**CO2 Car Design Process**

1. **Research/Brainstorm:** Research is a good way to start. There is no sense in re-inventing the wheel. Find out what has worked for other people. It does not mean to copy somebody else’s exact car, but rather to start the process on things that might work well with yours. Maybe you like one that has fins like a shark or one that replicates an airplane. Research is also a great way to learn from somebody else’s mistakes! If we do not learn from history, we are doomed to repeat it! Jot notes down and websites that helped you come up with your idea. Make sure to keep in mind the limitations you will be kept to such as: No attachments and the size of your wood block!
2. **Thumbnails Sketches**: Thumbnails are very small and quick sketches on paper. They help you see how your dragster is going to look. These are not detailed drawings, but rather just quick sketches to give you some ideas. This is where you can play around with some wild features or designs.
3. **Design Sketching:** On a clean sheet of paper, sketch your favorite design from the thumbnail sketches on a larger scale with more detail. Draw the top and side views. Make light projection lines from one view to the other to help you locate axle holes and other features of your design. Show the location of hidden details (such as the cartridge hole) by using dashed lines.
4. **Final Drawings:** Final drawings will be made to the exact size of your car on graph paper and will serve as a blueprint for producing your dragster. Be sure to take your time and check out the spec sheet! Your final drawing will include the top view (bird’s eye) and a side view. The drawing will also have to be labeled with your dimensions. Look at the examples to see how to dimension the drawing. Upon completion of the drawing, get it verified by the instructor and photocopied so you have 4 copies!
5. **Prototype:** A prototype is a model of the actual dragster. The prototype is made to the exact size as the finished dragster; however, it will be made from a cheaper such as Styrofoam. It is much more fragile than the wood, but will last long enough to serve as a model for your actual dragster. Carefully constructing your prototype will help you eliminate any design problems you may not have expected. In order to complete this process, you must have completed all the machine training. You will need to cut out a copy of your drawings (the Styrofoam block! Not your dragster contour) and tape them down to your Styrofoam block. Do your axels line up on your drawing? What order should you cut the car out after you have drilled your axle holes? These are some questions you should be asking yourself. When you cut off a chunk of material, do not discard it, as you may need to tape it back on when you cut the other view out. The cut off chunk will help stabilize your car to keep it from breaking and level it out. Does the prototype look like your drawing? Are the dimensions within specifications? Does the design of the prototype meet the objectives? If not, go back to the blueprint stage and redesign as needed.
6. **Final Production:** This is very similar to the prototype stage except it is made from wood. This time, after you cut the blocks out of your blueprint, glue them down so the paper does not move on the wood block. This will help you be more accurate on your cuts. When you are done cutting it out, shape it! Use the Dremel and sand paper to smooth out your design. Don’t forget to send the car to paint!
7. **Assembly:** After all the detail work is completed, you will need to put your hardware on your dragster. First, place your soda straw through your dragster. These straws will serve as axle bearings for your axles and wheels. Then place the axles through the straws. Add a washer on each end of the axle and then put on the wheels. Some trimming of the straw may be needed. To help eliminate some wobble on either axle, place a small dab of glue on the outside of the straw and place it through the axle before trimming. This will eliminate the straw from walking off. You can also lubricate the axles with graphite to help reduce friction. After the wheels are installed, you will need to install the screw eyes. Make sure they are placed within specs and inline of each other to keep the car running straight.