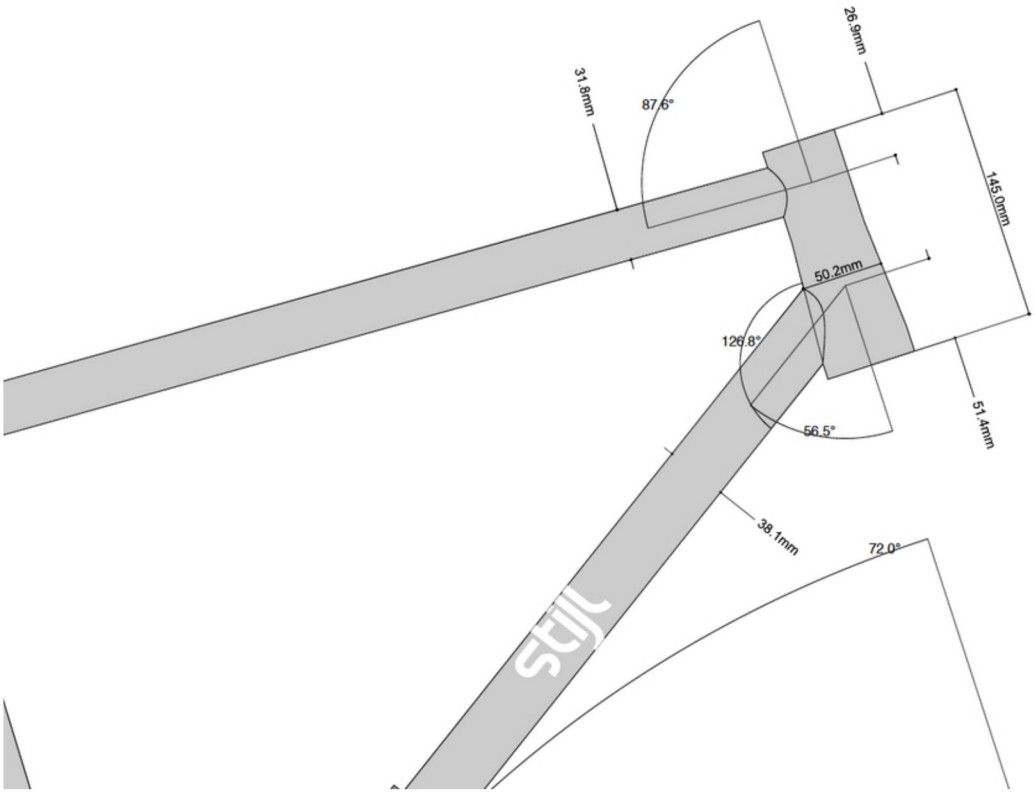
HOW TO COPE TO A TAPERED OR SHAPED HEAD TUBE

How to cope to a tapered head tube – what's so hard about that?

Understandably, there is no such thing as a tapered hole saw, but if you can get beyond that…

Following are some of the methods and techniques that I have used over the last five years to cope to tapered or shaped head tubes.

- Visualization and working up to it
- Coping with two different sized hole saws
- Making a sanding mandrel
- Coping the minor ID along the effective angle (see description and video below)
- Using BikeCAD templates (step by step example below)



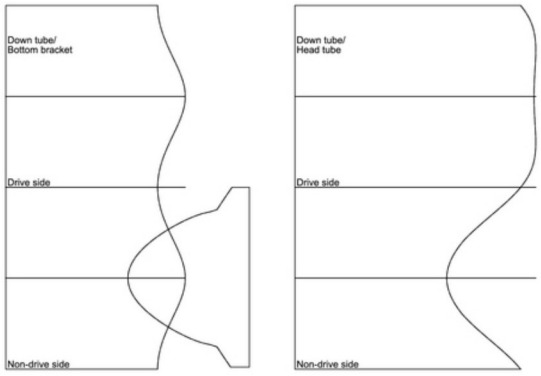
A key to determining many of these methods is having a way to visualize the shapes and be able to make some key measurements. BikeCAD is a great tool for this. However I have used Solidworks, Rhino, AutoCAD, and Illustrator to differing degrees of success. I prefer BikeCAD as my tool for a few reasons: I am generally designing the geometry of my frames in this program anyway, it allows you to model the head tube shape (takes some tinkering at first) and now you can save these shapes as "Standard" shapes for future use; the other reason I will get to a little later.

Mitering Shaped or Tapered Head Tubes via the **Minor ID / Effective Angle** way:

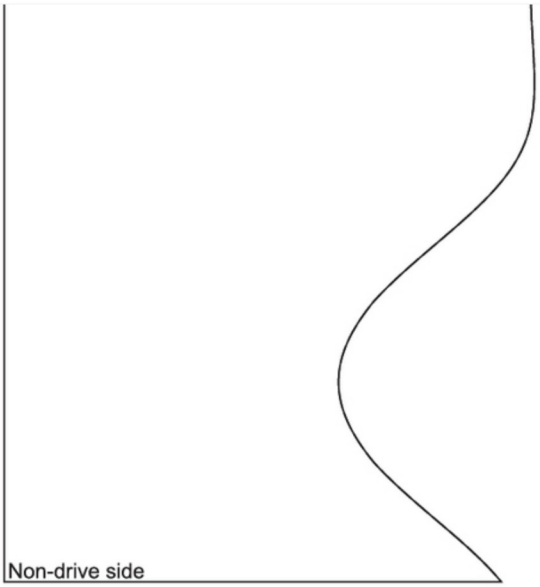
By Minor ID, I am referring to the smaller of the copes at the end of the tube or smallest diameter of the head tube that comes in contact with the cope (see BikeCAD image above). The effective angle of this method is not the center line of the tubes, but the new angle created by the innermost edge of the upper and lower portion of the cope (I drew a line connecting these in the BikeCAD image above). The example case above, which is a Columbus Tapered Integrated Head Tube, the minor ID is 50.2mm and the effective angle of the cope is 126.8 deg. I have a 47mm hole saw and 50.8mm that are close. But even if my biggest cutter was 38.1mm it would be fine.

Particularly now that we you have the ability to model and save Head Tube shapes and there are now two input methods to do this, using the templates method is super easy. The key to doing this, is doing a good job with you Head Tube model (IE. using calipers and pulling the needed dimensions) or asking your friendly manufacturer to provide you with a BikeCAD template file (I'm working with Brent now to compile all of available products and add them to the "Standard" folder for next release). Then export your miter template to a PDF, make all your wall thicknesses 0.00 (you want single lines for this), then print them out. The key here is to print them out to a **Vinyl Cutter,** then just mark you tubes where the copes go, peel and stick. *(No you don't have to use a Vinyl Cutter, but they aren't that expensive, and there is tons of other things you can do with them, many frame building related)* The next part is where it gets fun- Use a saw or snips to remove the majority of the material that needs to come off, then take it to your belt sander or grinder and get it as close to your vinyl as possible (go easy or have water near by, as the tube heats up and blisters the vinyl pretty easy).

Aero Head Tube Mitering HD



This is an example of the miter template for the Columbus tube, using BikeCAD 10. The newer version moved the split to the Bottom, but this was the version I had when I created the example miter below. I always mark a center line down the length of the tube, so I can align the Vinyls, thus phasing the miters. You can see to the right that I cleaned up the template for the Vinyl Cutter.


Non-drive side


Columbus

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