

Interlinked Tetrahedra



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Bead Mechanics

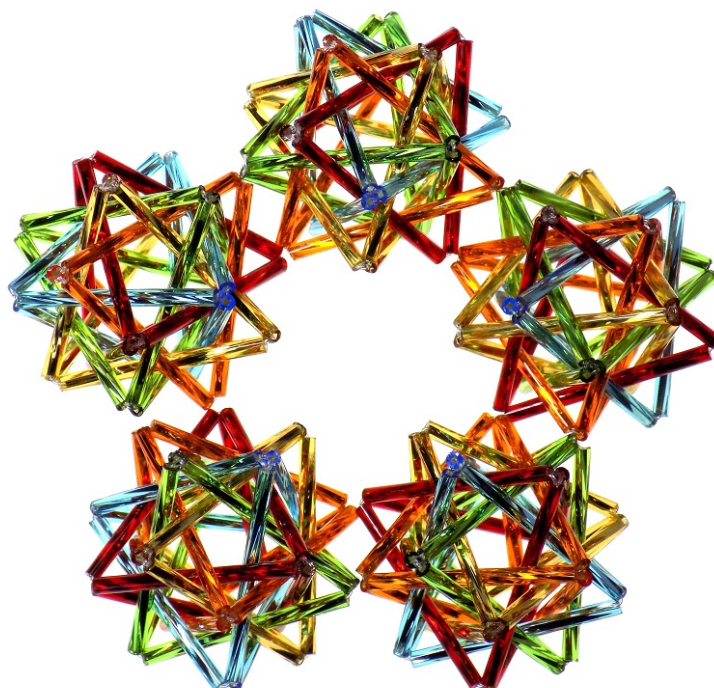
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Acknowledgements

This shape is a beadwork version of the origami model *Five Intersecting Tetrahedra* designed by Thomas Hull. More information about the origami model is available here: mars.wne.edu/~thull/fit.html.

The diagrams in this tutorial were created with Stella4D Pro: www.software3d.com/Stella.php.

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These instructions are for personal use only. Please do not copy, distribute or teach this tutorial or use it for commercial purposes. You may of course sell your own work made from these instructions, but mass production is not permitted. If you sell beadwork made from these instructions please credit the designer: Patricia Verrier, Bead Mechanics. For more information contact: patricia@beadmechanics.com.

Instructions

Materials list

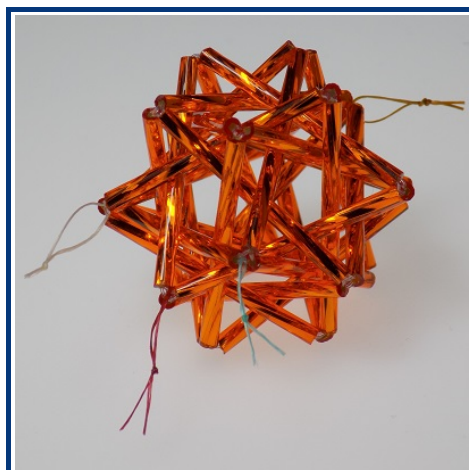
- 30 x Preciosa 30 mm Bugle Beads: 6 each of red, orange, yellow, green and blue
- 0.25 mm (0.01 inch) illusion cord monofilament, clear
- Thread (any type is ok, used only as a marker)
- Size 10 or 12 beading needle (used for the thread marker, you don't need to use a needle with the cord)
- Scissors
- Long nose tweezers (optional)

It is important that the bugle beads are the correct length and width otherwise the shape will not work. They need to be about 13 times as long as wide. You can check this by lining up 13 bugles and then placing one along the top to check the dimensions, as shown in the photo below.



Overview

This beaded bead is made from five interlinked tetrahedra. Each tetrahedron is a different colour and made from six bugles using angle weave. To make the shape in a single colour I recommend using additional thread markers – as explained in the following instructions – in red, orange, yellow and green to indicate which colour each tetrahedron corresponds to.



Tetrahedra 1

Step 1 On approximately 100 cm (40 inches) of cord string three red bugles, leaving a 30 cm tail. Pass through all the beads a second time and then once more through the first bead strung to make a triangle, as shown in Figure 1.

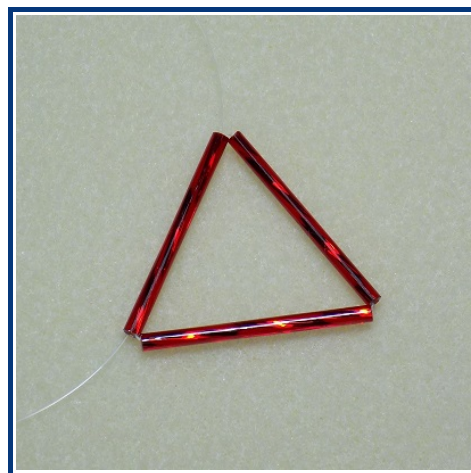
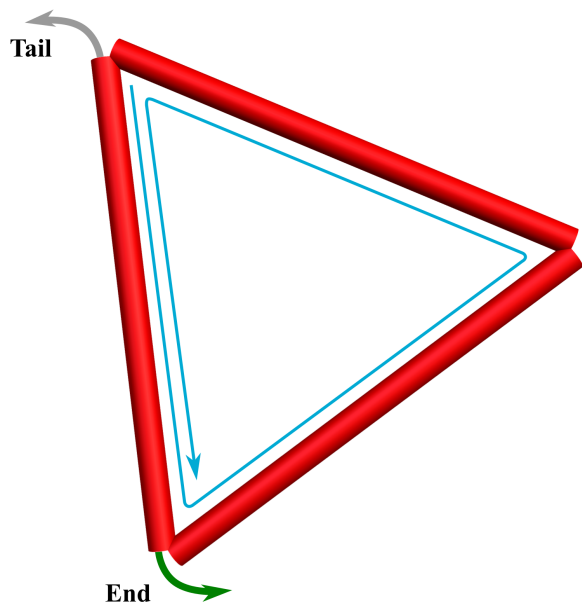


Figure 1. Tetrahedron 1: Step 1

Step 2 On the working end of the cord string two red bugles and pass through the bugle the cord was exiting from to make another triangle, as shown in Figure 2. Repeat this thread path once more to secure the triangle.

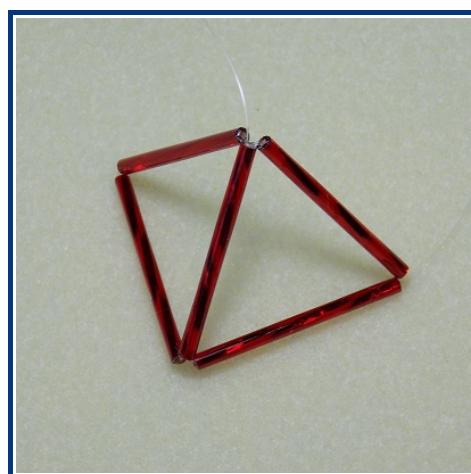
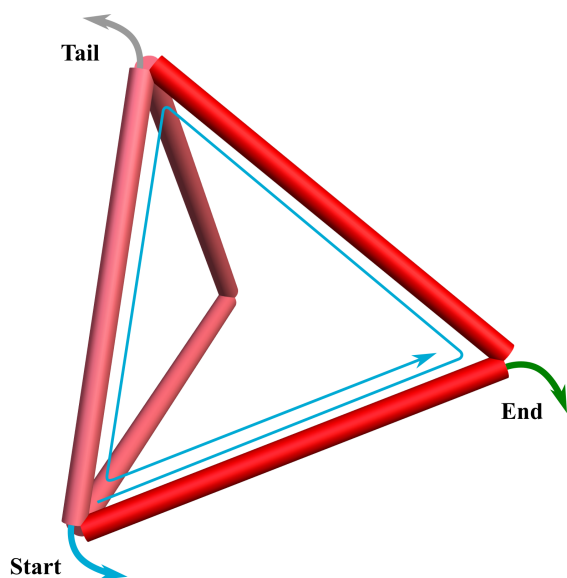


Figure 2. Tetrahedron 1: Step 2

Step 3 With the working end of the cord string one red bugle and follow the thread path shown in Figure 3 to complete another triangle. Repeat this thread path once more to secure the triangle.

With the tail end of the cord follow the thread path around the remaining unsecured face of the tetrahedron, as also shown in Figure 3. Repeat this thread path once more, making sure each corner has at least two passes.

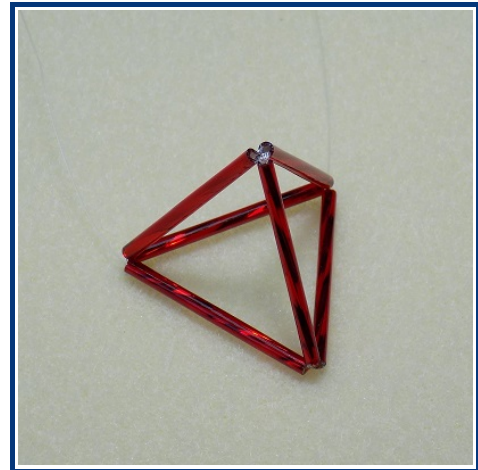
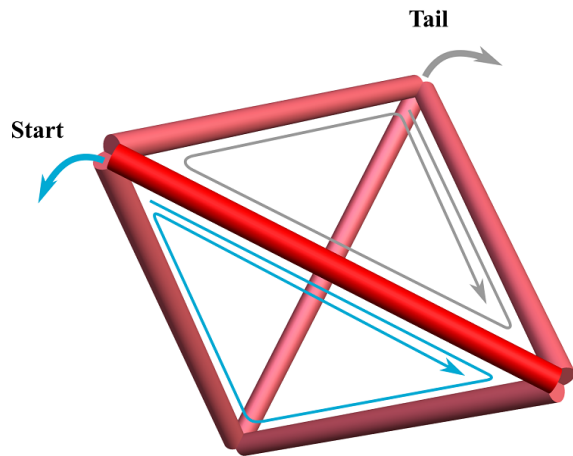


Figure 3. Tetrahedron 1: Step 3

Weave in both ends of the cord following the existing thread paths and trim. Using a pair of tweezers to thread the cord through the bugle bead can make weaving the ends in easier. If the cord gets stuck in a bead try rotating the bugle slightly as often the end is caught under one of the previous passes and this should free it. The completed tetrahedron is shown in Figure 4.

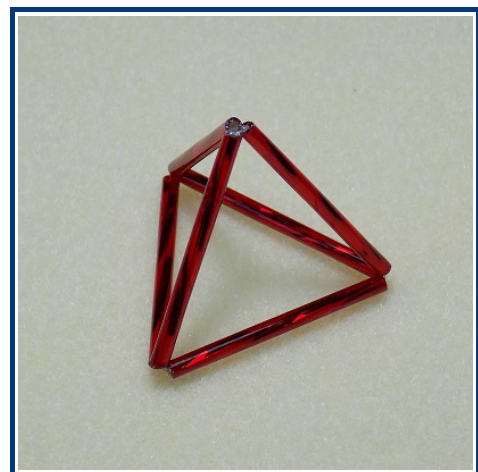
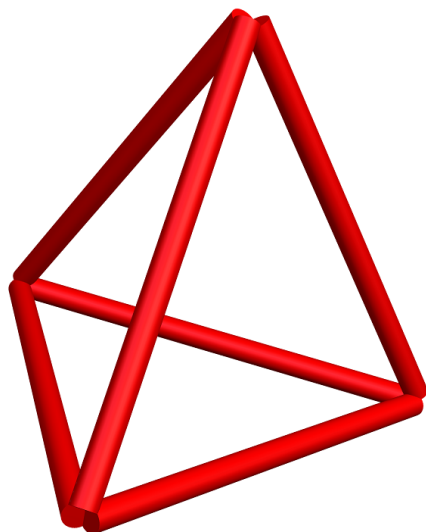


Figure 4. Tetrahedron 1: Completed

Adding a thread marker Using a beading needle and a short length of thread stitch through the gap between the three different cord paths at one of the points of the tetrahedron, as shown in the left photo in Figure 5. Tie the ends of the thread together into a small loop using an overhand knot and then trim, as shown in the right photo in Figure 5. This makes a marker for orientating the tetrahedron.

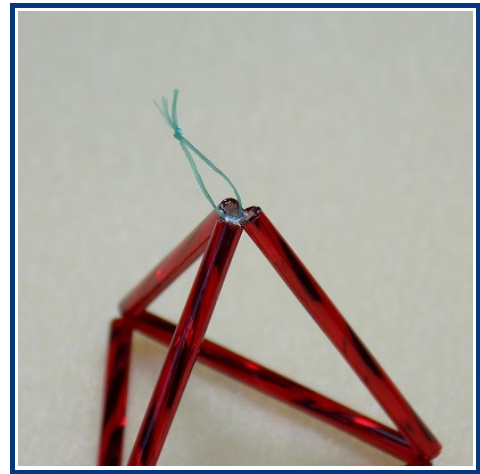
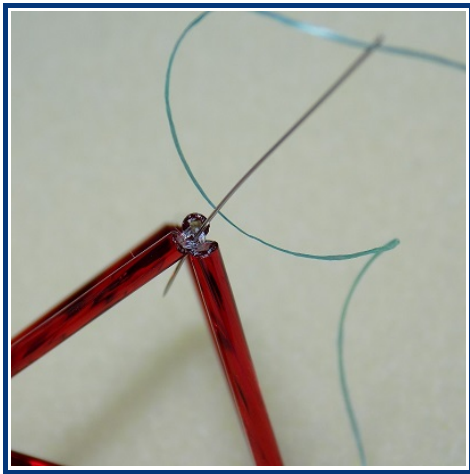


Figure 5. Tetrahedron 1: Adding a thread marker

Tetrahedra 2

Step 1 Repeat Step 1 for Tetrahedron 1 using orange bugles to make a triangle. Place the triangle over the point with the thread marker on tetrahedron 1, as shown in Figure 6.

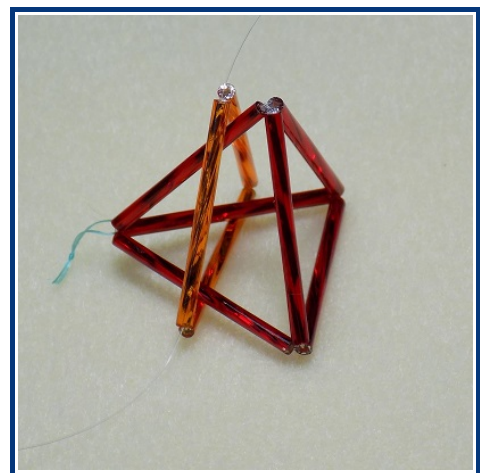
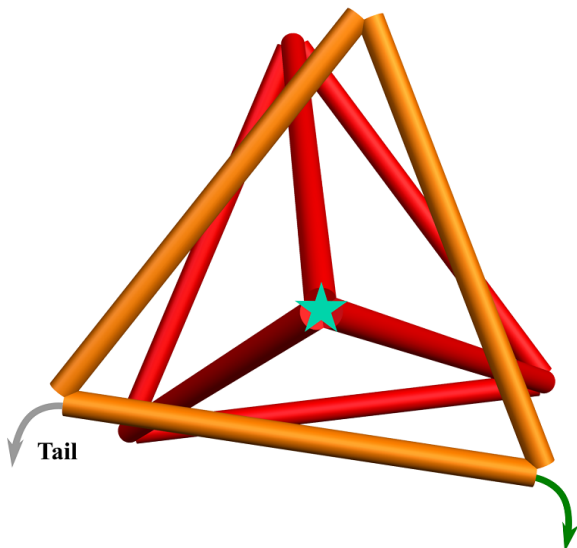


Figure 6. Tetrahedron 2: Step 1

Step 2 Repeat Step 2 for Tetrahedron 1 using orange bugles, but weave the two bugles through the beadwork as shown in Figure 7. Each orange bugle will pass under one red bugle. You can either string the bugles one at a time and then weave the cord through the beadwork, or weave the cord through then thread the bugles and move them into place, which ever is easiest.

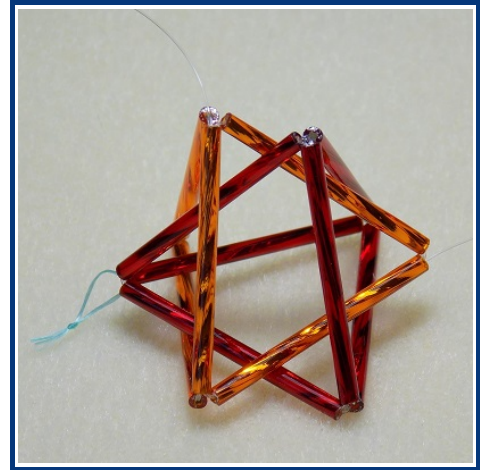
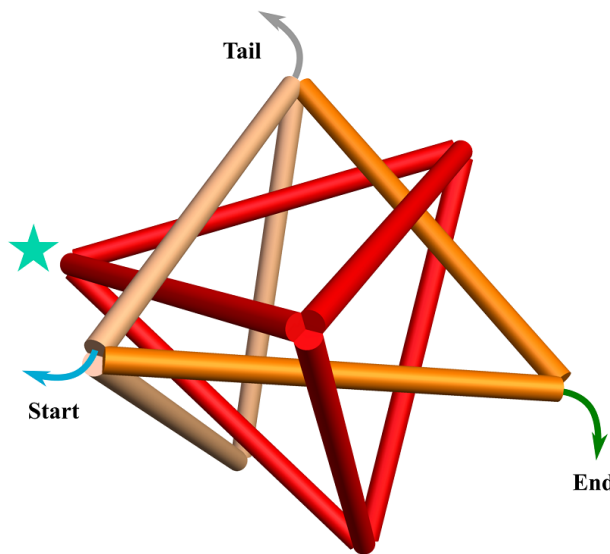


Figure 7. Tetrahedron 2: Step 2

Step 3 Repeat Step 3 for Tetrahedron 1 using an orange bugle, but weave the bugle through the beadwork as shown in Figure 8. The orange bugle will pass under one red bugle.

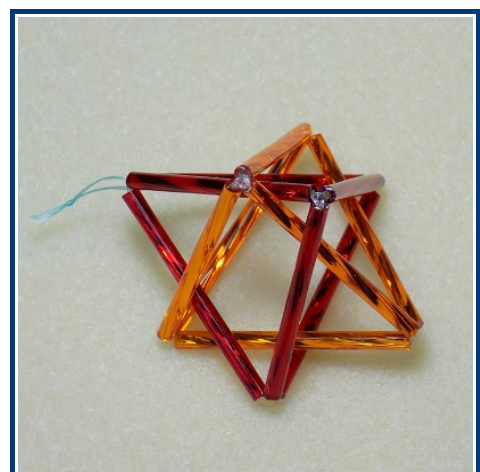
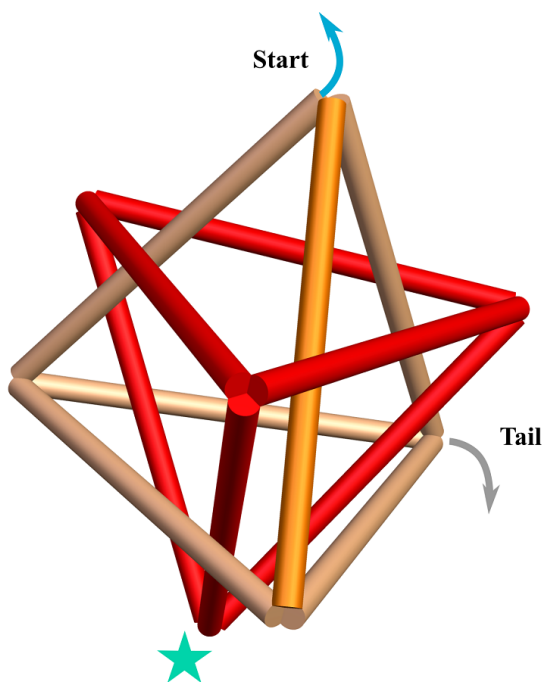


Figure 8. Tetrahedron 2: Step 3

Weave the ends of the cord in and trim. The two completed tetrahedra are shown in Figure 9.

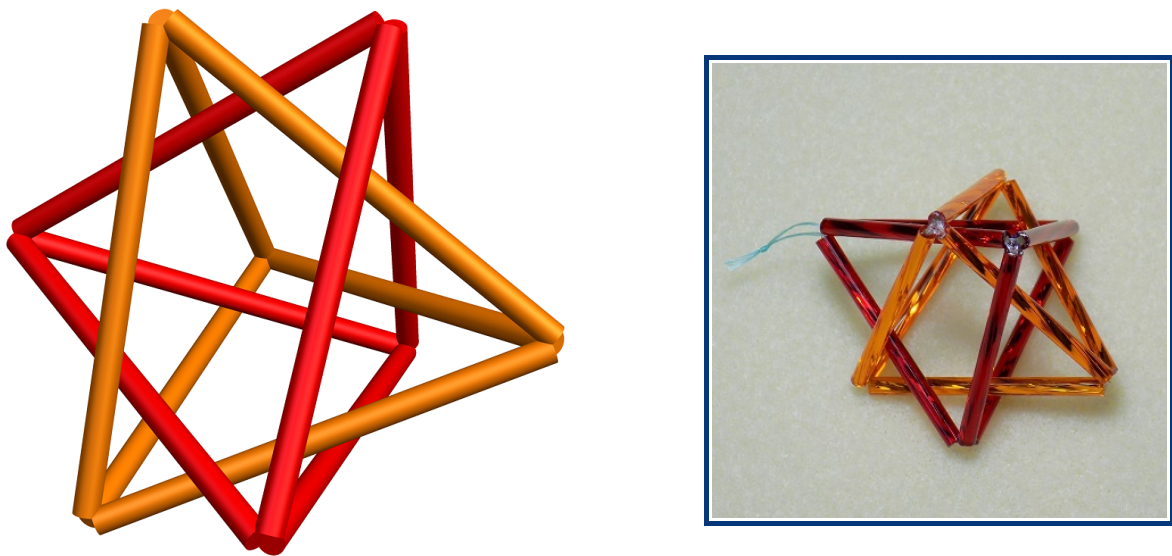


Figure 9. Tetrahedron 2: Completed

Use a short length of thread and a beading needle to create a second thread marker on the point of the orange tetrahedron that is opposite to the marker on the red tetrahedron, as shown in the left photo in Figure 10. These two tetrahedra form a 'link', as shown in the right photo in Figure 10, which is a good check that the tetrahedra are aligned correctly at this point.

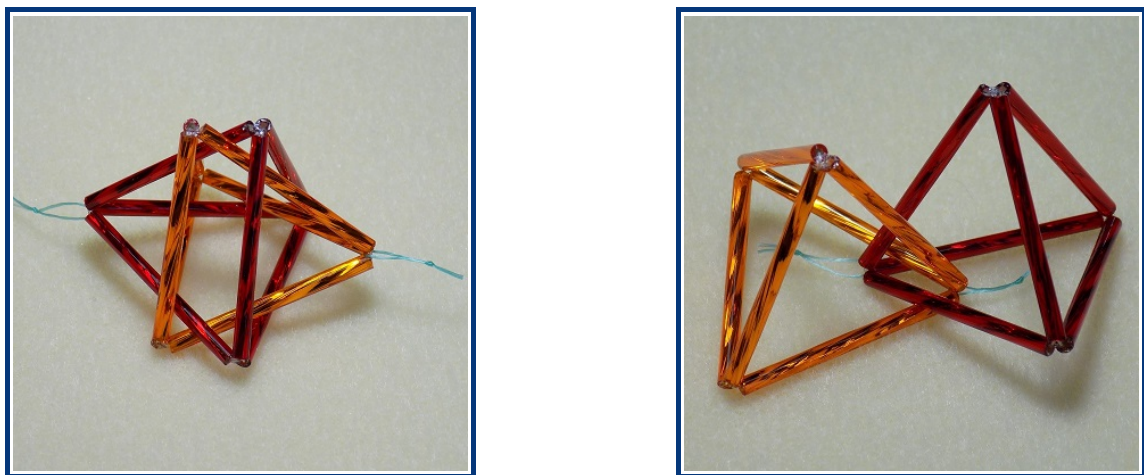


Figure 10. Tetrahedron 2: Adding a second thread marker

Tetrahedra 3

Step 1 Repeat Step 1 for Tetrahedron 1 using yellow bugles, but weave through the beadwork as shown in Figure 11. You will need to align the red and orange tetrahedra relative to each other so that they look like the diagram. Take care that, looking from the angle shown, the orange points are to the right-hand side of the red points. One yellow bugle will pass under one red bugle, one will pass under both a red and an orange bugle, and the last one will pass under one orange bugle only.

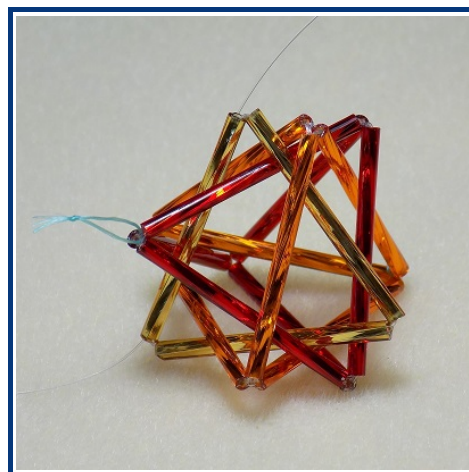
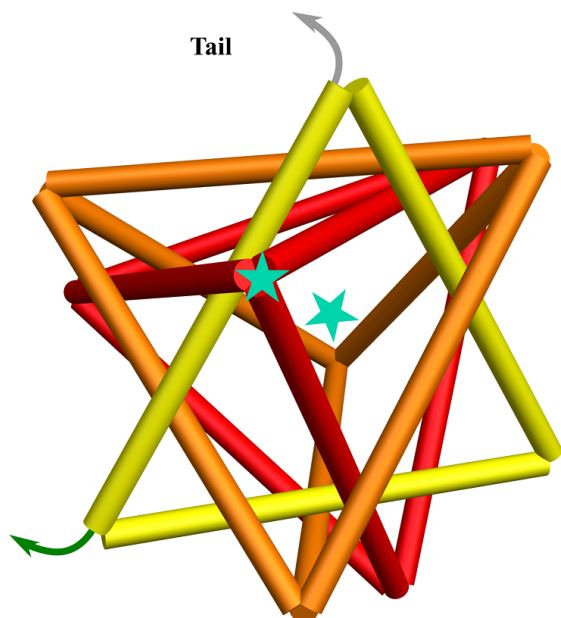


Figure 11. Tetrahedron 3: Step 1

Step 2 Repeat Step 2 for Tetrahedron 1 using yellow bugles, but weave the two bugles through the beadwork as shown in Figure 12. One yellow bugle will pass under two red bugles, while the other yellow bugle will not pass under any others.

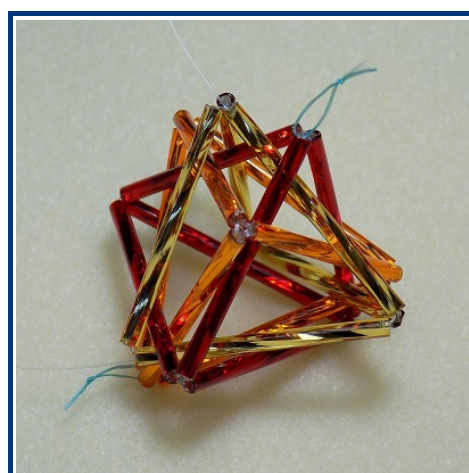
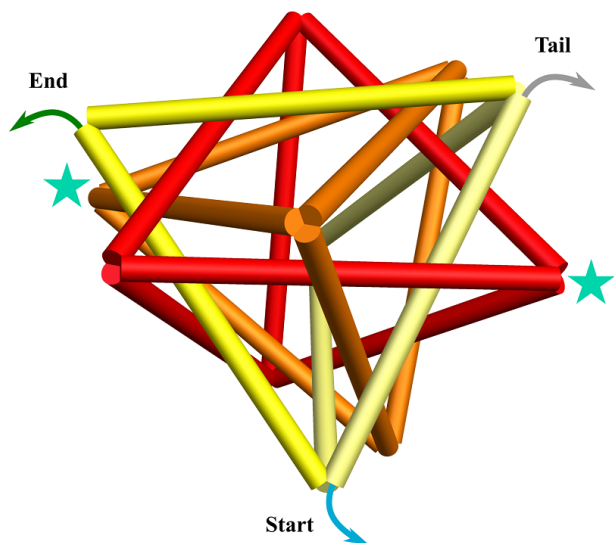


Figure 12. Tetrahedron 3: Step 2

Step 3 Repeat Step 3 for Tetrahedron 1 using a yellow bugle, but weave the bugle through the beadwork as shown in Figure 13. The yellow bugle will pass under one orange bugle.

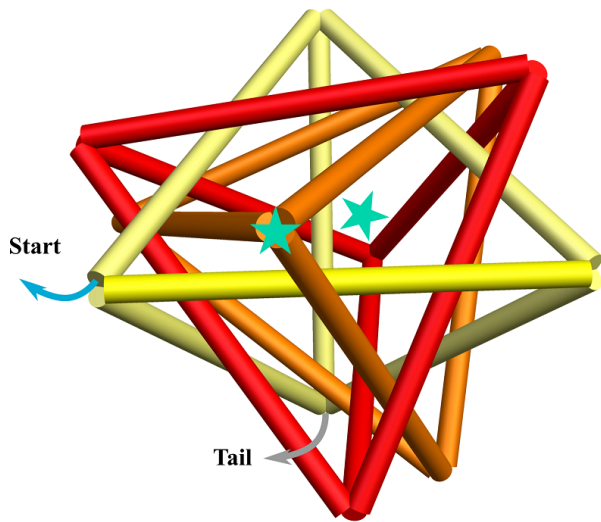


Figure 13. Tetrahedron 3: Step 3

Weave the ends of the cord in and trim. The three completed tetrahedra are shown in Figure 14. Tetrahedron 3 is the hardest one to make, the remaining two are much easier!

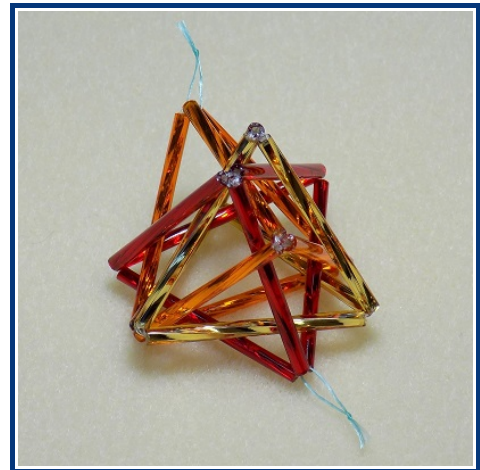
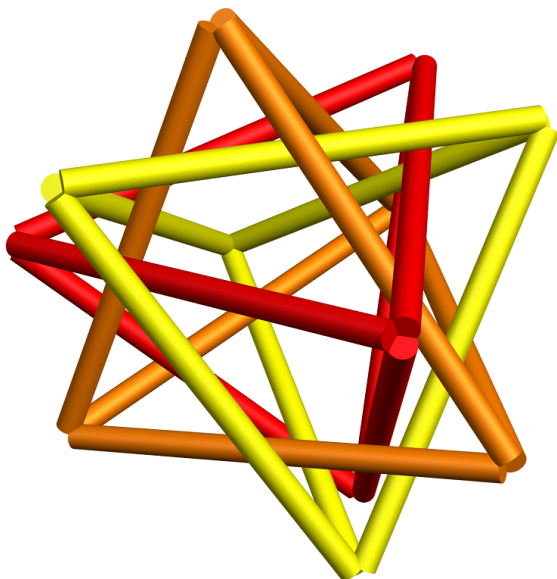


Figure 14. Tetrahedron 3: Completed

Tetrahedra 4

Step 1 Repeat Step 1 for Tetrahedron 1 using green bugles, but weave through the beadwork as shown in Figure 15.

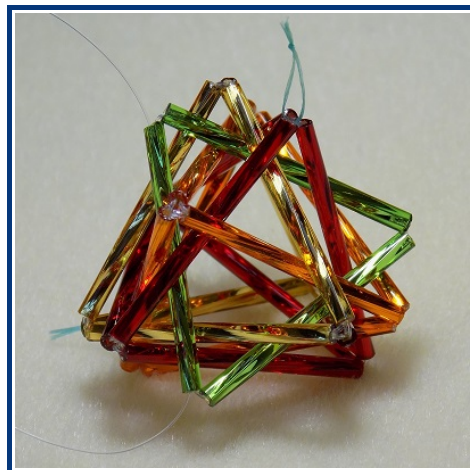
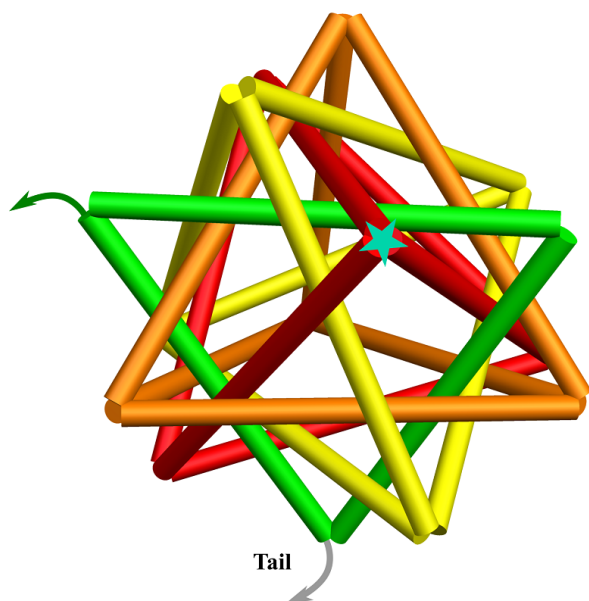


Figure 15. Tetrahedron 4: Step 1

Step 2 Repeat Step 2 for Tetrahedron 1 using green bugles, but weave the two bugles through the beadwork as shown in Figure 16. The beadwork should be fairly stable at this point, with little room for any of the individual tetrahedra to move relative to each other. (If the beadwork feels crowded and new bugles will not fit in place then it is unfortunately likely that there is a mistake in the position of one of the tetrahedra.)

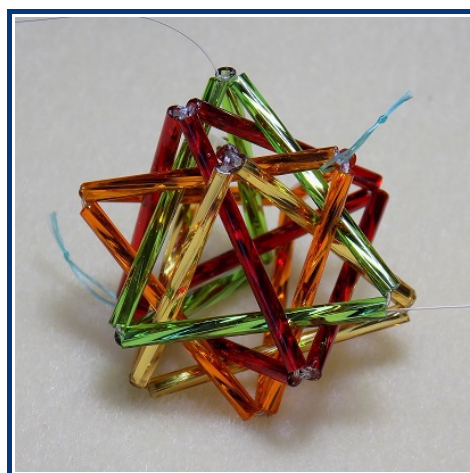
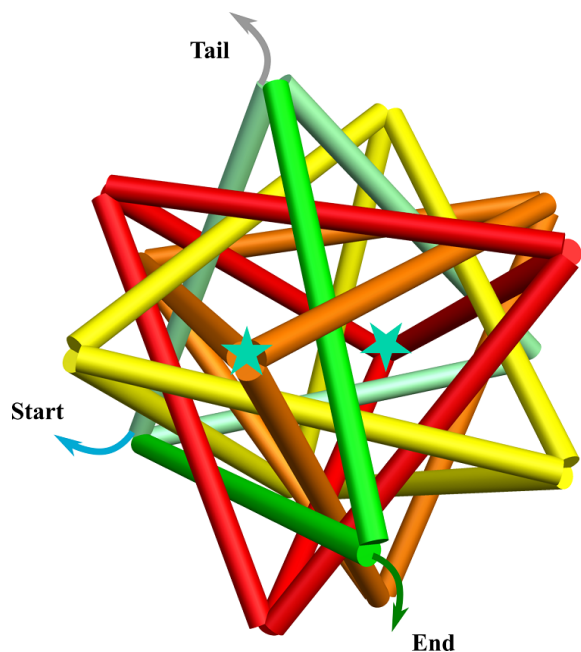


Figure 16. Tetrahedron 4: Step 2

Step 3 Repeat Step 3 for Tetrahedron 1 using a green bugle, but weave the bugle through the beadwork as shown in Figure 17.

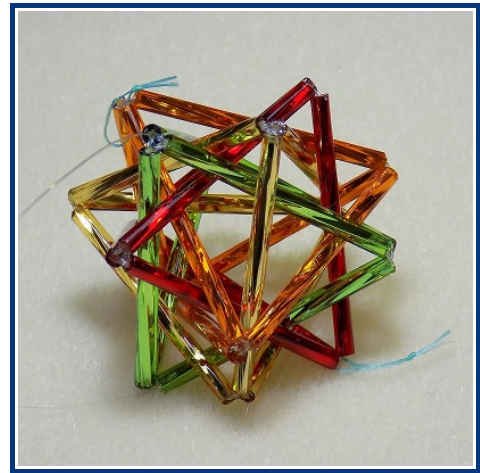
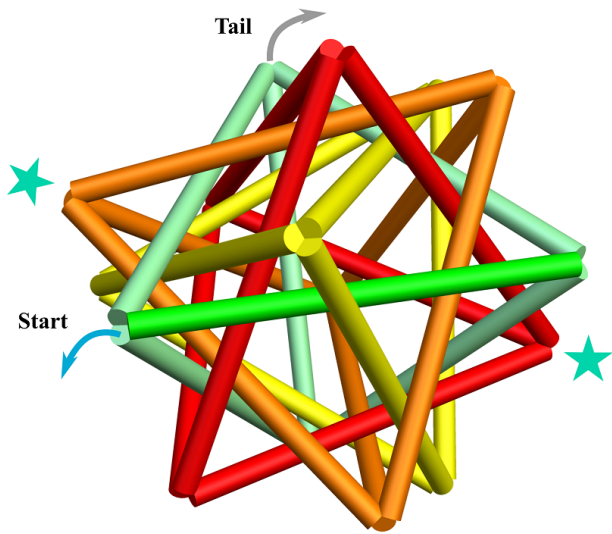


Figure 17. Tetrahedron 4: Step 3

Weave the ends of the cord in and trim. The four completed tetrahedra are shown in Figure 18.

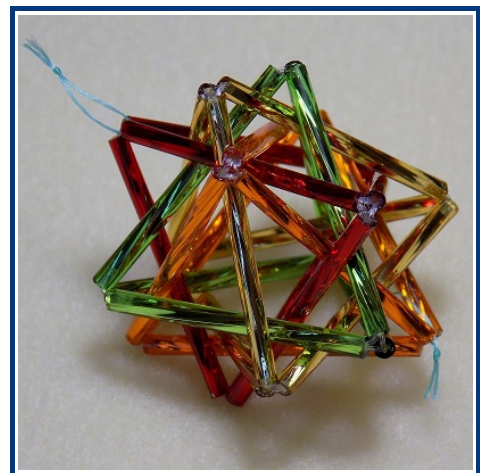
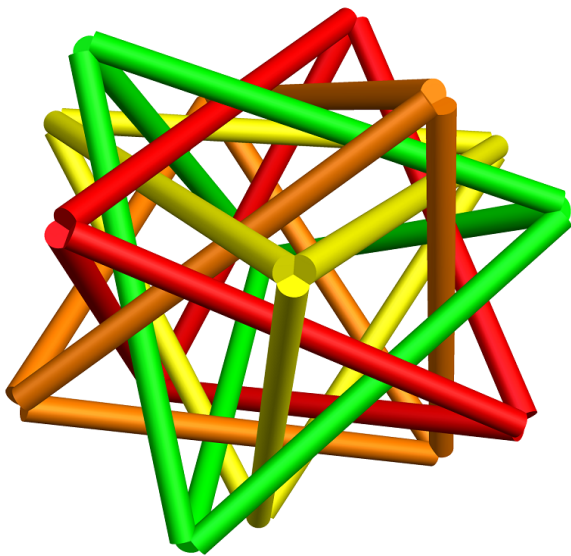


Figure 18. Tetrahedron 4: Completed

Tetrahedra 5

Step 1 Repeat Step 1 for Tetrahedron 1 using blue bugles, but weave through the beadwork as shown in Figure 19. This triangle should lock the other four tetrahedra into place so that there should now be very little movement possible relative to each other.

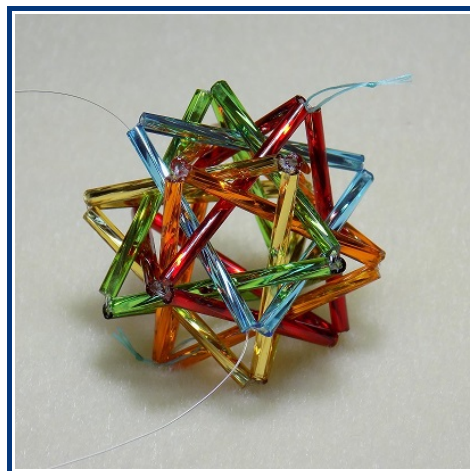
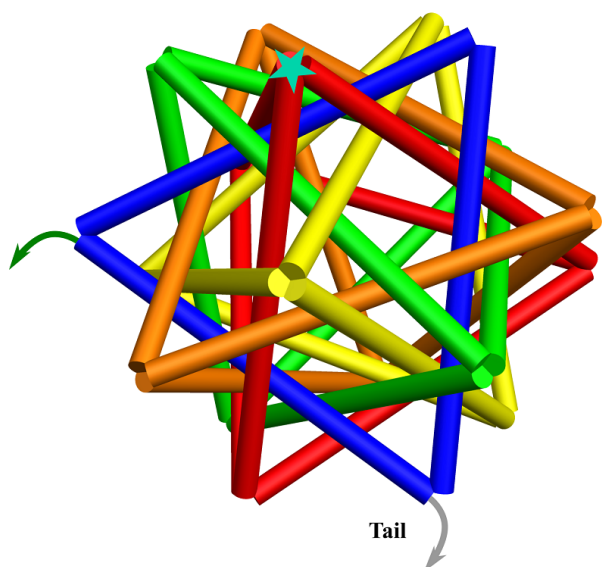


Figure 19. Tetrahedron 5: Step 1

Each bugle in tetrahedron 5 should pass under two others as shown in the left photo in Figure 20. Each point of each blue bugle triangle will also complete a spiral of five points that make a shape that looks like a star or crown, as shown in the right photo in Figure 20.

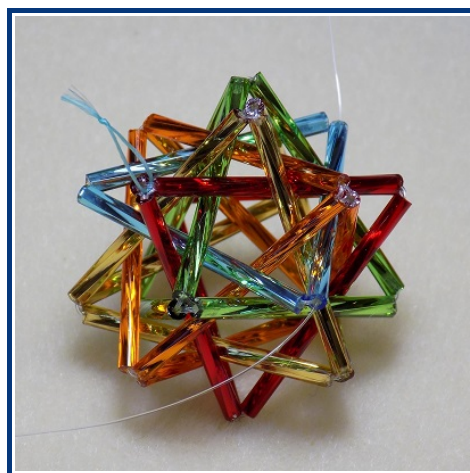


Figure 20. Tetrahedron 5: Symmetry

Step 2 Repeat Step 2 for Tetrahedron 1 using blue bugles, but weave the two bugles through the beadwork as shown in Figure 21.

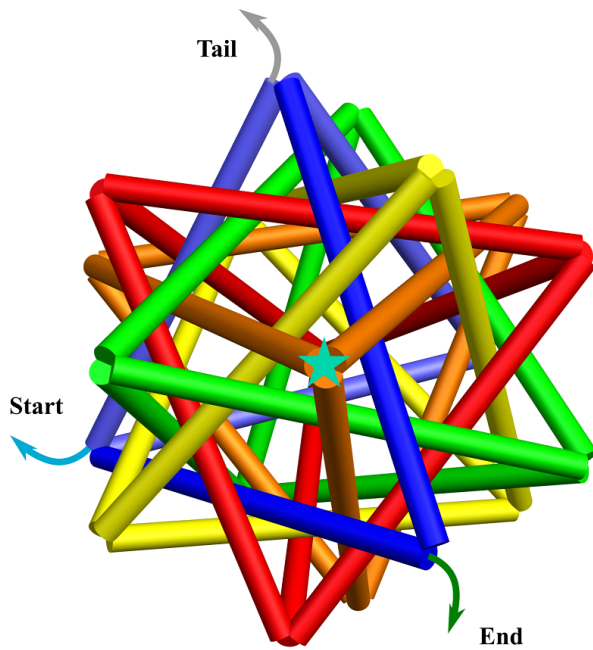


Figure 21. Tetrahedron 5: Step 2

Step 3 Repeat Step 3 for Tetrahedron 1 using a blue bugle, but weave the bugle through the beadwork as shown in Figure 22.

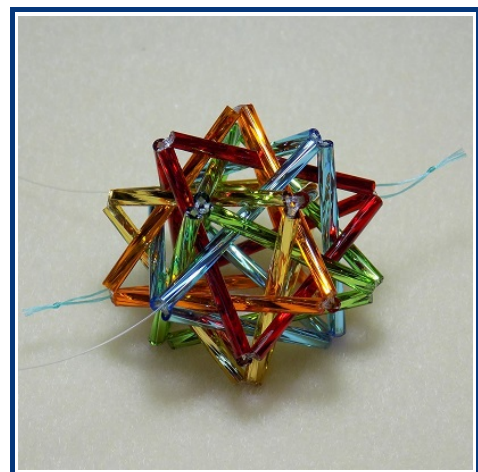
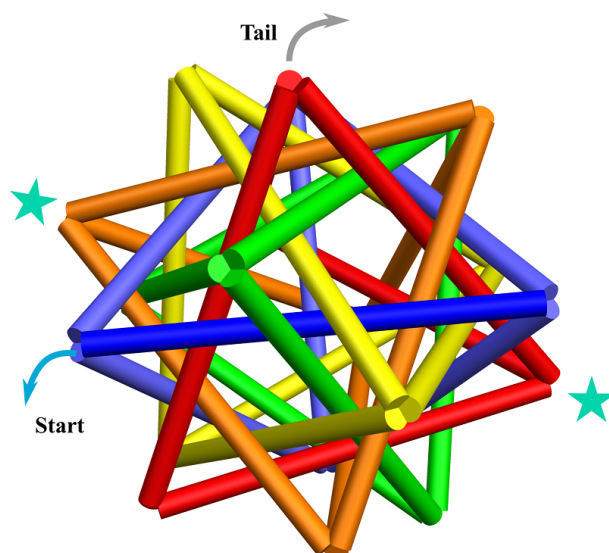
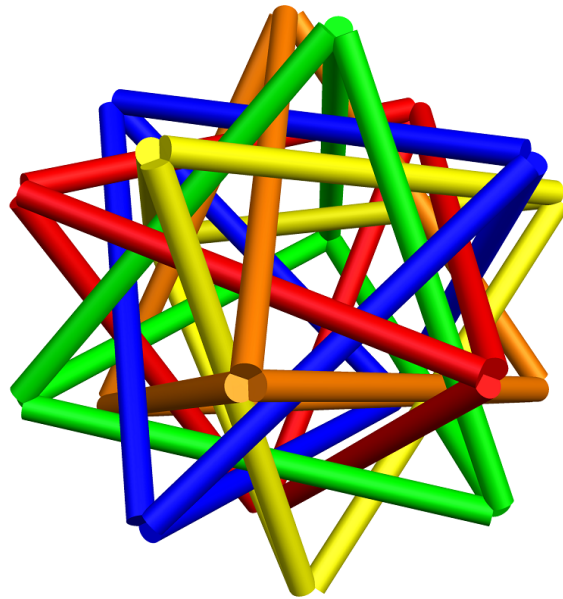


Figure 22. Tetrahedron 5: Step 3

Weave the ends of the cord in and trim. The five interlinked tetrahedra are now complete!



Happy Beading!