

Instron Training Notebook

Lab Manager: Dr. Perry Cheung
MSE Fee-For-Service Facility
Materials Science and Engineering
University of California, Riverside

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Before you begin...

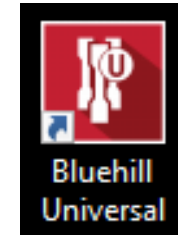
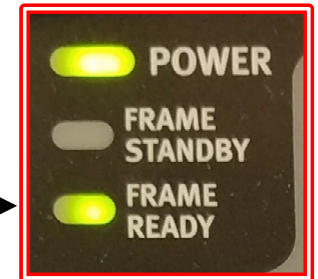
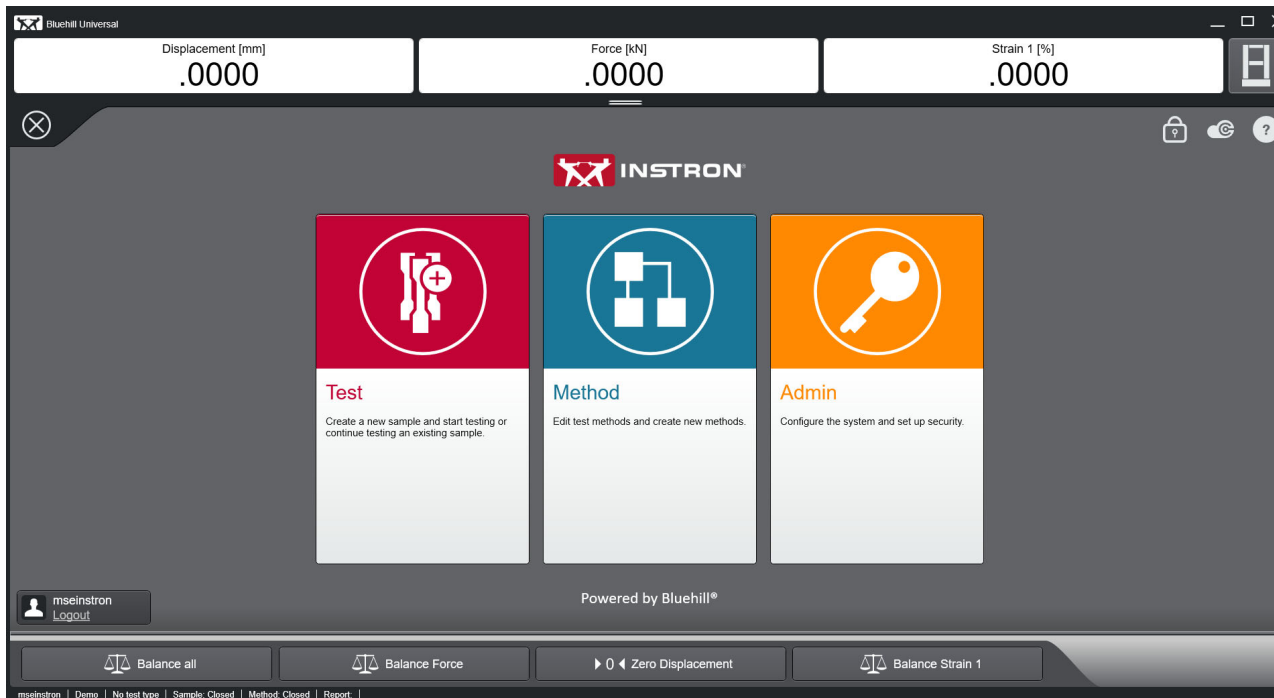
- Complete the required safety training modules on UC Learning
 - Laboratory Safety Orientation (Fundamentals) 2013
 - Hazardous Waste Management
 - Compressed Gas Safety
- Submit a copy of your Training Transcript to Lab Manager
- Review the MSE 150 250 309 Policies and Regulations
- Fill out the Fixed FFS FAU Authorization Form with PI signature
- Provide your ENGR user name to Lab Manager to set up Faces account
- Arrange a time for training with Lab Manager
- Schedule your reservation on Faces for your training

Instron Operation

- I. Start Up
- II. Control Panel
- III. System Details
- IV. Safety
- V. Removing Load Cells
- VI. Installing Load Cells
 - A. 50 kN
 - B. 500 N
 - C. 10 N (Huinan Lui Group)
- VII. Tension Tests
 - A. Jaw Faces
 - B. Wedge Grips
 - C. Preloading
 - D. Specimen Loading
 - E. Extensometer (optional)
- VIII. Compression Tests
 - A. Top Platen
 - B. Bottom Platen
- IX. Flexure Tests
 - A. Lower Anvils
 - B. Upper Anvils
 - C. Alignment
 - D. Specimen Loading
 - E. Deflectometer (optional)
- X. Creating Methods
- XI. Configuring Camera
- XII. Running Tests
- XIII. Cleanup

I. Start Up – 1/2

1. **Double-Click** the **Bluehill Universal** icon on the **Desktop**
2. **Login** with Username = **mseinstron** and Password = **mseffs** when prompted
3. **Home Screen** will appear and **Frame Ready** will light up

A login dialog box with a dark grey background. It contains a 'User name:' label above a text input field. Below it is a 'Password:' label above another text input field. A red warning icon and the text 'Required field' are visible next to the password field. At the bottom, there are two buttons: 'Exit' and 'Login'.

I. Start Up – 2/2

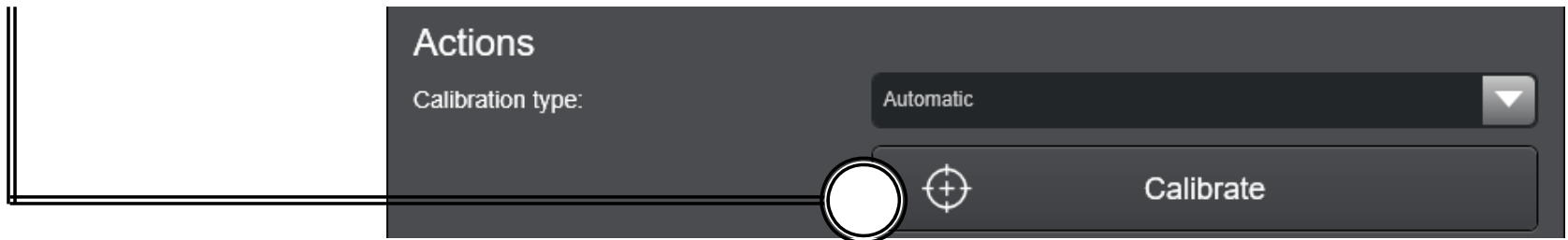
4. Click on the **Frame** icon



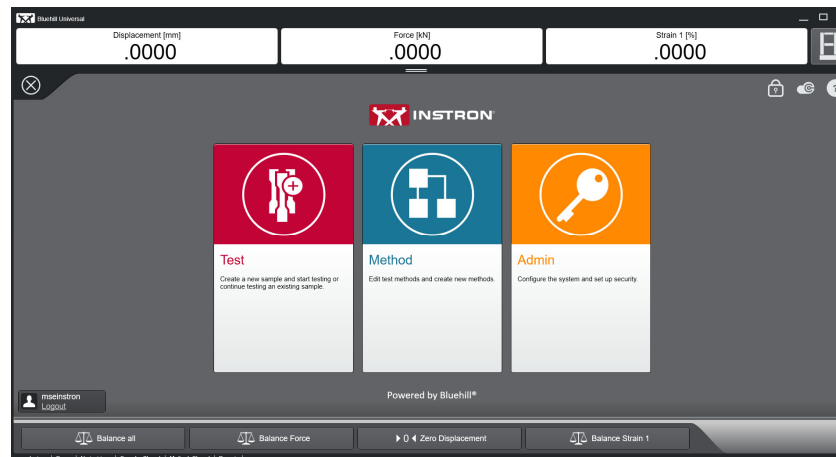
then the **Force Transducer Settings**



5. Click on **Calibrate** button and then **OK** to confirm calibration of your installed **Load Cell** before any tests



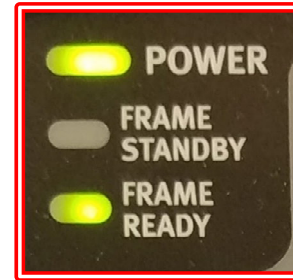
6. Close the windows to return back to the **Home Screen**



II. Control Panel – 1/4

1. **Power** Indicator lights

- **Frame Standby** – Frame is not set to move
- **Frame Ready** – Test system is ready for operation



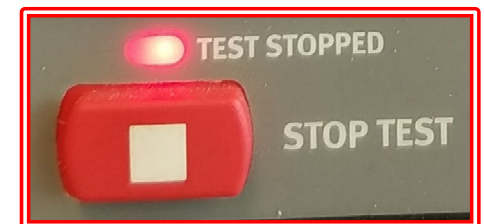
2. **Start Test** button

- Press this button **AFTER** setting test parameters to begin test
- Test in Progress indicator will be illuminated showing direction of **Crosshead** movement



3. **Stop Test** button

- Press this button to stop **Crosshead** during or end of test
- Test Stopped indicator will be illuminated showing test has stopped but **Crosshead** has not returned to the gauge length position



II. Control Panel – 2/4

4. **Specimen Protect** button

- **On** – Protects specimen from overloads set by software
- **Off** – No protection on specimen from any possible overloads



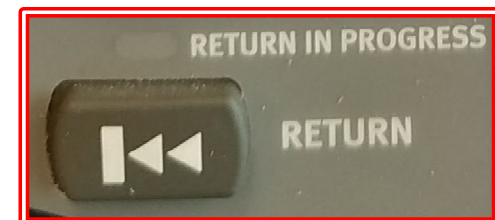
5. **Reset GL** button (Same as **Zero Displacement**)

- Press this button to set the current position of the **Crosshead** as the gauge length or Zero Displacement position
- Pressing **Return** button afterwards will return **Crosshead** to this gauge length position



6. **Return** button

- Press this button to move **Crosshead** back to gauge length position
- **Return in Progress** indicator will be illuminated to show **Crosshead** is returning to gauge length position

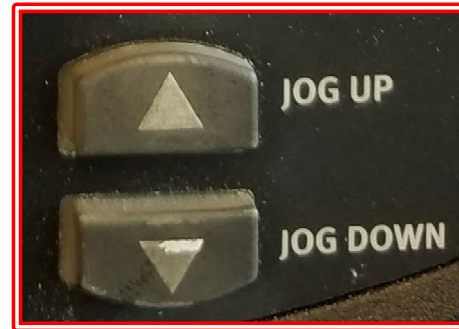


WARNING: DO NOT PRESS THIS BUTTON UNLESS YOU ARE READY FOR THE CROSSHEAD TO RETURN TO GAUGE LENGTH POSITION OF 0.000 INCHES!

II. Control Panel – 3/4

7. Δ *Jog Up* button

- Press this button to move the **Crosshead** upward (in tension)
- Holding the button increases the speed linearly, up to a maximum speed, until you release the button



8. ∇ *Jog Down* button

- Press this button to move the **Crosshead** downward (in compression)
- Holding the button increases the speed linearly, up to a maximum speed, until you release the button

9. *Fine Jog* wheel

- Turn thumbwheel to slowly position **Crosshead**
- Use to set an accurate zero extension point
- Use to set a precise grip position for loading specimens



II. Control Panel – 4/4

10. **Toggle** button

- Use to toggle between the **Soft Keys** and the **Live Displays**

11. **“1” – Balance Force**

- Balances load to ~ 0.0 N

12. **“2” – Balance Strain 1**

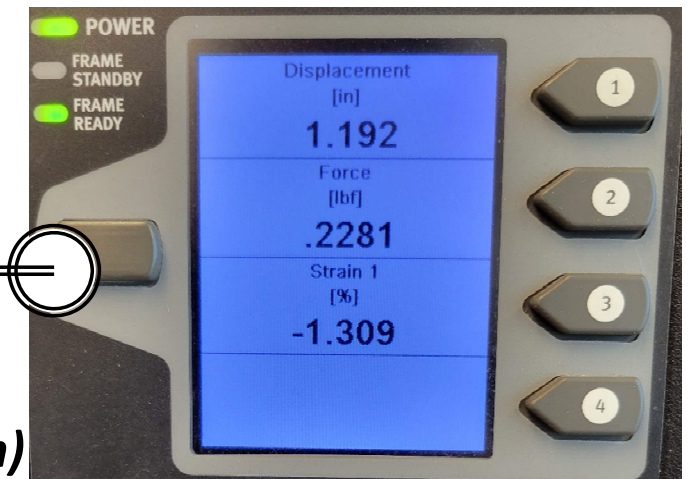
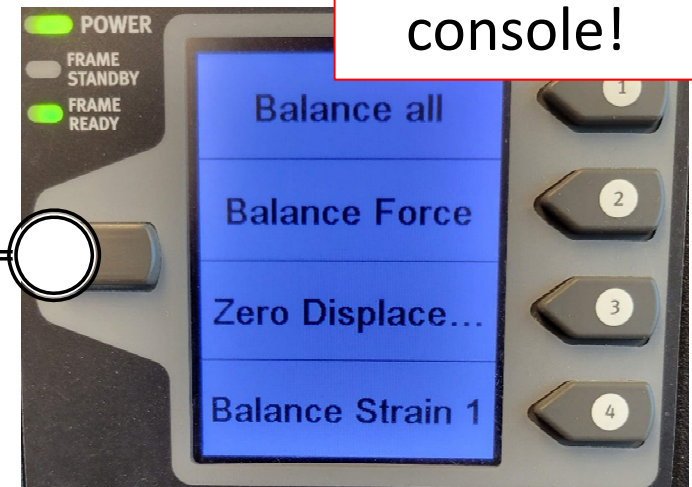
- Balances strain to ~ 0.0 %
- Meaningful only when using **Extensometer**

13. **“3” – Balance All**

- Balances loads, strain, and resets gauge length

14. **“4” – Zero Displacement (or Reset Gauge Length)**

- Resets displacement (or gauge length) back to 0.0 mm



Need new screenshot of the console!

III. System Details – 1/3



System settings

These icons contain the settings for various components of the system and reflect the currently active transducers.

Disable frame

System information



1. ***Input/Output Settings***

- Not applicable - IGNORE

2. ***Transducer Settings for Displacement***

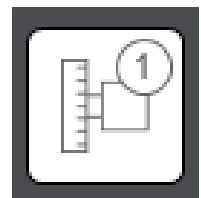
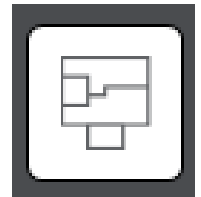
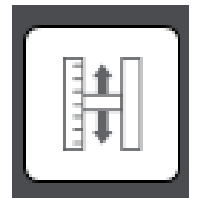
- Configures the ***Displacement*** settings – DO NOT CHANGE

3. ***Transducer Settings for Load Cells***

- Configures the ***Load Cell*** settings – DO NOT CHANGE
- Only use to calibrate the ***Load Cell*** before any tests -> See ***Start Up***

4. ***Transducer Settings for Strain Gauge***

- Configures the ***Strain Gauge*** settings – DO NOT CHANGE
- Only use to calibrate the ***Strain Gauge*** before any tests



III. System Details – 2/3



Method settings
Changing the settings in this section will affect the currently open method.

Live Displays Soft Keys Frame Grips

Available live displays

Measurements

- Strain 2
- Time

Selected live displays

- Displacement
- Force
- Strain 1

Displacement

Description: Displacement

Units: mm

Number of digits: 4

Maximum columns: 4

Close

1. Live Displays

- Configures the **Live Displays** at top of **Home Screen** – Keep **Displacement, Force, Strain 1**

Method settings
Changing the settings in this section will affect the currently open method.

Live Displays Soft Keys Frame Grips

Available soft keys

- Balance
- Balance all
- Return
- Zero Displacement

Selected soft keys (maximum of 4)

- Balance all
- Balance Force
- Zero Displacement
- Balance Strain 1

Balance all

Description: Balance all

Close

2. Soft Keys

- Configures **Soft Keys** – Keep **Balance All, Balance Force, Zero Displacement, Balance Strain 1**

III. System Details – 3/3



Method settings
Changing the settings in this section will affect the currently open method.

Live Displays Soft Keys **Frame** Grips

Test area: Below crosshead

Frame rates

Jog rate: 600.00 mm/min
Valid values are between 0.00 mm/min and 600.00 mm/min

Return rate: 799.98 mm/min
Valid values are between 101.60 mm/min and 799.98 mm/min

Return destination

Displacement returns to: 0.00 mm

Close

3. **Frame**

- Configures the **Frame** settings – DO NOT CHANGE

Method settings
Changing the settings in this section will affect the currently open method.

Live Displays Soft Keys Frame **Grips**

Enable pretension

Enable excess tension

Protect the specimen from too much force. The grips open if the excess tension value is reached before the test starts.

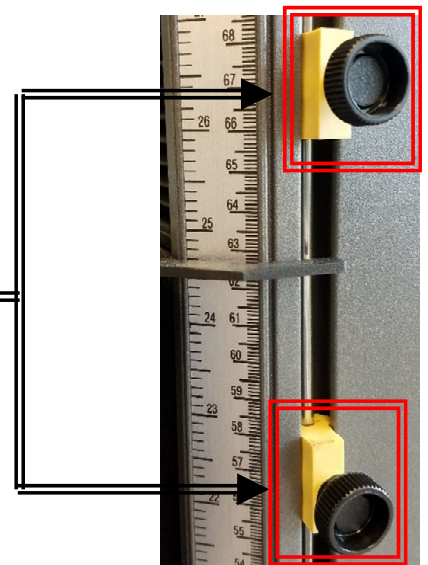
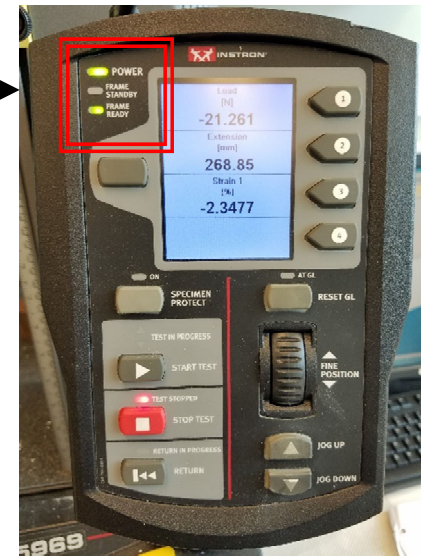
Close

4. **Grips**

- Not applicable – IGNORE

IV. Safety – 1/3

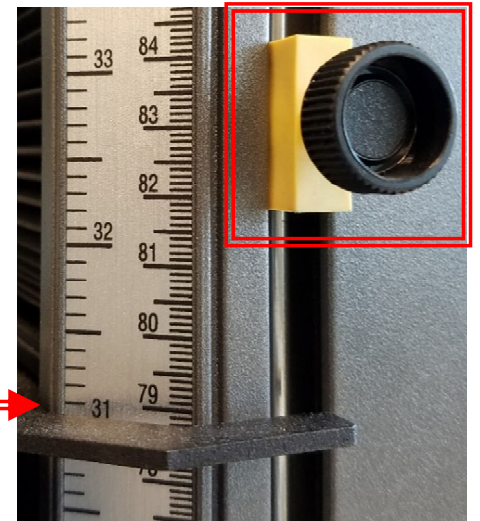
1. Check if the **Instron** is powered **ON** via the control panel
2. If not, turn to **ON** at the back of the Instron
3. Check if the **Crosshead** is sufficiently high enough to install the desired load cell, grips, or fixtures on measurement scale
4. Always set limits before operating the **Instron** and ensure appropriate limits are enabled before moving the **Crosshead**
5. Loosen and move the slides to the desired positions and tighten the thumb screws



IV. Safety – 2/3

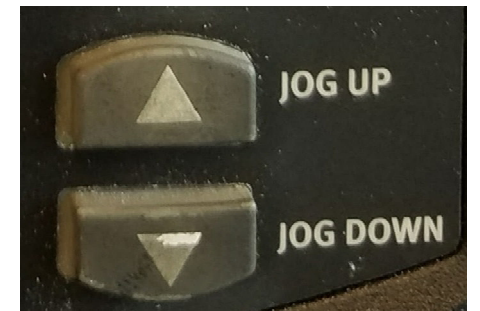
6. Raise the **Upper Limit Stop** on the measurement scale first for desired installation for:

- a) Load Cell > 16"
- b) Tension Tests > 31"
- c) Compression Tests > 22"
- d) Flexure Tests > 25"



7. Press the **Jog Up** Δ on the control panel to raise the **Crosshead** to the appropriate height on the measurement scale for desired installation:

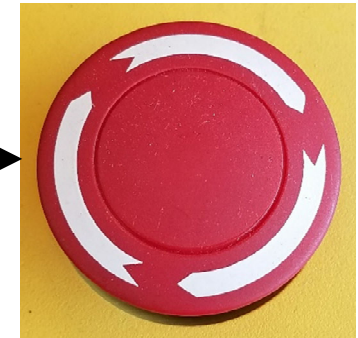
- a) Load Cell > 16"
- b) Tension Tests > 31"
- c) Compression Tests > 22"
- d) Flexure Tests > 25"



IV. Safety – 3/3

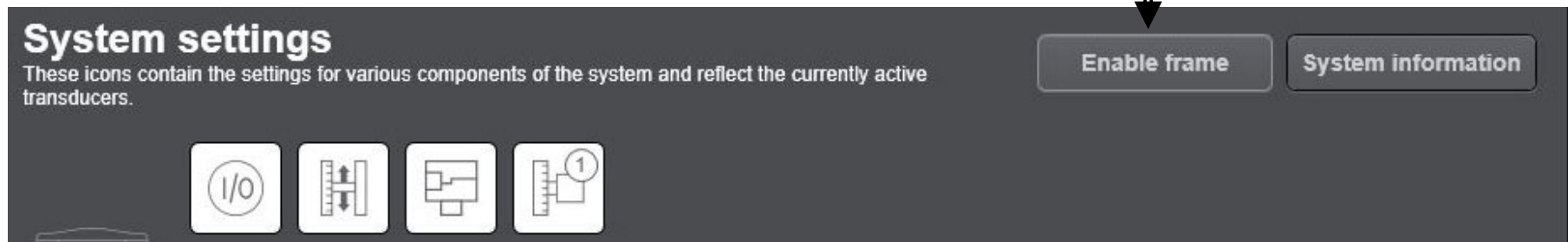
13. Press the **Emergency Stop** button to stop the test immediately when a condition develops that:

- Could affect the safety of persons operating system
- Could damage the load frame or test fixtures

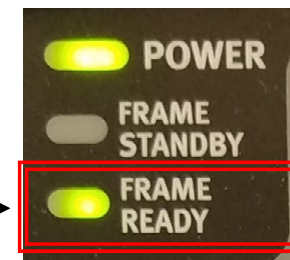


14. To reset the **Emergency Stop** button and re-enable load frame:

- a) Rotate **Emergency Stop** button **clockwise** until it resets
- b) Click on **Frame** button to open the **System Details**
- c) Click the **Enable Frame** button

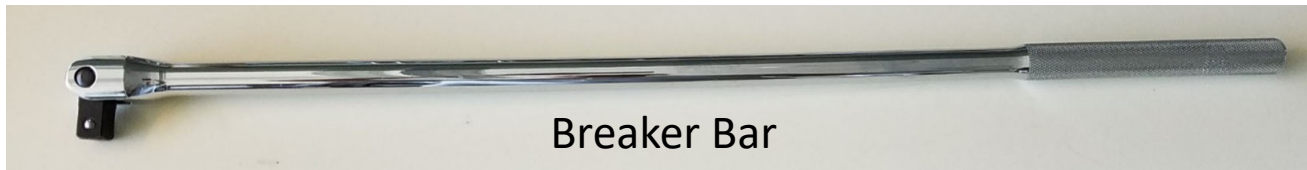


d) The **Frame Ready** light on the control panel should be illuminated



V. Removing Load Cell – 1/2

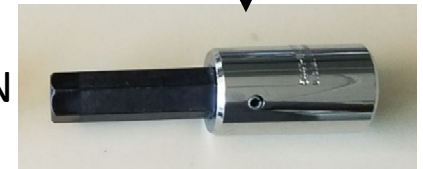
1. Remove the installed **Load Cell** using the **Breaker Bar**



2. Install the appropriate **Hex Adapter** to **Breaker Bar** for installed **Mounting Screw**

3. Push **counter-clockwise** against the **Breaker Bar** until **Mounting Screw** “breaks” and becomes loose

50 kN



4. If necessary, spray a little of **WD-40** at top of **Mounting Screw** to provide lubrication

500 N
and 10 N



5. Remove the **Hex Adapter** from **Breaker Bar**

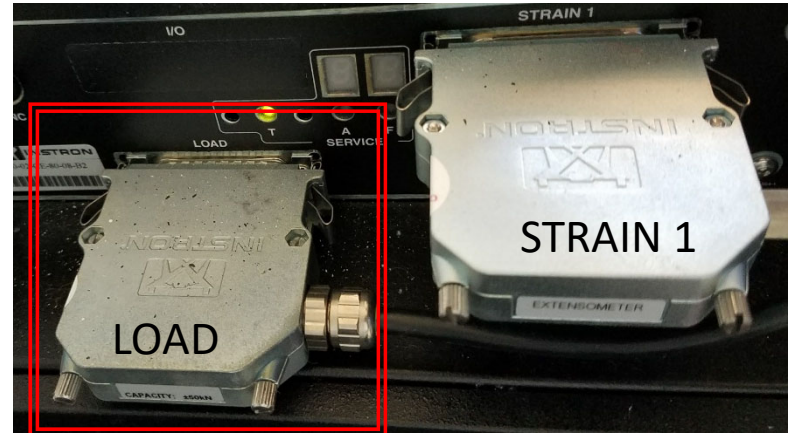
6. Support the **Load Cell** with one hand while unscrewing the **Mounting Screw** with your other hand



NOTE: DO NOT LET THE LOAD CELL DROP AS YOU UNSCREW IT!

V. Removing Load Cell – 2/2

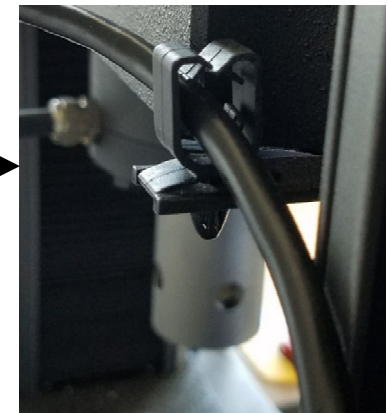
7. Carefully detach the **Load Cell Cable** from **LOAD** connector on controller



8. Remove the cable from the **Hook** on the back of frame

Hook

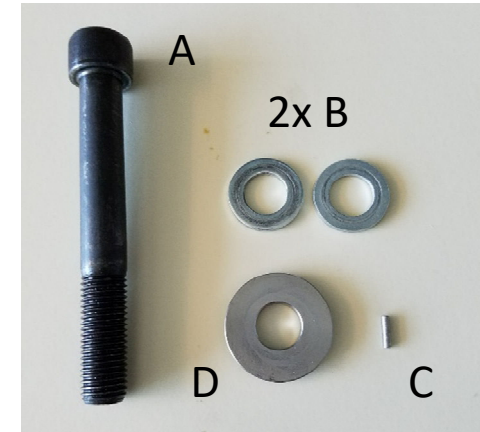
9. Carefully place the uninstalled **Load Cell** back in its appropriate **Storage Box**



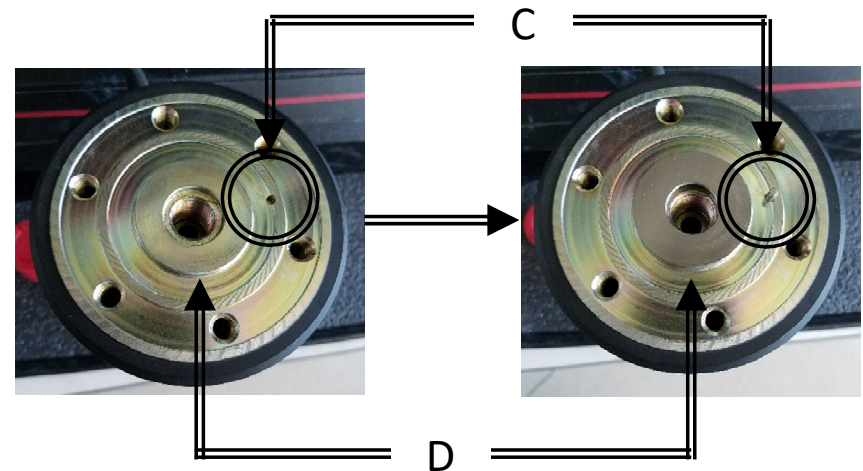
VI.A. 50 kN Load Cell – 1/4

1. Locate the necessary components

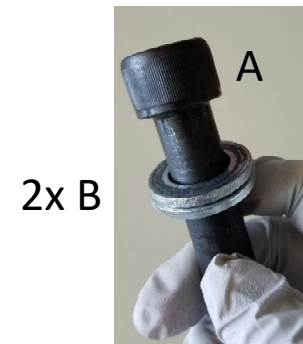
- A. Mounting Screw
- B. 2 Large Washers
- C. Anti-rotation Pin
- D. Locating Ring



2. Insert the **Anti-rotation Pin (C)** and **Locating Ring (D)** into top of **Load Cell**



3. Assemble the **Mounting Screw (A)** and **2x Washers (B)**



VI.A. 50 kN Load Cell – 2/4

4. Lubricate the **Mounting Screw** threads with **WD-40** and wipe off any excess with a towel

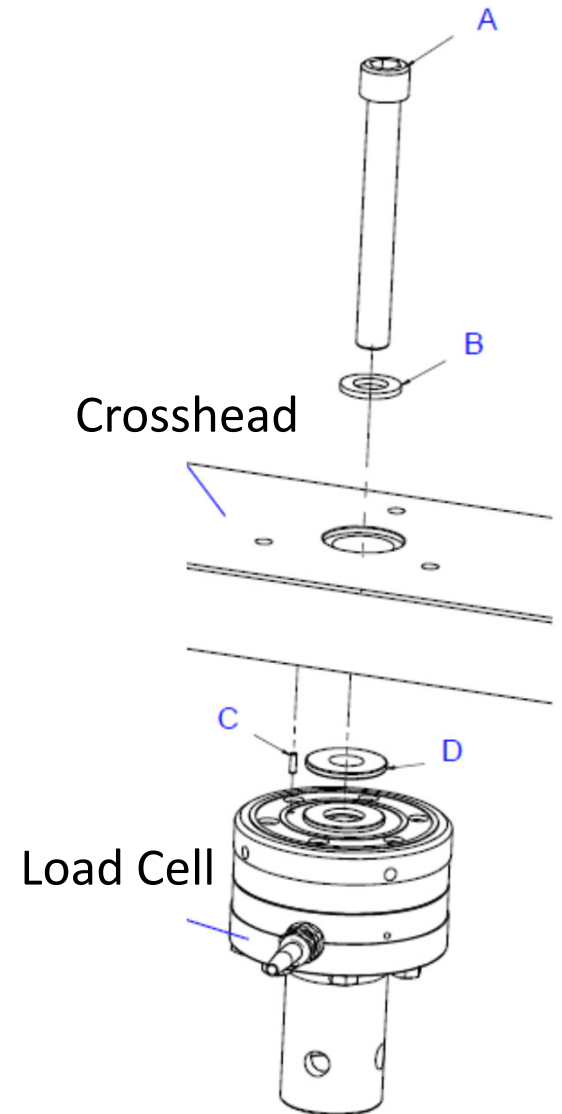
5. Place the **Load Cell** against bottom of **Crosshead**

6. Align the **Load Cell** so **Anti-rotation Pin** will fit into slot underneath **Crosshead** and cable is toward the back



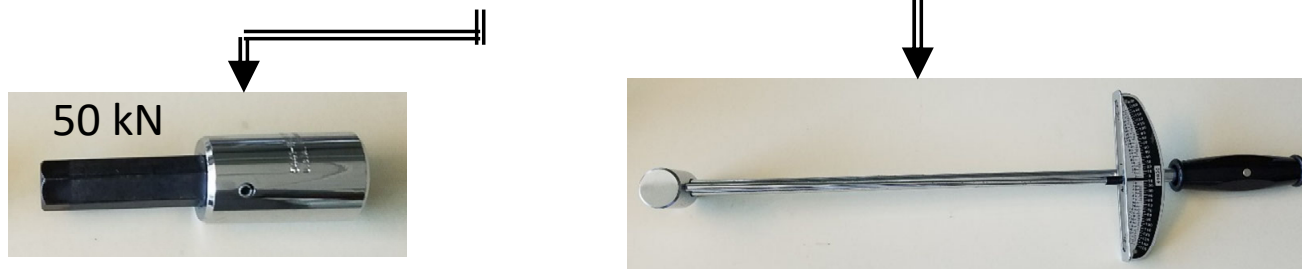
7. Ensure that **Anti-rotation Pin** and **Locating Ring** fit securely in place against **Crosshead** and **Load Cell**

8. Insert the **Mounting Screw** on to top of **Crosshead**

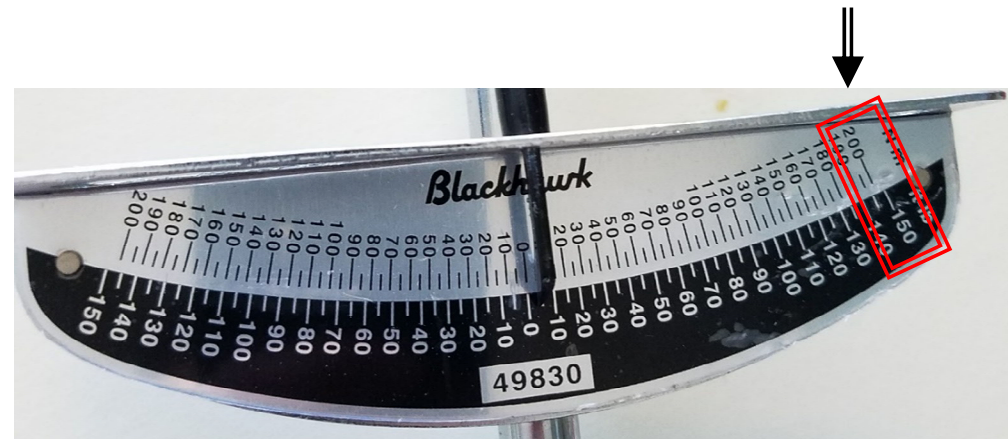


VI.A. 50 kN Load Cell – 3/4

9. Tighten the **Mounting Screw** by hand so that it is secure against the **Load Cell**
10. Install the appropriate **Hex Adapter** to **Torque Wrench**



11. Further tighten the **Mounting Screw** with the **Torque Wrench**
12. Torque down to 148 ft-lb (200 N-m) or as high as possible using the **Torque Wrench**



VI.A. 50 kN Load Cell – 4/4

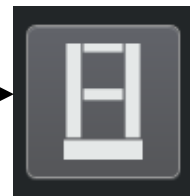
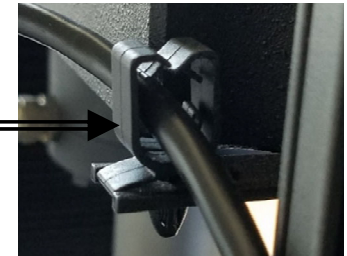
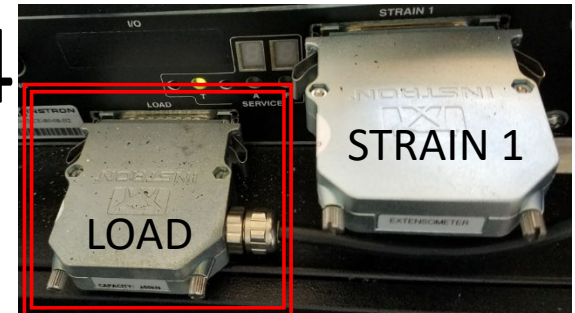
13. Carefully attach the **Load Cell Cable** into **LOAD** connector on controller

14. Insert the cable on to the **Hook** on the back of frame

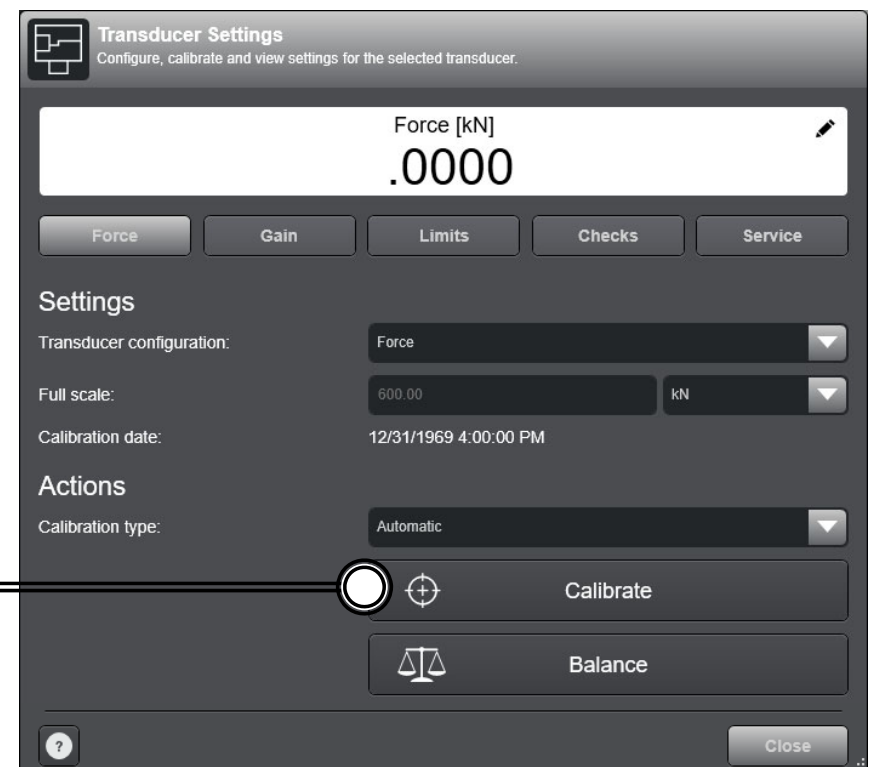
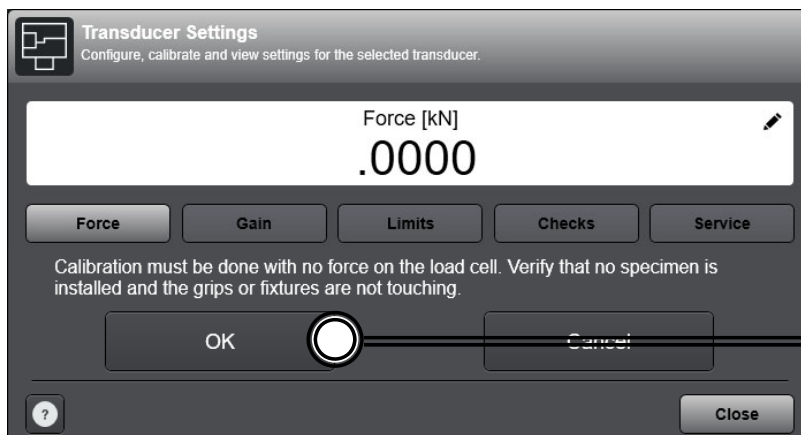
15. Click on **Frame** then **Transducers** icon

16. Click "**Calibrate**", and click "**OK**"

17. Wait for at least **15 MINUTES** to allow **Load Cell** to warm-up, then click "**Calibrate**", and "**OK**" again



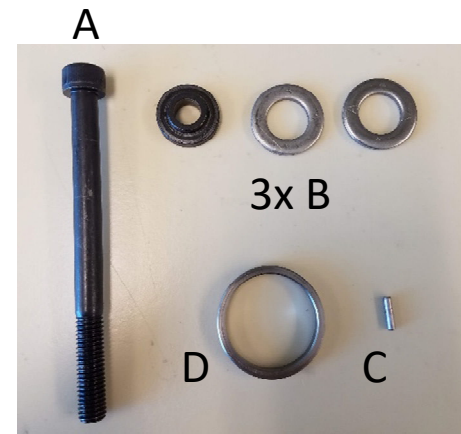
Hook



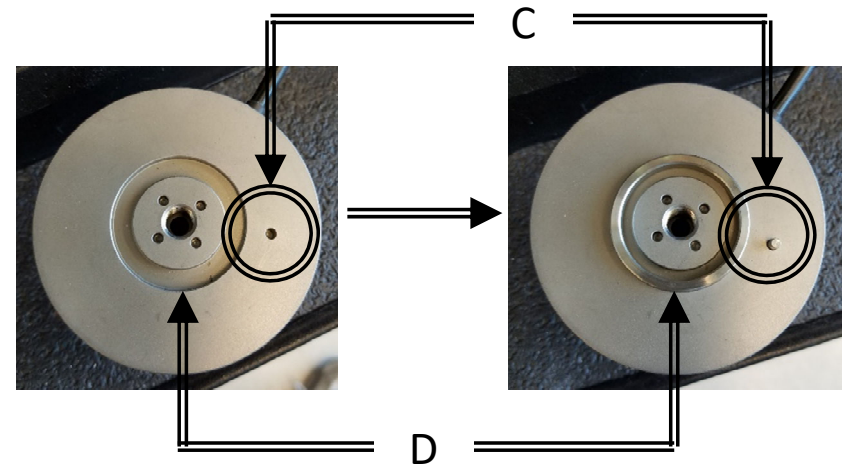
VI.B. 500 N Load Cell – 1/4

1. Locate the necessary components

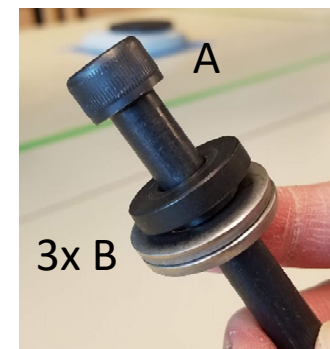
- A. Mounting Screw
- B. Small + 2 Large Washers
- C. Anti-rotation Pin
- D. Locating Ring



2. Insert the **Anti-rotation Pin (C)** and **Locating Ring (D)** into top of **Load Cell**



3. Assemble the **Mounting Screw (A)** and **2x Washers (B)**



VI.B. 500 N Load Cell – 2/4

4. Lubricate the **Mounting Screw** threads with **WD-40** and wipe off any excess with a towel

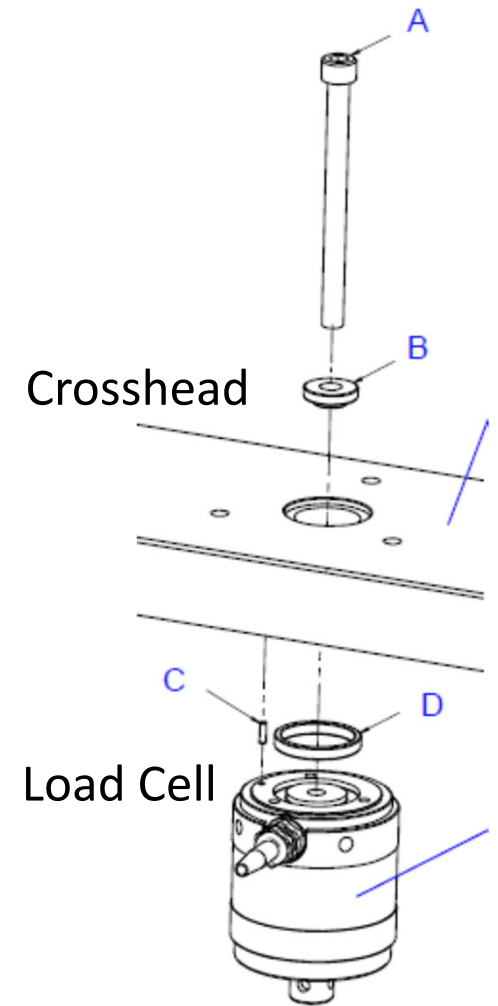
5. Place the **Load Cell** against bottom of **Crosshead**

6. Align the **Load Cell** so **Anti-rotation Pin** will fit into slot underneath **Crosshead** and cable is toward the back



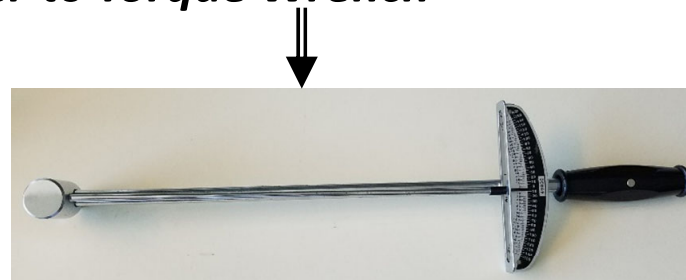
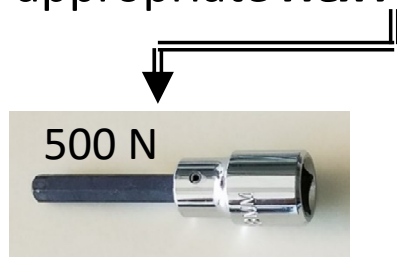
7. Ensure that **Anti-rotation Pin** and **Locating Ring** fit securely in place against **Crosshead** and **Load Cell**

8. Insert the **Mounting Screw** on to top of **Crosshead**

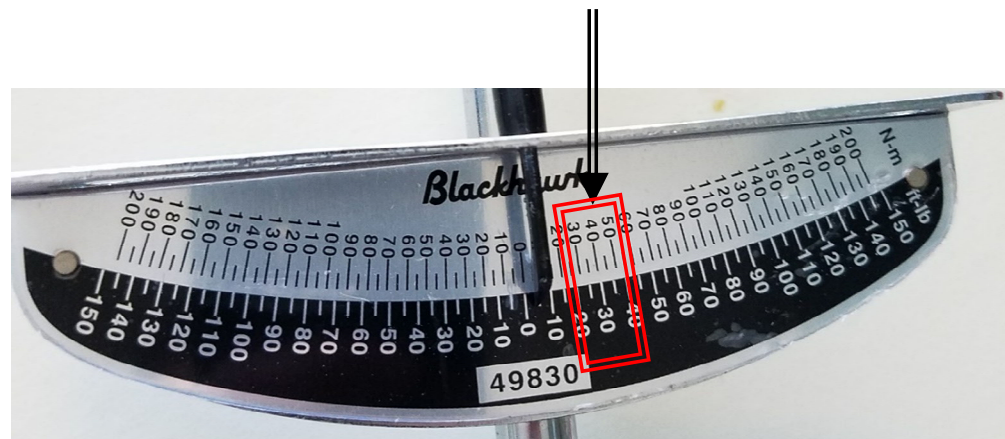


VI.B. 500 N Load Cell – 3/4

9. Tighten the **Mounting Screw** by hand so that it is secure against the **Load Cell**
10. Install the appropriate **Hex Adapter** to **Torque Wrench**



11. Further tighten the **Mounting Screw** with the **Torque Wrench**
12. Torque down to 30 ft-lb (40 N-m) using the **Torque Wrench**



VI.B. 500 N Load Cell – 4/4

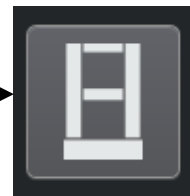
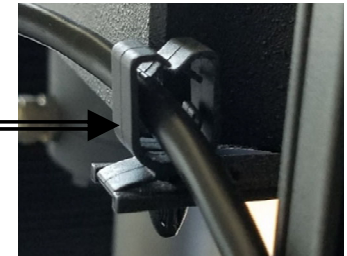
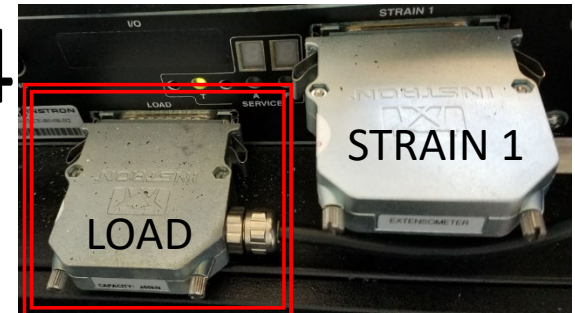
13. Carefully attach the **Load Cell Cable** into **LOAD** connector on controller

14. Insert the cable on to the **Hook** on the back of frame

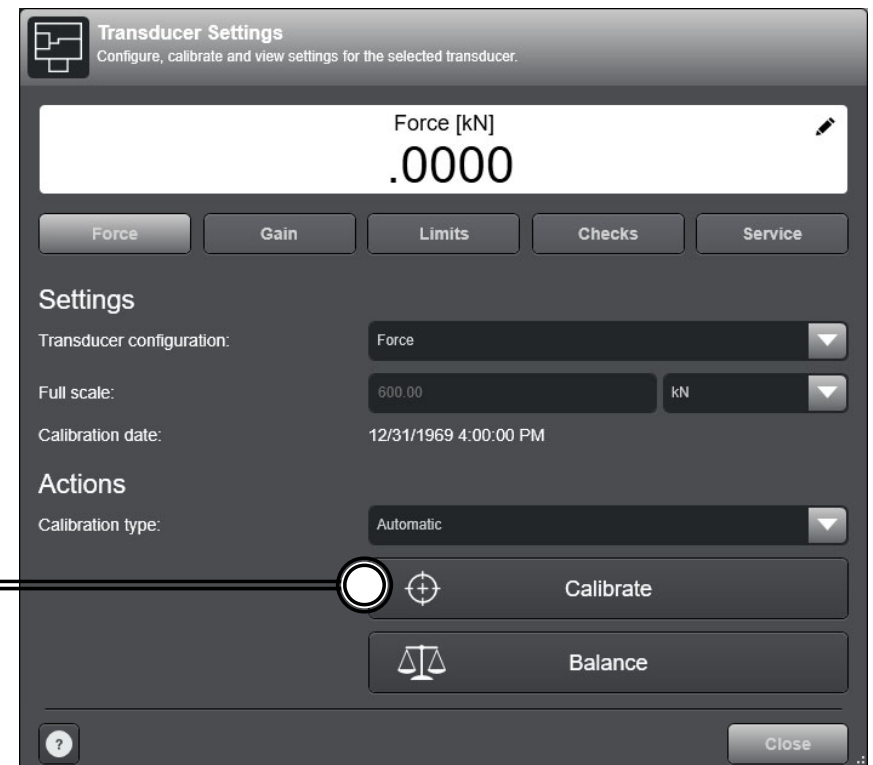
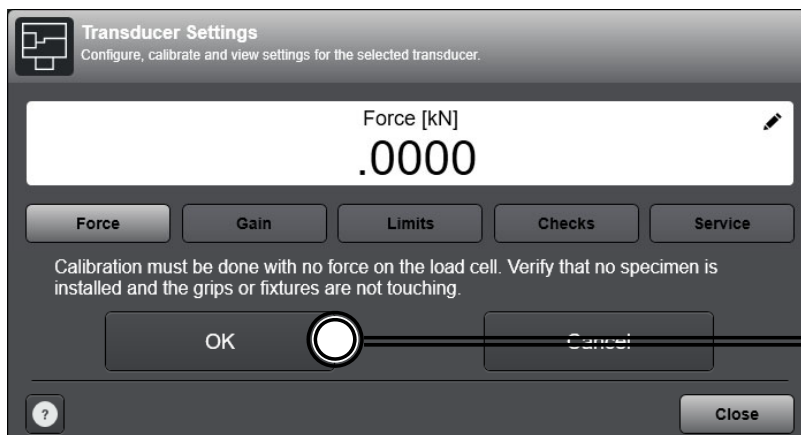
15. Click on **Frame** then **Transducers** icon

16. Click "**Calibrate**", and click "**OK**"

17. Wait for at least **15 MINUTES** to allow **Load Cell** to warm-up, then click "**Calibrate**", and "**OK**" again

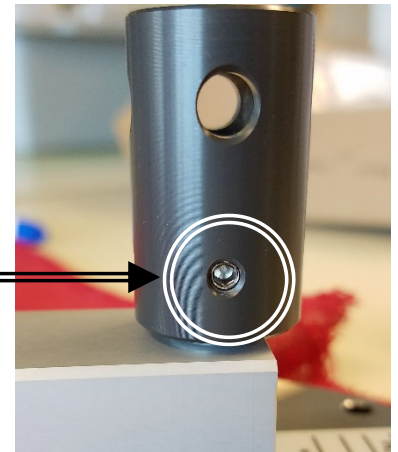


Hook



VI.C. 10 N Load Cell – 1/5

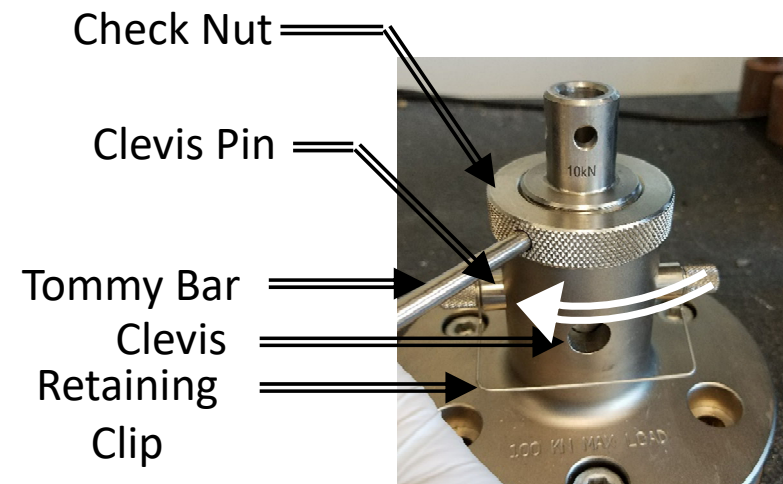
1. Before installing the **Load Cell**, ensure that the **4 Set Screws** holding the **Adapter** are securely tightened
2. Check that the **Compression Spring** is placed inside the bottom **Base Adapter**
3. Position **O Adapter Check Nut** until it is close to the top
4. Install the **O Adapter** in to **Base Adapter**
5. Align the **O Adapter Clevis** to the **Clevis** in the **Base Adapter**
6. Insert the $\frac{1}{2}$ " **Clevis Pin** through the **Clevis** and into the **Base Adapter**
7. Attach the **Retaining Clip**
8. Hand tighten the **Check Nut** turning **clockwise** towards the **Base Adapter**
9. Use the provided **Tommy Bar** to further tighten, but **DO NOT OVERTIGHTEN!**



Compression Spring



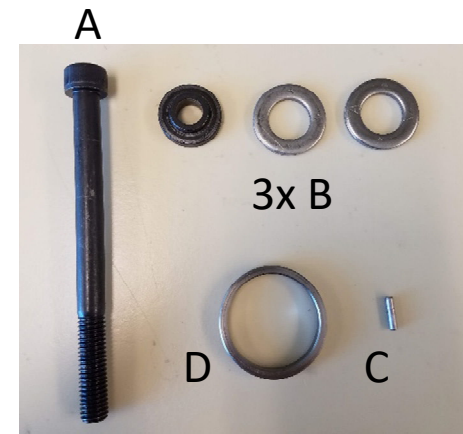
Bottom Base Adapter



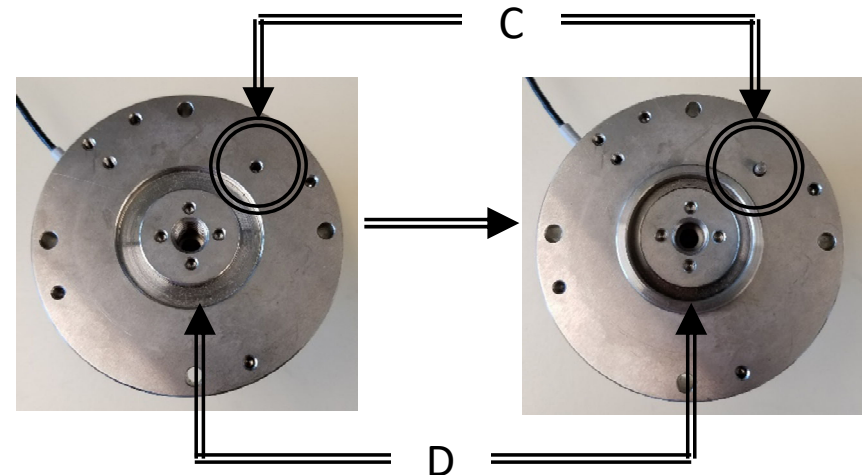
VI.C. 10 N Load Cell – 2/5

10. Locate the necessary components

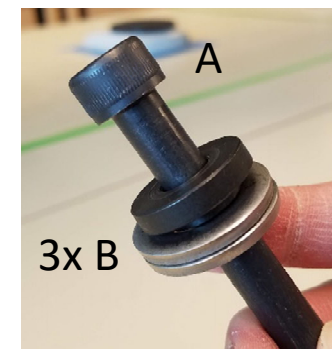
- A. Mounting Screw
- B. Large + Small Washers
- C. Anti-rotation Pin
- D. Locating Ring



11. Insert the **Anti-rotation Pin (C)** and **Locating Ring (D)** into top of **Load Cell**



12. Assemble the **Mounting Screw (A)** and **2x Washers (B)**



VI.C. 10 N Load Cell – 3/5

13. Lubricate the **Mounting Screw** threads with **WD-40** and wipe off any excess with a towel

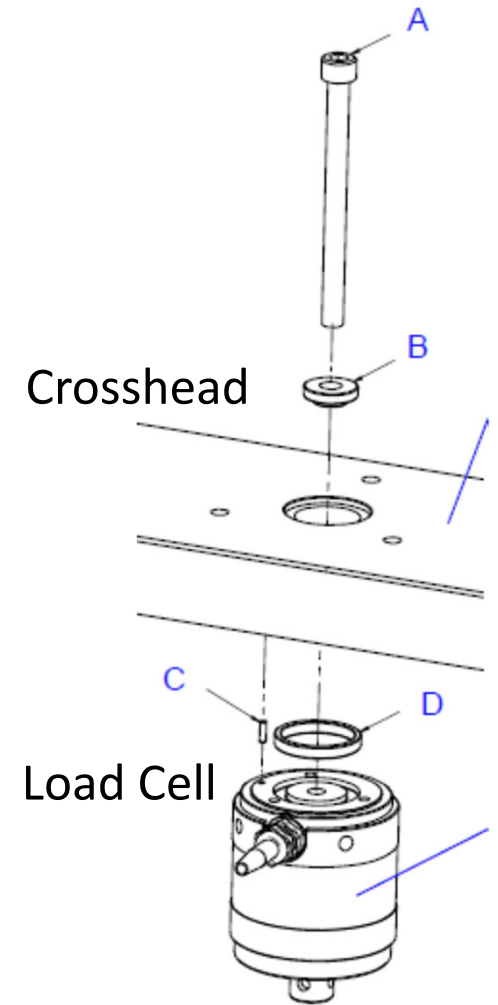
14. Place the **Load Cell** against bottom of **Crosshead**

15. Align the **Load Cell** so **Anti-rotation Pin** will fit into slot underneath **Crosshead** and cable is toward the back



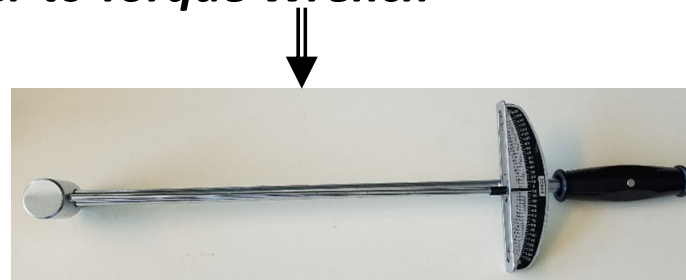
16. Ensure that **Anti-rotation Pin** and **Locating Ring** fit securely in place against **Crosshead** and **Load Cell**

17. Insert the **Mounting Screw** on to top of **Crosshead**

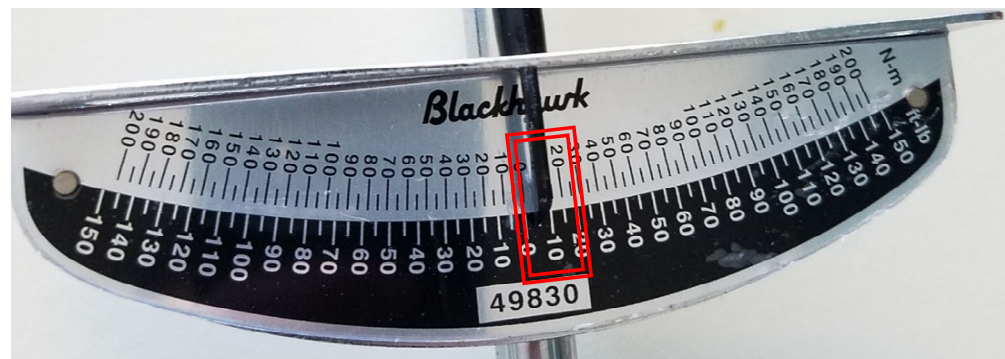


VI.C. 10 N Load Cell – 4/5

18. Tighten the **Mounting Screw** by hand so that it is secure against the **Load Cell**
19. Install the appropriate **Hex Adapter** to **Torque Wrench**



20. Further tighten the **Mounting Screw** with the **Torque Wrench**
21. Torque down to 9 ft-lb (12 N-m) using the **Torque Wrench**



VI.C. 10 N Load Cell – 5/5

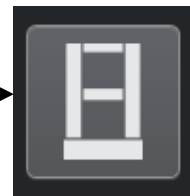
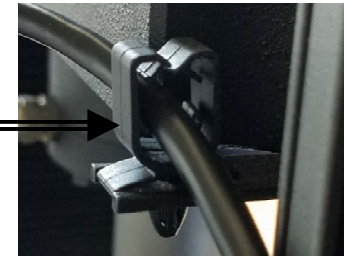
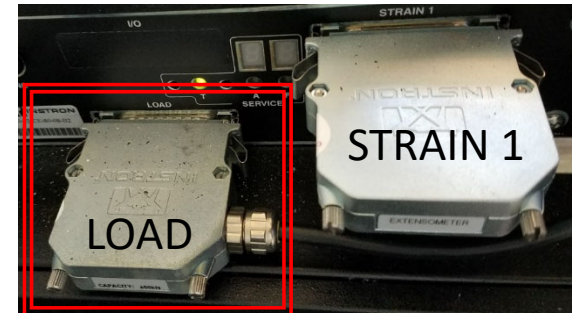
22. Carefully attach the **Load Cell Cable** into **LOAD** connector on controller

23. Insert the cable on to the **Hook** on the back of frame

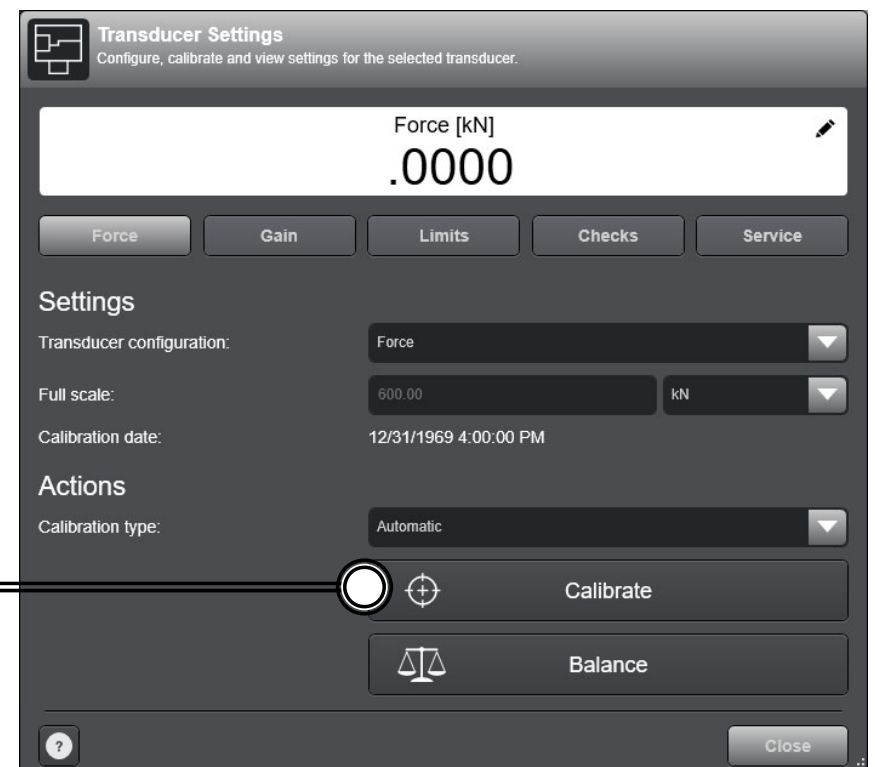
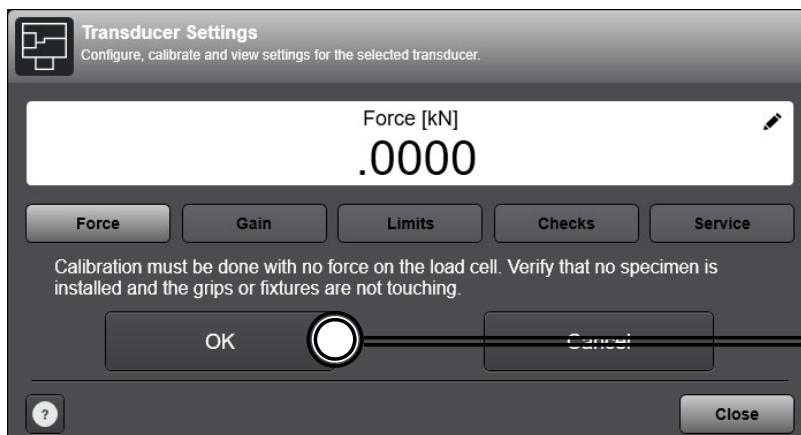
24. Click on **Frame** then **Transducers** icon

25. Click "**Calibrate**", and click "**OK**"

26. Wait for at least **15 MINUTES** to allow **Load Cell** to warm-up, then click "**Calibrate**", and "**OK**" again



Hook



VI.C. Top Screw Grip – 1/1

NOTE: ALWAYS SUPPORT FIXTURE WITH HAND DURING INSTALLATION AS IMPOSED LOAD BY USER MAY BE ENOUGH TO PERMANENTLY DAMAGE LOAD CELL

1. Position **Check Nut** until it is loose against **Grip**
2. Align the **Grip Clevis** to the **Clevis** in the **Load Cell**
3. Insert the **6 mm Clevis Pin** through the **Clevis** and into the **Load Cell**
4. Attach the **Retaining Clip**, making sure the fixture is supported at the bottom
5. Hand tighten the **Check Nut** turning **counter-clockwise** toward **Load Cell**
6. Further tighten the **Check Nut** with **Tommy Bar**, but **DO NOT OVERTIGHTEN!**

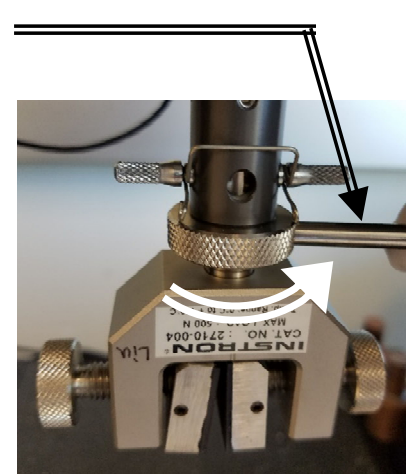
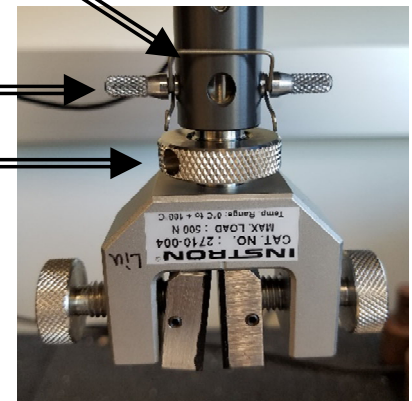
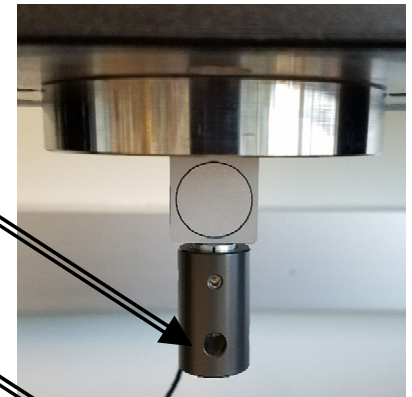
Clevis

Retaining
Clip

Clevis Pin

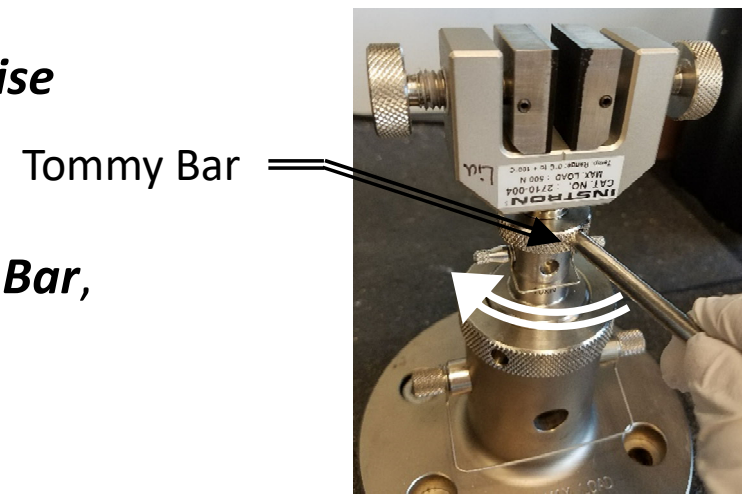
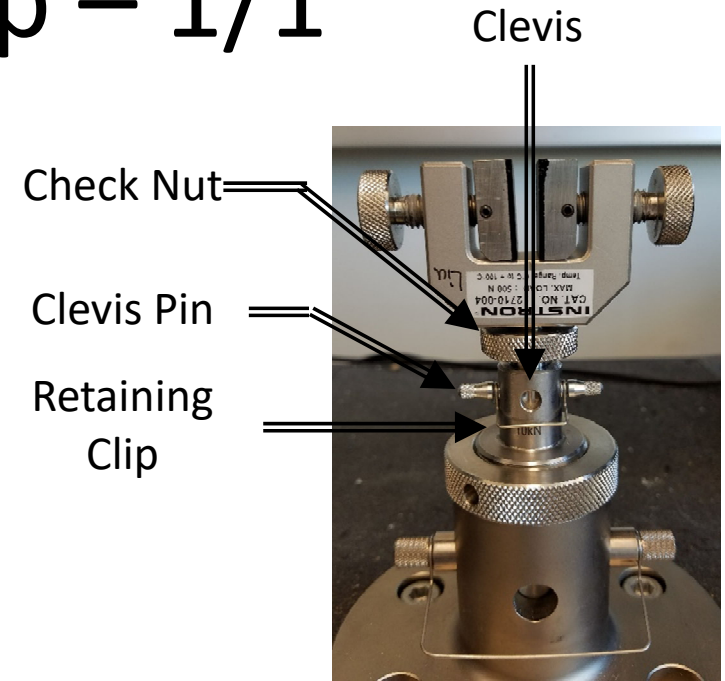
Check Nut

Tommy Bar



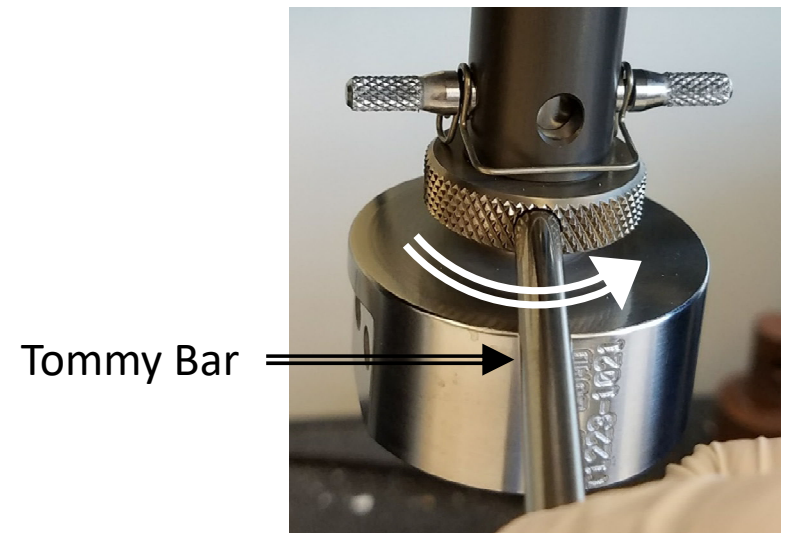
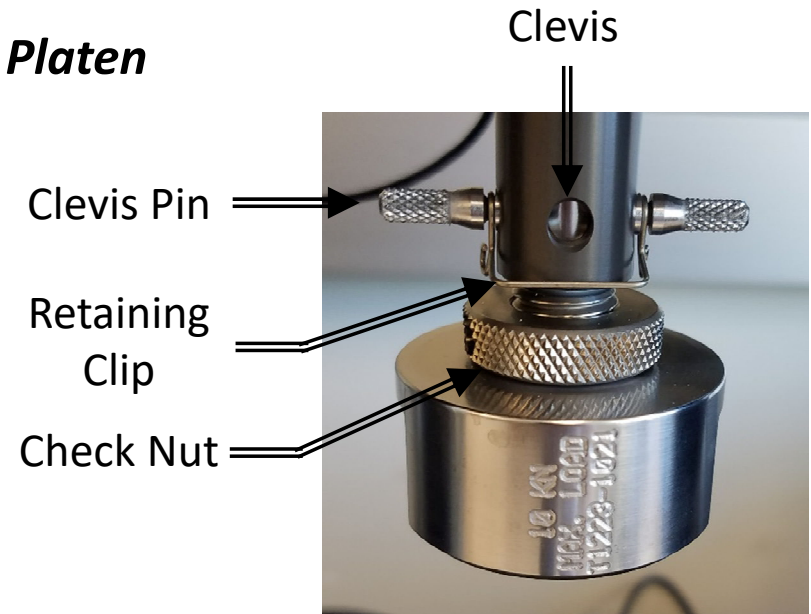
VI.C. Bottom Screw Grip – 1/1

1. Position the **Check Nut** until it is loose against **Grip**
2. Align the **Grip Clevis** to the **Clevis** in the **O Adapter**
3. Insert the **6 mm Clevis Pin** through the **Clevis** and into the **Load Cell**
4. Attach the **Retaining Clip**
5. Hand tighten the **Check Nut** turning **clockwise** toward **O Adapter**
6. Further tighten the **Check Nut** with **Tommy Bar**, but **DO NOT OVERTIGHTEN!**



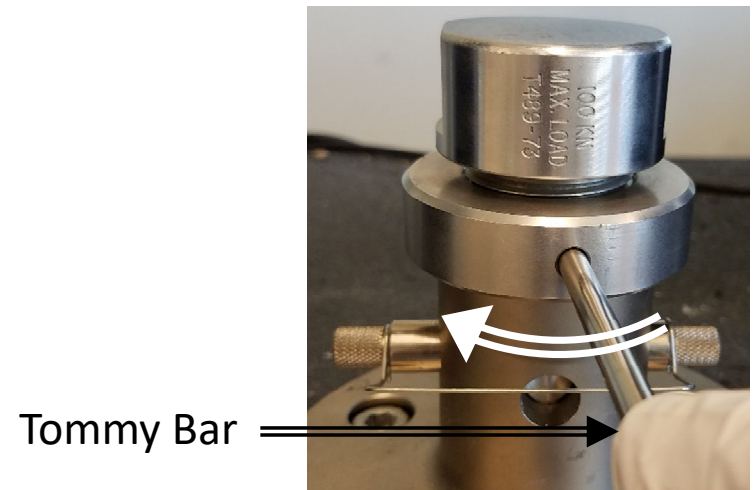
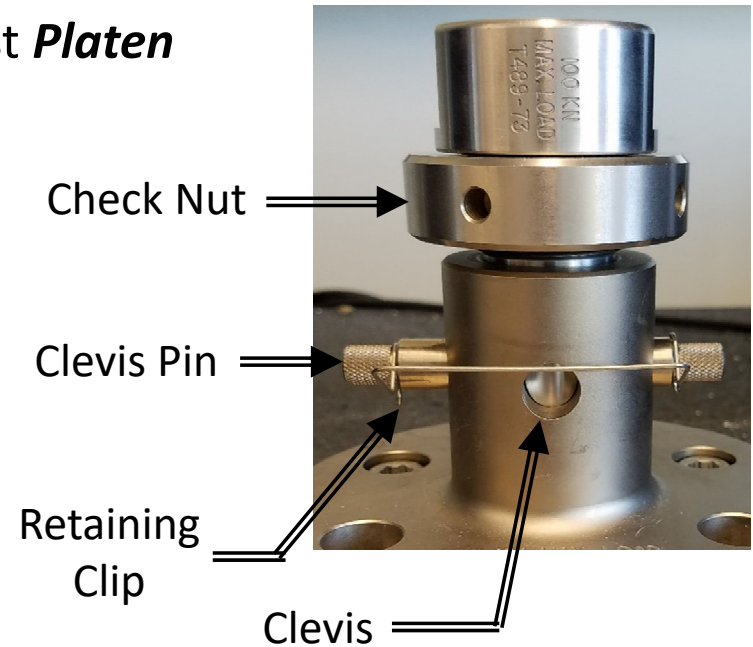
VI.C. Top 2" Platen – 1/1

1. Position **Check Nut** until it is loose against **Platen**
2. Align the **Platen Clevis** to the **Clevis** in the **Load Cell**
3. Insert the **6 mm Clevis Pin** through the **Clevis**
4. Attach the **Retaining Clip**
5. Hand tighten **Check Nut** turning **counter-clockwise** until it is against the **Load Cell**
6. Use the provided **Tommy Bar** to help, but **DO NOT OVERTIGHTEN!**



VI.C. Bottom 2" Platen – 1/1

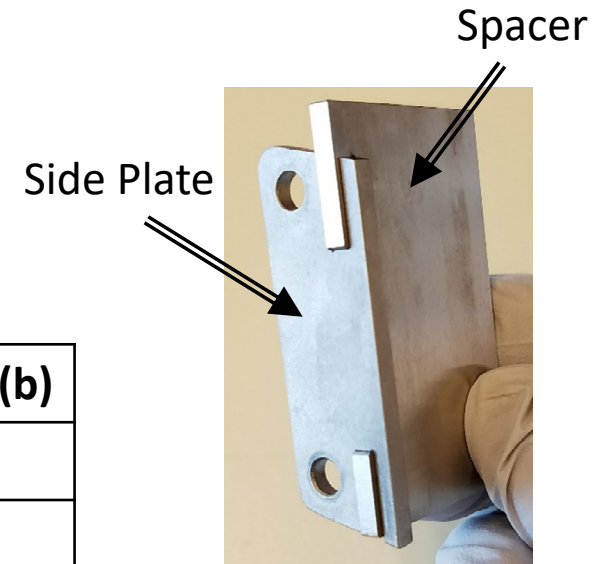
1. Position the **Check Nut** until it is loose against **Platen**
2. Align the **Platen Clevis** to the **Clevis** in the **Base Adapter**
3. Insert the $\frac{1}{2}$ " **Clevis Pin** through the **Clevis**
4. Attach the **Retaining Clip**
5. Hand tighten the **Check Nut** turning **clockwise** until it is against the **Base Adapter**
6. Use the provided **Tommy Bar** to help, but **DO NOT OVERTIGHTEN!**



VII.A. Jaw Faces – 1/2

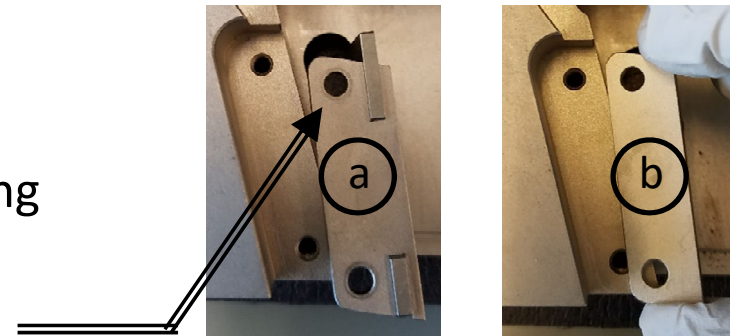
1. Identify the appropriate **Jaw Faces** and necessary usage of spacers for your test specimen size

Nominal Jaw Size	With Spacers (a)	Side Plates Only (b)
0 – 0.25"	0 – 0.25"	0.20 – 0.45"
0.25 – 0.5"	0.25 – 0.5"	0.45 – 0.70"



2. If desired **Jaw Face** is already installed, skip to **VII.B. Wedge Grips**

3. Remove installed **Spacers** or **Side Plates** using a **3 mm hex wrench**



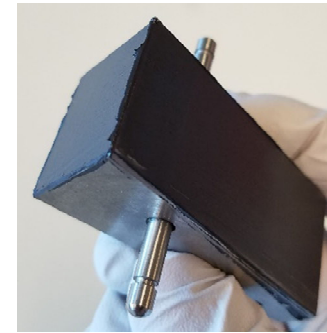
4. Align the **Spacers** so it is aligned with the two screw holes on top of the flat section

5. Rotate the handle until the **Wedge Grips** are in the fully **Open** position



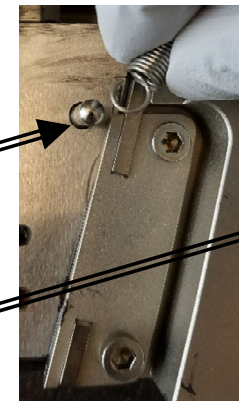
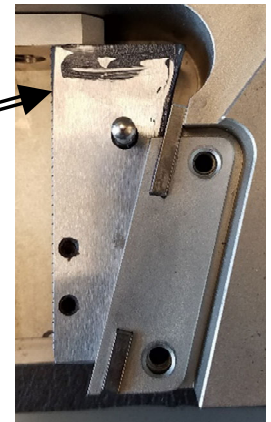
VII.A. Jaw Faces – 2/2

6. Coat the back and base of the **Jaw Face** with **Molykote g-N paste** using the applicator provided



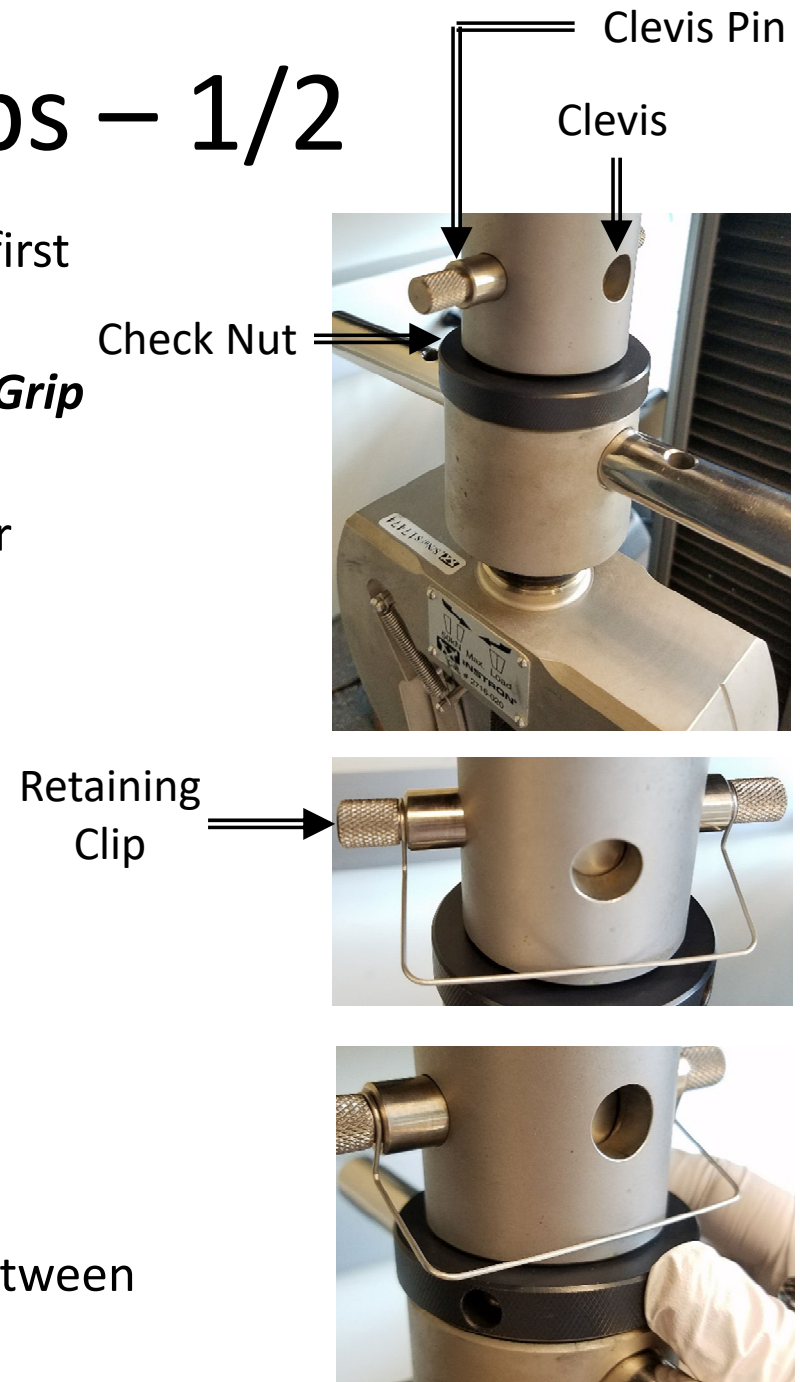
Note: Wipe down applicator + Wash hands thoroughly after using Molykote g-N paste!

6. Insert the **Jaw Face** and slide it towards the base of the **Wedge Grip**
7. Firmly secure the **Spacers** using the **3 mm hex wrench** so the **Jaw** has no sideways movement
8. Attach the **Springs** from the spring retainer post to the post for each **Jaw Face**
9. Repeat for the back side



VII.B. Top Wedge Grips – 1/2

1. Identify the *Top Wedge Grip* from drawer first
2. Position *Check Nut* until it is loose against *Grip*
3. Orient the *Wedge Grip* to be perpendicular to the *Crosshead*
4. Align the *Wedge Grip Clevis* to the *Clevis* in the *Load Cell*
5. Insert the $\frac{1}{2}$ " *Clevis Pin* through the *Clevis* and into the *Load Cell*
6. Attach the *Retaining Clip*
7. Confirm that the *Check Nut* is still loose between the *Load Cell* and *Wedge Grip*



VII.B. Bottom Wedge Grips – 2/2

8. Identify the **Bottom Wedge Grip** from drawer first

9. Check that the **Compression Spring** is placed inside the bottom **Base Adapter**

10. Position **Check Nut** until it is loose against **Grip**

11. Orient the **Wedge Grip** to be perpendicular to the **Crosshead**

12. Align the **Wedge Grip Clevis** to the **Clevis** in the **Base Adapter**

13. Insert the $\frac{1}{2}$ " **Clevis Pin** through the **Clevis** and into the **Base Adapter**

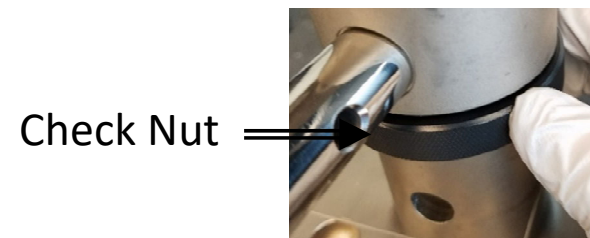
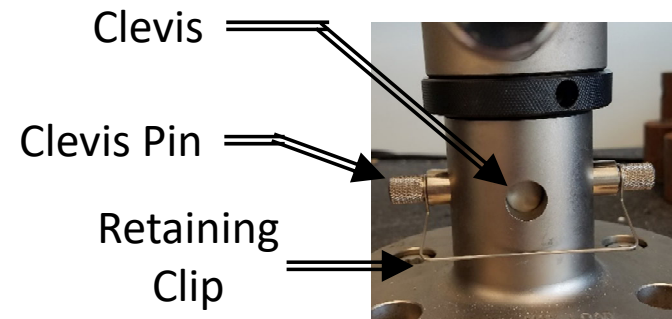
14. Attach the **Retaining Clip**

15. Confirm that the **Check Nut** is still loose between the **Base Adapter** and **Wedge Grip**

Compression Spring



Bottom Base Adapter



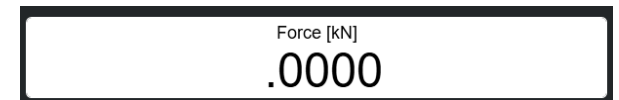
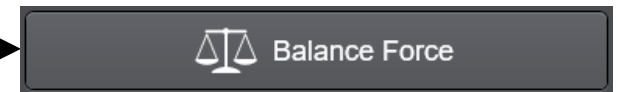
VII.C. Preloading – 1/5

Note: Preloading the load string prevents backlash and deflections which can degrade integrity of results at high load tension tests

1. Identify which **Preloading specimen** is appropriate for your Jaw Faces
 - a) 20 kN Maximum Load: 0 – 0.25” Jaws
 - b) 50 kN Maximum Load: 0.25 – 0.5” Jaws

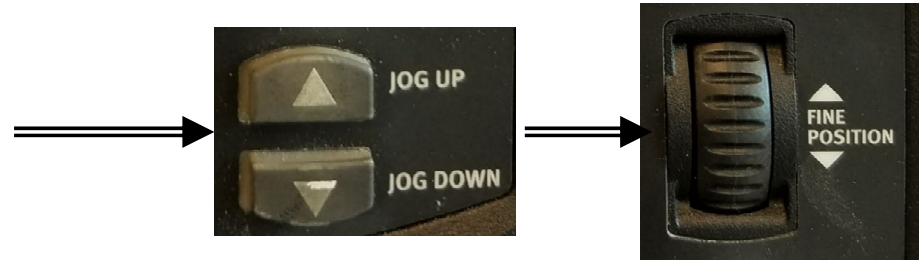


2. Before inserting **Preloading specimen**, check the following:
 - a) Both **Check Nuts** are loose
 - b) Click **Balance Force** and check live load is near zero⇒
 - c) Identify the **Maximum Load** you plan on applying for your tests and **NEVER** exceed the **Maximum Load** for **ANY** component in the load string



VII.C. Preloading – 2/5

3. Press the **Jog Up/Down** $\Delta \nabla$ buttons and **Fine Jog** on the control panel to adjust the **Wedge Grip** positions to an appropriate height



4. Adjust **Wedge Grip** positions until majority of **Jaw Faces** are engaged with the **Preloading specimen**



5. Align and center the specimen visually into the **Jaw Faces**

6. Turn handles to tighten the lower and upper grips until the **Jaw Faces** engage the specimen



VII.C. Preloading – 3/5

7. Identify a **Load Limit** that is **10-15%** greater than the highest load you will be applying for your tests
8. If unknown, check the provided table to estimate the anticipated load applied to your specimen

Load (N) = Yield Strength or Ultimate Strength (MPa) x Area (mm²)

e.g. Mild Steel 1090: Yield Strength = 248 Mpa

Ultimate Strength = **841 MPa** (largest)

Ultimate Load = 841 MPa x 25 mm² ≈ 21,000 N or 21 kN

To be safe, assume **Max Load ≈ 25,000 N** or 25 kN (15% greater)

9. Click on **Zero Displacement** to set the **Crosshead** position to zero

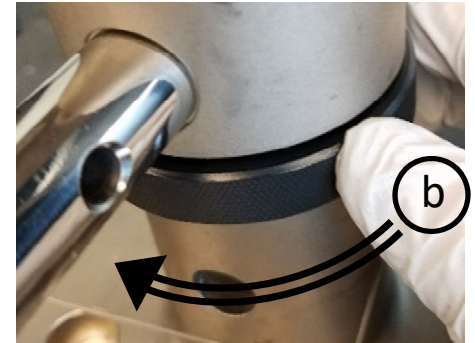
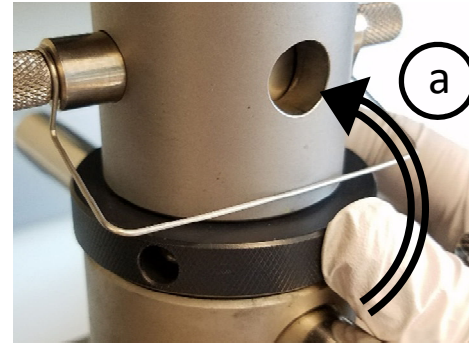


VII.C. Preloading – 4/5

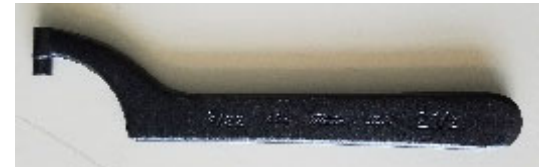
10. Slowly ***Fine Jog*** up until the desired load is achieved

11. Hand tighten the ***Check Nuts*** against the ***Load Cell*** and ***Base Adapter***; respectively

- a) Top: ***Counter-clockwise***
- b) Bottom: ***Clockwise***



12. Use provided ***Spanner Wrench*** to provide additional help if necessary, but **DO NOT OVERTIGHTEN!**



13. Slowly ***Fine Jog*** back down until the load is near zero again

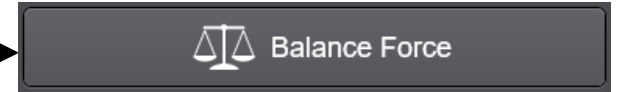
14. Unload the ***Preloading specimen*** by turning the handles on the upper and lower grips

15. You may now execute tests on your desired samples, but remember to **UNLOAD PRELOAD** before leaving!

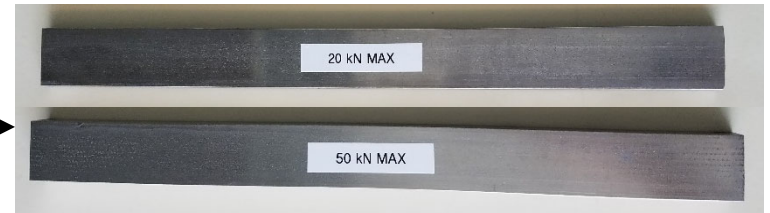
VII.C. Preloading – 5/5

NOTE: Check nuts will now be **TOO TIGHT** and will require you to unload preload to remove wedge grips!

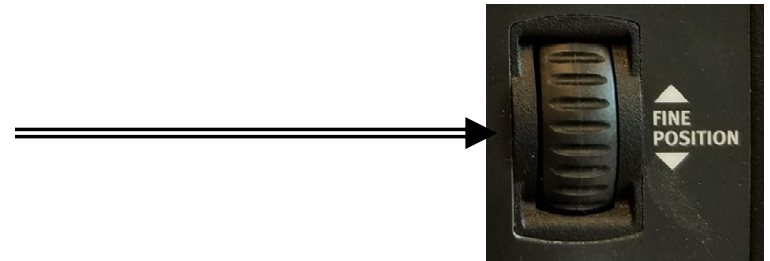
16. To unload the **Preload**, click **Balance Force** with nothing installed



17. Re-install the **Preloading specimen**

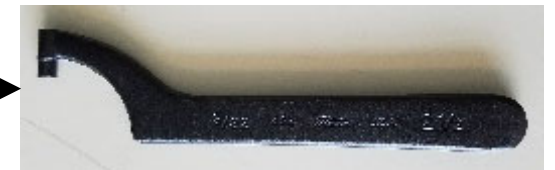


18. Slowly **Fine Jog** up until the previously used load is achieved again (approximately)



19. Loosen the **Check Nuts** again if possible, else slowly **Fine Jog** to increase the load until **Check Nuts** are loose again

20. If necessary, use the provided **Spanner Wrench** to help you loosen

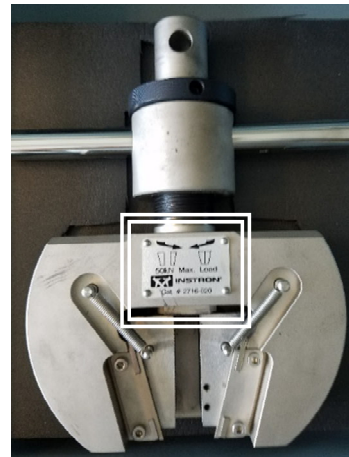


21. Slowly **Fine Jog** back to near **Zero Load** to uninstall the **Preloading specimen**

VII.D. Specimen Loading – 1/1

NOTE: NEVER exceed the **Maximum Load** for **ANY** component in the load string such as Load Cell, Grips, or Fixtures!

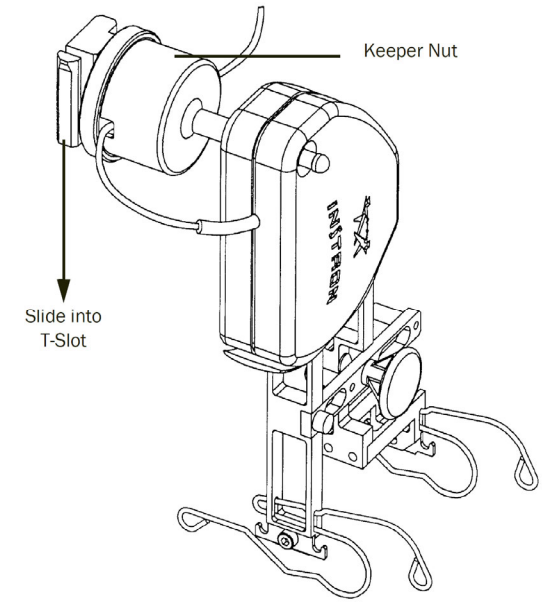
1. Adjust **Wedge Grip** height and install specimen so majority of **Jaw Faces** are engaged
2. Align and center the specimen visually into the **Jaw Faces**
3. Turn handles to tighten the lower and upper grips until the **Jaw Faces** engage the specimen
4. Continue to **VII.E. Extensometer** if you require accurate Stress-Strain values prior to yielding (e.g. Young's Modulus), else skip directly to **XII. Running Tests**



VII.E. Extensometer – 1/5

Extensometer provides a more accurate measure of **Strain** during your test compared to using the **Extension** alone from **Crosshead** position

NOTE: Extensometer is only rated to travel -0.1" to +1.0" for a set gauge length of 1.0" or -10% to 100% Strain and is only appropriate for low ductility samples like metals and NOT polymers!

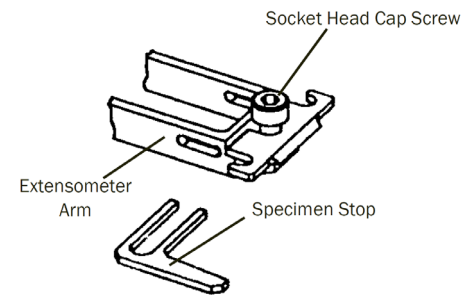
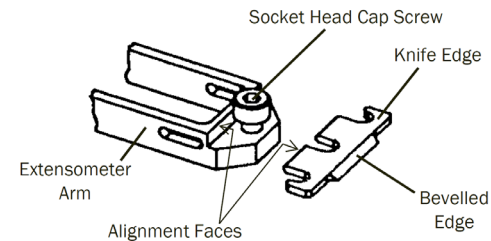
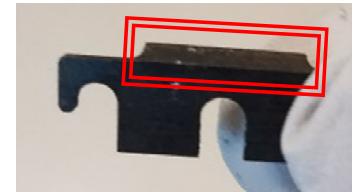
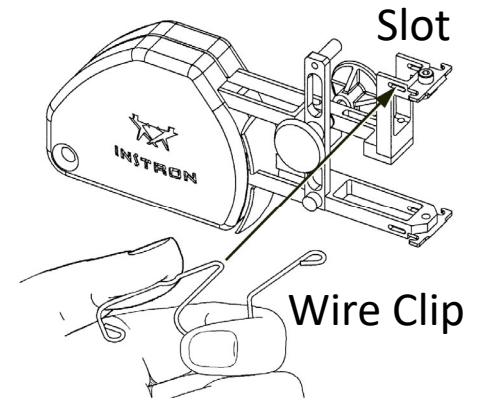


1. Identify appropriate **Wire Clip** based on specimen shape and size

Specimen Shape	A	B	C	D	E	F
Round (RO)	0 – 3 mm 0 – 0.12"	3 – 6 mm 0.12 – 0.24"	6 – 9 mm 0.24 – 0.35"	9 – 12 mm 0.35 – 0.47"	12 – 15 mm 0.47 – 0.59"	20 mm 0.79"
Rectangle (RE)	0 – 3 mm 0 – 0.12"	3 – 6 mm 0.12 – 0.24"	6 – 9 mm 0.24 – 0.35"	9 – 12 mm 0.35 – 0.47"	12 – 15 mm 0.47 – 0.59"	N/A

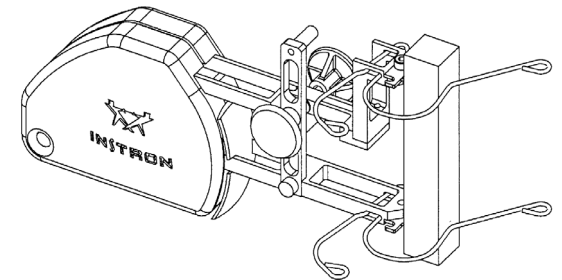
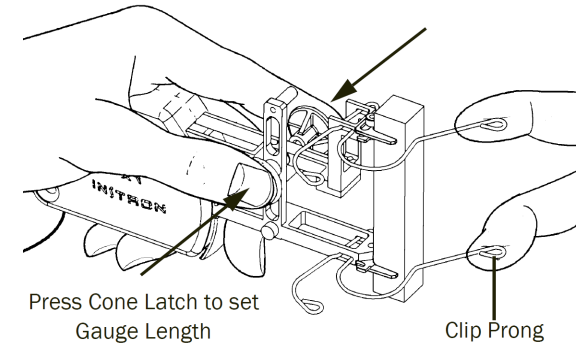
VII.E. Extensometer – 2/5

2. Insert the **Wire Clip** by squeezing and inserting into **Slot** as shown
3. Visually inspect the **Bevelled Edge** on the **Knife Edge** and contact Lab Manager if chipped or severely worn
4. Check that the **Knife Edge** is installed correctly and flush against the **Alignment Faces** using provided **2 mm Hex Key**
5. If desired, install and visually align the **Specimen Stop** to help with specimen alignment



VII.E. Extensometer – 3/5

6. Push the **Cone-Latch** together with your index finger and thumb to set **Gauge Length**
7. Use other hand to hold the **Clip Prongs** open and slip onto specimen as shown
8. Gradually release the clip prongs first and allow **Bevelled Edge** to gently touch specimen
9. Release the **Cone-Latch** to set the 1" gauge length
10. If the **Extensometer** slips, you may need to use a smaller sized **Wire Clip**



NOTE: Do not slide *Bevelled Edge* against the specimen as you attach to specimen as it will blunt the *Bevelled Edge* and scratch your specimen

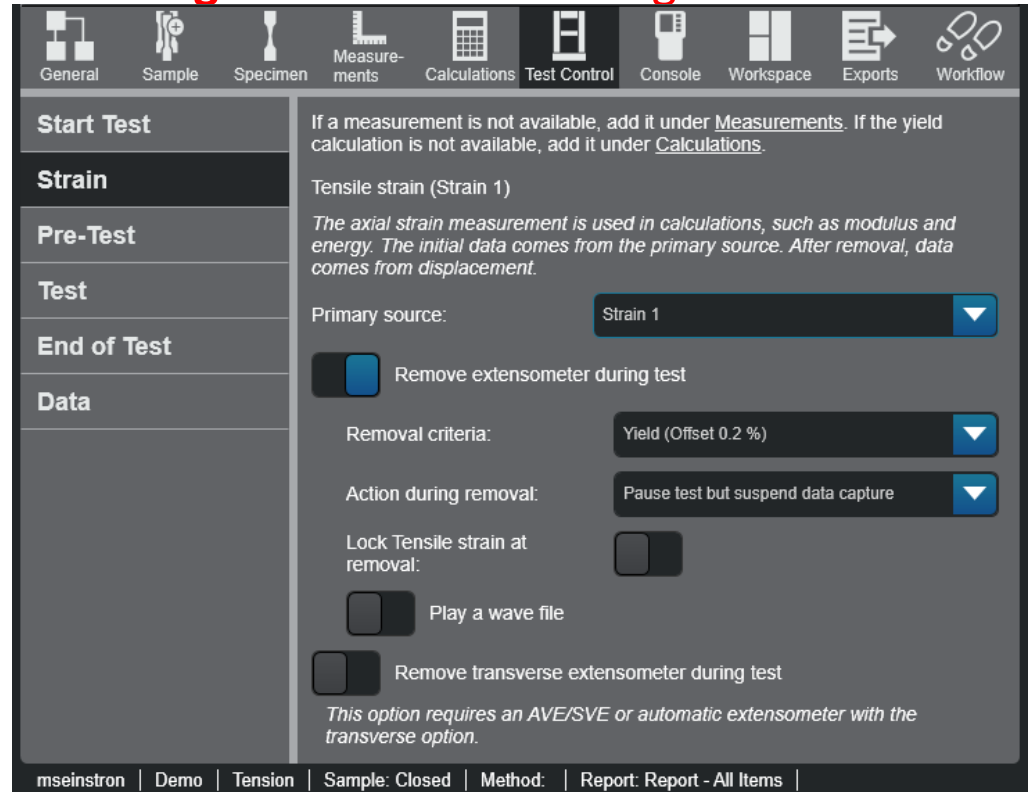
VII.E. Extensometer – 4/5

NOTE: *Extensometer* can only be used in the elastic region of the stress-strain curve and **MUST be removed at the **Yield Strength** or before reaching **+100% strain****

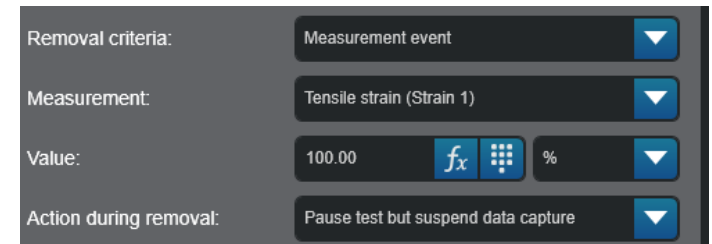
11. Protect the ***Extensometer*** by removing it before it's broken!
12. Confirm ***Remove extensometer during test*** is toggled to ***On***
13. Confirm ***Removal criteria*** as:

Yield (Offset 0.2%) or

Measurement event ->
Tensile strain (Strain 1) -> 100%



14. Select ***Action during removal*** as ***Pause test but suspend data capture***

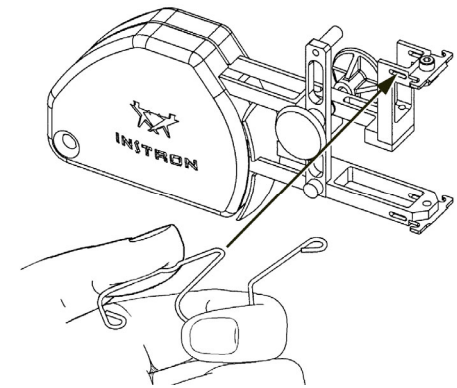
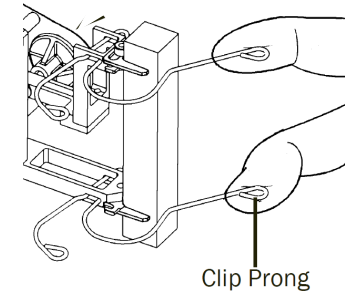


VII.E. Extensometer – 5/5

15. To remove, hold *Extensometer* with one hand and carefully pry the clip prongs open with other hand

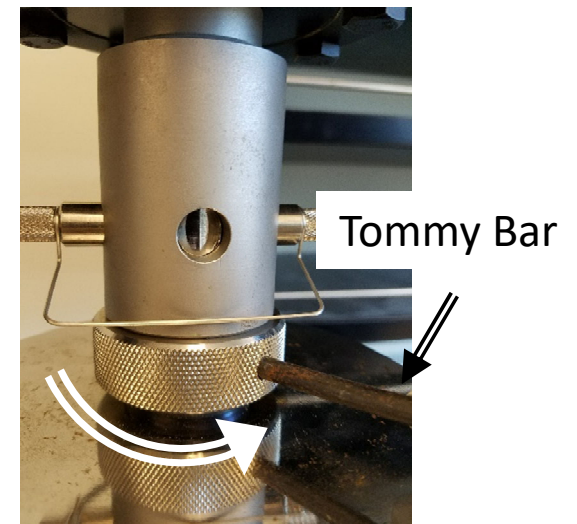
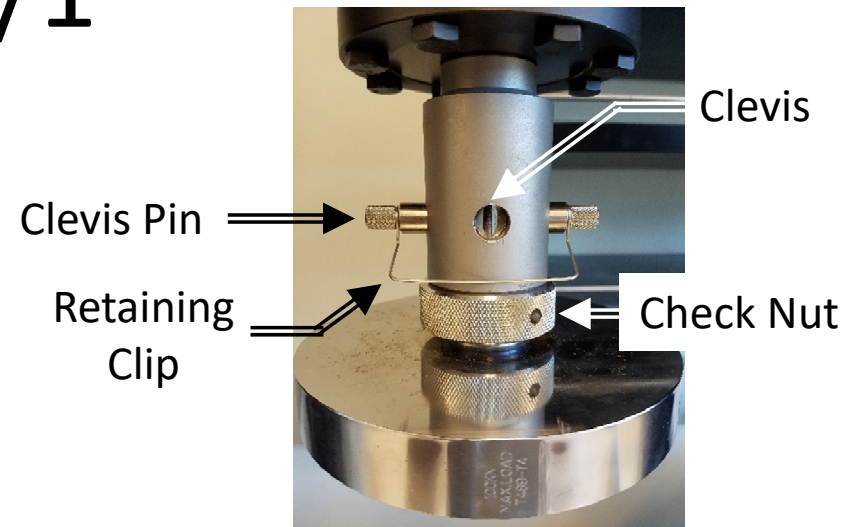
NOTE: DO NOT PUSH THE CONE-LATCH BUTTONS TOGETHER AS THIS WILL SCRAPE THE BEVELLED EDGE AGAINST YOUR SPECIMEN BACK TO GAUGE LENGTH!

16. Remove the *Extensometer* from the *Specimen*
17. Avoid sliding the knife edge against the specimen as you remove the *Extensometer* again to prevent damage
18. Remove the *Wire Clip* and place back into storage box
19. Place the *Extensometer* back onto its holder next to the frame



VIII.A. Top Platen – 1/1

1. Position the **Check Nut** until it is loose against the **Platen**
2. Align the **Platen Clevis** to the **Clevis** in the **Load Cell**
3. Insert the $\frac{1}{2}$ " **Clevis Pin** through the **Clevis**
4. Attach the **Retaining Clip**
5. Hand tighten **Check Nut** turning **counter-clockwise** until it is against the **Load Cell**
6. Use the provided **Tommy Bar** to help, but **DO NOT OVERTIGHTEN!**



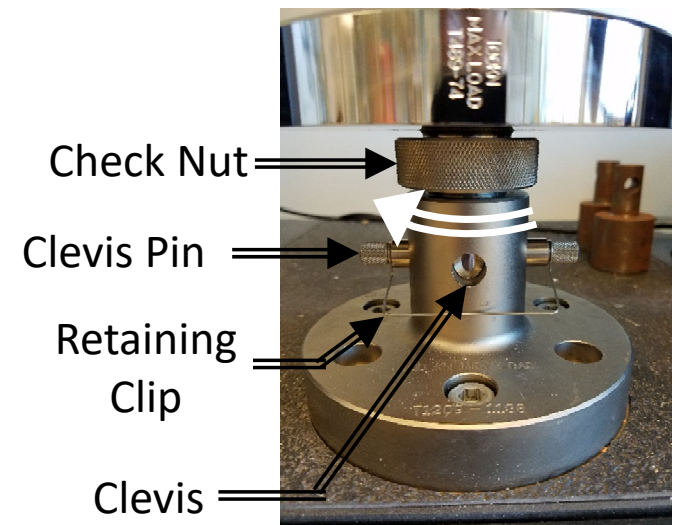
VIII.B. Bottom Platen – 2/1

1. Check that the **Compression Spring** is placed inside the bottom **Base Adapter**
2. Position the **Check Nut** until it is loose against the **Platen**
3. Align the **Platen Clevis** to the **Clevis** in the **Base Adapter**
4. Insert the $\frac{1}{2}$ " **Clevis Pin** through the **Clevis**
5. Attach the **Retaining Clip**
6. Hand tighten the **Check Nut** turning **clockwise** until it is against the **Base Adapter**
7. Use the provided **Tommy Bar** to help, but **DO NOT OVERTIGHTEN!**

Compression Spring

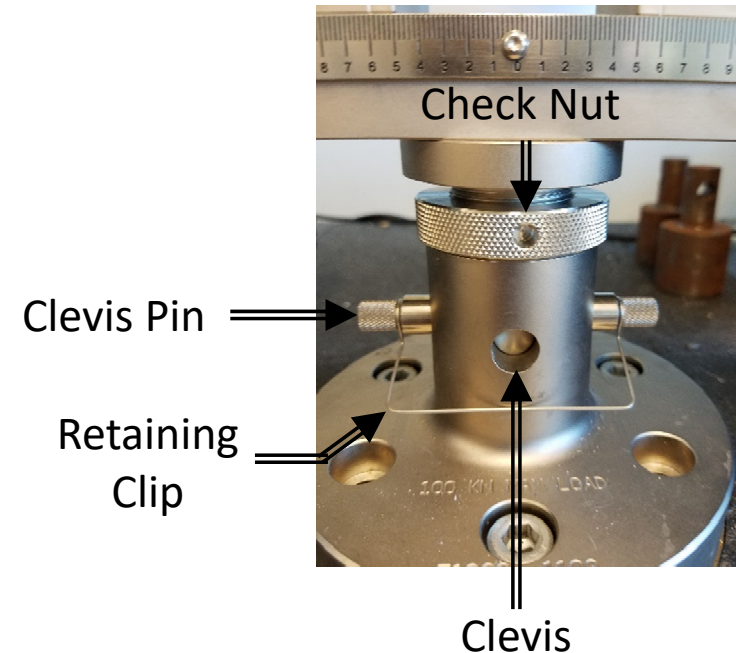
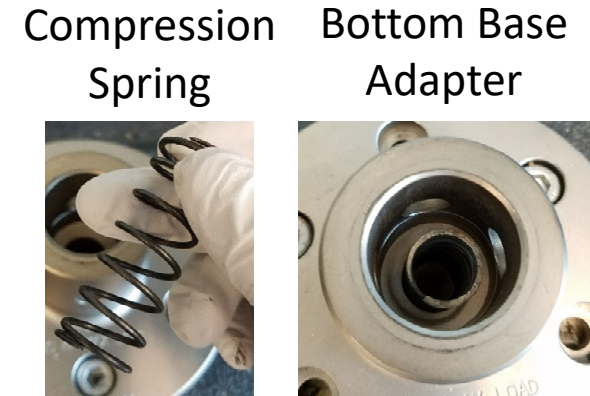


Bottom Base Adapter



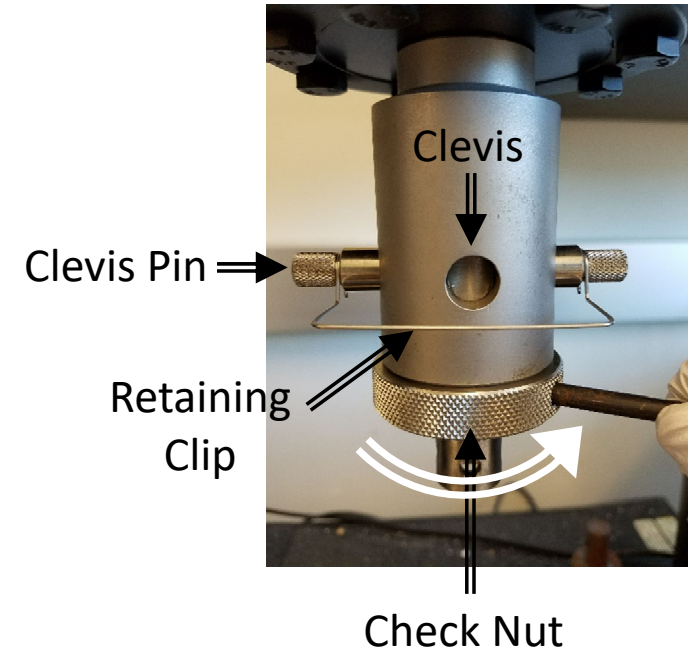
IX.A. Lower Anvils – 1/1

1. Check that the **Compression Spring** is placed inside the bottom **Baseplate Adapter**
2. Position **Check Nut** until it is loose against **Anvil**
3. Place the **Lower Anvil** assembly into the **Baseplate Adapter**
4. Rotate the **Lower Anvil** until the scale faces the front and the **Anvil Clevis** are aligned with **Baseplate Adapter Clevis**
5. Insert the $\frac{1}{2}$ " **Clevis Pin** into the **Baseplate Adapter**
6. Attach the **Retaining Clip**



IX.B. Upper Anvils – 1/2

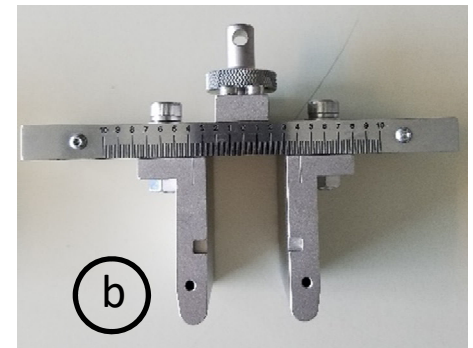
1. Position ***O Adapter Check Nut*** until it is loose
2. Insert the ***O Adapter*** into the ***Load Cell***
3. Align the ***O Adapter Clevis*** to the ***Clevis*** in the ***Load Cell***
4. Insert the **$\frac{1}{2}$ " *Clevis Pin*** through the ***Load Cell***
5. Attach the ***Retaining Clip***
6. Hand tighten the ***Check Nut*** turning ***counter-clockwise*** until it is against the body of the ***Load Cell***
7. Use the provided ***Tommy Bar*** to help, but **DO NOT OVERTIGHTEN!**
8. Select desired ***Upper Anvils*** to install
 - a) 3-point Flexural tests
 - b) 4-point Flexural tests



3-point

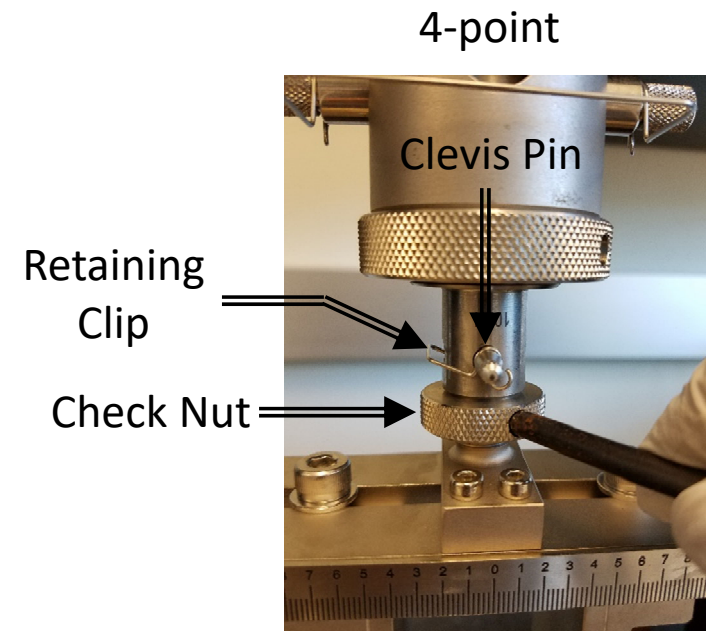
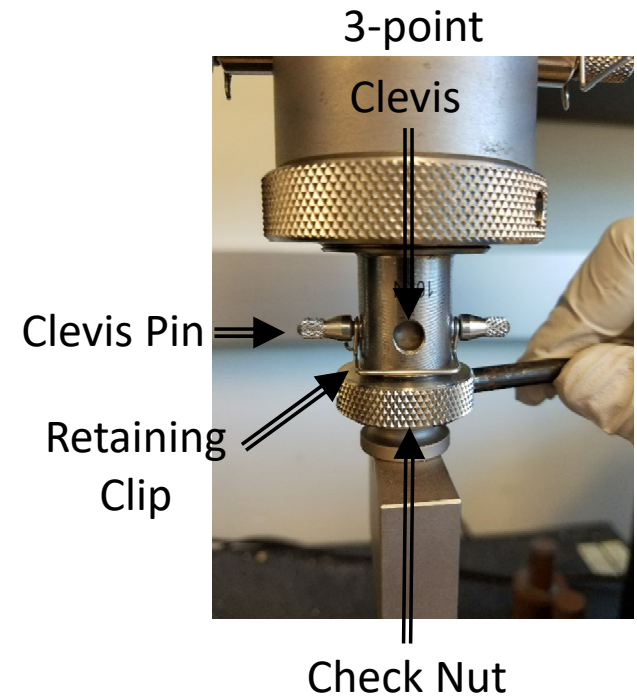


4-point



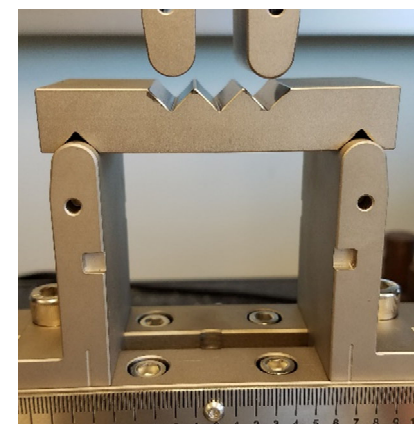
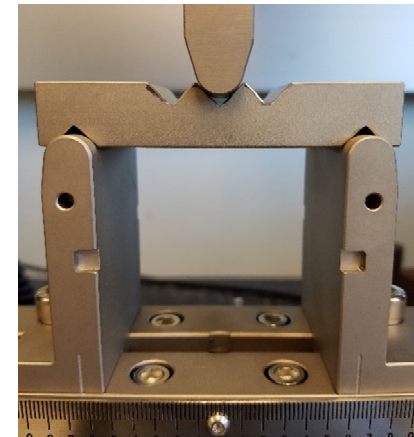
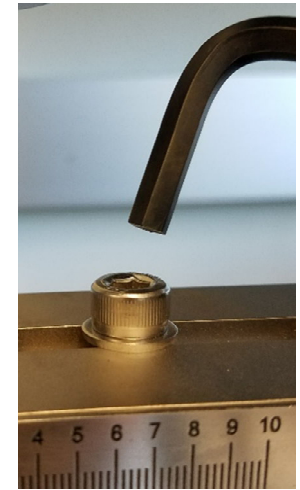
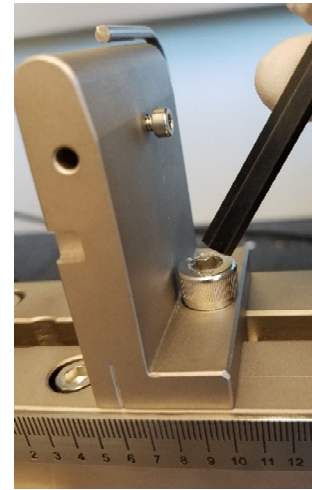
IX.B. Upper Anvils – 2/2

9. Position **Check Nut** until it is loose against **Anvil**
10. Insert the **Upper Anvil** into the **O Adapter**
11. (3-point) Rotate the **Upper Anvil** until it is parallel with the **Lower Anvils**
12. (4-point) Rotate the **Upper Anvils** until it is parallel with the **Lower Anvils** and the scale faces the front
13. Align and insert the **6 mm Clevis Pin** into **O Adapter** clevis
14. Attach the **Retaining Clip**



IX.C. Alignment – 1/2

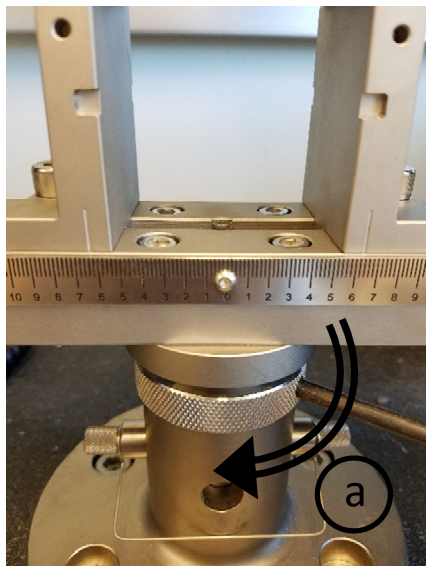
1. Loosen the cap screws with **6 mm Hex** holding the **Lower and Upper Anvils** and allow them to slide freely
2. Place the **Alignment Plate** onto the **Lower Anvils**
3. Adjust the **Lower Anvil** positions until they are both at about **6.2** on the lower front scale
4. For 3-point fixture, there is no need for adjustment of the single **Upper Anvil**
5. For 4-point fixture, adjust the **Upper Anvils** until they are both at about **2** on the upper front scale
6. Carefully lower the **Crosshead** using **Jog** and **Fine Jog** until the **Upper Anvil(s)** are just above the **Alignment Plate**



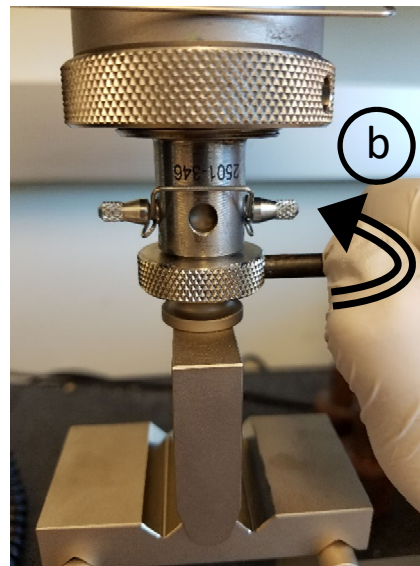
IX.C. Alignment – 2/2

7. Adjust and align both the *Upper and Lower Anvils* until they **BARELY** touch
8. Hand tighten the *Check Nuts* on the *Upper and Lower Anvils*
 - a) Lower Anvil: *Clockwise*
 - b) Upper Anvils: *Counter-clockwise*
9. Use the provided *Tommy Bar* to help, but **DO NOT OVERTIGHTEN!**

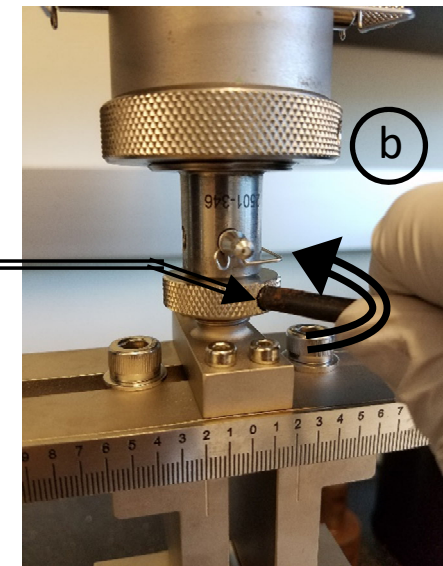
Lower Anvil



Upper Anvil

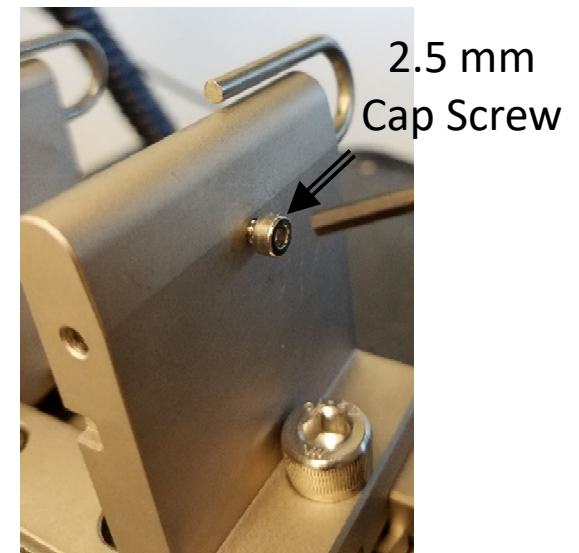
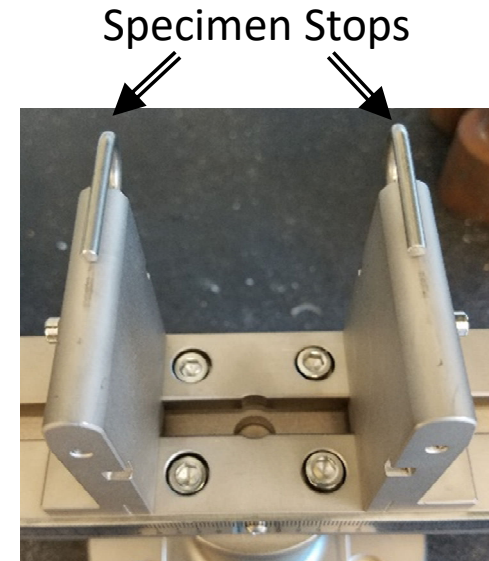


Upper Anvil



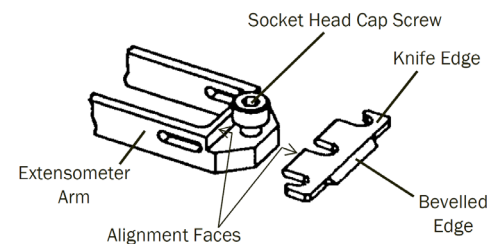
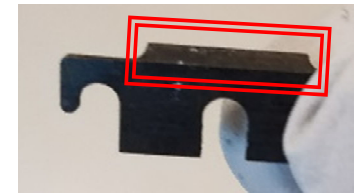
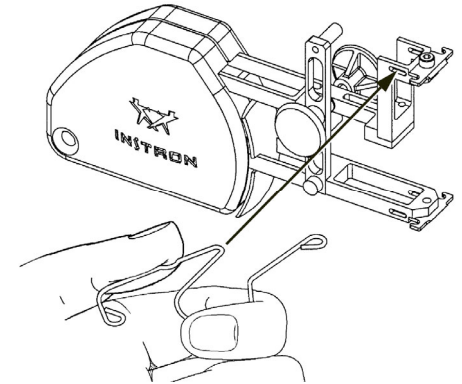
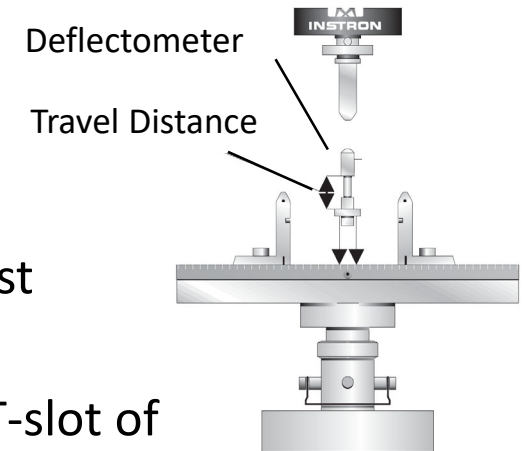
IX.D. Specimen Loading – 1/1

1. For 3-point fixture, set the span of the **Lower Anvils** to an appropriate spacing for your specimen
2. For 4-point fixture, set the span of both the **Upper and Lower Anvils** to an appropriate spacing for your specimen
3. Slightly raise the **Crosshead** to allow room for your specimen
4. Install **Specimen Stops** to ensure that each specimen is consistently in the same position on the fixture
5. Slide each specimen stop through the hole on the back (or front) of each **Lower Anvil**
6. Secure **Specimen Stops** in the desired position with the **2.5 mm Cap Screws** located on the side of each **Lower Anvil**



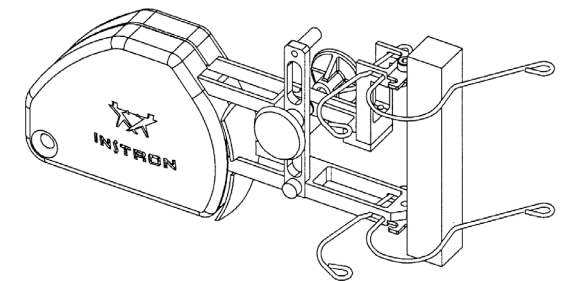
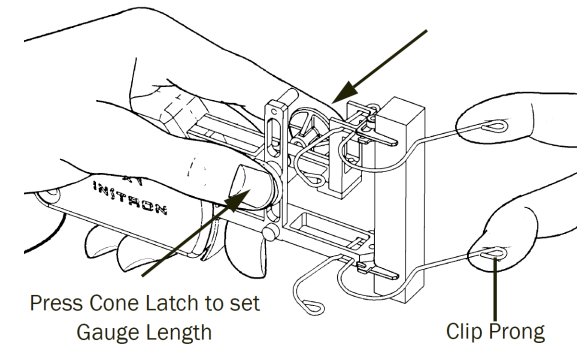
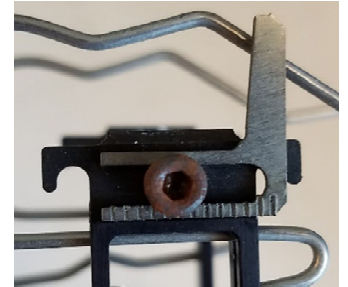
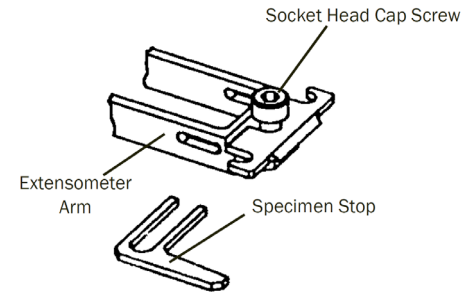
IX.E. Deflectometer – 1/4

1. Install **Deflectometer** and **Extensometer** to accurately measure deflection of the specimen during a flexure test
2. Place **Deflectometer** in the center hole, located in the T-slot of **Anvil**
3. Choose **Wire Clip RO D 9 - 12 mm** and insert the **Wire Clip** by squeezing and inserting into slot as shown
4. Visually inspect the **Bevelled Edge** on the **Knife Edge** and contact Lab Manager if chipped or severely worn
5. Check that the **Knife Edge** is installed correctly and flush against the **Alignment Faces** using provided **2 mm Hex Key**



IX.E. Deflectometer – 2/4

6. If desired, install and visually align the **Specimen Stop** to help with specimen alignment
7. Push the **Cone-Latch** together with your index finger and thumb to set gauge length
8. Use other hand to hold the **Clip Prongs** open and slip onto **Deflectometer**
9. Gradually release the clip prongs first and allow **Bevelled Edge** to gently touch **Deflectometer**
10. Release the **Cone-Latch** to set the 1" gauge length
11. If the **Extensometer** slips, you may need to use a smaller sized **Wire Clip**

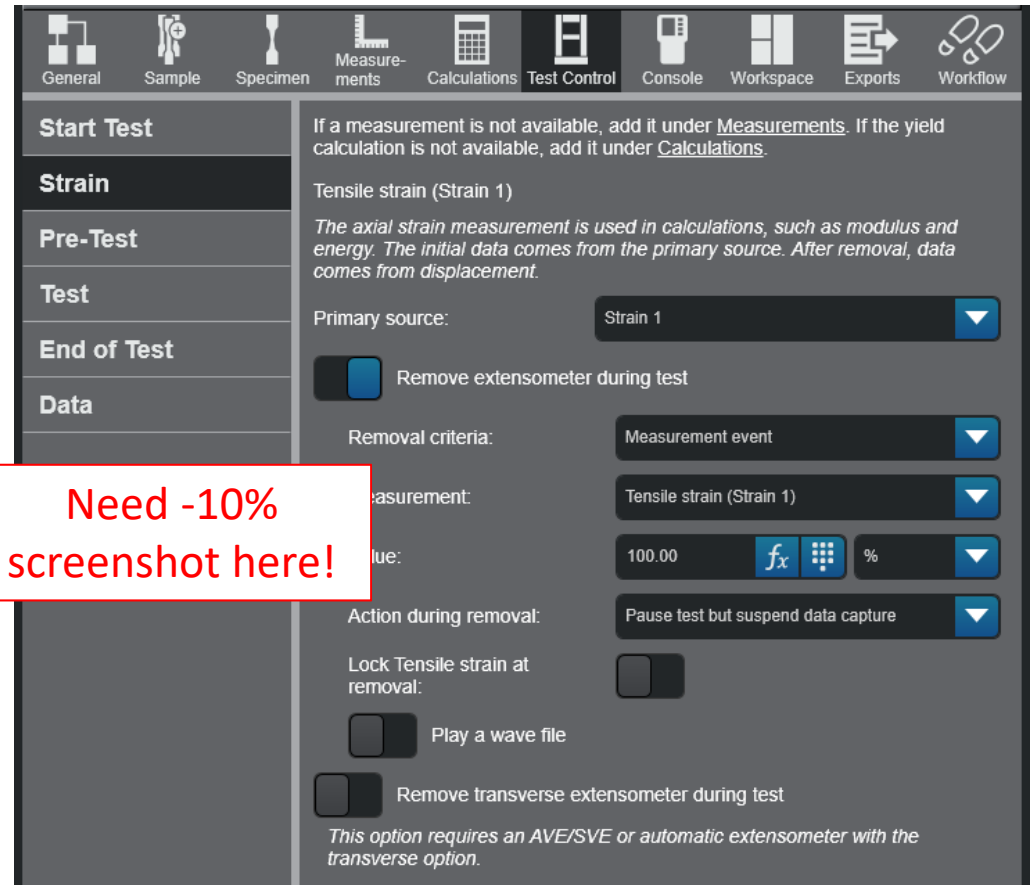


NOTE: Do not slide *Bevelled Edge* against the *Deflectometer* as it will blunt the *Bevelled Edge* and scratch *Deflectometer* surface

IX.E. Deflectometer – 3/4

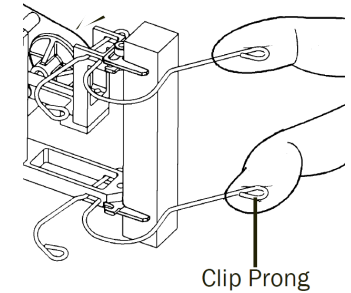
NOTE: EXTENSOMETER MUST BE REMOVED BEFORE REACHING -10% STRAIN

12. Protect **Extensometer** by removing it before it gets broken!
13. Confirm **Remove extensometer during test** is toggled **On**
14. Confirm **Removal criteria** as:
Measurement event ->
Tensile strain (Strain 1) ->
-10%
15. Select **Action during removal** as **Pause test but suspend data capture**



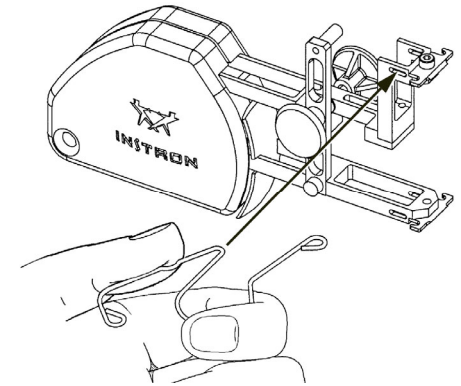
IX.E. Deflectometer – 4/4

17. Hold the *Extensometer* with one hand and carefully pry the *Clip Prongs* open with your other hand



NOTE: DO NOT PUSH THE CONE-LATCH BUTTONS TOGETHER AS THIS WILL SCRAPE THE BEVELLED EDGE AGAINST DEFLECTOMETER BACK TO GAUGE LENGTH!

18. Remove the *Extensometer* from the *Deflectometer*



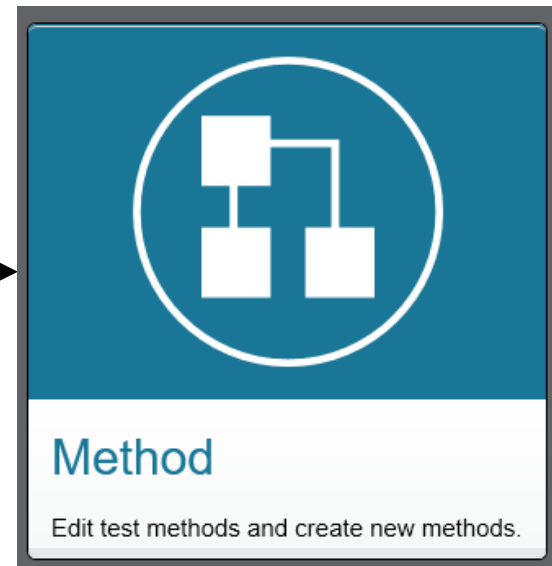
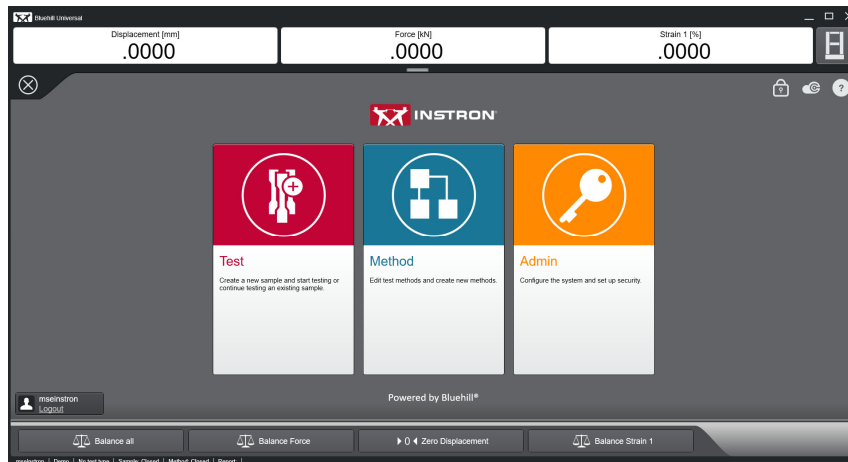
19. Avoid sliding the knife edge against the *Deflectometer* as you remove the *Extensometer* again to prevent damage
20. Remove the *Wire Clip* and place back into storage box
21. Place the *Extensometer* back onto its holder next to the frame



X. Creating Methods – 1/41

1. The following questions should be known prior to creating a new **Method**:
 - a) What is the test going to do? (e.g. Tension, Compression, Flexural)
 - b) What starts and stops the test? (e.g. Break, Load, Displacement)
 - c) What speed or speeds should the test run? (e.g. 0.01 mm/min)
 - d) What is the shape and dimensions of the test specimen? (e.g. Rectangle)
 - e) What data is collected and at what rate? (e.g. Load, Displacement)
 - f) What output type are required? (e.g. Raw Data, Graphs, Reports)
 - g) What answers from the test do you require? (e.g. Area under Curve)
 - h) What information is going to be supplied by the operator? (e.g. Specimen Inputs)

2. Click **Method** from the **Home Screen**



X. Creating Methods – 2/41

3. Select the new desired **Method Template** or **Application-Specific Method**

4. Or select desired **Recent Methods** to edit

The screenshot displays the 'Method' application interface. At the top, there is a navigation bar with a home icon, the title 'Method', and a subtitle 'Create or open a test method to edit'. Below this, the 'New method' section is visible, featuring a search bar for 'Application type' (set to 'Composites') and a 'Filter by' dropdown. The 'New method' section is divided into two main areas: 'Templates' (highlighted with a red box) and 'Composites Methods' (highlighted with a blue box). The 'Templates' area contains six cards for different test methods: Tension method, Compression method, Flexure method, Tension Creep/Relax method, Compression Creep/Relax method, and Flexure Creep/Relax method. The 'Composites Methods' area contains two cards for specific standards: AITM 1-0002 (Issue 3 November 1998) Method and AITM 1-0005 (Issue 2 June 1994) Method. Below the 'New method' section is the 'Edit a method' section, which includes a 'Browse methods' button and a 'Filter by' dropdown. The 'Edit a method' section shows a list of 'Methods' (highlighted with a green box), with the first item being 'Tension Test Aluminum Dogbone MSE 002L'. An information icon (i) next to this item is circled in yellow. To the right of the 'Edit a method' section, a 'Method Preview' window is open, displaying details for the selected method: 'Tension Test Aluminum Dogbone MSE 002L'. The preview includes fields for 'Test method', 'Method description', 'Method saved date', and 'Report template', along with 'Open Method' and 'Close' buttons.

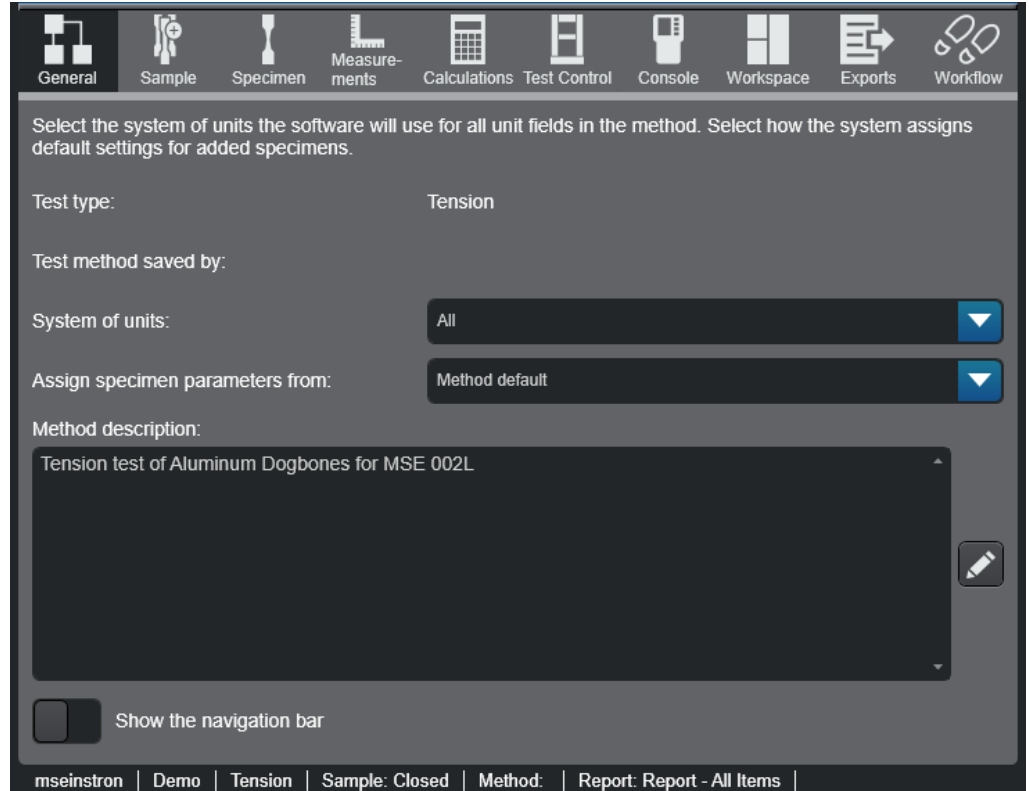
5. Or click **Browse Methods**

6. Click on **Preview Icon** to check **Method Details**

X. Creating Methods – 3/41

7. Input **General** parameters for your **Method**

- System of units: SI, Metric, US, All
- Recommend – **“All”**
- Specimen parameters:
- Recommend – **“Method default”**
- Method description:
- Enter descriptive information for your method to avoid confusion with similar method names (e.g. “<Type of Test> <Material> <Shape> <Laboratory>”)



The screenshot shows the 'General' tab of a software interface for creating a method. The interface has a dark theme and a navigation bar at the top with icons for General, Sample, Specimen, Measurements, Calculations, Test Control, Console, Workspace, Exports, and Workflow. The 'General' tab is active, and the following settings are visible:

- Test type:** Tension
- Test method saved by:** (empty field)
- System of units:** All (dropdown menu)
- Assign specimen parameters from:** Method default (dropdown menu)
- Method description:** Tension test of Aluminum Dogbones for MSE 002L (text area with a pencil icon for editing)
- Show the navigation bar:** (checkbox, currently unchecked)

The status bar at the bottom of the window displays: mseinstron | Demo | Tension | Sample: Closed | Method: | Report: Report - All Items |

X. Creating Methods – 4/41

8. Input *Sample* parameters for your *Method*

○ *Notes:*

- *Sample description:*
 - Enter *sample description*
- *Sample notes:*
 - Enter any *sample notes*

The screenshot shows the 'Sample' tab in a software interface. The 'Notes' section is active, displaying a list of input types on the left: Notes, Number Inputs, Text Inputs, Choice Inputs, and Date Inputs. The main area contains the following text: 'Create the sample description for the sample preview. Sample notes are available for report method parameters, prompted test, export method parameters.' Below this, there is a 'Sample description:' field with the text 'Aluminum Dogbones' and a 'Sample note 1:' field with the text 'Sample note 1'. The bottom status bar shows 'mseinstron | Demo | Tension | Sample: Closed | Method: | Report: Report - All Items |'.

○ *Number Inputs:*

- Specify if any *Sample number inputs* are desired
- Change the prompt using the *Pen* if desired
- Recommend toggling *Off*

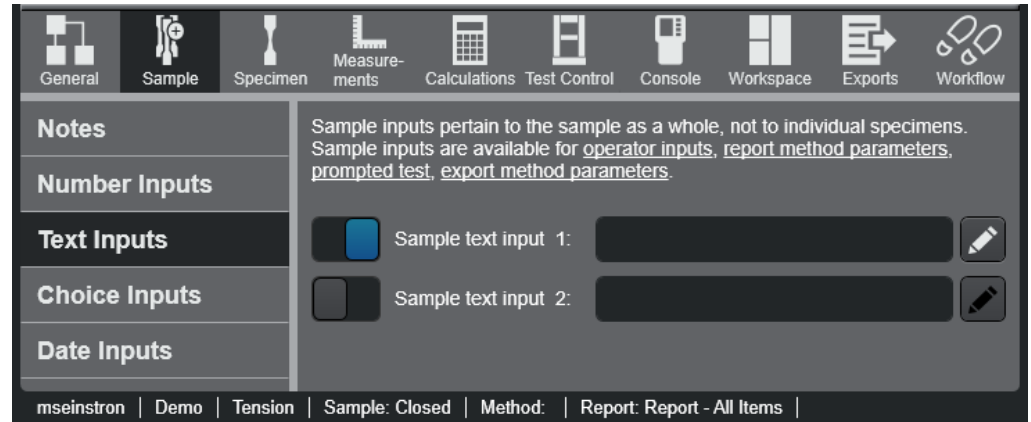
The screenshot shows the 'Sample' tab in a software interface. The 'Number Inputs' section is active, displaying a list of input types on the left: Notes, Number Inputs, Text Inputs, Choice Inputs, and Date Inputs. The main area contains the following text: 'Sample inputs pertain to the sample as a whole, not to individual specimens. Sample inputs are available for operator inputs, report method parameters, prompted test, export method parameters.' Below this, there are two 'Sample number input' fields. The first field is labeled 'Sample number input 1:' and has a value of '0.00'. The second field is labeled 'Sample number input 2:' and has a value of '0.00'. Both fields have a toggle switch to their left, which is currently turned off. The bottom status bar shows 'mseinstron | Demo | Tension | Sample: Closed | Method: | Report: Report - All Items |'.

X. Creating Methods – 5/41

8. Input *Sample* parameters for your *Method*

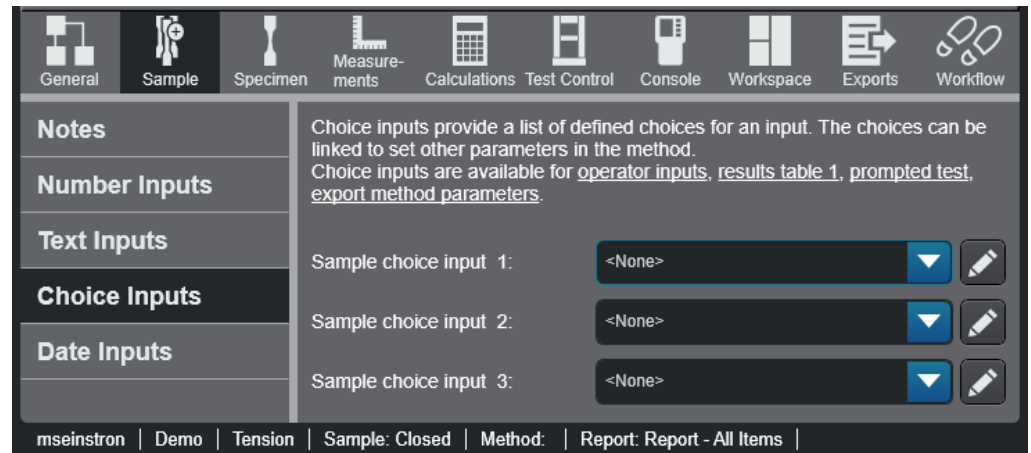
○ *Text Inputs:*

- Specify if any *Sample text inputs* are desired
- Change the prompt using the *Pen* if desired
- Recommend turning toggling *Off*



Choice Inputs:

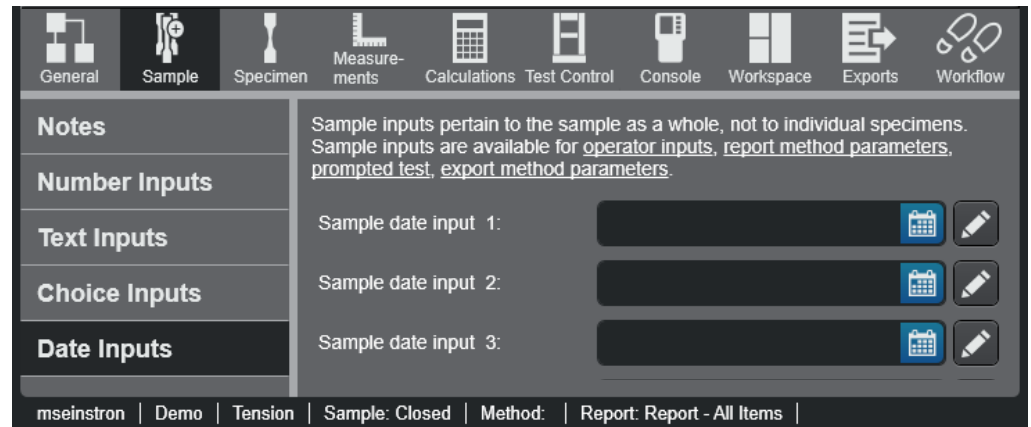
- Specify if any *Choice inputs* are desired
- Change the prompt and format using the *Pen* if desired
- Recommend *None*



X. Creating Methods – 6/41

8. Input *Sample* parameters for your *Method*

- **Date Inputs:**
 - Specify if any **Sample date inputs** are desired
 - Change the prompt and format using the **Pen** if desired
 - Recommend **None**



X. Creating Methods – 7/41

9. Input *Specimen* parameters for your *Method*

- **Properties:**
 - **Specimen properties:**
 - Specify a Specimen label if desired as an option in the legend for a graph
 - **Geometry and dimensions:**
 - Specify the **Geometry**
 - Specify the **Dimensions** that will be used in **Calculations** if constant
 - Change the prompt and format using the **Pen** if desired
 - Recommend entering **Specimen Dimensions** as **Operator Input** instead

The screenshot displays the software interface for creating a method, specifically the **Specimen** tab. The interface is divided into several sections:

- General**: Contains a toolbar with icons for General, Sample, Specimen, Measurements, Calculations, Test Control, Console, Workspace, Exports, and Workflow.
- Properties**: A sidebar on the left with tabs for Properties, Notes, Number Inputs, Text Inputs, and Choice Inputs.
- Specimen properties**: A section with a text input field for the **Specimen label**.
- Geometry and dimensions**: A section with a dropdown menu for **Geometry** (set to Rectangular) and several input fields for dimensions: **Width** (10.00 mm), **Thickness** (1.00 mm), **Length** (100.00 mm), **Fixture separation** (100.00 mm), **Final width** (10.00 mm), **Final thickness** (1.00 mm), and **Final length** (100.00 mm). Each input field has a grid icon and a pen icon for editing.
- Rectangular**: A diagram showing a 3D perspective of a rectangular specimen with labels for **Width** and **Thickness**.
- Fixture separation**: A diagram showing a 2D cross-section of a specimen held between two fixtures, with labels for **Fixture separation** and **Length**.

X. Creating Methods – 8/41

9. Input *Specimen* parameters for your *Method*

- **Notes:**

- ***Specimen notes:***

- Specify a *Specimen notes* if desired

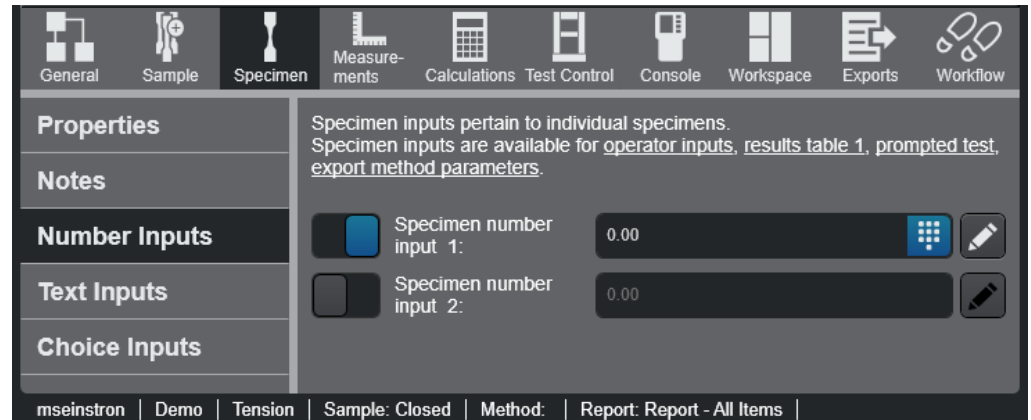
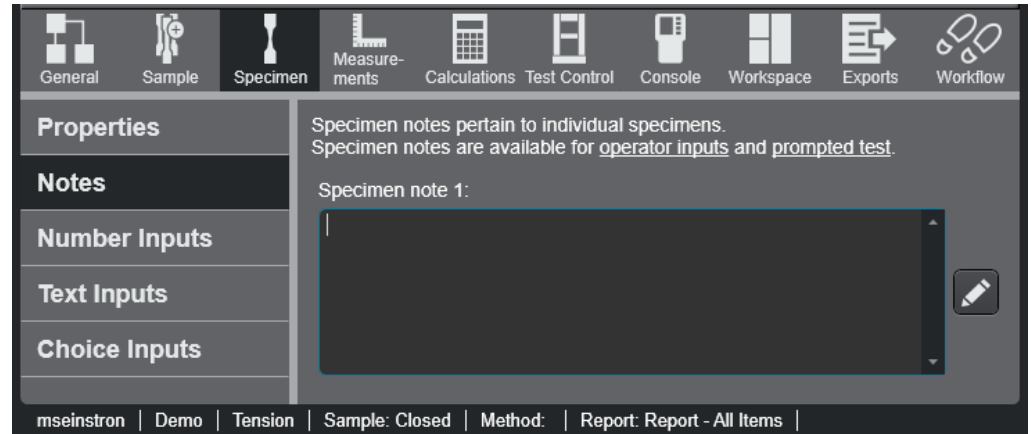
- If desired enter *Specimen notes* as *Operator Input* instead

- ***Number Inputs:***

- Specify *Specimen number inputs* if desired or toggle *Off*

- Change the prompt and format using the *Pen* if desired

- If desired enter *Specimen number inputs* as *Operator Input* instead

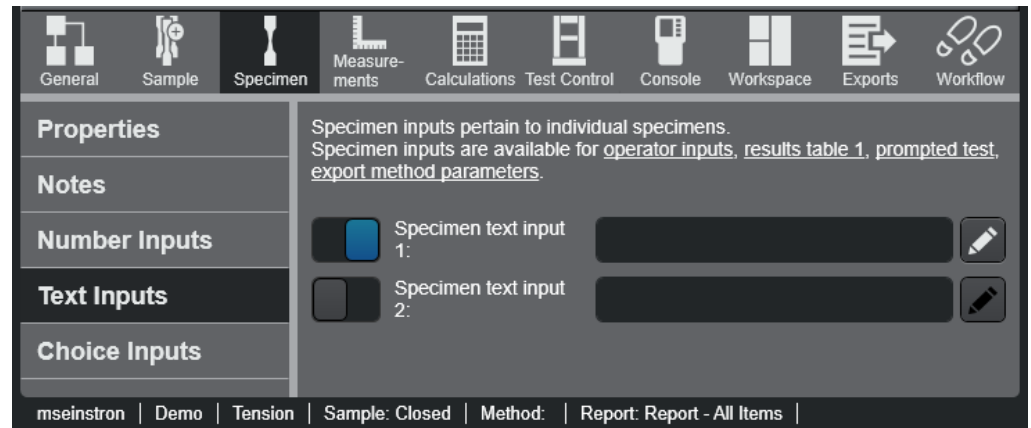


X. Creating Methods – 9/41

9. Input *Specimen* parameters for your *Method*

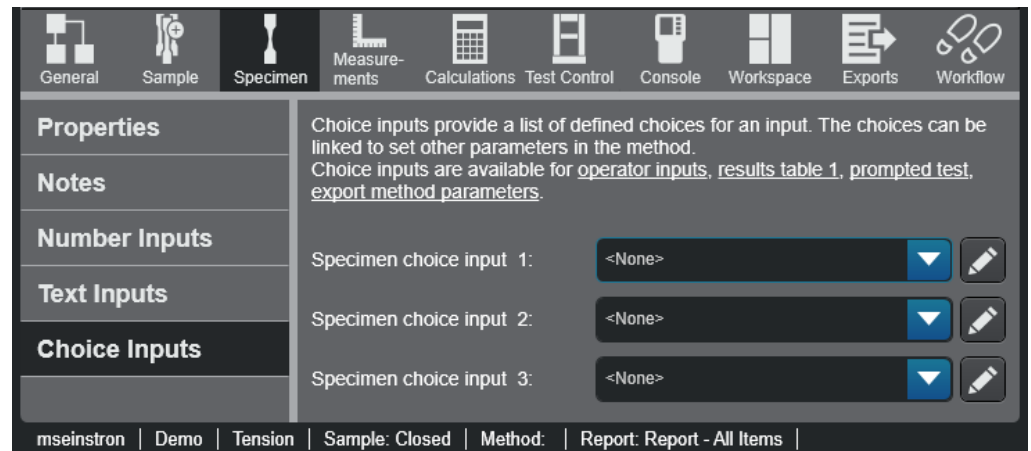
○ *Text Inputs:*

- Specify *Specimen text inputs* if desired or toggle **Off**
- Change the prompt and format using the **Pen** if desired
- Recommend entering *Specimen text inputs* as *Operator Input* instead



○ *Choice Inputs:*

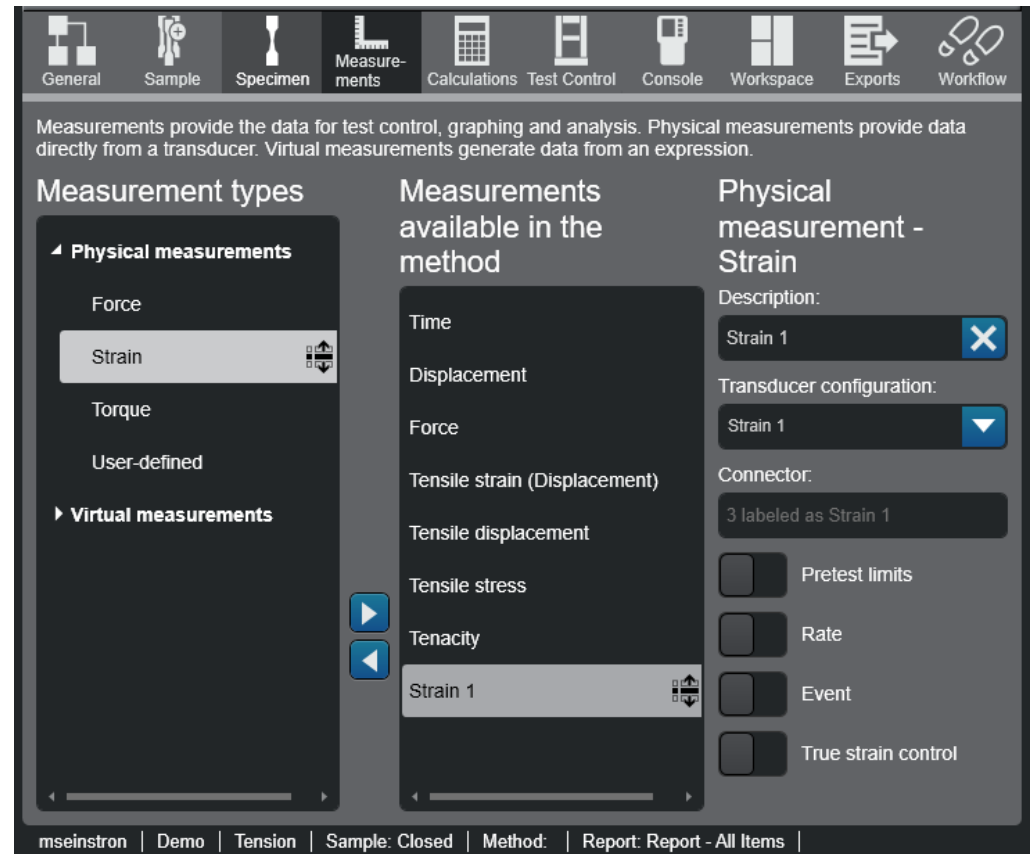
- Specify *Specimen choice inputs* if desired
- Change the prompt and format using the **Pen** if desired
- If desired enter *Specimen choice inputs* as *Operator Input* instead
- Recommend **None**



X. Creating Methods – 10/41

10. Input *Measurements* parameters for your *Method*

- **Measurements Available:**
 - Confirm the following defaults:
 - **Time**
 - **Displacement**
 - **Force**
 - **Strain 1** (only if using *Extensometer*)



X. Creating Methods – 11/41

11. Input *Calculations* parameters for your *Method*

○ *Setup:*

- Identify desired *Calculations* for test:
 - Select calculations using arrow button
 - Configure selected calculations using options to the right
 - Use of *Extensometer* will require ***Yield (Offset 0.2%)*** and ***Modulus (Automatic Young's)*** and toggling ***Calculate during the test*** to ***On***

General Sample Specimen Measurements Calculations Test Control Console Workspace Exports Workflow

Setup

Rounding

Create the calculations required for testing. To use a calculation during a test, enable "Calculate during the test". To display calculated results, create a [results table](#) or add results to [live displays](#).

Available calculations

- % of break
- Area reduction
- Area under curve
- Average value
- Break
- Break location
- Coefficient of friction
- Compensated en
- Creep/Relaxation
- Elongation after f
- Fracture toughness
- Hold preset point
- Line intersection
- Modulus

Selected calculations

- Area under curve
- Modulus (Automatic)
- Yield (Offset 0.2 %)

Yield

Description: Yield (Offset 0.2%)

Type: Offset

Parent calculation: Modulus (Automatic)

Search measurement: Tensile strain (%)

Value: f_x

Indicate on graph:

Calculate during the test:

mginstro | Demo | Tension | Sample: Closed | Method: Tension Test Aluminium Dashboard | Report: Report - All

X. Creating Methods – 12/41

11. Input *Calculations* parameters for your *Method*

- **Rounding:**
- Creates rounding rules for displayed values:
 - Add rules if desired
 - Recommend **None**

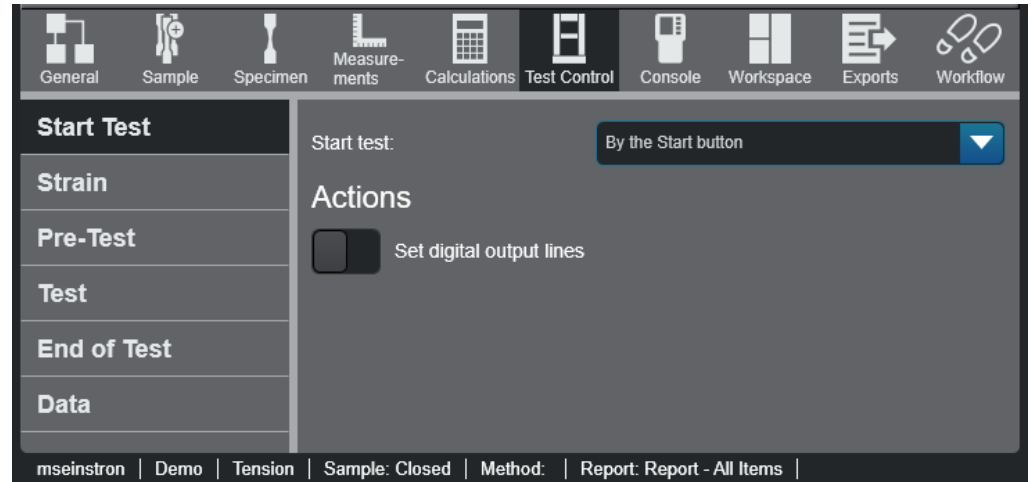


X. Creating Methods – 13/41

12. Input *Test Control* parameters for your *Method*

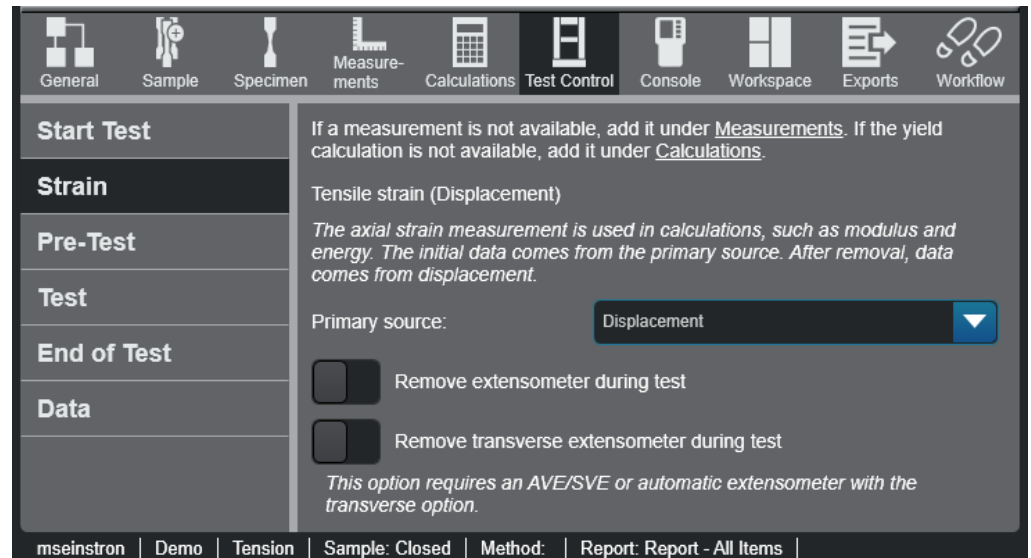
- **Start Test:**

- Start test: *By the Start button*



- **Strain:**

- Primary source: *Displacement*
- Uses *Crosshead* location as default



X. Creating Methods – 14/41

12. Input *Test Control* parameters for your *Method*

- **Strain:**

- Primary source: **Strain 1**

- Only use when using **Extensometer**
- Toggle **Remove extensometer during test** to **On**

- Select Removal criteria as:

Yield (Offset 0.2%) or

Measurement event ->

Tensile strain (Strain 1) -> 100%

- Select Action during removal as **Pause test but suspend data capture**

The screenshot shows the 'Test Control' tab in a software interface. The left sidebar has tabs for 'Start Test', 'Strain', 'Pre-Test', 'Test', 'End of Test', and 'Data'. The 'Strain' tab is selected. The main panel contains the following settings:

- Primary source: Strain 1 (dropdown)
- Remove extensometer during test:
- Removal criteria: Yield (Offset 0.2 %) (dropdown)
- Action during removal: Pause test but suspend data capture (dropdown)
- Lock Tensile strain at removal:
- Play a wave file:
- Remove transverse extensometer during test:

Below the settings, there is a note: "This option requires an AVE/SVE or automatic extensometer with the transverse option." At the bottom of the interface, a status bar shows: "mseinstron | Demo | Tension | Sample: Closed | Method: | Report: Report - All Items |"

This close-up shows the 'Removal criteria' and 'Measurement' settings:

- Removal criteria: Measurement event (dropdown)
- Measurement: Tensile strain (Strain 1) (dropdown)
- Value: 100.00 (input field), f_x (function button), % (dropdown)
- Action during removal: Pause test but suspend data capture (dropdown)

X. Creating Methods – 15/41

12. Input *Test Control* parameters for your *Method*

- **Pre-Test:** Recommend **None**
- **Preload:** Remove slack in specimen
 - Recommend for **Flexural tests**
 - Control mode: **Displacement**
 - Rate: Choose desired rate
 - Measurement: **Force**
 - Value: Low value to confirm contact
- **Auto balance:** Automatically balances transducers after preload or precycling
- **Precycling:** May be required for some tests and not available in every testing type

The screenshot displays the 'Test Control' tab in a software interface. The left sidebar contains a navigation menu with the following items: Start Test, Strain, Pre-Test (highlighted), Test, End of Test, and Data. The main panel is titled 'Pre-test parameters are optional actions that occur before the system begins capturing data. Upon starting the test, the enabled actions occur in the order listed. If a measurement is not available, add it under Measurements.' The configuration options include:

- Temperature soak:** Disabled (checkbox).
- Preload:** Enabled (checkbox). Description: 'Remove slack in a specimen caused by gripping the specimen.'
- Control mode:** Displacement (dropdown menu).
- Rate:** 1.00 (input field), f_x (unit icon), mm/min (dropdown menu).
- Changeover criteria:** Measurement event (dropdown menu).
- Measurement:** Force (dropdown menu).
- Value:** 50.00 (input field), f_x (unit icon), N (dropdown menu).
- Overtravel:** Disabled (checkbox). Description: 'Stop test and perform end of test action if either overtravel condition occurs.'
- Auto balance:** Disabled (checkbox). Description: 'Automatically balance selected measurements after preload.'
- Precycling:** Disabled (checkbox). Description: 'Cycle between two specified boundary points.'

At the bottom of the interface, a status bar shows: 'reciprotron | Demo | Testplan | Sample: Closed | Method: | Report: Report | All Items |'

X. Creating Methods – 16/41

12. Input *Test Control* parameters for your *Method*

- *Test*

- *Ramp 1:*

- Control mode 1: *Displacement*

- Rate 1: Choose desired rate

- *Ramp 2:*

- Toggle *Off* if only single rate (*Ramp 1*) is sufficient

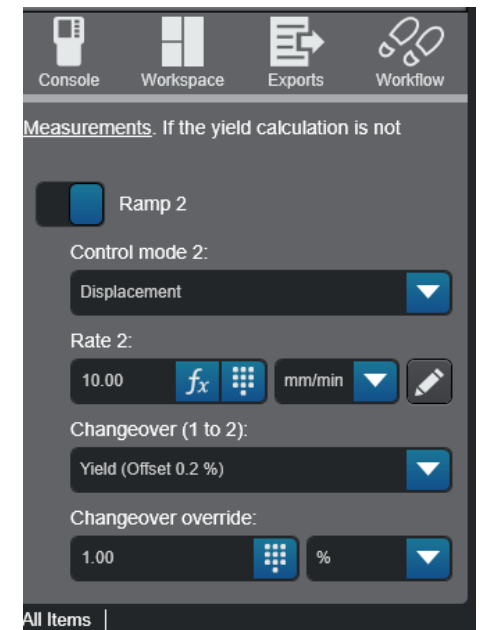
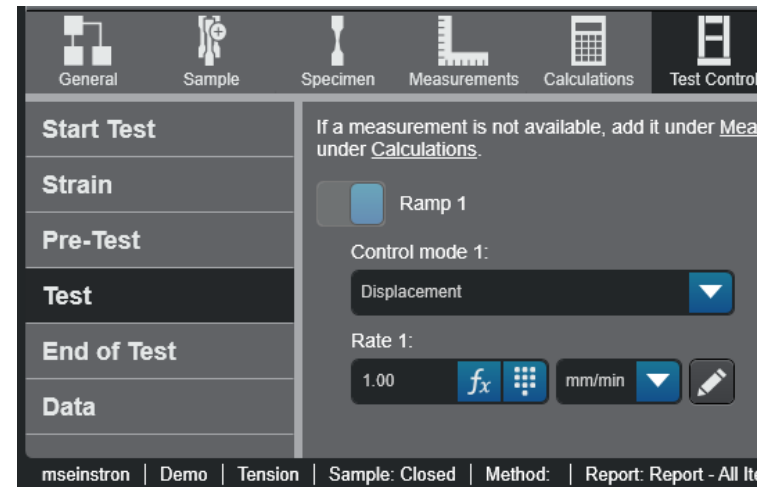
- Recommend to separate a slow speed in elastic region (*Ramp 1*) and a faster speed in the plastic region (*Ramp 2*) is desired

- Control mode 2: *Displacement*

- Rate 2: Choose higher desired rate (relative to *Ramp 1*)

- Changeover (1 to 2): *Yield (Offset 0.2%)*

- Changeover override: *Choose desired strain %*



X. Creating Methods – 17/41

12. Input *Test Control* parameters for your *Method*

- **End of Test**

- **End of test 1** (see *Help* for options)

 - Criteria 1: **Measurement rate**

 - Measurement 1: **Force**

 - Sensitivity 1: **40%**

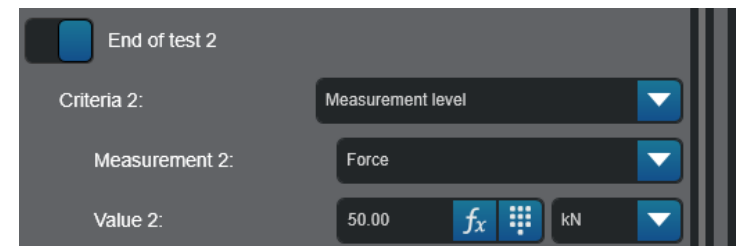
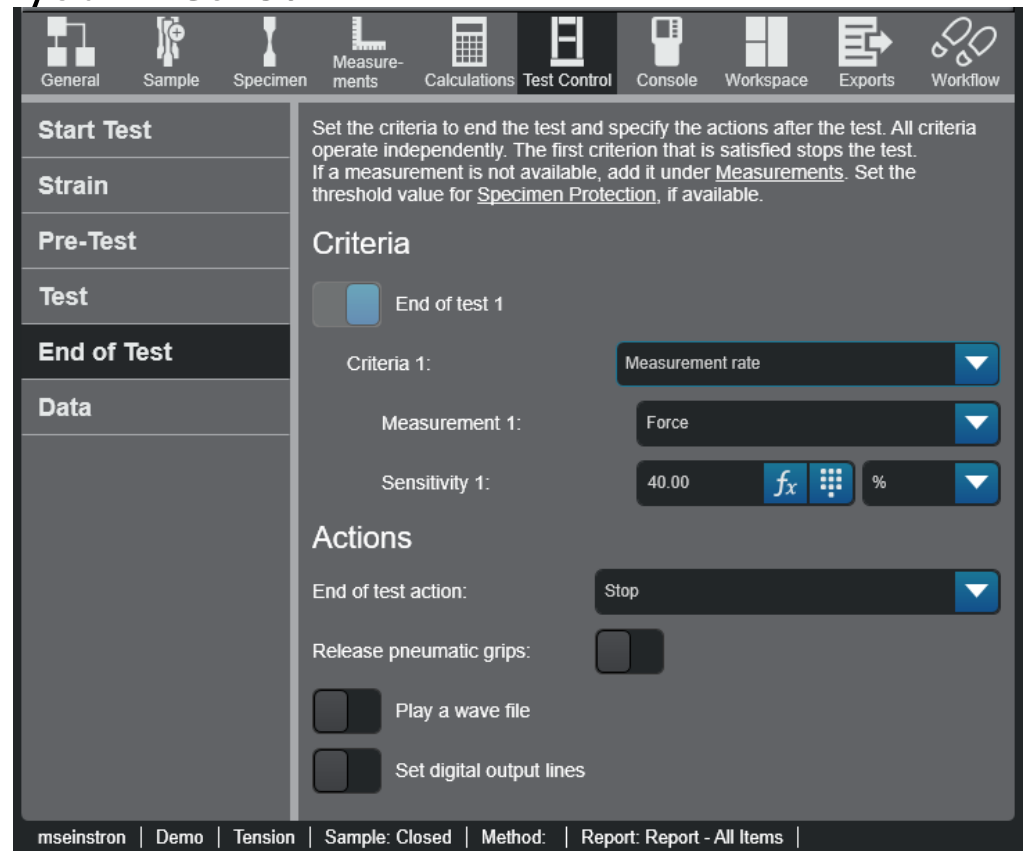
- **Actions**

 - End of test action: **Stop**

- **End of test 2 - 4**

 - Toggle **On** if more criteria are desired

 - Recommend: **Measurement level - Force = 50 kN**
Measurement level - Displacement



X. Creating Methods – 18/41

12. Input *Test Control* parameters for your *Method*

- **Data**

- **Data capture scheme:**

- Recommend **Default settings**

- Criteria 1: **Measurement rate**

- Measurement 1: **Time**

- Interval 1: **20 ms**

- **Record with TestCam**

- Toggle **On** if video recording is desired

- Video file quality: Choose **High – required to work**

- Video frame interval: **100 ms** (default)

The screenshot shows the 'Test Control' tab in a software interface. The left sidebar has a 'Data' section selected. The main panel displays the following settings:

- Start Test**: Specify how often the system captures test data. All criteria operate independently. The system captures data simultaneously from all selected measurements when any specified interval occurs.
- Data capture scheme**: Default settings (dropdown)
- Criteria 1**: (toggle)
- Measurement 1**: Time (text input)
- Interval 1**: 20.00 (text input) ms (dropdown)
- Criteria 2**: (toggle)
- Criteria 3**: (toggle)
- Record with TestCam**: (toggle)
- Video file quality**: Low (dropdown)
- Video frame interval**: 100.00 (text input) ms (dropdown)

At the bottom, there is a status bar: mseinstron | Demo | Tension | Sample: Closed | Method: | Report: Report - All Items |

Only setting with
“High” will work for
videos...

X. Creating Methods – 19/41

13. Input *Console* parameters for your *Method*

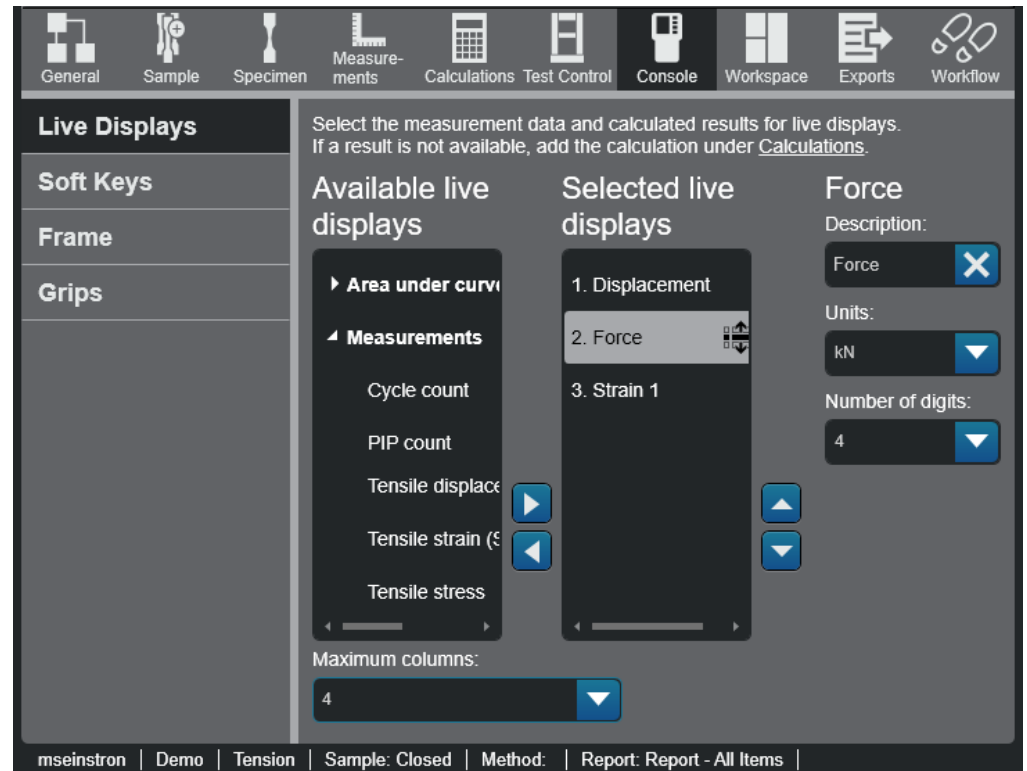
- *Live Displays*

- Confirm the following defaults:

- *Displacement*

- *Force*

- *Strain 1* (only if using *Extensometer*)



X. Creating Methods – 20/41

13. Input *Console* parameters for your *Method*

- **Soft Keys**

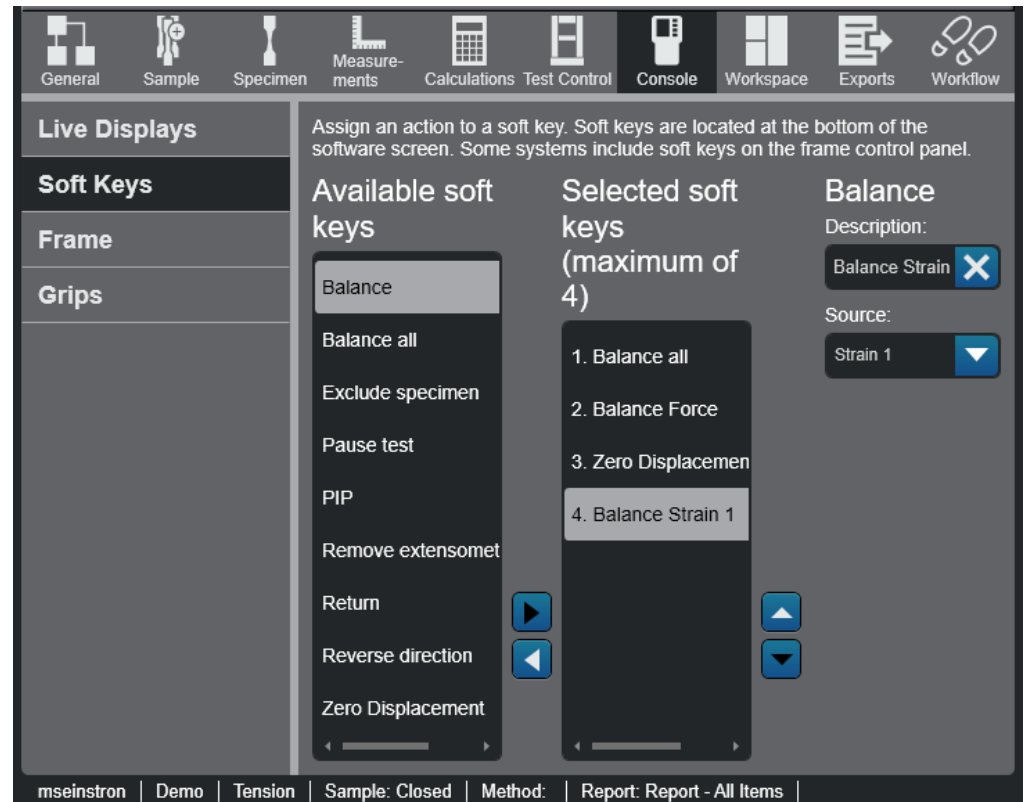
- Confirm the recommended defaults:

- ***Balance All***

- ***Balance Force***

- ***Zero Displacement***

- ***Balance Strain 1***
(if using *Extensometer*)



X. Creating Methods – 21/41

13. Input *Console* parameters for your *Method*

○ *Frame*

- Test area: ***Below crosshead***
- Jog rate: ***600 mm/min***
- Return rate: ***799.98 mm/min***
- Displacement returns to: ***0 mm***

The screenshot shows the software interface with the 'Console' tab selected. The left sidebar has 'Frame' selected under 'Grips'. The main area displays the following parameters:

- Test area:** Below crosshead
- Frame rates:**
 - Jog rate:** 600.00 mm/min. Valid values are between 0.00 mm/min and 600.00 mm/min.
 - Return rate:** 799.98 mm/min. Valid values are between 101.60 mm/min and 799.98 mm/min.
- Return destination:** Displacement returns to: 0.00 mm

The status bar at the bottom reads: mseinstron | Demo | Tension | Sample: Closed | Method: | Report: Report - All Items |

○ *Grips*

- ***Not applicable - Ignore***

The screenshot shows the software interface with the 'Console' tab selected. The left sidebar has 'Grips' selected. The main area displays the following parameters:

- Enable pretension:**
- Enable excess tension:**

Protect the specimen from too much force. The grips open if the excess tension value is reached before the test starts.

The status bar at the bottom reads: mseinstron | Demo | Tension | Sample: Closed | Method: | Report: Report - All Items |

X. Creating Methods – 22/41

14. Input *Workspace* parameters for your *Method*

- **Operator Inputs**
- Recommend **Specimen properties** for **Calculations**
 - **Length**
 - **Thickness**
 - **Width**
- Toggle when values cannot be changed
 - Untested – **Off** by default
 - Testing – **On** by default
 - Tested – **Off** by default



X. Creating Methods – 23/41

14. Input *Workspace* parameters for your *Method*

- **Results 1** and **Results 2**
- **Columns**
 - Add results to **Results 1 Table** and **Results 2 Table**
 - Toggle **Failure Bounds** to **On** and enter bounds if **Pass/Fail** status is desired in **Workspace** and **Results 1 Table** and **Results 2 Table**

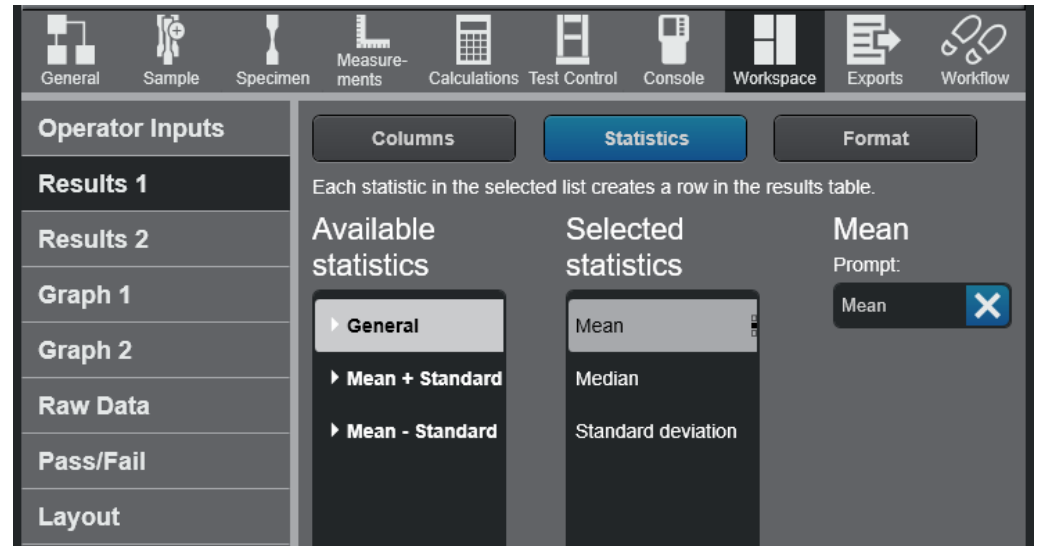
The screenshot shows the software interface for creating methods, specifically the 'Columns' tab. The interface is divided into several sections:

- Operator Inputs:** A vertical list on the left with options: Results 1, Results 2, Graph 1, Graph 2, Raw Data, Pass/Fail, and Layout.
- Columns:** The main tab, containing a 'Columns' button, 'Statistics', and 'Format' buttons. Below these are 'Available results' and 'Selected results' lists.
- Available results:** A list of categories and sub-items, including 'Area under curve', 'General', 'Modulus (Automatic Young's)', 'Sample choice input', 'Specimen choice input', 'Specimen notes', 'Specimen number inputs', 'Specimen properties', 'Specimen text inputs', 'Strain', 'Test', and 'Yield (Offset 0.2 %)'.
- Selected results:** A list of results currently selected, including 'Area under curve', 'Specimen number (included)', 'Modulus (Automatic Young's)', 'Length', 'Thickness', 'Width', and 'Tensile stress at Yield (Offset 0.2 %)'.
- Area under curve:** A configuration panel for the 'Area under curve' result, including a 'Prompt' field (set to 'Area under curve'), 'Units' (set to 'J'), and 'Failure bounds' (set to 'Results'). It also includes 'Upper bound' and 'Lower bound' fields for both 'Results' and 'Mean and median'.

X. Creating Methods – 24/41

14. Input *Workspace* parameters for your *Method*

- **Results 1** and **Results 2**
- **Statistics**
 - Add statistics to **Results 1 Table** and **Results 2 Table**



X. Creating Methods – 25/41

14. Input *Workspace* parameters for your *Method*

- **Results 1** and **Results 2**
- **Format**
 - Customize **Format** for **Results 1 Table** and **Results 2 Table**

Operator Inputs

Results 1

Results 2

Graph 1

Graph 2

Raw Data

Pass/Fail

Layout

Columns Statistics **Format**

Customize the format of the results table. "Show excluded specimens" is a global setting that also applies to the raw data table and graphs.

Table styles: Table element:

Column Headings	Area under curve [J]	Sp
1	0.00	
2	0.00	
3	0.00	
4	0.00	
Mean	0.00	
Median	0.00	
Standard deviation		

Show excluded specimens

Show results

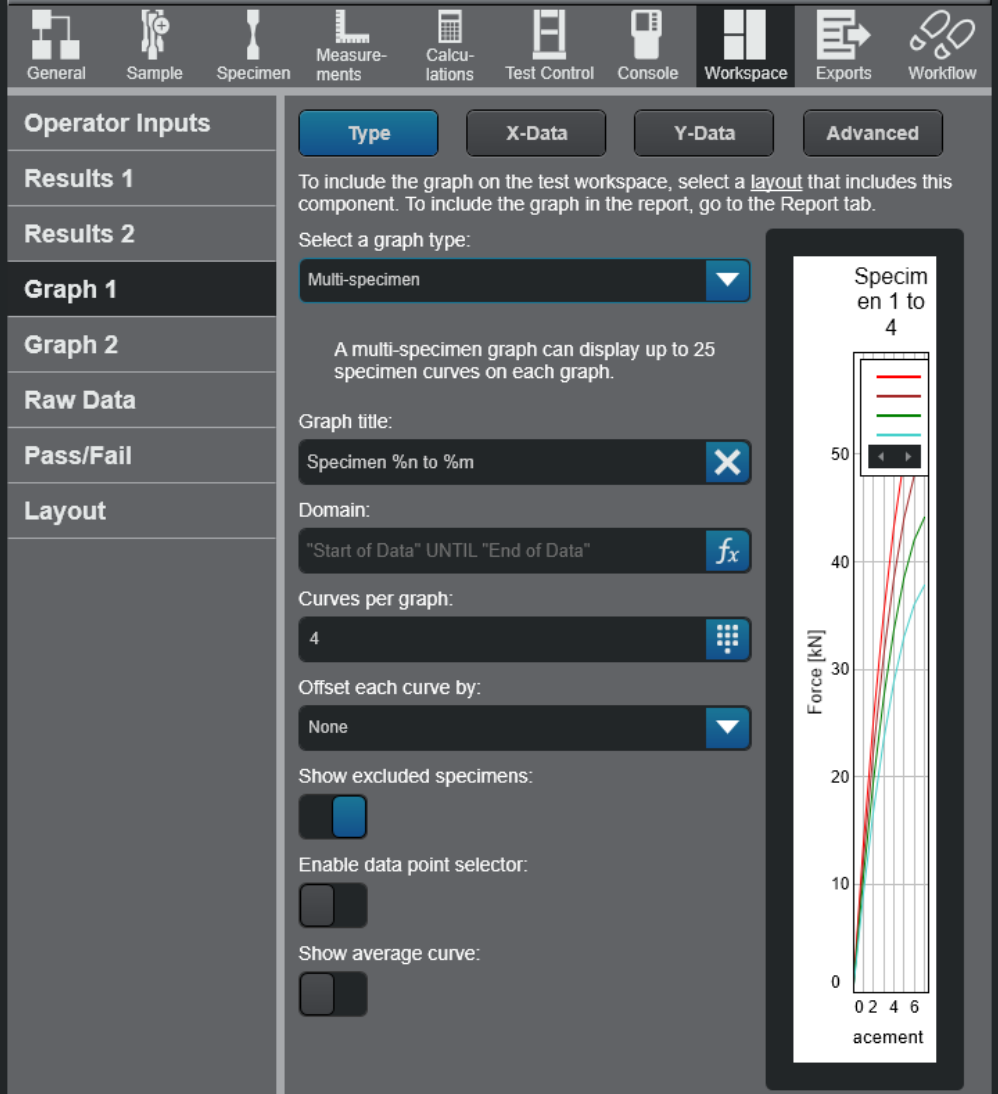
Show group statistics

Show sample statistics

X. Creating Methods – 26/41

14. Input *Workspace* parameters for your *Method*

- **Graph 1** and **Graph 2**
- **Type**
 - Customize **Graph Type** for **Graph 1** and **Graph 2**



The screenshot shows the software interface for configuring a graph type. The top navigation bar includes icons for General, Sample, Specimen, Measurements, Calculations, Test Control, Console, Workspace, Exports, and Workflow. The left sidebar lists various configuration options: Operator Inputs, Results 1, Results 2, Graph 1 (selected), Graph 2, Raw Data, Pass/Fail, and Layout. The main panel is titled 'Type' and contains the following settings:

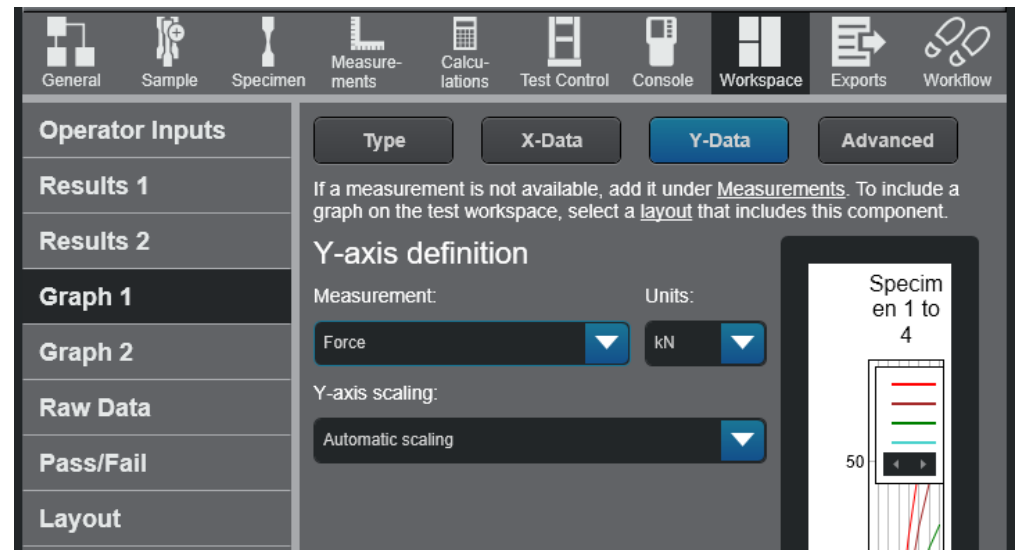
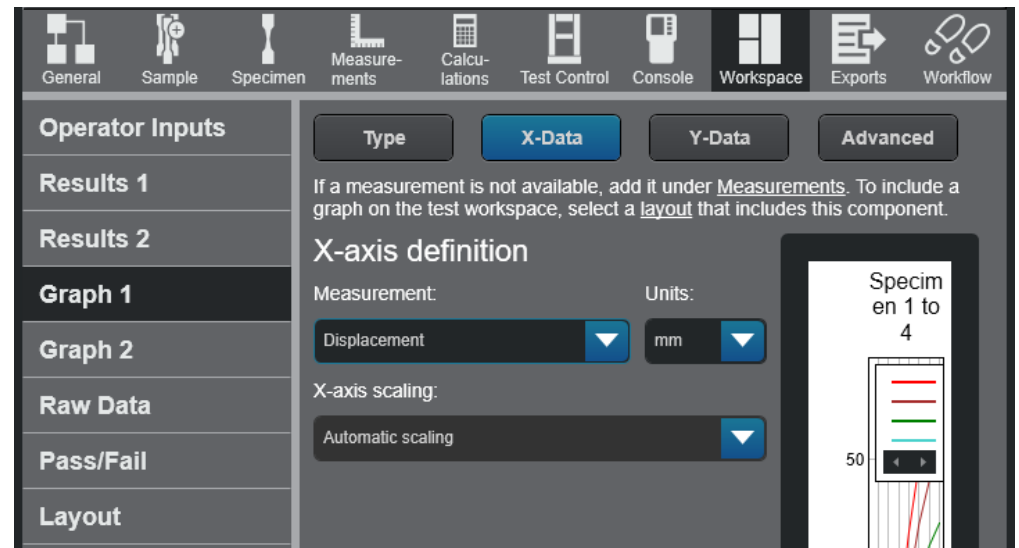
- Type:** Multi-specimen (selected from a dropdown menu)
- Description:** A multi-specimen graph can display up to 25 specimen curves on each graph.
- Graph title:** Specimen %n to %m
- Domain:** "Start of Data" UNTIL "End of Data" (with a function key f_x)
- Curves per graph:** 4
- Offset each curve by:** None
- Show excluded specimens:**
- Enable data point selector:**
- Show average curve:**

On the right side, there is a preview window titled 'Specimen 1 to 4' showing a graph of Force [kN] versus displacement (labeled 'acement'). The graph displays four distinct curves in red, orange, green, and cyan, representing different specimens. The y-axis ranges from 0 to 50 kN, and the x-axis ranges from 0 to 6.

X. Creating Methods – 27/41

14. Input *Workspace* parameters for your *Method*

- **Graph 1** and **Graph 2**
- **X-Data**
 - Customize **X-Data** for **Graph 1** and **Graph 2**
- **Y-Data**
 - Customize **Y-Data** for **Graph 1** and **Graph 2**



X. Creating Methods – 28/41

14. Input *Workspace* parameters for your *Method*

- **Graph 1** and **Graph 2**
- **Advanced**
 - Customize **Advanced Format** for **Graph 1** and **Graph 2**

The screenshot shows a software interface with a top navigation bar containing icons for General, Sample, Specimen, Measurements, Calculations, Test Control, Console, Workspace, Exports, and Workflow. The main interface is divided into a left sidebar and a right main area. The sidebar has a menu with the following items: Operator Inputs, Results 1, Results 2, Graph 1 (highlighted), Graph 2, Raw Data, Pass/Fail, and Layout. The main area has tabs for Type, X-Data, Y-Data, and Advanced (selected). Below the tabs, there is a section titled 'Average curve' with the following settings: Line style: Solid (dropdown), Line width: 1 (slider), Line color: (dropdown with an 'Edit...' button), Symbol: None (dropdown), Symbol size: 4 (slider), and Symbol color: (dropdown with an 'Edit...' button). On the right side of the main area, there is a graph titled 'Specimen 1 to 4'. The y-axis is labeled 'Force [kN]' and ranges from 0 to 50. The x-axis is labeled 'acement' and ranges from 0 to 6. The graph shows four curves in different colors (red, green, blue, and cyan) representing different specimens. A legend in the top right of the graph area shows the color coding for the specimens.

X. Creating Methods – 29/41

14. Input *Workspace* parameters for your *Method*

- **Raw Data**

- **Columns**

- Recommended **Measurements** to be added as a new **Column** to **Raw Data Table**

- **Time**

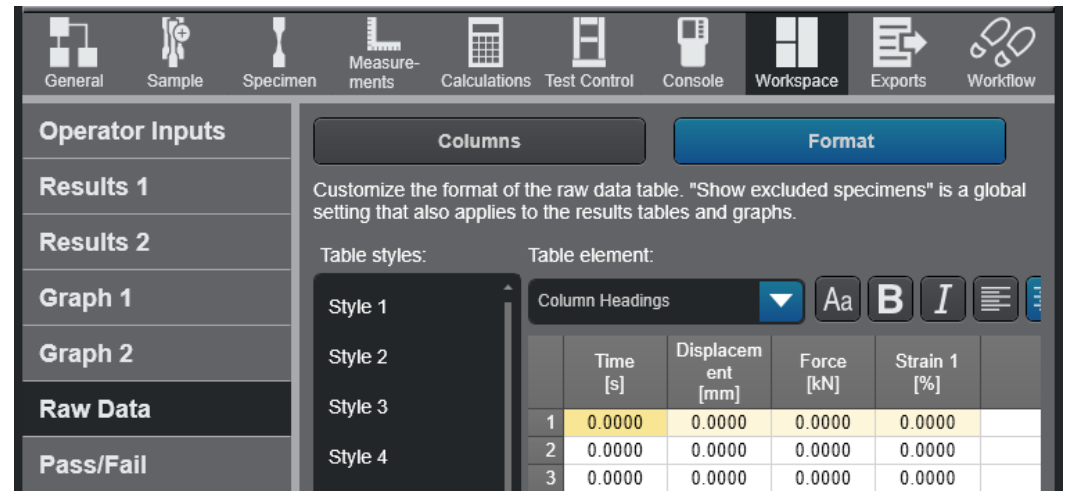
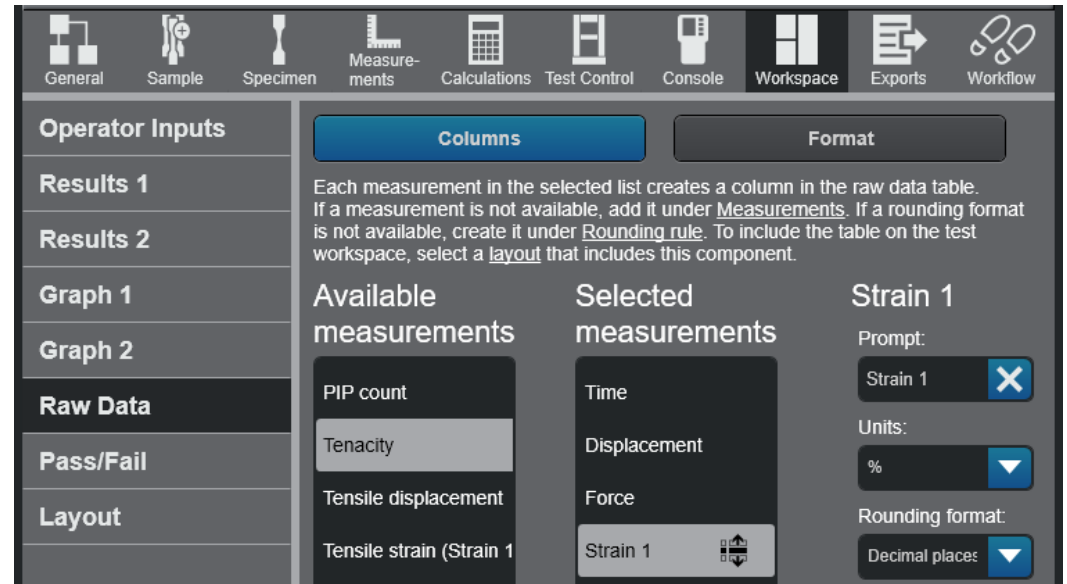
- **Displacement**

- **Force**

- **Strain 1** (if using **Extensometer**)

- **Format**

- Customize **Format** for **Raw Data Table**



X. Creating Methods – 30/41

14. Input *Workspace* parameters for your *Method*

- **Pass/Fail**
- **Pass/Fail Settings**
 - Change description of **Pass** and **Fail** text of each specimen based on **Failure Bounds** criteria found in **Results 1 Table** and **Results 2 Table**

The screenshot displays the software's configuration interface for the 'Pass/Fail' settings. The top navigation bar includes icons for General, Sample, Specimen, Measurements, Calculations, Test Control, Console, Workspace, Exports, and Workflow. The 'Workspace' tab is currently selected. On the left, a sidebar menu lists various configuration sections: Operator Inputs, Results 1, Results 2, Graph 1, Graph 2, Raw Data, Pass/Fail, and Layout. The 'Pass/Fail' section is active, showing a description: 'Indicate the status of each tested specimen based on the failure bounds criteria for the specimen results. Enable Results under 'Failure bounds' to set the bounds criteria on results table 1 and results table 2.' Below this, there are two input fields for descriptions: 'Pass' and 'Fail', each with a blue 'X' icon to its right. The status bar at the bottom indicates the current context: 'mseinstron | Demo | Tension | Sample: Closed | Method: | Report: Report - All Items*'.

X. Creating Methods – 31/41

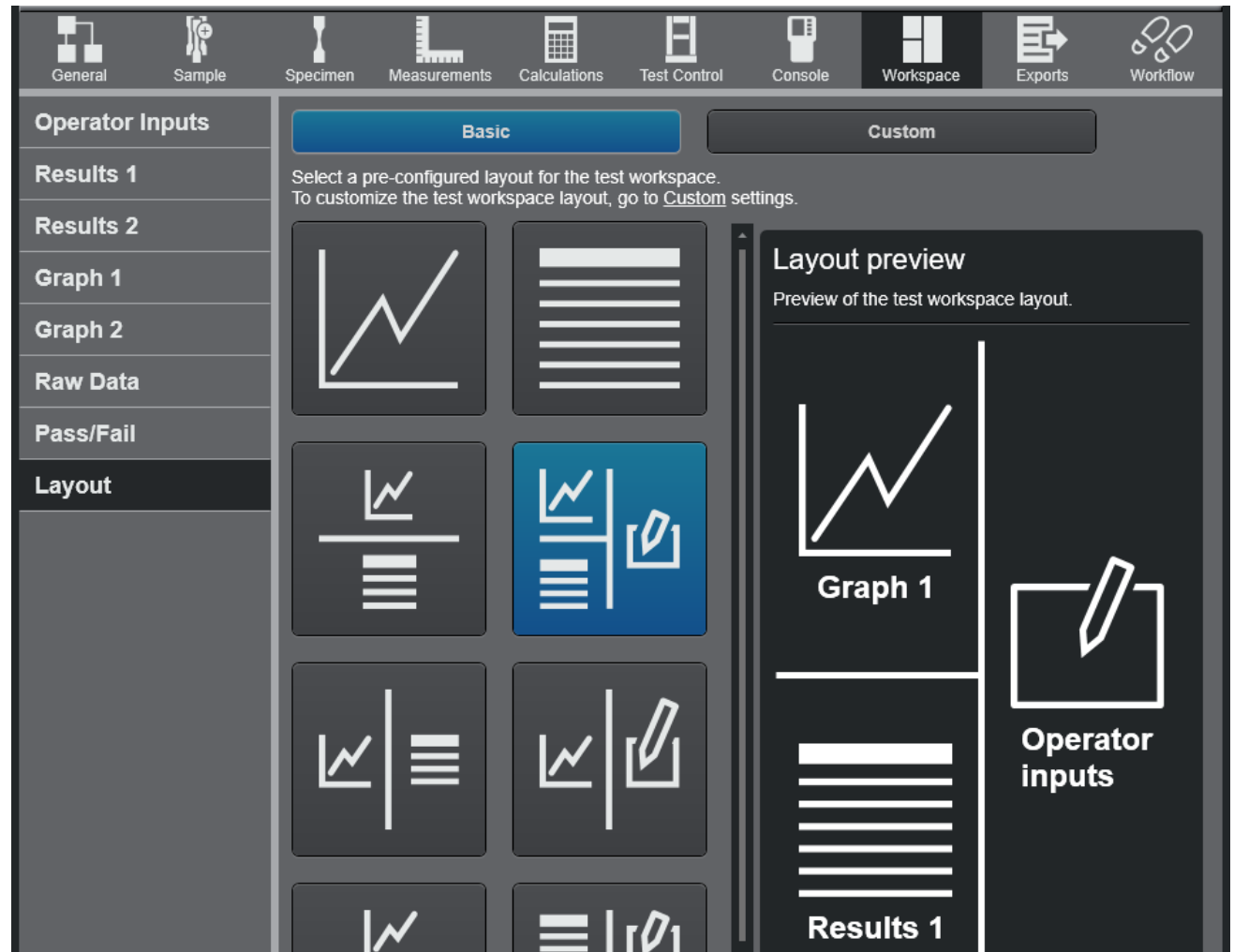
14. Input *Workspace* parameters for your *Method*

- **Layout**

- **Basic**

- Select a pre-configured layout for the **Test Workspace**

- Adding **Video** to the **Test Workspace** requires **Custom** layout



X. Creating Methods – 32/41

14. Input *Workspace* parameters for your *Method*

- **Layout**

- **Custom**

- Split Plane Horizontally



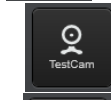
- Split Plane Vertically



- Delete Plane



- Add TestCam



- Add Pass/Fail



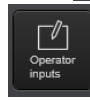
- Add Raw Data



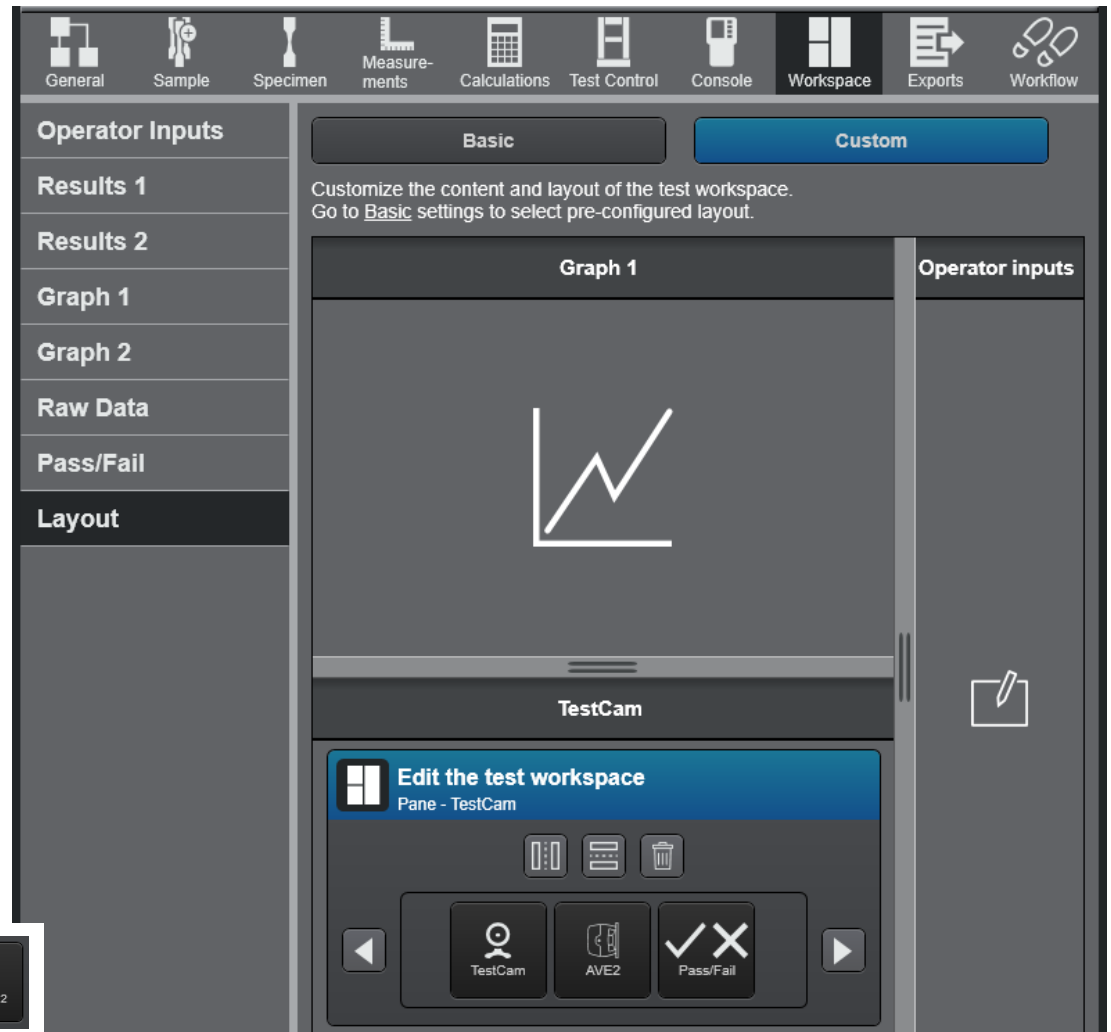
- Add Graph 1 or Graph 2



- Add Operator Inputs



- Add Results 1 or Results 2



X. Creating Methods – 33/41

15. Input **Exports** parameters for your **Method**

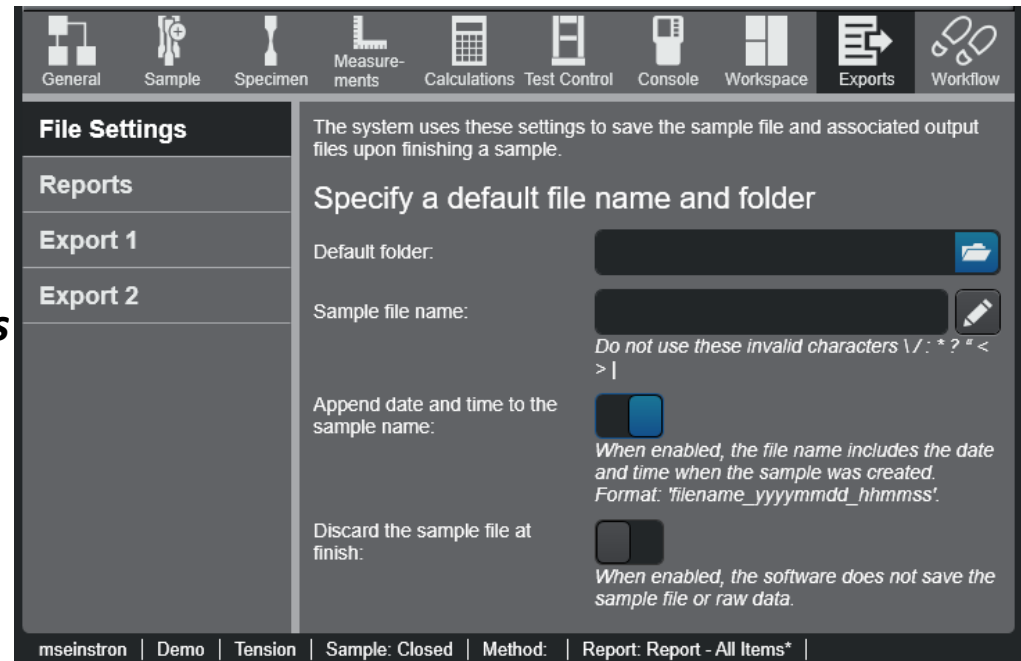
- **File Settings**

- **Default Folder**

- Enter **Default Folder Location** where **Sample File** and associated **Output Files** are saved upon finishing a **Sample**

- **Sample File Name**

- Enter **Default Sample File Name**



- **Append Date and Time to the Sample Name**

- Recommend toggling to **On**

- **Discard the Sample File at Finish**

- Recommend toggling to **Off**

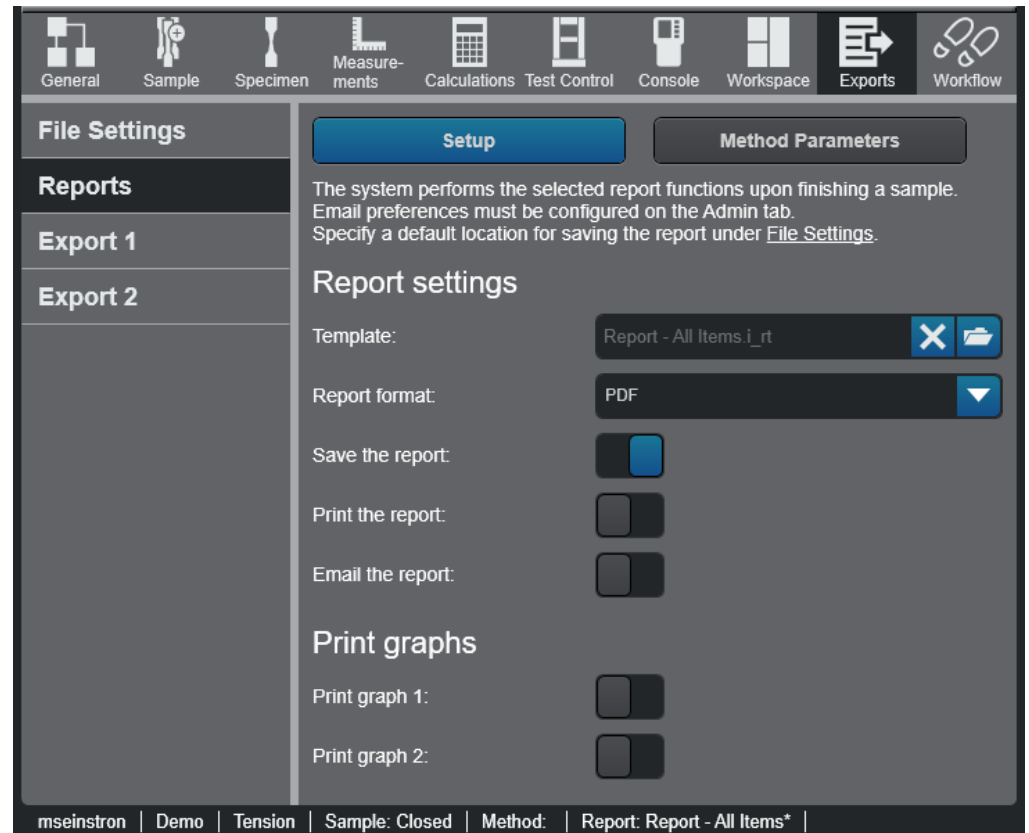
X. Creating Methods – 34/41

15. Input **Exports** parameters for your **Method**

- **Reports**

- **Setup**

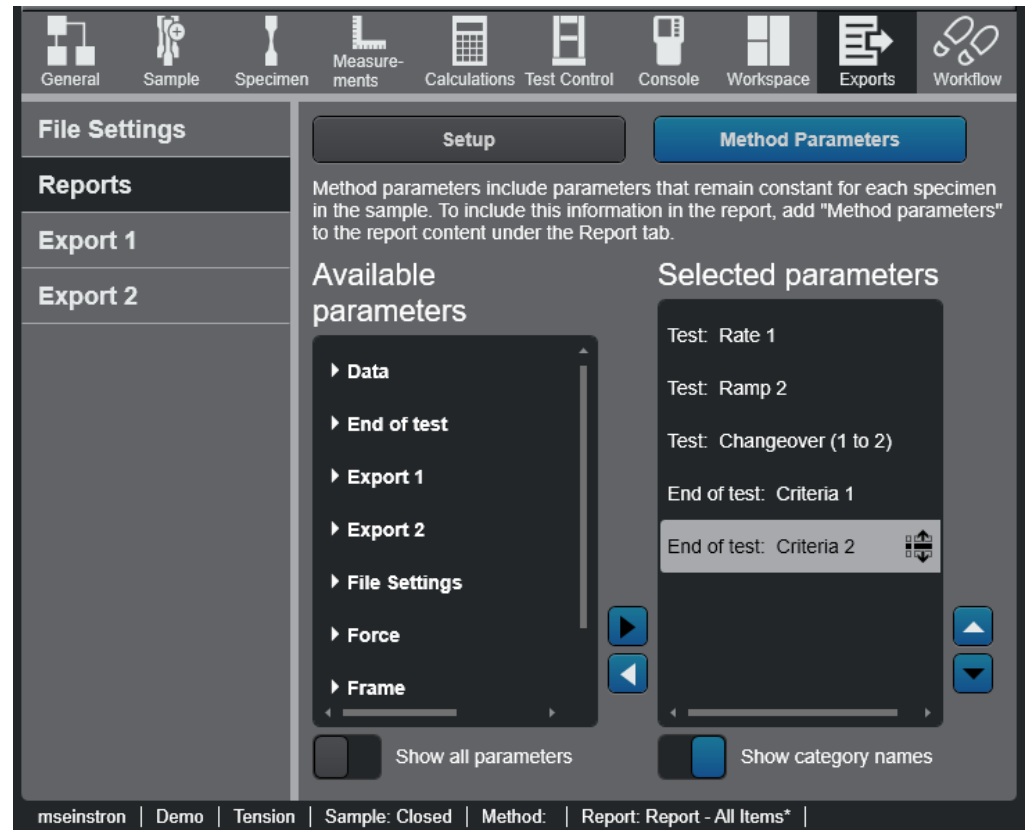
- Template: Keep **Default**
- Report Format: Keep **PDF**
- Save the Report: Toggle **On** if desired
- Print the Report: Keep **Off**
- Email the Report: Keep **Off**
- Print Graph 1: Keep **Off**
- Print Graph 2: Keep **Off**



X. Creating Methods – 35/41

15. Input *Exports* parameters for your *Method*

- **Reports**
- **Method Parameters**
 - Add desired **Parameters** that remain constant for each **Specimen** in the **Sample**
 - Add **Method Parameters** to **Report Template** to have it appear in the **Report**



X. Creating Methods – 36/41

15. Input *Exports* parameters for your *Method*

- *Export 1* and *Export 2*

- *Setup*

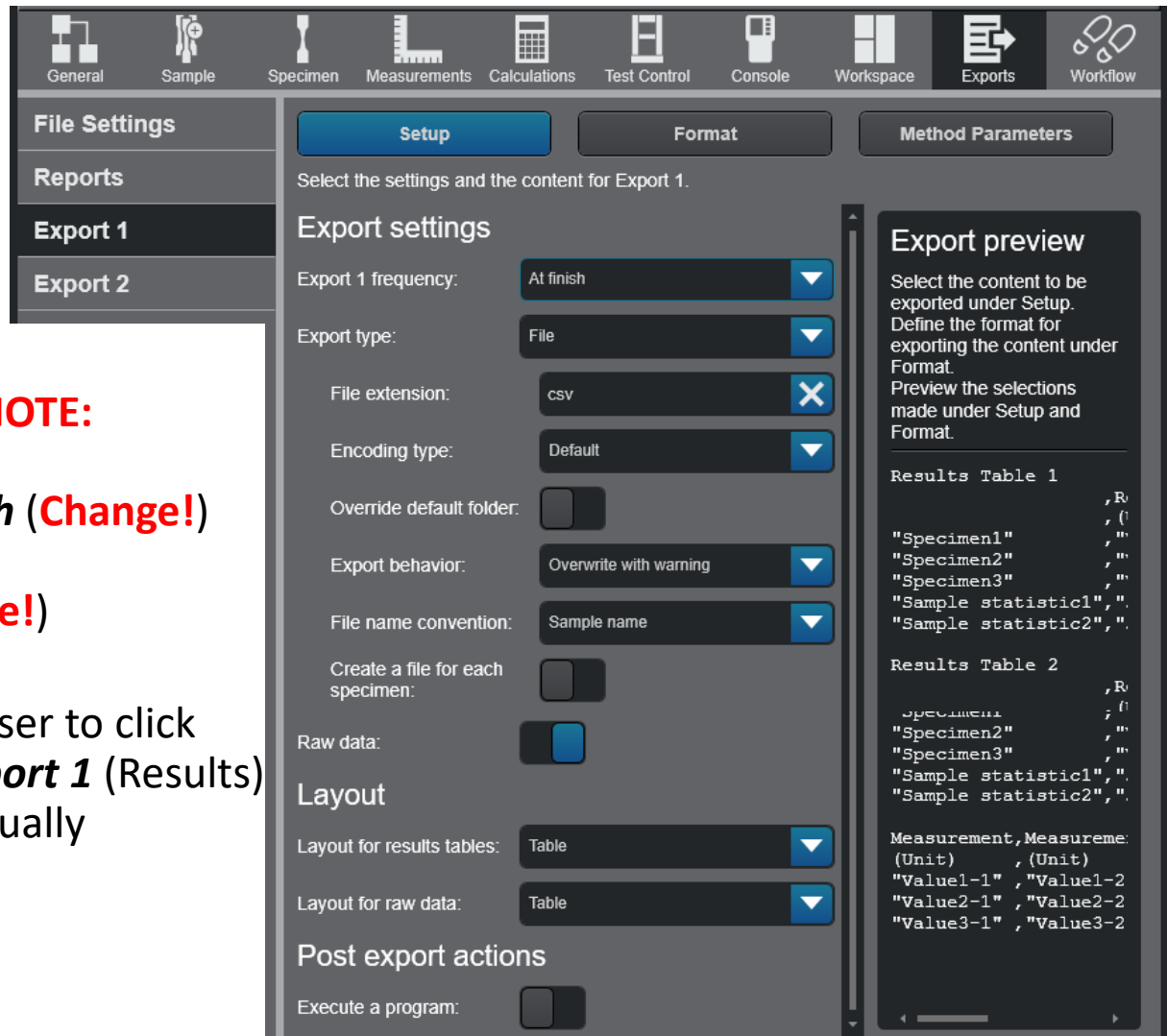
- Select desired settings for *Export 1* to export *At Finish*

- **IMPORTANT SETTINGS TO NOTE:**

- Export 1 frequency: *At Finish* (**Change!**)

- Raw data: Toggle *On* (**Change!**)

- Default settings will require user to click *Export* button to perform *Export 1* (Results) and *Export 2* (Raw Data) manually



X. Creating Methods – 37/41

15. Input **Exports** parameters for your **Method**

- **Export 1** and **Export 2**

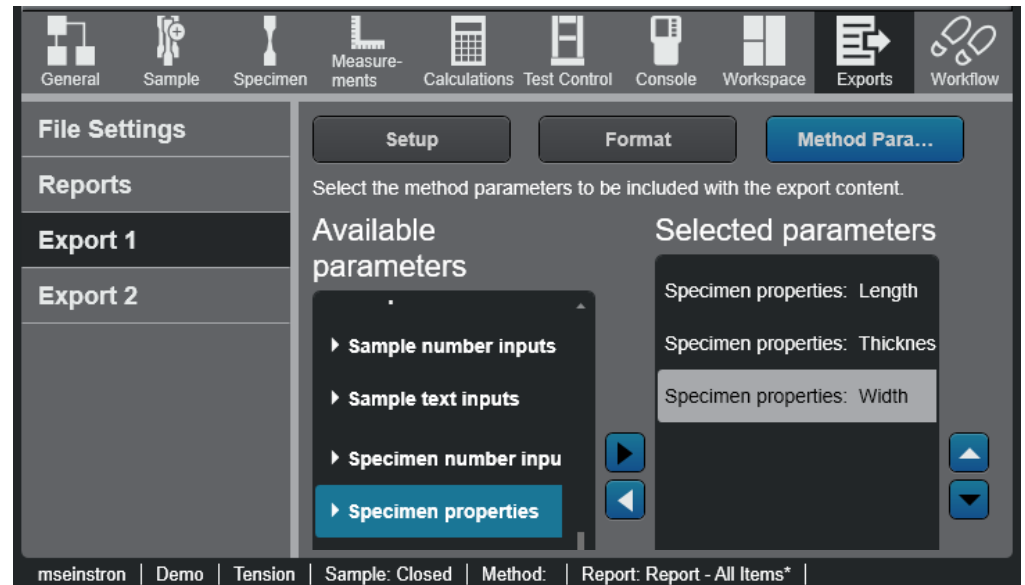
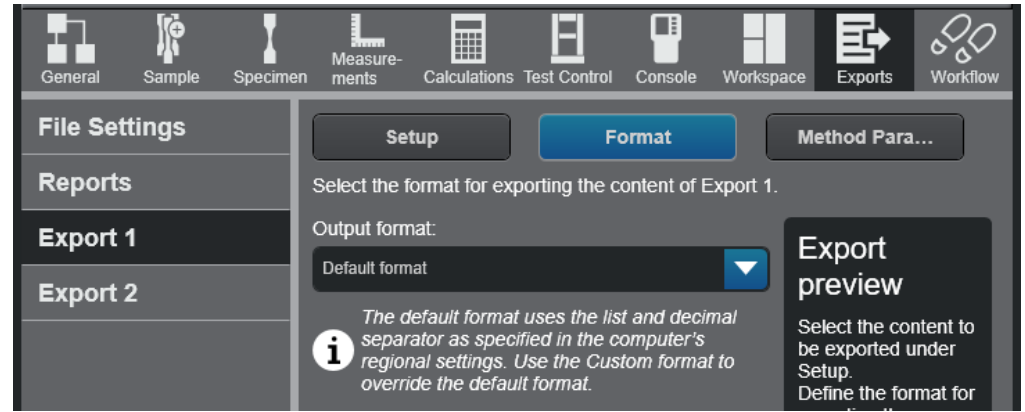
- **Format**

- Output Format: Recommend **Default**

- **Method Parameters**

- Select desired **Method Parameters** to include in Export Files

- Recommend **Specimen Properties**

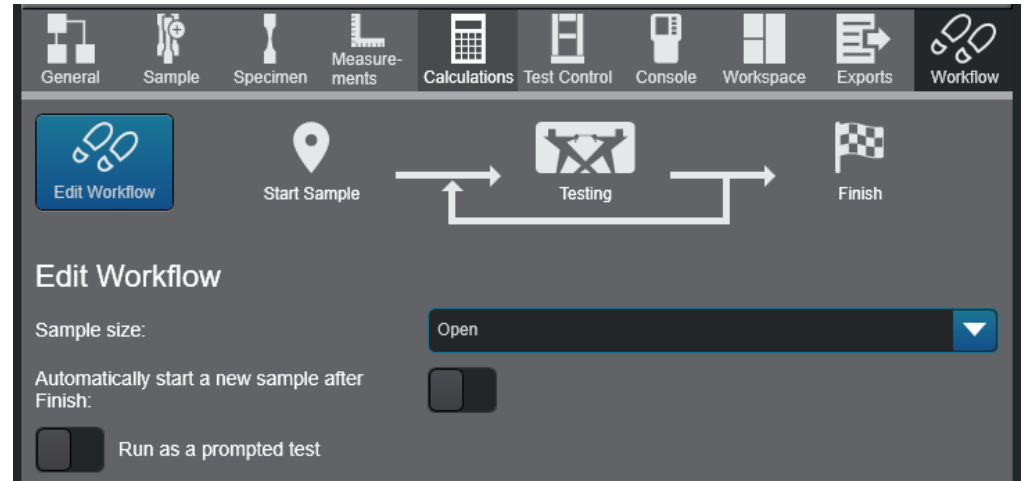


X. Creating Methods – 38/41

16. Input *Workflow* parameters for your *Method*

- **Edit Workflow**

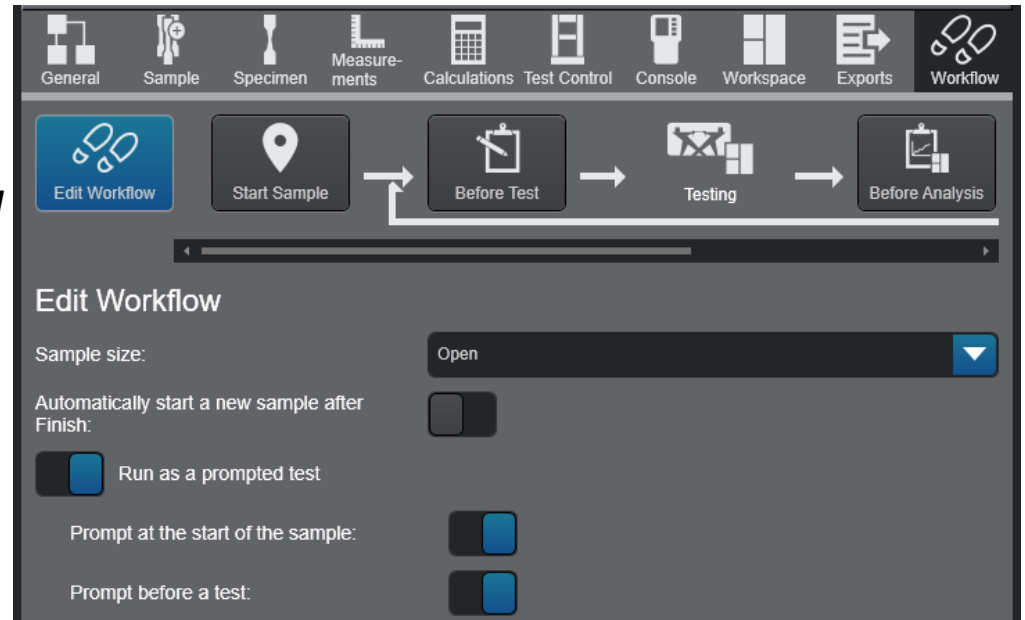
- Recommend keeping **Default** settings



- **Run as a Prompted Test**

- If using **Video** **DO NOT** toggle **Run as a Prompted Test** to **On**

- Toggle **On** if you wish to prompt user to enter in parameters at specified **Workflow States** (Start Sample, Before Test, Before Analysis, Test Notes, or Finish)



X. Creating Methods – 39/41

17. Click on the **Report** tab at the top to edit **Report Template**

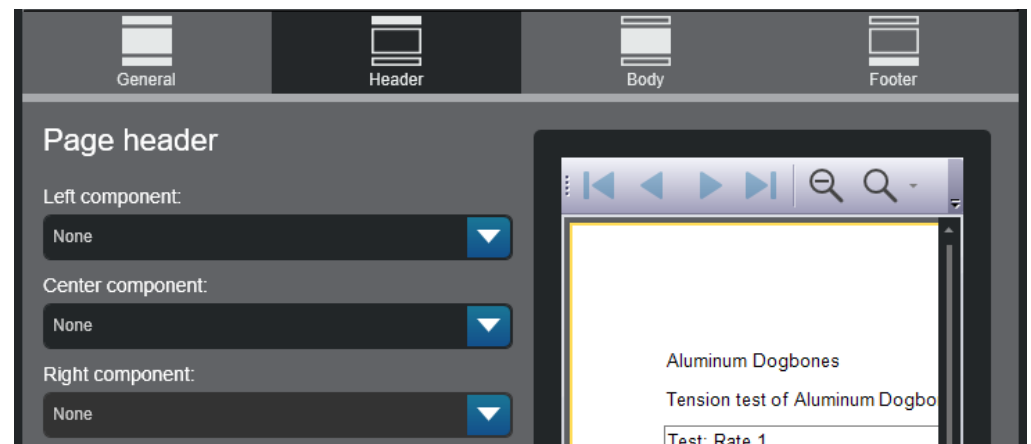
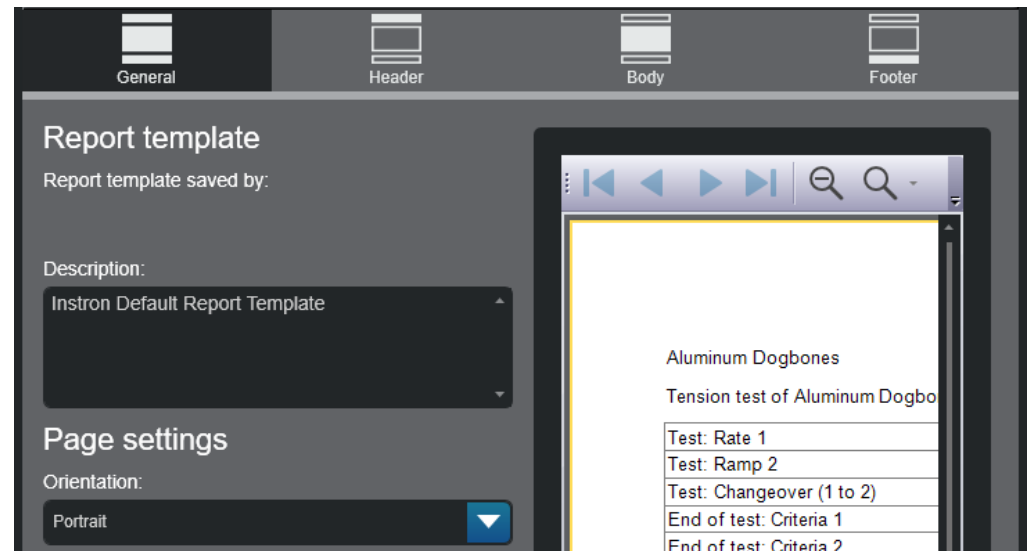
- **Report**

- **General**

- Edit **General** settings

- **Header**

- Edit **Page Header** settings



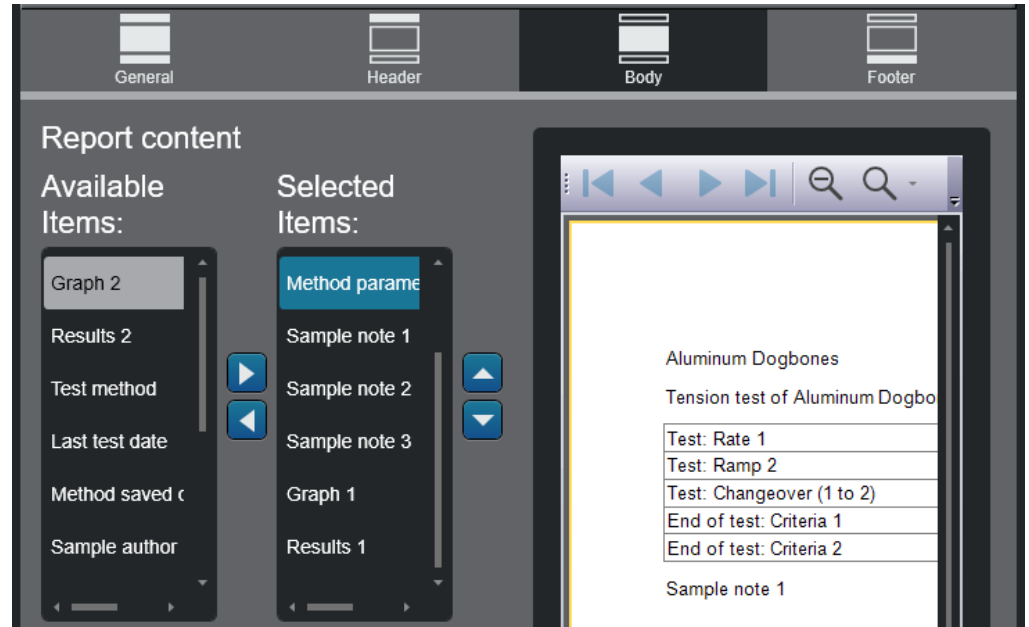
X. Creating Methods – 40/41

17. Click on the **Report** tab at the top to edit **Report Template**

- **Report**

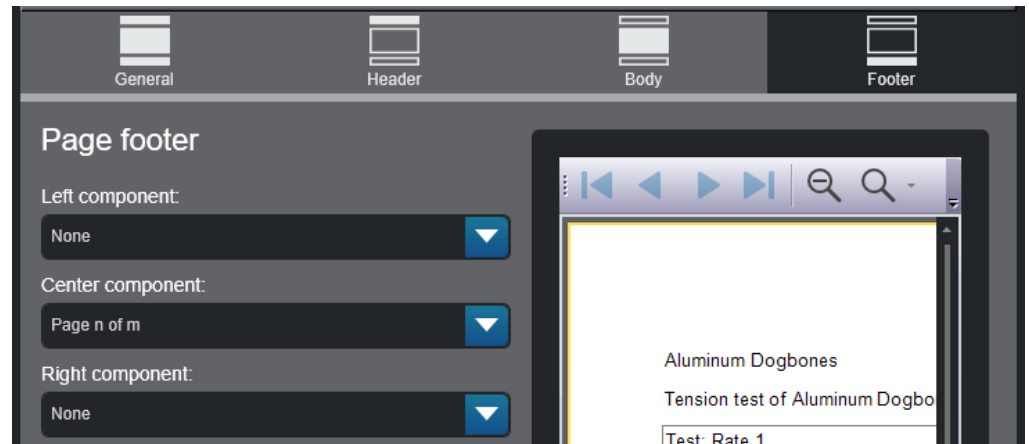
- **Body**

- Edit **Report Content** for the **Body**



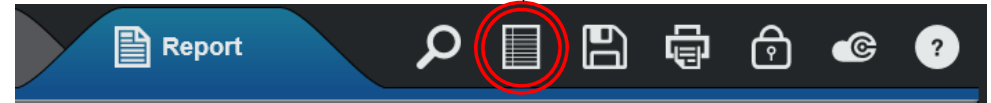
- **Footer**

- Edit **Page Footer** settings

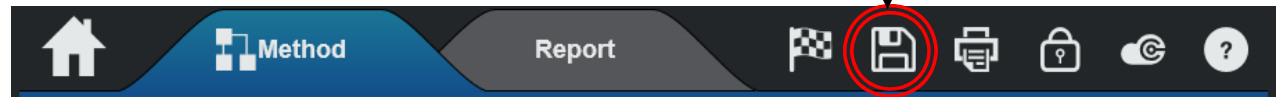


X. Creating Methods – 41/41

18. Click on **Preview Icon** to preview **Report**

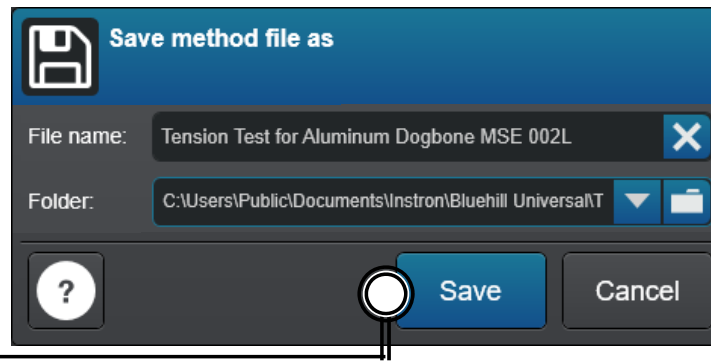


19. Click on **Save Icon** to save **Method**



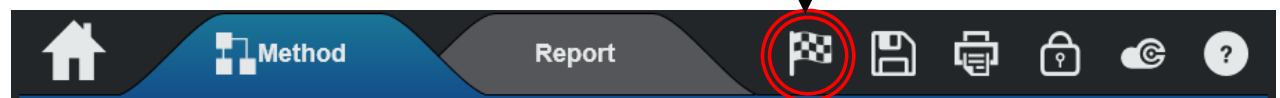
20. Default **Save Location** is: C:\Users\Public\Documents\Instron\Bluehill Universal\Templates\Bluehill Universal User Methods**<YOUR FOLDER>**

21. Enter a descriptive **File Name**



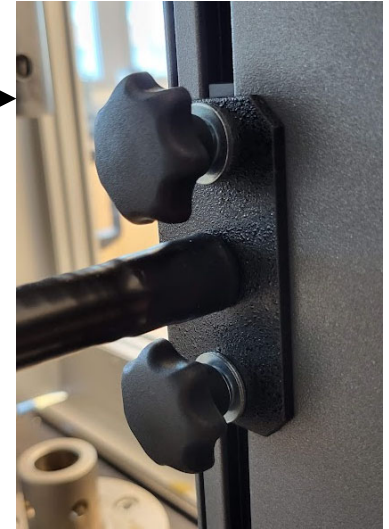
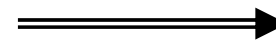
22. Click **Save**

23. Click **Finish** to save and close **Method**



XI. Configuring Camera – 1/1

1. Loosen the **Knobs** to position the **Camera Height** along the back of the **Instron Frame**



2. Carefully adjust the **Camera Angle** by adjusting **Ball Socket**



3. For more control over **Video Image** change **Camera Settings** by clicking on icon on the **Desktop**



4. Install the **Window Cover** to cover the **Plastic Shield Window**

XII. Running Test – 1/6

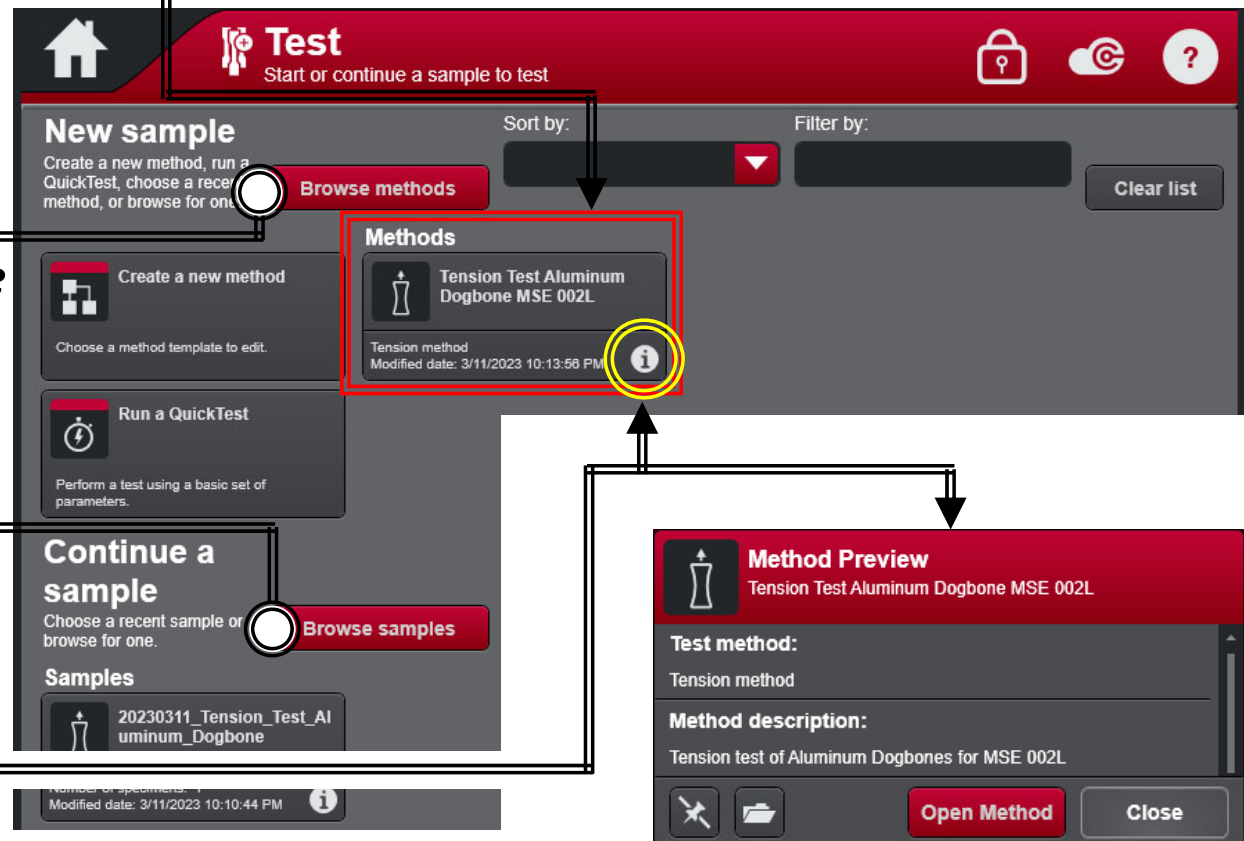
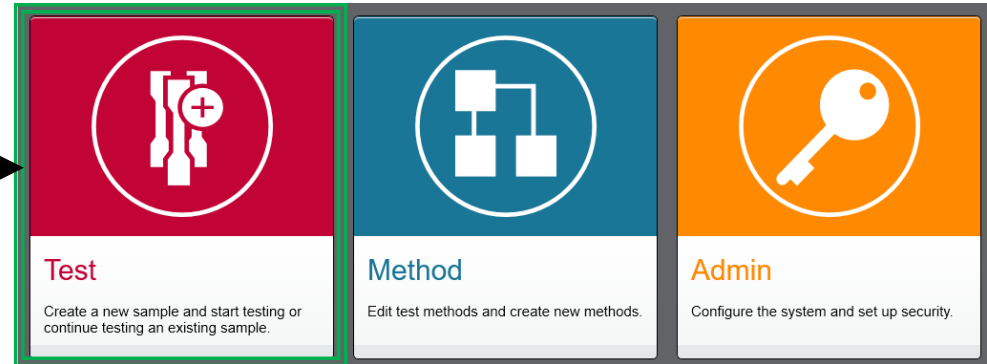
1. Click **Test** on the **Home screen**

2. For a **New Sample Test** select the desired **Recent Method**

3. Or click **Browse Methods**

4. To **Continue A Sample Test** click on **Browse Samples**

5. Click the **Preview Icon** to check **Method Details** to confirm correct **Method**



XII. Running Test – 2/6

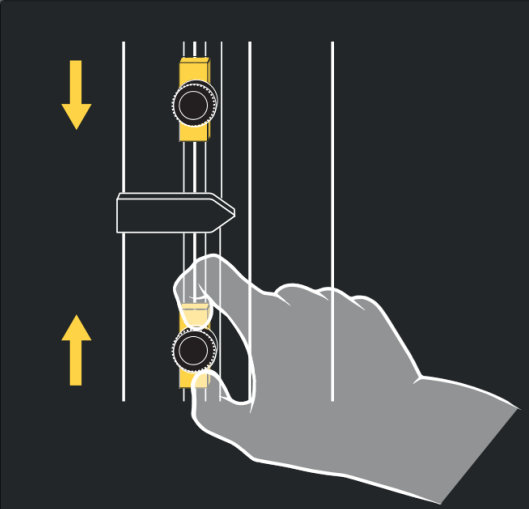
6. Proceed to follow the prompt to **Set Travel Limits** and click **OK**
7. Always set **Upper** and **Lower Limits** before operating the Instron and ensure appropriate limits are set before moving the **Crosshead**

⚠ Set the travel limits

Set the appropriate crosshead travel limits to reduce the risk of bodily injury and damage to the specimen or system.

Refer to the operator's guide for instructions.

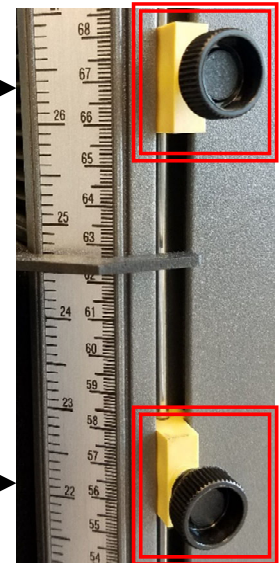
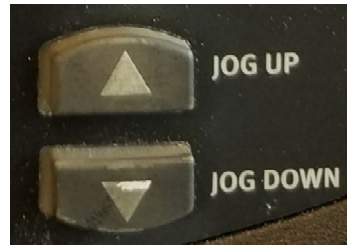
The sample is ready for testing. Press OK after the travel limits are set.




OK

8. Loosen and move the **Slides** to the desired positions and tighten the **Thumb Screws**

9. Position the **Crosshead** to its starting position for the test using **Jog** Δ ∇ and **Fine Jog** controls



XII. Running Test – 3/6

10. Determine how you would like to measure strain (if applicable)
 - a) “**Displacement**” is determined by the location of the **Cross Head** (Default)
 - b) “**Strain 1**” is determined by **Extensometer** via the knife edge distance
11. Collect all **Specimens** together that will make up your **Sample** and identify each **Specimen** (e.g. with markings) by 1, 2, 3 and measure **Dimensions....**
12. Click “**Balance All**” A rectangular button with a dark grey background and a thin border. On the left is a white icon of a balance scale. To the right of the icon, the text "Balance all" is written in white.
13. Load your **Specimen** into installed **Fixture** or **Grips** and **Close Door**

Note: Force reading may be **Non-Zero** due to applied load from **Fixture** or **Grips**

14. Click “**Zero Displacement**” A rectangular button with a dark grey background and a thin border. In the center is a white icon of a zero with arrows pointing left and right. To the right of the icon, the text "Zero Displacement" is written in white.

NOTE: Always RESET GL (GAUGE LENGTH) or ZERO DISPLACEMENT after jogging or manually changing position of the crosshead before starting any tests

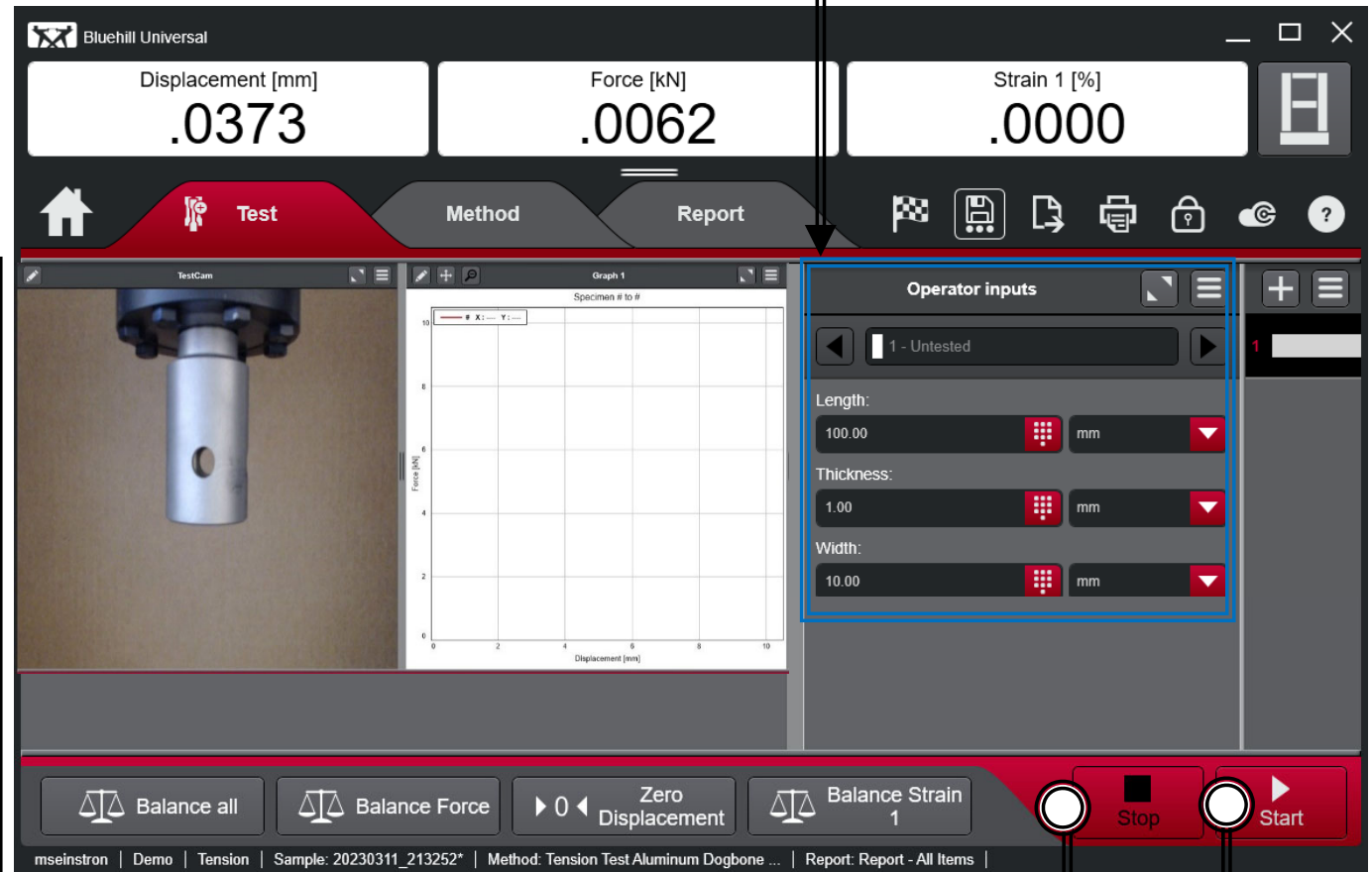
XII. Running Test – 4/6

15. Proceed to enter **Operator Inputs** (if used)

16. Click **Start** when ready to **Test** for each **Specimen**

17. The **Test** should end based on **End Criteria(s)**

18. Click **Stop** if **Test** does not end automatically



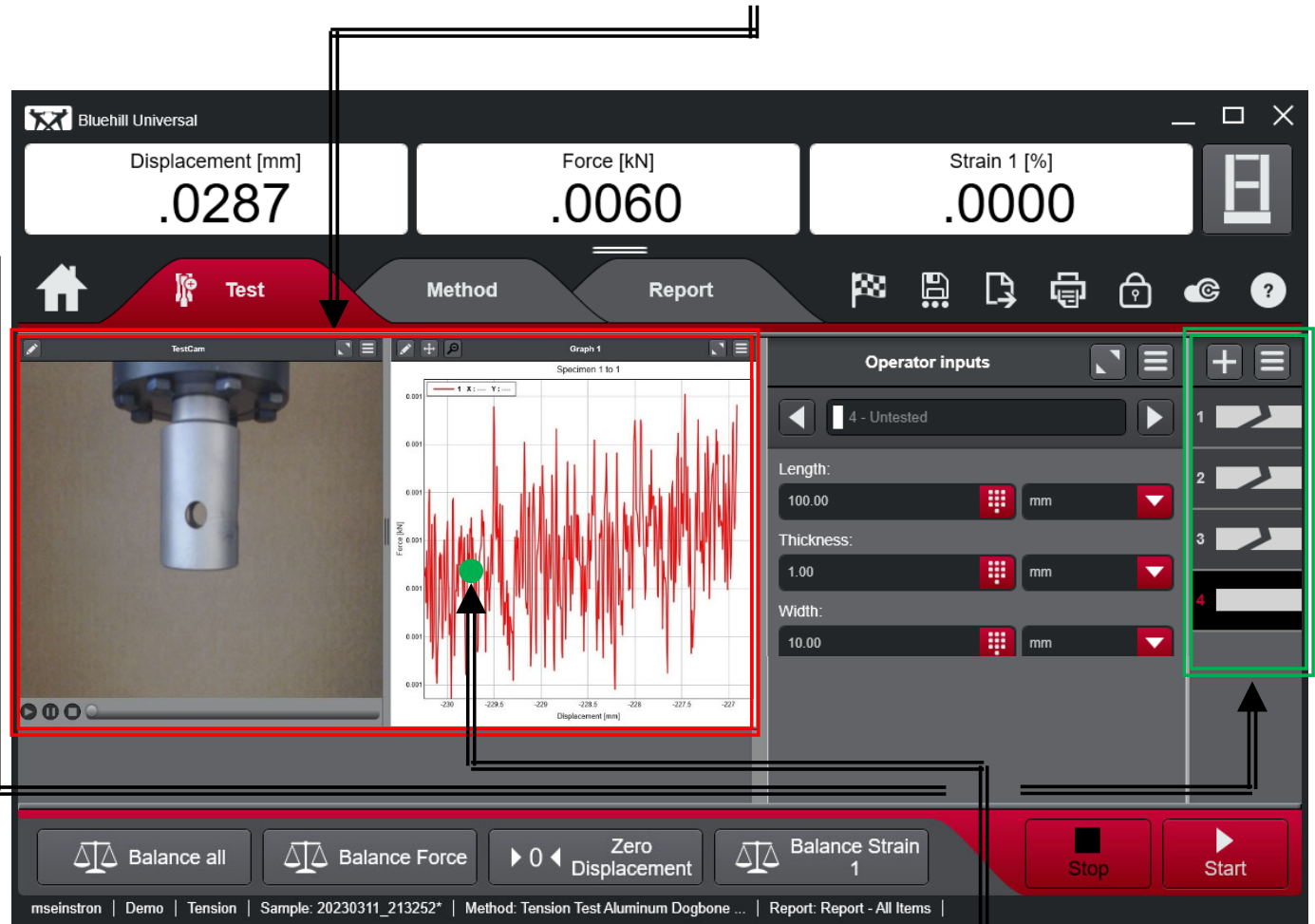
XII. Running Test – 5/6

19. The results for all *Specimens* will be shown in the *Graph*

20. Status for each *Specimen* can be found in the *Specimen Panel*

21. The *Playback* feature for *Tested Specimens* will be available when selected

22. Moving the *Playback Cursor* will correspond to the position indicated on the *Graph*

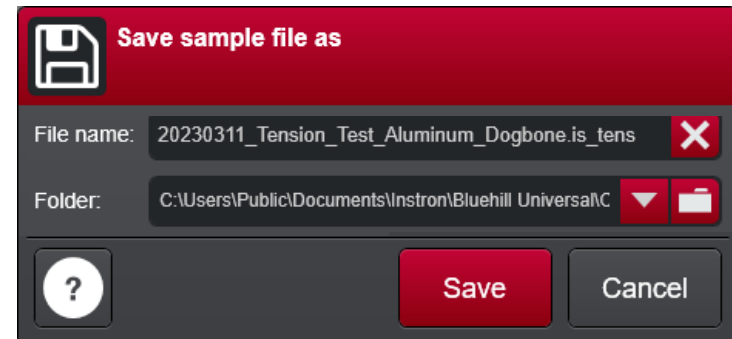


XII. Running Test – 6/6

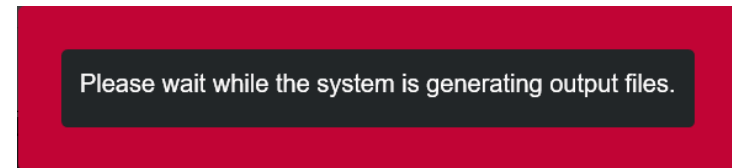
23. Click **Export Options** button to export **All Results** or **Individual Results**



24. Click **Save Options** button to save **Results** and **Raw Data** with desired **File Name** and **Folder Location**



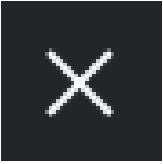
25. Click the **Finish Sample** button to end the **Tests** for your **Sample**



26. Determine if you wish to start another **New Sample** with the same **Test Parameters**



XIII. Cleanup – 1/1

1. Remove ***Specimen*** from the installed grip or fixtures
2. Remove the ***Preload*** if performing Tension tests, see ***VII.C. Preloading***
3. Remove any installed grip or fixtures
4. Return all components back to their respective storage drawers and boxes
5. Clean up any broken or specimen debris around the Instron
6. Turn off the software by clicking on the ***Exit*** button 
7. Sign-out of your ***ENGR account***