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Thumb Wrestlers Capstone Team

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### Water Jetting vs. Router Table for Cutting Aluminum

One of the first things that needed to be done for the project was create a new baseplate for both left-hand and right-hand use. The team initially assumed the baseplate would be CNC'd. After a few discussions and meeting, we decided to try water jetting. We were under the impression that it would be the most precise and give the best final result. So, I reached out to Gateway Materials and WSU who each have water jet tables. The one at WSU is quite small and would have required that the baseplate to made into two pieces. They were also pretty expensive. Gateway thought our project was really cool and just charged us for material and labor, not machine run time. They could also make the baseplate in one piece because their water jet was massive. When I went and picked it up, their water jet operator told me that using a router table for .250" aluminum would have been better. I had heard of router tables but had no real concept of how they worked or why it would be better for machining aluminum.



Figure 1 and 2: Waterjet and CNC Router Table

A water jet uses high pressure water with garnet to penetrate various types of materials. The one at Gateway is a five axis so it can cut profiles, as well as cut shapes. But that is a limiting factor for water jets. They can only fully penetrate. The penetrations can be at angles, but they are limited to having to go thru the material. A router table can mill, tap, as well as cut shapes. All can be thru holes, or only go into the surface a desired depth. This would have been really useful for the baseplate. Where it connects to the 80/20 bar, we decided to use countersunk screws. The countersinks could not be cut on the water jet because the hole diameter was too small, and it would cut into the material around the hole. The countersinks had to be cut in the U of I machine shop.

The largest advantage I could see of using the router table over the water jet is the lead on the cuts for the small holes in the baseplate. The water jet had to start in the middle of the hole, then move towards the outside diameter. When the cutting head finally got to the diameter of the hole, it would leave a small indent that was noticeable when I went to pick it up. A router table could just plunge into the material with a bit that was already the hole diameter, which would require no lead in. The router could have also used a counter sink bit to cut all of the countersinks required in the new baseplate. The cost of the two is really comparable too. The router table would take a bit longer, due to it having to change bits, as well as cut slower. Time isn't really a limiting factor, but due to the overall increase in cut quality, I think the next baseplate will be cut on the router table at Gateway Materials in Lewiston.