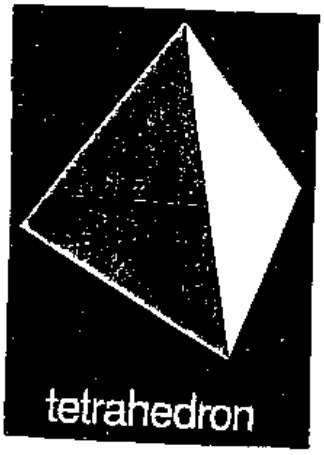
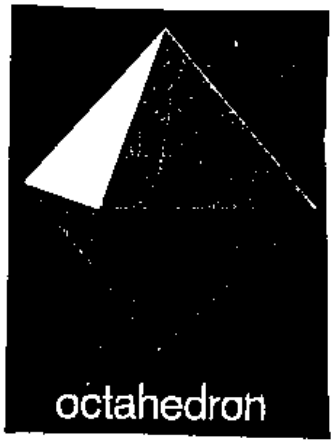
SUBJECT- LAMINATED TURNED FORMS BY BOB ROLLINGS

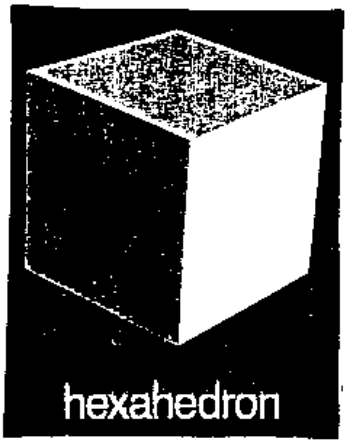
To make turned wood bowls, boxes or faceted forms I offer the following information.

Polyhedra

Five Regular





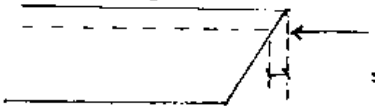


The five Regular Polyhedra

TETRAHEDRON – four equilateral triangles
HEXAHEDRON – six squares
OCTAHEDRON – Eight equilateral triangles
DODECAHEDRON – Twelve pentagons
ICOSAHEDRON – Twenty equilateral triangles

Step #1 is selection of wood

a) It must be dry 8-10% moisture content
b) It must be flat - not cupted
c) It is very important that all pieces for the same project be the same thickness otherwise the sizes of the cut pieces will vary.



It will be best if the wood can be calibrated using a thickness planer or wide belt sander

Step #2 decide on the finished diameter of the sphere

This maybe determined by the size of the pieces of wood available and also by consulting table "A" which gives you the size and thickness of the segments required (note - the thickness given is confusing as it does not allow for wall thickness. add 3/8" to all measurments after having made the calculation

Step #3 making the cutting template

The success of your finished item will now be decided and will be determinded by your ability to make a 100% accurate template, the lenth of each of the sides and each of the angles must be perfect or you will not get closure see figure "a" on page 3

FIG "a"

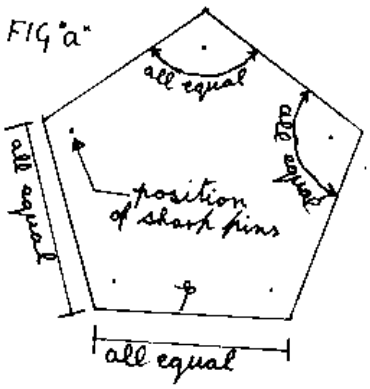
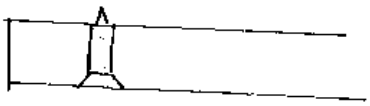


FIG "b"



♀ index symbol

I like to use baltic Birch plywood for these templates as it holds a fine line when marking out accurately and will hold the sharpened screws securly.
After having made the template put screws in several corners. (use screws that are theaded all the way up the shank) if you have used ¾" screws on ½" plywood you can then file the protusion to a fine point see fig "b", the sharper the point the easer to attatch to your blanks

Step #4 Having decided on the size of your blanks use a cardboard template to mark out the pieces on your wood, mark them out larger than the finished size, then cut out roughly on the band saw. Note – they do not necessarily have to be the same size as your cutting template as you will be able to cut your finished pieces larger or smaller than your cutting template
see figur "c"

Step #5 Setting up the saw
Consult table "A" to determine the angle to set the table saw. It will be best if you have a plate which allows no gap other than the saw Kerf

as the pieces you are cutting off are wedge shaped and you dont want them jamming between the plate and the saw blade.
at this time clamp your wooden fence either to the existing fence, or to the table top of the saw. The purpose of the woodern fence is to allow for the escape of of the cut off wedges see figure "C"

Step #5 Cutting the blanks to shape and angle
Befor fastening blank and template put indexing mark on blank to aline with mark on template this is important when you need to re-attach. attaching the template to the blank by taping with a hammer so the sharpened points bite into the blank. Note - the holes made by the points are in the corners and will disapear when you turn the sphere. You proceed to cut pushing the template along the fence one side after the other.
Do not attempt to cut your blanks to finished size on the first cut as you need to confirm your angle is correct.
Although the angle given in table "A" is correct we cannot be certain the calibration on our saw scale is and can only be verified by tapeing the appropriate number of pieces to-gether and making sure the joints are closed back on the inside and outside.
You may have to fine tune the angle 2 or 3 times before you are statisfied.
Only at this time do you need to come to the finished size, you can now cut as many Pieces as you need without futher checking

STEP #6 Putting veneer slips in joints if desired see FIGURE "d"
veneer slips of contrasting colour will enhance the the look of the geometry. Try to select the same number of sides of each segment to put the veneer on. so as not to change the size of any one segment to much, if you pre-assemble and mark the sides you want to veneer it should not present a problem, you should only use a thin veneer 1/32 or less. The veneer can easily be glued on useing carpenters glue and the jig I show in figure 'd'

Step #7 Glueing the segments together
for this opperation I like to use Lee Valley's 9-2 epoxy resin glue, the reason being its extended working time, it gives you lots of time to balance out all the joints and ensure the lid of your box will fit neatley to the lower half. It does however take 24 hours to cure.
Where the lid meets the box put small slips of paper (at the joints only) to make sure there is no leakage of glue as you must make sure you do not finish up with a solid block.

Step #8 Turning
You can now turn in a conventional manner after having glued a sacrifice block on each end.
The two halves of your box are held securley to-gether by the pressure of the tailstock

NOTE For more information on platonic solids I reccomend Jack Cox's book BEYOND BASIC TURNING
ISBN 0-941936-25-2

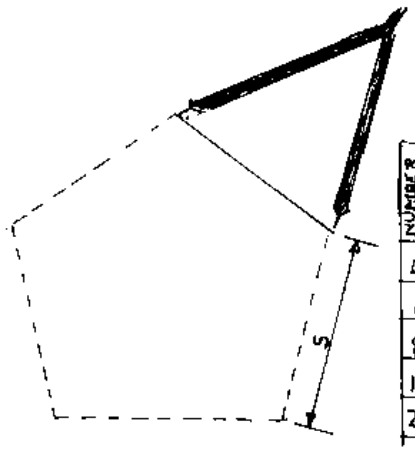
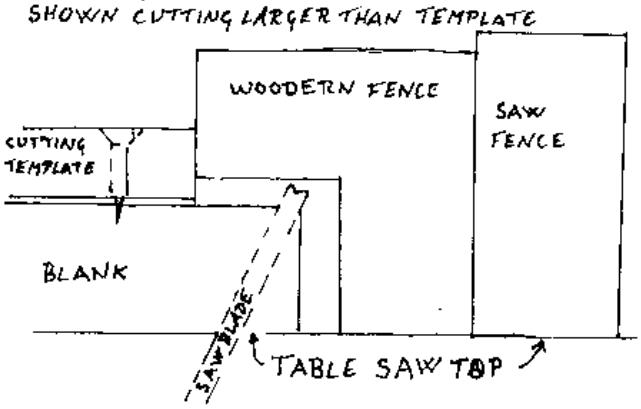


TABLE "A"

NUMBER of FACETS	SOLID	MITRE ANGLE (B)	MAX BALL DIAMETER (D)	MIN THICKNESS (T)
4	TETRAHEDRON	35·264	·408	·136
6	HEXAHEDRON	45·000	1·000	·211
8	OCTAHEDRON	54·736	·816	·173
12	DODECAHEDRON	58·283	2·228	·228
20	ICOSAHEDRON	69·095	1·512	·155

EXAMPLE CALULATION FOR DODECAHEDRON
IF (S) = 3" 3 × 2·228 = 6·684" MAX DIAMETER
THICKNESS OF SIDES
(3 × ·228) = ·684" + ·375 = ·959" OR 1"
NOTE - ·375 OR 3/8" IS ADDED ON ONLY AFTER (5 × T)

FIGURE "C"
SHOWN CUTTING LARGER THAN TEMPLATE



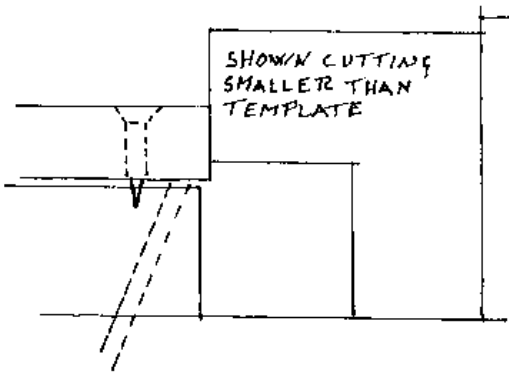


FIGURE "d"