

## Open Segmented Basics

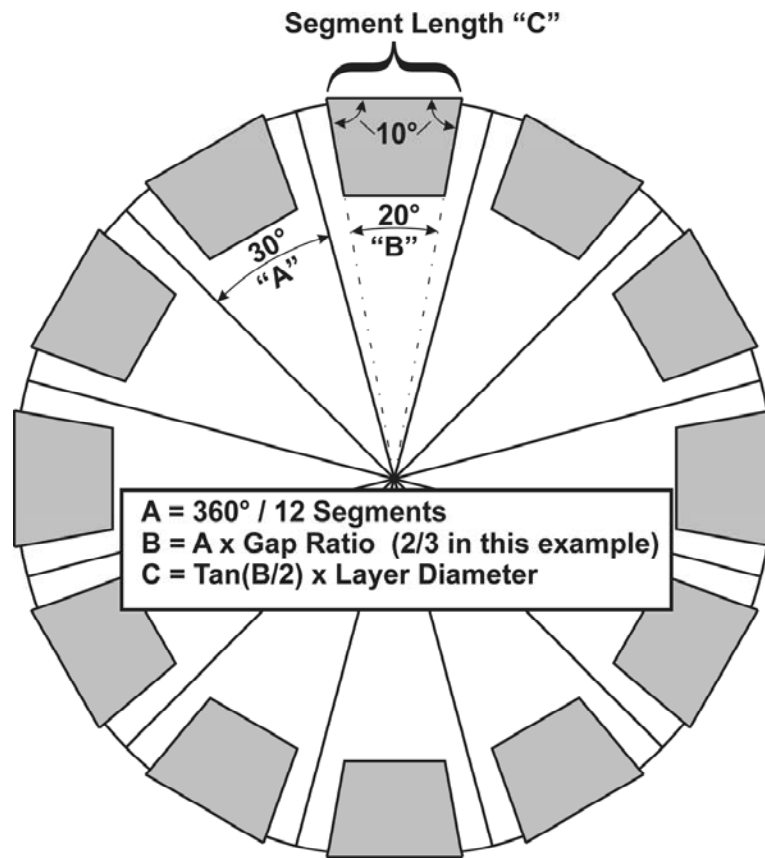
By Bill Smith

I developed the system I am demonstrating in 1996 after seeing a turning made by Yosh Sugiyama, the originator of the open segment concept. I still use the same system today for 100% of my open segmented work. I first demonstrated this system at the 1999 AAW Tacoma symposium. Since that time many turners, both beginners and experts, have successfully created open segmented turnings using my system. In 2002 I authored the book *Segmented Woodturning* published by Schiffer Publishing Ltd. To make the system available to turners who missed my Tacoma demonstration.

If you have questions please email me at [wsmith99@gmail.com](mailto:wsmith99@gmail.com) and be sure to visit my web site at [www.smithart.us](http://www.smithart.us)

### **Open Segment Geometry**

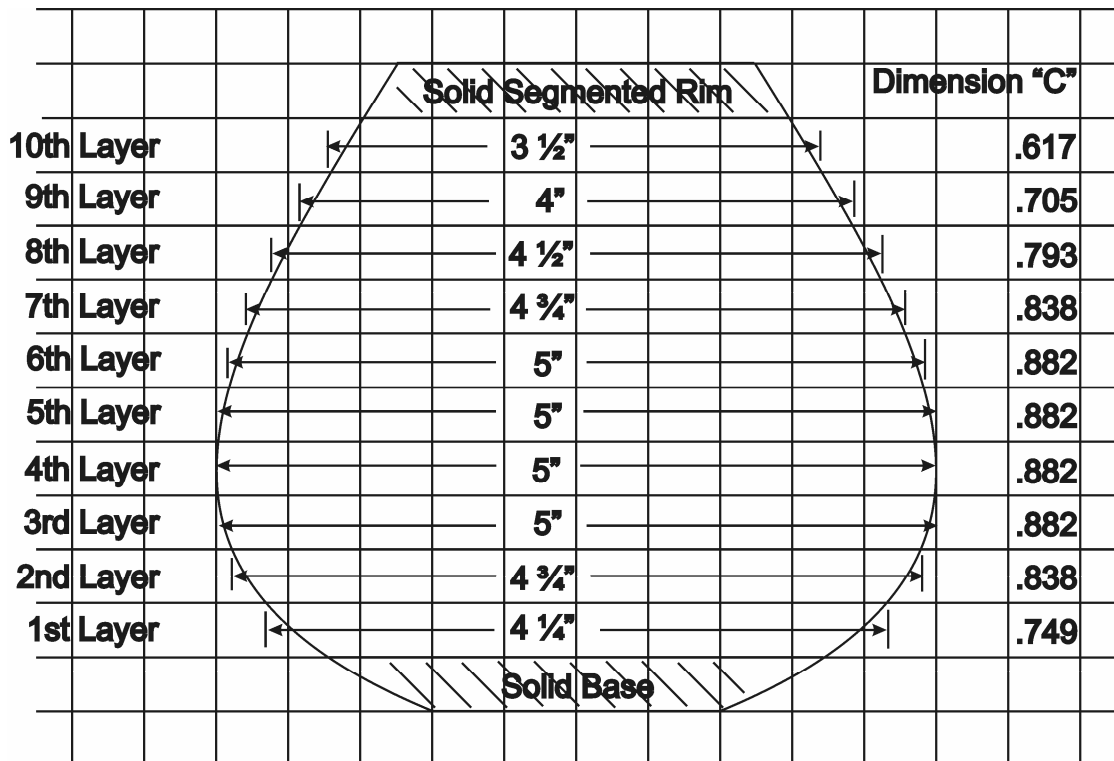
This drawing shows the basic geometry for open segment construction. This is the plan view (looking down) for a single layer of a design encompassing 12 segments per layer. I have divided a circle into 12 equal partitions of 30° each ("A" below). For this design I want the gaps to take up 1/3 of each partition and the segments to take up the other 2/3 (.667). Practical gap ratios can range from the example of .667 up to about .95. Use the formula to calculate the length ("C") of the segments. Set your miter gauge to angle "B" divided by 2 to cut the segments.



## Open Segmented Design Procedure

I use the following steps in designing an open segment turning:

- 1) Print or purchase graph paper with vertical spacing equal to the height of each layer. The  $\frac{3}{4}$  scale example below uses  $\frac{3}{8}$ " x  $\frac{1}{2}$ " (vertical x horizontal) graph paper.
- 2) Draw the outline of the final shape you want to achieve. Be sure to include the rim and base sections.
- 3) Measure the widest diameter for each layer. If you need to round, always round up. I usually round up to the nearest  $\frac{1}{4}$ ".
- 4) Use the formula to calculate the length (dimension "C") for the segments in each layer.
- 5) Use the calculated amounts to determine how much stock you will need. Add up the column of Dimension "C" numbers which comes out to 8.068". We need to add in .125" for the saw kerf. Since there are 10 layers we add 1.25" to get 9.32 inches. This is the amount of wood for one column of segments. This turning will have 12 segments in each layer or 12 columns of segments so we will need 112 inches of stock. I plan to alternate maple and walnut columns so I will need 56 inches of maple stock and 56 inches of walnut stock.
- 6) Save your design. They are helpful in making future designs and really helpful if you need to duplicate a turning.



This is a  $\frac{3}{4}$  scale design for the turning used in the Basic Open Segmented rotations.

## Small Scale Techniques - Resources

### Turning Tools

6mm bowl gouge - Deep flute allows for long swept back fingernail grind.

Woodcut Tools Limited in New Zealand

Email: [sales@woodcut-tools.com](mailto:sales@woodcut-tools.com) Telephone: +64 6 875 1066

Unhandled, about \$28 USD including shipping (last order about 1 year ago)

6mm scrapers – extra long (6 inches) – AKU Wire, Inc. (215) 672-8071

[www.akuwire.com](http://www.akuwire.com) Unhandled, about \$25.00 plus Shipping

Henry Taylor mini tool set has 5 tools including a ¼” moderately deep fluted bowl gouge and a ¼” scraper. Available from Crafts Supply USA [www.woodturnerscatalog.com](http://www.woodturnerscatalog.com)

All tools handled, \$99.00 plus shipping

### Other Items

Flange Nuts: for 1 x 8 faceplate. Be sure to get at least 1¼” high to clear most spindles.

Cut relief for shoulder on spindle about 1.050 dia by ¼” deep. Remove all scale, rust and oil from the flange by grinding the outer surface until it is shiny. Epoxy on a maple waste block that has been recessed to fit the flange.

Enco 800-873-3626 Part # 891-5720 about \$5.50 each

### Palette knife

Langnickel # B-2 Can usually be ordered at most art supply

### Table Saw

Find a saw with belt drive, adjustable arbor and little runout (less than .003”).

Suggested modifications:

Change out motor for 1800 rpm version. ¼ hp or ½ hp motors are fine

Change belt and pulleys with target blade rpm of 1200 to 1800 rpm

I use a 7¼” 60 tooth crosscut blade from Forrest - [www.forrestblades.com](http://www.forrestblades.com)

Precisely adjust the arbor so the blade is perpendicular to the table and parallel to

. the miter slot then lock the arbor for 1” to 1½” height and 0° tilt.

If runout is a problem double precision bearings may help

Use a zero clearance sled

### Burrs

Inside bottom of bowls - carbide crosscut or double cut flame or oval shape

Outside base – carbide single cut or cross cut cylinder shape ¼” diameter

Drum Sander – See article in Downloads section at [www.smithart.us](http://www.smithart.us)

Pattern Design Graph Paper – Available at Downloads section at [www.smithart.us](http://www.smithart.us)