6

Interior and Exterior Millwork
METHODS OF PRODUCTION

Flat Surfaces:
- Sawing - This produces relatively rough surfaces that are not utilized for architectural woodwork except where a “rough sawn” texture or finish is desired for design purposes. To achieve the smooth surfaces generally required, the rough sawn boards are further surfaced by the following methods:
  - Planing - Sawn lumber is passed through a planer or jointer, which has a revolving head with projecting knives, removing a thin layer of wood to produce a relatively smooth surface.
  - Abrasive Planing - Sawn lumber is passed through a powerful belt sander with tough, coarse belts, which remove the rough top surface.

Moulded Surfaces:
Sawn lumber is passed through a moulder or shaper that has knives ground to a pattern which produces the moulded profile desired.

SMOOTHNESS OF FLAT AND MOULDED SURFACES

Planers and Moulders: The smoothness of surfaces which have been machine planed or moulded is determined by the closeness of the knife cuts. The closer the cuts to each other (i.e., the more knife cuts per inch [KCPI]) the closer the ridges, and therefore the smoother the resulting appearance.

Sanding and Abrasives: Surfaces can be further smoothed by sanding. Sandpapers come in grits from coarse to fine and are assigned ascending grit numbers. The coarser the grit, the faster the stock removal. The surface will show the striations caused by the grit. Sanding with progressively finer-grit papers will produce smoother surfaces.

DESIGN AND USE OF RESOURCES

Moldings should be cut from lumber approximately the same size as the finished piece to make the best use of our natural resources. Designing moldings with the size of typical boards in mind has several advantages.

The typical 1” x 4” (25.4 mm x 101.6 mm) will yield a very nice 3/4” (19 mm) thick molding, but will not be thick enough to develop a molding which is a full 1” (25.4 mm) thick in finish dimension. The typical 2” x 4” (50.8 mm x 101.6 mm) piece of lumber can be made into moldings about 1-3/4” (44.5 mm) thick in a similar manner.

Deep or large moldings are often best cut from more than one piece and built up to make the final profile. Just as in the manufacturing of single moldings, this process minimizes waste and reduces the tendency of the finished profiles to twist, warp, cup, or bow as a result of removing too much material from either side of the initial board.
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IDENTIFICATION OF STANDING AND RUNNING TRIM AND RAIL PARTS

1. Spindle or Baluster (see Section 7)

2. Crown Running Trim

3. Crown Running Trim

4. Handrail

5. Base Combination (Cove, board, shoe) Running Trim

6. Window Casing Standing Trim

7. Wall Molding Combination (Cove, board, cove) Standing Trim

8. Chair Rail Combination (Cap, cove & rail) Running Trim

9. Newel Post (see Section 7)
RADIUS MOLDINGS

Both traditional and nontraditional architectural styles often call for radius standing and running trim either in plan, elevation, or both. In situations where the size of the molding and the radius to which it is to be formed is such that a straight molding will not conform to the substrate, the architectural woodworker can use several methods to fabricate radius moldings. Moldings applied to radii can be segmented, bent, laminated and formed, pre-shaped, or machined to the radius. Woodworkers will fabricate the moldings in the longest practical lengths, with the purpose of minimizing the field joints.

The architectural woodworker frequently uses band sawing for fabricating radius moldings. With this technique, the woodworker starts with a large, often glued-up piece of material and band saws to get a curved piece. In order to cut down on waste, the woodworker tries to get several curved pieces from one large piece by nesting, as shown in Illustration A. Characteristically, this method of fabricating radius moldings limits the length of pieces that can be developed without a joint. It also yields a piece of material with grain straight on the face, not following the curve.

When dealing with profiles with a flat face (see Illustration B), the woodworker may saw the pieces from a sheet of plywood and then apply an edge band. This will yield larger pieces with more consistent grain.

Another technique for fabricating a radius mould involves laminating thin, bendable plies of lumber in a form (see Illustration C). Laminated pieces hold their shape without being secured to another surface. This curved piece will then be milled to the desired profile. The glue lines follow the edge grain and the curve, thus minimizing their visibility. The species of wood and the tightness of the radius determine the maximum thickness of each ply.

When dealing with some cross sections, it can be advantageous to combine band sawing and laminating. The woodworker band saws a core of common lumber and laminates finish material to the exposed faces. From looking at Illustration D, it is apparent that this technique must be limited to certain profiles. It does, however, offer the ability to minimize glue joints and control grain directions. Finally, the simplest method for obtaining a radius molding is kerfing.

As seen in Illustration E, kerfing consists of making repeated saw cuts on the back face of the piece, perpendicular to the bend. The tightness of the radius determines the spacing and depth of the kerfs. Kerfing allows the piece to be bent to the required radius, and then secured in place to hold the bend. Kerfing almost always results in “flats” on the face which show in finishing. When dealing with a large radius, it is sometimes possible to stop the kerf prior to going through an exposed edge. In most cases, however, the kerf runs all the way through, and the edge must be concealed.

Unless specifically called out, the architectural woodworker will have the option of which method to use for fabricating radius molding. Since the fabrication method determines the final appearance of the pieces, especially regarding the direction of grain and visibility of glue joints, the architect or designer may wish to specify the method. It is recommended that an architectural woodwork firm be consulted before making a selection. Mock-ups may be required to visualize the end product.

Some acceptable methods of radius fabrication

Segmented radius fabrication only by direct specification
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Solid Lumber Paneling Patterns

The variety of solid lumber paneling is only limited by the imagination of the design professional. Virtually any machinable profile can be custom manufactured. The following profiles are some of the traditional patterns associated with solid board paneling. They are not dimensioned intentionally, allowing the design professional to determine the scale and proportions most appropriate for the project.
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TYPICAL USES OF STANDING AND RUNNING TRIM AND RAILS

1. Cove (straight) 2. Cove (radius)

1. Loose
2. Large Radius field bend; Small Radius machined to approximate curve
3. Back band

4. Base (straight) 5. Base (radius)

4. Loose
5. Large Radius field bend; Small Radius machined to approximate curve
6. Kerf back side for Large Radius, field bend; Small Radius machined to approximate curve
6 - Interior and Exterior Millwork

1 Built-up Cornice
2 Outside Corner
3 Base (at bookcase)
4 Base (at wall)
5 Wall Molding (at wall)
6 Wall Molding (at bookcase)
6 - Interior and Exterior Millwork

1 Skylight Cornice
2 Crown
3 Panel Molding
4 Handrail
6 - Interior and Exterior Millwork

1 Cornice
2 Chair Rail
3 3-piece Base
4 Casing
5 Panel Molding
6 - Interior and Exterior Millwork

“BUILT-UP” MOLDINGS FOR LARGER PROFILES
(Used with permission of the Wood Molding and Millwork Producers Association.)

Ceilings
The most obvious area for “built-up” moldings is where the walls meet the ceiling. This is primarily true of rooms with high ceilings. In low-ceiling rooms (8’ (2438 mm)), single molding profiles usually work best. A series of “built-up” moldings would have a tendency to make a low ceiling appear even lower. But if your ceilings are high (10’ (2540 mm) or higher), there is no limit to the rich three-dimensional elegance you can add to the room’s appearance with the creative application of moldings. Below are several suggested combinations. Let your imagination create your own combinations and designs.

Chair Rails
Adding chair rails to a room is a very traditional method of breaking up walls, adding both interest and protection. They prevent the wall from being bumped or scuffed by chairs and can also be used to separate two types of decorating material such as paneling, wallpaper, and paint. Following are some variations of “built-up” chair rail combinations.
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Fireplaces
The use of “built-up” moldings is also an excellent way to highlight or frame a fireplace or add depth and richness to the fireplace mantel. Below are a few creative but simple-to-install profile combinations.

Doors and Windows
The framing of doors and windows is most commonly done with single molding profiles, but by adding other patterns, the basic trim can easily be transformed into a window or door casing of classical depth and beauty. Installing plinth blocks at the bottom of casing further enhances the traditional look.

Base
The elaborate look of elegance can even be carried through to base moldings where the wall meets the floor, as illustrated in the following variations.
Appendix B

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COMBINATION CORNICES AND WALL TRIMS

Example 1

Example 2

Example 3

Example 4

Example 5

Example 6

Example 7
IMPORTANT NOTE: The following drawings are illustrations, not measured or engineered. They are offered for general profile shape only. Some manufacturers may vary the profile or sizes. They are not dimensioned intentionally, allowing the design professional to determine the scale and proportions most appropriate for the project.
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Base Caps and Bases

BAS-1000  BAS-1001  BAS-1002  BAS-1003  BAS-1004  BAS-1005

BAS-1006  BAS-1007  BAS-1008  BAS-1009  BAS-1010  BAS-1011

BAS-1012  BAS-1013  BAS-1014  BAS-10015  BAS-1016  BAS-1017

BAS-1018  BAS-1019  BAS-1020  BAS-1021  BAS-1022  BAS-1023
6 - Interior and Exterior Millwork

Base Caps and Bases

BAS-1012  BAS-1013  BAS-1014  BAS-10015  BAS-1016  BAS-1017

BAS-1018  BAS-1019  BAS-1020  BAS-1021  BAS-1022  BAS-1023

BAS-1024  BAS-1025  BAS-1026  BAS-1027  BAS-1028  BAS-1029

BAS-1030  BAS-1031  BAS-1032  BAS-1033  BAS-1034  BAS-1035
6 - Interior and Exterior Millwork

Base Caps and Bases

BAS-1036
BAS-1037
BAS-1038
BAS-1039
BAS-1040
BAS-1041
BAS-1042
BAS-1043
BAS-1044
BAS-1045
BAS-1046
BAS-1047
BAS-1048
BAS-1049
BAS-1050
BAS-1051
BAS-1052
BAS-1053
BAS-1054
BAS-1055
BAS-1056
BAS-1057
BAS-1058
BAS-1059
6 - Interior and Exterior Millwork

Base Caps and Bases

BAS-1060  BAS-1061  BAS-1062  BAS-1063  BAS-1064  BAS-1065

BAS-1066  BAS-1067  BAS-1068  BAS-1069  BAS-1070  BAS-1071

BAS-1072  BAS-1073  BAS-1074  BAS-1075
6 - Interior and Exterior Millwork

Casings


6 - Interior and Exterior Millwork

Casings

CAS-2024
CAS-2025
CAS-2026
CAS-2027
CAS-2028
CAS-2029

CAS-2030
CAS-2031
CAS-2032
CAS-2033
CAS-2034
CAS-2035

CAS-2036
CAS-2037
CAS-2038
CAS-2039
CAS-2040
CAS-2041

CAS-2042
CAS-2043
CAS-2044
CAS-2045
CAS-2046
CAS-2047
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Casings

CAS-2048  CAS-2049  CAS-2050  CAS-2051  CAS-2052  CAS-2053
CAS-2054  CAS-2055  CAS-2056  CAS-2057  CAS-2058  CAS-2059
CAS-2060  CAS-2061  CAS-2062  CAS-2063  CAS-2064  CAS-2065
CAS-2066  CAS-2067  CAS-2068  CAS-2069  CAS-2070  CAS-2071
6 - Interior and Exterior Millwork

Casings

CAS-2072  CAS-2073  CAS-2074  CAS-2075  CAS-2076  CAS-2077

CAS-2078  CAS-2079  CAS-2080  CAS-2081  CAS-2082  CAS-2083

CAS-2084  CAS-2085  CAS-2086  CAS-2087  CAS-2088  CAS-2089

CAS-2090  CAS-2091  CAS-2092  CAS-2093  CAS-2094  CAS-2095
6 - Interior and Exterior Millwork

Casings

CAS-2096  CAS-2097  CAS-2098  CAS-2099  CAS-2100  CAS-2101

CAS-2102  CAS-2103  CAS-2104  CAS-2105  CAS-2106  CAS-2107

CAS-2108  CAS-2109  CAS-2110  CAS-2111  CAS-2112  CAS-2113

CAS-2114  CAS-2115  CAS-2116  CAS-2117  CAS-2118  CAS-2119
6 - Interior and Exterior Millwork

Casings and Panel Moldings

CAS-2120  CAS-2121  CAS-2122  CAS-2123  CAS-2124  CAS-2125

CAS-2126  CAS-2727  CAS-2728

PNL-3000  PNL-3001  PNL-3002  PNL-3003  PNL-3004  PNL-3005

PNL-3006  PNL-3007  PNL-3008  PNL-3009  PNL-3010  PNL-3011
6 - Interior and Exterior Millwork

Crown Moldings

CRN-4000 CRN-4001 CRN-4002 CRN-4003 CRN-4004

CRN-4005 CRN-4006 CRN-4007 CRN-4008 CRN-4009

CRN-4010 CRN-4011 CRN-4012 CRN-4013 CRN-4014

CRN-4015 CRN-4016 CRN-4017 CRN-4018 CRN-4019
6 - Interior and Exterior Millwork

Crown Moldings

CRN-4020
CRN-4021
CRN-4022
CRN-4023
CRN-4024

CRN-4025
CRN-4026
CRN-4027
CRN-4028
CRN-4029

CRN-4030
CRN-4031
CRN-4032
CRN-4033
CRN-4034

CRN-4035
CRN-4036
CRN-4037
CRN-4038
CRN-4039
6 - Interior and Exterior Millwork

Handrails

HRL-5000  HRL-5001  HRL-5002  HRL-5003  HRL-5005
HRL-5004  HRL-5006  HRL-5007  HRL-5008  HRL-5009
HRL-5010  HRL-5011  HRL-5012  HRL-5013  HRL-5014
HRL-5015  HRL-5016  HRL-5017  HRL-5018  HRL-5019
HRL-5020  HRL-5021  HRL-5022  HRL-5023

These two are Secondary Rails, customarily placed under balusters.
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Chair Rails

CHR-6000
CHR-6001
CHR-6002
CHR-6003
CHR-6004
CHR-6005
CHR-6006
CHR-6007
CHR-6008
CHR-6009
CHR-6010
CHR-6011
CHR-6012
CHR-6013
CHR-6014
CHR-6015
CHR-6016
CHR-6017
CHR-6018
CHR-6019
CHR-6020
CHR-6021
CHR-6022
CHR-6023
6 - Interior and Exterior Millwork

Chair Rails

CHR-6024  CHR-6025  CHR-6026  CHR-6027  CHR-6028  CHR-6029

CHR-6030  CHR-6031  CHR-6032  CHR-6033  CHR-6034  CHR-6035

CHR-6036  CHR-6037  CHR-6038  CHR-6039  CHR-6040  CHR-6041

CHR-6042  CHR-6043  CHR-6044  CHR-6045  CHR-6046  CHR-6047
6 - Interior and Exterior Millwork

Picture Moldings

PIC-7000

PIC-7001

PIC-7002

PIC-7003

PIC-7004

PIC-7005

PIC-7006

PIC-7007

PIC-7008

PIC-7009

PIC-7010
Ornamental woodwork can be considered any addition to the purely functional and may partly rely on context for its aesthetic appeal. Among various definitions, the one pertinent here is: “Something that lends grace or beauty; a manner or quality that adorns.” Ornamentation is defined as a decorative device or embellishment. A good example is the molding which can have functional uses such as covering joints, or with a profile, can be a design element. The profile can be further embellished or enriched by decorative carving. Architectural carving combines the flat surfaces and clearly defined lines of geometry with the interpretive modeling of naturalistic forms.

Historic preservation, conservation and restoration disciplines are extensions of ornamental woodwork. Aspects of this work include, but are not limited to, stripping, repair, reconstruction, reuse of historic material, addition of new material, and special documentation for the work.

The United States Department of the Interior (www.doi.gov/), the National Park Service (www.nps.gov/), and the Historic Sites and Monuments Board of Canada (www.parkscanada.gc.ca/) publish documents related to work under their jurisdiction. The most recent publications from these entities will provide valuable information for the design professional and the woodwork fabrication, finishing, and installation.

There are a number of related arts which are incorporated into wood constructions, such as stained glass, ceramic tiles, mosaic, fabric, plaster or composition ornament, faux finishes, metal hardware and stone inlays.

Excludes:

Standing and running trim except as incorporated as integral parts of elements.

Unless required by the details and/or woodwork specifications, the woodworker shall not:

• provide or prepare for any electrical, telephone, mechanical, or plumbing equipment;
• install woodwork or furnish common blocking, furring or hanging devices for the support or attachment of the woodwork;
• supply exposed materials other than wood or plastic laminate;
• factory finish; or
• supply “stock” or specialty products. If they are to be supplied, they must be specified by a brand name or manufacturer.
6 - Interior and Exterior Millwork

FIRE-RETARDANT SOLID LUMBER

Finishing of Fire- Retardant-Treated Lumber: Fire retardant treatments may affect the finishes intended to be used on the wood, particularly if transparent finishes are planned. The compatibility of any finishes should be tested before they are applied.

Built-up Construction to Improve Fire Rating: In lieu of solid lumber, it is often advisable, where a fire rating is required, to build up members by using treated cores (Fire rated particleboard or medium density fiberboard) clad with untreated veneers not thicker than $\frac{1}{28}$" (0.9 mm). Some existing building codes, except where locally amended, provide that facing materials $\frac{1}{28}$" (0.9 mm) or thinner finished dimension are not considered in determining the flame spread rating of the woodwork.

SOURCES FOR WOOD ORNAMENTATION

There are two possible sources for wood ornamentation: machine-produced elements and the custom carver.

A. The mass-produced product is often limited in available species, sizes and design, which is often a hodge-podge of historic styles. Often the detail lacks clarity because of the tooling, sanding or finish. However, the product is relatively inexpensive, consistent in appearance and appropriate for many applications.

B. On the other hand, there are a number of reasons to contact a custom carver.

1. When the pieces required are impractical or impossible to shape on conventional shop machinery. Examples are tapering profiles as in keystones, acute (interior) corners such as in Gothic tracery and compound curves as in stair handrails.
2. When small quantities are specified which are impractical or too expensive to fabricate by computerized methods.
3. When there is a need to replicate missing (hand carved) elements for restoration or renovation.
4. When elements of specified dimensions are required and unavailable otherwise.
5. When a particular wood species is required.
6. When customized logos or lettering is desired.
7. When patterns are required for casting in another material such as plaster, metal, or glass.
8. When uniqueness is valued by the customer.

Hand tooled and carved work has a special appearance. It has a depth and clarity or crispness which machine tooling often cannot achieve. Because it is done by a skilled artisan there will be slight irregularities, but this is deemed desirable as it lends character and credence to the work. Whether the surface is sanded smooth or the texture of tool marks is left, is one of the points of discussion between the millwork company and carver.

WORKING WITH THE ARTISAN

The custom carver usually works by him- or herself in a studio situation, but this does not necessarily indicate limitations either in quality, production time or fabrication capability. Work is done on a commission basis, so it is common to expect reasonable lead times.

A. What the wood carver will need to know (from millwork specifier or customer):

1. Type of element - molding, capital, bracket, etc.
2. Sizes - drawings showing elevations and Sections are absolutely necessary for accurate cost estimates, whether provided by the millwork company or drawn by the carver. Often the carver will redraw computer-generated designs or ones not full sized.
3. Species of wood and who will supply the “blanks.”. Finishes (paint grade, gilding, faux finish) should also be discussed.
4. Context and/or installed location should be made clear in order to understand lighting and the degree of detail necessary.
5. Intended schedule or completion date.
6. Budget if available as the carver can propose subtle changes in order to oblige a tight budget.

The millwork company should make reasonable efforts to provide as much information as possible as to design, and material. If providing blanks, effort should be made to fabricate them as accurately as possible. Material should be straight grained and contain a minimum of glue lines and therefore, grain directional changes. Consultation concerning what should be provided (sizes, species, special fabrication such as turning) with the carver is essential.

B. What to expect from the carver:

1. The carver provides skill and knowledge through experience. The cost is in labor not material. Carving is a unique product which adds immeasurably to the character and attractiveness of the overall project.
2. The carving should closely resemble what is represented in drawings and verbal descriptions.
3. The product should be cleanly carved without distracting irregularities and chips or fuzz in the recesses. The agreed upon surface treatment: sanded, tool textured, primed or gilded, etc. should be consistent throughout.
4. Work should be done in a timely manner as agreed upon.

Quality in artistic handwork is often a subjective matter, but proper communication and agreement among parties should reduce variance of interpretation.
6 - Interior and Exterior Millwork

ARCHITECTURAL ORNAMENTATION

Discussing ornamental style is a difficult endeavor because it is historically complex and subject to interpretation. North America is made up of ethnic groups from around the world and each has brought its own cultural history to the mix. The notes here do not intend to exclude any style of ornamentation, but concentrate on the predominant influence of Western Art and Architecture. Risking over-simplification, style tends to vacillate over time between two extremes — formal, restrained classicism and emotional and vivacious Romanticism.

Much of Western Architecture derives from the art and architecture of ancient Greece and Rome. Classicism is based on symmetry and proportion providing mathematical relationships among all elements of the building. One characteristic is the use of columns for support, though engaged columns and pilasters were used, sometimes in conjunction with arches. The *orders* of architecture, have been codified and reinterpreted ever since Vitruvius wrote a treatise on architecture in 30 BCE. In reality there was wide variation and great adaptability over a thousand years of evolution in many disparate geographical areas. The Parthenon in Athens, the Maison Carée in Nîmes, France, or the Pantheon in Rome are familiar examples. In succeeding revivals an abundance of government and academic building reflect these archetypes - the United States Capital building, many state and county courthouses, and Jefferson’s University of Virginia.

Romanticism, on the other hand, is subjective, derived from the randomness of nature, *spiritual*, and introduces asymmetry, exuberance, and complex lines. Many designs are eclectic, fantastic and mix a number of exotic motifs. Though there are many of the same mathematical concerns in Romanesque and Gothic buildings as there are in Classical buildings, the ornamentation conveys a different feeling. The achievement of Gothic architecture was the introduction of the pointed arch which solved some structural limitations of Romanesque vaulting. While classicism appears to be simple in concept, romanticism seems to relish complexity. A Gothic cathedral when viewed from any angle except frontally does not seem to have much order, with flying buttresses and pinnacles and windows complicating one’s perception of the form of the building.

Reacting to Gothic embellishments, Renaissance architects rediscovered classicism, but in time the classical tenets were corrupted (Mannerism) and the Baroque, which emphasized undulating surfaces, complicated interior spaces and dramatic decoration, permeated Europe. As a reaction to the flamboyance of the Baroque, interest in Classicism reemerged in the 18th Century. But in this era the Rococo style and the “Chinese” style, (Chinoiserie), especially in furniture, were also in vogue. The 19th Century saw continued classicism, but also an eclectic mix of revivals - Romanesque, Gothic and Eastern styles.

CLASSICAL ORDERS

The *orders* of architecture refer to the configurations and relationship of parts of Greek and Roman buildings. (See illustrations on the following pages.) Over the centuries, the relationship of parts of the classical building have been systematized, but one should keep in mind that Greek and Roman architecture had many variations and evolved through time. Generally, the orders refer to the proportions of the building; some being squarish or heavy, while others are taller and therefore lighter. The trabeated or post and lintel system of building consists of columns and a superstructure supporting the roof. This entablature is made up of the architrave, the frieze and the cornice. The architrave is the beam, which spans from column to column. The frieze is derived from the band covering the joist ends, while the cornice creates the eaves. The columns have base moldings (except the Doric order) a shaft, plain or fluted, and a capital, which supports the architrave. Because the capitals are very different in appearance for each order it is an easy way to distinguish among them. Because the roof line ran the length of the building the triangular area above the entablature is called the pediment.

There are three Greek orders and two Roman ones.

The Doric column has no base but rests directly on the stylobate or *floor*, of the building, is fluted and has a simple turned bowl-like capital. The bulging shape is the echinus. The frieze of the Doric is divided into triglyphs and metopes; the latter often decorated with sculptural figures (as on the Parthenon). This order appears sturdy and well planted, having a horizontal appearance.

The Ionic order has a column which has several rounds of base moldings, usually consisting of two or half-round moldings, divided by a scotia or concave recess, a shaft which is fluted and a capital with distinctive scrolls or volutes. The frieze is relatively plain, or contains sculptural figures in an uninterrupted procession. Above the frieze is the characteristic dentil molding.

The Corinthian order proportionally is similar to the Ionic though some examples have very slender proportions. The column is similar, but the capital has acanthus leaves, and volutes spring like sprouts from the foliage. The entablature is similar to the Ionic, but the use of modillions or brackets in the eaves (separating rosettes in the soffit) sets this order apart.

The Roman orders are the Tuscan and the Composite.

The first is derived from native antecedents and is a relatively plain style with unfluted columns, simply echinus capital and entablature like the Ionic without the dentil course.

The Composite has a capital, which is an amalgamation of the Ionic volutes, and the Corinthian acanthus leaves. The entablature is similar to the Corinthian. The Romans introduced several building innovations, but the use of the arch (the arcuated system), and therefore vaults and domes, changed architecture immeasurably.
6 - Interior and Exterior Millwork

THE FIVE ORDERS - CHITHAM, ROBERT. THE CLASSICAL ORDERS OF ARCHITECTURE; USED WITH PERMISSION.

(Appendix B is not part of the AWS for compliance purposes)
The columns of the classical orders of Greek and Roman architecture are often adapted for modern construction. These orders are Tuscan, Doric, Ionic, Corinthian, and Composite. The Composite figure (above) names the basic features of a classical order and gives some of the proportions of the column in relation to the shaft diameter as a basic unit of measurement. Pilasters are rectangular in plan, without taper from top to bottom. If used structurally they are usually referred to as piers, but are treated architecturally as columns. The typical pilaster extends a third or less of its width from the wall surface behind it.
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IONIC CAPITAL AND ENTABLATURE - CHITHAM, ROBERT. THE CLASSICAL ORDERS OF ARCHITECTURE; USED WITH PERMISSION.


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IONIC CAPITAL DETAIL - CHITHAM, ROBERT. THE CLASSICAL ORDERS OF ARCHITECTURE; USED WITH PERMISSION.
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Corinthian Order Proportions - Chitham, Robert. The Classical Orders of Architecture; used with permission.

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CORINTHIAN CAPITAL DETAIL - CHITHAM, ROBERT. THE CLASSICAL ORDERS OF ARCHITECTURE; USED WITH PERMISSION.
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Details of Console

CORINTHIAN ENABLATURE DETAIL - CHITHAM, ROBERT. THE CLASSICAL ORDERS OF ARCHITECTURE; USED WITH PERMISSION.
Appendix B

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TERMINOLOGY OF ORNAMENTATION

A rudimentary explanation of some carving terms will assist the millwork specifier in communicating with the custom carver.

There are four methods of depicting a design in wood.

- **Incised**: Incised designs are simply made by shallow grooves in the surface of the material.
- **Relief**: Most architectural carving is carved in relief. The degree to which the design is lifted, off the surface is described as low, or high, relief.
- **Pierced**: Some voids in the design are literally cut through the material and are termed pierced carvings.
- **Sculpture**: Carving in-the-round or sculptural works are also incorporated into architectural surroundings.

Moldings have multiple uses but one important one is to visually set apart various elements. For instance, they are transitions between the parts of the entablature. They accentuate the trim (architrave) around doors and windows, and around an arch (archivolt). The various terms depend primarily on the profiles, but there are a few terms which indicate use, location or size.

The curving profiles are often separated or off set by a relatively small flat called a fillet.

The small half round is an astragal, often decorated with beads or bead and billet. A larger half round, usually associated with the base of a column or base of a structure is called a torus (plural tori) molding, sometimes decorated with ribbon-bundled bay laurel, oak leaves, or reeds.

The ovolo is a quarter ellipse (Greek) or quarter round (Roman) profile, most often carved with egg and dart design, but many other possibilities make it a very popular molding.

The cyma recta is a double-curved molding with the concave curve on the outside of the molding, pointing toward the viewer as if reaching, outward. The cyma reversa is the opposite, the convexity nearer the viewer and seems to support or bolster the element to which it is attached. Both profiles are often carved with foliage, generically termed acanthus leaf. Both of these profiles as well as the ovolo often have the curved portion separated from the fillet by deep valleys or quirks.

Medieval moldings were often made of a number of closely placed profiles, often with deep hollows and repeated rounds.

Romanesque architecture continued many of the same principles of classical architecture, though much of the decoration; such as column capitals became more idiosyncratic and depicted the profusion of natural foliage. The innovation of the pointed arch (loosely called the Gothic arch), ubiquitous in Gothic architecture, allowed buildings to soar to great heights and to redistribute weight. This allowed larger windows and the lacy stone work termed tracery. The designs of this tracery are geometrically derived from, for the most part, overlapping and intersecting circles. The circular voids are called foils and the pointed interSections cusps; thus a three lobbed design is a trefoil, while one of four is a quatrefoil, one of five is a cinquefoil. Tracery was found incorporated into the woodwork of choir stalls, paneling and memorial structures.

Much decoration was derived from nature in depictions of vines and animals. Of course, religious figures and symbols were also a primary motif. Foliage climbing the edges of pinnacles and spires consists of the leaves, called crockets, and the terminating leaves, a finial or (especially on pew ends) poppyhead. Moldings were made of multiple profiles and combined with running vines and crestenst, or stylized leaves. Square flowers and ballflowers were often spaced along moldings. At intersections of the ribbed vaults were bosses, which depict foliage (like a roseaite), figures, or heraldic devises. A selected partially illustrated glossary related to ornament and architecture follows.

ORNAMENTAL WOODWORK GLOSSARY

**abacus**

The uppermost member of the capital of a column; often a plain square slab, but sometimes moulded or carved. The plate or bearing surface at the top of a column upon which the architrave rests.

**acanthus**

An indigenous plant of the Mediterranean area depicted on the Corinthian capital and used as a decorative motif on many objects throughout history. Today nearly a generic term for any multi-leafleted foliage.

**arch**

A curved construction which spans an opening; usually consists of wedge-shaped blocks called voussoirs and a keystone, or a curved or pointed structural member which is supported at the sides or ends (often contrasted to trabeated construction of post and lintel).

**architrave**

1. In the classical orders, the lowest members of the entablature; the beam that spans from column to column, resting directly on their capitals. 2. The ornamental moldings around the faces of the jambs and lintel of a doorway or other opening.

**archivolt**

The face molding of an arch (the architrave of an arch).

**astragal**

1. A bead, usually half-round, with a fillet on one or both sides. It may be plain, but the term is more correctly used to describe the classical molding decorated with a string of beads or bead-and-reel shapes. A small molding of half round Section, often carved with beads; often referred to as a bead by furniture-makers.

**bead**

1. A bead molding. 2. A narrow wood strip, moulded on one edge, against which a door or window sash closes; a stop bead. 3. A pearl-shaped carved decoration on moldings or other ornaments, usually in a series, or in conjunction with other shapes; a beading.

**bead-and-reel**

A semiround convex molding carved with a pattern of disks alternating with round or elongated beads.
Appendix B

6 - Interior and Exterior Millwork

bolection molding
A molding which covers the joint between panel and stile and projects above the surface of stile; a molding applied to a flat ground.

boss
1. A projecting, usually richly carved ornament, decorative rosette, portrait, heraldic devise or similar motif, placed at the intersection of ribs, groins, beams, etc., or at the termination of a molding. 2. In masonry, a roughly shaped stone set to project for carving in place.

bracket
A general term for an element projecting from a wall or other surface to support another element such as a beam or cornice.

capital
The topmost member, usually decorated, of a column or pilaster, etc., it provides a larger bearing surface for the architrave; different in appearance according to the order of the building.

cavetto
A cove; a molding profile whose arc is a segment of a circle, (unlike scotia whose profile has two centers).

cinquefoil
A five-lobed pattern divided by cusps; in Gothic tracery a geometric design with five round open areas.

column
1. In structures, a relatively long, slender structural compression member such as a post, pillar, or strut; usually vertical, supporting a load which acts in (or near) the direction of its longitudinal axis. 2. In classical architecture, a cylindrical support of the entablature, consisting of a base (except Greek Doric), shaft, and capital.

Composite order
One of the five classical orders. A Roman order of classical architecture which has proportions close to the Corinthian order, but the capital is a combination of the Ionic and the Corinthian capitals. The entablature is also similar or identical with the Corinthian entablature.

corbel
A projection from a wall which supports a beam, arch or vault ribbing.

Corinthian order
One of the Greek orders characterized by slender proportions; the column shaft is fluted, with a capital depicting acanthus leaves and scrolled sprouts (caulicoli) and with an entablature with dentil course and modillions under the soffit. Roman adaptations often highly decorated.

cornice
1. Any moulded projection which crowns or finishes the parts to which it is affixed. 2. The third or uppermost division of an entablature, resting on the frieze consisting of corona and cymatium. 3. An ornamental molding, usually of wood or plaster, running round the walls of a room just below the ceiling; a crown molding; the molding forming the top member of a door or a window frame.

corona
The overhanging vertical member of a cornice.

crochets
Regularly spaced leaves projecting along the gable of a Gothic arch, spire, or pinnacle. Sometimes as terminations of the interior cusps of an arch or trefoil, quartrefoil, etc.

cusp
In Gothic tracery, the intersection or termination of arcs which define foliations or spaces.

cyma recta
A molding with an S curve section; orientation is with concave curve foremost toward viewer. Example is cymatium of cornice; opposite of cyma reversa.

cyma reversa
A molding with a S curve section; orientation is with convex curve foremost toward viewer. Example is panel (bolection) molding.

cymatium
The top molding of the cornice; usually a cym profile, but can be an ovolo or (rarely) a cavetto.
dentil
One of a band or small, square, tooth-like blocks forming part of the characteristic ornamentation of the Ionic, Corinthian, and Composite orders.

Doric order
One of the Greek orders; the sturdiest order with stout proportions; the column has no base, is fluted and has a relatively simple flaring capital; the frieze of the entablature is divided into triglyphs and metopes. Example is the Parthenon.

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echinos
The bulging or flaring of a capital; of elliptical Section as in the Doric order, often an ovolo molding.

egg and dart
The egg-shaped ornament alternating with a dart-like ornament, used to enrich ovolo and other moldings.

entablature
In classical architecture, the elaborated beam member carried by the columns, horizontally divided into architrave (below), frieze, and cornice (above).

entasis
The intentional slight convex curving of the vertical profile of a tapered column used to overcome the optical illusion of concavity that characterized straight-sided columns.

gadroon
Elongated bulbous shapes in series, as on decorative urns and turnings; a molding of repeated tear-drop shaped elements, often on a thumbnail profile.

Gothic arch
A loose term denoting a pointed arch consisting of two (or more centers) as opposed to Roman or Romanesque arch which is semicircular.

finial
An ornament which terminates the point of a spire, pinnacle, etc., often turned or carved (downward pointing decorations are called drops).

foil
In tracery, any of several lobes, circular or nearly so, tangent to the inner side of a larger arc, as of an arch, and meeting each other in points, called cusps, projecting inward from the arch, or circle. Five foils make a cinquefoil.

frieze
1. The middle horizontal member of a classical entablature, above the architrave and below the cornice. 2. A similar decorative band near the top of an interior wall below the cornice. 3. Any broad horizontal band near the top of the wall or element (such as a mantelpiece).

fret
An essentially two-dimensional geometric design consisting of shallow bands; example is Greek key.

gothic
A loose term denoting a pointed arch consisting of two (or more centers) as opposed to Roman or Romanesque arch which is semicircular.
### 6 - Interior and Exterior Millwork

**guillouche**
Shallow design of overlapping circles, sometimes in-filled with rosettes.

**Ionic order**
The classical order originated by the Ionian Greeks, characterized by its capital with large volutes, a fasciated entablature, continuous frieze, usually dentils in the cornice, and by its elegant detailing.

**metopes**
The panel between the triglyphs in the Doric frieze, often carved.

**modillions**
a horizontal bracket or console, usually in the form of a scroll with acanthus, supporting the corona under a cornice.

**mutule**
a sloping flat block on the soffit of the Doric cornice order

**ovolo**
a convex molding, less than a semicircle in profile; usually a quarter of a circle or approximately a quarter-ellipse in profile, often decorated with egg and dart design.

**quirk**
a indentation separating one element from another, as between moldings; a valley between fillet and profile of a molding; between abacus and echinus of Doric capital.