

CEAST 9340 Impact Tester (INSTRON CEAST division)

Location of Machine: Composites Lab, RFM 1218

Location of SOP and Machine Operating & Safety Manual: Composites Lab website under resources; Composites Lab TRACS site; and Hardcopy near machine.

Emergency Contact:

- Call 911
- Call EHS & Risk Management at 512-245-3616
- Call Head Lab Technician, Dr. Ray Cook (office 512-245-2050)
- Call Dr. Jitendra S Tate (office 512-245-4872)

Before using this machine:

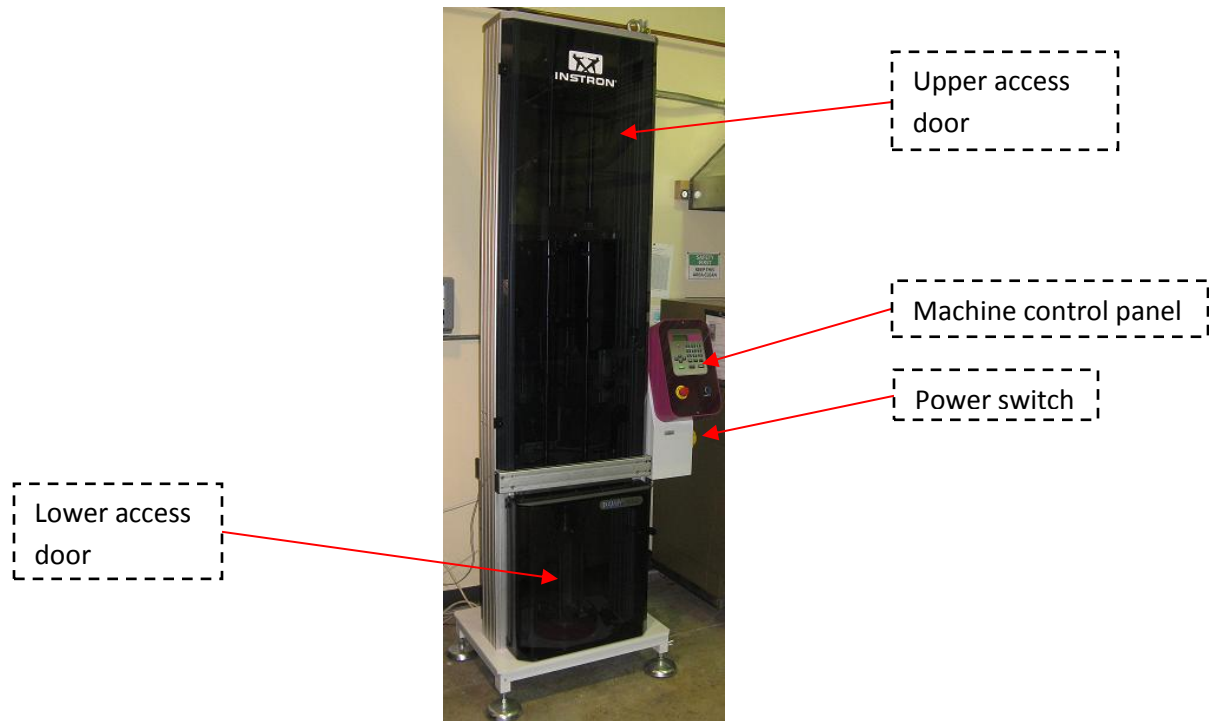
- You must have permission from Dr. Tate.
- You must have received formal training from technician or, trained research student (designated by Dr. Tate) related to machine safety and operation.
- You must read and understand **SOP and Machine Operating & Safety Manual.**
- You must use this machine under direct supervision of Dr. Tate or, Dr. Cook or, trained research student (designated by Dr. Tate).
- You must have signed "Lab Rules" document with Dr. Tate. This document must be signed every semester fall, spring, and summer (as applicable).
- If you do NOT follow above instructions you will be held responsible for your own safety and damages.

Safety Precautions:

Protective Equipment: Prior to performing this procedure, the following personal protective equipment must be obtained and ready for use: **Gloves, Safety Goggles, Lab Coat.**

Important Safeguards:

1. Check that the tup signal cable is far enough from the cylinder (on the left side of turret) of anti-rebound system avoiding to cut the cable during the movement of the anti-rebound crosshead or during the tup repositioning.
2. If any cable is damaged or cut, it must be replaced by qualified maintenance personnel.
3. Exercise care when altering the applied masses. There is danger of crushing due to slippage or dropping of the masses.
4. Never disable any safety mechanism anywhere on the machine. Operation of the machine with safety mechanisms disabled can result in significant injury to the operator and/or damage the machine.
5. Should there be damage or breakdown of a component, the instrument must be removed from use until its once again in perfect working order.



General information

The CEAST 9340 is a floor standing impact system designed to deliver 0.30 - 405 J (0.22 - 299 ft-lb) of energy. The CEAST 9340 is suitable for a range of impact applications including tensile impact, penetration tests on plates and films, Izod, and Charpy tests.

Specifications:

Drop height range (mm) 30 to 1100

Mass range (Kg) 3 to 22.487

Speed range (m/s) 0.77 to 4.64

Energy range (J) 0.89 to 242.410

Test temperature ambient

Impact and rebound velocity- measured by optical detector

Striker position- measured by digital encoder

Accessories:

- **Fixtures:** ASTM D7136 hemispherical striker head. ASTM D256 (Izod) striker head. Izod clamping apparatus.
- **Weight disks:** 0.5kg, 1kg, 2kg, 3kg, 5kg.

Turning and preparing the CEAST 9340 Impact Tester for instrumented operation

1. Locate and turn on the **black** power switch located on the back of the DAS 8000 Junior unit.



2. Locate and turn the **red** circular switch on the right side of the impact tester tower. Depress the **blue** button labeled “power on” located on the control panel on the front of the impact tester tower. Wait until you hear an audible “click” coming from the machine.



3. Locate and depress the **green** “START” button located on the control panel on the front of the impact tester tower.



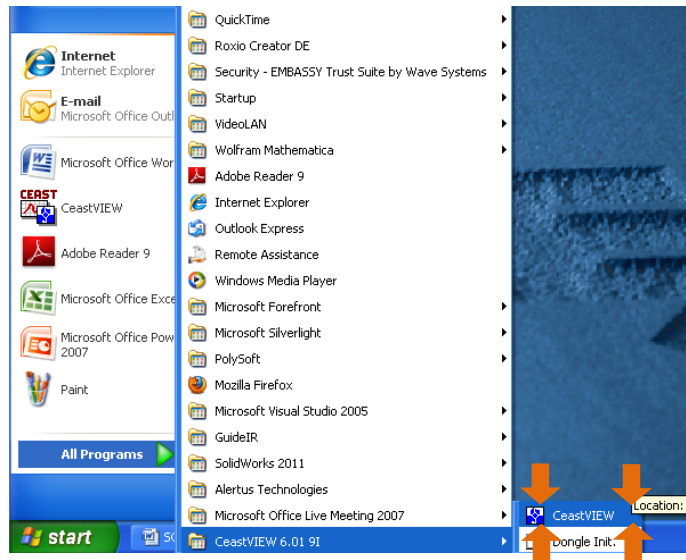
4. Hit the **grey** button labeled “STOP/CANC” located on the control panel on the front of the impact tester tower. **This will cause the machine to move automatically to its home position.**



5. To open the control & acquisition software on the computer attached to the impact tester, perform the following steps in order:

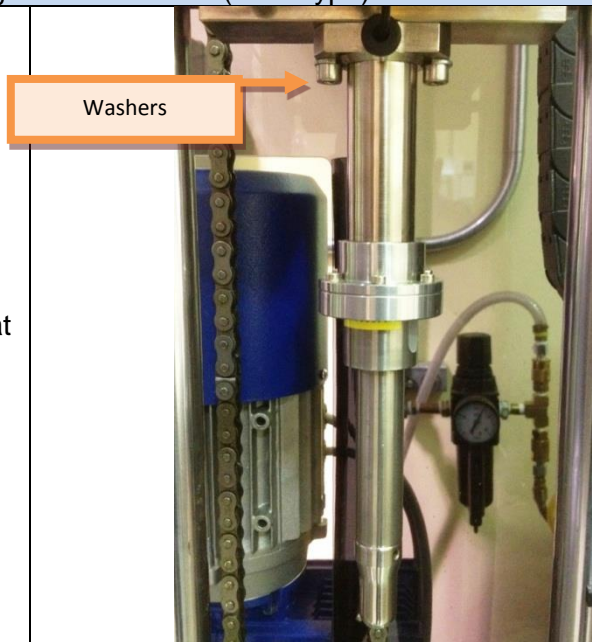
- Click the “Start” button.
- Click the “All Programs” button
- Click the “CeastVIEW 6.01 9I” button.
- Click the “CeastVIEW” button.

After the software opens, click the “OK” button when presented with the username/password box (the username is CEAST, the password is CEAST).



Setting up running an ASTM D256 (Izod Type) Test

1. There are currently two strikers available. M2054 (10kN) shown in step 2 and M2299 (90kN) shown to the right. If you are going to do test that experience over 9kN peak force, install the 90kN striker (unlikely for Izod test). There are two washers that have been cut to allow the bolts to sit flush that need to be used when installing the 90kN striker. When performing Izod test, the 10kN striker is recommended because of the very small force that it will resist.


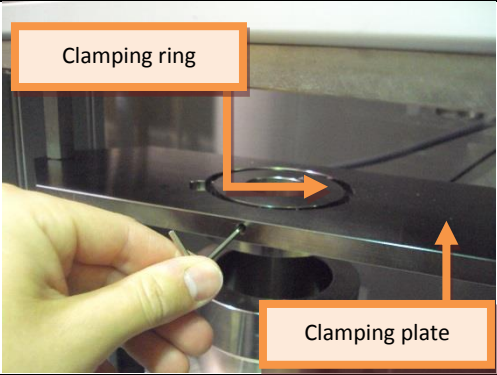
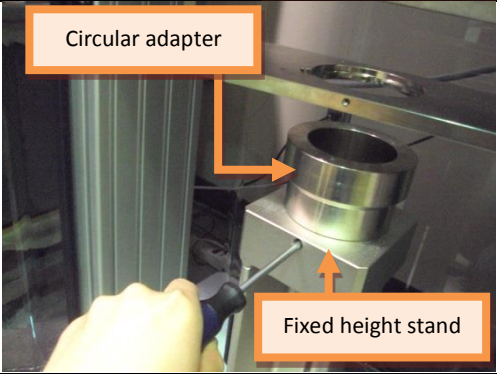
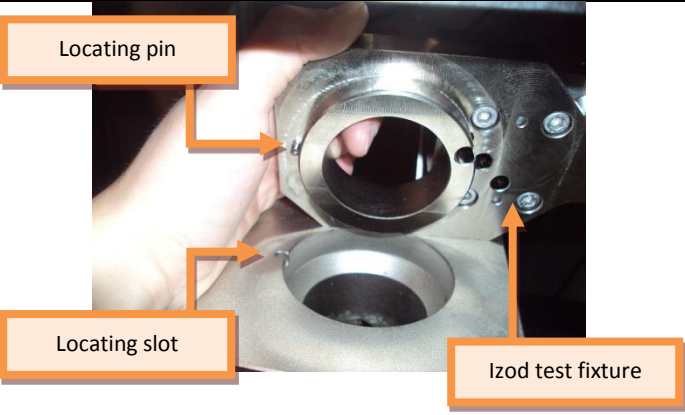



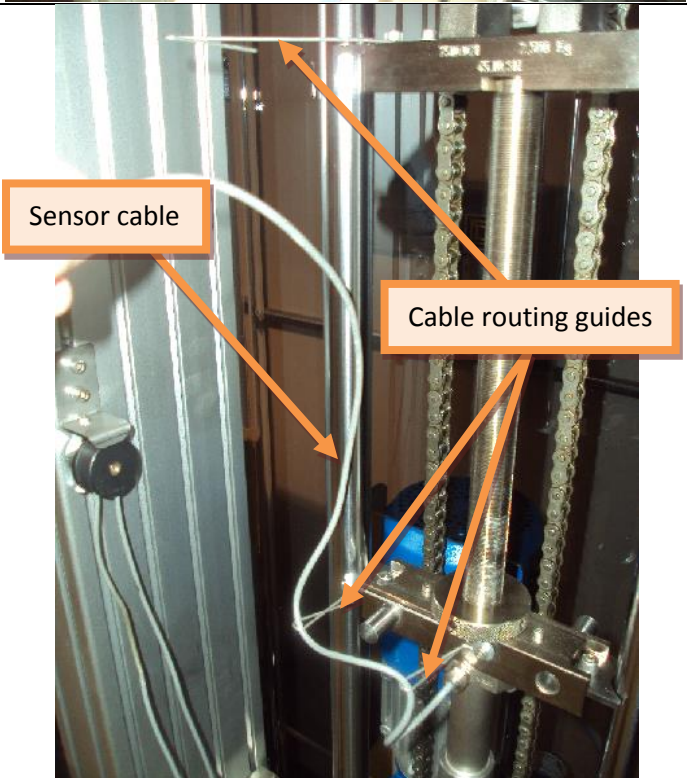
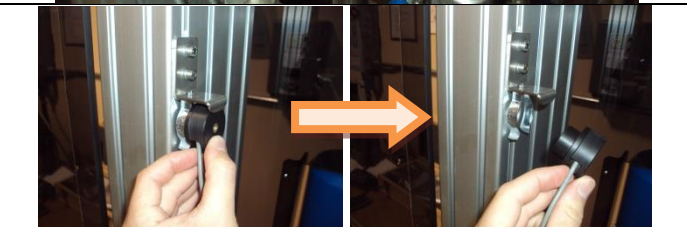
2. Read both a., b. and c. below:
 a. If the 90kN striker is loaded on the machine, remove it and install the 10kN striker following steps 6-9.
 b. If the hemispherical head


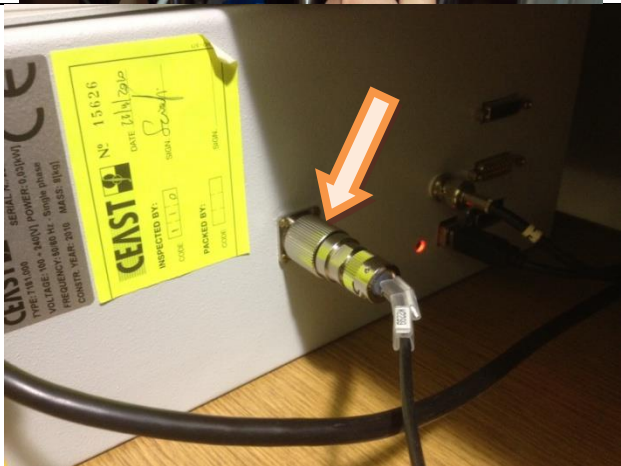
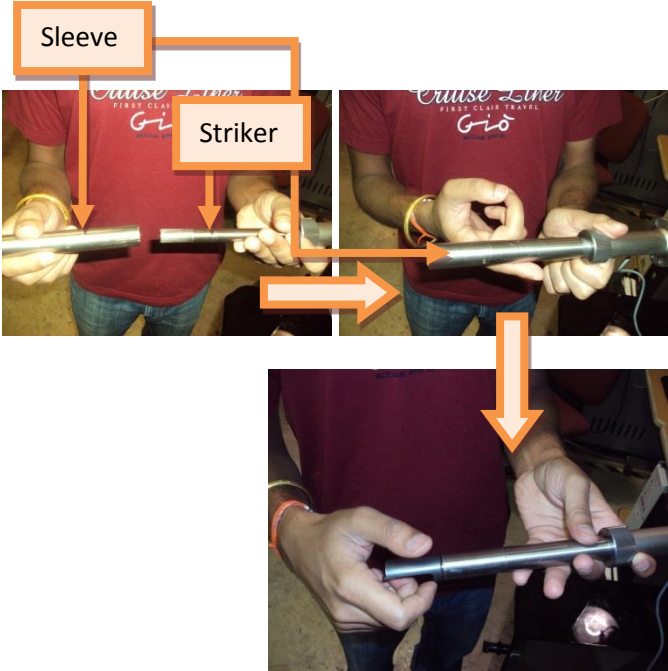


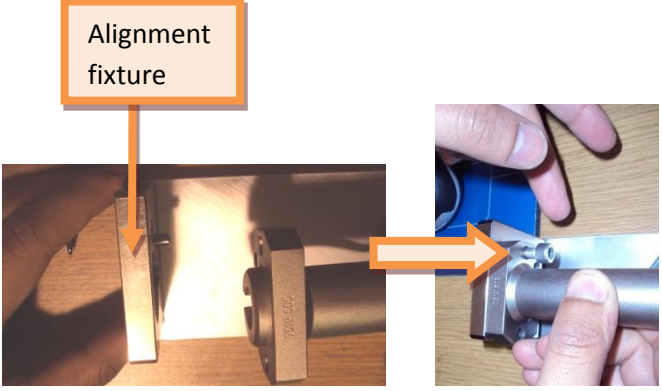
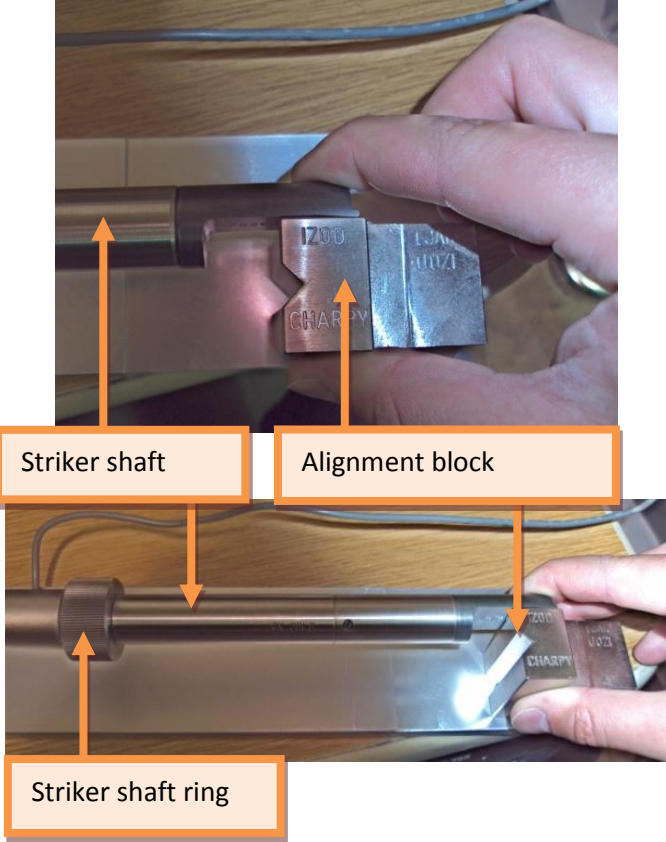
ASTM D7136 hemispherical striker head

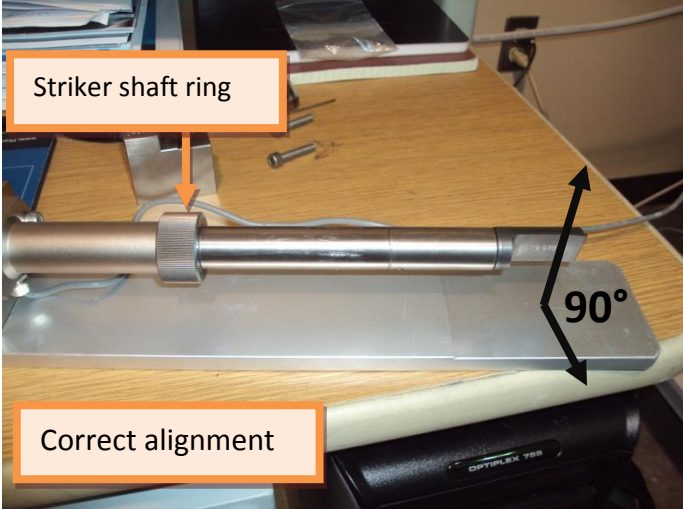
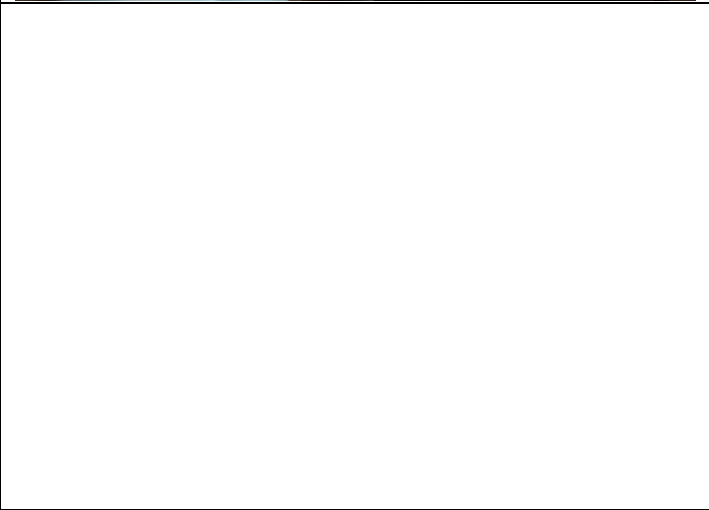
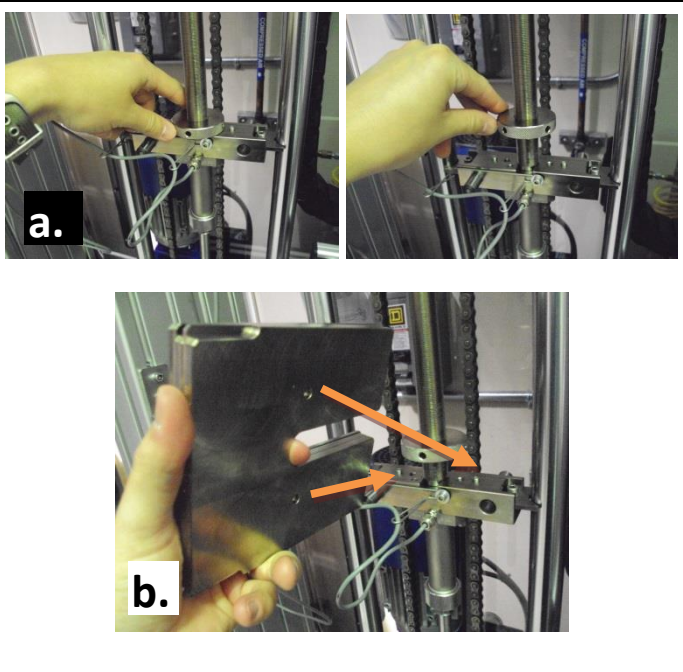


<p>is loaded on the striker the machine is setup for the ASTM D7136 test and must be re-setup to run the Izod test. Proceed to Step 2 below.</p> <p>c. If the Izod striker tip is loaded on the striker (see picture at right), then the machine is currently set up to run the Izod test and you may proceed to Step 13. below.</p>	 <p>ASTM D256 (Izod) striker head</p>
<p>3. Open the bottom access door. Loosen the set screw holding the clamping ring with a 2.5 mm Allen wrench. While carefully supporting the clamping ring from beneath, rotate the clamping ring until the locating pins allow it to come free from the clamping plate.</p>	 <p>Clamping ring</p> <p>Clamping plate</p>
<p>4. Loosen the set screw located at the top front center location of the fixed height stand with a 5 mm hexagonal screw driver or Allen wrench. Lift the circular adapter out of the stand.</p>	 <p>Circular adapter</p> <p>Fixed height stand</p>
<p>5. Insert the Izod test fixture into the fixed height stand, being careful to align the locating pin on the fixture with the locating slot on the stand. Lightly tighten the set screw to hold the Izod test fixture in place. See picture on next page of assembled Izod clamping apparatus.</p>	 <p>Locating pin</p> <p>Locating slot</p> <p>Izod test fixture</p>

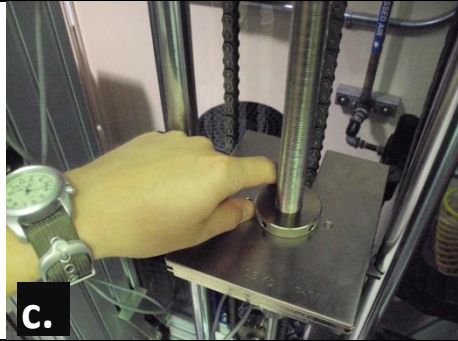
	 <p>Assembled Izod clamping apparatus</p>
<p>6. Un-route the sensor cable from the three (3) cable routing guides. Be careful not to scratch or puncture the cable.</p>	 <p>Sensor cable</p> <p>Cable routing guides</p>
<p>7. Remove safety tension release device from machine frame.</p>	 <p>→</p>

<p>8. Using a 5 mm hexagonal screw driver, <u>loosen but do not remove</u> the two screws holding the striker to drop mass assembly. After the screws have been loosened, grasp the striker to prevent it from dropping and remove the two screws the rest of the way by hand.</p>	
<p>9. This step is only required when switching striker models.</p> <p>Unscrew the sensor cable from the back of the DAS 800 Junior controller located on the desk.</p>	
<p>10. Assembling the striker:</p> <ol style="list-style-type: none"> Unscrew the hemispherical striker head from the striker. Locate the adapter sleeve in the wooden Ceast box next to the machine. Thread it loosely onto the striker (do not tighten). Locate the Izod striker head in the wooden Ceast box next to the machine (see Step 1. for picture of proper striker head). Thread it loosely into the hole that the hemispherical head was removed from (do not tighten). 	

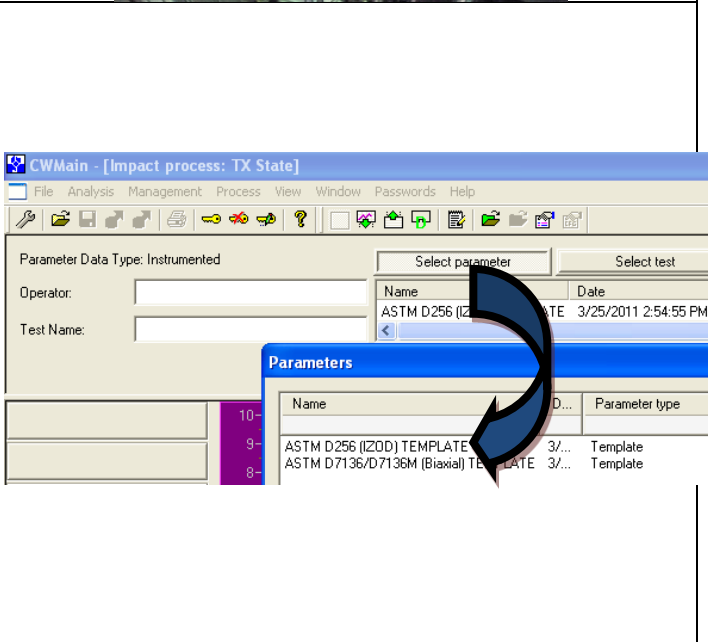
<p>11. Setting up the alignment fixture:</p> <ol style="list-style-type: none">Obtain the alignment fixture (pictured at right) and remove the single screw from the fixture.Place the striker onto the alignment fixture by aligning the locating pin on the fixture with the locating hole on the striker.Reinsert the screw through the hole on the striker and tighten lightly with 5 mm hexagonal screw driver.	
<p>12. Aligning the striker head: The Izod striker head must be aligned to strike the specimen with the plane of the striker being parallel to the plane of the break in the specimen. To align the striker properly do the following:</p> <ol style="list-style-type: none">Locate the alignment block and place it on the stepped region of the alignment fixture as shown at right.Press the side of the alignment block labeled "IZOD" against the striker head. Because the striker head has not been fully screwed into the striker body, it will align parallel to the side of the alignment block, and perpendicular to the upper surface of the alignment fixture. Be careful to keep the alignment block pressed firmly downward as well as against the alignment block.While holding the striker head and alignment block firmly in alignment, tighten the striker shaft ring to finish the alignment process. <u>At this point the alignment head should not</u>	

<p>be loose, but firmly fixed at the end of the striker</p>	
<p>13. To re-attach the striker assembly to the carriage, we will essentially reverse steps 6-8 and 11 from above. See each respective step for reference pictures if needed.</p> <ol style="list-style-type: none"> a. Remove striker from alignment plate. b. Affix striker to the mass assembly with the two screws. c. Affix safety tension release to machine frame. d. Route sensor cable through the three (3) cable routing guides. 	
<p>14. Adding drop mass (this step may not be necessary depending on the impact energy desired):</p> <ol style="list-style-type: none"> a. Loosen the threaded retaining ring located at the base of the threaded rod which connects the top of the drop carriage with the striker assembly attachment point. b. Slide the desired mass quantity into place on the mass assembly, being careful to seat the masses over the alignment pins on the mass assembly. 	

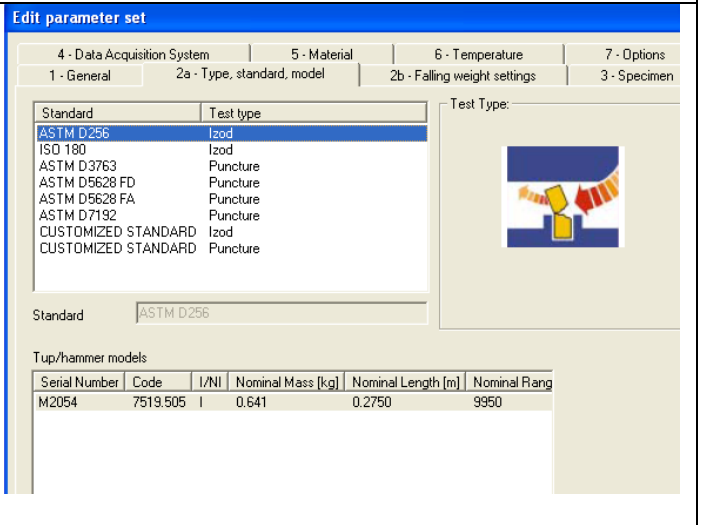
c. Re-tighten the retaining ring.



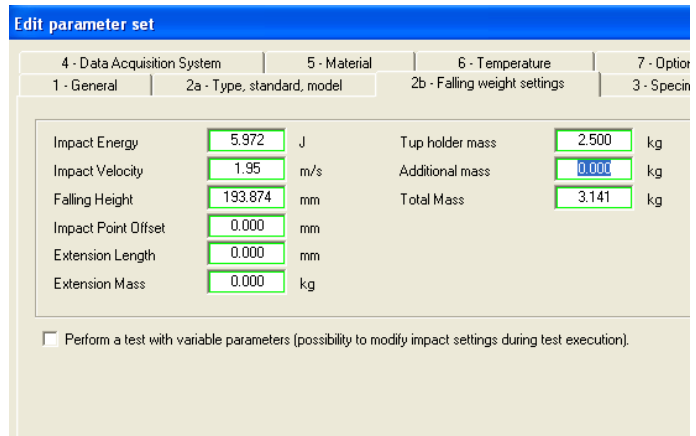
15. The computer software interface now needs to be set to the proper parameters for the Izod test. Press the “Select parameter” button, and then select the parameter named “ASTM D256 (IZOD) TEMPLATE.” Once the parameters are highlighted, select the “Copy” button on the bottom left of the active window. When prompted, descriptively name your test parameter (for example: ASTM D256 (IZOD) Neat polycarbonate study) and hit the “OK” button. Under no circumstances should you use or edit the template file. You can now double-click the parameter you created to open it.



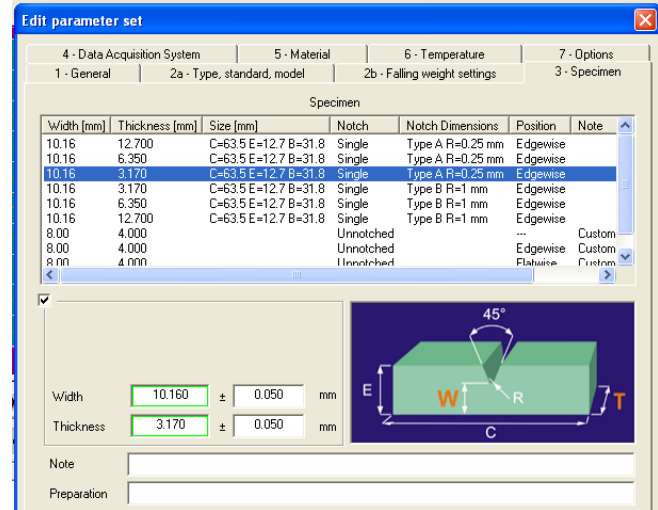
16. Click “Analysis”-“View Parameters”. When “Edit parameter set” window opens, click the tab labeled “2a- Type, standard, model.” Select the appropriate standard for the Izod test type.



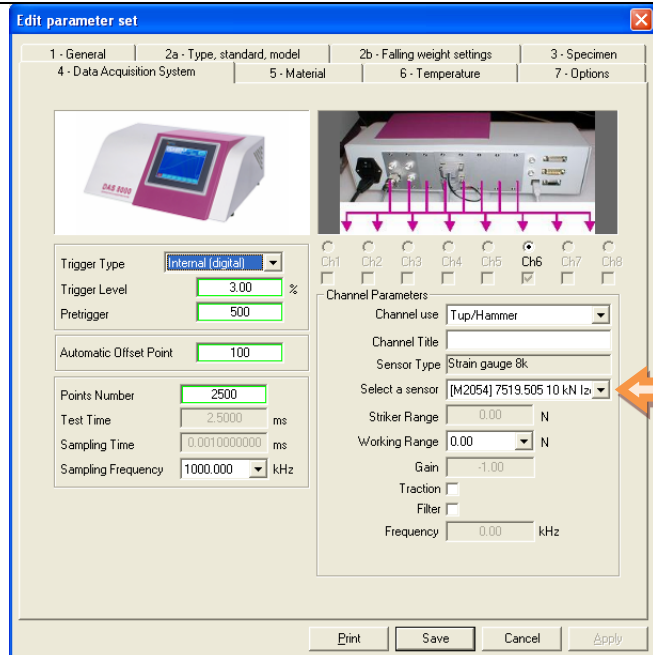
15. Click tab labeled “2b- Falling weight settings”. If your test requires additional mass (see Step 12. above), enter the amount added in the “Additional Mass” field. Additionally, you may change the value for “Impact Energy,” “Impact Velocity,” and “Falling Height” and the software will recalculate the appropriate values within the other fields, providing it does not exceed the maximum potential energy possible given your total mass and maximum drop height.



16. Click the tab labeled “3 - Specimen.” Select the proper geometry for your sample which is defined in the Izod test standard.



17. Click the tab labeled “4 – Data Acquisition System.” Specify the number of data points you would like the DAS to capture. Note that the sum of the value in the “Pretrigger” field and the “Points Number” field may not exceed a value of 8000. Values in the “Sampling Frequency” and “Working Range” may also be changed to values appropriate to your test. Then click on the appropriate sensor from the “Select a sensor” drop down box.

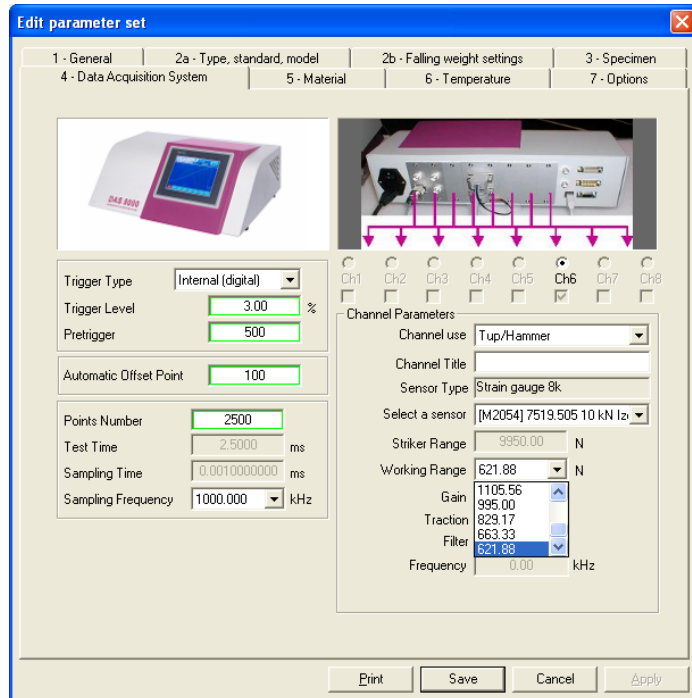


18. If your working range is zero then the sensor hasn't been clicked from the drop down box. It may look pre-selected but it will not register until it is clicked.

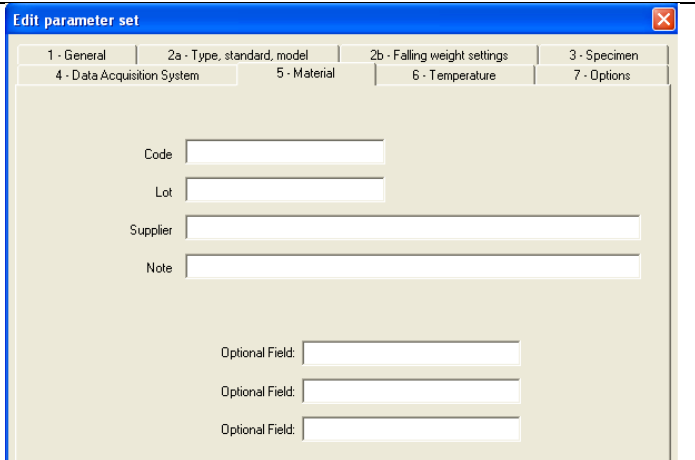
The trigger level should be set to about 3 -5 %. If it is set to 3% and the working range is set to 50% it would take 3 % of 5 kN (half of the full range of the 10 kN striker) or 0.15 kN to trigger the data collection.

If the specimen generates 0.1 kN of force during the impact it does not trigger. So setting the working range down to 3 kN, it would only take 0.09 kN of force to trigger it and it would trigger at any force that exceeds this.

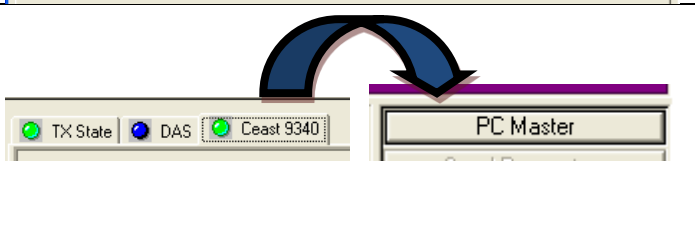
*See Izod Testing Problem document in Composites Lab TRACS- Resources-(SOP)- Instron Impact Notes for more help



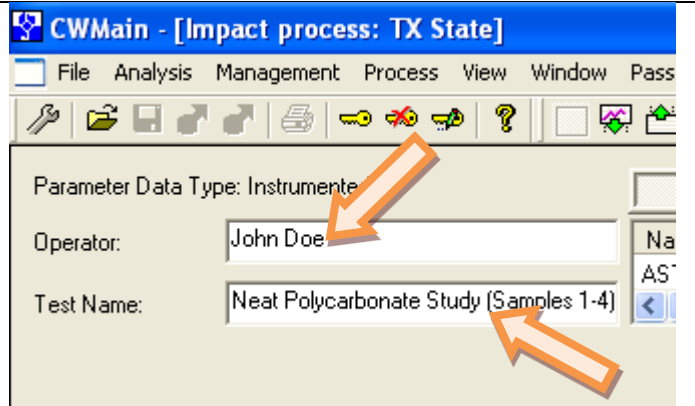
19. Click the tab labeled “5 – Material.” Fill in all fields as descriptively as possible. Press the “Save” button to save all test options, and exit the “Edit parameter set” window.



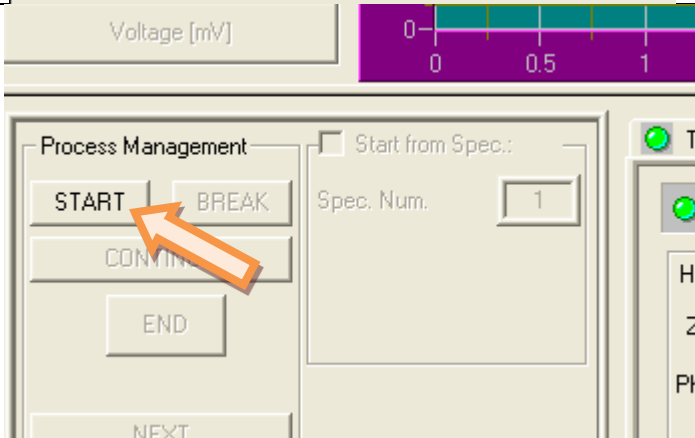
20. Locate and click the “Ceast 9340” tab on the test screen. Once clicked you will be presented with a column of selectable options on the bottom right hand side of the screen. Select the “PC Master Button.”



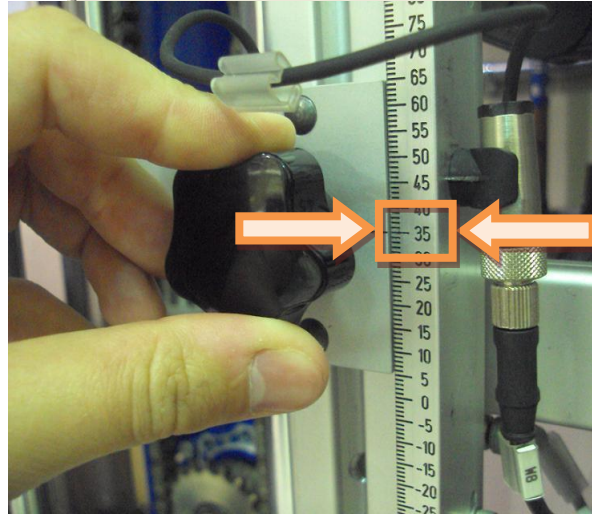
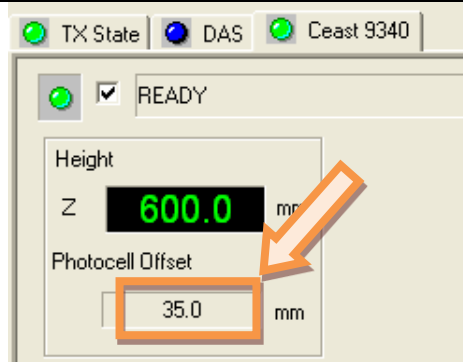
21. In the upper left had corner of the screen, enter appropriate information into the Operator and Test Name fields.



22. Click the “START” button to begin the test procedure.

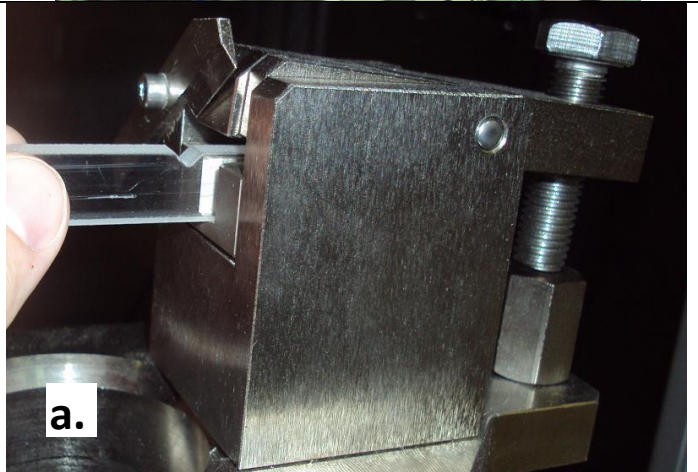


23. In the bottom right portion of the screen, a message will be displayed: "Check photocell offset insert specimen and then press CONTINUE." Locate the value in the "Photocell Offset" field. Open the upper access door on the Instron Impact Machine and adjust the Photocell offset slider to the amount indicated by the software. An example is shown at right.

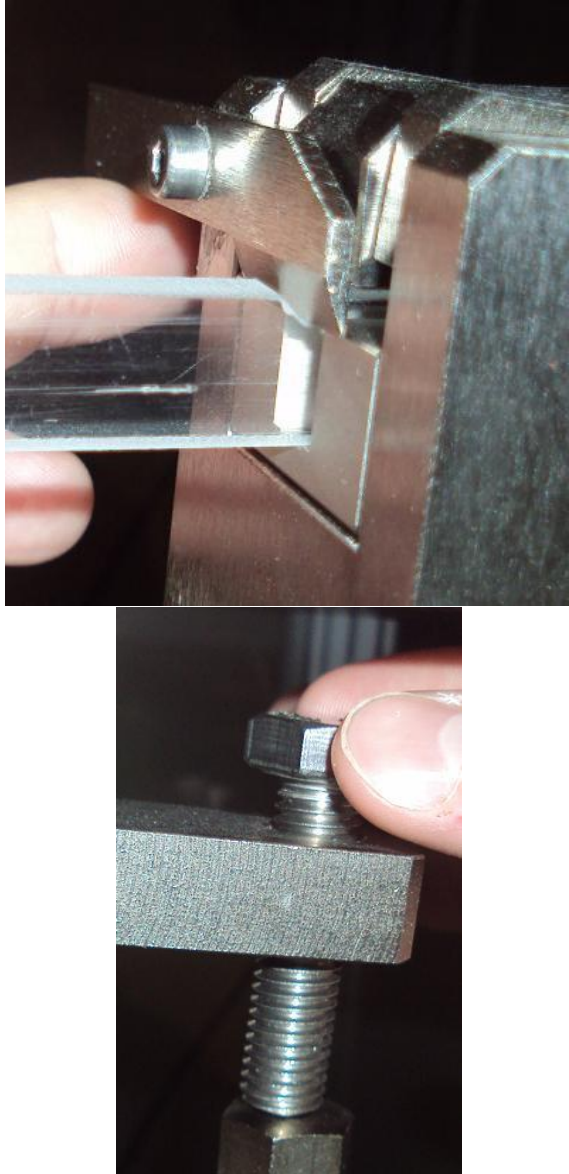
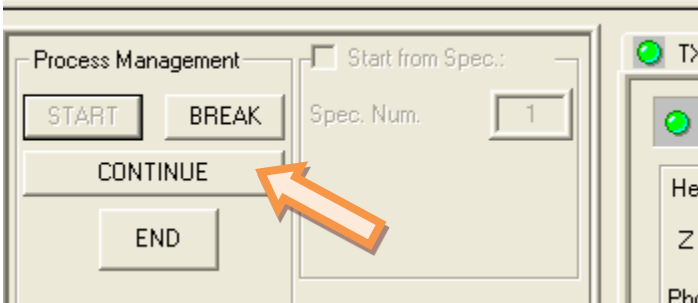


24. Loading the specimen:

- Insert specimen with notch up into the loading slot.
- lower locating arm until it rests in the bottom of the v-shaped notch on the specimen.
- finger tighten bolt at back of Izod fixture to secure specimen. Return locating arm to original position.

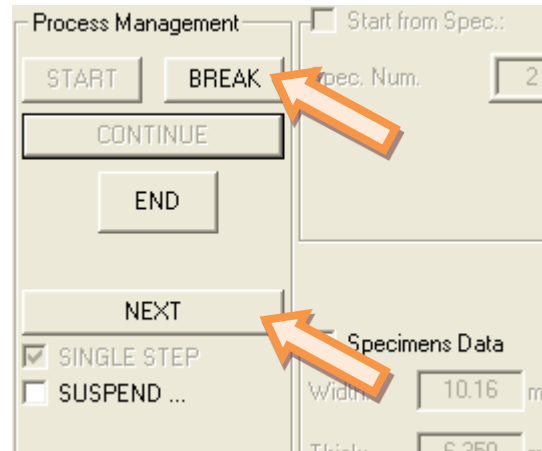


b.

	
<p>25. Once the photocell offset has been set, close the upper access door and press the “CONTINUE” button in the software</p>	
<p>26. The software will now send parameters to the DAS and the Instron Impact Machine, and the impact test will proceed.</p>	

27. Once the test has completed, you are given the option to continue testing subsequent samples, or to finish the test:

- a. To finish testing click the "BREAK" button. When asked if you want to finish the test, click the "Yes" button.
- b. To continue testing samples open the bottom access door of the Instron Impact Machine, remove the tested sample and insert a new sample. Close the bottom access door. Click the "NEXT" button in the computer software. Another impact test will be performed.



Setting up running an ASTM D7136/D7136M (Biaxial) Test

1. There are currently two strikers available. M2054 (10kN) shown in step 2 and M2299 (90kN) shown to the right. If you are going to do test that experience over 9kN peak force, install the 90kN striker. There are two washers that have been cut to allow the bolts to sit flush that need to be used when installing the 90kN striker.



2. Read both a., b. and c. below:

- a. To switch the strikers follow steps 6-9 and 11 below.
- b. If the hemispherical head is loaded on the striker the machine is setup for the ASTM D7136 test. Proceed to step 11 below.
- c. If the Izod striker tip is loaded on the striker (see picture at right), then the machine is currently set up to run the Izod test and must be re-setup to run the ASTM D7136 test. Proceed to Step 2 below.

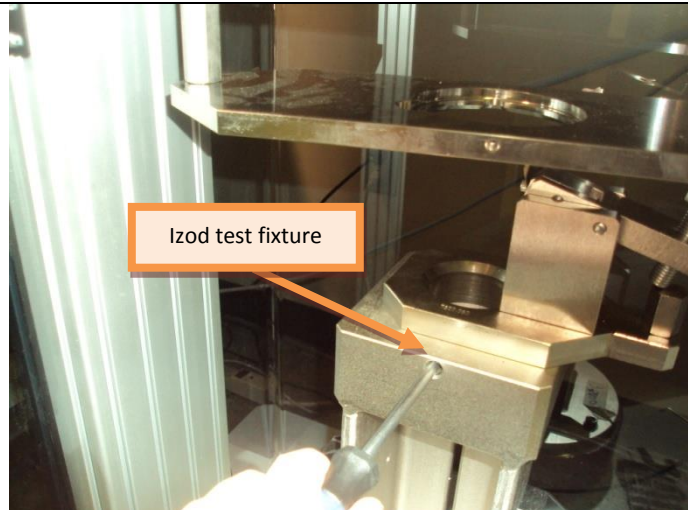


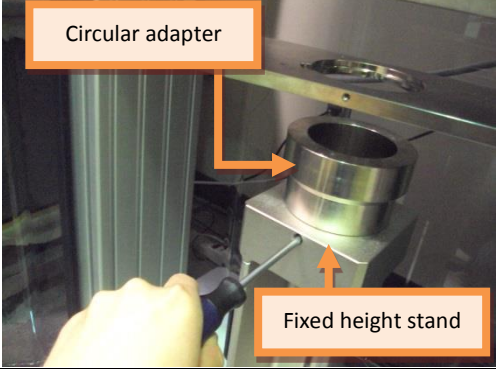
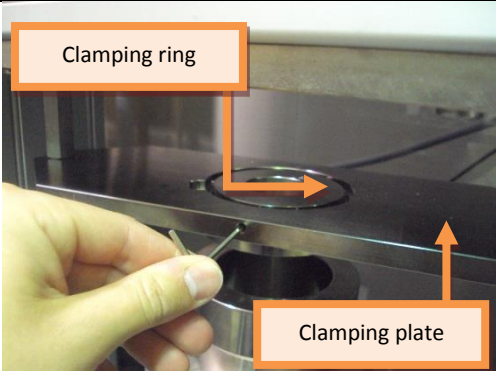
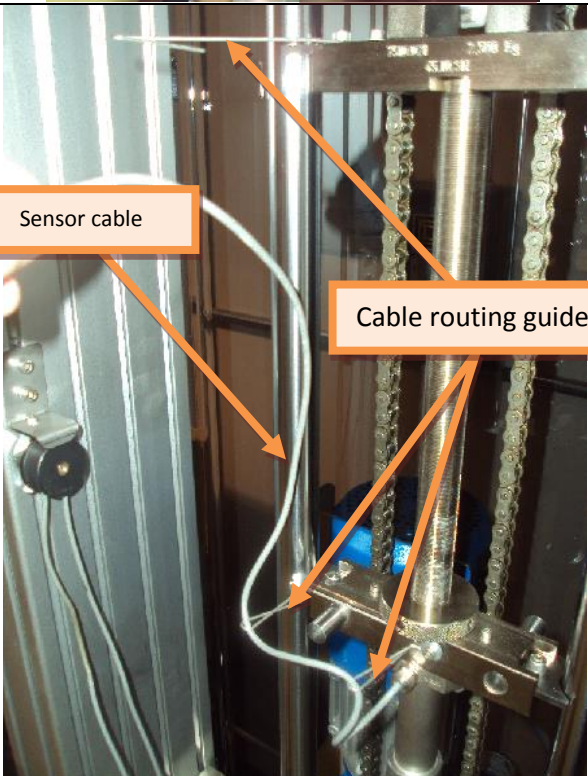
ASTM D7136 hemispherical striker head

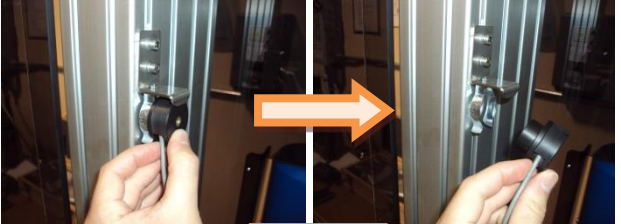
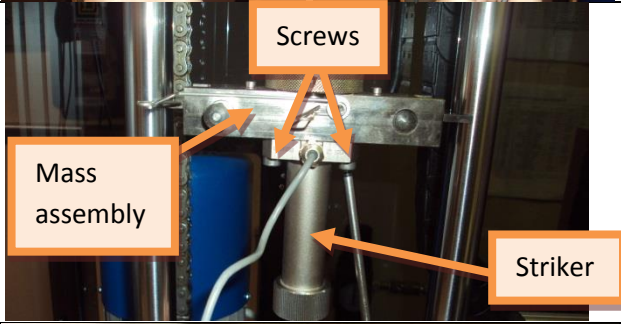

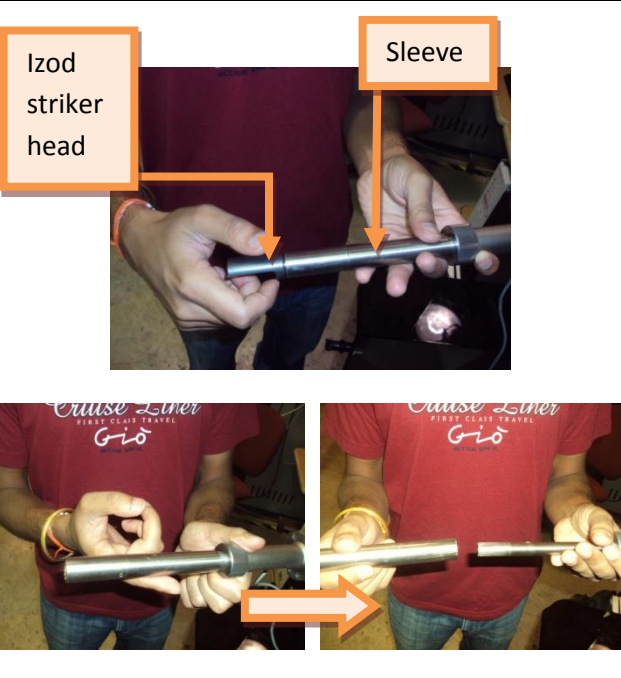


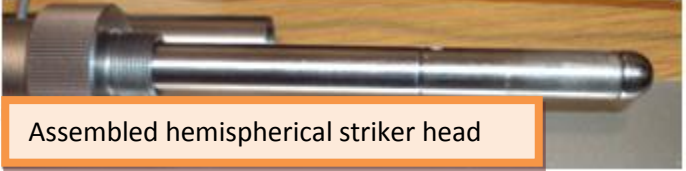
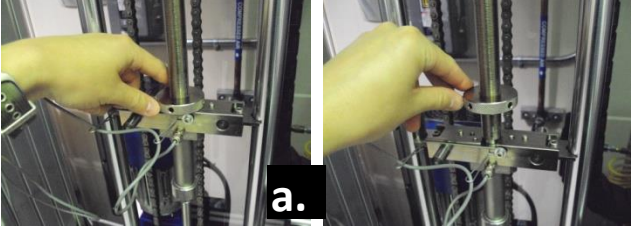
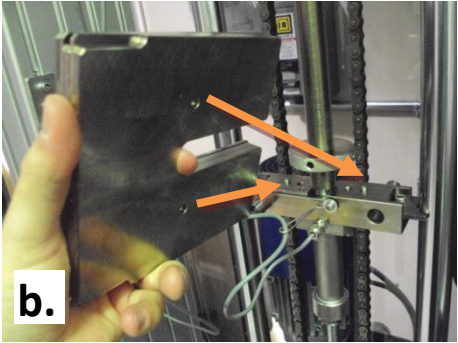
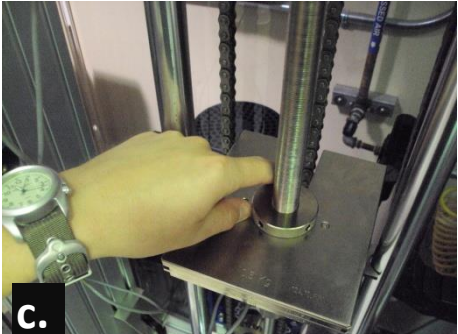
ASTM D256 (Izod) striker head

3. Using a 5 mm hexagonal screw driver, loosen the set screw located at the side of the test stand. Remove the Izod test fixture from the stand.

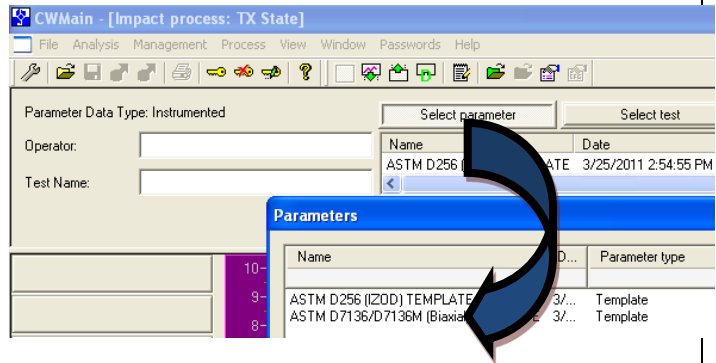


<p>4. Locate the circular adapter for the ASTM D7136 test, and place it into the circular hole vacated by the Izod test fixture in the previous step. Tighten the set screw with the 5 mm hexagonal screw driver.</p>	 <p>Circular adapter</p> <p>Fixed height stand</p>
<p>5. While carefully supporting the clamping ring from beneath, insert the clamping ring upwards into the clamping plate. Rotate the ring so that the locating pins hold the ring in place. Tighten the set screw holding the clamping ring with a 2.5 mm Allen wrench.</p>	 <p>Clamping ring</p> <p>Clamping plate</p>
<p>6. Un-route the sensor cable from the three (3) cable routing guides.</p>	 <p>Sensor cable</p> <p>Cable routing guides</p>

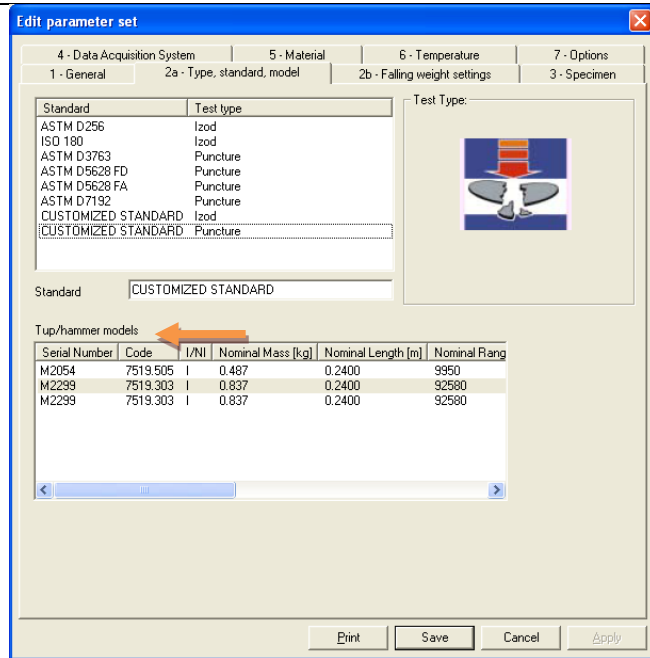
<p>7. Remove safety tension release device from machine frame.</p>	
<p>8. Using a 5 mm hexagonal screw driver, <u>loosen but do not remove</u> the two screws holding the striker to drop mass assembly. After the screws have been loosened, grasp the striker to prevent it from dropping and remove the two screws the rest of the way by hand.</p>	
<p>9. This step is only required when switching striker models.</p> <p>Unscrew the sensor cable from the back of the DAS 800 Junior controller located on the desk.</p>	
<p>10. Assembling the striker:</p> <ol style="list-style-type: none"> Unscrew the Izod striker head from the striker. Unscrew the adapter sleeve from the striker Thread it loosely into the hole that the hemispherical head was removed from (do not tighten). Thread the hemispherical striker head into the striker. Finger tighten until it is secure. Do not use excessive force when tightening or the hemispherical head will be difficult to remove. 	

	 <p>Assembled hemispherical striker head</p>
<p>11. To re-attach the striker assembly to the carriage, we will essentially reverse steps 5-7 from above. See each respective step for reference pictures if needed.</p> <ol style="list-style-type: none">Affix striker to the mass assembly with the two screws.Affix safety tension release to machine frame.Route sensor cable through the three (3) cable routing guides.	
<p>12. Adding drop mass (this step may not be necessary depending on the impact energy desired):</p> <ol style="list-style-type: none">Loosen the threaded retaining ring located at the base of the threaded rod which connects the top of the drop carriage with the striker assembly attachment point.Slide the desired mass quantity into place on the mass assembly, being careful to seat the masses over the alignment pins on the mass assembly.Re-tighten the retaining ring.	 <p>a.</p>  <p>b.</p>  <p>c.</p>

13. The computer software interface now needs to be set to the proper parameters for the Izod test. Press the “Select parameter” button, and then select the parameter named “ASTM D7136/D7136M (BIAXIAL) TEMPLATE.” Once the parameters are highlighted, select the “Copy” button on the bottom left of the active window. When prompted, descriptively name your test parameter (for example: ASTM D7136 (BIAXIAL) 45/45 E-glass) and hit the “OK” button. Under no circumstances should you use or edit the template file. You can now double-click the parameter you created to open it.



14. Click “Analysis”-“View Parameters”. When “Edit parameter set” window opens, click the tab labeled “2a- Type, standard, model.” Select the appropriate standard for the Puncture test type. Then select the striker that is loaded in the machine.



13. Click tab labeled “2b- Falling weight settings”. If your test requires additional mass (see Step 12. above), enter the amount added in the “Additional Mass” field. Additionally, you may change the value for “Impact Energy,” “Impact Velocity,” and “Falling Height” and the software will recalculate the appropriate values within the other fields, providing it does not exceed the maximum potential energy possible given your total mass and maximum drop height.

Edit parameter set

4 - Data Acquisition System | 5 - Material | 6 - Temperature | 7 - Option
 1 - General | 2a - Type, standard, model | 2b - Falling weight settings | 3 - Specimen

Impact Energy: 5.972 J
 Impact Velocity: 1.95 m/s
 Falling Height: 193.874 mm
 Impact Point Offset: 0.000 mm
 Extension Length: 0.000 mm
 Extension Mass: 0.000 kg
 Tup holder mass: 2.500 kg
 Additional mass: 0.000 kg
 Total Mass: 3.141 kg

Perform a test with variable parameters (possibility to modify impact settings during test execution).

14. Click the tab labeled “3 - Specimen.” Select the proper geometry for your sample which is defined in the D7136 test standard. You will enter the actual thickness for your specimen in the highlighted box.

Edit parameter set

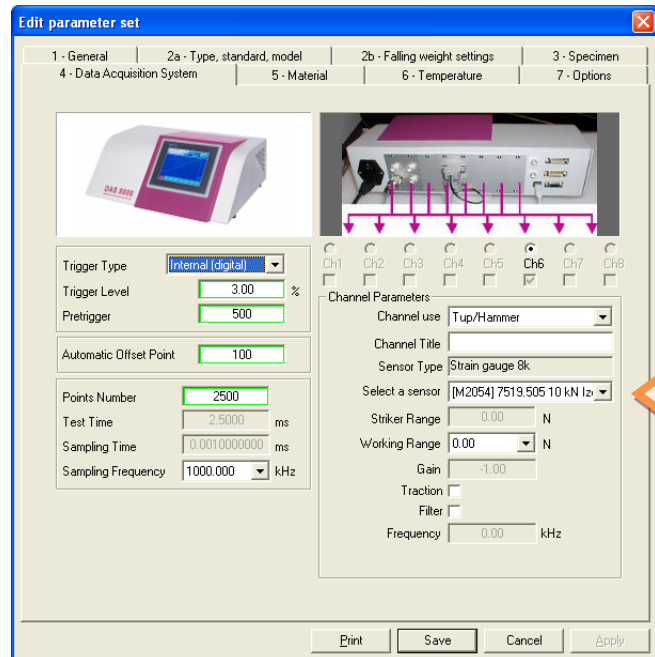
4 - Data Acquisition System | 5 - Material | 6 - Temperature | 7 - Options
 1 - General | 2a - Type, standard, model | 2b - Falling weight settings | 3 - Specimen

Specimen

Thickness [mm]	Size [mm]	Notch	Notch Dimensions	Position	Note
4.000		Unnotched		---	Customized specimen
4.000		Unnotched		Edgewise	Customized specimen
4.000		Unnotched		Flatwise	Customized specimen

Thickness: 4.000 ± 0.200 mm
 Note: Customized specimen
 Preparation:

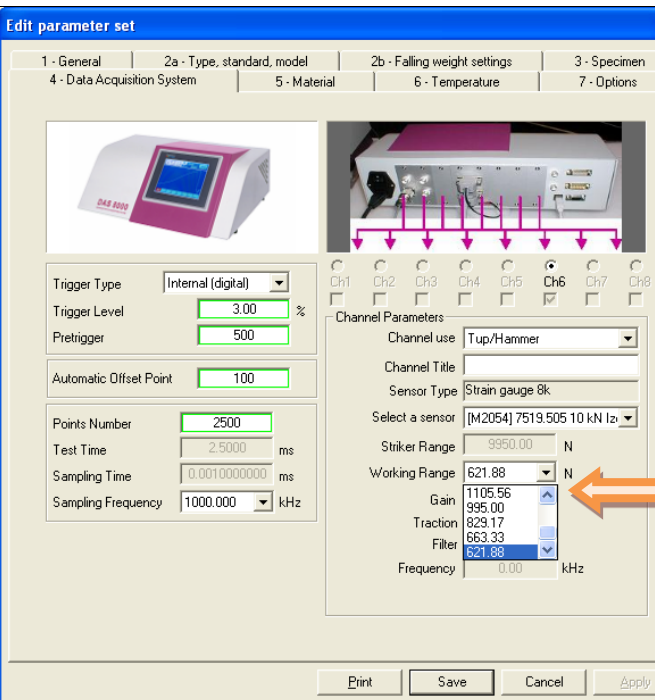
15. Click the tab labeled “4 – Data Acquisition System.” Specify the number of data points you would like the DAS to capture. Note that the sum of the value in the “Pretrigger” field and the “Points Number” field may not exceed a value of 8000. Values in the “Sampling Frequency” and “Working Range” may also be changed to values appropriate to your test. Then click on the appropriate sensor from the “Select a sensor” drop down box.



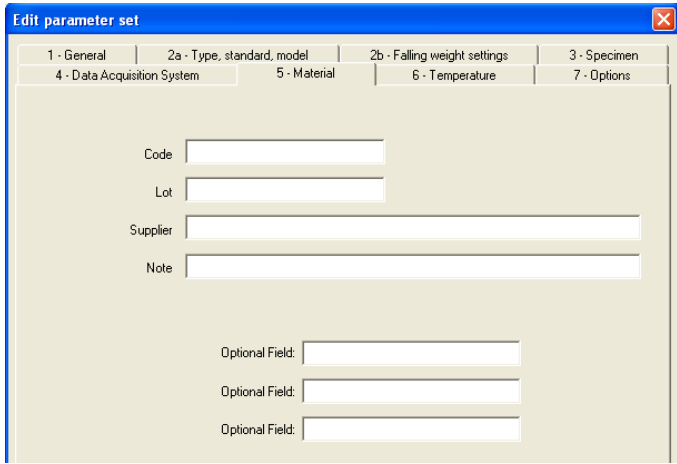
16. If your working range is zero then the sensor hasn't been clicked from the drop down box. It may look pre-selected but it will not register until it is clicked.

The trigger level should be set to about 3 -5 %. If it is set to 3% and the working range is set to 50% it would take 3 % of 5 kN (half of the full range of the 10 kN striker) or 0.15 kN to trigger the data collection.

*See Izod Testing Problem document in Composites Lab TRACS- Resources-(SOP)- Instron Impact Notes for more help



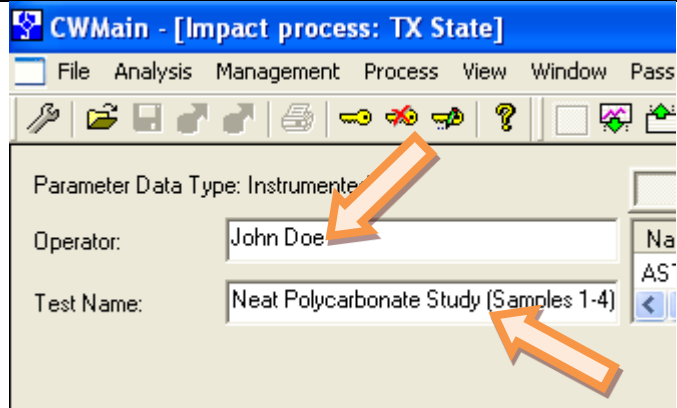
17. Click the tab labeled “5 – Material.” Fill in all fields as descriptively as possible. Press the “Save” button to save all test options, and exit the “Edit parameter set” window.



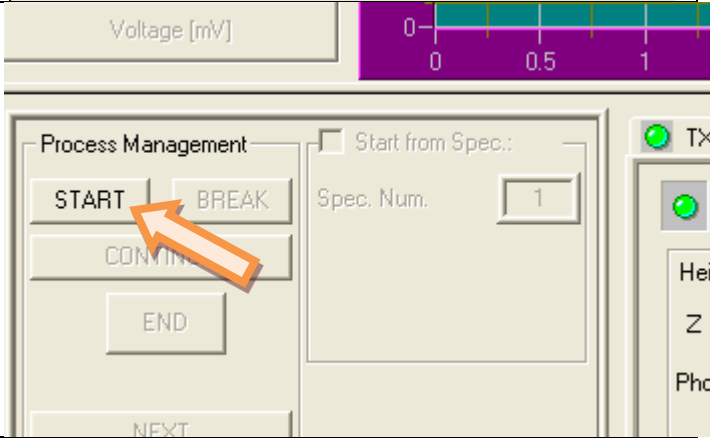
16. Locate and click the “Ceast 9340” tab on the test screen. Once clicked you will be presented with a column of selectable options on the bottom right hand side of the screen. Select the “PC Master Button.”

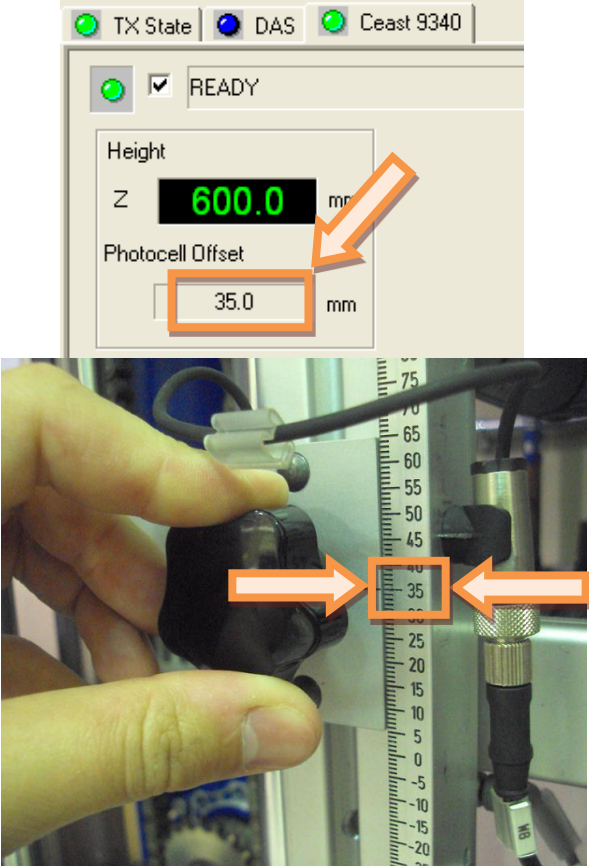
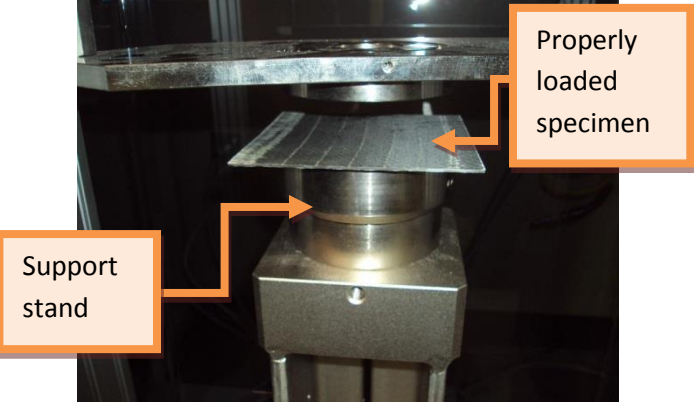
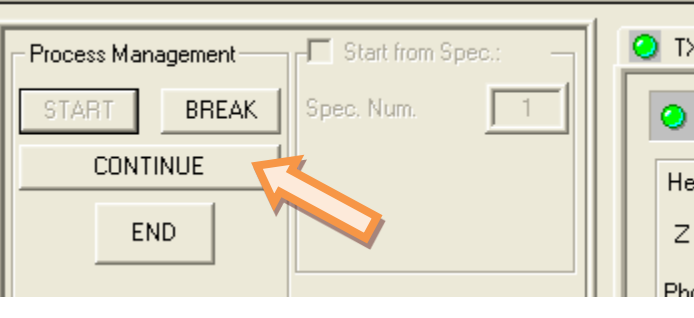


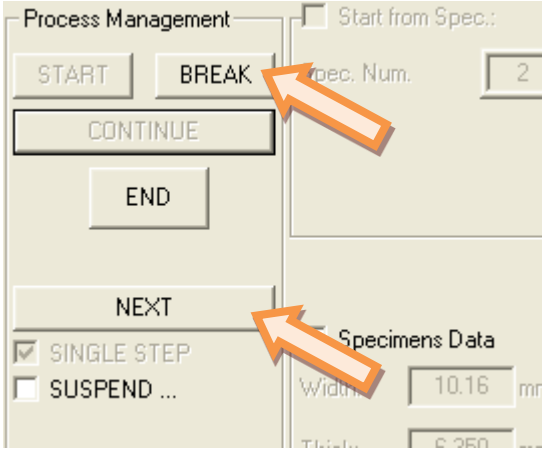
17. In the upper left had corner of the screen, enter appropriate information into the Operator and Test Name fields.



18. Click the “START” button to begin the test procedure.

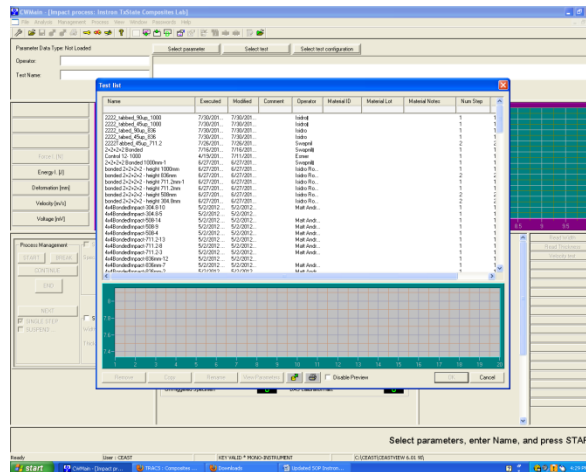


<p>19. In the bottom right portion of the screen, a message will be displayed: "Check photocell offset insert specimen and then press CONTINUE." Locate the value in the "Photocell Offset" field. Open the upper access door on the Instron Impact Machine and adjust the Photocell offset slider to the amount indicated by the software. An example is shown at right.</p>	
<p>20. Loading the specimen:</p> <ol style="list-style-type: none"> Open the lower access door. Place and center test specimen on support stand. Close lower access door. 	
<p>21. Once the photocell offset has been set, close the upper access door and press the "CONTINUE" button in the software</p>	
<p>22. The software will now send parameters to the DAS and the</p>	

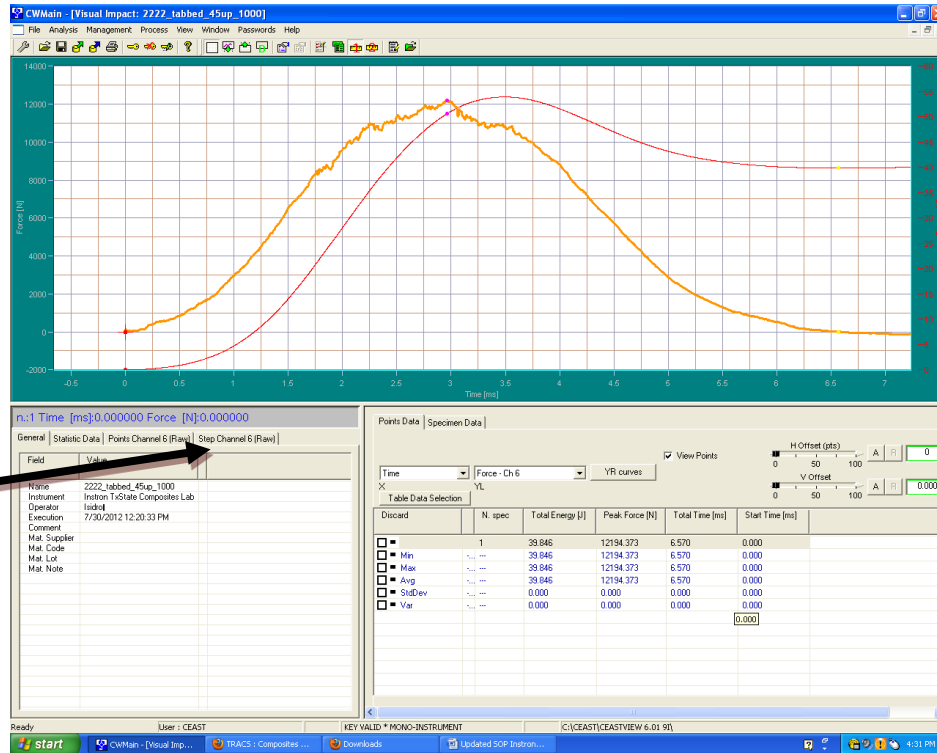
Instron Impact Machine, and the impact test will proceed.	
<p>23. Once the test has completed, you are given the option to continue testing subsequent samples, or to finish the test:</p> <ol style="list-style-type: none"> To finish testing click the “BREAK” button. When asked if you want to finish the test, click the “Yes” button. To continue testing samples open the bottom access door of the Instron Impact Machine, remove the tested sample and insert a new sample. close the bottom access door. Click the “NEXT” button in the computer software. Another impact test will be performed. 	

Exporting Data file from the Ceast Software

- Go to file click on Open. It will open the list of previous all tests as below shown in the picture.

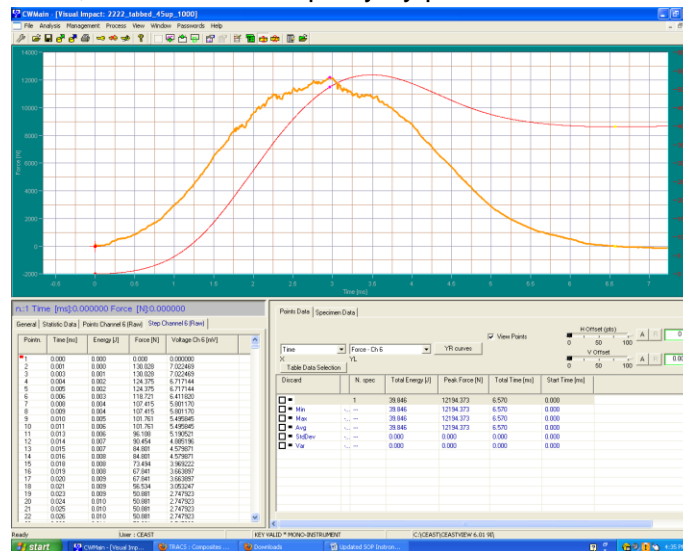


- Select the particular test for which you want export the data file. Click Ok. It will open window as shown below.



Click on Step channel 6

3. Click on step channel 6, it will show data point by point. Same as shown below.



4. Right click on the data and select copy all to clipboard.
5. Open a new excel document, and paste the selected data.