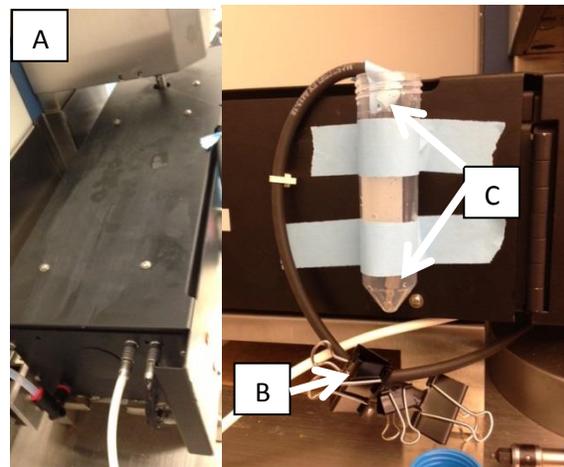


Tensile Fatigue Testing Protocol

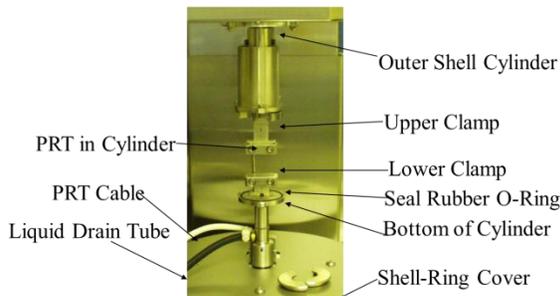
1. Login to SMIF website
2. Turn air up to 80psi, turn on the MSA, and turn on TA orchestrator
3. Turn on **both** the motor and environmental controller (set to your temp of choice, on the oven).
 - The oven will not begin warming until the environmental control box is closed, so you will have a “temp low” reading on the bottom right corner of the screen.
 - Note that the temperature is set on the oven, but the readout is from inside the cup. This means that the temperature on the LCD display may at times be higher than the temp displayed by the software.
4. The white cord is the temperature control. It plugs into either of the ports on the back of the oven box (see pic: A). The black cord is the drain cord. It will be clamped in Step 11.
5. Open gap control and ‘send to top’ for loading of the fixture. Load the upper fixture with the lip facing towards you (as usual); the lower fixture does not have a lip so you will have to use the small hole on the front where the lip would be to load it in the correct orientation. Zero the forces.
6. Once the upper fixture is secure and the lower fixture is mounted, slide the cup onto the upper fixture and secure with clip (see RSA 3 tension immersion fig).

7. Lower the stage until the fixtures are almost touching and check to ensure that they are lined up straight. Zero the fixtures on the gap control panel.
8. Set gap then load samples as usual, using the torque wrench to ensure all samples are loaded with the same tightness.



9. Lower the cup and secure with screws (I find it easiest to pull the tip out of the torque wrench and use it to tighten these screws).
10. The black cord is the drain cord. It should be clamped in several locations (see pic: B), the tip placed in a 50mL

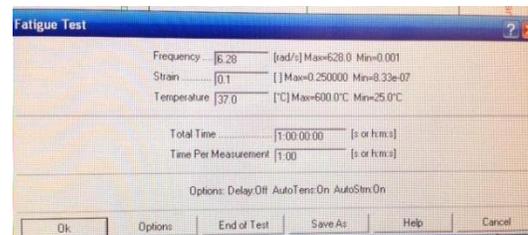
RSA 3 Tension Immersion Fixture



Testing Position

conical tube, and the tube taped onto the oven above the level of the sample cup such that the fluid will be less likely to flow out (see pic: C).

11. Pour your liquid of choice (~30-40mL) into the sample cup, checking to ensure no leakage from bottom or out of black tube. Cover sample cup with the two half circle plates (shell ring covers) to close it. See “testing position” figure.
12. Slide the oven over to where it begins to encase the sample cup, close the door and clamp shut. You should hear air pressure turn on and the little red lights on the left side/end of the oven should begin blinking, displaying that the heater has been turned on.
13. Open gap control panel and set gap such that the sample is under 20% strain; this is our starting point it may vary for your experiment.
14. Click Start to open the instrument testing window.
15. Ensure that the geometry is set to “Rectangular tension/compression geometry” and enter the geometry data for your sample.



16. Open “Fatigue Test” protocol. Note: this is a dynamic time sweep protocol and you may need to select dynamic (rather than transient) testing to see it. **DO NOT RESAVE YOUR TEST IN OUR PROTOCOL – YOU MUST RE-SAVE IN YOUR OWN TESTING FOLDER.** Our testing protocol is as such: If you click ‘edit test’, Frequency should be set to 6.28 (1Hz), strain 0.1 (=10%) and temp = 37C. Total time is set to 1 day, and it will take a measurement every minute. (details on final page of this protocol)
17. Begin test. Using our protocol: it will take a measurement every 60 seconds. It will hold at 20% strain between measurements then oscillate +/-10% strain for the measurement.
 - a. There is a 30 minute time delay on the test to allow equilibration of the sample which will start when you click to begin the test.
18. Check on the sample periodically to ensure that everything is running smoothly, and come back in 24 hours to take down the sample. Note: If you are running for more than 8 hours at 37°C or higher, your liquid will begin to evaporate out of the sample cup. To combat this, we use an IV drip set up to ensure that the liquid level remains constant throughout the experiment.

If you have any problems with the equipment, you can contact TA Instruments rheology support line at (302)427-2167 or RSupport@tainstruments.com

If for any reason the program has been lost or edited, here is our program info:

