

micro:bit Rover Lessons

Lesson 1: Designing M3 Bolt Test Pieces

Objective: To design, create, test, and refine a test piece for M3 bolts, and to document the entire process in your engineering design notebook.

Materials:

- Calipers
- A ruler
- An M3 bolt
- A datasheet for the bolt
- An engineering design notebook

Constraints:

- All test pieces must be 3mm. in height.
- A minimum of four possible diameters must be tested on the test piece.
- Test pieces should have a conservative length and width to conserve filament and reduce fabrication time.

Instructions:

1. **Observation:** Observe the M3 bolt and the datasheet provided by your teacher. Write your observations in your engineering design notebook.
2. **Design:** Sketch a diagram of the test piece in your engineering design notebook. The diagram must have labels of the measurements and the diameters of the holes you are testing for the M3 bolts. The diagram must also have more than one angle.
3. **Creation:** Create a 3D model of the test piece in Tinkercad. The test piece's model must match the diagram's specifications in your notebook.
4. **Testing:** 3D print the test pieces. If the print job fails because of the structure, troubleshoot and revise your design. Document the process in your notebook. Test the holes in your test piece with the M3 bolts and record your observations in your notebook.
5. **Refinement:** If your design needs to be revised, do so in your notebook and repeat the process, documenting any changes.
6. **Reflection:** After you create a test piece for the M3 bolt holes, reflect on the process in your notebook.

Keep the datasheets in your engineering design notebook for future reference.