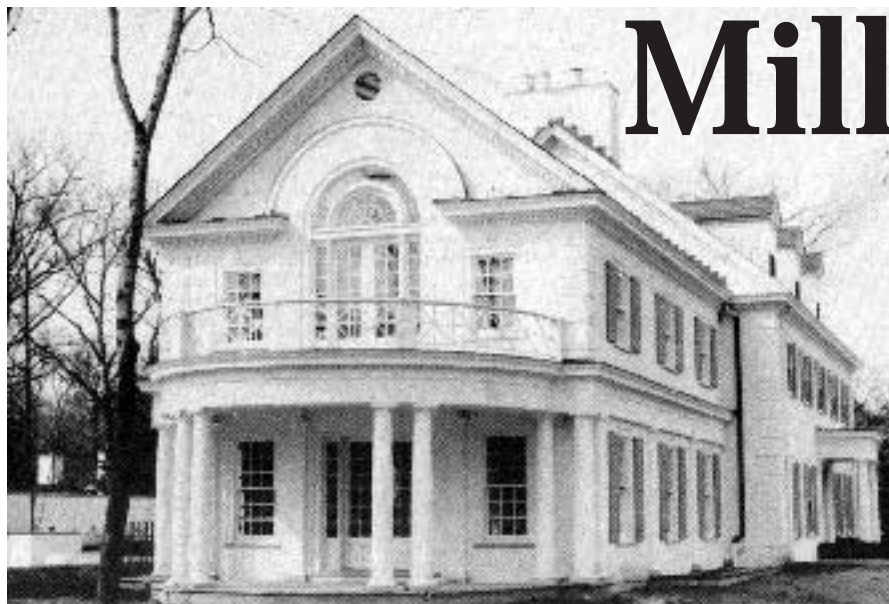




Discovering Architectural Millworks



With the help of a quality millworks, you can tackle just about any woodworking jobs that come your way

by Gary Eickman

I laugh when I hear that you can't find quality woodwork anymore. You can get it easily; it just costs you more than it did in 1900.

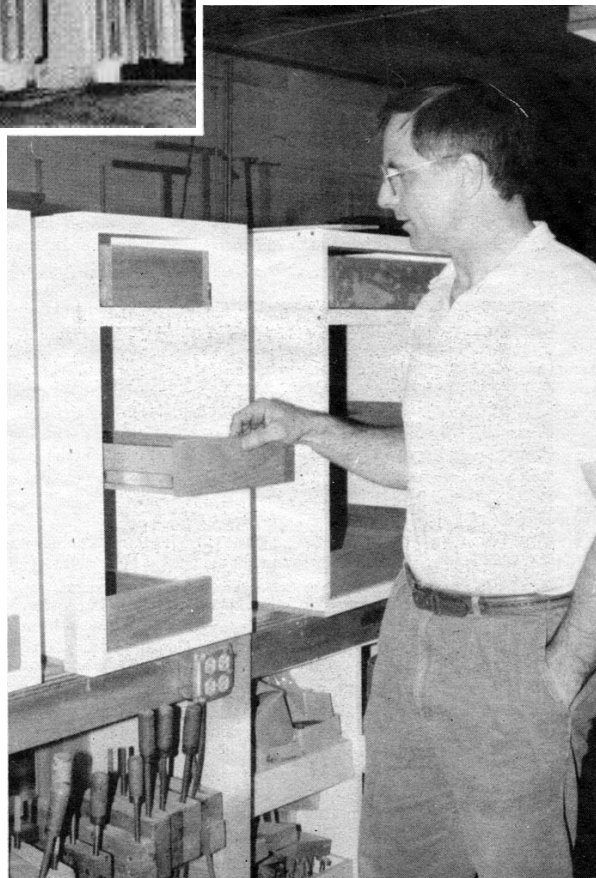
The specialty that produces custom woodwork is called architectural millworks. It's a trade that combines furniture making, cabinetry, door and window productions, custom laminate work, and production of any sort of molding, paneling, cornice, or dentil you could imagine.

Architectural millworks can do traditional, art nouveau, or ultra-modern interior and exteriors. We work with plastic laminates, corian, or any kind of wood or veneer. Most architectural millworks put the whole package together and install it.

Help for the Contractor

On many types of jobs we can compete with lumberyards. For example, we can make a custom entry door for \$400 to \$800, not much more than the lumberyard model.

More commonly, a contractor might come to us to have woodwork duplicated on a renovation job. If a contractor brings me some balusters, a porch rail, and part of a cornice, first I see if I have the knives to make the



The author's company made the windows, doors, dentil molding, cornice, architrave, and shutters (left), as well as the circular porch woodwork, to match the original. The author tests a drawer glide (right) on a new laminated cabinet fabricated in his shop.

Shop Tour



by Gary Eickman

Architectural millwork attracts tool collectors. These tools give us versatility and precision. They enable us to automate many tasks that a small shop ordinarily would do by hand.

Undressed lumber arrives in the bay

at the far end of the shop, which you can see at the top of the photo above. This is where milling and shaping take place. This mill area is set up very much like a millwork shop that runs moldings all day long. Everything in this area is

set up to handle long material. We can dress raw lumber, joint it, and rip it.

Ripped stock goes right off the straight-line rip into the molder (see Figure A). We have a six-headed molder which has a jointing and a flattening knife. Then it goes into four knives that do the profiles. What we like about this particular machine is that it lets us change the heads quickly. It's relatively easy to set it up for a 400- to 500-foot run.

The older American molders were push feeds, with the feed mechanism on the front of the machine. That made it more economical for long runs. But the older system took hours to set up and wasted a lot of material until you got the molder adjusted. Our pull-through molder works better for small shops.

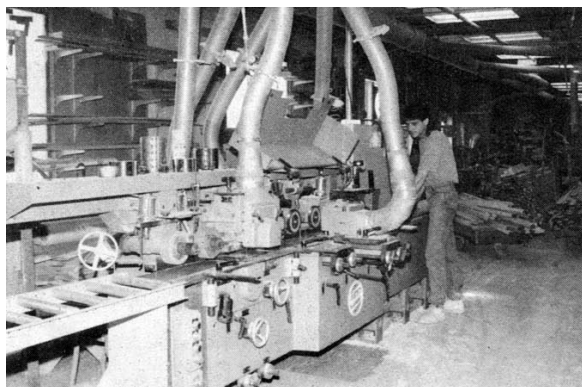
In the middle of the shop, panel, door, and cabinet parts are pre-cut. Here we have a rip saw/bandsaw, panel saw, a hydraulic stroke sander, a wide belt sander, and an edge sander. This setup allows us to have milling operations going on at the same time we're assembling cabinets, since cabinet assembly takes up a lot of space.

Assembly and finish operations take place in the front of the shop. Here we have a boring machine (see Figure B). The 32mm dowel-boring machine is used to assemble casework for frameless cabinets. It also does line boring and makes holes for shelf clips.

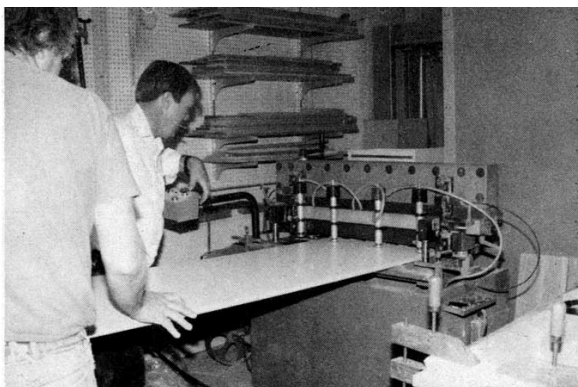
The 32mm work also requires an edge bander (Figure C). The machine puts veneer or plastic-laminate edges on cabinet doors or other laminate work. The machine melts glue and sprays it as the cabinet part is fed through the first station. At the second station it applies the tape and presses it on. At the next station, routers take off excess on the top and bottom of the panel. Then a final saw cuts off leading and trailing edges. Buffing wheels finish the taped edges. This tool replaces a hand-held iron and heat tape. The cheapest ones are \$20,000.

We also have a special section of the shop for making doors. When you're making doors for a whole house or several houses, you have space-consuming materials, but you need to do precision work on them. We use specialized tools for this.

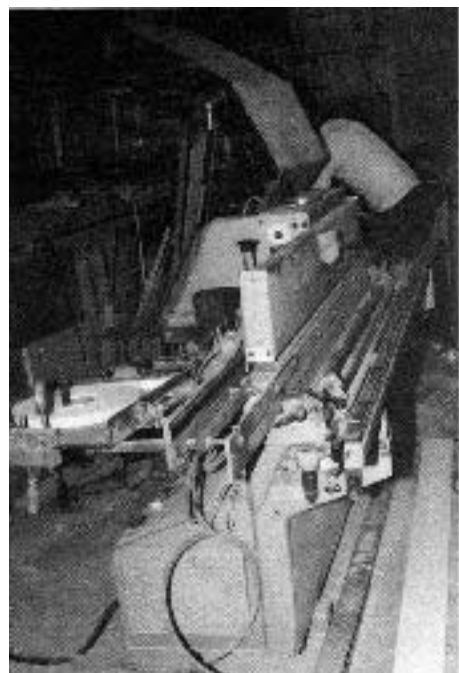
Our door and window maker, imported from Italy by Medalist (see Figure D), is primarily for doweled doors. It's a big shaper with a powered sliding table. The sliding table is used for the coping cut. All the heads are on it at one time: the panel rake, the cope, and the stick. You can put all cutters on at one time and go back and forth. In our shop, we do more tenoned doors. It's more convenient to make a cope and stick, and put in several dowels. What we need now is a dowel-boring machine that automatically will bore the holes in the end.



▲
Figure A. This pull-feed molder is quick to set up.



▲
Figure B. The dowel-boring machine drills holes in precise locations on the end of the panel.



◀
Figure C. The roll of plastic-laminate edging feeds through the edge bander. The machine automates application of veneer or formica edging.



◀
Figure D. The window-and-door maker automates production of coped joints.

moldings. If I have to cut new knives, it adds about \$100 to the job, depending on the intricacy of the knife. Then I have a lineal foot price for running the stock through the molder—60¢ per foot. There might also be a \$50 set-up charge if the job is less than several thousand feet. Finally, I charge for the cost of the wood. Some architectural millworks have many profiles already in stock, especially if the area has historic buildings.

For small custom work, mid-size shops like ours may be too expensive. But many small woodworkers can duplicate small quantities of molding in basement shops with simple tools, such as a Foley Belsaw. That's a good option for a few hundred feet of custom milling.

You can also use an architectural millworks for custom cabinets. We can make either face-frame or frameless cabinets. Shops such as ours can help you with curved kitchen cabinets, rounded Formica work, or curved islands. Most of the time when you need curved work (such as for moldings, casings, and jambs), you'll need an architectural millworks.

On high-end remodels, we sometimes do complete interiors, such as a paneled dressing room, library, or dining room. On this type of work, we double-check all measurements and build the interior to the architect's specs. We often install the work as well, taking responsibility for much of the finish carpentry off the general contractor's shoulders.

On architect-designed new homes, we may do all the woodwork (doors, jambs, cabinets, and moldings). This adds about 10 to 15% to the cost of a home built with lumberyard products. But the quality and custom features stand out. In general, the larger our volume of work, the more competitive we can be. For example, we just got an order for 2,500 window casing sets and 250 door jamb sets. On a job that size, we can give you a deal.

Quality Millwork Today

Architectural millworks set trends in design. A few years ago, for example, circle-top windows were only made by custom shops. Now, most window companies carry them. Today, we're seeing new trends in the kitchen cabinets we're fabricating. Soon these will be standard too. In general, the highest quality work is done in custom shops, especially those that follow the Architectural Woodwork Institute (AWI) standards. In written materials from this trade association, you'll find specifications for top quality work. The biggest change from traditional woodwork is that today's products have greater dimensional stability.

Flashy veneer. Some of the nicest woodwork today is done with veneer. Let's say you want to panel a library in an upscale home. He room will be much more spectacular with book-matched panels than with random paneling. Veneer provides greater design flexibility for paneled interiors than does solid wood. For example, you can only get the rich figure of burl in a veneer.

Better glue. Today's glues have excellent long-term performance. When we make an exterior door, for example, we glue the veneer with epoxy or one of the catalyzed, waterproof glues—Titebond 35 or Multi-bond W. Catalytic glues give a Type 1 waterproof bond; the wood rots before the glue fails. These glues dry fairly fast, and will set at temperatures down to

60°F. The other glue we use if we want a super strong glue is marine epoxy (West System 205). We mix it with fibers (West System 403 Microfibers) to hold joints together and fill gaps. The epoxy won't give, so the door won't sag.

New substrates. New, dimensionally stable substrates have eliminated problems with seasonal expansion and contraction. A veneer applied to the substrate never buckles or splits. I remember hating the word "particle-board." But now I recognize that it's a perfect substrate for veneering because it's stable.

The manufactured basswood core material we use for doors is also much more stable than solid wood. The bass-

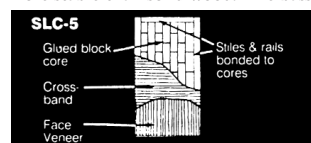


Figure 1. Glued-block basswood core material, purchased in large sheets, makes a stable substrate for solid-core doors.

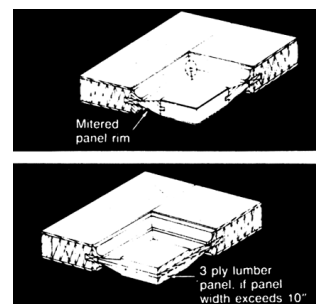


Figure 2. A mitered rim, fastened by a tongue-and-groove joint, stabilizes a raised panel (top). Rim mitering is required on panels over 10 inches wide in premium-grade woodwork. An alternative is a three-ply panel (bottom).

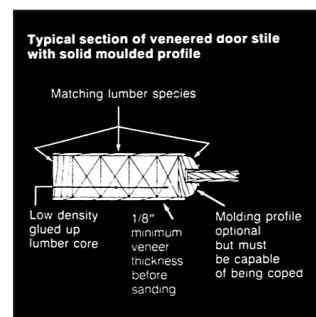


Figure 3. Rather than use solid wood, which is unstable, premium panel doors use veneered construction for rails and stiles. Solid lumber strips are glued to stile edges so the stile can be coped.

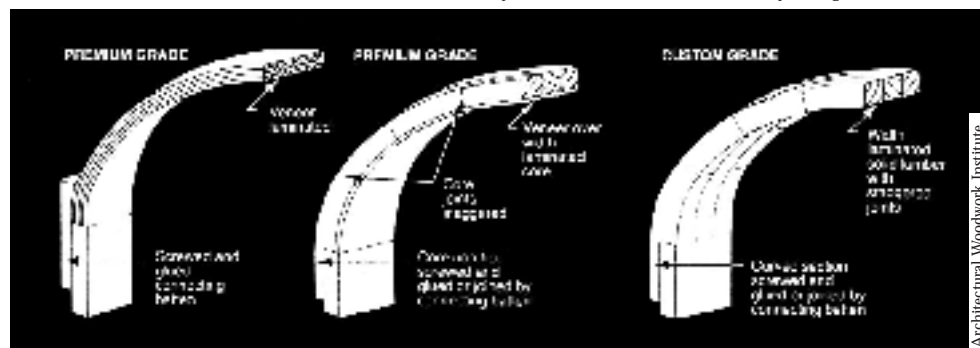


Figure 4. Circle-top windows follow specifications for premium and custom grades. Top-grade construction uses laminated veneers or veneer over a width-laminated core.

wood is prefabricated for doors—finger-jointed, moisture-proof glued, kiln-dried (see Figure 1). It comes in big sheets that we rip to the size we need.

Better panels. Because wood expands and contracts seasonally, any paneled room used to undergo yearly dimensional change. With a 30-inch-wide panel, you could get 3/8-inch movement. Traditional wide panels frequently cracked. Now panels are rim-joined; you'll never have cracks, even in big panels. "Rim-joined" is a specification for panels. Like a lot of other terms we use, it's unfamiliar to many contractors.

A panel can be made three ways, according to AWI. If the panel is under 10 inches, solid wood is acceptable. For premium grade and for panels over 10 inches, you must use a rim miter. The third method is to make a three ply panel. The inner and outer layers run with the wood grain. But a middle layer runs across the grain to keep the door or panel dimensionally stable (see Figure 2).

Warp-free doors. In a magazine ad I saw recently, a company said it only made entry doors out of solid wood. It is a common misperception that this is a premium-grade door. In fact, premium-grade exterior doors are all veneered. Period. A solid door is a lower-grade door, which is going to warp. Just as we use veneer to make rim-joined panels, we also use it to get more stable doors. We don't even make the stiles out of solid wood. Today's standards say you can use solid stiles on exterior doors only if you're using Honduras mahogany or pine.

Instead, we fabricate veneered-stile doors. On these you have 1/10- to 1/8-inch veneer above the basswood core. Solid wood strips are used on the edges of the doors. You can't tell the door is veneered (see Figure 3).

A solid-wood door is a mistake even on interior doors. If you have a solid oak door, it's a heavyweight. With veneered stile, the interior wood is pine or basswood, which is lighter, therefore making the whole door lighter and more dimensionally stable.

New cabinet styles. Cabinet styles and construction have changed considerably over the years. Today's frameless cabinets have a lot of advantages. They're easier to build, 30% cheaper, and have a larger capacity than older-style face-frame cabinets. Once you get the boxes mounted in the wall, they're just as strong as face-frame cabinets. Even without the face-frame, you have the back and dowels to provide stability.

With face-frame cabinets, you can have 61/2 inches taken up with frame—equivalent to a good size drawer. In addition, with a frame cabinet, it's more work to put on European sliding hardware. If you haven't installed frameless cabinets, you should talk to

an architectural millworks about their advantages. The European hinges work perfectly, are self-closing, and they're invisible.

Recognizing Quality

It's important for the general contractor or architect to understand what the specifications for woodwork mean. A shop like ours has trouble bidding against small shops who don't understand the specifications. Nine times out of ten, they pick the wrong way to do a job. That's where AWI comes in handy. Architects and contractors can get specs from AWI which can help them distinguish a top-notch job from an inferior job. Here's some examples of what to look for.

Millmarks. One of my pet peeves is mill marks left by poor milling. The AWI specs tell you how many mill marks are allowed for premium, for custom, and for junk. You can go through many homes and look at the trim, and you'll see mill marks all over the place. That's not even close to quality woodwork. The stock is going through the molder too fast or the knife is out of alignment. The work looks shoddy and it makes more work for the painter.

Miter joints. The AWI standards tell you the maximum allowable gap in a mitered joint. In premium, you can't have any more than 1/64-inch. For custom it's 1/32-inch. They also set standards for finishes.

Door standards. AWI standards describe how doors should be assembled. Custom doors are doweled; premium doors are mortised and tenoned. For flush doors you use cross banding and face veneer on the top. The cross-banding is usually poplar glued on horizontally. The finish veneer on top is glued to the poplar layer.

Curved elements. Different grades have been established for curved material (see Figure 4). Windows can be segmented, segmented with veneer, or all veneer.

Visualizing the End Product

In working with a millworks, it's important to know exactly what you're getting. To do so, you'll need to sharpen your ability to read shop drawings. Architects and builders who know how to read blueprints can still have a hard time reading shop drawings. The main difference between a shop drawing and a blueprint is the scale. If you haven't worked with shop drawings before, you won't be familiar with the details—or know what they mean for the finished product. Millwork companies don't always do shop drawings. But a company that knows how to do them should stand out from the rest because it understands how to translate the architect's small-scale elevations into full-scale drawings that show all the pieces and how they fit together.

Custom millwork prices are higher than you'd pay at the lumberyard. But when you need something out of the ordinary, we're there. You say you have a curved room, curved moldings, custom cabinets, and fancy Formica work? You're going to end up at an architectural millworks because they're the only ones that can handle it.

The shop drawings and the specifications are intertwined. The architect's specs come first. Then the architectural millworks does the shop drawings to flesh out the architect's plans. At this point we advise architects and contractors when details are not going to look good. If they take our advice, we can save a lot of grief.

We develop larger-scale details that go back to the architect and general contractor for approval; then we use these drawings to do our millwork in the shop. You can also use shop drawings to determine the specifications. But the drawings were usually made from the specifications. The drawings show what size plywood, which glue, which joints, and what size material will be used. The drawings almost tell you the sequence of construction. You can compare those drawings to AWI's specs and see if they fall short. You should also compare the written specs to AWI's specs.

On most jobs, the architect and contractor both have to sign off on shop drawings before fabrication begins.

Unfortunately, we find that many architects can't visualize traditional details, or picture the size and scale of cabinet subtleties.

I like to think every type of work is available to everyone. But unfortunately it's not. Custom millwork prices are higher than you'd pay at the lumberyard. But when you need something out of the ordinary, we're there. You say you have a curved room, curved moldings, custom cabinets, and fancy Formica work? You're going to end up at an architectural millworks because they're the only ones that can handle it.

Further Information

For more information about architectural woodworks, contact AWI (Architectural Woodwork Institute), 2310 S. Walter Reed Dr., Arlington, VA 22206; 703/671-9100. ■

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