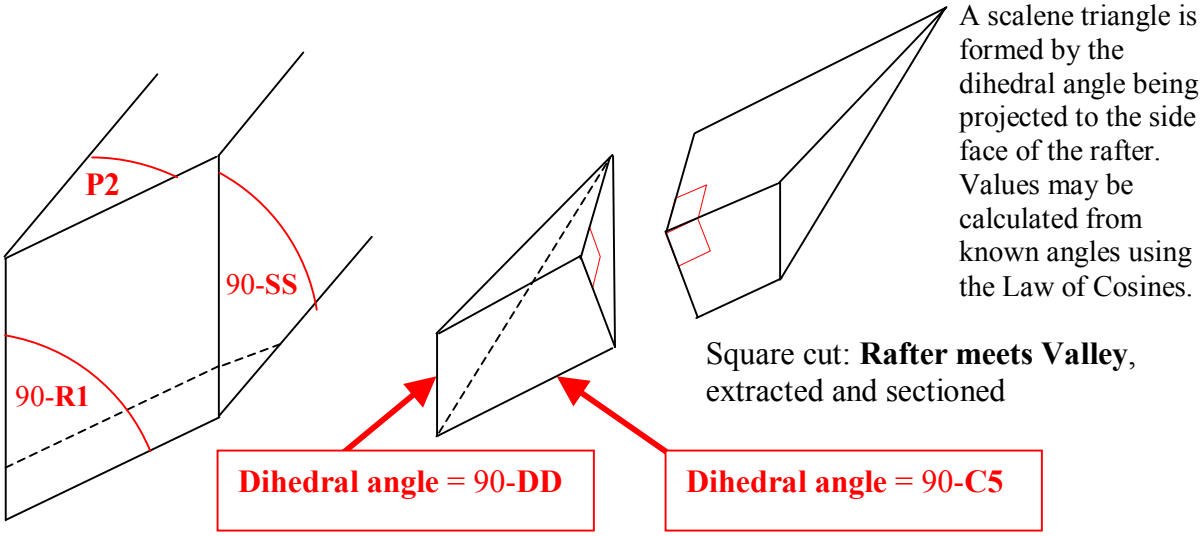
GENERAL SQUARE CUT MODEL:

Refer to "Notes re: Square Cut Angles"

The square cut is extracted from the member, and a section is taken. Relationships between the angles are analysed, and a general model or template for any square cut may be created. Cognate angles, or angles in the same positions, may be substituted, the same as for tetrahedral kernels.

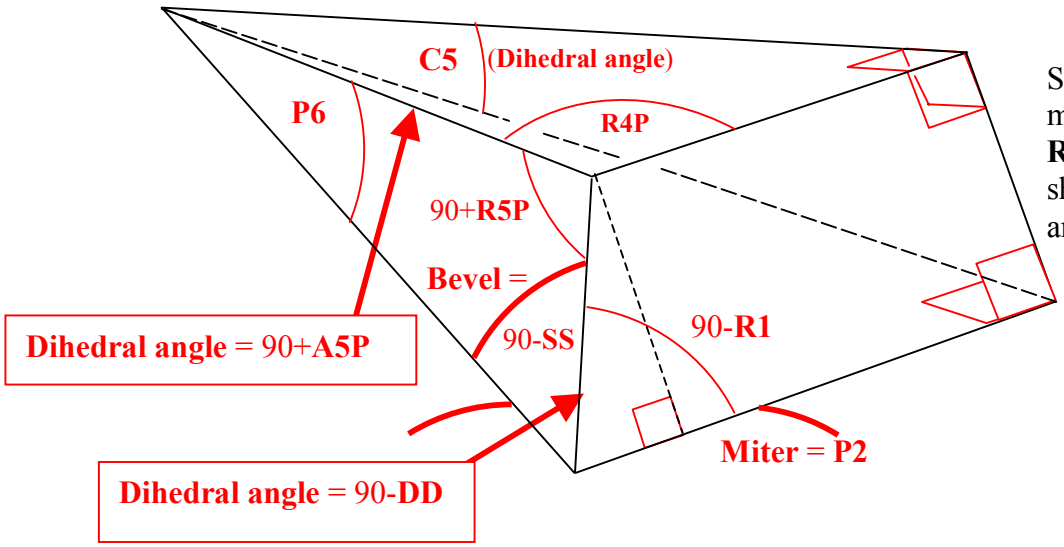
The angles along the bottom edge of **Common Rafter meets Valley** will be used as a template.

This geometric model is useful for dimensioning tenons, housings and mortises.



A scalene triangle is formed by the dihedral angle being projected to the side face of the rafter. Values may be calculated from known angles using the Law of Cosines.

Square cut: **Rafter meets Valley**, extracted and sectioned

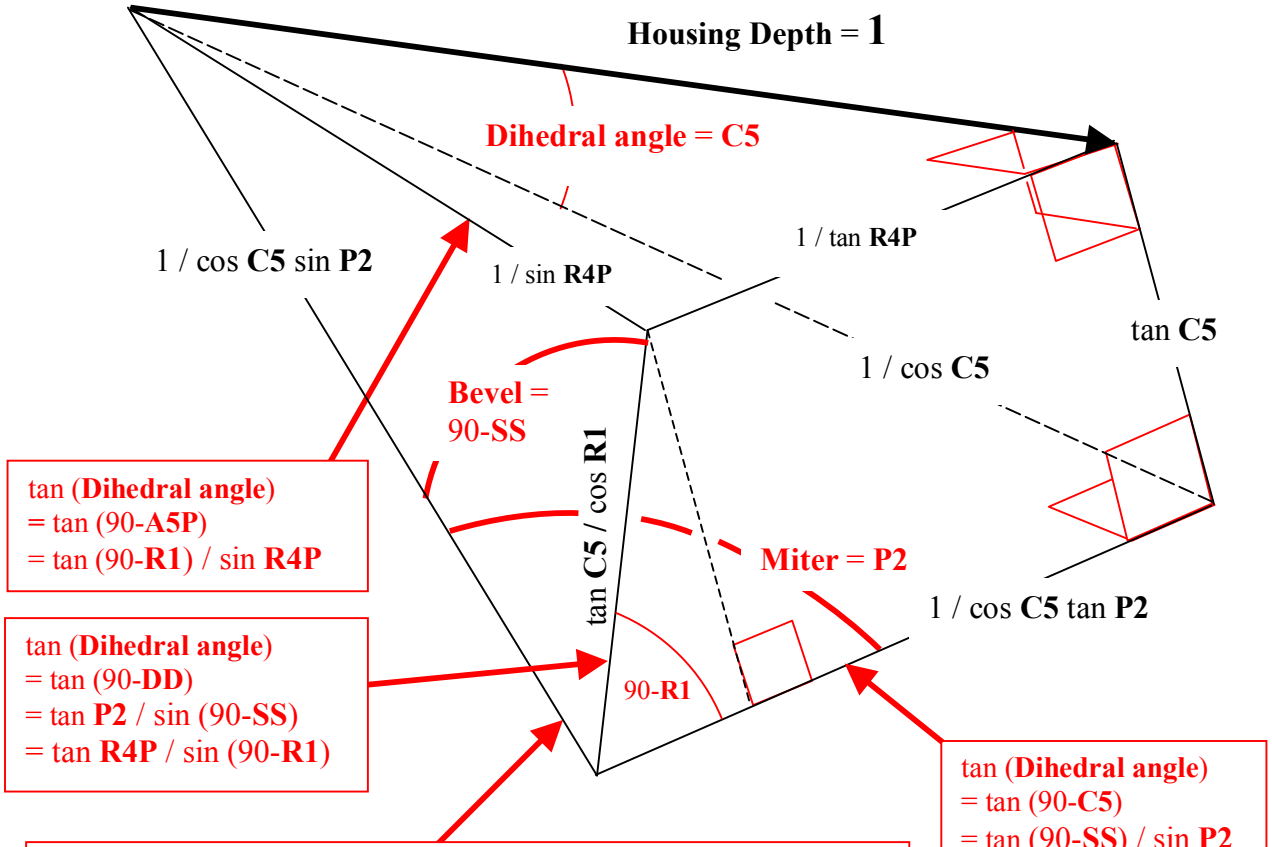


Square cut: model re-oriented, **Rafter meets Valley**, showing locations of angles

GENERAL SQUARE CUT MODEL:

Scaled in terms of Trig Functions of the Angles

The theoretical model "housing depth" is assigned a unit value, but may be set to any desired value in order to calculate actual mortise or tenon dimensions. The measurement in question is taken perpendicular to the face to be mortised.



Calculations for **R4P**: Miter (**P2**) and bevel (90-**SS**) are always given, the angle may be calculated using the following pattern:

Dihedral angle = 90-**DD**: tan(90-**DD**) = tan**P2** / sin(90-**SS**)

Angle on **Compound face** = 90-**R1**: cos(90-**R1**) = cos**P2** cos(90-**SS**)

tan**R4P** = tan(90-**DD**) sin(90-**R1**)

The angles on this plane may be identified by their position; in this case the plane follows the bottom face of the Valley rafter.

Type of Joint	Position	**Miter**	**Bevel**	**SETS of SQUARE CUT ANGLES:** **Rafter meets Valley,** cut along bottom edge to be used as template. Refer to diagrams for angle locations.						
Rafter meets Valley	Rafter bottom edge	**P2**	90-**SS**	**C5**	90-**DD**	90+ **A5P**	90-**R1**	**R4P**	**P6**	90+ **R5P**
	Plumb line (90-**SS**)	90-**SS**	**P2**	**DD**	90-**C5**	90+ **P5BV**	90-**R1**	90-**A7**	**P5**	90+**A9**
Purlin meets Valley	Purlin bottom edge	90-**P2**	90-**P1**	**C5**	90-**C1**	90+**C2**	90-**R2**	90-**R3**	**P3**	180-**Q2**
	Ref. Line (90-**R2**)	90-**P1**	90-**P2**	**C1**	90-**C5**	90+ **P4BV**	90-**R2**	**Q1**	**P4**	90+**A8**
Valley meets Main Rafter	Valley bottom edge	**R4P**	90-**R1**	**A5P**	90-**DD**	90+ **R6PBV**	90- **R5P**	**VC**	**R6P**	90+ **R1-R6P**
	Plumb line (90-**R1**)	90-**R1**	**R4P**	**DD**	90- **A5P**	90+ **A5B**	90- **R5P**	90- **R5B**	**R4B**	180- (**R4B**+ **R4P**)
Valley meets Main Purlin	Valley bottom edge	90-**R3**	90-**R2**	**C2**	90-**C1**	90+ **R7BV**	**Q2**	**VP**	**R7**	90+ **R2-R7**

Note the interchange of Miter and Bevel, and their corresponding dihedral angles, for pairs of related square cuts on the same member; also, the angle on the Compound face stays constant.