

## Project 3 – Automotive Wheel Concept

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### 1 Project 3 – Automotive Wheel Concept

#### 1.1 Project Overview

Further develop knowledge of using digital sketching in the product development cycle. Explore features of SketchBook Designer allowing for images to be created efficiently.

#### Objectives

- Improve understanding of how digital sketching can affect the development cycle
- Radial symmetry function
- Use of vector tools to quickly create images of products
- Use of paint/raster and vector tools to create images

#### 1.2 Project Introduction

A major reason to use digital sketching in the development of a new product is ability to shorten the development cycle. With the initial sketches being in a digital format this allows for information to be given to various team members very early on in the cycle.

#### 1.3 Automotive Wheel Story

During a recent customer focus group it was determined by the marketing group that having visual aids, instead of asking questions to the customers, generated more detailed results. With the trends in vehicle styling changing rapidly, it is difficult to prepare a vast majority of visual aids for these meetings.

Recently, at a strategic company planning meeting, the marketing group brought up the need for visual aids in focus groups again. Furthermore, the marketing department thought it would be a great idea to allow the customer to see their styling ideas that were recently expressed in the meeting. The marketing teams thought was that once the customer saw his initial styling idea they would provide even more feedback to the company. This second wave of feedback would define the styling idea even further.

With the above in mind, the marketing department needed a way to:

- Create accurate looking images of customers styling ideas
- Ability to quickly bring these images into a customer focus group meeting for discussion
- Images showing the styling ideas need to be created in an extremely short amount of time.
- Allow for the idea to be reviewed by the focus group prior to the meeting ending

Let's get started using SketchBook Designer to assist in the development of the vehicle wheel.

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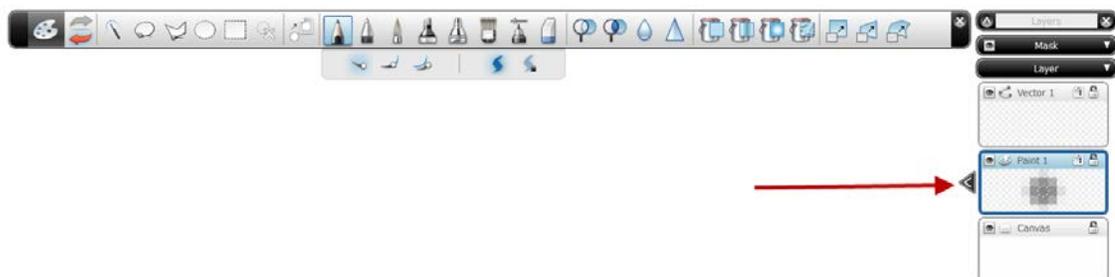
### 1.4 Automotive Wheel Story

By creating the image below quickly and in a digital format the company was able to verify that the major areas of focus for this wheel design were achieved. The following is how each major area was affected by having this digital sketch created early on in the development process.



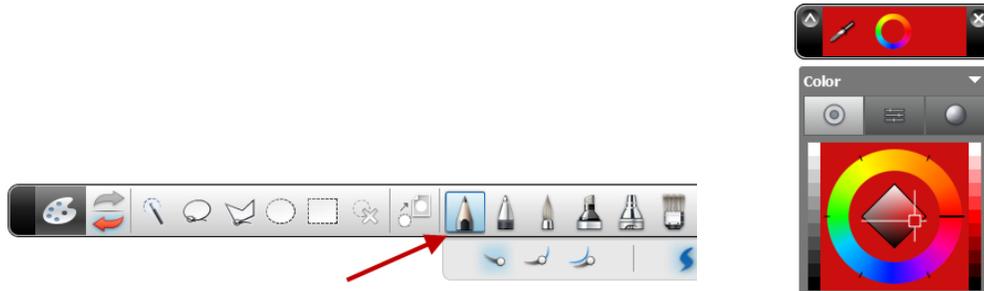
### 1.5 Instructions

1. With the wheel design being a perfect circle, let's begin by sketching in some construction lines to assist in the development of the sketch. These lines will establish the center point of the wheel and establish some over all sizes of key areas.
2. In order to create these construction lines lets change up the process a little and use a paint layer to put down some red construction lines.



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- Let's activate a paint layer and pick a red pencil and zoom out on the canvas so we can sketch in some construction lines.



- When using the paint tool, a little trick to draw perfectly horizontal or vertical lines is to hold down the shift key. This is very useful when working with a mouse.

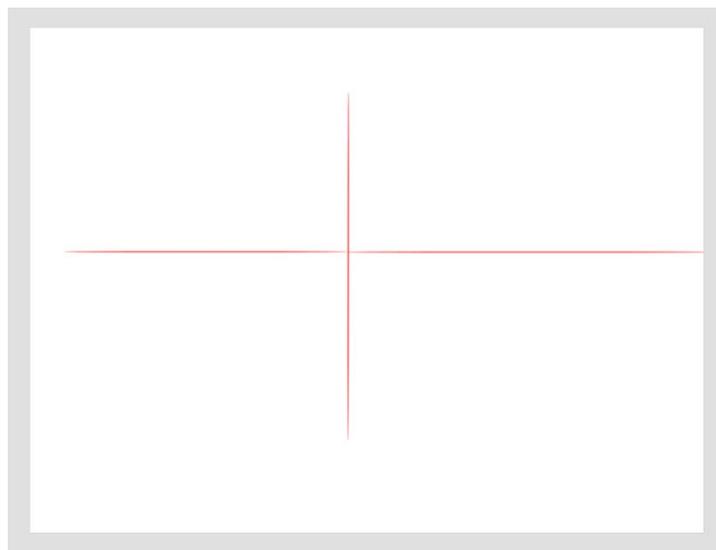
**No shift key held down**



**Shift key held down**

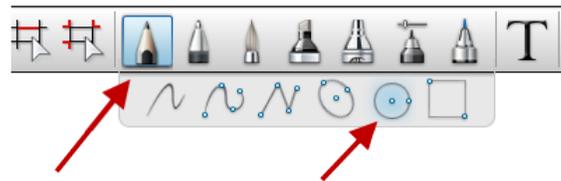


- Begin by sketching in a vertical and horizontal line to establish the wheels center. Hold the shift key down then press the left mouse button down at the point you want to start the sketch line. Then simply drag the mouse quickly over a nice straight line will be created.

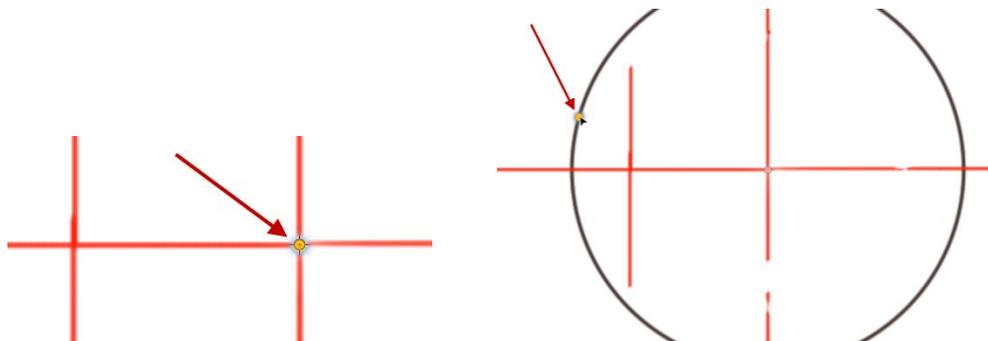


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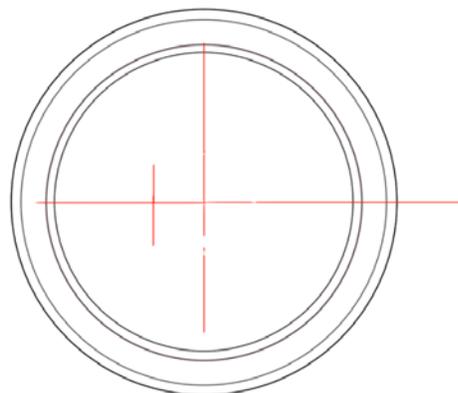
6. So the first sketch will be the shape of the tire so we have a visual idea of the size during the sketching of the rim.
7. Since the tires and wheel are perfect circles, let's use the vector tools to create the tire's shape. Activate a vector layer and toolbar, and then click the pencil tool and the circle command from the fly out menu.



8. Zoom in on the canvas to the intersection of the construction lines and tag the center of the circle then drag out to create the outer diameter of the tire.



9. Repeat this command to establish the inner tire diameter and rim outer diameter. Along with this circle also go ahead and draw in two more circles that represent the tire tread diameter and inner tire bead area. These circles will divide the tire wall thickness up allowing us to shade each portion differently giving us a 3D look for the sketch.

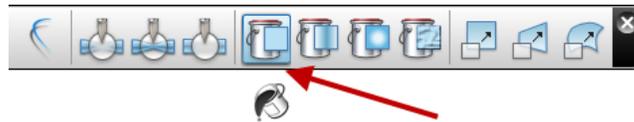


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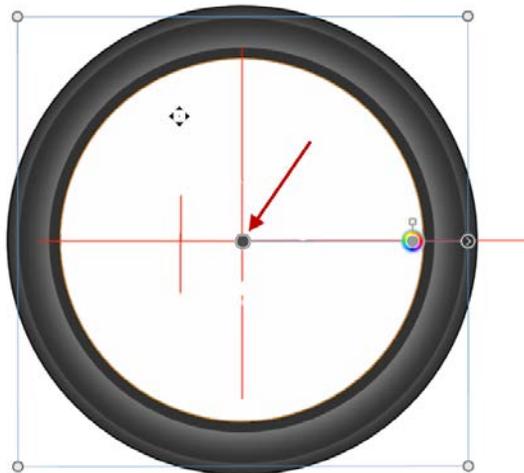
10. Go ahead and activate the vector radial fill tool and fill in the areas using the some black to light gray fills. Take advantage of the construction lines when doing the fills. If necessary, move the fill center point to the intersection of the construction center lines.



11. For the tire bead area you can use the vector solid fill tool and select the tire bead area.



12. . If necessary, move the fill center point to the intersection of the construction center lines.

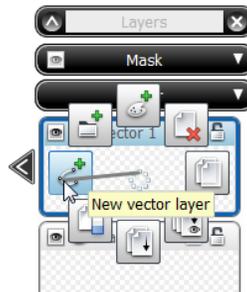


13. We now have a small diameter and low profile tire created.

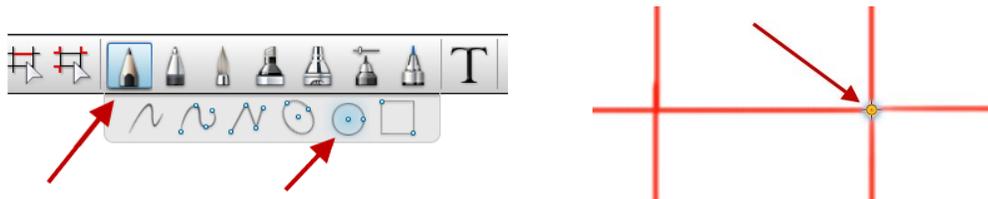


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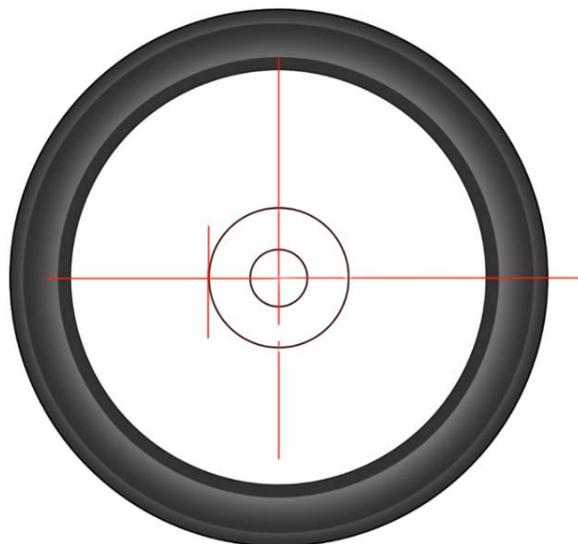
14. Let's now begin to develop the major areas that must be present in order for the rim to function correctly. The first area that we can define is the center part of the rim or hub area. This area also needs to be fairly large so the rim can be attached to the axle and hub. It is a good idea to work in multiple layers so let's start a new vector layer using the layer marking menu.



15. With the new vector layer activated, use the vector circle sketching tool and draw in some circles that will represent the center portion of the rim. Be sure to zoom and in and get the center point over the construction centerlines intersection. Perhaps on the construction layer you put in a vertical line that represents the minimum diameter for the center area.



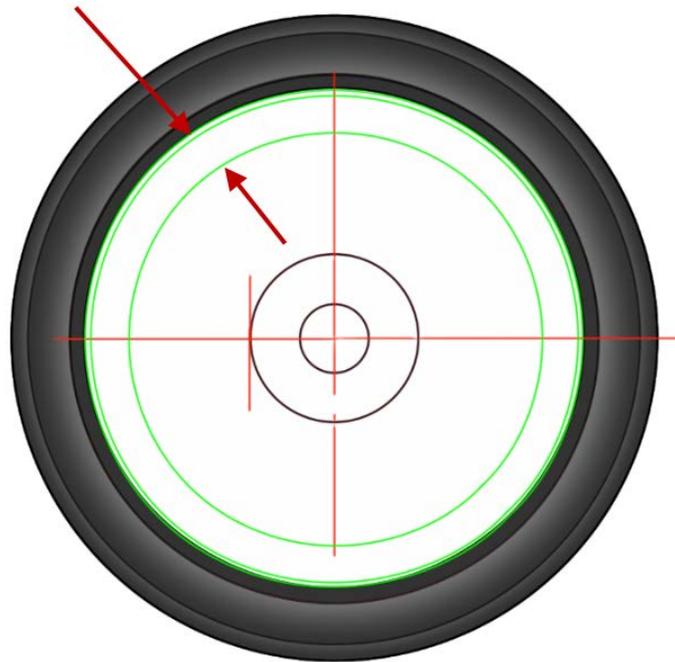
16. Let's also draw in another circle that will represent the center cap area of the rim. This will once again give us the ability to apply some different shades to the center part of the rim.



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17. The other area of the rim that really cannot vary that much is the outer rim diameter or where it interfaces with the tire. This area will be curved towards the center of the tire to provide strength for the rim. We can use the vector circle tools again to create outlines for this area. Feel free to add other circles to create different fill effects.

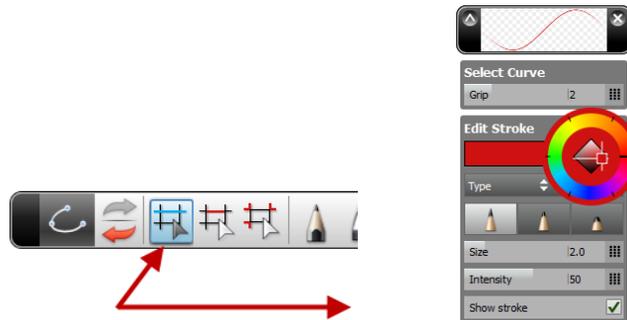


18. We can apply shading to these defined areas of the rim so we can get a better idea of the rim prior to creating the spokes of the rim or area that connects the outer rim area to the center.
19. Go ahead and activate the radial vector fill tool again and fill in the outer and center area using some nice smooth flowing gray colors. To create the look of the outer rim part being curved towards the center start with the inner circle being a dark gray and working to lighter gray closer towards the outer rim edge. This will create the appearance of the rim have an inner cone shape.



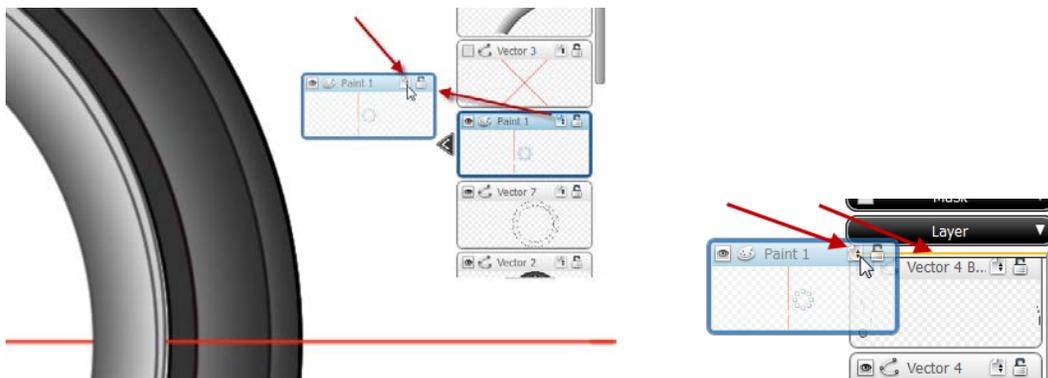
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20. Another trick may be to play with the color of the vector outline lines. Changing them to a different shade of gray or even thickening them can create different effects. This can be accomplished by using the select vector item tool and then editing the items using the tool editor menu.

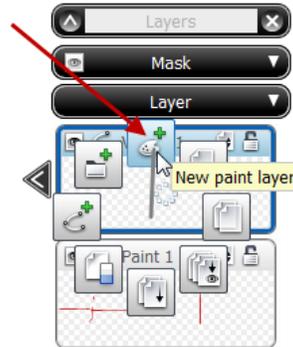


21. The one main area of the new rim design that can vary is the spokes, the area that connects the out rim to the center hub part. For the creation of the spokes the marketing group asked the customers in the focus group what they thought the shape of the spokes should be and also the number of spokes. The one idea that kept coming up was simple spoke shape with five total spokes being used.

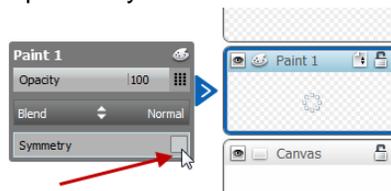
22. Let's begin to start getting some ideas for design of the spokes sketched out. You may have noticed that construction lines we first put down are hiding under the vector fills. To get the construction lines visible again, we need to get this layer/sheet to the top of stack. Tag and hold down the move layer icon and drag the layer up.



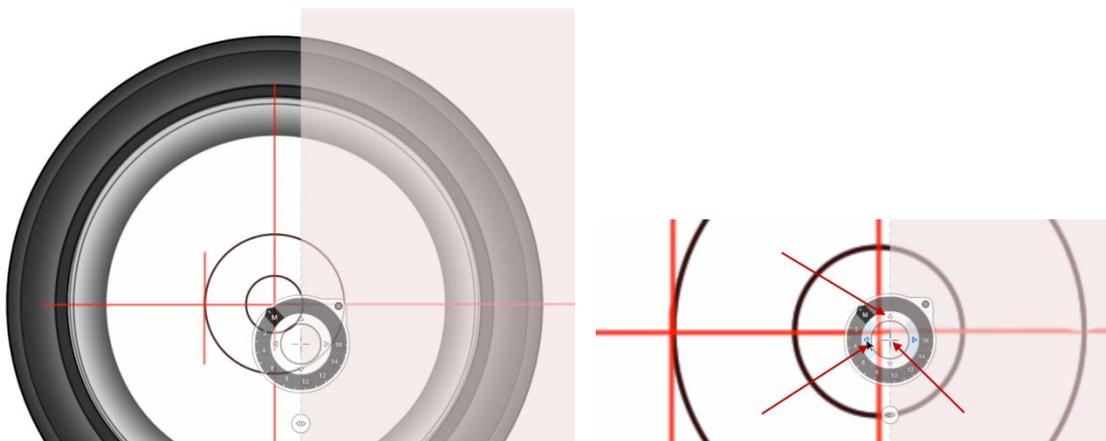
23. Let's begin a new paint layer to sketch some ideas down for the shape of the spoke.



24. One of the most powerful functions of sketching in a digital format is the ability to make sketch symmetrically across a center line. Another feature of this command is ability to do a radial symmetry of a sketch from a center point. To activate symmetry for a layer simply click on the symmetry option under layer properties fly out.

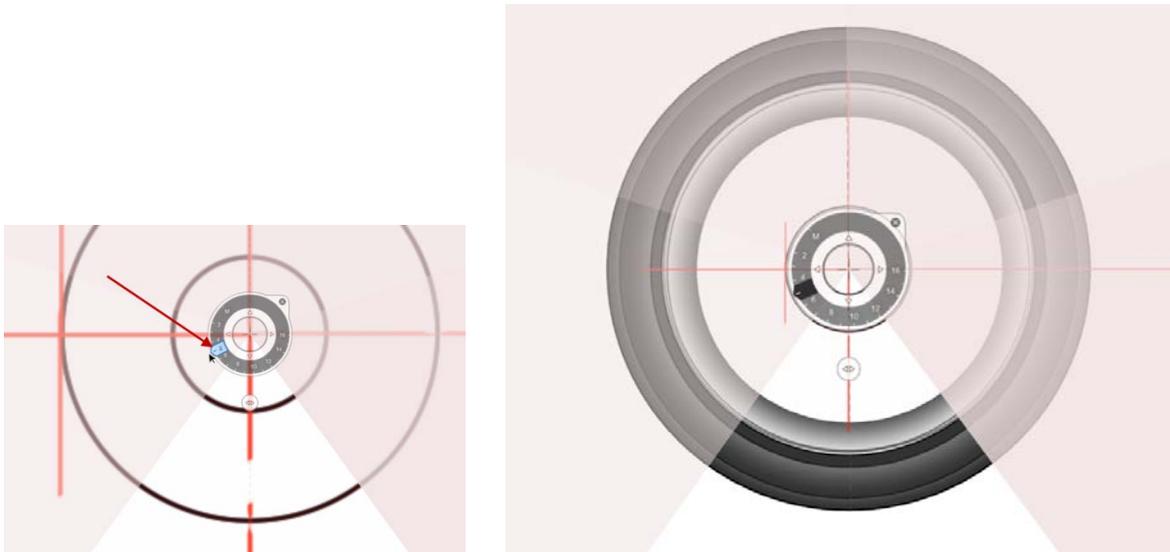


25. You will see the symmetry mask and control icon come up. Let's position the symmetry mask by center point of its icon over top the construction lines intersection. Use the move arrows on the icon to get the center point exactly over top the center of the rim.

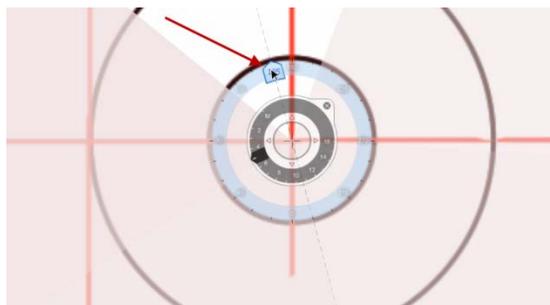


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26. Once you have the symmetry mask over the center of the rim, let's go ahead and activate the radial symmetry. You will see a dial on the icon that goes from "M" to "16". Tag and drag the point the pointer on this dial to the number five. You will see that you have divided the canvas up into pie shapes.



27. The white area is the area you can sketch in and have placed into the other sections of the canvas. Let's rotate the white area to the top of the rim. Simply tag and drag the double arrow on the icon. You will see a new dial come up once you start dragging that represents the start angle for the white area. Once you get the right angle, close the symmetry icon by pressing the "x" in the upper right corner.

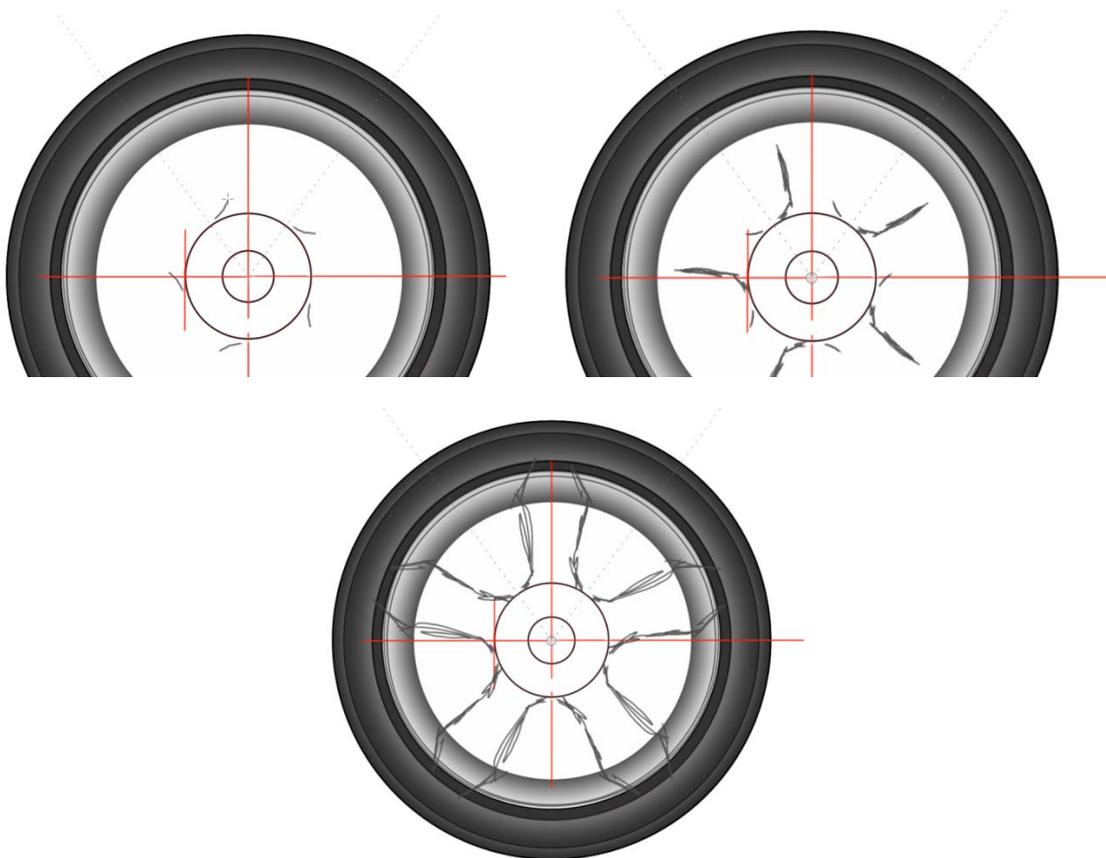


28. Let's now begin to create some ideas for the outer shape of the spoke using the pencil sketch tool.

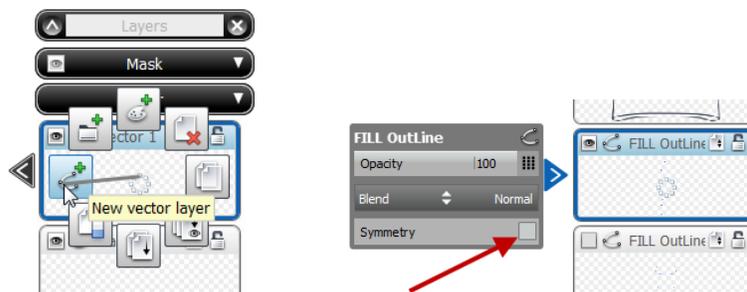


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29. Begin by sketching in some of the ideas for the curves that make up the spokes outline. You will notice that once you start sketching in the designated area for this layer you see those sketch items appear in the other pie shaped areas of the canvas. Since this is happening in real time you can get a good idea of what the rim will look like.

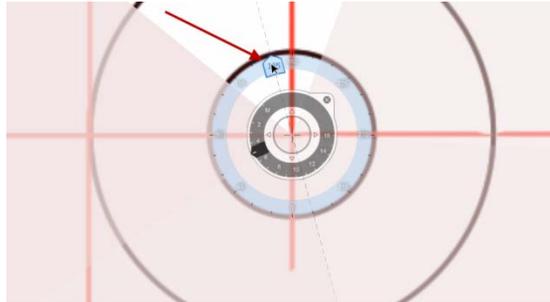


30. Once you have decided upon a shape for the spoke, let's go ahead and draw in some vector curves over top the painted sketched lines. We can accomplish this in the same manner as the bottle outline in lesson two. Begin a new vector layer for the spoke outline. Activate the symmetry for the layer also.

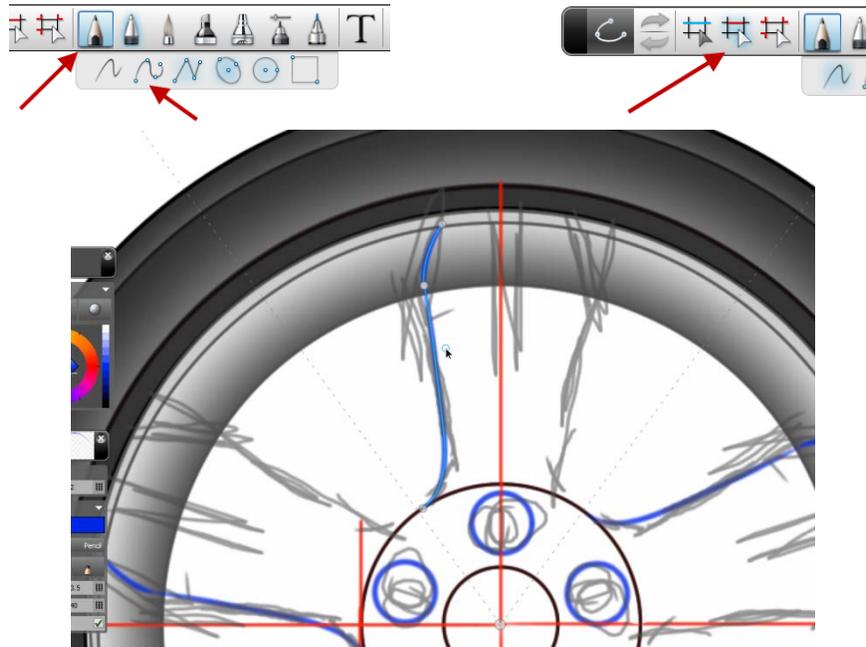


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31. Just like the paint layer, position the symmetry icon at the center point of the rim. Also switch to radial symmetry with five pieces. Position the start area at the top of rim as well.

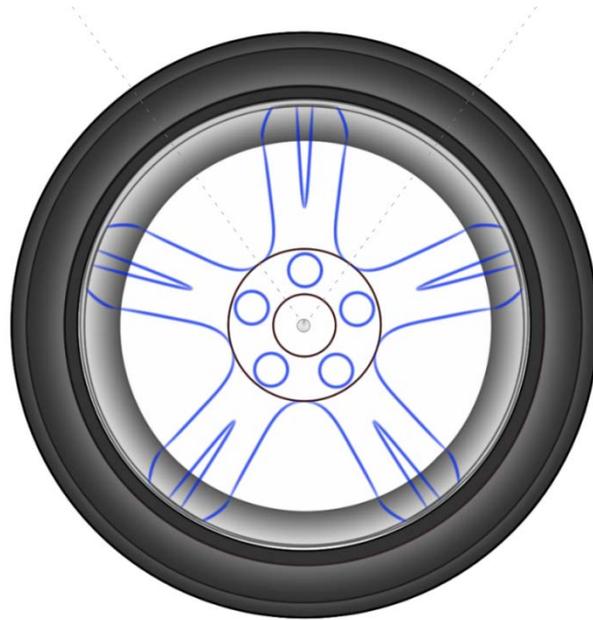


32. Use the various vector drawing and trimming tools to create the desired spoke outlines that we can use for shading. You can also draw in a circle to represent the lug nut. Same as with the radial symmetry paint layer, a vector curve item you create will automatically be placed into the other areas in real time.



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33. Go ahead and complete the vector outline for the spoke. Shut off the unwanted layers once you complete and ready to begin the shading of the spoke.



34. Let's now use the vector fill commands to create the shading for the spoke. Since we are placing the vector fill on the radial symmetry outline layer, the fill will also be placed onto the other spokes in real time.

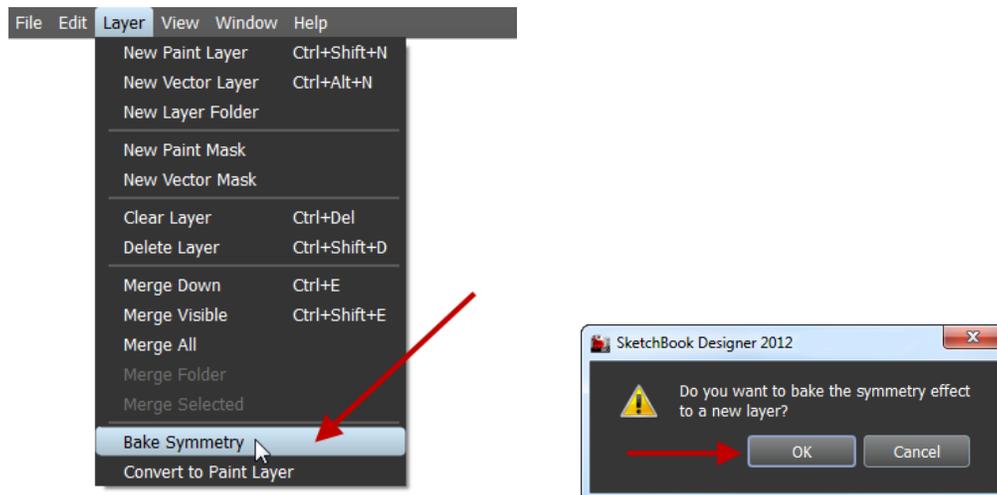


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35. Go ahead and toggle back to the layer that has the center portion of the rim on it. Then, using a radial fill, go ahead and apply some shading to the center of the rim.



36. To finish off the image let's go ahead and bake the radial symmetry layer that contains the spoke. Activate this layer then go over to program control area and select the layer menu, from its pull down you will see a command called bake symmetry. Tag this then another dialog box will appear asking if you would like to bake the symmetry to a new layer, click yes.

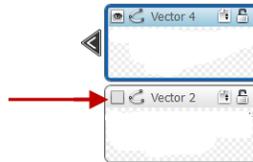


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37. By having a layer with the radial symmetry all baked into one layer and still having the layer with the symmetry we can easily go back to the spoke outline and make changes. This could be used to create various variations of the same spoke very easily.

38. Go ahead and shut off all unused layers by toggle the visibility of each.



39. We are left with a completed image of the rim and tire that can easily be saved off in a variety of digital images formats. These images can then be given to the marketing and focus group for further discussions.

