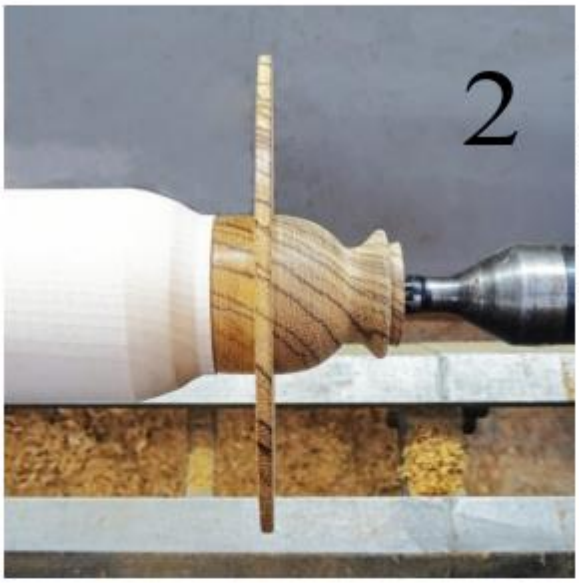
Saturn Bowls and Op Art

By Robin Goodman

In my previous Turnings article, I wrote about the Woodturners Worldwide online symposium in September. I mentioned in particular that Jason Clarke's Saturn bowl demo had intrigued me. The wide but thin rim had been transformed into several rings that could rotate independently and could be offset if required. The means of holding the rings in place was not immediately obvious. He chose Zebrano, which has a very strong grain pattern and by rotating the rings relative to each other an interesting variable effect can be achieved, **photo 1.**



He had cleverly linked the rings by making a 45^0 cut from the top and underside to intersect accurately and form a concealed 'v' shape on its side. To make these very narrow cuts, he had made a special micro parting tool with an extremely thin tip.

I initially tried to make a Saturn bowl using his method and design. This proved much more difficult than I had anticipated. I shaped the inner bowl profile together with the very thin 3mm rim from a 150 mm diameter by 50 thick zebrano blank, **photo 2**.

Grinding a special micro parting tool as suggested by Jason was not easy. From a short length of 6 mm square section HSS steel I carefully ground it down to produce a thin – 0.4 mm – tip a few mm long, as shown in **photo 3**. However, it proved so delicate that the tip broke twice, when trying to make the first 45^0 cut. It was also prone to making a bad catch, not helped by the fact that my tip was not exactly at right angles to the base of the tool blade; also it was cutting cross grain. Maybe I should just blame operator error!

Another problem was that each pair of cuts had to be ridiculously accurate.

Photo 4 shows the tool about to start a cut. To ensure a satisfactory 'v' cut within the 3mm thick rim and to maintain

enough strength in the rim, the depth had to be accurate to about ½ mm and the second cut from the other side had to line up with the first to about ½ mm; the angle was also critical. I found this almost impossible to achieve, success being partly dependent on luck, so it would inevitably lead to more failures in the 3 or 4 'v' cuts needed for each bowl. Slight distortion and warping of the thin rim also made the delicate cuts more difficult.

Photo 5 shows how I failed to make a good 'v' cut between rim and bowl; the first cut went right through and inadvertently separated the bowl from the first ring. Another lesson learnt was that for eccentric rings you need to have the wood grain tangential at the thinnest part of the ring for greater strength. A second attempt on a different rim resulted in a bad catch, although the first pair of 'v' cuts was otherwise satisfactory. In addition, this coloured rim stuck fast to the very tight jam chuck guide cylinder and in separating it the rim broke, **photo 6**.

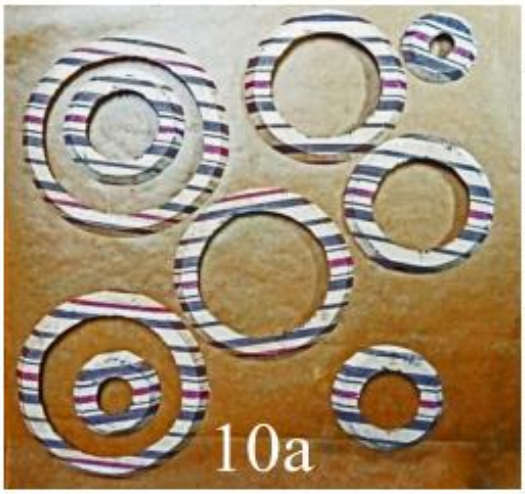
It was time to consider what modifications I could make to have more hope of success. Instead of a 'v' cut, a single cut could be made either at 45^0 or vertical. My thinnest ordinary parting tool is 1.4 mm thick and if used for 45 deg cuts would lead to an unsatisfactory 2 mm drop across the cut joint. A vertical cut appeared a better option.

To make the rings a reasonably tight fit, one simple solution is to cut each ring separately and provide support from underneath. In a similar way to cutting captive rings on a goblet stem, but with extra accuracy required, each rectangular section ring was cut from the rest of the blank to a diameter exactly matching the adjacent ring, **photo 7.** To increase the strength of each ring and minimise warping, I increased the thickness from 3 to 6 mm.

For a design with eccentric rings varying in width around their circumference, I needed to turn using at least 2 different centres. I tried an unusual combination of a standard spigot plus an offset face plate ring, **photo 8.**

The maximum offset I could achieve with this combination was 5mm, which enabled me to produce rings with widths tapering from 20 to 10mm, see my first successful zebrano bowl in **photo 9**.

In the past I have made bowls using a series of rings of increasing size that are also moved relative to each other to produce patterns. A blank was made up by gluing different coloured woods together; it was then sliced into 6mm thick boards, which were cut into rings, **photo 10a**, (next page), at an angle on the bandsaw – it was



necessary to cut the rings into 2 halves before sawing and then glue back together again afterwards.

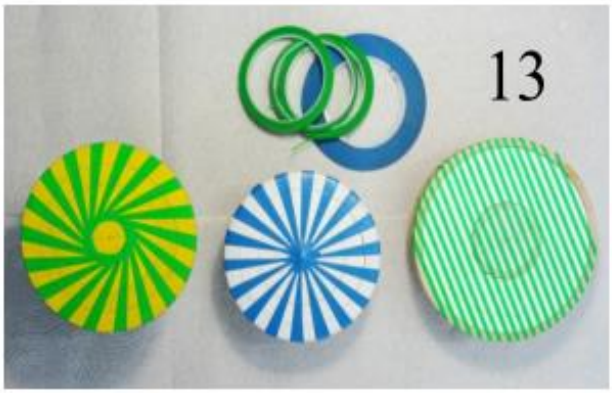
Before gluing the rings together, they were carefully twisted relative to each other. Turning was straightforward, **photo 10b**, and the interesting pattern only emerged on completion. Plan view is shown in **photo 10c.** This is a quicker way than the traditional segmental technique.

I like to add colour or decoration to many of my pieces. For the Saturn bowl, to make use of the rotation of the rings, I immediately thought that a geometric pattern, along the lines of 'Op art', that changed when rings rotate, could work well.

Op Art or Optical Art is a branch of mid-20th century geometric abstract art that often creates optical illusions. It is usually achieved by the precise manipulation of shapes and colours. The English artist Bridget Riley produced many such designs including 'Movement in Squares' 1961, **photo 11a** and the curvier design shown in **photo 11b.**

I was interested in Op art a long time ago. My front door is made up of chamfered vertical 70 mm wide boards butted together to form a groove at each joint. Producing a picture across all the grooves is difficult and tends to result in distortion when viewed. An obvious option was to make a geometric pattern coinciding with the vertical grooves, op art in essence. I came up with a simple design and it has now been on my front door for many decades, **photo 12.**

For my new bowls I opted for 3 different pattern designs using sycamore blanks that I already had. Having cut and assembled the rings with as tight a fit as possible, I airbrushed a base colour of white or yellow. The next stage was to pencil on the designs and then laboriously add narrow masking tape to form the designs, **photo 13.** 4mm wide stripes, radial lines at 10 deg intervals and skewed radial lines were my 3 designs. After airbrushing with black paint and in one case with an extra iridescent layer, the masking tape was removed to show the planned patterns.



The bowls were then turned with integral rims to support the rings. Using Cole jaws, the bases were finished off as in **photo 14**. The first design had a small upstand on the inside and outside of rim**, see photo 15a**. The others had a smaller rim hidden by the largest ring on top.

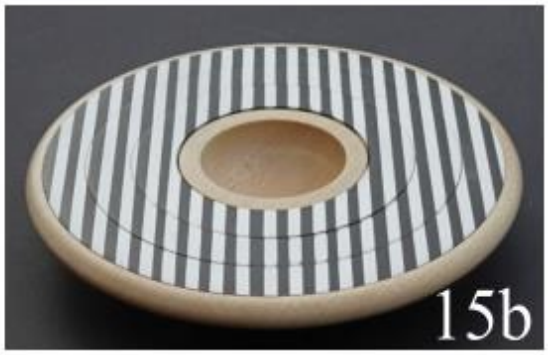
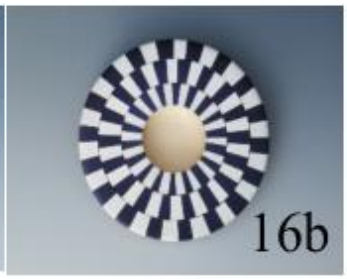
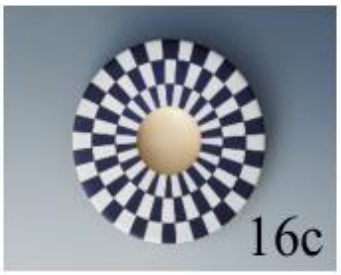


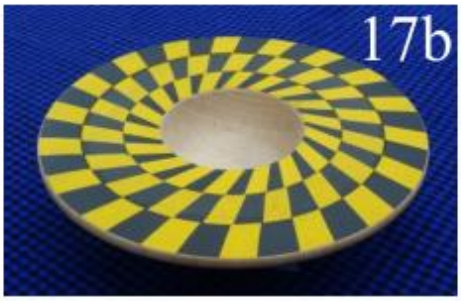
Photo 15b shows the parallel design as formed and then in one possible arrangement after rings had been rotated, **photo 15c.**

The radial design is shown as original**, photo 16a** and then in 2 possible configurations after rotating the rings, **photos 16b and 16c.**





For the skewed radial pattern, I used a yellow first coat; original and one rotated option are shown in photos 17a and 17b.



This was an interesting project that started with Jason's demo showing how one could make a bowl rim of interconnected rings that can be rotated independently. The original method proved very difficult, so changes were made and new decorative patterns were developed by using the rotation of the rings. I was pleased with my idea of using Op art designs for the rims and with the final outcomes, which are hopefully unique.

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