

1-2-3 Block Project Summary

This is a straightforward project but can meet many curriculum expectations. 1-2-3 blocks have been around for ages but as far as I can tell there has been no systematic effort to improve them. I see this as a suitable grade 12 project for students considering a machinist, tool and die-making or manufacturing technology career. This project can be approached from a product improvement/development perspective. A little research will show there are lots of possible improvements. This project also involves advanced measuring, proper grinding wheel selection, heat treating/metallurgy and other skills. The final grinding must be quite precise, square and parallel with flat surfaces. Students (or you) will need to find a heat-treating source and since most schools don't have a surface grinder, they will need to partner with a local college or business. Since this can be a student driven project the following are just guidelines.

Cut the raw material. The material needs to be able to be hardened. Potential choices are 1045 steel or A2 tool steel but many other steels are also suitable choices. The final size is 1" x 2" x 3" so cut enough material to allow finishing.

Mill the project to 1.020" by 2.020" by 3.020" and pay attention to squareness, parallelism and flatness. Just break corners with a file.

Drill an 11-hole pattern with a .532" diameter drill as shown in picture. This is my preferred hole pattern. Other options are available. The 2 tapped holes can be 3/8 -16 NC thru. Chamfer the holes, remembering there will be .020 ground off at the end of the process. The finished chamfer should be .060" or slightly more. Remember to thoroughly deburr the interior before heat-treating. A die-grinder is helpful to deburr the interior of the blocks.

Heat treat to about 60 Rc. Once it is heat-treated, no more shaping or rework is possible other than grinding.

Grind to finish size. This should be done in pairs so the each piece is identical to its mate. Pay attention that the blocks are square and parallel. A good angle plate is helpful here. I recommend that they leave .003" on each surface unless you have access to a quality surface grinder. When they start working they will probably have access to a better quality grinder and can finish the project then. Run a honing stone over the corners to make sure there are no sharp edges. Do this carefully so the edges are even and visually the same.

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