RMS 800 Annealing Manual

Introduction

Annealing samples allows for the aging history of the sample to be reset. By heating the samples and returning them to room temperature, residual stresses and strains can be reduced in the polymer, allowing for more accurate tests to be run. This manual will detail the process of annealing the cut Instron samples in the RMS 800, located in 130B.

Safety Information

- This process involves bringing samples up to a high temperature. Avoid touching the machine while the test is running to prevent injury.
- This machine has moving parts. Avoid touching the motor while turning it on.
- When the test is started, stay to ensure that the RMS 800 chamber temperature does not climb more than a few dozen degrees above the set temperature. If temperature badly overshoots (50+ degrees F), turn oven switch off. Keep in mind that it is typical for the machine to *slightly* overheat and then cool down.

Procedure

This manual contains the following sections:

A. Turning on the Air (3 steps)
B. Running the RMS 800 (23 steps)
C. Shutting Down the RMS 800: (8 steps)

Materials

- RMS 800
- 1-inch epoxy samples

Annealing

Turning on the Air:

1. Begin by turning on the Main Air, located on the west wall of room 130B. To do this, turn the red handle one-quarter turn to the left. Air pressure should read around 90 psi.

Figure 1: Main Air in the "Off" position. Notice that the air pressure is 0 psi.

Figure 2: Main Air in the "On" position. Notice that the air pressure is around 90 psi.

2. Connect the hose from the Hankison (located on the north wall of room 130B) to the blue RMS 800 hose.

Figure 3: The Hankison

Figure 4: The Hankison's power switch and air pressure gauges.

3. Turn the Hankinson on. Air pressure should read around 80 psi.

Running the RMS 800:

1. Go to the RMS 800, located on the south wall in room 130B, and check the air pressures on the gauges located on the bottom half of the machine. The oven air and transducer air should read 40 psi and the motor air should read 60 psi.

2. Place the samples you wish to anneal in the hatch, making sure that the samples do not block the motor that is on the top of the hatch, or the thermocouples that are on each side of the hatch. You may stack the samples vertically.
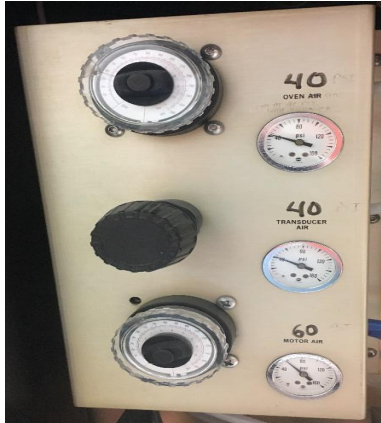

Figure 5: The pressure gauges on the RMS 800.

3. Close and latch the hatch.

Figure 6: Hatch of the RMS 800

4. Turn on the main power by pushing the Main Power button.

Figure 7: Power buttons on the RMS 800

5. Turn on the motor by pushing the Motor button.

6. Go to the computer and open the RSI Orchestrator.

7. Open the Utilities menu using the tab at the top of the program.

8. Click Service.

9. Click Check Instrument Address. The address should be "A00B". If it is not, change it to
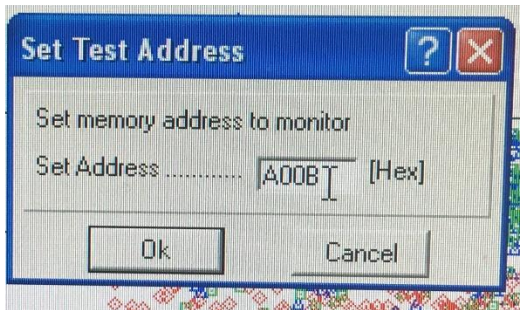   be so and click Ok.

Figure 8: The Instrument Address Code

10. Open the Control menu.

11. Click Instrument Control Panel.

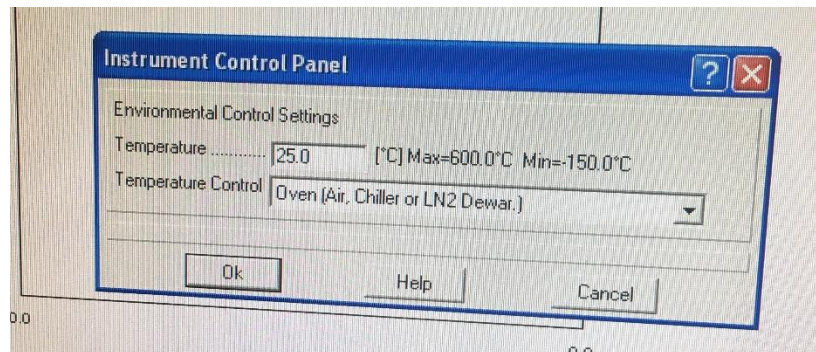12. Set the Temperature to "25.0" and the Temperature Control to "Oven (Air, Chiller or

Figure 9: Instrument Control Panel set up

LN2 Dewar.)" and click Ok.

13. Click on the green start button. Clicking this button does not actually start the test, it just opens the editing menu.

14. Select the Torsion Rectangular Geometry from the Geometry drop down menu.

15. Select the Dynamic Temperature Ramp Test from the Test Setup drop down menu.

16. Click on the Edit Test button. If you are testing 828DEA, set every variable to be equal to the ones in Figure 8. If you are testing any other material, set "Initial Temp" to 30 degrees F above the material's Tg, "Final Temp" to approximately 40 degrees F below the Tg, and all other variables to the ones in Figure 8.
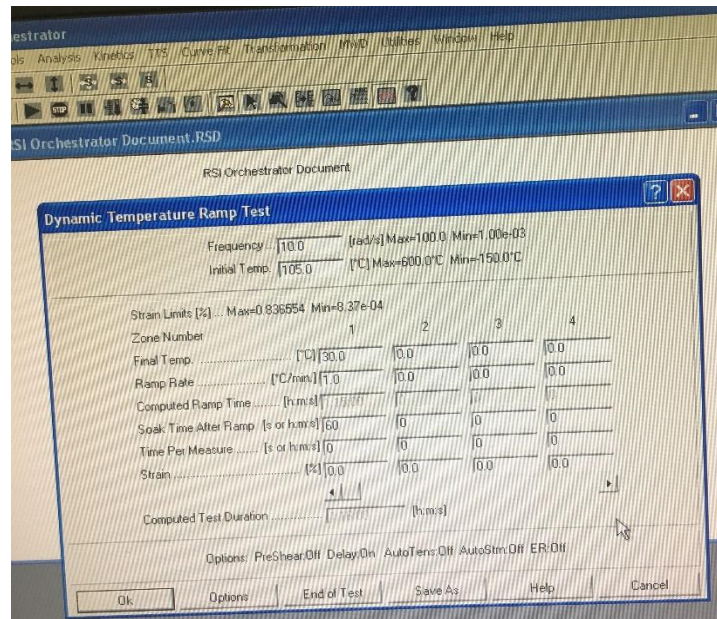

Figure 10: The Dynamic Temperature Ramp Test setup

17. Click on the Options button and select Delay Before Test.

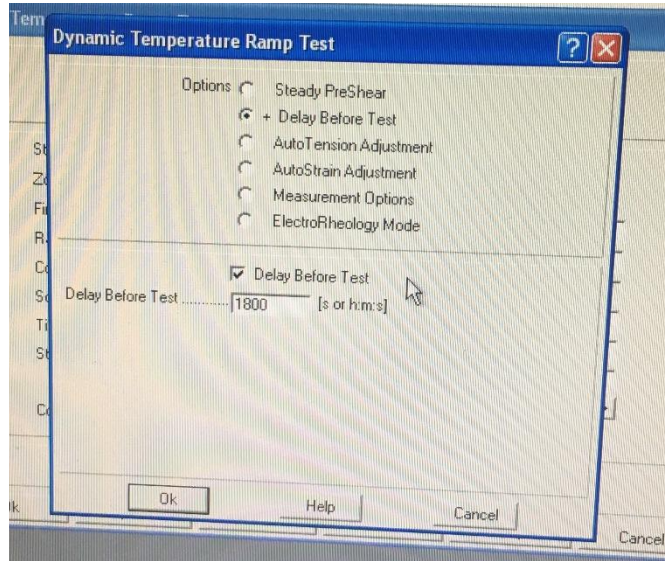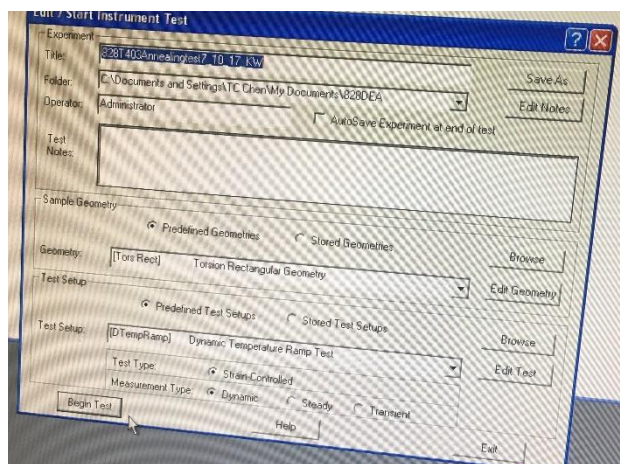18. Check the Delay Before Test box and type 1800 into the text box.

Figure 11: The Dynamic Temperature Ramp Test options
menu setup.

19. Click Ok to exit the Options menu, and click Ok again to exit the Dynamic Temperature
    Ramp Test menu.

20. Return to the RMS 800 and turn the transducer on by pushing the Transducer On button.

21. Push the Oven On button.

22. Return to the computer and press the Begin Test button.

27

Figure 12: Overall setup of the test.

23. Wait until you have seen the temperature reach the set value and begin to decrease (See "Safety Information" section) before leaving the test to run its course.

Shutting Down the RMS 800:

1. Take the samples out of the oven as soon as the test is complete. If you leave the samples at room temperature for several hours, they will regain an aging history and will have to be annealed again.

2. Once the test is complete, go to the RMS 800 and push the Oven Off button.

3. Turn off the transducer by pushing the Transducer Off button.

4. Turn off the motor by pushing the Motor Off button.

5. Turn off the main power by pushing the Main Power Off button.

6. Open the hatch and remove your samples.

7. Go to the Hankison and switch the power off.

8. Go to the main air valve and close the value.