

Design4Practice (D4P) Program

To: Professor Trevas
From: Hunter Kea
Re: Self-Learning Assignment

Sheet metal Forming and Fabrication

For my self-learning assignment, I wanted to research and learn about sheet metal and different processes used to shape and form. I have been around a lot of sheet metal working since I was a kid with my grandfather in his auto shop that he makes custom cars in but I haven't had as much hands on time as I should of so this project is supposed to freshen up my memory and help me learn details that I may not have caught or methods that people use in the industry vs home shops. There are a lot of different ways to work on sheet metal, but the overwhelming majority will work into either stretching, shaping, or mending. Some of the methods fit into multiple like the English wheel which uses pinching between two wheels to stretch the sheet out into a radii. Some of the methods to work on sheet metal depends on the gauge thickness; 16 is a stiffer thickness 20 gauge is the easiest to work with vs strength and the most mailable so that is the go-to for most metal shapers. The shape that the user is going for is what determines the tool here are some tools that are usually needed.

- Planishing Hammer "shrinker" - two opposing dies compress to the sheet metal using hydraulic air as the force to bring a flat sheet to a curved shape
- English Wheel – one larger wheel rolling along another that when the sheet metal is placed in between and pulled and pushed creates a radiused sheet from a flat one
- Dimple Die – drill a dole to the desired diameter that the two machined dies require, put the dies through and around the hole and use a hydraulic press to finish
- Bead Roller – uses two parallel rolling rods with the desired "bead" shape mounted to the end, when a sheet of metal is placed between the rollers a groove is created
- Welder – used to mate two surfaces of metal together using heat and welding rod
- Pan Brake - uses human power to bend sheet metal linearly
- Press Brake – uses hydraulic pressure to create a bend like the pan brake
- Metal Shears – cuts sheet metal along a line
- Slip Roller – makes a perfect circle out of a flat piece of sheet metal
- Hydraulic Press – used with other tools to like the dimple die
- Forming Bags – like a beanbag to create shapes like a bowl
- Anvil – flat surface to beat on or a round tip to bend around

- Forming hammers – have a flat square side as well as a rounded ball peen
- Forming Block- solid steel dolly that has all different shapes

These tools are just baseline tools that a metal shaper needs to make things. Some make things easier than other tools like a set of tin snips will work but a sheet metal shear will make everything easier. Now most of these tools are self-explanatory the user just needs practice to get the result they want. How much practice is the question for most of these tools bead rolling isn't hard but if the user wants to get crazy with designs, they need to have more practice or watch some instructional videos. Most of sheet metal working is just knowing what result you want and try to keep working at it till you get it. For my project I started small and made a switch panel to hold my switches that control the wiring and ECU. I used 18 gauge steel and put a radius into it to get it to a 42 degree angle which is the angle I can reach the switches with my four points on. I had to radius the corners to match the transmission tunnel as well which I used a piece of 2 inch tubing to get. That piece of sheet metal worked well and mounted nicely now I will use the sheet metal brake on some 20 gauge aluminum to make my dash in the 510 it will be 4 foot across and will have approximately 5 bends in it to create the shape I want. I need to go get the material tomorrow and then start working on it.