most popular screw, the 8-18 x 1/2 TEK1 tends to bulge the corners of the drywall.

I prefer using a 1/2-inch S12 round-washer-head self-tapping screw. It leaves a much smoother surface for drywall application later. Locking C-Clamp Vise Grips (American Tool Co. Inc., 108 S. Pear St., DeWitt, NE 68341; 402/683-2315) or Adapa clamps (Adapa Inc., Box 5183, Topeka, KS 66605; 800/255-2302; 913/862-2060) come in very handy for clamping studs to the track when screwing (Figure 2). Where the finish appearance is of the utmost importance, try using pop rivets or USG's metal lock fastener tool made for this purpose.

Working Metal

Carpenters who have mainly worked residential jobs have a distinct preference for wood. Working with metal uses different tools and details. But switching over is not difficult.

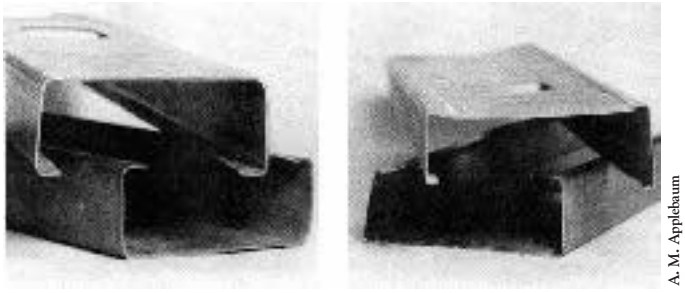


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Figure 1. *The structural studs on the left are 16-gauge steel; the drywall studs on the right are 25-gauge and non-load bearing.*

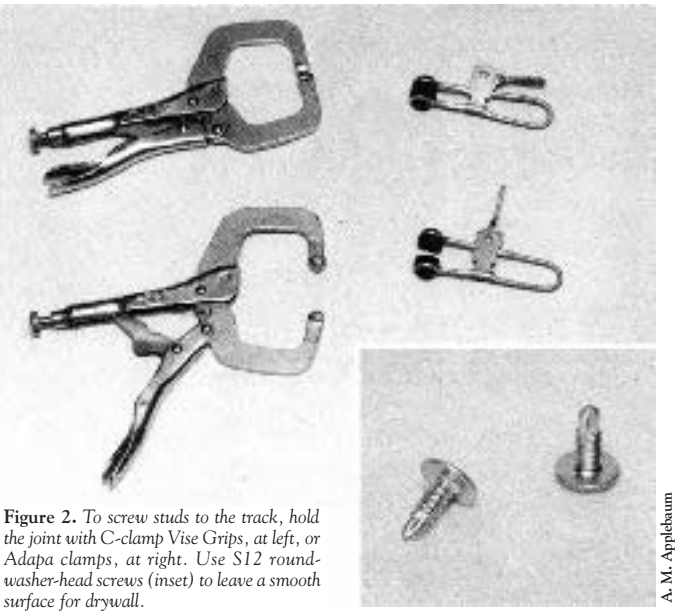

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Figure 2. *To screw studs to the track, hold the joint with C-clamp Vise Grips, at left, or Adapa clamps, at right. Use S12 round-washer-head screws (inset) to leave a smooth surface for drywall.*

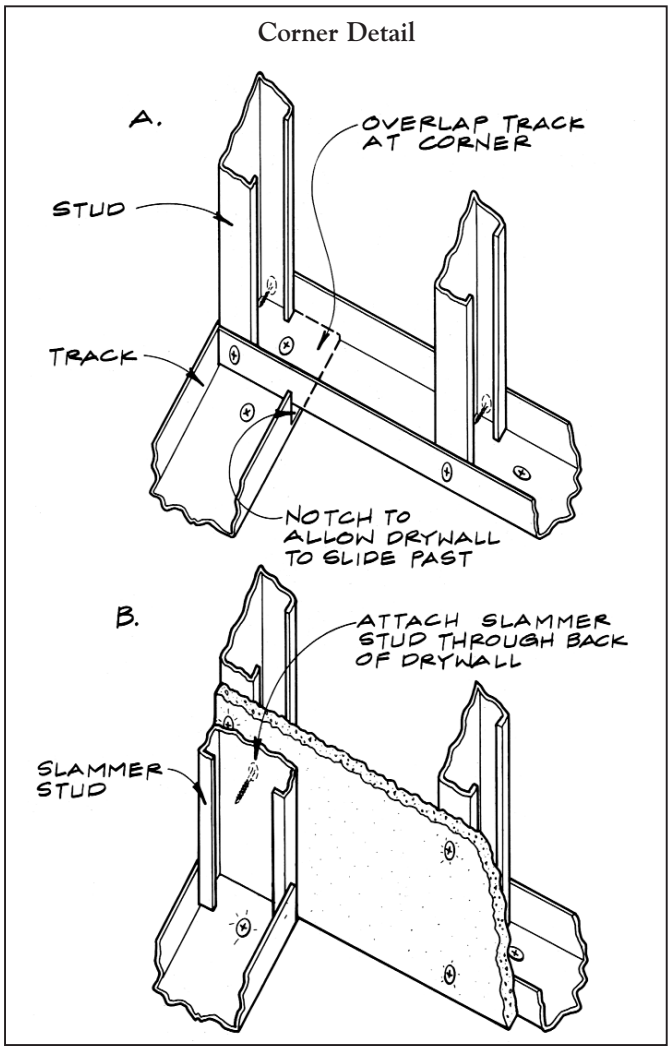

Figure 3. ***Corner detail:*** *Overlap track at corners as shown (a), notching to allow drywall to slide past the inside flange. Fasten screws through the back of the drywall into the floating "slammer" stud (b). The slammer stud isn't anchored to the track — just to the drywall.*

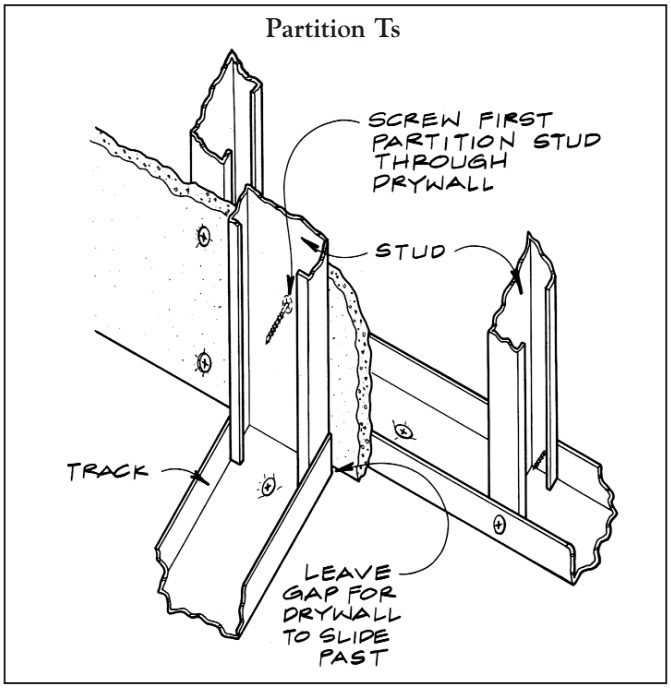

Figure 4. ***Partition Ts:*** *Leave a gap in the floor and ceiling track at partition Ts for drywall to slide in. If you have access from the other side of the wall, fasten the first stud of the partition T through the back of the drywall. If not, attach the first stud at the top and bottom plates of the wall behind it, and "forkscrew" the stud to the drywall in several places. Forkscrewing is similar to toenailing: The screws are driven at opposing 45-degree angles into the drywall for better grab.*

To cut metal track use aviation snips or a cutoff chopsaw. You need a real chopsaw — the kind plumbers use for cutting pipe — not the electric miter box you use for trim work. Put on a carborundum blade, and you're ready for metal cutting. Don't forget to wear eye protection.

Installing track. Track should be overlapped at corners, leaving a gap for drywall (Figure 3). Overlapping saves on fasteners and makes a stronger connection. Also leave a gap at partition Ts for drywall to slide past (Figure 4).

Track can be butted, spliced, or notched when walls are greater than 10 feet long (Figure 5, page 42). Butting the track ends is sufficient but takes twice as many fasteners. When you lap the ends with a splice or notch, you only have to use one fastener. It's mainly a matter of preference, but most carpenters now are using the lapped joints.

Length and layout. Cut each stud at the top with aviation snips or gang-cut them in a chopsaw. Unlike wood, you need not cut the stud to fit tight between the top and bottom track on NLB partitions. This really saves time when you're working on existing buildings. With wood studs, you would be marking each stud and cutting it to exact length.

Metal studs are laid out like their wood counterparts. A 24-inches-on-center layout is common for NLB partitions, although 12- or 16-inch centers can be used if you need closer spacing. You're better off using closer spacing if you intend to hang cabinets. If you're using 3/8- or 1/2-inch drywall, the 16-inch spacing will give a more even wall surface.

Stud throat direction. One thing is critical when you're laying out metal studs. You have to orient the studs correctly. Because the studs are C-shaped, the throats of the "on-center" studs point back towards the starting point of the layout. Drywallers will hang the gypsum board in this direction. The result will be a smooth surface for the tapers (Figure 6, page 43). The first panel that is installed anchors the stud flange and keeps it from deflecting. If you installed drywall from the other direction, the flange would deflect, and the edges of the panels would be uneven.

Door and window openings. Use metal track for header and sill material so cripple studs can interlock and follow the layout.

Ordering Steel Studs

Studs and runners are C-shaped and roll-formed from corrosion-resistant steel. Coatings are hot-dip galvanized or aluminum-zinc. You won't be able to run down to the local lumberyard to buy these studs, but most companies which manufacture them have 800 numbers. You can call and order what you need and pick them up from a local distributor. Manufacturers will even cut them to length for special orders.

Stud gauges & width. There are eight gauges available: 26, 25, 22, (two) 20, 18, 16, and 14. The higher the gauge number, the thinner the metal.

Studs come in five widths: 1 5/8, 2 1/2, 3 5/8, 4, and 6 inch. USG has a helpful publication called *USG System Folder SA-923 (1989)* that lists the various stud spacings for each stud size and gauge. You should get this publication if you're going to be using steel studs on commercial jobs.

The width indicates the web dimension, which varies. But the leg (flange) of the stud is always 1 1/4 inches. The corrosion-resistant coating is not considered part of the web and flange dimensions. Lengths range from 8 feet to 16 feet.

In my area, we commonly refer to steel studs as metal studs. USG denotes the 25-gauge 3 5/8-inch metal studs that I use in remodeling as 358ST25. They run around 19¢ per lineal foot in St. Louis.

Steel runners. Runners come in the same widths as the studs mentioned above. The length of a 25-gauge runner is limited to 10 feet. Once again, in my area, we refer to the steel runner as metal track. Metal track is available in two leg (flange) lengths; 1 inch and 1 1/4 inch. USG denotes this track style as 358CR25. The track costs about 17¢ per lineal foot.

In July 1989, Unimast bought USG's steel-stud manufacturing division. USG is the exclusive marketing agent for Unimast today.

— *J.G.*

Manufacturers of Steel Studs

For more technical information on steel studs, contact manufacturers:

Unimast (Formerly USG's steel stud division)
9595 West Grand Ave.
Franklin Park, IL 60131
708/456-1930

Steel Benders, Inc.
15550 West 108th Street
Lenexa, KS 66219
913/492-7274

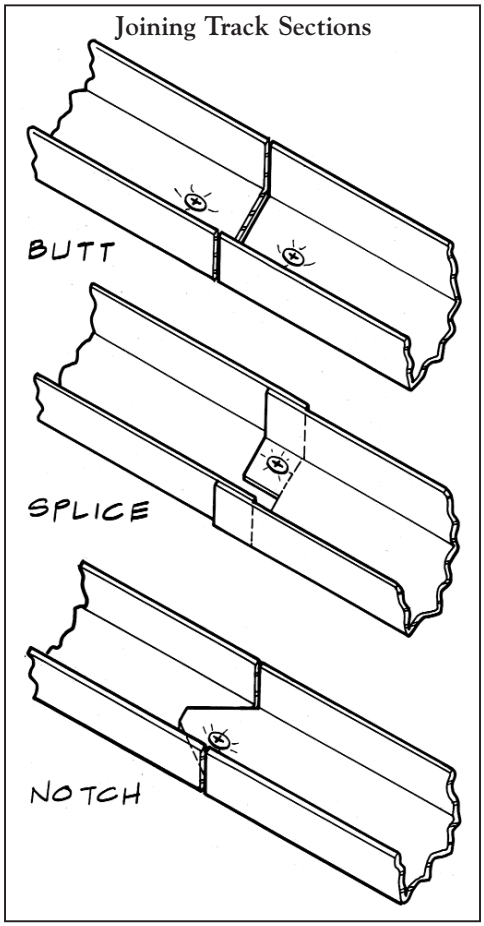

Figure 5. *Join sections of track by butting, splicing or notching.*

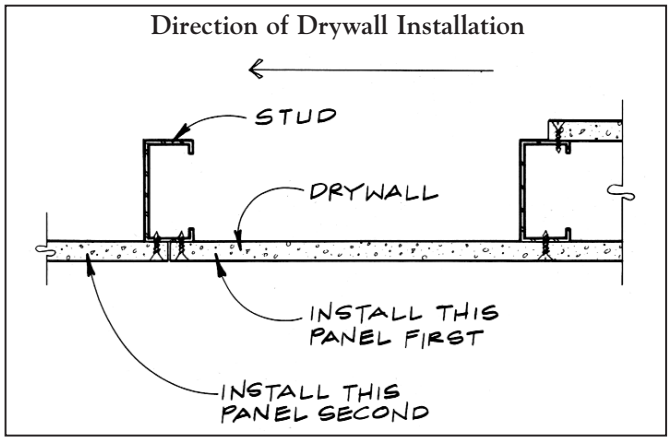

Figure 6. *Install studs so the C-sections are properly aligned for drywallers. Then install drywall in the correct direction. Otherwise, drywall will be bumpy.*

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Figure 7. *Plastic insulators protect wiring and small PVC pipes running through steel studs.*

Studs at door and window openings must face the opening. I like to hold the metal studs in a door or window rough opening back 1 1/2 inches on each side. Likewise, I hold the metal track for the rough door header up 1 1/2 inches. This allows me to use wood 2x4s for jacks and the header. I can screw through the metal studs and track into the wood or through the wood into the metal. This gives me a nailing surface for easier installation of wood pre-hung door or window units.

Backing, bridging, and bracing. Wood and metal fastened between studs can be used as backing for sinks, grab bars, shelving cleats, etc. Bridging or bracing may be required where stud lengths become too great.

Utilities. Electric, plumbing, and telephone lines must be installed in the stud cavities before closing in both sides of the partition. One advantage of using metal studs is the pre-punched utility holes in every stud. For electrical, some residential areas will allow the use of non-metallic sheathed cable (Romex) in conjunction with plastic "grommet" insulators (Figure 7). Check your local codes. Most commercial jobs use thin-wall conduit or some type of armored cable such as B-X or Greenfield.

Metal or plastic outlet boxes can be screwed or riveted to the stud. For plumbing, plastic pipes require protection like the grommets mentioned above. Chase walls can be built for larger pipes similar to those built with wood studs.

Sound control. Prior to hanging drywall in a basement, consider installing insulation for sound control. With 4-inch, unfaced fiberglass insulation for 3 5/8-inch studs, you'll have a "friction fit" between stud cavities. This will provide a STC-44 (Sound Transmission Class) if 5/8-inch gypsum board is properly installed on both sides of the partition. The recommended rating for bedrooms in private residences is STC-37. Keep in mind that ratings for the floor/ceiling assembly must be considered too. See the references at the end of the article for more information.

Code considerations. Code officials will check on-center screw spacing for drywall into studs, and spacing along the top and bottom track. Check local codes for fastener spacing requirements.

Screw spacing is also a factor in a wall assembly's fire rating. Since screws provide up to 350 percent more holding power than nails, you can space screws further apart than nails.

Code officials see a lot of jobs where the metal studs are not fastened to the track, but are held in place by the drywall. They call this a "friction fit." Acceptance of this practice varies, so check your local code.

Drywall and Trim

After the studs are installed, begin hanging drywall on one side of the partition. Leave the other side open for any plumbing or electrical work. The drywall can be installed horizontally or vertically. The USG specs say to use 1-inch Type S, bugle-head drywall screws when applying 1/2-inch gypsumboard to metal studs. However, the 1 1/8-inch length is the most commonly sold in this area.

Wood base, chair rail, and crown mold can be attached to partitions framed with metal studs. There are several ways you can fasten trim. One method uses Type S or S12 trim-head screws. These screws resemble the drywall version mentioned above, except they have a much smaller head for countersinking. This makes it easy to fill holes with stain putty. Trim-head screws are fastened through the trim and drywall into the metal stud or track.

If you'd rather not use screws, you can use an air nailer and construction adhesive. The air nailer tacks the trim in place while the adhesive cures.

Pros and Cons

I've used metal studs on both commercial and residential jobs. I particularly like the precision of the metal studs because you don't ever have to send a bowed stud back to the yard.

As I see it metal studs have the following advantages:

- ease of handling
- straightness
- pre-punched utility knockouts
- fire/moisture resistance
- reduced sawdust mess

Their cost is comparable to wood's, and they can be used horizontally for ceiling framing if need be.

But there are some disadvantages too, particularly during the "learning curve" when you're getting comfortable with a different material and methods. They require some tools not common to wood framing, and their sharp edges will cut you if you're not careful. Also they're not readily available in some areas.

On your first job with metal-stud framing, plan for some extra hours. The time you take to educate yourself may pay off on some residential work and may give you the versatility to begin doing more commercial work. I believe once you have tried remodeling with metal studs, you'll find applications on upcoming projects where this system will save your company time and money. ■

John Gaal is a journeyman carpenter and teaches full-time at the Carpenter Apprenticeship School in St. Louis, Mo. Also in St. Louis, Mark Rurtz of Negwer Materials and Mark Brennan of W.J. Brennan Co. assisted with portions of this article.

For More Information:

Drywall Contracting, J.T. Frane (Carlsbad, Calif.: Craftsman, 1987).

Fire Resistance Design Manual (Evanston, Ill.: Gypsum Assoc., 1984).

Gypsum Construction Handbook, Chicago: United States Gypsum, 1982).

Sound, Noise, and Vibration Control, L.F. Yerges (Melbourne,