

Bluehill Instron Compression Manual

Introduction

Subjecting a material to large amounts of stress can teach us a lot about that material's properties and merits. After annealing, 1-inch epoxy cylinder samples undergo compression tests with the Bluehill Instron, located in lab 177. This manual will detail how to perform a compression test using the Bluehill Instron Machine

Safety Information

- Depending on the test being run, the oven and its contents may be hot.
- Large machines with moving parts are present. Keep hands, clothes, and hair away from these parts. The top compression speed of this machine is very slow, but caution should nonetheless be employed. The machine is equipped with an emergency stop button, as well as two pins placed on the frame that act as circuit breakers if they are contacted.



Emergency off button and circuit breaking pins

Procedure

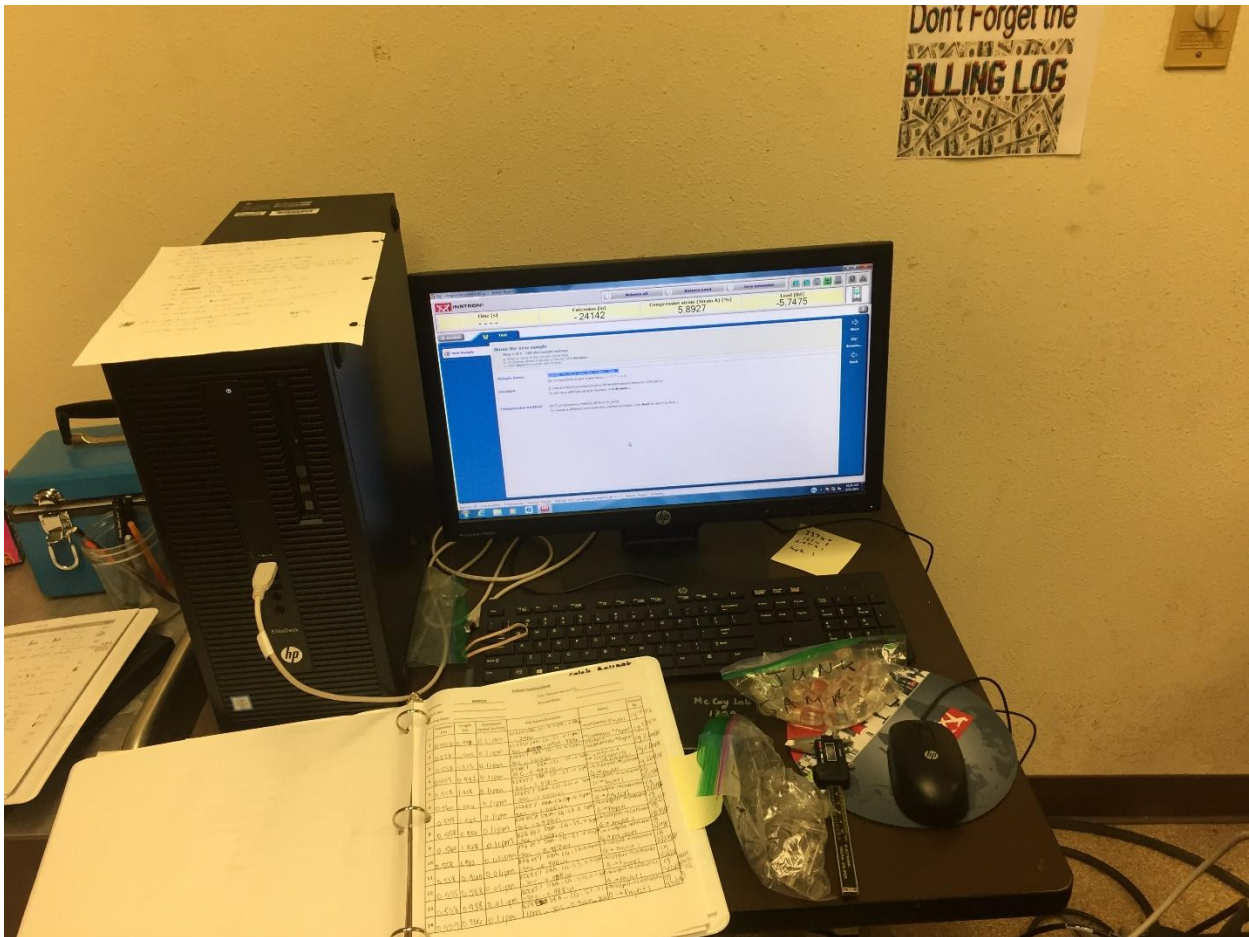
This manual contains the following sections:

- A. Sample Preparation (steps 1-2)
- B. Creating the File (steps 3-8)
- C. Programming the Test (steps 9-12)
- D. Running the Test (steps 13-18)

E. Finishing the Test (steps 19-21)

Materials

- 1-inch annealed epoxy cylinder samples
- Digital caliper
- Instron logbook



Instron computer and logbook

Compression Test

Sample Preparation

1. Measure the height and diameter of the sample using the digital caliper. Record the values in the Instron logbook.

Serial: 828DEA Test Temperature (°C): 30
 Sample No: 2590 Anneal Date: _____
 Testing Date: _____

Diameter (in)	Length (in)	Crosshead Speed (in/min)	File Name/Location	Notes	Tested By
562	0.985	0.1			CB
2558	0.928	0.01			CB
561	0.915	0.1		24 hr	CB
558	1.008	.1 in		96 hr	CB
558	1.041	.1		336 hr	CB
62	.950	.1		72 hr	CB
562	.956	.1		199 hr	CB
60	.944	.1		48 hr	CB
1	1.016	.1		159 hr	CB
0	.947	.01		48 hr	CB
	.955	.01		336 hr	CB

Instron logbook page

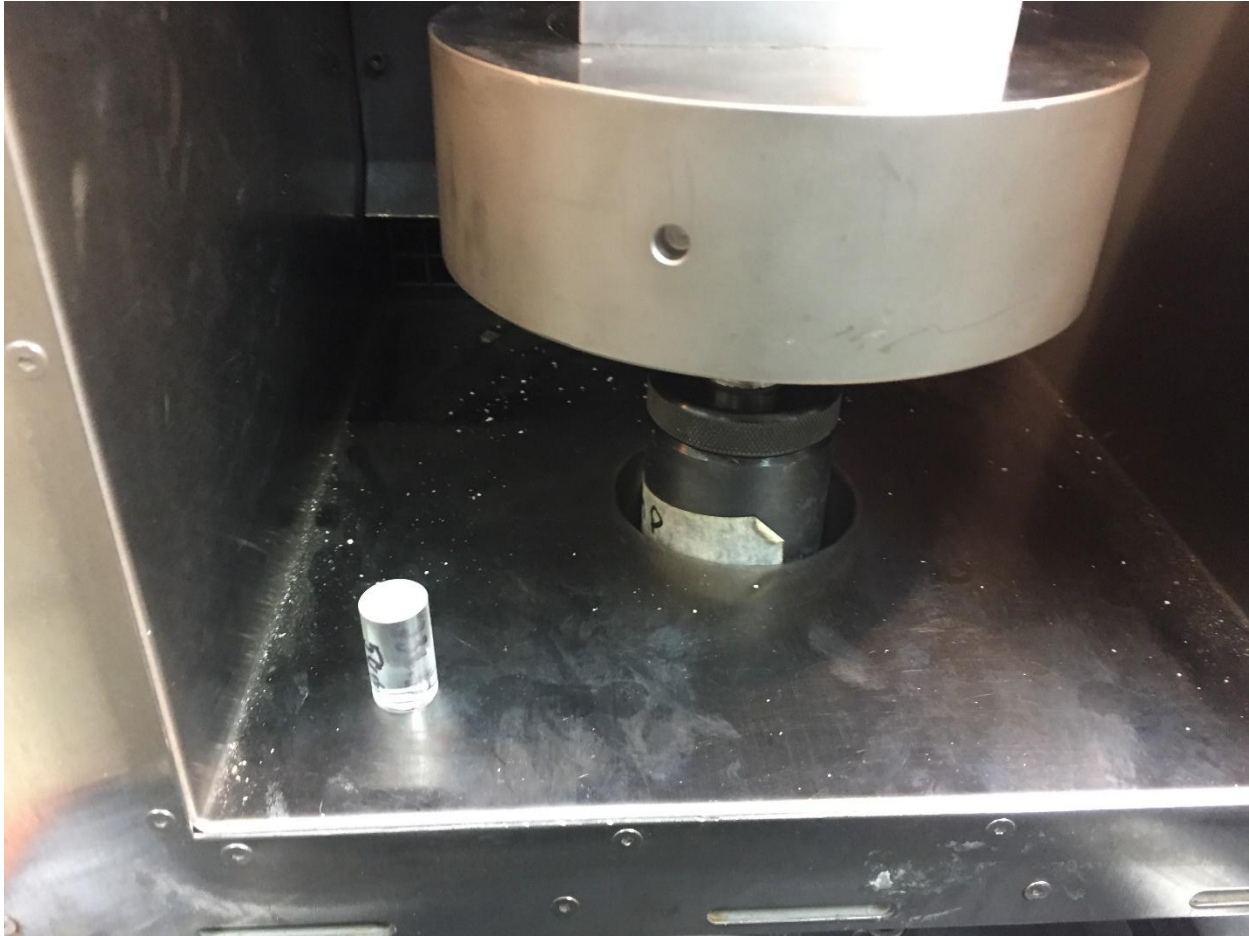
2. Allow the temperature of the sample to come to equilibrium with the Instron oven. To do this, place the sample inside the oven for at least thirty minutes before testing. Ensure that the door to the Instron is closed and sealed while the sample is equilibrating. **Turn off the fan using the fan switch anytime that the doors open.**



Make sure to turn off the fan using this switch anytime that the doors open.



Press the “Light” button in order to illuminate the Instron chamber.



Set the sample in the oven like so to be equilibrated.

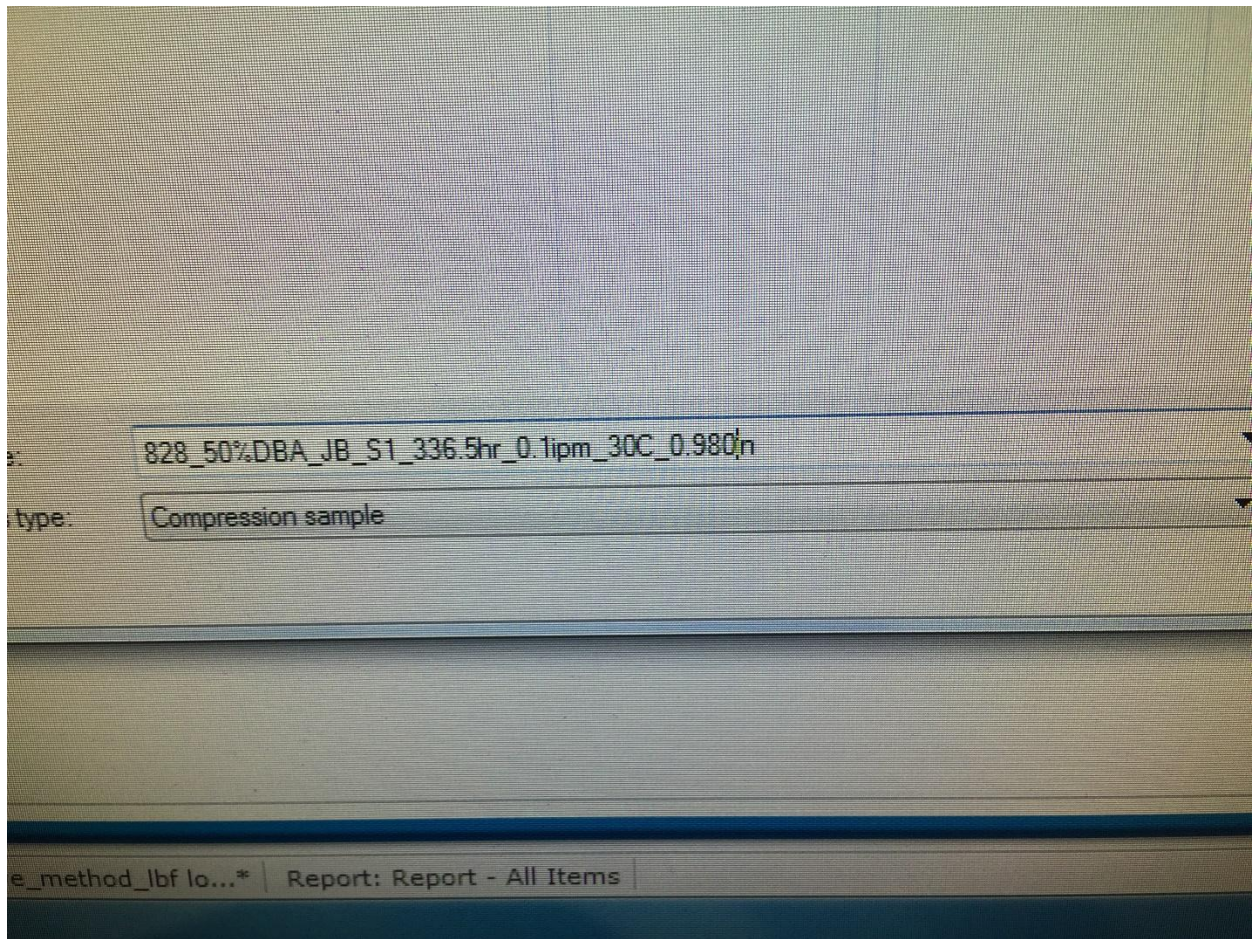
Creating the File

3. On the computer, open the Bluehill application by double clicking it.
4. Select the 2017 Compression program from the menu.
5. Name your file. In general, follow this format:

[Material] [Batch Number] [Sample Number] [Crosshead Speed] [Length of Sample]

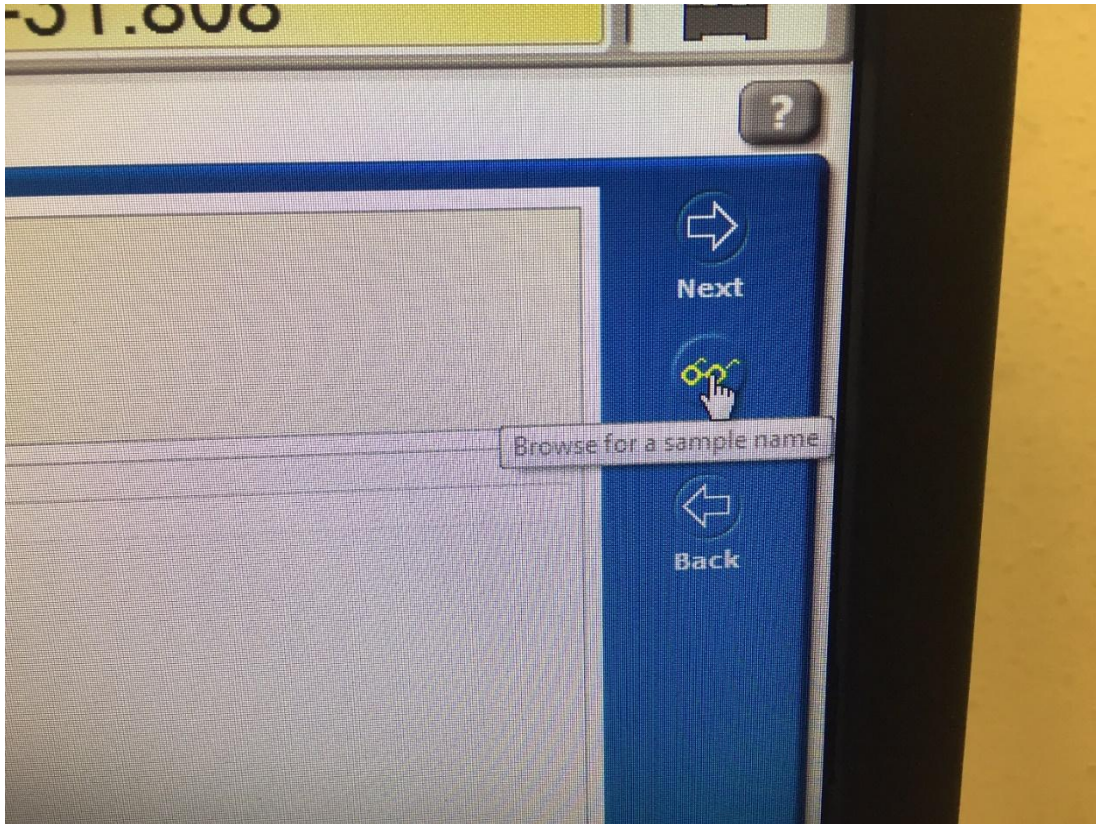
i.e.: *828DEA25%DBA_B091716_S2_0.1ipm_0.987in*

Other factors, such as oven temperature and sample aging history, may be included in the file if needed.



Naming your file in Bluehill

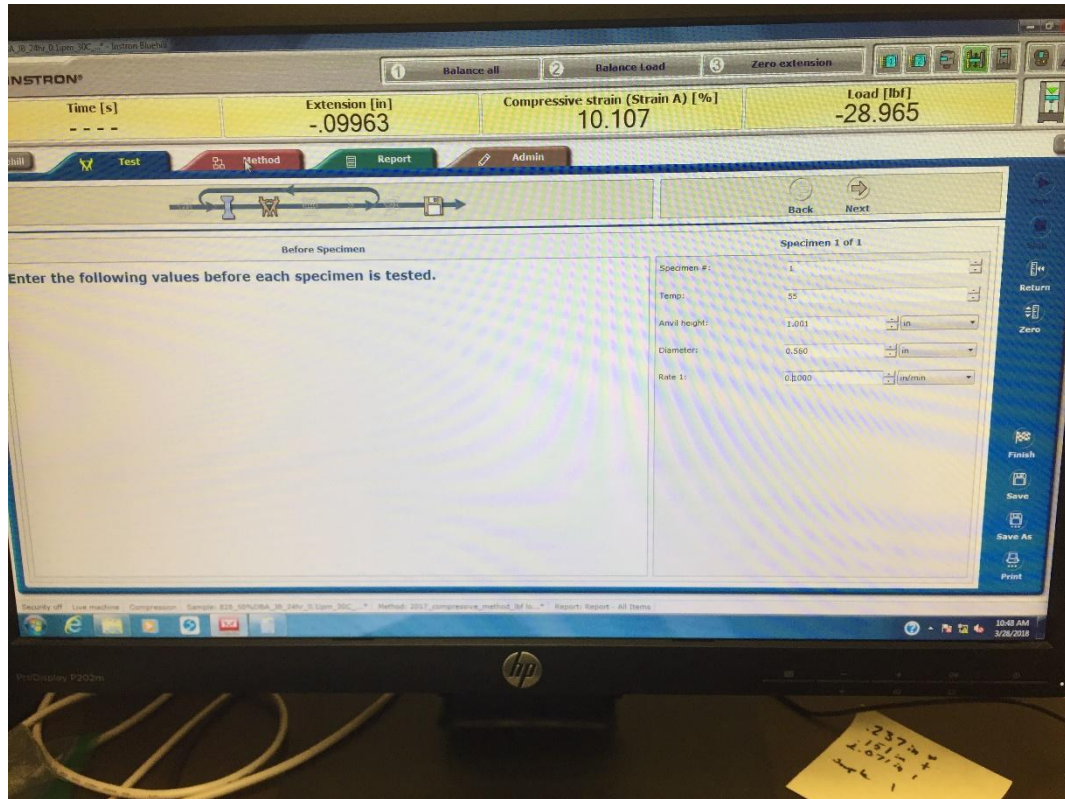
6. On the right hand side of the screen, click “Browse”.



Toolbar on right side of screen, with functions “Next”, “Browse”, and “Back”

7. Choose your file destination. If necessary, create a folder or net of folders to properly archive your tests. Click “Next”.

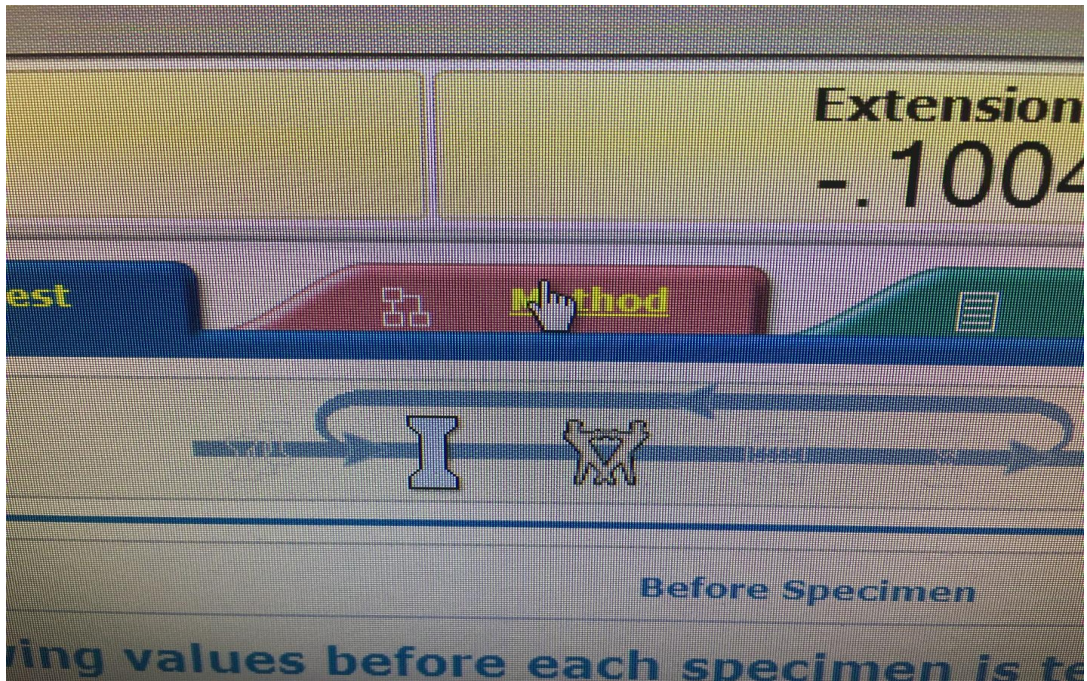
8. Input the sample parameters on the right side of the screen: sample number, oven temperature, sample length (“anvil height”), sample diameter, and crosshead speed. Click “Next”.



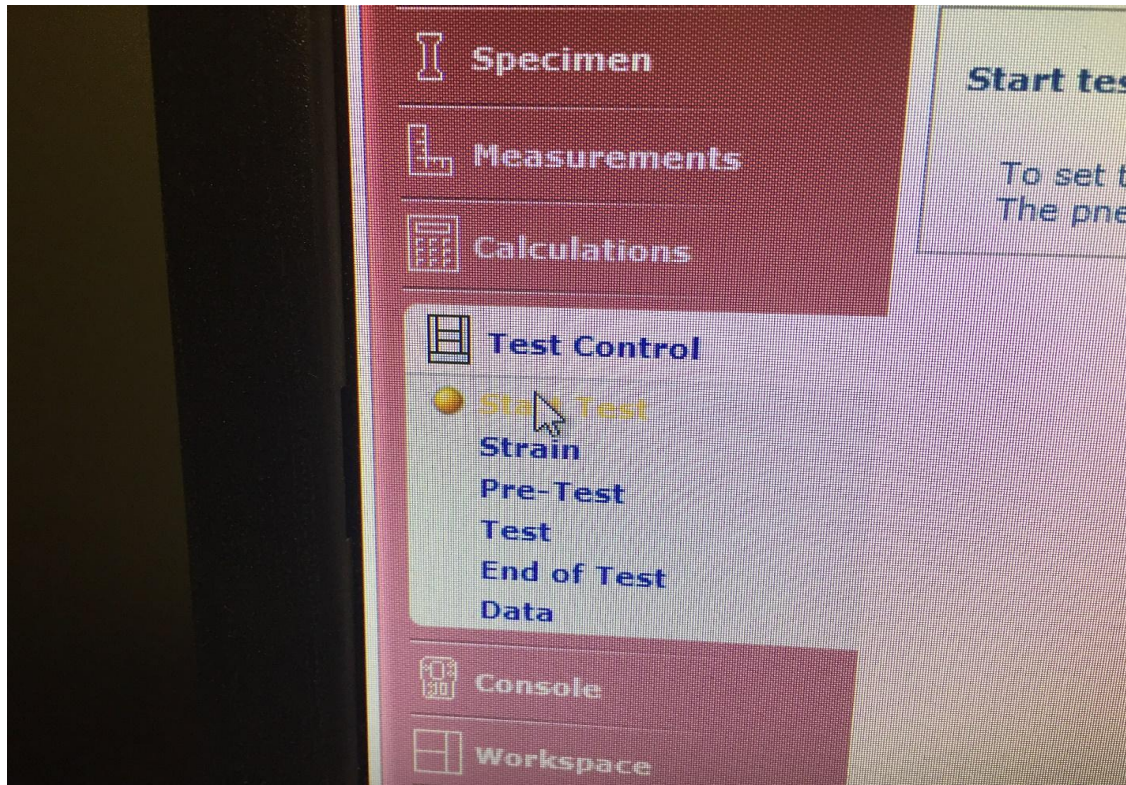
Input sample and test parameters to the window on the right

Programming the Test

9. Click on the red tab near the top of the screen that reads “Method”. From there, click on “Test Control” and then “Pre-Test”. Make sure that none of the boxes are checked on this page.

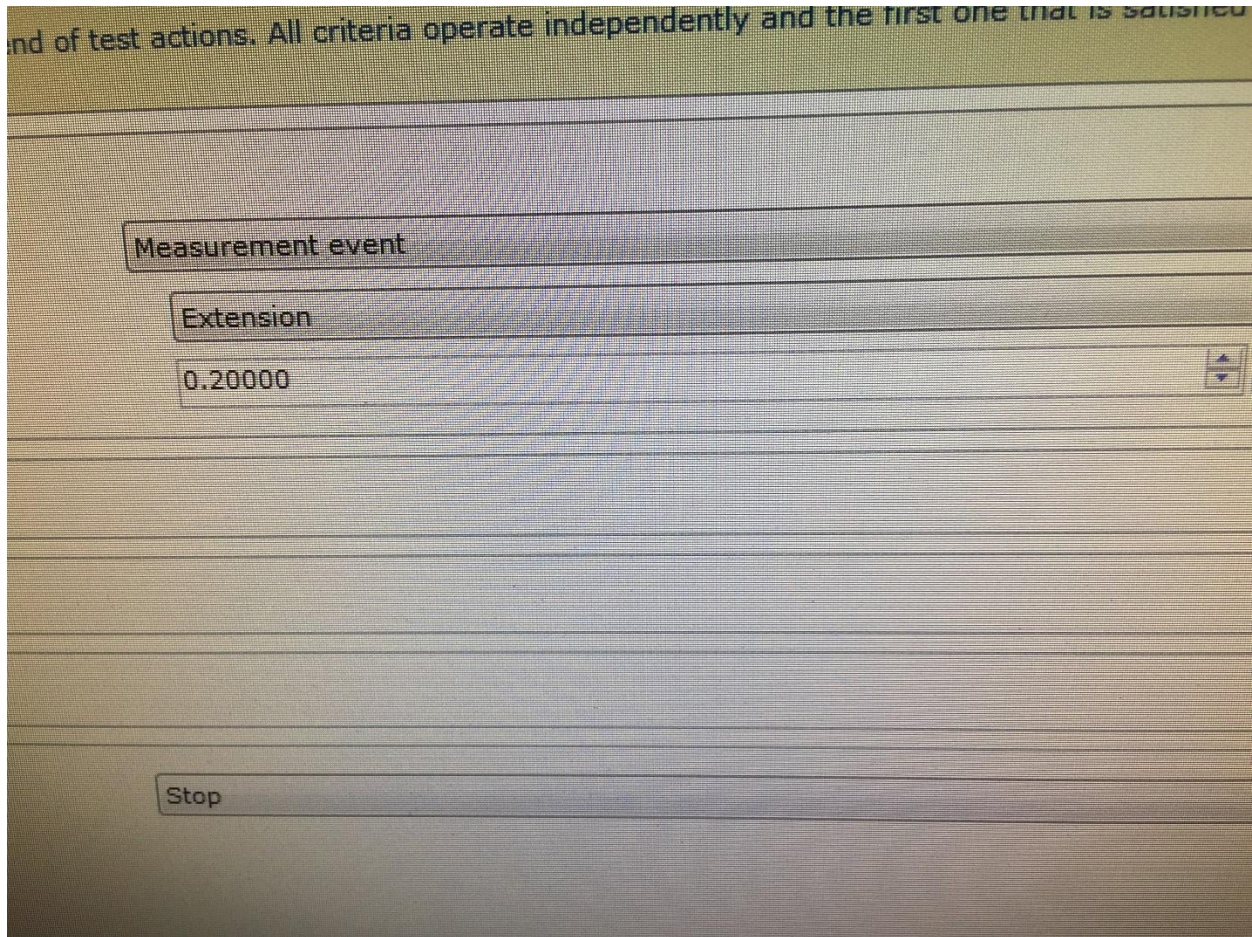


The tab ribbon at the top of the test window, with tabs “Test”, “Method”, “Report” and “Admin”



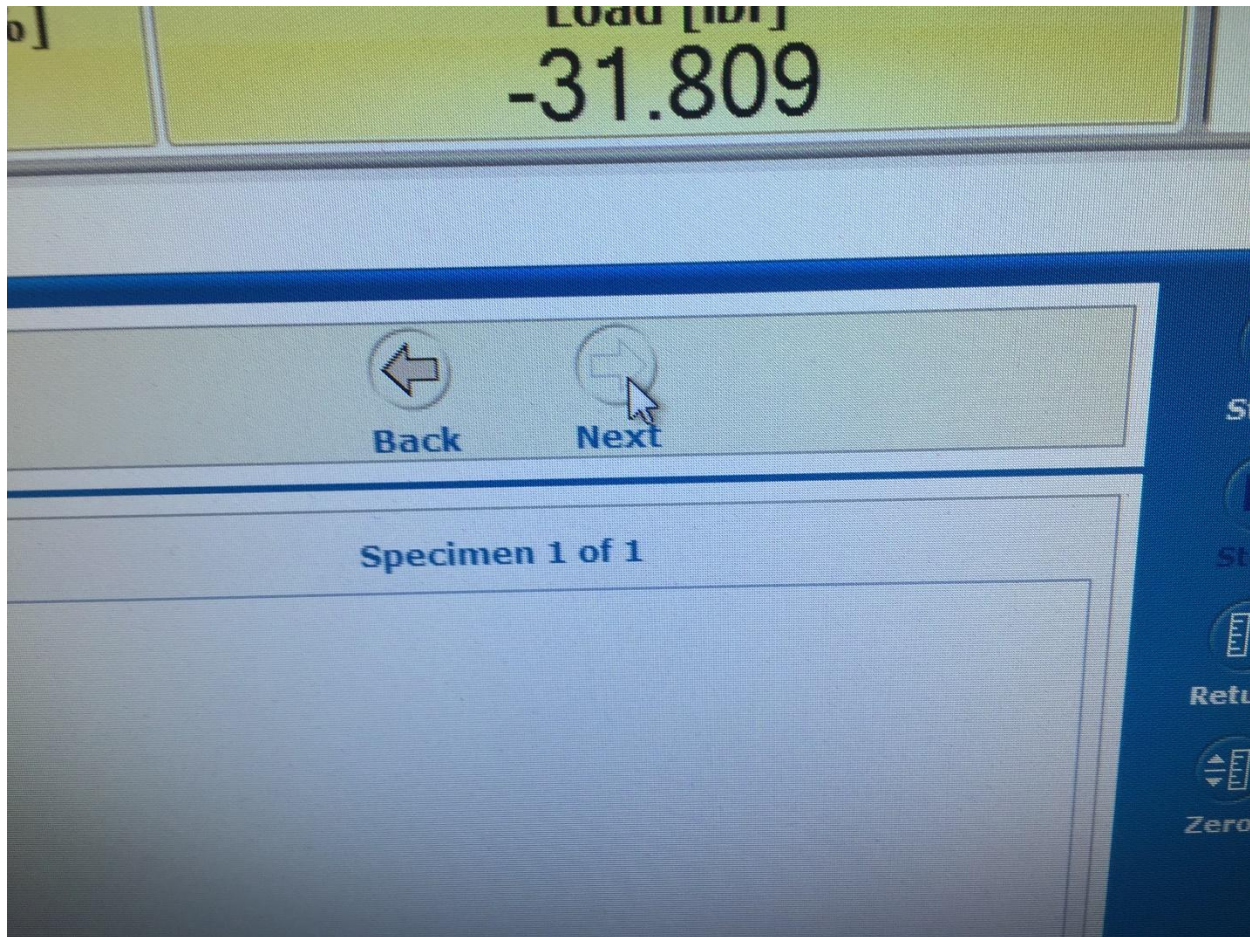
The “Test Control” section under the “Test” tab

10. Under “Test Control”, click into “Test” and input your desired crosshead speed.
11. Under “Test Control”, click into “End of Test” and input your desired extension. (Most tests have an extension of 0.3 inches.)



“End of Test” window

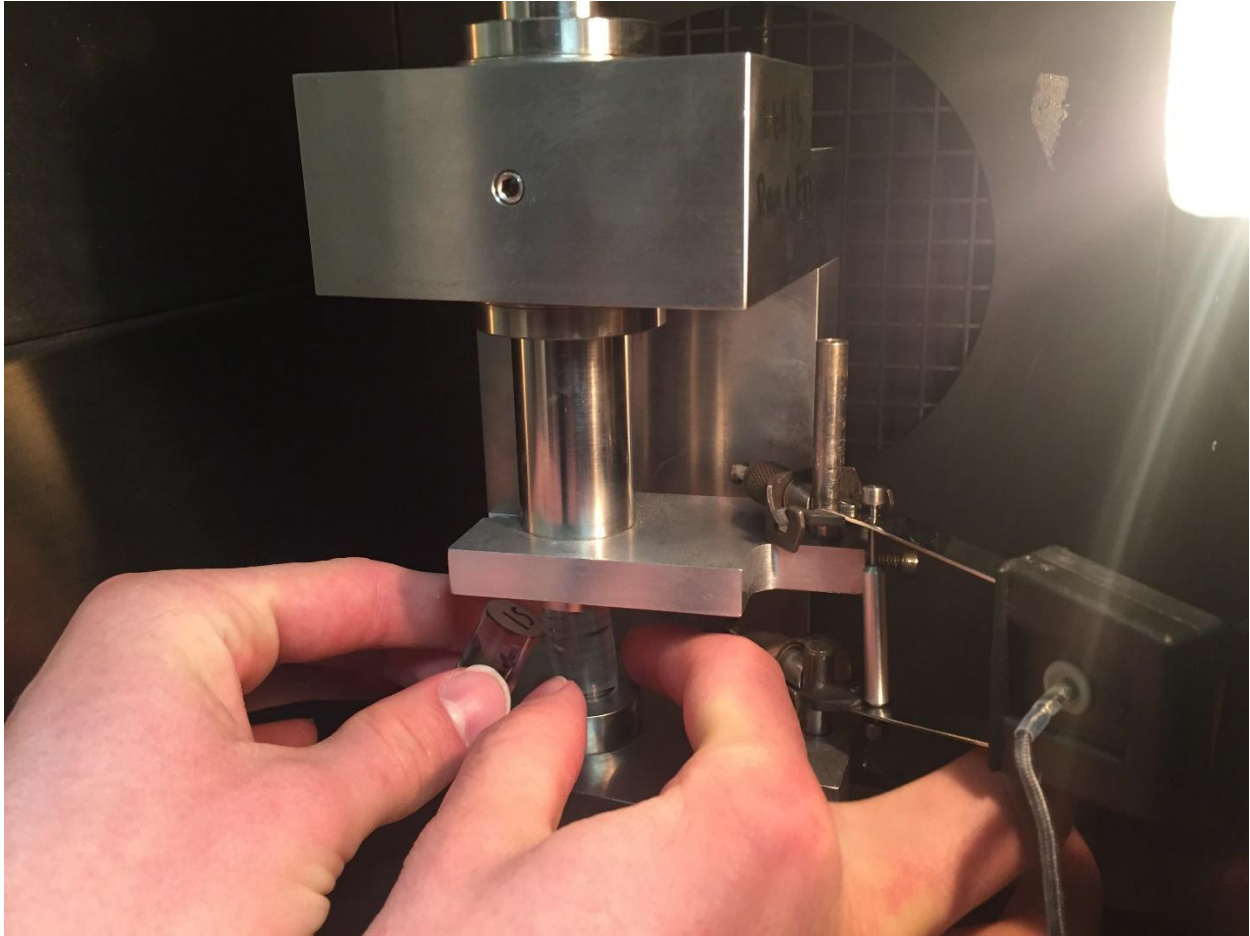
12. Back at the top of the screen, click on the blue “Test” tab, and then the “Next” button.



The “Next” and “Back” buttons to the upper right of the “Test” tab

Running the Test

13. Open the Instron doors, and replace the placeholder sample in the compression mechanism with the sample you wish to test. Leaving the machine without a sample beneath it is hard on its workings, so make the exchange quickly and smoothly. **Be sure to turn the fan off when the doors are open and to turn it back on once the door is closed.**



Carefully switch the epoxy samples, jostling the module as little as possible.

14. Once the sample is loaded and the oven door latched closed, begin lowering the load frame using the “jog down” button on the control panel. Stop once the large compression plate is a centimeter or two away from the cap of the sample module.

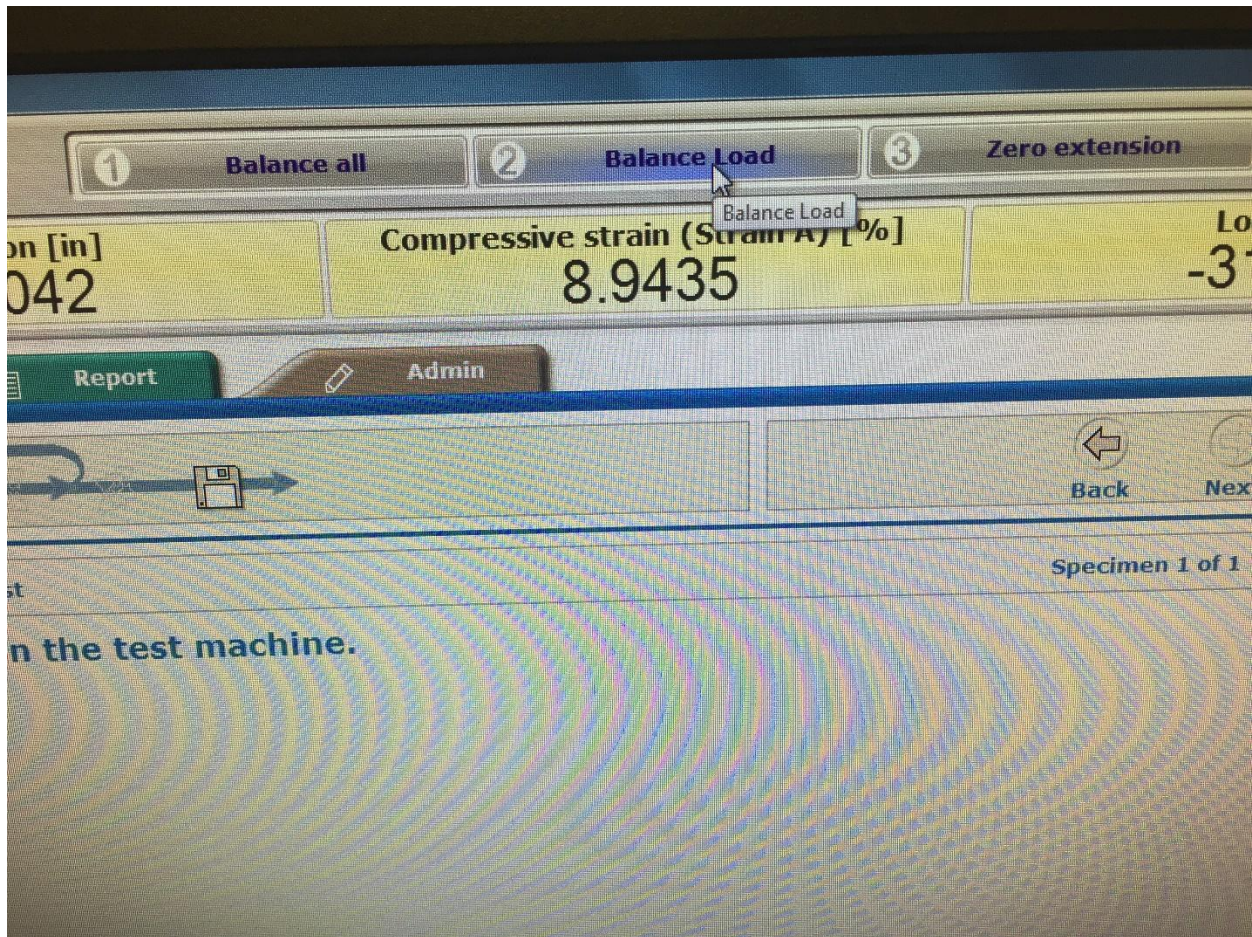


Instron Control Panel with “Jog Up” /“Jog Down” buttons and a “Fine Position” knob.



Hold the “Jog Down” button until the large plate at the top of the Instron is nearly touching the cylinder beneath it, as pictured here.

15. Click the “Balance Load” button in the Bluehill program.

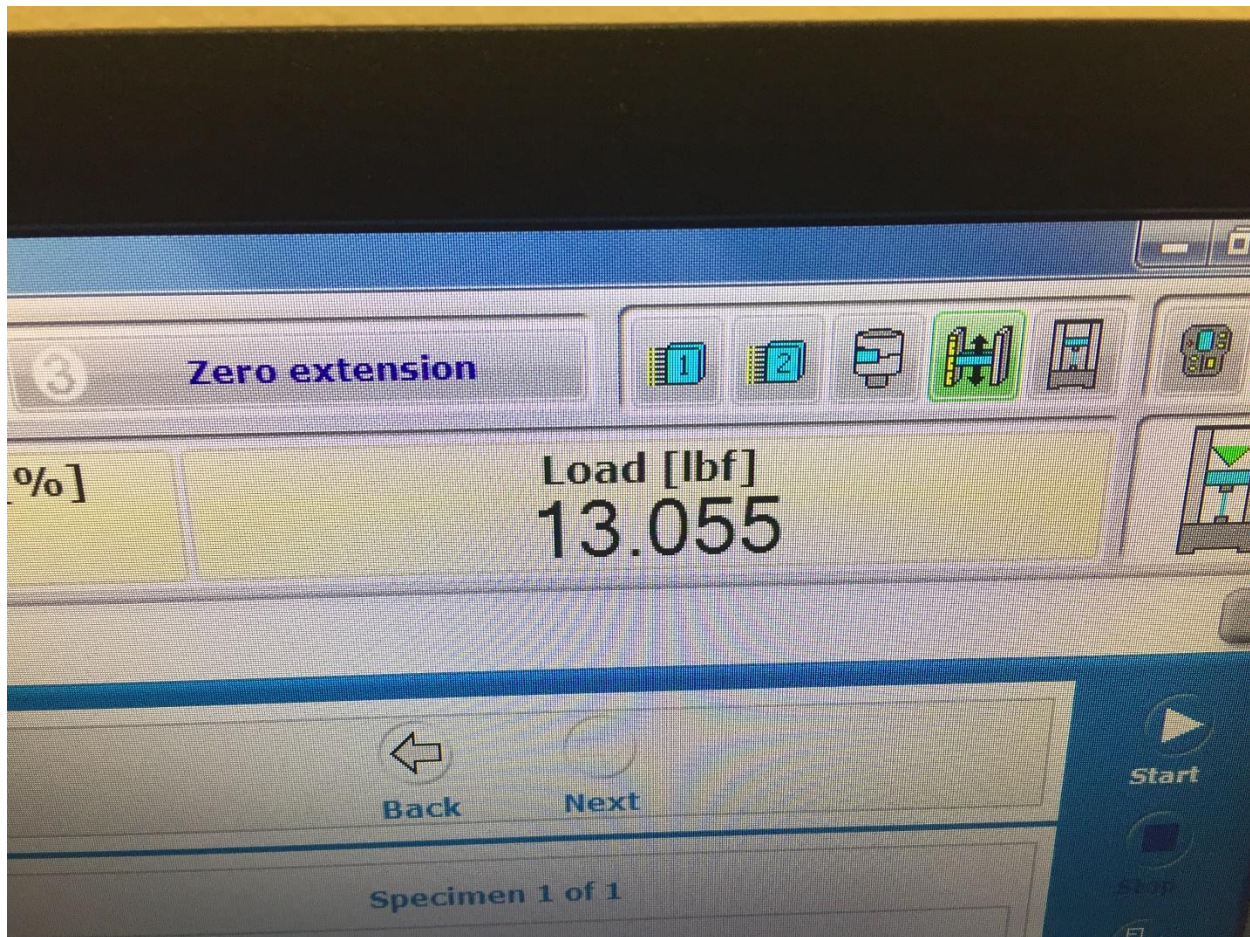


Ribbon at top of test window functions “Balance All”, “Balance Load”, and “Zero Extension”.

16. Use the “Fine Position” knob on the panel to slowly and carefully lower the compression plate until “Load”, on the upper right corner of the Bluehill program, reads between 10 and 15 pounds of force. Do not to go far over this point, as it will preemptively compress the sample and skew the results of the test.



Use the “Fine Position” knob on the panel for a slower, more controlled lowering of the load frame.



“Load” should read between 10 and 15 lbf

17. Once the sample is done being manually pre-loaded, click “Zero Extension”.
18. Click the “Start” button on the far right of the screen. Wait until the sample is finished compressing. Long tests may be ran overnight with Dr. McCoy’s permission.

Finishing the Test

19. Once the test is complete, click “Return” on the far right of the screen. This will return the compression plates to their initial positions before the test was begun.
20. Open the Instron door, **again toggling the fan when the doors open and close**. Remove the now compressed sample and replace it with the placeholder. If more space is needed between compression plates, you may use the “Jog Up” button on the control panel.

21. Click the “Finish Sample” button on the computer- **not the “Continue Testing” button, which will not save the experimental data.** The raw data for your test is now saved to the computer. If another sample needs testing, begin this process from the “Sample Preparation” stage.