A Star Shaped Festive Flexagon

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A star shaped festive flexagon decorating our Christmas tree is shown in Figure 1. Its net is shown full size in Figure 2. This is Figure 10.55 in my book Serious Fun with Flexagons, where it is described as a 60°-120° rhombus even edge flexagon. It is a variant of a square flexagon with the squares replaced by 60°-120° rhombi, and the number of sectors increased from two to three.

The net was printed on the plain white side of gift wrapping paper. This took the printer ink reasonably well, but to avoid smudging it had to be left to dry for several minutes. Some gift wrapping papers will not take printer ink.

Figure 1. A star shaped festive flexagon.
Figure 2. Net for a star shaped festive flexagon. Cut along the heavy and dashed lines, and crease the light lines to form hinges. Fold together pairs of leaves numbered 3 and 4, and join the ends with transparent adhesive tape.

As assembled, the flexagon is in main position 1(2). It can be flexed around its 4-cycle by using the 3-fold pinch flex. There are two different types of main position, which appear alternately. Main positions 1(2) and 3(4) are, in appearance, star shaped flat regular even edge rings of \(60^\circ-120^\circ\) rhombi (Figure 1). Main positions 2(3) and 4(1) are skew regular even edge rings of \(60^\circ-120^\circ\) rhombi (Figure 3(a)). Intermediate positions are \(60^\circ-120^\circ\) rhombus edge triples (Figure 3(b)). Figure 3 is Figure 10.57 in *Serious Fun with Flexagons*. Intermediate positions can be opened into box positions which are regular box even edge rings of \(60^\circ-120^\circ\) rhombi.
Figure 3. A flexagon as the following. (a) Skew regular even edge ring of 6 $60^\circ$-$120^\circ$ rhombi. (b) $60^\circ$-$120^\circ$ rhombus edge triple.

The net for the precursor two sector first order fundamental square even edge flexagon is shown in Figure 4 (Figure 1.2 in *Serious Fun with Flexagons*).

Figure 4. The two sector first order fundamental square even edge flexagon.