CHAPTER 48

Installing Moulding and Trim

Objectives

After studying this chapter, you should be able to:

- Identify moulding types and purposes.
- Identify tools used for trim carpentry.
- Plan installation sequences.
- Install standing and running mouldings.
- Describe efficient work methods.
- Identify installation standards.

Technical Terms

base
butt joint
casing
chair rail
colonial-style moulding
coped joint
corner block
crown moulding
extension jambs
paint grade
picture rail
plinth block
profile
ranch-style moulding
reveal
reveal block
running mouldings
scarf joint
shoe moulding
stain grade
standing mouldings
stool and apron

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Figure 48-1. A traditional interior with multiple mouldings and decorative trim elements.

Installing mouldings, a task typically reserved for the finish carpenter, involves applying moulding around doors, windows, and other decorative trim items. Columns, corner blocks, plinth blocks, and corner guards are all examples of architectural elements commonly referred to as trim, **Figure 48-1**. Interior trim is one of the last items installed. Carpenters must work carefully to avoid damaging or dirtying walls, cabinets, and appliances. Fixing dents and scratches can be very expensive.

In this chapter, we will discuss the installation of standing and running mouldings. ***Standing mouldings*** are primarily vertically oriented mouldings found around doors and windows. ***Running mouldings*** refer to mouldings that run horizontally, such as base and crown.

48.1 Moulding Types

The majority of mouldings are standard profiles produced by large manufacturers. However, hundreds of variations exist. Common types of

moulding include base, casing, and crown. ***Base*** is installed where the floor meets the wall. ***Casing*** is used to surround and strengthen doors and windows. Casing differs from base in that it is narrower and thicker, and has eased edges.

Most homes utilize base and casing to cover gaps between doors, windows, and flooring. Spaces that are more traditional have additional mouldings such as crown, chair rail, and sometimes picture rail. ***Crown moulding*** is applied where walls and ceilings meet. It may also be used at the top of furniture or cabinetry. ***Chair rail*** and ***picture rail*** are horizontal mouldings that run along the walls.

48.1.1 Profiles

A ***profile*** is the shape of a moulding when viewed in cross-section. Profiles typically come in various widths to suit the scale of the space. For example, a 4″ to 6″ (102 mm to 152 mm) wide crown moulding might be used in a space with tall ceilings, whereas a 3″ to 4″ (76 mm to 102 mm) wide crown might look better in a room with 8′ (2438 mm) ceilings.

While many variations of moulding shapes exist (refer to **Figure 14-31**), there are two main styles: ranch and colonial. ***Ranch-style mouldings*** have flat or slightly curved faces with little surface detail. They are sometimes referred to as clamshell mouldings. ***Colonial-style mouldings*** have multiple coves, ogees, and fillets, which capture light and enhance shadows.

Stock Mouldings

Mouldings purchased from a home center or lumberyard typically include standard profiles produced by a large millwork manufacturer. They offer an array of shapes and sizes, often including multiple variations of a given profile. Stock mouldings can be combined to create unique profiles, but they may not match existing mouldings.

Custom Mouldings

When remodeling a building, it may be necessary to have a custom profile created. Use a profile gauge to copy the shape of the existing moulding, **Figure 48-2**. A millwork manufacturer will use this pattern to grind a knife to match the moulding. Generally, orders of 250′ or more are necessary to justify the cost of making the knife and setting up for a custom run.

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Figure 48-2. A profile gauge consists of a series of metal pins that conform to the surface of the moulding to replicate the pattern.

48.1.2 Materials and Lengths

Traditionally, mouldings were made from narrow lengths of solid wood. While this is still the case for most ***stain grade*** wood, composite materials such as MDF, plastic, or finger-jointed lengths of solid stock are common for ***paint grade*** material. Composite materials have the benefit of being available in long lengths (typically 16′), which are straight and uniform. They are also more stable and economical than solid wood.

Plastic mouldings are made from polyurethane, polystyrene, or polyester resins. They accept paint well and have the added benefit of being flexible. You will often find this material in installations that require trim to wrap around curved surfaces.

Mouldings are sold by the linear foot and are usually available in various lengths. The shortest is typically 7′ (2134 mm) for door casing. Most other mouldings are sold in 2′ (610 mm) increments, from 8′ to 16′ (2438 mm to 4877 mm). Always install the longest length possible to minimize joints. This is especially important with stain grade trim where differences in color and grain are more obvious.

Working Knowledge

Installers will often add up the total number of feet required, add a percentage for waste, and order that amount. Suppliers may provide random lengths, which the installer must decide where best to use.

48.2 Tools for Trim Carpentry

A number of tools are necessary to install mouldings successfully. These include hand and power tools. Traditionally, mouldings were cut with handsaws and attached with a hammer and nails. Carpenters are now able to get better results and work faster with power miter saws and pneumatically driven nail guns. While power tools are more efficient, an array of hand tools are still needed to achieve good results.

48.2.1 Hand Tools

The finish carpenter must carry and use tools from room to room. Their most important tool is a good quality tool belt. See **Figure 48-3**. This will keep frequently used items safe, and within easy reach. Common hand tools include:

- Block plane for shaving and fitting mouldings
- Pry bar to lift items and make adjustments
- Hammer (13–16 oz.) and nail set
- Tape measure (25′ recommended)
- Coping saw for joints
- Utility knife for cutting various materials
- Combination square or reveal block
- Scribe or compass
- Rasp and files for shaping mouldings
- Surform to shave drywall
- Electronic stud finder to locate framing
- Levels (various lengths)
- Marking tools, including a pencil and chalk line

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Figure 48-3. A tool belt and common tools used for trim carpentry, including quality kneepads.

48.2.2 Portable Power Tools

The power miter saw has become the most important tool for cutting moulding. It has evolved a great deal in the past 30 years. Newer models are lighter and have an array of features that make the job easier. (Miter saws are discussed in Chapter 22.) Look for models that slide for cutting wide boards, and tilt either one or both ways. The ability to tilt the blade helps when compound cuts are needed, such as with crown moulding. Many saws have optional stands or extension tables that support long lengths.

While most finish carpenters still carry a hammer, the majority of trim is applied with pneumatic nail guns, **Figure 48-4**. These can be cordless, or powered by compressed air. While cordless nail guns are noisier and less convenient, they provide the longest service life. Having two or more nail guns with different sized nails will speed the installation and reduce the chances of splitting the trim. Longer nails are necessary when nailing into framing. Use smaller nails (brads) on delicate parts of mouldings, or to reinforce corners.

Safety Note

Drain portable air compressors daily. Moisture can build up in the tank, causing rust, which can corrode the steel.

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Figure 48-4. Using a pneumatic nail gun to install trim.

A Robert Bosch Tool Corporation

B Robert Bosch Tool Corporation

C Robert Bosch Tool Corporation

Figure 48-5. Laser levels are common on the jobsite. A—Point lasers are useful for transferring locations. B—Rotary lasers can project horizontal and vertical lines 360°. C—Using a rotary laser to establish plumb and level.

Hand levels are useful in many situations, but when it is necessary to mark a level or plumb line within a room, a laser level is more effective. They are useful for setting cabinets and wall panels, and determining how flat a floor or ceiling is. There are many types available, including units that project a spot, line, a combination of these two, or rotary lasers that project 360° lines both horizontally and vertically, **Figure 48-5**. Lasers offer the advantage of speed, and they do not leave visible marks on the work surface.

48.2.3 Stationary Tools

Most jobsites are not set up with stationary tools. However, many tools designed for portable use can be mounted to a benchtop or stand to make them more useful. For example, the portable power plane shown in **Figure 48-6** can be turned into a small jointer. Another common tool is the jobsite table saw, which can be equipped with extension tables for safely cutting large panels.

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Figure 48-6. This portable power plane has a special bracket, allowing it to function as a small, benchtop jointer.

Work surfaces are very important for the finish carpenter. Portable tables provide a flat surface for clamping and assembling trim. Stools can be used for cutting and shaping trim, and provide an extra step when you need to reach the top of a cabinet or door. See **Figure 48-7**.

48.2.4 Maintaining a Safe Working Environment

Trim carpenters must be able to work safely at various heights. This often requires the use of ladders and scaffolding. See **Figure 48-8**. Avoiding injury is your number one concern. Proper clothing and personal protective equipment (PPE) are necessary to stay safe. Always wear safety glasses. Use hearing protection when working around loud noises. Hard surfaces can reflect high-pitched noises that quickly

A Patrick A. Molzahn

B Patrick A. Molzahn

C ungvar/Shutterstock.com

Figure 48-7. A trim stool can be used to store tools, shape mouldings, and as a step to reach the tops of doors and cabinets when installing moulding.

damage hearing. Other PPE items include work boots with puncture resistant soles, and kneepads. Installing trim requires a lot of kneeling, especially when running base mouldings.

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Figure 48-8. Finish carpenters frequently use ladders and scaffold to install trim.

Safety Note

Workers must be protected by guardrail systems, safety net systems, or personal fall arrest systems, even when not engaged in leading edge work, if they are on a walking or working surface that is 6′ or more above a level where leading edges are under construction (OSHA 29 CFR 1926.501(b)(2)(ii)).

Keeping the jobsite clean and organized will reduce the chance of injury and help create better results. Make a point to clean frequently. This will also keep your client happy. Sweeping can cause dust to become airborne. Vacuuming is preferred, **Figure 48-9**. In either case, it is good to have a respirator available when needed. Also, have a first aid kit on hand should an injury occur. Splinters are also a common occurrence when working with wood. Quality tweezers and a supply of bandages are a necessity.

Finally, with multiple power tools in use, electrical safety is extremely important. Make sure all extension and tool cords are in good condition. Look for nicks in the insulation, and never use a cord if it is missing a ground plug. At the end of the day, you will need a place to store your tools. To avoid having to carry them back to your vehicle each day, you

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Figure 48-9. Keeping a clean site will improve safety and overall results.

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Figure 48-10. Inspect the rough frame before drywall is added to look for areas that may need blocking, or framing members that are not straight.

might consider investing in a lockable, jobsite stage box. This will reduce the chance of theft, provide peace of mind, and save valuable time.

48.3 Planning the Installation

The success of a good installation rests on proper planning. This includes visiting the site ahead of time, ordering the necessary materials, ensuring they are delivered when needed, and are properly stored on the jobsite.

48.3.1 Inspecting the Rough Frame

Many years ago, the same person who built the frame also did the trim work. They took extra care to make sure the walls were plumb and the floor and ceiling were level because they knew it would make their work much more difficult if the framing was not installed accurately. Now, with dozens of specialized trades, it is rare that the same person will install both the rough frame and the trim. As a result, things like adding blocking to attach mouldings to are often overlooked. When possible, try to inspect the rough frame before the space is drywalled. See **Figure 48-10**.

Take the time to verify opening sizes and double check for plumb, level, and square. You might also mark the locations of wall studs on the floor with paint. Digital cameras are useful for documenting the built space, providing a helpful resource to refer to later when attaching trim.

48.3.2 Cutting and Joining Mouldings

The are several ways to assemble mouldings, **Figure 48-11**. Miter joints are used for outside corners. Do not assume a corner is 90°. Always check with a square, or use two precut pieces of moulding to test fit. Angled walls can be checked with a T-bevel or angle finder. It is the finish carpenter's responsibility to cover up inaccuracies, provided they do not exceed standard tolerances. When possible, reinforce miters with mechanical fasteners, such as biscuits and glue. This will depend on the thickness of the material. Many mouldings are too thin for plate joinery. In this case, use small brads to pin corner joints from either the faces or edges.

Coped joints are preferred for inside corners, especially base. This involves making a face miter and then using a coping saw to cut the profile so it mates tightly with the adjoining moulding when butted together, **Figure 48-12**. While some carpenters miter inside corners, the joint will quickly open up when bumped with a vacuum cleaner. Coped joints are never glued. They stay tight because they are installed with a slight amount of pressure.

There are two ways to join mouldings when a wall requires a length greater than the longest piece of moulding. You can either butt two pieces together, or create a scarf. The ends of a ***butt joint*** are cut at 90° to the face. These joints should be reinforced to keep the faces flush. Plate joinery is recommended if the moulding is thick. ***Scarf joints*** involve cutting a bevel on each piece. While most scarf joints run vertically, an angled scarf joint may be used on stain-grade crown moulding to help blend the grain

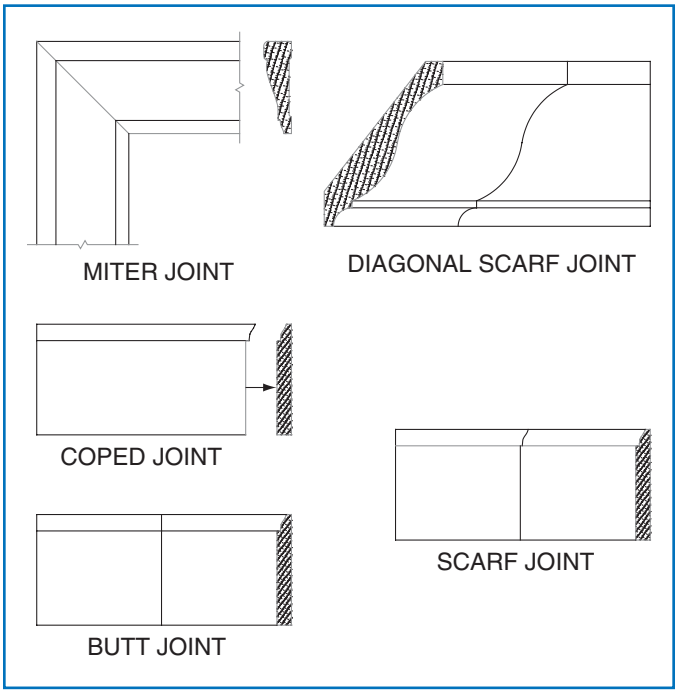

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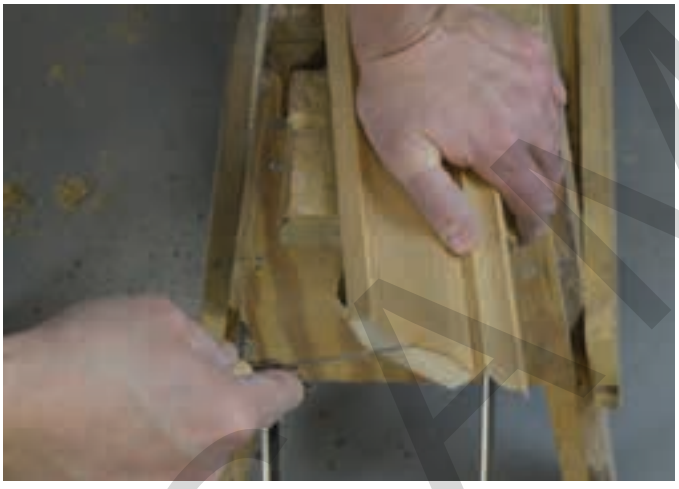
Figure 48-11. Common ways to assemble mouldings.



A Patrick A. Molzahn

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Figure 48-12. Coping crown moulding. A—Follow the edge of the face miter, angling the saw back from the face. B—Fine-tune the fit with a rasp.

appearance between the two pieces. Scarf joints provide better glue surface than butt joints. Whichever you choose, plan the joint so that it lands on a stud. This allows both pieces to be fastened securely to the structure.

48.3.3 Attaching Mouldings

Mouldings can be attached with nails, trim screws, or adhesives, **Figure 48-13**. Nail sizes are covered in Chapter 20. Common sizes include 15 or 16 gauge nails, 18 gauge brads, and 23 gauge pins. These vary in length from 3/8″ to 2 1/2″ or more. Trim screws are useful when attaching wood mouldings to steel studs. They leave a larger hole than nails, but much smaller than a bugle head screw, which is unsightly and should never be used for installing trim. Construction adhesive may be used when there is no framing to nail into.

Other adhesives include carpenter's glue (aliphatic resin), epoxy, hot-melt glue, and polyurethane. The advantages of some adhesives can often be combined to create a secure, long-lasting joint. For example, an outside corner for crown moulding can be preassembled and glued with epoxy. Use hot-melt to glue a wood block coated with epoxy on the backside of the moulding. The hot-melt will hold the block in place while the epoxy cures. The result is a strong joint with no visible fasteners.

Another method is to use a mechanical fastener that is hidden. In this example, a special biscuit joiner creates a slotted groove that accepts a barbed, plastic fastener. Work carefully to achieve accurate alignment. When the assembly is ready, the joint is pushed together. See **Figure 48-14**.

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Figure 48-13. Common fastening methods for attaching mouldings.

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Figure 48-14. This fastener clips together and holds the moulding in position while the adhesive sets.

48.3.4 Sequencing the Installation

In most cases, standing mouldings are installed first, because running mouldings often terminate into them. For example, base will typically butt into the casing on a door. Begin by installing casing for doors and windows. However, if crown moulding is part of the install, you may want to work from the top down. In this way, you are less likely to damage a moulding or surface if you accidentally drop a tool.

In addition to deciding which type of moulding to start with, installers must decide on the order they plan to install individual mouldings in a room. This is especially important with running mouldings such as base and crown, since they will require multiple joints. The goal should be to reduce the number of joints whenever possible by using the longest lengths of material available. This will minimize color differences and profile variations that can occur between pieces when joining mouldings. The installer should also consider which joints are most visible. This will vary based on the viewing angle as you enter a room.

Figure 48-15 shows the floor plan of a room, with the recommended installation sequence and joint types. Start with the wall opposite the entrance.

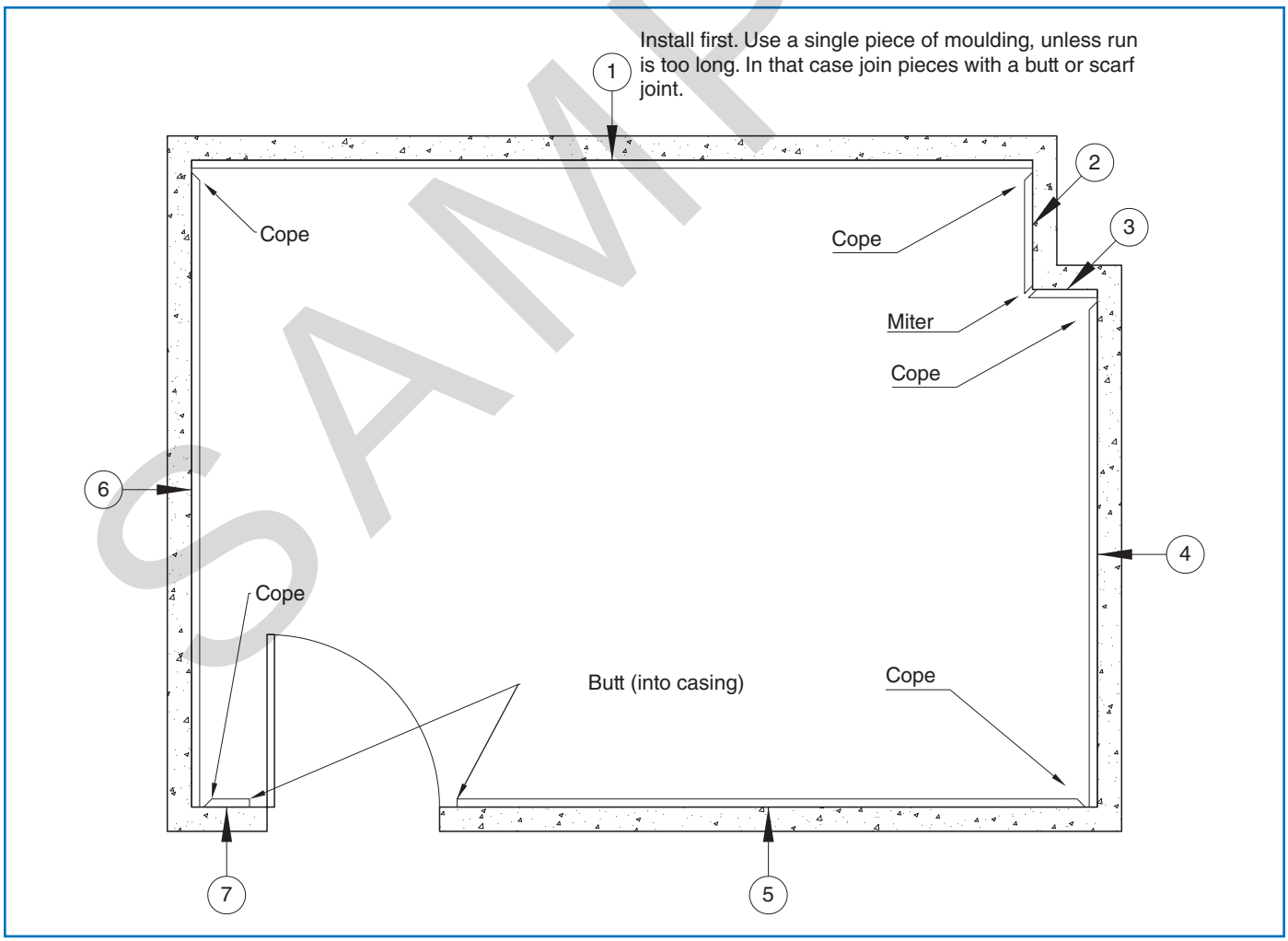

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Figure 48-15. Common moulding sequence and joinery for a room.

Install a length of running moulding along this wall. Then decide if you prefer to work clockwise or counterclockwise. This decision is often driven by personal preference. The ends of the mouldings are typically coped when they butt into the previous piece installed. Consider carefully where joints occur. It is better for cope joints to be placed away from direct view for best results. Avoid situations that require both ends of a piece of moulding to be coped. These joints are more difficult and time consuming to create accurately. If possible, leave the moulding long so the joint can be tested for fit, then cut to length.

48.4 Installing Standing Mouldings

Casing around doors and windows are the two most common applications for standing trim. There are different ways to install casing. Depending on the type and style of mouldings used, some installers prefer to preassemble and glue the joints on a bench or table, which provides an easy to reach, flat surface on which to work. This avoids the necessary step of fitting compound bevels, as well as a lot of time spent climbing up and down ladders or scaffolding. Preassembled moulding will not always fit flat against the wall if the surface is not in the same plane as the door or window jamb, making it necessary to caulk any gaps. For this reason, preassembly is better suited for paint-grade trim.

48.4.1 Casing a Door

Most doors will have either mitered casing, or butted casing. Butted casing uses square corner blocks, and often has plinth blocks at the base of the door. See **Figure 48-16**. Begin by marking the ***reveal***. This is the space from the inside edge of the jamb to the spot where you will place the inside edge of the casing. The reveal is typically 1/8″ to 1/4″ (3 mm to 6 mm). Check to make sure the reveal is wide enough to clear the hinge knuckles. Choose a dimension and keep it consistent throughout the project. Use a combination square, or make a ***reveal block*** by routing a rabbet on two sides of a scrap piece of wood with your preferred dimension. Make several light pencil marks at 16″ to 24″ (406 mm to 610 mm) intervals along the jamb, and at the corners where the trim will meet. These will help you align the trim parallel with the jamb. Mark lightly, as all pencil lines must be removed after installation.

For mitered casing, you can either start at the top by cutting the head casing to length and tacking it in place, or you can work around the opening as described here. If the finished floor is already installed, make a clean, square cut at the end of the moulding. The first couple of inches at the beginning and end of a piece of moulding will often have defects. Provided you have enough extra length, cut about 2″ (51 mm) of material off. Hold the moulding up to the door and check the fit at the floor. If there are no gaps, mark the inside corner at the top and cut the miter. Nail the moulding to the jamb in a couple of places using 1″ to 1 1/2″ (25 mm to 38 mm) brad nails, deliberately staying about 12″ (305 mm) away from the miter to allow for minor adjustments when fitting the top casing.

A *Patrick A. Molzahn* **B** *Patrick A. Molzahn*

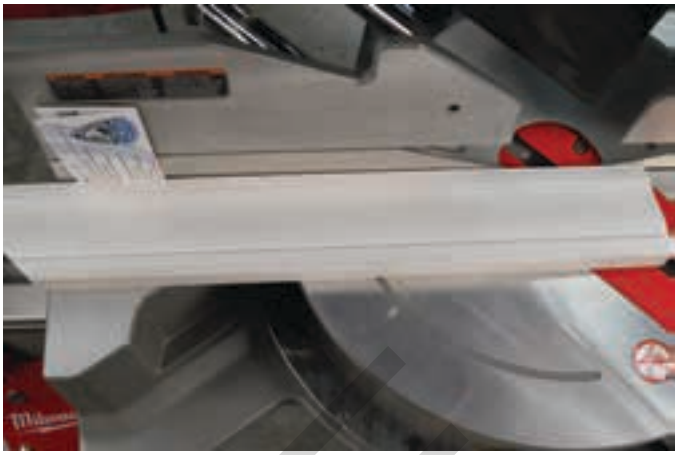
Figure 48-16. Two options for casing a door. A—Mitered corners. B—Butted casing.

Working Knowledge

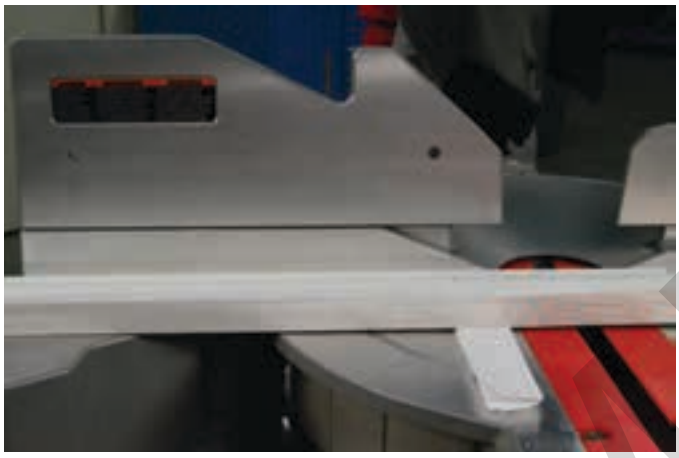
Miter angles can be adjusted without changing the saw settings, **Figure 48-17**.

- Use a folded piece of paper or card stock to increase or decrease the miter angle. Fold the paper as needed to adjust the angle. See **Figure 48-17A** and **Figure 48-17B**.
- Place a shim under the moulding near the blade to create a slight back bevel. See **Figure 48-17C**.
- Shim the moulding farther from the blade to create a face bevel. See **Figure 48-17D**. This technique also works well for adjusting vertical mouldings such as base when walls are slightly out of plumb.

A Patrick A. Molzahn



B Patrick A. Molzahn



C Patrick A. Molzahn

D Patrick A. Molzahn

Figure 48-17. Adjusting miter and bevel angles without adjusting the saw.

Safety Note

Use caution when placing shims so they do not get caught in the blade.

Now cut the mating miter on the top casing and check for fit. If a slight adjustment is necessary, either recut the moulding with the miter saw or use a low-angled block plane to remove material. Often the moulding will not sit flat against the wall, making it necessary to plane the miter at a slight bevel, removing material from either the face or back of the miter. Once the joint fits tightly, cut the opposite miter and install like the first piece. Add glue to the miter before assembly, and cross pin the corner with brads whenever possible to keep the joint aligned.

The final step is to cut the opposite vertical casing. Remember to make a clean end-cut and check the fit with the finished floor before cutting the miter. Hold the moulding in place to mark the length. When cutting the miter, leave the moulding about 1/16″ (1.5 mm) long. This will provide extra material in case the miter needs to be trimmed to fit. When the joint is tight, complete the assembly as before by gluing and pinning the corners. Use 2″ to 2 1/2″ (51 mm to 63 mm) casing nails on the outside edges to secure the moulding in place. Mouldings should be nailed approximately every 12″ (305 mm) along the inside and outside edges.

Working Knowledge

Distributing nails evenly and aligning them horizontally and vertically is the sign of good workmanship.

The process for installing door casing with plinth and corner blocks is similar to installing mitered casing, only easier. Once the reveal has been established, secure the plinth blocks in place. A ***plinth block*** is a rectangular length of material, slightly thicker and wider than the casing, located at the base of a door, **Figure 48-18**. This trim element provides a good way to terminate the base and casing. If carpeting is to be installed, keep the plinth about 3/8″

WHYFRAME/Shutterstock.com

Figure 48-18. A plinth block at the base of this door provides a way for the base moulding to terminate nicely.

(10 mm) above the subfloor so installers can tuck the carpeting under the moulding. The same should be done when installing mitered casing.

With the plinth blocks installed, hold the corner blocks in place and mark their locations. Like a plinth block, a ***corner block*** is an architectural element installed at the upper left and right corners of a door or window. The top and side casings are cut to length, and should fit tight to the blocks. Corner blocks are slightly thicker than the casing and often have surface relief, such as a circular profile in the center. Install them with 2 1/2″ (63 mm) casing nails.

48.4.2 Casing a Window

Casing a window is similar to casing a door. There are two main styles of casing: picture frame, and stool and apron. With picture frame casing, all four corners are mitered. ***Stool and apron*** casing involves installing a stool, or flat interior sill at the bottom of the window, **Figure 48-19**. An apron moulding is installed on the wall below the stool. This may be flat, S4S stock, or profiled casing. The head casing is either mitered, like picture frame, or joined with corner blocks.

Before casing a window, check the opening for square by measuring the diagonals. Jambs can become bowed due to excessive insulation. Use a straightedge to check. Finally, examine the jambs to see if they are in the same plane as the interior wall surface. ***Extension jambs*** may be needed. These are simply S4S pieces of material nailed into the jambs to make the window unit flush with the wall surface. Bowed framing can cause slight variations. Differences of up to 3/16″ (4.5 mm) can usually be accommodated by cutting and shaving the drywall. This often results in compound miter joints, but that is part of the finish carpenter's challenge.

Kristen Smith/Shutterstock.com

Figure 48-19. The parts of the stool and apron casing.

Picture frame casing may be installed piece by piece, or prefabricated on a flat surface and installed as a single unit. To install piece by piece, start by marking the reveal along the face of the jamb. Then cut the head casing to length, miter both ends, and tack in place with 18 gauge brad nails. Fit the left and right top miters of the sidepieces, using your block plane to make minor adjustments. When the miters are acceptable, mark the length and cut the miter at the lower end. Then glue and nail the moulding in place, cross pinning the corners to reinforce the joint. Fit the lower miters, and secure. Complete the assembly by nailing the outside edges of the casing to the framing with 2 1/2″ (63 mm) casing nails.

Preassembly of picture frame casing is usually faster than piece-by-piece installation, **Figure 48-20**. If the casing is thick enough, the corners can be reinforced with plate joinery. While preassembly has advantages, the miters cannot be adjusted when surface variations between the jamb and wall exist, often resulting in gaps between the casing and wall or jamb. When using paint-grade mouldings, these gaps are easily caulked. However, with stain-grade moulding, the gaps are not as easy to hide.

Working Knowledge

Seasonal wood movement can cause miters to open up, especially in winter when wood is driest. The joint will usually return to normal in summer. See **Figure 48-21**. Reinforced miters have less tendency to open.

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Figure 48-20. Preassembling picture frame casing. Notice the spring clamps used to pull the miters tight during assembly.

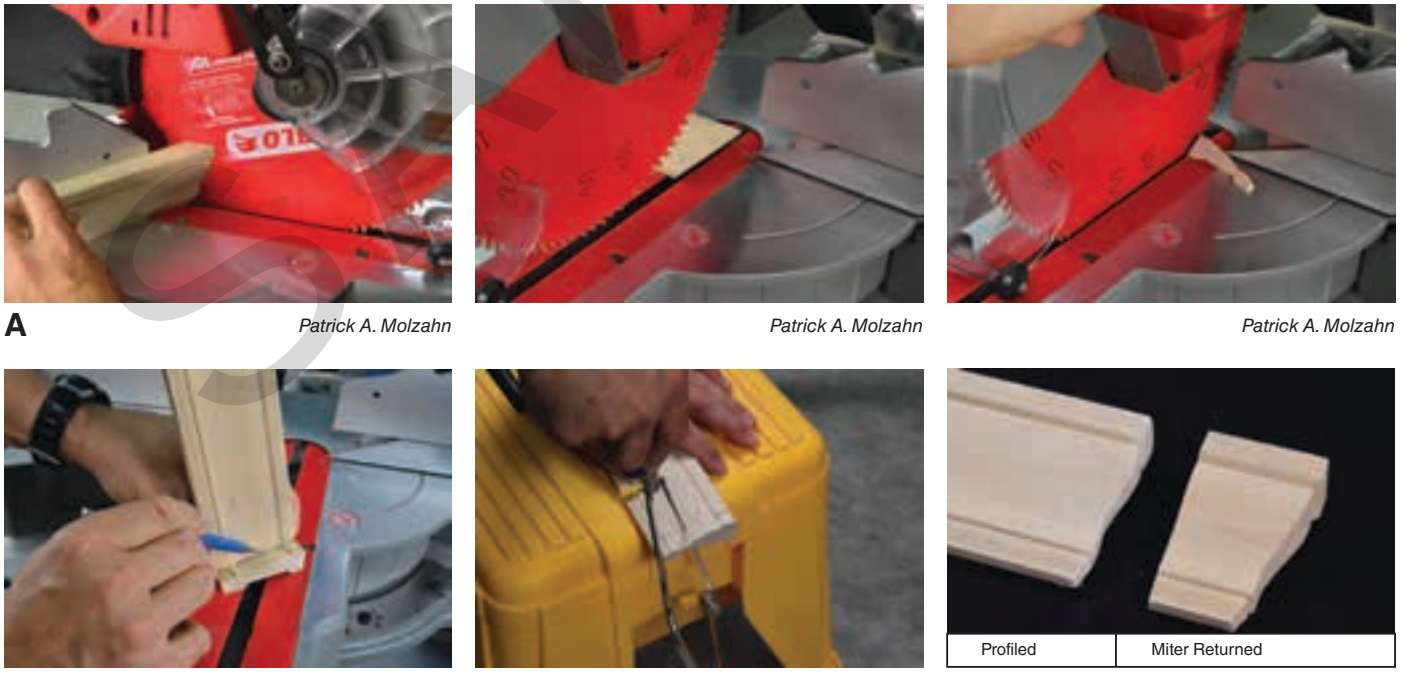
A Patrick A. Molzahn B Patrick A. Molzahn

Figure 48-21. Miter joints can change from season to season. A—This joint opens up in the winter months. B—The same joint in the summer months.

Start stool and apron installation by fitting the stool. Determine the overall length by measuring the interior from jamb to jamb, adding the reveals and casing widths, and adding an additional 1/2″ to 1″ (13 mm to 25 mm) beyond the casing. The stool extends past the wall surface, and must be notched to fit the window opening. The ends of the stool are called horns. They are typically miter-returned to the wall. Areas not covered by casing need to be scribed tight to the wall. When the stool is properly fit, secure it in place by nailing into the sill framing.

The apron is installed below the stool, providing support and visual balance. The ends of the apron should line up with the outer edges of casing. The apron may be S4S material, or profiled casing. Some paint-grade installations allow it to be simply cut to length, but stain-grade material should be miter-returned, **Figure 48-22A**. Cut a miter on a piece of stock. Then make a square cut to release the miter. This small piece is glued to the end of the moulding to create an attractive, decorative return. Use pins to secure in place for added reinforcement.

Miter returns can be time consuming to cut and assemble. They can also fail over time if not adequately attached. Some carpenters opt to profile the moulding instead. While this will reveal end grain,



A Patrick A. Molzahn Patrick A. Molzahn Patrick A. Molzahn

B Patrick A. Molzahn Patrick A. Molzahn Patrick A. Molzahn

Figure 48-22. Two ways to terminate an apron moulding. A—The process for cutting a return miter. B—Laying out and making a profile cut.

there are no added pieces to fall off. This technique is most common when installing paint-grade work, as the end grain can be easily hidden with paint. Trace the shape of the moulding on the end to be cut. Using a coping saw, cut the profile to make it look like a miter return, **Figure 48-22B**.

Working Knowledge

If end grain is exposed, prefinish the wood before installation. It is much easier to coat the end of a piece of trim when it is loose, than to have to carefully coat the end without getting finish on the wall, once the trim is installed.

Stool and apron assemblies may include an additional moulding to cover the joint between the stool and apron. This narrow moulding can flex to adjust to any irregularities. With the bottom of the window trim complete, install the side and head casings as described previously.

Arched casings present an additional challenge. To find the miter, temporarily hold the mouldings in place and trace their inner and outer edges. Connect the points where they intersect to find the miter angle, **Figure 48-23**. Transfer the angle to the mouldings directly from the layout, or with a T-bevel.

Cutting the straight casing is easy; simply adjust the miter saw to the proper angle. The curved casing presents a bit of a challenge. Use a scrap block or a clamp to hold the moulding secure on the saw. Adjust the miter angle until it aligns and make the cut, **Figure 48-24**. Use your block plane to make minor adjustments. Variations in the flushness of the mating surfaces may also exist. Use rasps, sandpaper, or other tools to shape and align the faces.

Patrick A. Molzahn

Figure 48-24. Cutting a miter on curved casing. Two points of contact are necessary when cutting to ensure the moulding does not move during the cut.

Safety Note

Curved mouldings must be properly supported when cutting. Use a shim or clamp the moulding in place to make sure it does not rotate accidentally when cutting. One or more support rollers should be used to keep long mouldings from tipping.

A *Patrick A. Molzahn* **B** *Patrick A. Molzahn* **C** *Patrick A. Molzahn*

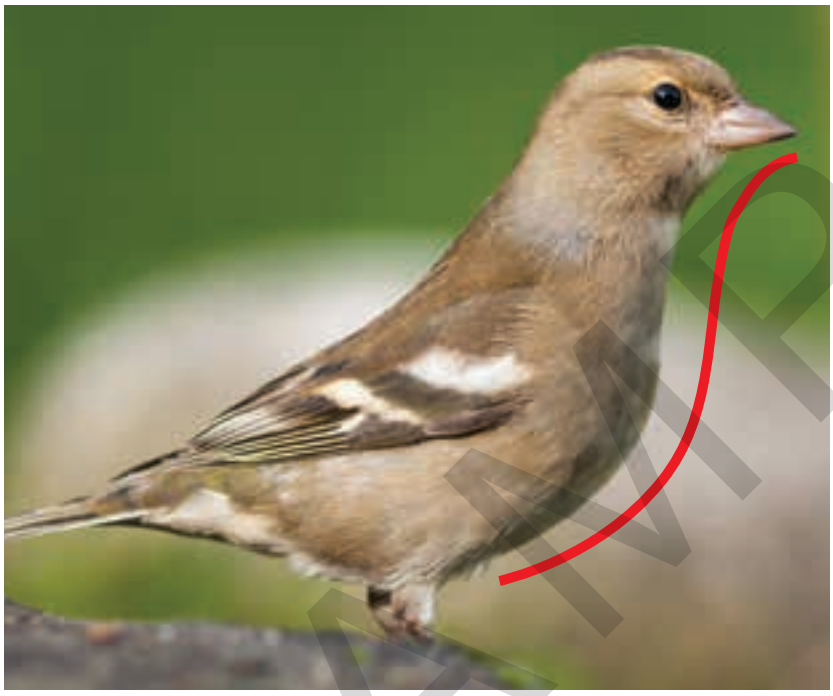
Figure 48-23. Determining the angle where straight and curved casing meet.

48.5 Installing Running Mouldings

Running mouldings include horizontal mouldings like crown, base, and chair rail. Of these, crown is the most difficult to cut and install. It will also require ladders or scaffolding to reach ceilings and high spaces. Unlike standing mouldings, running mouldings are typically cut slightly longer when joining long runs. This puts pressure on the joints to help ensure they stay tight.

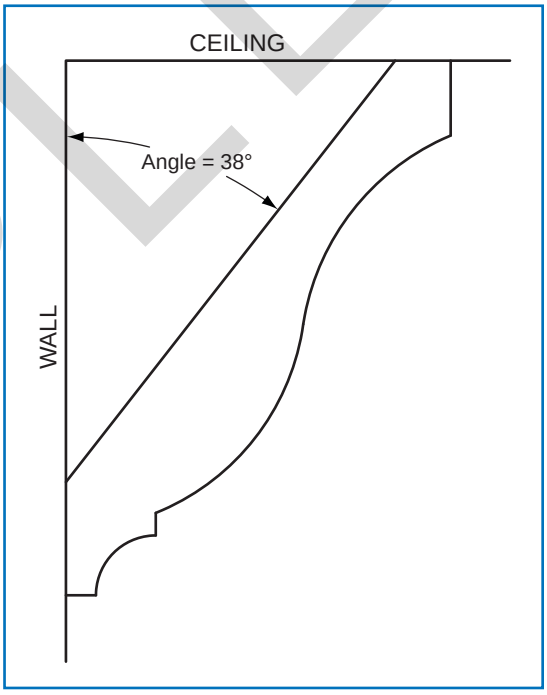
48.5.1 Installing Crown Moulding

Crown moulding can be cut either flat or at an angle. When cut flat, the saw must be set to a compound angle. See **Figure 48-25**. Cutting flat is especially useful for wide mouldings. The first step in cutting crown is to determine the projection. Most crown projects at a 38° angle from the wall, though some crown mouldings are designed to angle 45°. Hold the moulding with a square to find how far the moulding projects from the wall and how far down from the ceiling. Record these measurements.



A

Rob kemp/Shutterstock.com



B

Patrick A. Molzahn

Angles for Cutting Crown Sitting Flat on Dual-Bevel Sliding Miter Saw (Top of moulding rests against fence for all cuts)

Crown Angle	Right-End Cope or Left-End Miter		Left-End Cope or Right-End Miter	
	Miter Angle	Bevel Angle	Miter Angle	Bevel Angle
38°	31.6° right	33.9° left	31.6° left	33.9° right
45°	35.3° right	30° left	35.3° left	30° right

Note: Even though all these angles are standard, the corners are not always exactly 90°. You may need to "fine tune" these settings and make necessary adjustments to the cutting angles.

C

Patrick A. Molzahn

Figure 48-25. The original inspiration for crown moulding came from seeing a bird perched atop a building. A—This visualization will help ensure you never install crown moulding upside down. B—Typical crown mouldings project at either a 38° or 45° angle. C—Standard miter and bevel settings for cutting crown in the flat position on a compound miter saw.

FESTOOL

Figure 48-26. This saw is equipped with a crown stop and vertical clamp to position and hold the moulding while cutting.

The other way to cut crown is to angle it against the table and fence on your miter saw. The bevel angle is set to 0°, and the miter angle for a 90° corner is set to 45°. The moulding must be cut *upside down and backward*. Mark the stock clearly, because mistakes are easy to make. For repeat cuts, use a stop block on the saw's table to ensure that the moulding is consistently aligned. Minor variations when cutting can complicate the fitting of joints. Some saw manufacturers have optional accessories for holding crown moulding at the correct angle, **Figure 48-26**. Alternatively, you can make your own wooden fence.

Before installing crown, check the ceiling for flatness. It may be necessary to establish a level line to keep the installation uniform. A rotary laser is a useful tool for this. Also, verify that blocking is in place to nail the moulding. A wood backer can be screwed to the wall and/or ceiling if necessary for nailing.

Start with a length of straight moulding, ideally long enough to cover an entire wall. Minimize joints wherever possible. Inside corners should be coped. Cope cuts on crown moulding require more of a back cut than other mouldings due to their curved

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Figure 48-27. Using a short length of coped moulding to check the fit of an inside corner.

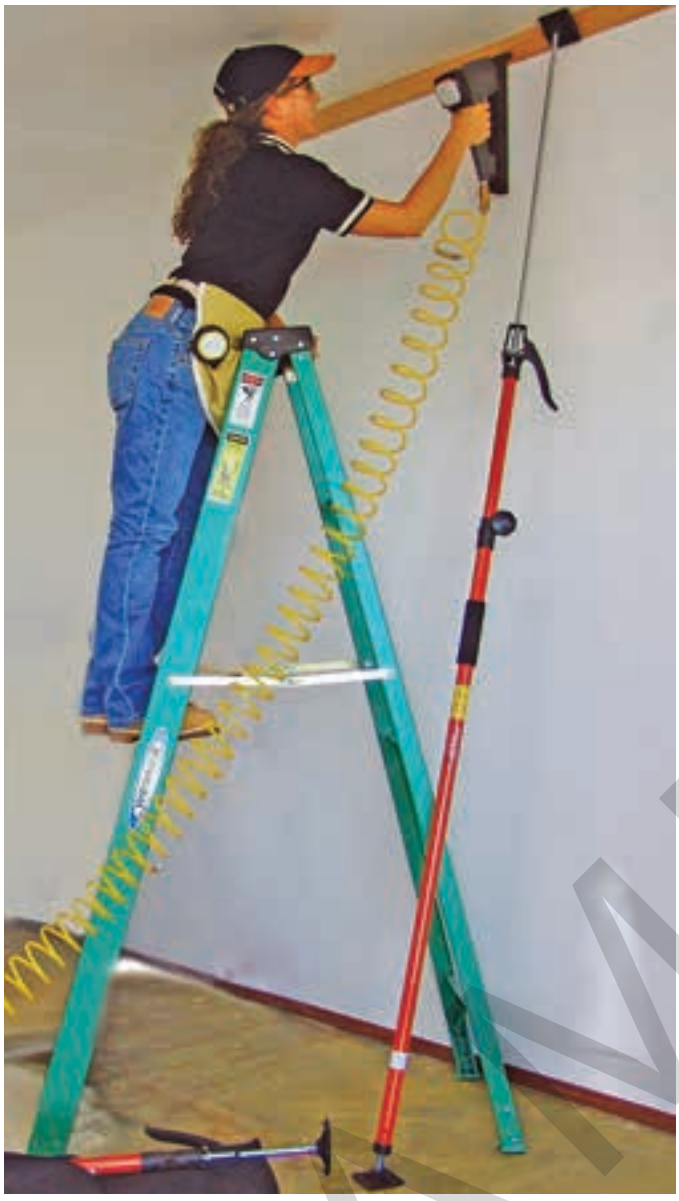
profile and angled projection. An angle grinder with an 80-grit disk is useful for quickly removing extra material. A small piece of moulding can be used to test fit the joint, **Figure 48-27**. Once verified, cut the joint on the actual moulding. Outside corners are mitered. If the moulding is thick enough, use plate joinery or a mechanical fastener to reinforce the joint. The assembly should be glued.

Most carpenters will work in a clockwise direction around the room when installing crown. This keeps the majority of cope cuts on the left end of the moulding for ease of cutting. If you are working alone, you will need to support the moulding while installing. Accessories can be purchased or fabricated for this, **Figure 48-28**. Secure the moulding to the ceiling and wall at 12″ to 16″ (305 mm to 406 mm) intervals.

48.5.2 Installing Chair Rail

Chair rail moulding was originally designed to keep the backs of chairs from damaging wall surfaces. It is typically installed 32″ to 36″ (813 mm to 914 mm) above the finished floor, and often serves as a decorative cap for wall panels. Refer to **Figure 14-32**. Like crown, inside corners are coped, and outside corners are mitered. Unlike crown, chair rail is held either flat or vertical when cutting, but not at an angle.

To install chair rail, mark a level line around the room. Chair rail will butt into vertical casings. Properly designed, the casing should project further from the wall's surface than the chair rail. If not, the end of the chair rail will need to be shaped slightly to



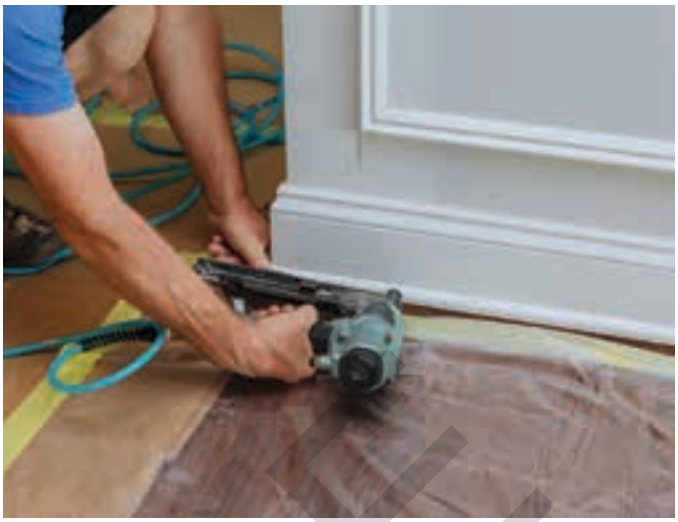
FastCap, LLC

Figure 48-28. Support poles can be made or purchased. They help hold the crown moulding when working alone.

prevent an unsightly appearance. Secure chair rail to the framing at 12″ to 16″ (305 mm to 406 mm) intervals. When properly installed, the thickest portion of the moulding should be at the top.

48.5.3 Installing Base

Base moulding may be a single piece or multiple pieces. When installed over hard surfaces, ***shoe moulding*** is typically added to ensure a tight fit with the floor, **Figure 48-29**. The narrow profile allows the moulding to flex to fit tight to the floor. When installing base in rooms with carpeting, leave a 3/8″ to 1/2″ (10 mm to 13 mm) gap between the base and



ungvar/Shutterstock.com

Figure 48-29. Installing shoe. Secure to the base, not the floor.

subfloor to allow the carpeting to be tucked under the base.

Base moulding protects the wall surface and is typically the most abused moulding. Furniture gets pushed into it and vacuums often hit the surface during use. To ensure joints do not open up over time, cope inside corners and reinforce outside corners. Like crown moulding, start with the longest run, especially if it is opposite an entryway.

Limit the number of joints whenever possible, using cutoffs and mouldings with less appealing grain or color in locations that are less visible, such as closets. Multiple pieces for long runs can be butt joined or scarfed. Use glue and fasteners to reinforce these joints. Avoid coping both ends of a moulding; this needlessly complicates your work. To cut base to length, you can make a simple U-shaped wooden block. Slip this over the moulding and butt it tight to the casing. Use it to mark the surface to be cut.

Check corners and angled walls before making cuts. Use a framing square to verify the squareness of a corner, and a T-bevel or digital measuring device to determine angles. See **Figure 48-30**. Calculate miter cuts by dividing the angle in half.

Multiple-piece base assemblies include base cap and shoe. Wide base may consist of a manufactured panel product covered with a cap moulding to hide the core. When installing shoe, avoid nailing into hardwood or engineered flooring. These materials expand and contract, and will cause the shoe moulding to pull away from, or distort, the base moulding.

Curved walls require flexible mouldings. Solid wood can be kerf-cut to allow it to bend around a curve. Make a series of cuts on the backside of the moulding,

Robert Bosch Tool Corporation

Figure 48-30. A digital angle protractor can measure to within 0.1 degree.

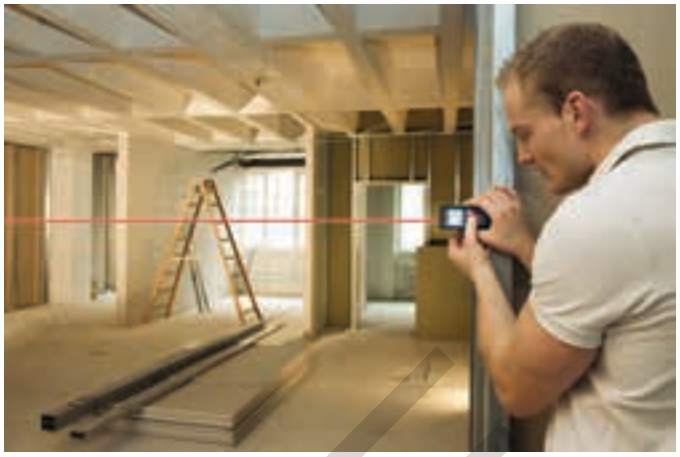
leaving about 1/16″ (1.5 mm) of material. (Refer to Chapter 33). Multiple-piece base assemblies work better for curves as they allow thinner base caps to flex and cover the kerfs required in thicker materials.

48.6 Working Efficiently

Installing moulding and trim requires a lot of physical exertion. The easiest way to get the work done faster is to have one or more helpers, especially when the work involves ladders and scaffolding. A person on a scaffold can measure and install, while a second person can make all of the cuts. This avoids repeatedly climbing up and down, which is both time consuming and dangerous.

Your tools and equipment can also reduce the time it takes to accomplish tasks. For example, rather than struggling with a tape measure, use a digital measuring device, **Figure 48-31**. While adding cost upfront, it can quickly pay for itself. This is also true of saws. A lot of time is spent adjusting miter angles from 45° left to 45° right. Even though today's saws are able to quickly and accurately align the head with precision, consider investing in a second saw. Avoiding this adjustment may only save seconds, but when multiplied by hundreds of cuts, the time adds up.

When working with others, have a clear communication system. For example, decide on how best to communicate measurements and cuts. Whether it is written on a piece of paper or a scrap block of wood, a simple code such as *C* for cope, *M* for miter, and *B* for butt can quickly indicate what type of cut and which end of the board. Writing, instead of shouting dimensions, is a better way to avoid miscommunication.



Robert Bosch Tool Corporation

Figure 48-31. Digital measuring devices make it easy for one person to quickly and accurately capture measurements.

There are always things you can do to make the job more efficient. Planning is a key part of this. When possible, precut materials and minimize the need to move materials around the jobsite. Climbing over materials not only increases the risk of damage and injury, it wastes precious time.

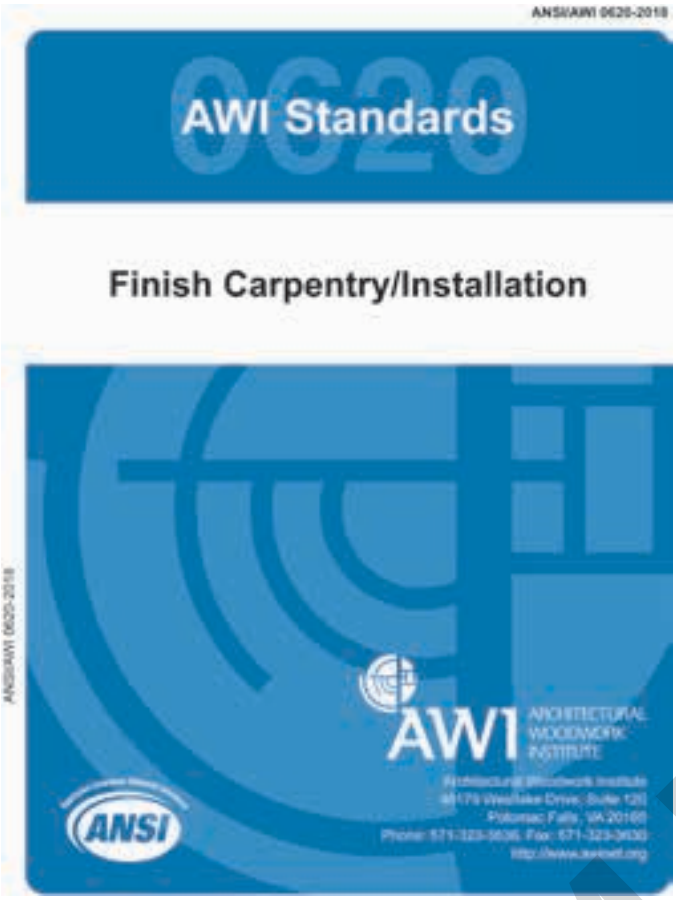
48.7 Standards for Finish Carpentry

What makes a quality installation? The Architectural Woodwork Institute (AWI) has created a standard to define this, **Figure 48-32**. AWI 0620 covers the installation of wood trim, wall panels, casework, doors, countertops, and other related interior finishes. Expectations and tolerances are set to maintain a high degree of control over the aesthetic quality and structural integrity of the finished product. When disagreements occur, standards provide definitive guidelines to evaluate the installed woodwork and resolve conflicts.

Like other AWI standards, 0620 defines three levels of quality as they relate to visual aesthetics: Premium, Custom, and Economy. These levels list the types of fasteners that may be used, and how they are to be installed. More importantly, the standard outlines general tolerances, flushness, and appearance of joints assembled in the field. The following is a summary of some of the items contained in the standard:

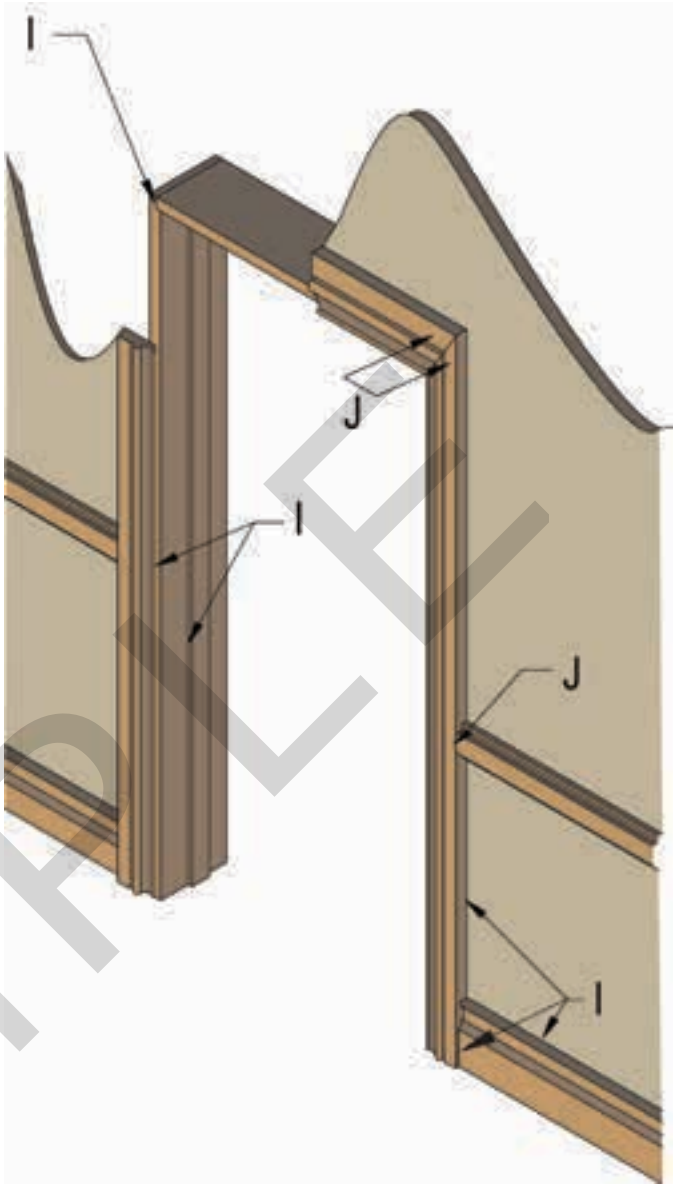
Gaps at field joints. Wood to wood at flat and shaped surfaces, **Figure 48-33I**, shall not exceed:

- Premium—0.4 mm (0.016″)
- Custom—0.8 mm (0.031″)
- Economy—1.2 mm (0.047″)



Architectural Woodwork Institute

Figure 48-32. AWI 0620 Finish Carpentry/Installation standard.



Architectural Woodwork Institute

Figure 48-33. Locations for measuring gaps (*I*) and flushness (*J*) of standing and running trim.

Flushness variations at field joints. Wood to wood at shaped surfaced, **Figure 48-33J**, shall not exceed:

- Premium—0.8 mm (0.031″)
- Custom—1.2 mm (0.047″)
- Economy—1.6 mm (0.063″)

Transparent finished product (stain grade). Solid stock to solid stock shall be installed as follows.

- Premium—Well matched for color and grain.
- Custom—Compatible for color and grain.
- Economy—Without consideration of color and grain.

Standing and Running Trim. Joinery requirements:

- Premium—Exposed trimmed ends shall be miter returned; multiple joints in running trim shall not be within 1219 mm (48″) of another joint in the run, including corners.
- Custom—Exposed trimmed ends shall be profiled or miter returned; multiple joints in running trim shall not be within 914 mm (36″) of another joint in the run, including corners.
- Economy—Exposed trimmed ends at the option of the installer; multiple joints in running trim shall not be within 610 mm (24″) of another joint in the run, including corners.

Workplace Skills

Respecting Diversity

Diversity includes differences in age, gender, ethnicity, or other qualities. By respecting these differences, we increase our ability to adapt to challenges and generate unique solutions to problems. Fear typically arises when individuals do not understand cultural differences. These include a person's beliefs, traditions, attitudes, and social behaviors.

Failing to understand cultural differences often leads to developing and perpetuating stereotypes. Stereotypes encourage division and polarization. Humans by nature tend to associate with people they are most familiar with and can relate to. Sometimes you need to go outside your comfort zone to get to know someone, especially if they come from a different culture.

Make it your goal to understand an individual's perspective before drawing conclusions about them. Refrain from perpetuating stereotypes about others. If you are in a position to hire, look to strengthen your workforce by encouraging a diverse pool of potential hires. Not only is this good practice, it is against the law to discriminate based on age, race, or gender when hiring. Utilize diverse perspectives when making decisions. By encouraging and respecting diversity, you will have a greater chance of making decisions that will be relevant for and accepted by the majority of individuals.

1. Have you ever had an experience when someone has perpetuated a stereotype about another culture? How did you react?
2. Your company has hired a recent immigrant. You notice at lunchtime he is sitting alone. What would you do?
3. You are assigned a supervisor who is younger than you are and has less experience. You disagree with their management style. How might you overcome your differences?

Summary

- Installing mouldings involves applying moulding around doors, windows, and other decorative trim items.
- Standing mouldings are primarily vertically oriented mouldings found around doors and windows.
- Running mouldings run horizontally, such as base and crown.
- Ranch-style mouldings have flat or slightly curved faces with little surface detail.
- Colonial-style mouldings have multiple coves, ogees, and fillets, which capture light and enhance shadows.
- Stock mouldings are purchased from a home center or lumberyard.
- Millwork manufacturers can create unique profiles, or mouldings that match existing trim.
- Stain-grade mouldings are made of narrow lengths of solid wood.
- Paint-grade mouldings can be made from composite materials.
- Tools needed to successfully install mouldings include hand and power tools.
- Trim carpenters must be able to work safely at various heights. This often requires the use of ladders and scaffolding.
- There are several ways to assemble mouldings. Miter joints are used for outside corners. Coped joints are preferred for inside corners.
- To join mouldings when a wall requires a length greater than your longest piece of moulding, either butt two pieces together or create a scarf joint.
- Mouldings can be attached with nails, trim screws, or adhesives.
- Installers must decide which type of moulding to start with and the order in which they will install individual mouldings in a room.
- Most doors will have either mitered casing or butted casing.
- Casing a window is similar to casing a door.
- Picture frame casing may be installed piece by piece, or prefabricated on a flat surface and installed as a single unit.
- Stool and apron installations start by fitting the stool.
- Running mouldings include horizontal mouldings like crown, base, and chair rail.
- Crown moulding can be cut either flat, or at an angle. When cut flat, the saw must be set to a compound angle.
- Base moulding may be a single piece, or multiple pieces. Base moulding protects the wall surface and receives the most wear and tear.
- Multiple-piece base assemblies include base cap and shoe.
- Wide base may consist of a manufactured panel product covered with a cap moulding to hide the core.
- The Architectural Woodwork Institute has created standards for the installation of wood trim, wall panels, casework, doors, countertops, and other related interior finishes.

Test Your Knowledge

Answer the following questions using the information provided in the chapter.

1. *True or False?* Mouldings that are primarily vertical are called running mouldings.
2. *True or False?* Ranch-style mouldings have flat or slightly curved faces with little surface detail.
3. Which type of moulding would be appropriate for using small lengths of finger-jointed material?
   A. Stain-grade moulding
   B. Paint-grade moulding
   C. Short lengths of moulding
   D. Crown moulding
4. What should be done when inspecting the rough frame?
   A. Install blocking
   B. Check walls for plumb
   C. Mark stud locations
   D. All of the above.
5. *True or False?* Inside corners should be mitered.
6. Which joint is used when joining two lengths of running moulding on a jobsite?
   A. Miter joint
   B. Finger joint
   C. Scarf joint
   D. None of the above.
7. What is the process for creating a cope joint?
8. Which moulding should be installed first?
   A. Base
   B. Chair rail
   C. Casing
   D. Shoe

9. Why should the first 2″ of a moulding be cut off when installing?
10. At what interval should casing be nailed?
    A. 6″
    B. 12″
    C. 18″
    D. 24″
11. *True or False?* Plinth blocks are mounted at the upper corners of a door.
12. Why is base moulding kept off the floor when carpeting is to be installed?
13. *True or False?* When using a compound miter saw to cut crown moulding on the flat, it should be held upside down and backward.
14. At what height should chair rail be installed?
    A. 24″–28″
    B. 32″–36″
    C. 36″–42″
    D. 48″
15. *True or False?* Shoe moulding should be installed in rooms with hard flooring surfaces.
16. Why should base be cut slightly longer when joining long runs?
17. Why is it important to have standards for finish carpentry?

Critical Thinking

1. Details, like keeping the reveal consistent on a project or aligning nails vertically and horizontally, are important. Explain why.
2. Your client wants the mouldings in their house to look upscale, without costing too much money. What are some suggestions you could make?

Suggested Activities

1. Measure out the base in several rooms in your house. Add up the total number of linear feet and prepare an estimate to replace the moulding. Visit a lumberyard or home center in person or online to locate base moulding that appeals to you. Calculate the total cost for material to replace the base.
2. Make a mock-up of the two casing styles mentioned in this chapter. Record your time while assembling the two different styles. Do you prefer the picture frame or stool and apron style? Which took more time to install?