

Instron Training Notebook

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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 MSE 150 250 309 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

- A. GUI
- B. Control Panel
- C. Console Control
- D. Preparation
- E. Removing Load Cells
- I. Installing Load Cells
 - A. 50 kN
 - B. 500 N
 - C. 10 N (Huinan Lui Group)
- II. Tension Tests
 - A. Jaw Faces
 - B. Wedge Grips
 - C. Preloading
 - D. Specimen Loading
- E. Extensometer (optional)
- III. Compression Tests
 - A. Top Platen
 - B. Bottom Platen
- IV. Flexure Tests
 - A. Lower Anvils
 - B. Upper Anvils
 - C. Alignment
 - D. Specimen Loading
 - E. Deflectometer (optional)
- V. Configuring Test
- VI. Running Test
- VII. Cleanup

A. GUI – 1/2

1. Test Button



- Start a New Sample
 - a) Starting a New Sample enables you to either select an existing test method or create a method “on the fly”
 - b) Specify the name of the file the test data will be stored within and begin running tests
- Continue a Sample
 - a) Continuing a Sample allows you to open a sample file that had been previously created and test additional samples
 - b) This option will allow you to review the data from a previously created Sample

2. Method Button



- Create a Method
- Choose a Method
 - a) Make changes to the test parameters and either save those changes back to the original test method file (Save) or to a new test file (Save As)

A. GUI – 2/2

3. Analysis Button



- Choose a sample to open
- Choose a test method from which to load calculation and result parameters
- Analyze and recalculate test data in a sample

4. Help Button



- Click to open the Help system

5. Exit Button



- Click to exit the software

B. Control Panel – 1/4

1. Power Indicator lights

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



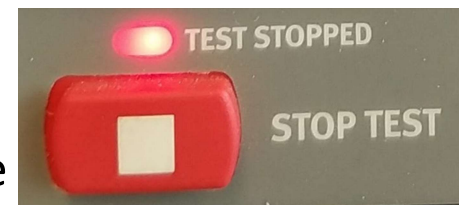
2. Start Test button

- 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

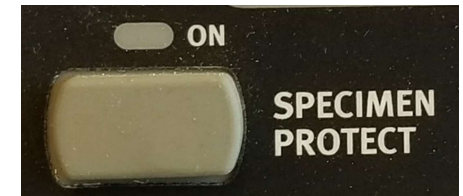
- Press this button to stop **Crosshead** during or end of test
- Test Stopped indicator will be illuminated showing test has stopped but **Crosshead** has not returned to the gauge length position



B. Control Panel – 2/4

4. Specimen Protect button

- On – System is protecting specimen from overloads set by software
- Off – Specimen is not protected from any possible overloads



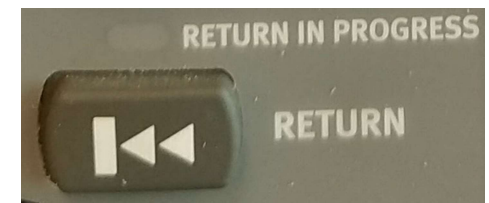
5. Reset GL button

- Press this button to set the current position of the **Crosshead** as the gauge length or zero extension 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

B. Control Panel – 3/4

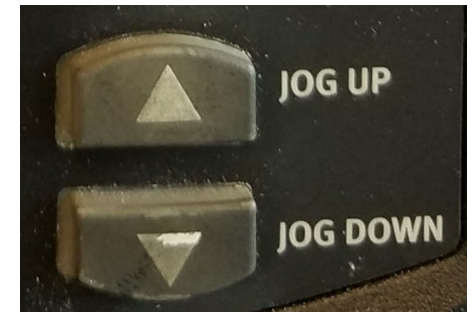
7. Fine Jog wheel

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



8. Δ Jog Up button

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

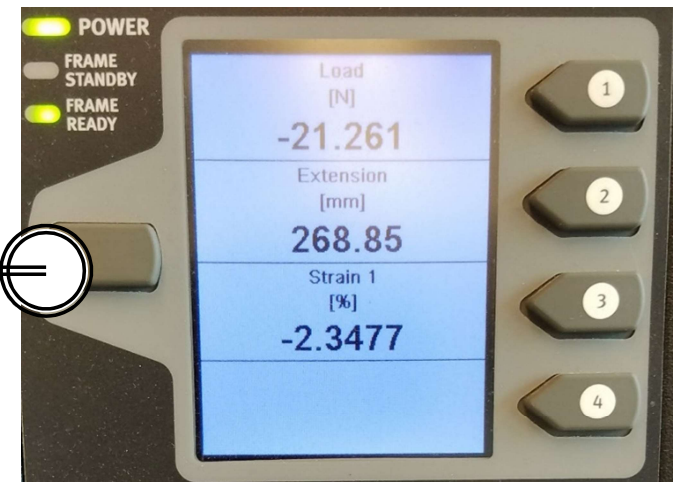
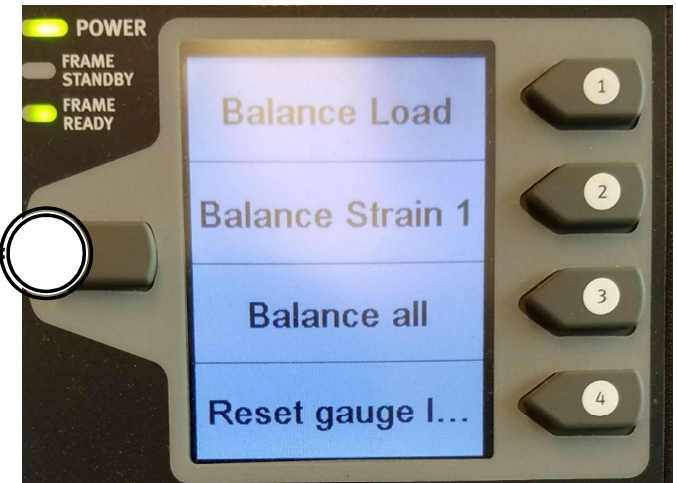


9. ∇ Jog Down button

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

B. Control Panel – 4/4

10. Toggle button
 - Use to toggle between the *Soft Keys* and the *Live Displays*
11. “1” – Balance Load
 - 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” – Reset Gauge Length
 - Resets gauge length back to 0.0 mm



C. Console Control – 1/1



1. Console Settings

- Click this icon to access the control panel settings and configure the general **Live displays**, **Soft Keys**, frame settings and grips



2. Calibration of Transducers

- Calibration of transducers (i.e. load cell) is automatic and its settings should **NOT** be changed



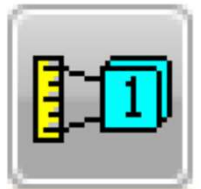
3. Software Limits

- Software limits are assigned to each transducer and need to be **CONFIRMED**
- These limits are separate from methods and are independently set



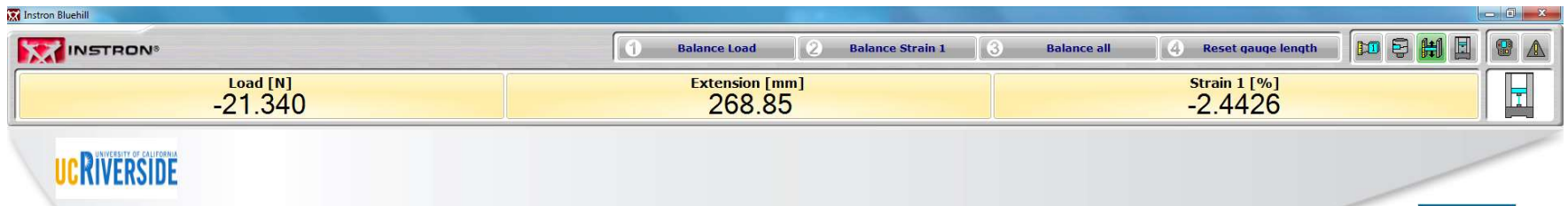
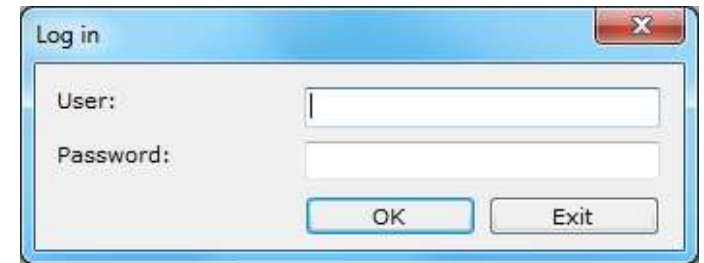
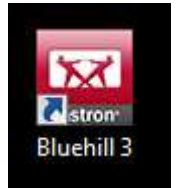
4. Transducer Setup for Extensometer

- Extensometer settings should **NOT** be changed and values are automatically assigned



D. Preparation – 1/4

1. Double-click on the **Instron Bluehill 3** icon to initialize the software and Instron frame
2. Enter the User: **mseinstron**
Password: **mseffs**
3. The **Home Screen** will appear

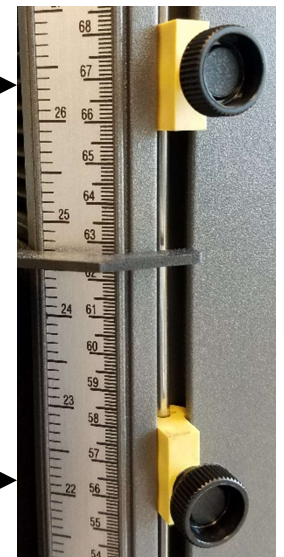
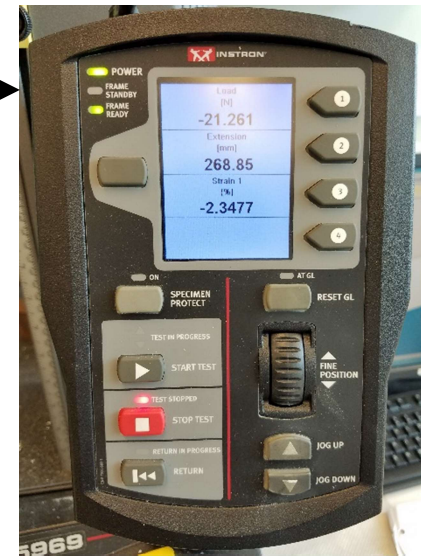


4. Click on **Method** to configure a new or existing method
5. Click on **Test** if you have a method prepared



D. Preparation – 2/4

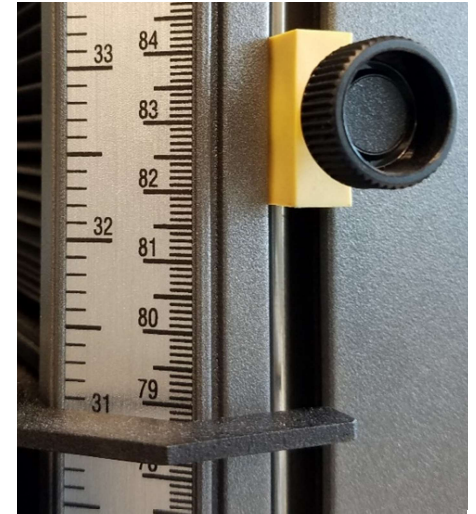
6. Check if the Instron is powered **ON** via the control panel
7. If not, turn to **ON** at the back of the Instron
8. Check if the **Crosshead** is sufficiently high enough to install the desired load cell, grips, or fixtures on measurement scale
9. Always set limits before operating the Instron and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



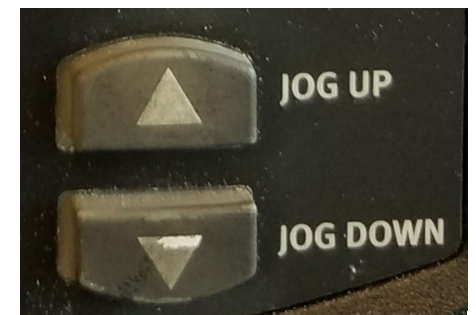
D. Preparation – 3/4

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

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



12. Press the **Jog Up** Δ on the control panel to raise the **Crosshead** to appropriate height on the measurement scale



D. Preparation – 4/4

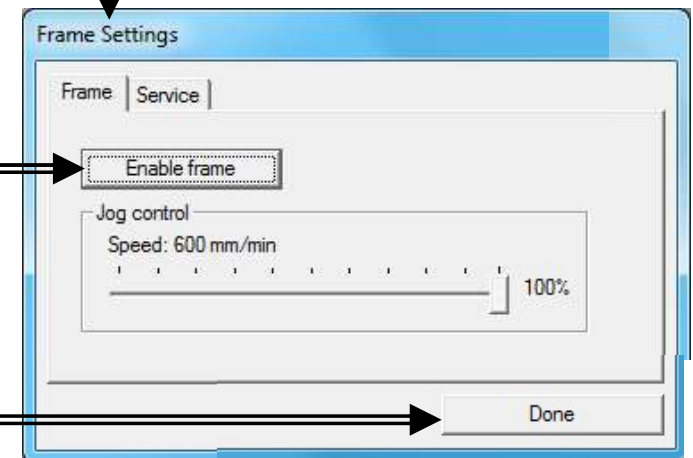
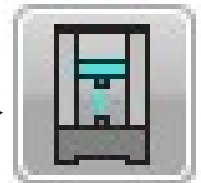
13. Press the **Emergency Stop** button to stop the test as soon as possible when a condition develops that:

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



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

- Rotate **Emergency Stop** button **clockwise** until it resets
- Click on **Frame** button to open the **Load Frame Settings** dialog
- Click the **Frame** tab and **Enable Frame**
- Click **Done** and the **Frame Ready** light on the control panel should be illuminated



E. 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!



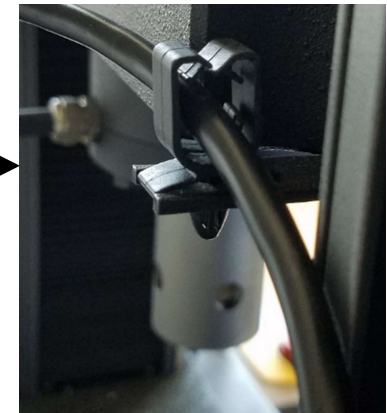
E. Removing Load Cell – 2/2

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



8. Remove the cable from the **Hook** on the back of frame
9. Carefully place the uninstalled **Load Cell** back in its appropriate **Storage Box**

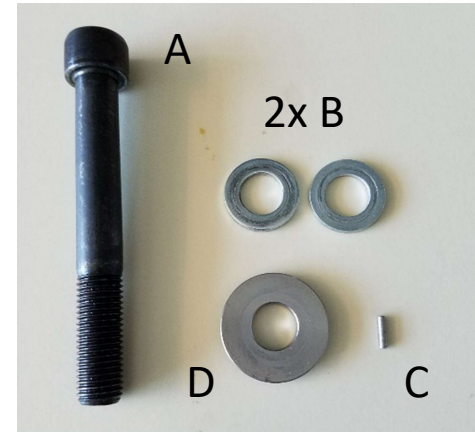
Hook



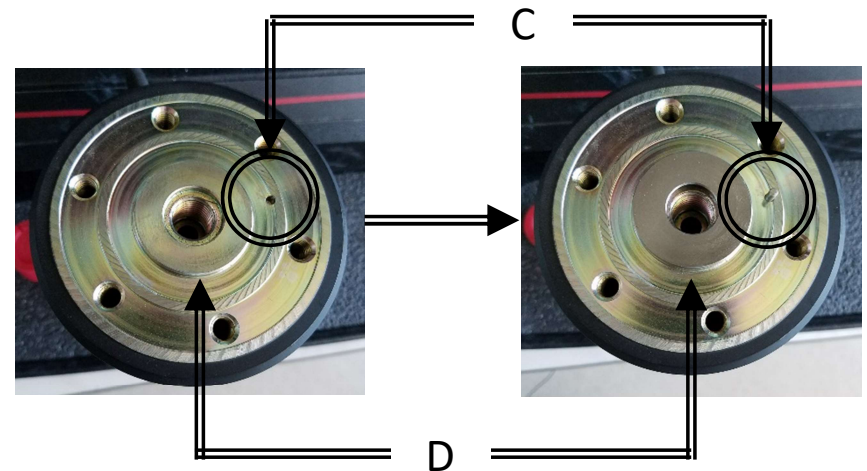
I.A. 50 kN Load Cell – 1/4

1. Locate the necessary components

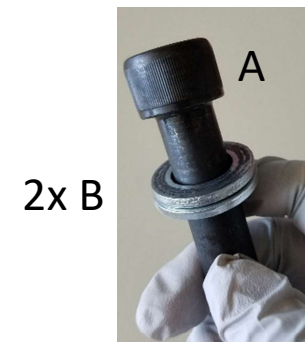
- A. Mounting Screw
- B. 2 Large Washers
- C. Anti-rotation Pin
- D. Locating Ring



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)**

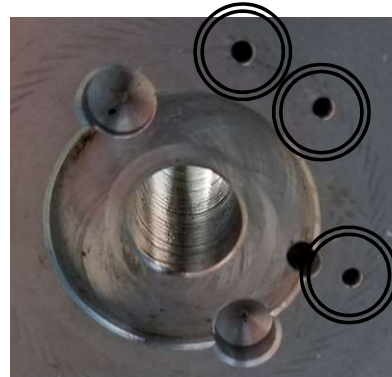


I.A. 50 kN Load Cell – 2/4

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

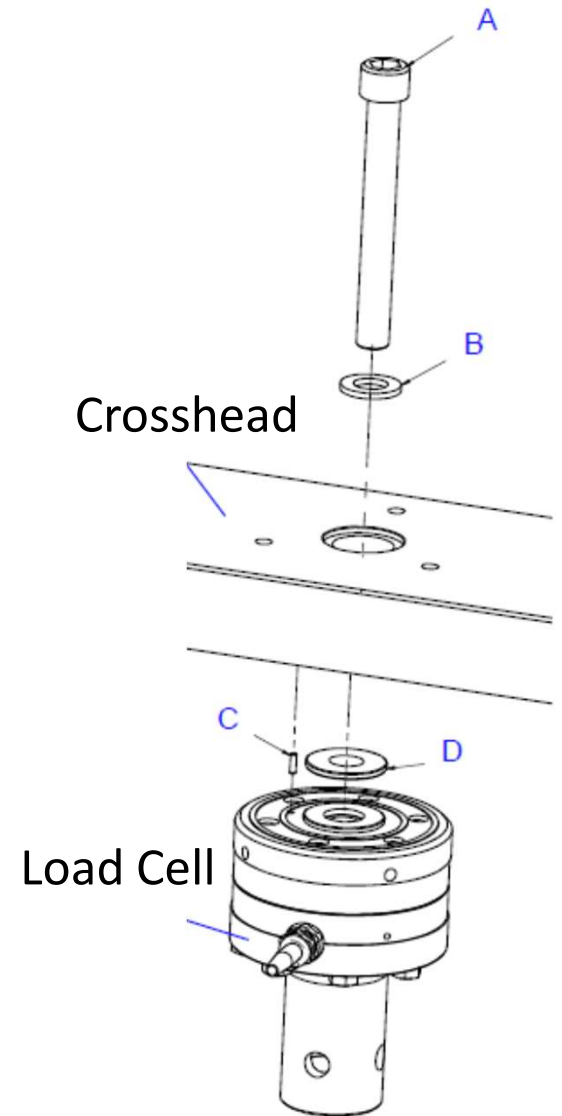
5. Place the **Load Cell** against bottom of **Crosshead**

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



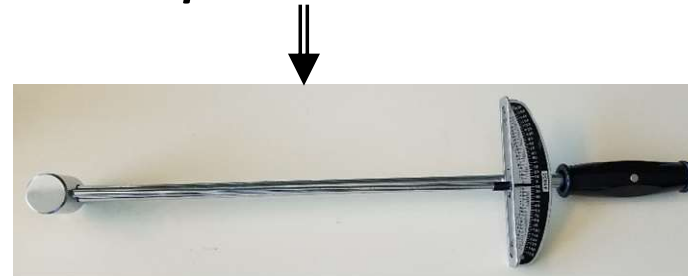
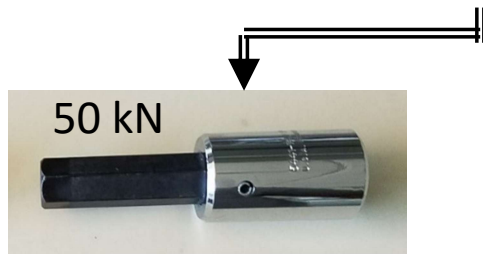
7. Ensure that **Anti-rotation Pin** and **Locating Ring** fit securely in place against **Crosshead** and **Load Cell**

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

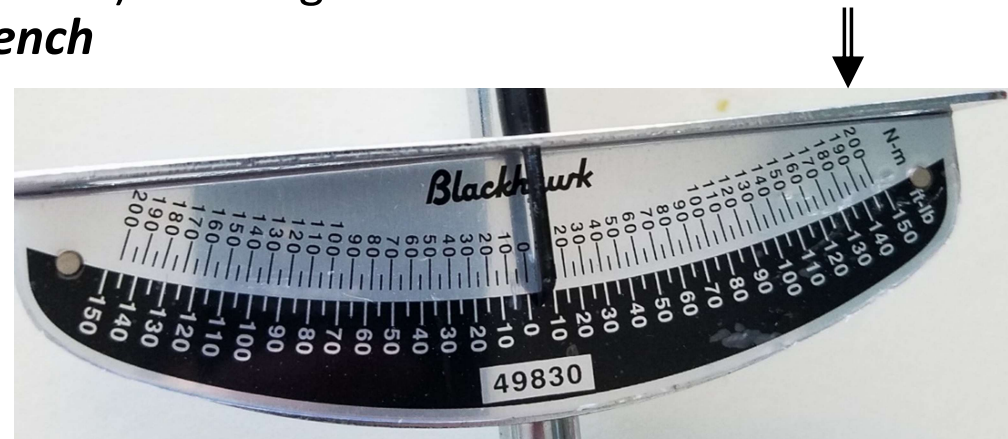


I.A. 50 kN Load Cell – 3/4

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**



9. Lubricate the **Mounting Screw** threads with **WD-40** and wipe off any excess with a towel
10. Further tighten the **Mounting Screw** with the **Torque Wrench**
11. Torque down to 148 ft-lb (**200 N-m**) or as high as possible using the **Torque Wrench**

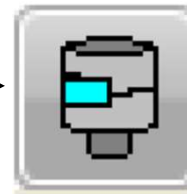


I.A. 50 kN Load Cell – 4/4

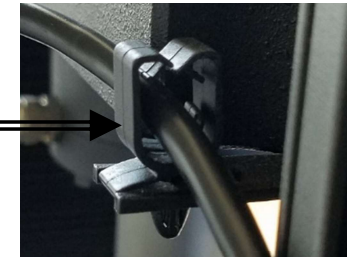
12. Carefully attach the **Load Cell Cable** into **LOAD** connector on controller

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

14. Click on **Transducers** icon

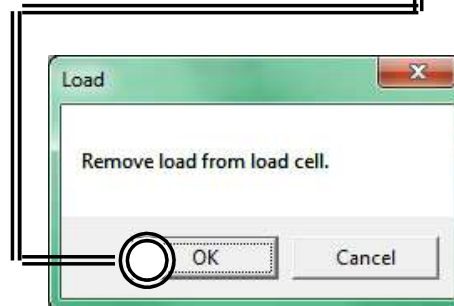
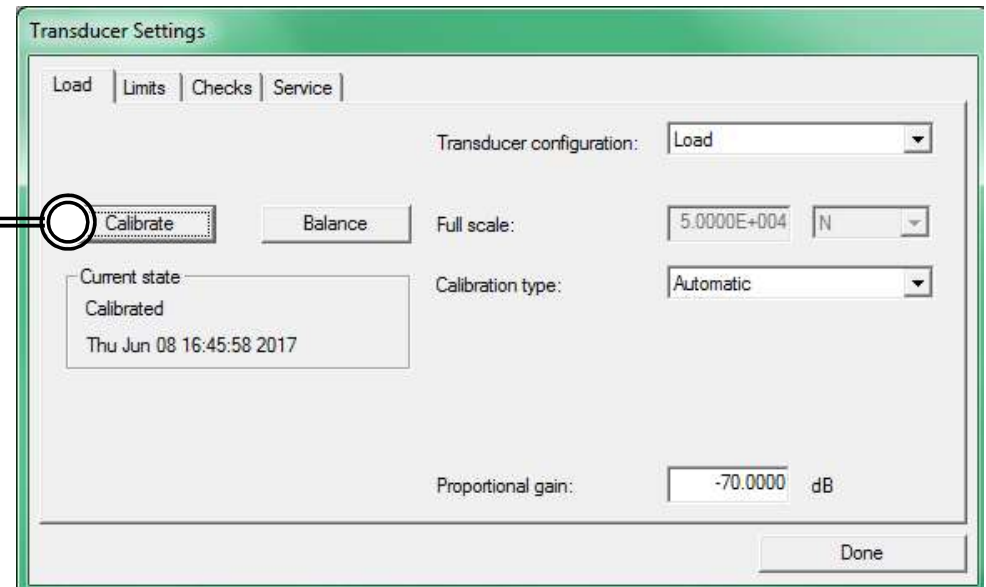


Hook



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

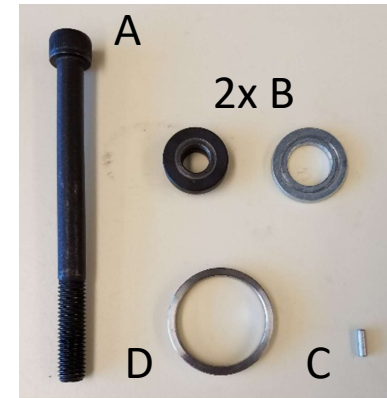
16. Wait for at least **15 MINUTES** to allow **Load Cell** to warm-up, then click "**Calibrate**", and "**OK**" again



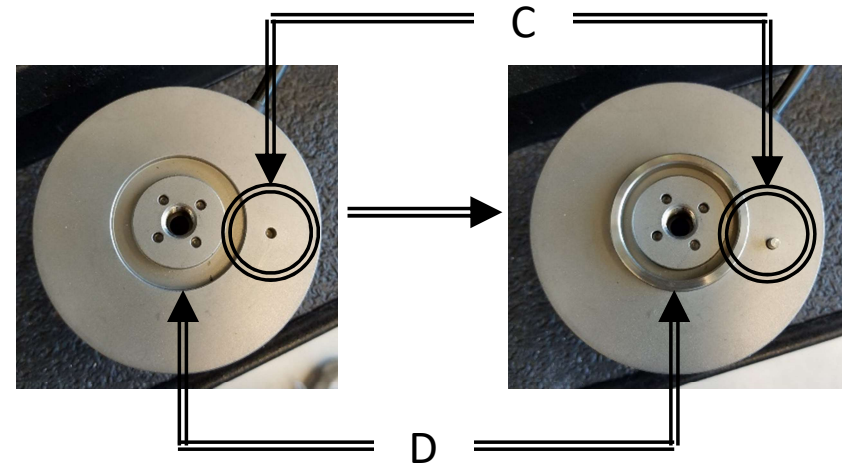
I.B. 500 N Load Cell – 1/4

1. Locate the necessary components

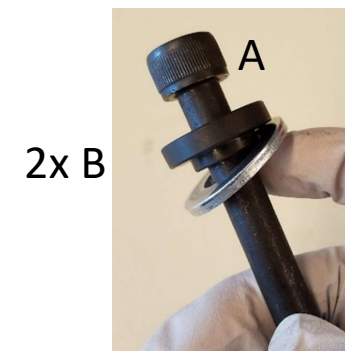
- A. Mounting Screw
- B. Large + Small Washers
- C. Anti-rotation Pin
- D. Locating Ring



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)**

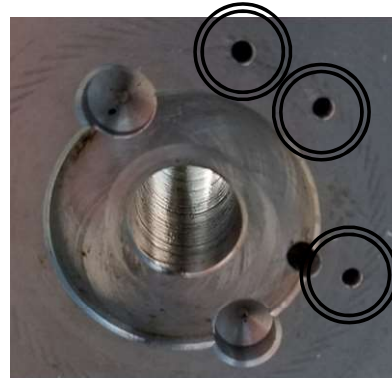


I.B. 500 N Load Cell – 2/4

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

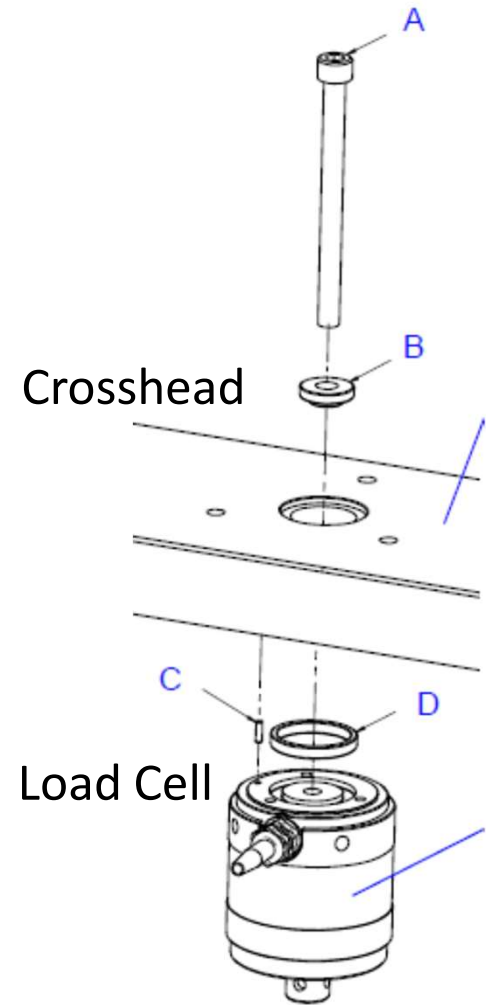
5. Place the **Load Cell** against bottom of **Crosshead**

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



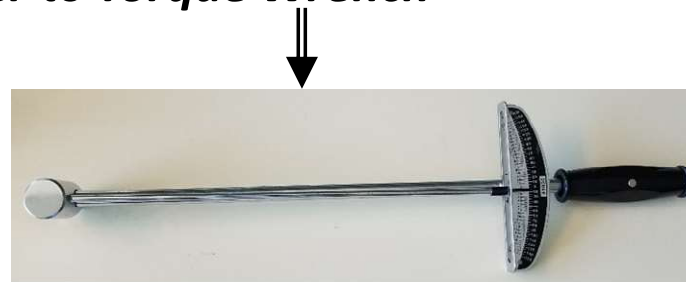
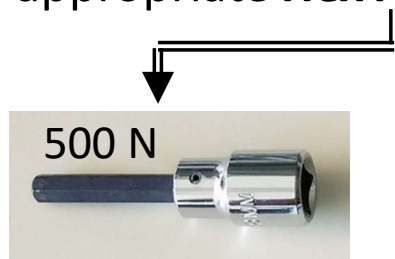
7. Ensure that **Anti-rotation Pin** and **Locating Ring** fit securely in place against **Crosshead** and **Load Cell**

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

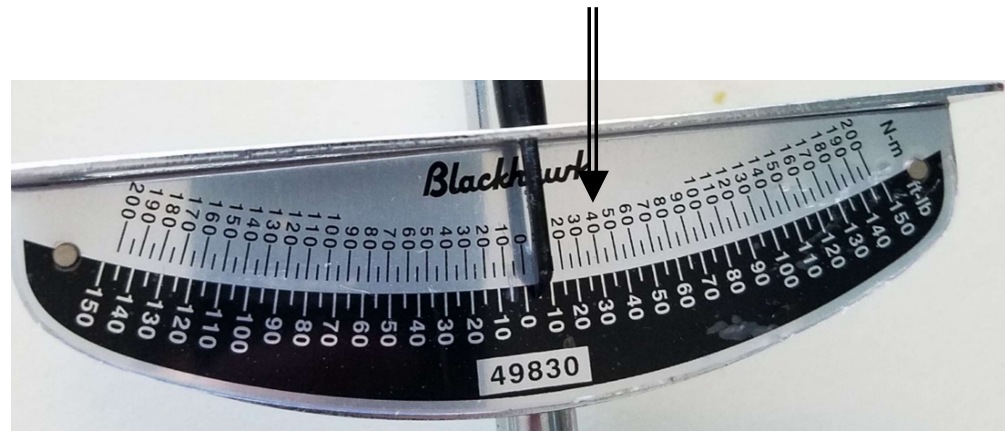


I.B. 500 N Load Cell – 3/4

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**



9. Lubricate the **Mounting Screw** threads with **WD-40** and wipe off any excess with a towel
10. Further tighten the **Mounting Screw** with the **Torque Wrench**
11. Torque down to 30 ft-lb (**40 N-m**) using the **Torque Wrench**

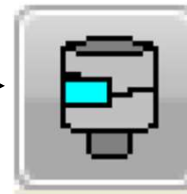


I.B. 500 N Load Cell – 4/4

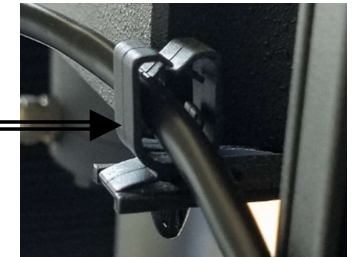
12. Carefully attach the **Load Cell Cable** into **LOAD** connector on controller

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

14. Click on **Transducers** icon

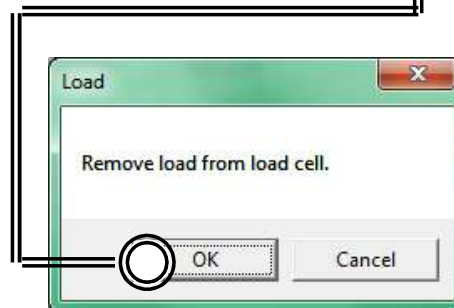
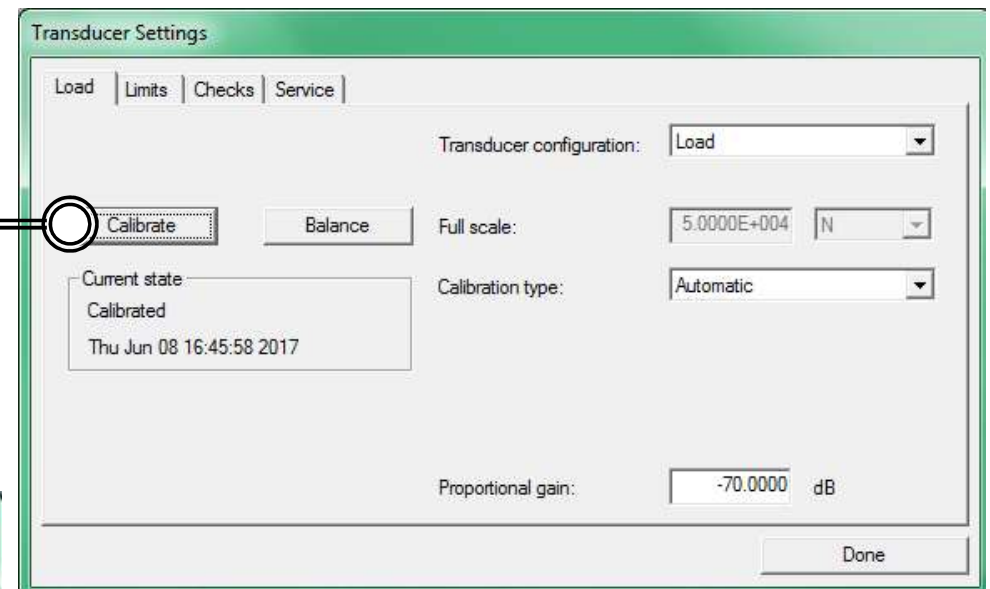


Hook



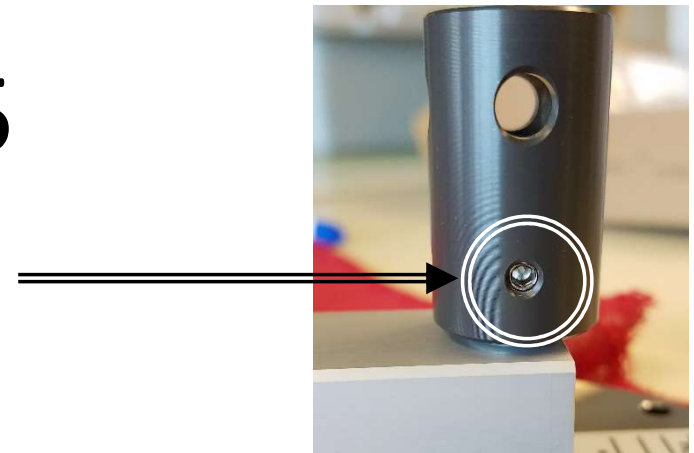
15. Click "**Calibrate**", and click "**OK**"

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



I.C. 10 N Load Cell – 1/5

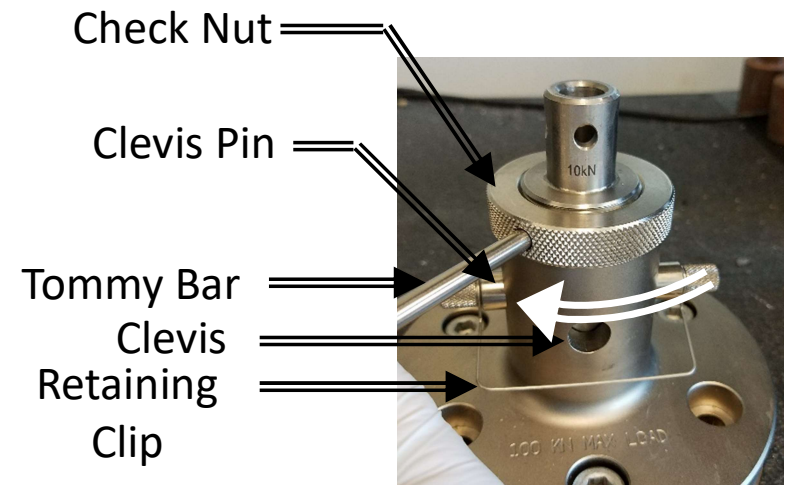
1. Before installing the **Load Cell**, ensure that the **4 Set Screws** holding the **Adapter** are securely tightened
2. Check that the **Compression Spring** is placed inside the bottom **Base Adapter**
3. Position **Check Nut** until it is close to the top
4. Install the **O Adapter** in to **Base 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



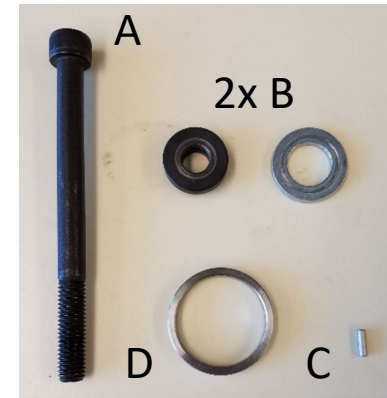
Bottom Base
Adapter



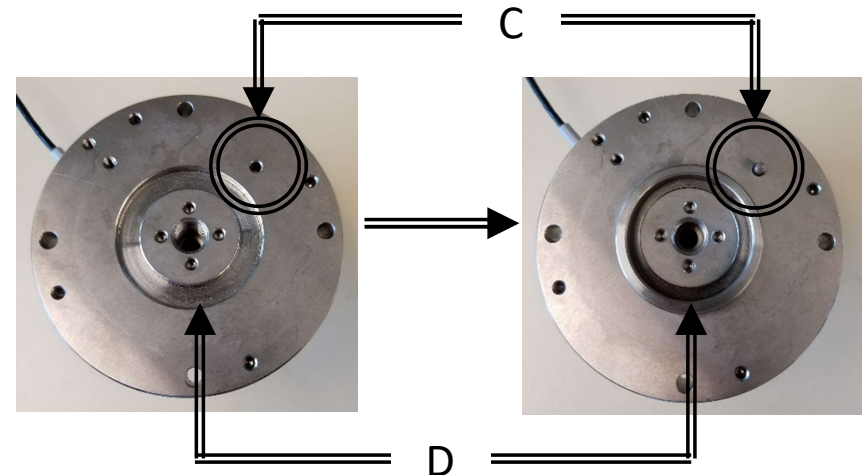
I.C. 10 N Load Cell – 2/5

10. Locate the necessary components

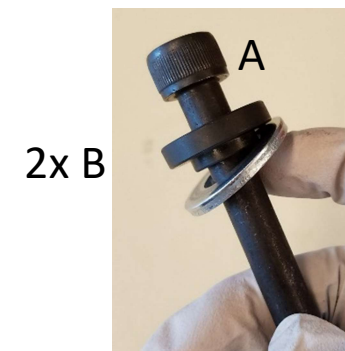
- A. Mounting Screw
- B. Large + Small Washers
- C. Anti-rotation Pin
- D. Locating Ring



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)**

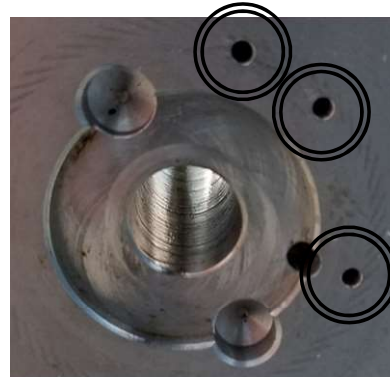


I.C. 10 N Load Cell – 3/5

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

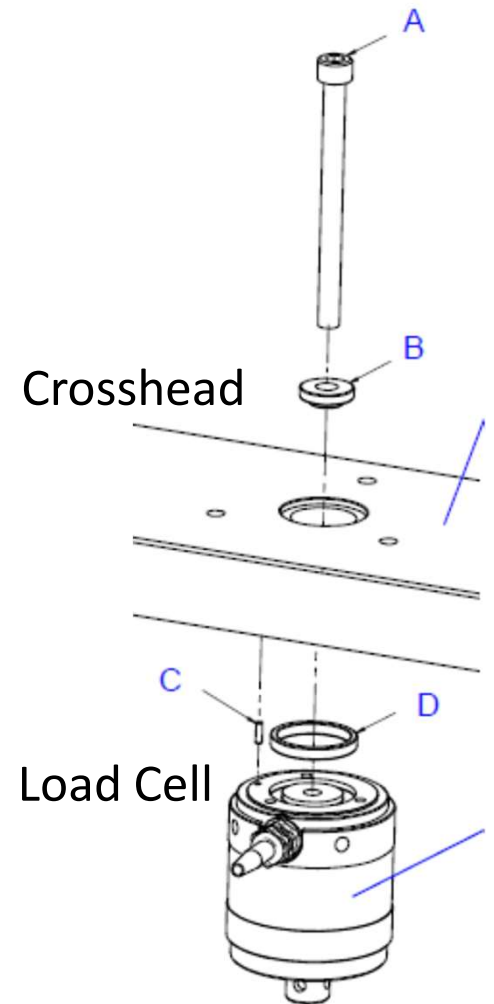
14. Place the **Load Cell** against bottom of **Crosshead**

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



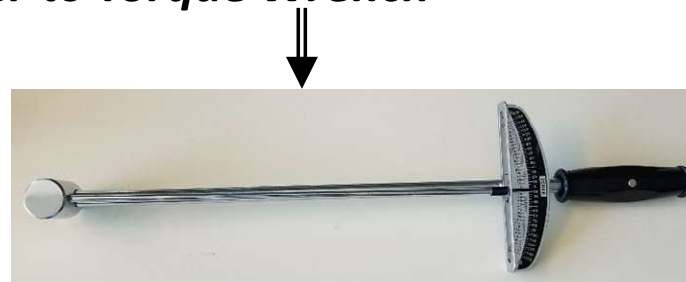
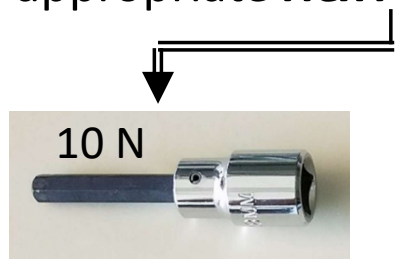
16. Ensure that **Anti-rotation Pin** and **Locating Ring** fit securely in place against **Crosshead** and **Load Cell**

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

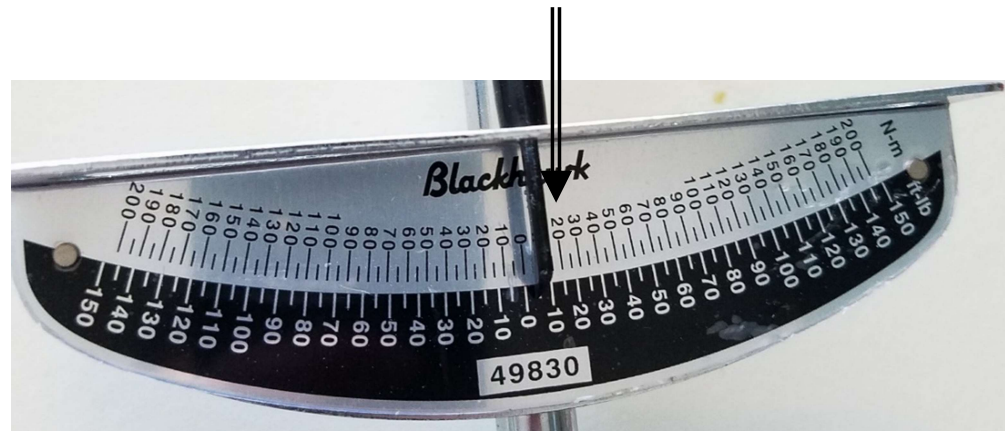


I.C. 10 N Load Cell – 4/5

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**



19. Lubricate the **Mounting Screw** threads with **WD-40** and wipe off any excess with a towel
20. Further tighten the **Mounting Screw** with the **Torque Wrench**
21. Torque down to 9 ft-lb (**12 N-m**) using the **Torque Wrench**

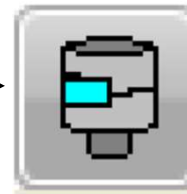


I.C. 10 N Load Cell – 5/5

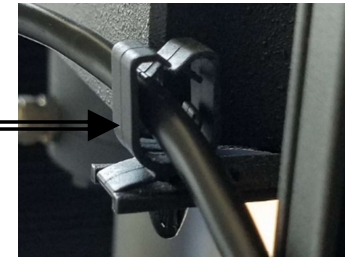
22. Carefully attach the **Load Cell Cable** into **LOAD** connector on controller

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

24. Click on **Transducers** icon

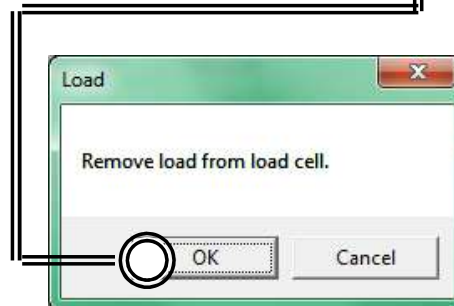
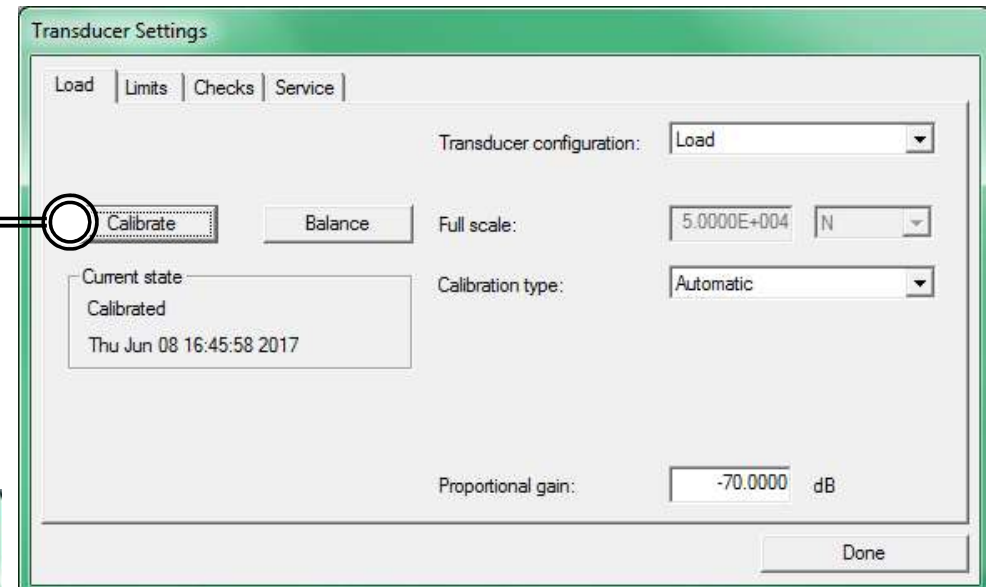


Hook



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

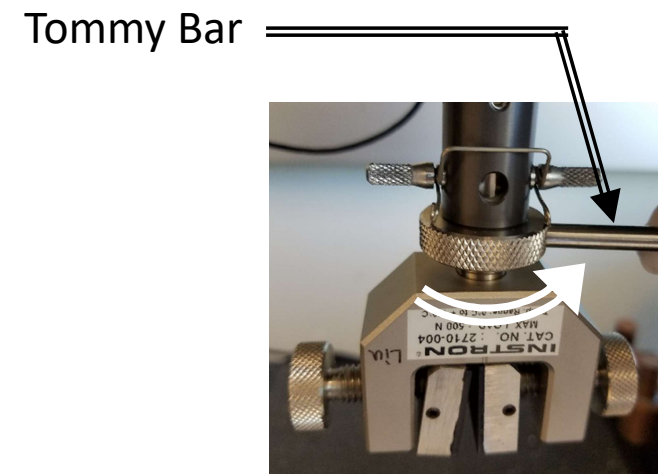
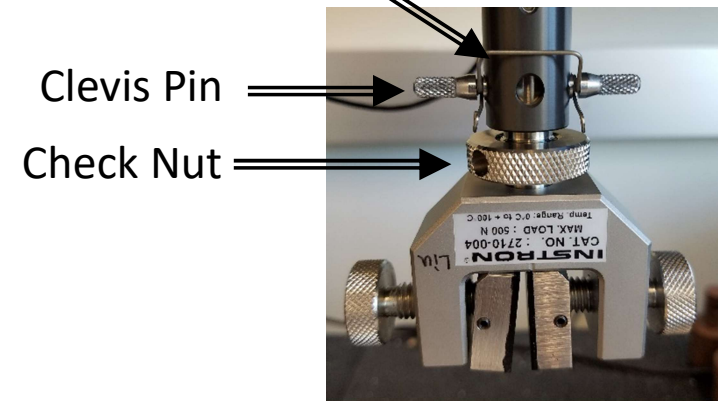
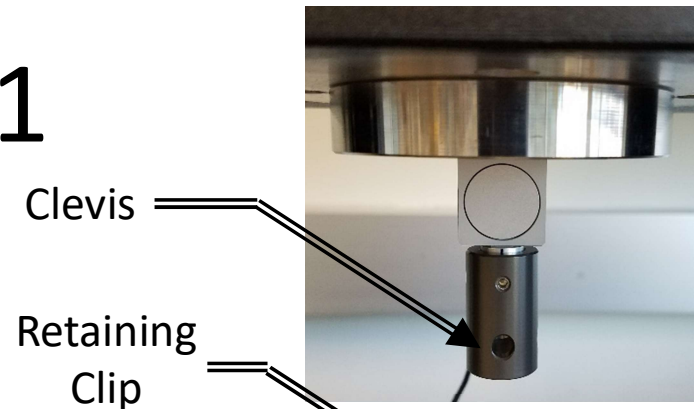
26. Wait for at least **15 MINUTES** to allow **Load Cell** to warm-up, then click "**Calibrate**", and "**OK**" again



I.C. Top Screw Grip – 1/1

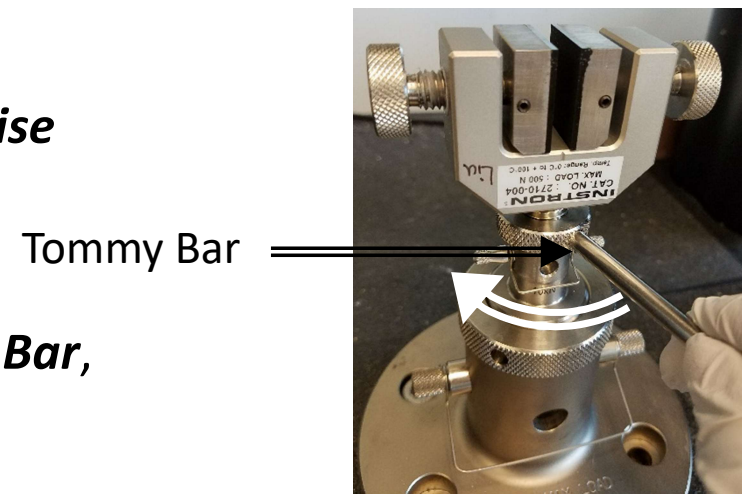
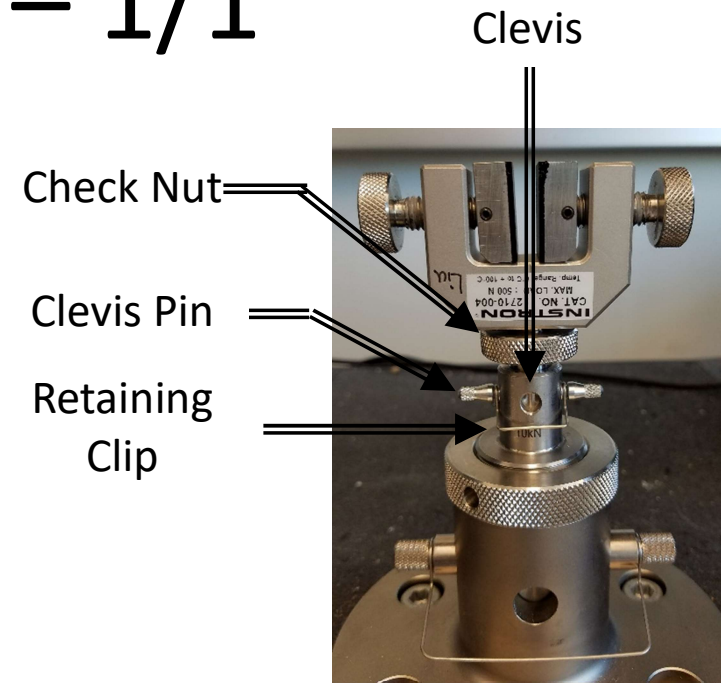
NOTE: ALWAYS SUPPORT ANY FIXTURE WITH HAND DURING ANY INSTALLATION OR INSERTION OF COMPONENTS AS IMPOSED LOAD BY USER MAY BE ENOUGH TO PERMANENTLY DAMAGE LOAD CELL

1. Position the **Check Nut** until it is loose
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!**



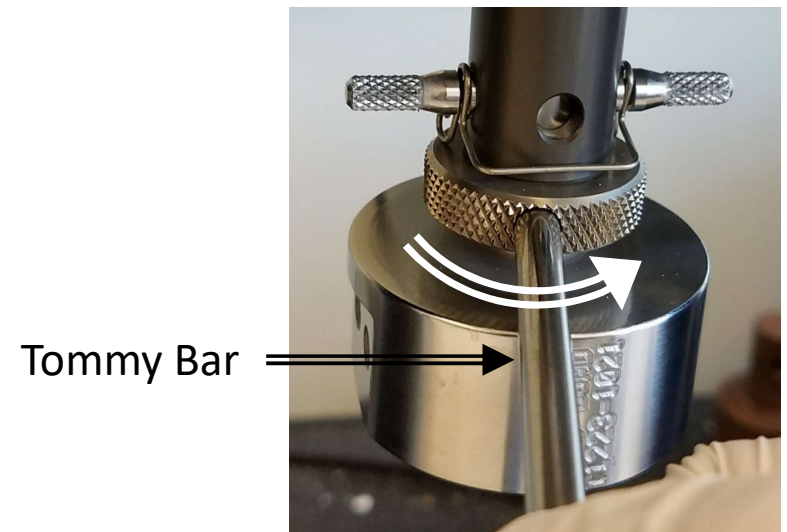
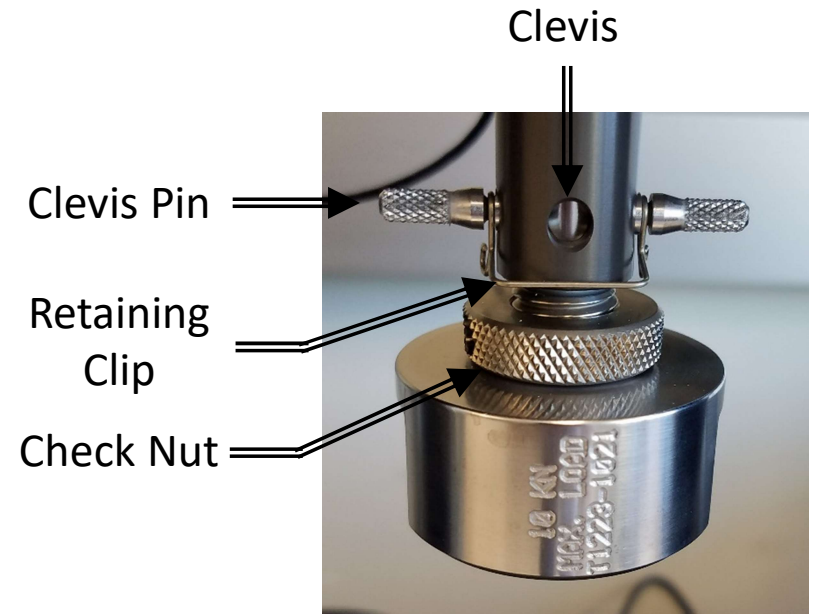
I.C. Bottom Screw Grip – 1/1

1. Position the **Check Nut** until it is loose
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!**



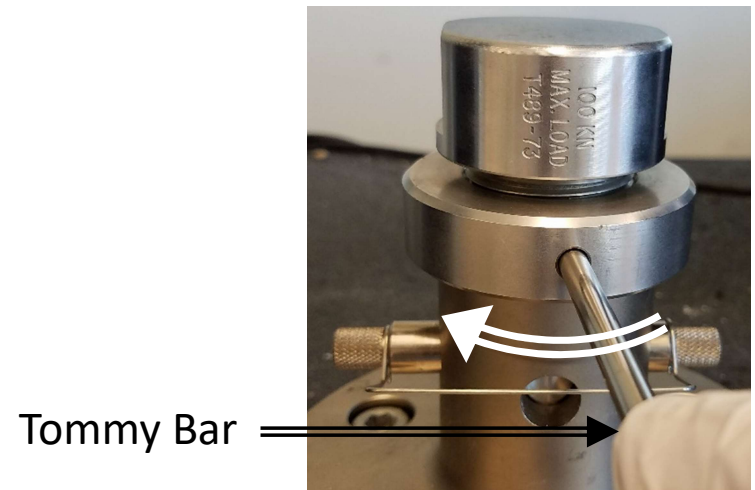
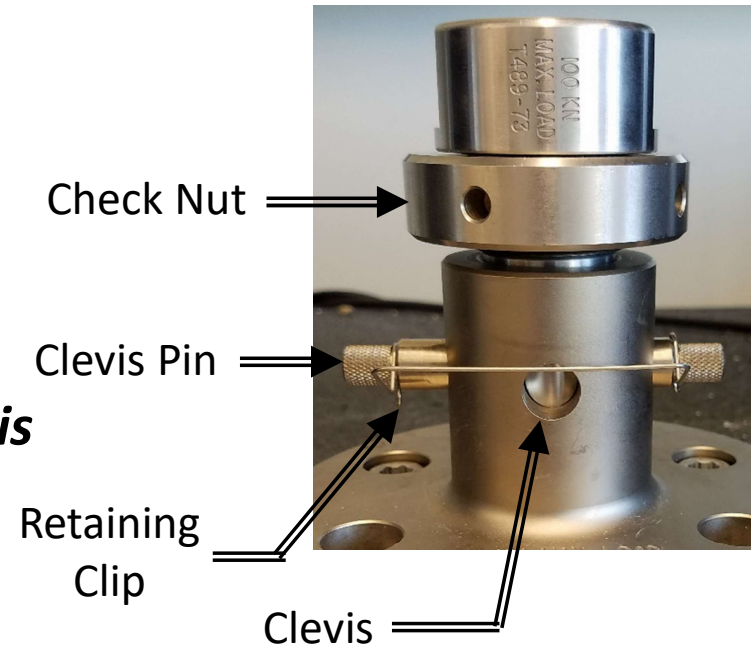
I.C. Top 2" Platen – 1/1

1. Position the **Check Nut** until it is loose
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!**



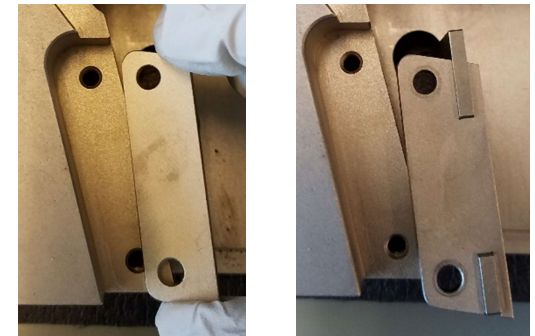
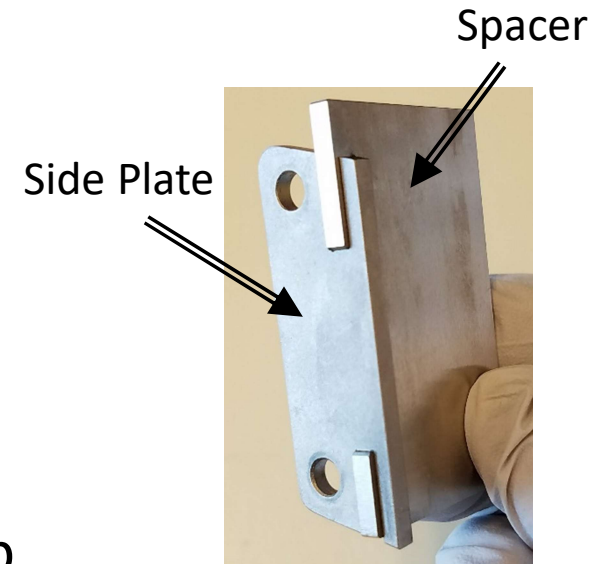
I.C. Bottom 2" Platen – 1/1

1. Position the **Check Nut** until it is loose
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!**



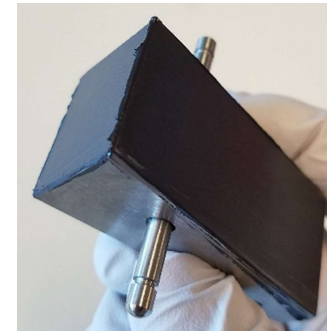
II.A. Jaw Faces – 1/2

1. Identify the appropriate **Jaw Faces** for your test specimen size
 - a) 0 – 0.25" Jaws – requires side plate only
 - b) 0.25 – 0.5" Jaws – requires spacer + side plate
2. If desired **Jaw Face** is already installed, skip to **II.B. Wedge Grips**
3. Remove installed spacers or side plates using a **3 mm hex wrench**
4. Align the **Side Plate** 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



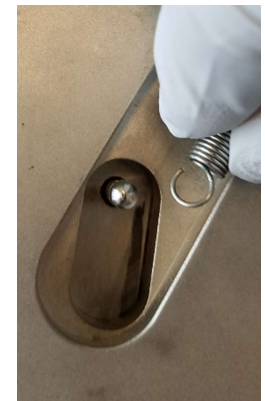
II.A. Jaw Faces – 2/2

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



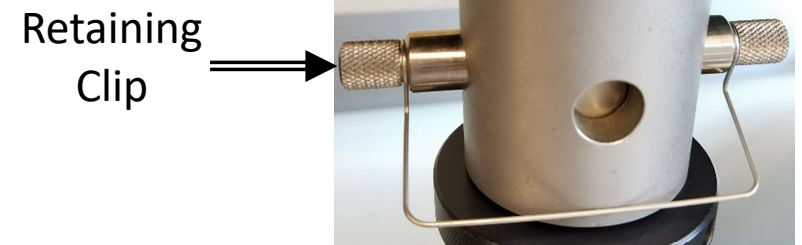
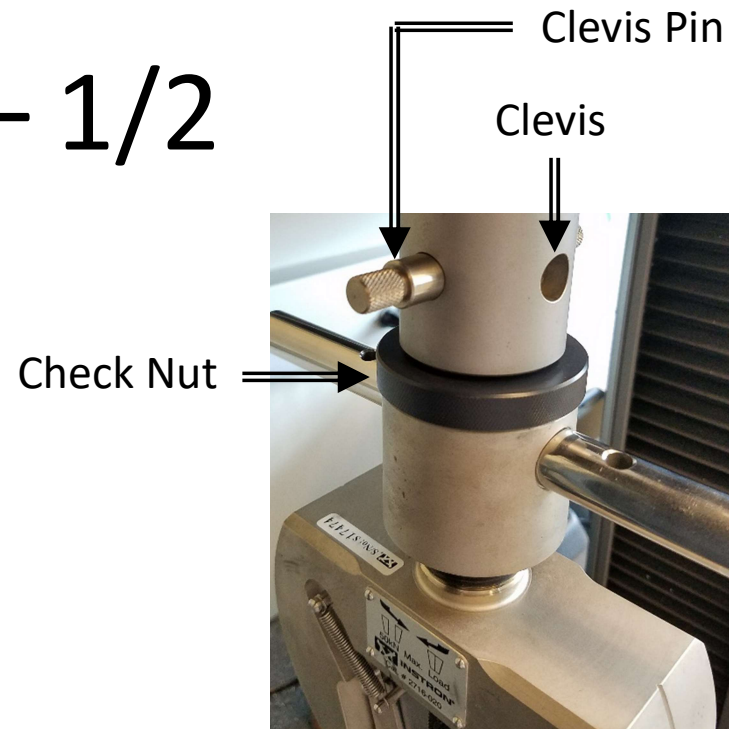
Note: Wash hands thoroughly after using Molykote g-N paste

6. Insert the **Jaw Face** and slide it towards the base of the **Wedge Grip**
7. Firmly secure the **Side Plates** 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



II.B. Top Wedge Grips – 1/2

1. Identify the **Top Wedge Grip** from drawer first
2. Position the **Check Nut** until it is loose
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**



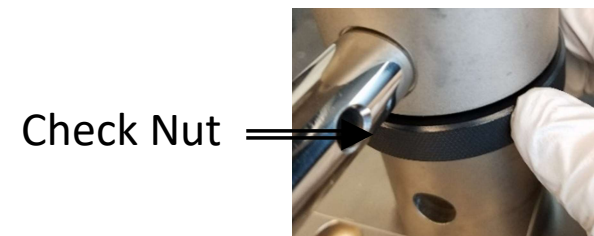
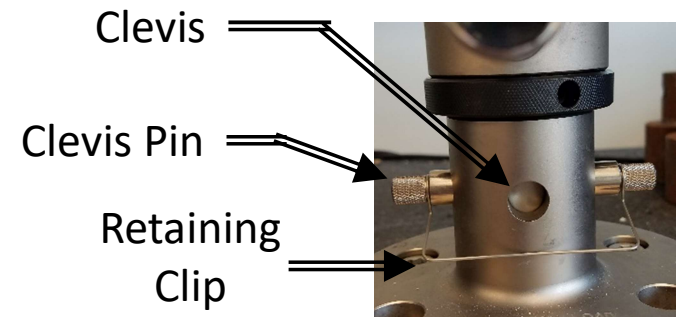
II.B. Bottom Wedge Grips – 2/2

8. Identify the **Bottom Wedge Grip** from drawer first
9. Check that the **Compression Spring** is placed inside the bottom **Base Adapter**
10. Position the **Check Nut** until it is loose
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



II.C. Preloading – 1/5

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 Load*** 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** components in the load string



II.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



II.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)

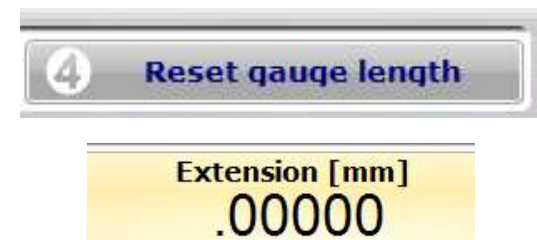
e.g. Mild Steel 1090: Yield Strength = 248 Mpa

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

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

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

9. Click on **Reset Gauge Length** to set the **Crosshead** position to zero



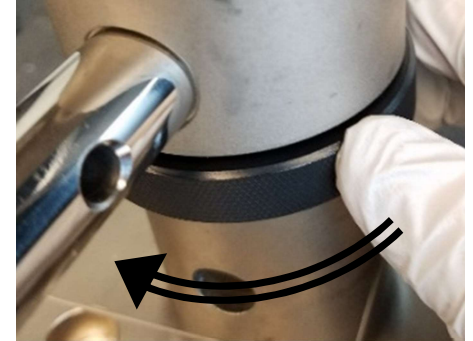
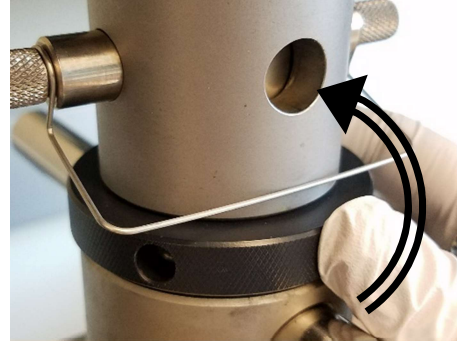
II.C. Preloading – 4/5

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!

II.C. Preloading – 5/5

NOTE: CHECK NUTS WILL NOW BE TOO TIGHT TO LOOSEN BY HAND TO PREVENT ANY BACKLASH DURING OR AFTER TESTS AND WILL REQUIRE YOU TO UNLOAD PRELOAD TO REMOVE WEDGE GRIPS

16. To unload the Preload, click **Balance Load** 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. Uninstall the **Preloading specimen**

II.D. Specimen Loading – 1/1

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

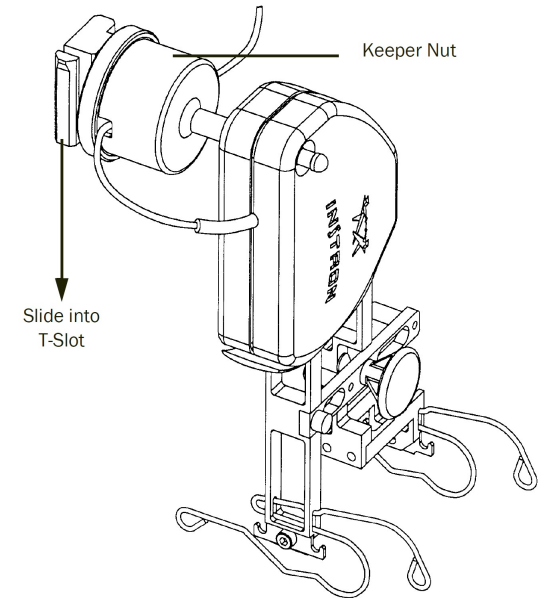
1. Adjust **Wedge Grip** height and install specimen so majority of **Jaw Faces** are engaged
2. Align and center the specimen visually into the **Jaw Faces**
3. Turn handles to tighten the lower and upper grips until the **Jaw Faces** engage the specimen
4. Continue to **II.E. Extensometer** if you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



II.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 gauge length of 1.0" or -10% to 100% **Strain** and is only appropriate for low ductility samples like metals and NOT polymers

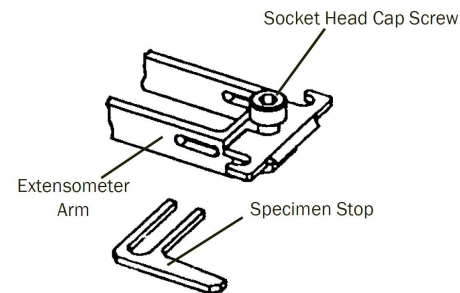
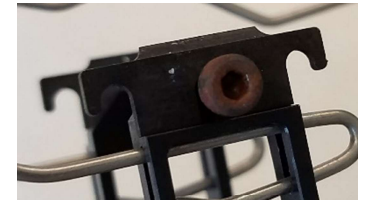
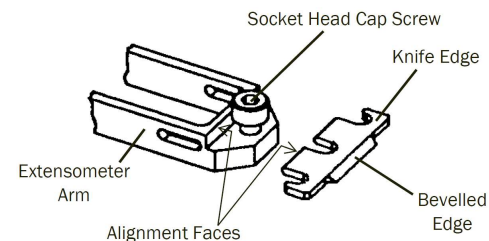
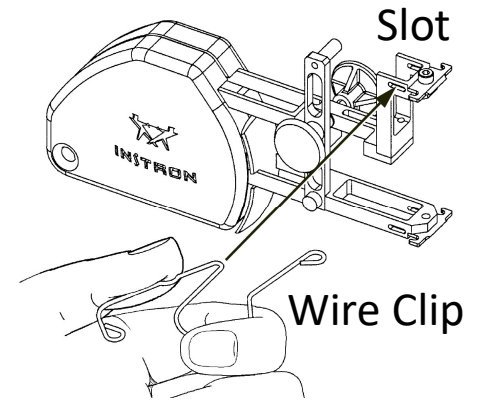


1. Identify appropriate **Wire Clip** based on specimen shape and size

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

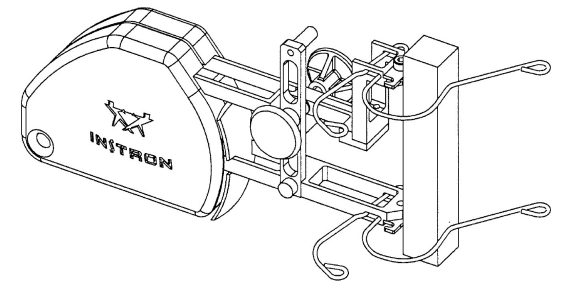
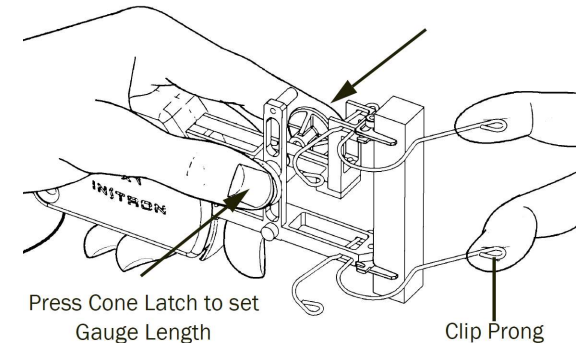
II.E. Extensometer – 2/5

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



II.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

II.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 gets broken!
12. Ensure that “**Remove extensometer during test**” is checked under the **Methods > Test Control > Strain** section
13. Select “**Yield (Offset 0.002 mm/mm)**” or “**Measurement event - (Strain 1 = 100%)**” as the Removal criteria

Specimen

Measurements

Calculations

Test Control

Start Test

Strain

Tensile strain (Extension)

Primary source: Extension

☒ Remove extensometer during test

Removal criteria: Yield (Offset 0.002 mm/mm)

Action during removal: Pause test but suspend data capture

Removal criteria: Measurement event

Measurement: Strain 1

Value: 100.00000 %

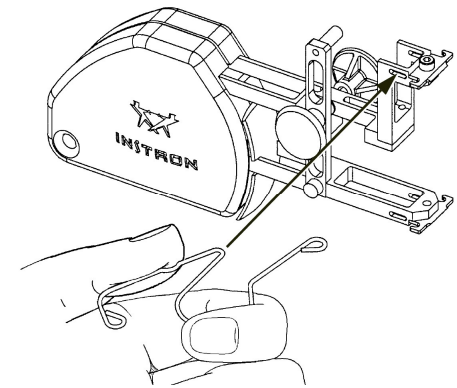
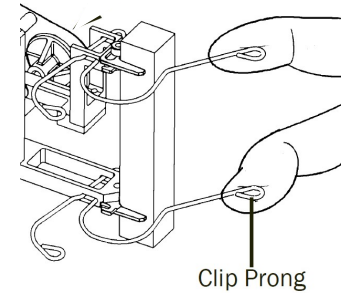
Action during removal: Pause test but suspend data capture

II.E. Extensometer – 5/5

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

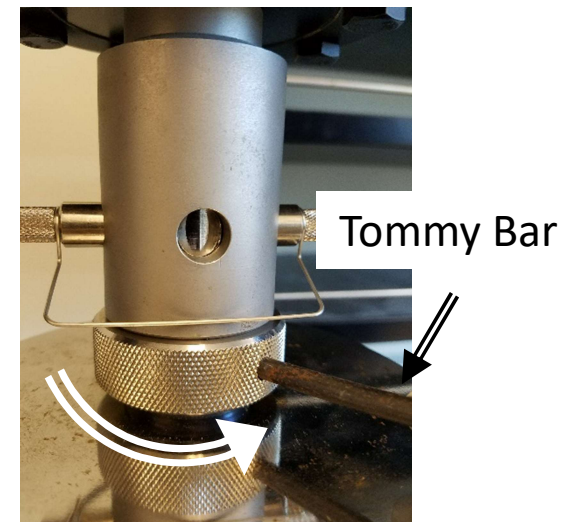
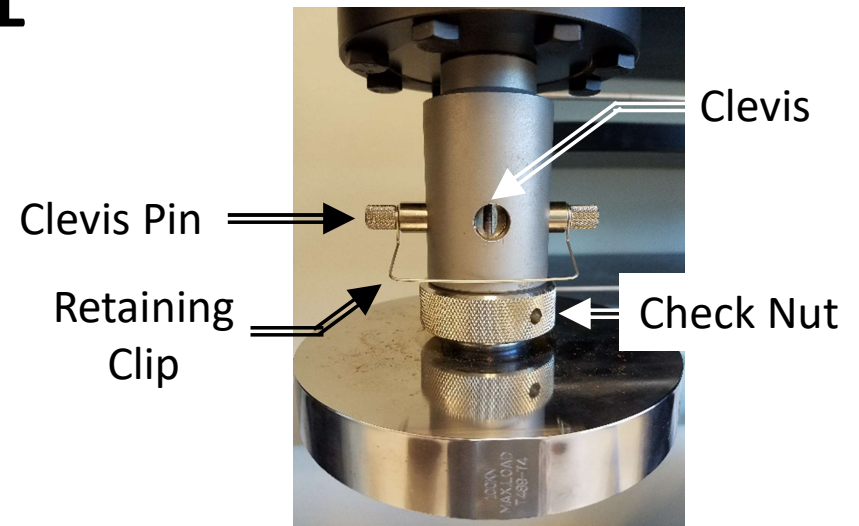
NOTE: DO NOT PUSH THE CONE-LATCH BUTTONS TOGETHER AS THIS WILL SCRAPE THE BEVELLED EDGE AGAINST YOUR SPECIMEN BACK TO GAUGE LENGTH!

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



III.A. Top Platen – 1/1

1. Position the **Check Nut** until it is loose
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!**



III.B. Bottom Platen – 2/1

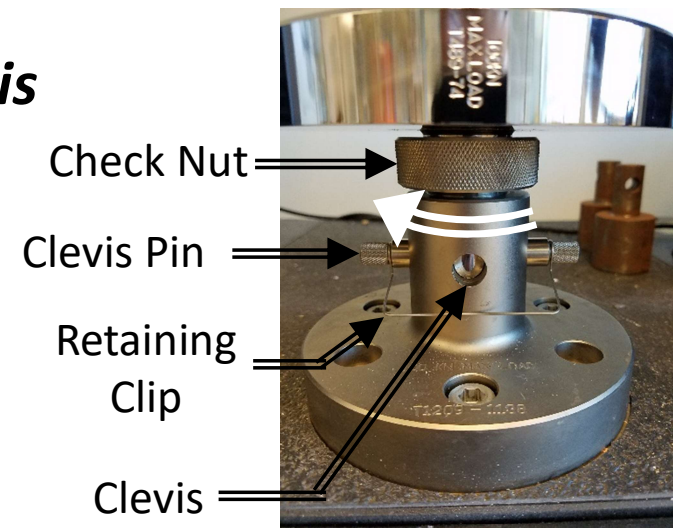
Compression
Spring



Bottom Base
Adapter



1. Check that the **Compression Spring** is placed inside the bottom **Base Adapter**
2. Position the **Check Nut** until it is loose
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 **Load Cell**
7. Use the provided **Tommy Bar** to help, but **DO NOT OVERTIGHTEN!**



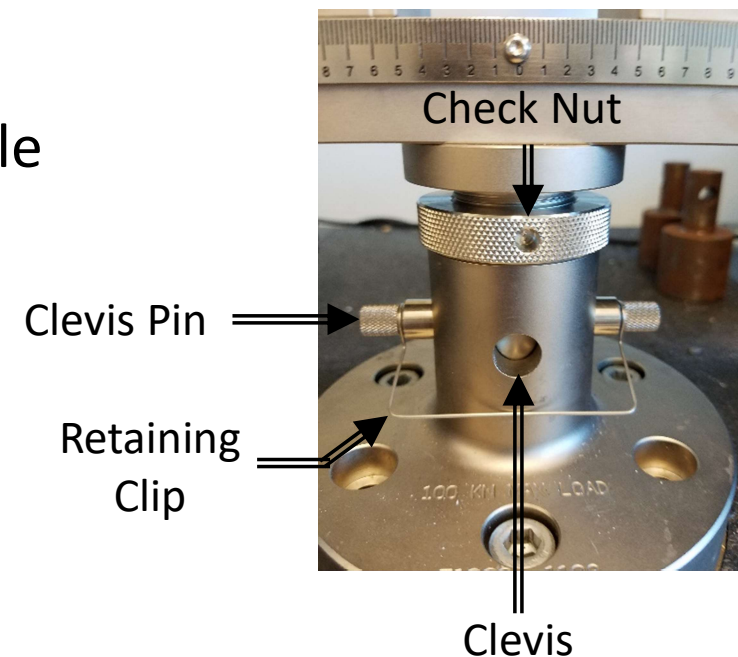
IV.A. Lower Anvils – 1/1

1. Check that the **Compression Spring** is placed inside the bottom **Baseplate Adapter**
2. Position the **Check Nut** until it is loose
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**

Compression
Spring

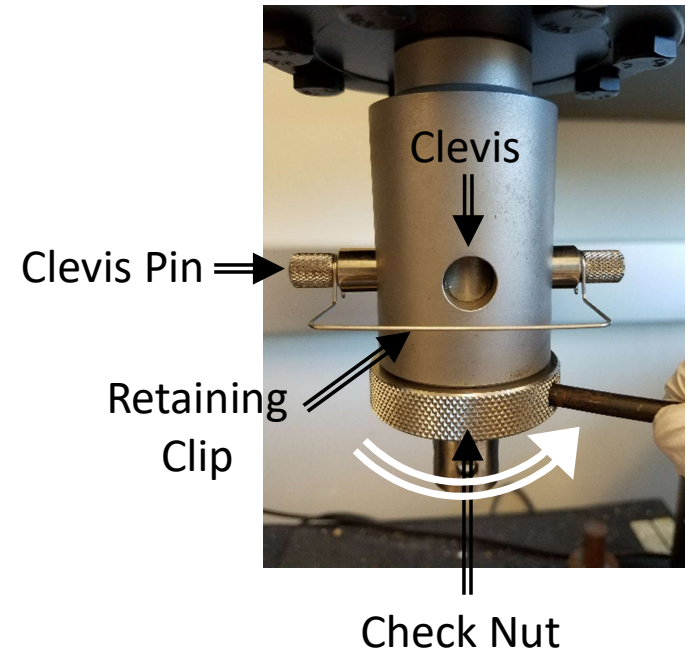


Bottom Base
Adapter



IV.B. Upper Anvils – 1/2

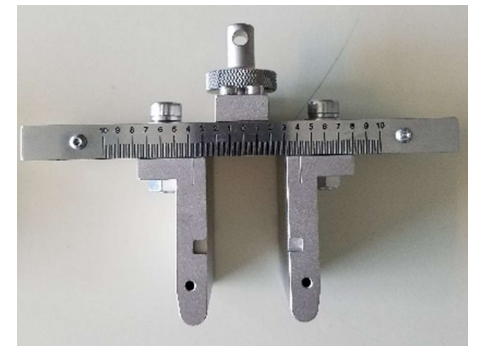
1. Position the **Check Nut** until it is loose
2. Insert the **O Adapter** into the **Load Cell**
3. Align the **O Adapter Clevis** to the **Clevis** in the **Load Cell**
4. Insert the **1/2" Clevis Pin** through the **Load Cell**
5. Attach the **Retaining Clip**
6. Hand tighten the **Check Nut** turning **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

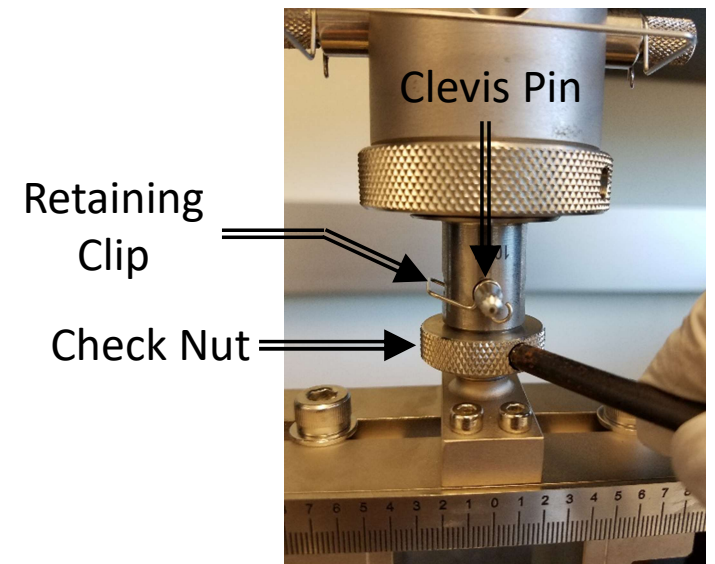
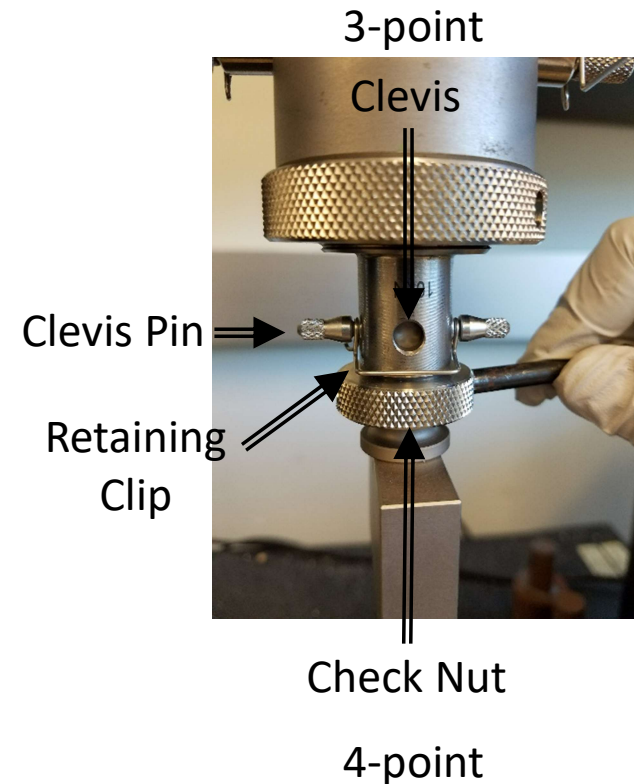


4-point



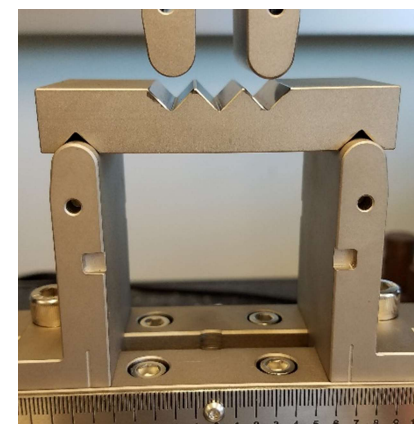
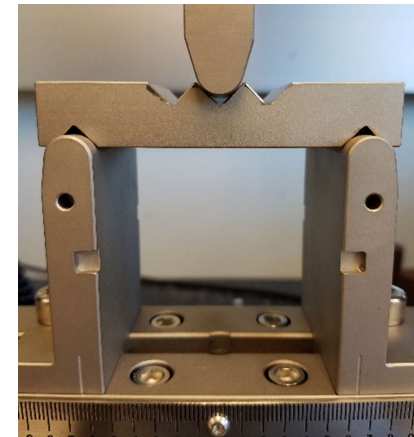
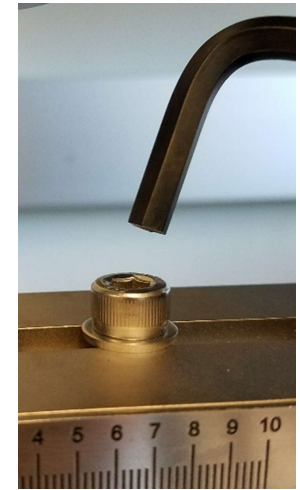
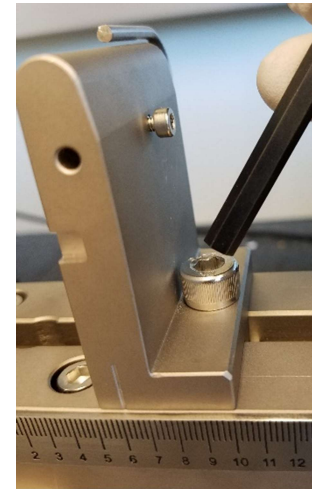
IV.B. Upper Anvils – 2/2

9. Position the **Check Nut** until it is loose
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**



IV.C. Alignment – 1/2

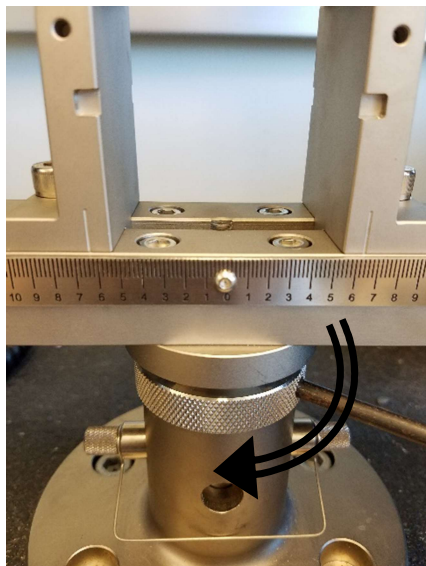
1. Loosen the cap screws with **6 mm Hex** holding the **Lower and Upper Anvils** and allow them to slide freely
2. Place the **Alignment Plate** onto the **Lower Anvils**
3. Adjust the **Lower Anvil** positions until they are both at about **6.2** on the lower front scale
4. For 3-point fixture, there 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**



IV.C. Alignment – 2/2

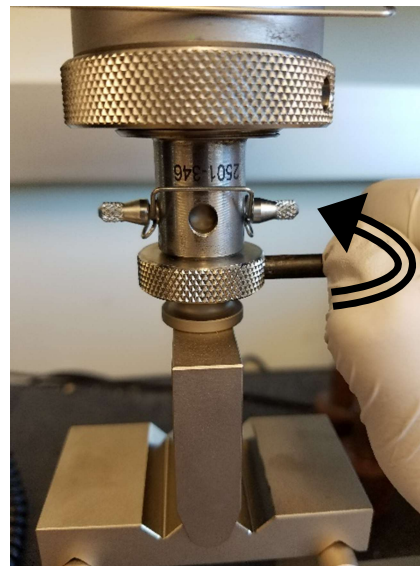
7. Adjust and align both the ***Upper and Lower Anvils*** until a snug fit is achieved
8. Hand tighten the ***Check Nuts*** on the ***Upper and Lower Anvils***
 - a) Lower Anvil: ***Clockwise***
 - b) Upper Anvils: ***Counter-clockwise***
9. Use the provided ***Tommy Bar*** to help, but **DO NOT OVERTIGHTEN!**

Lower Anvil

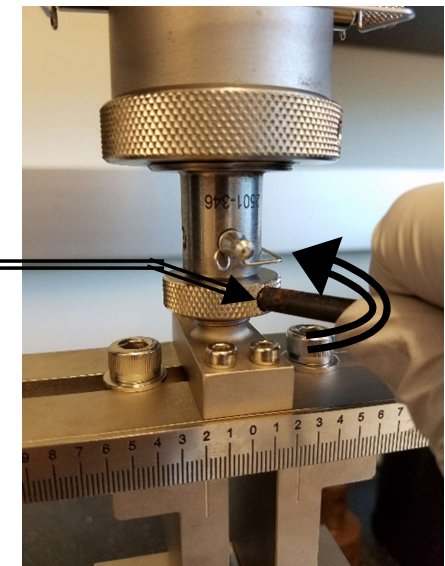


Tommy Bar

Upper Anvil



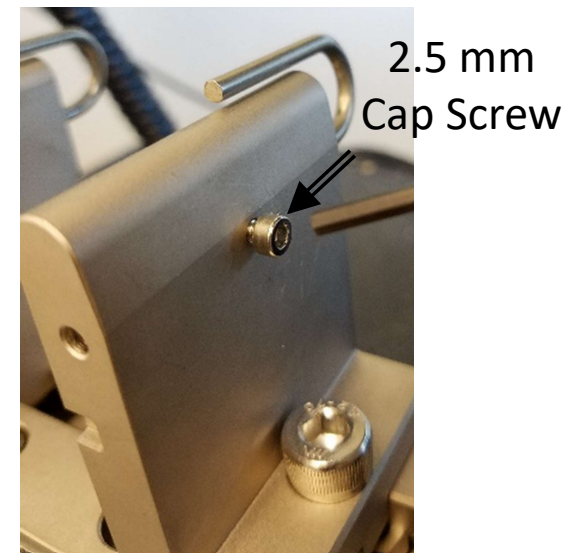
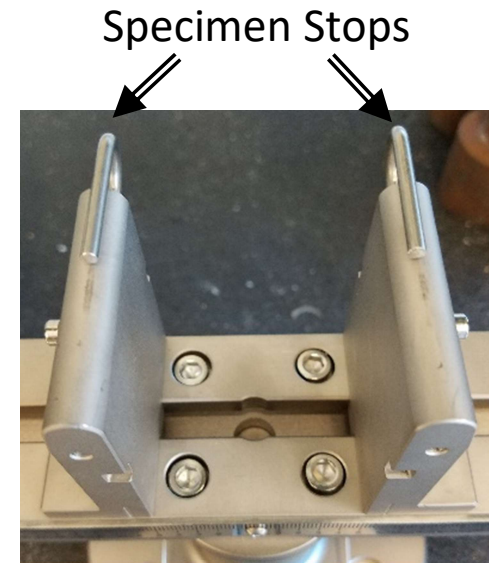
Upper Anvil



Tommy Bar

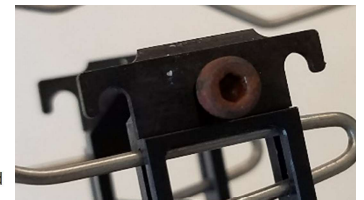
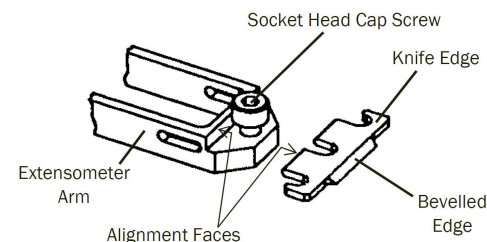
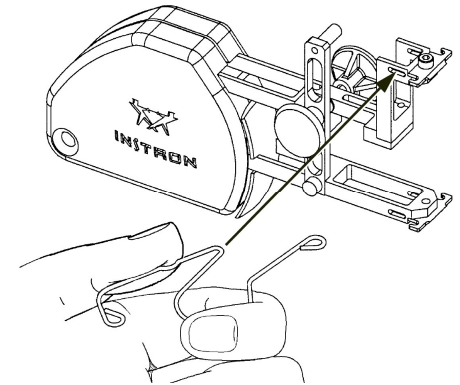
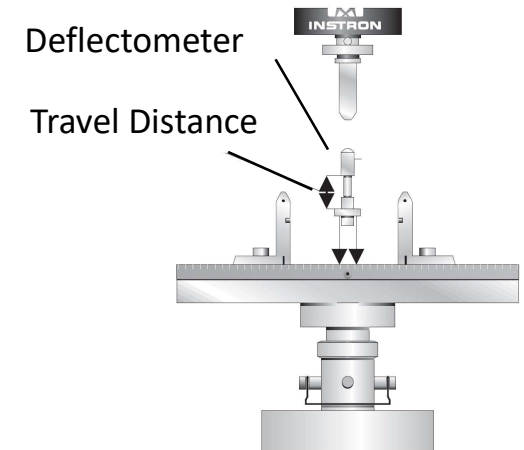
IV.D. Specimen Loading – 1/1

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**



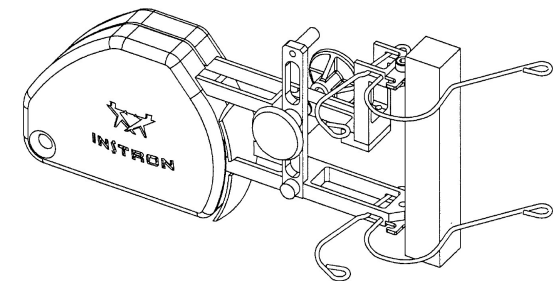
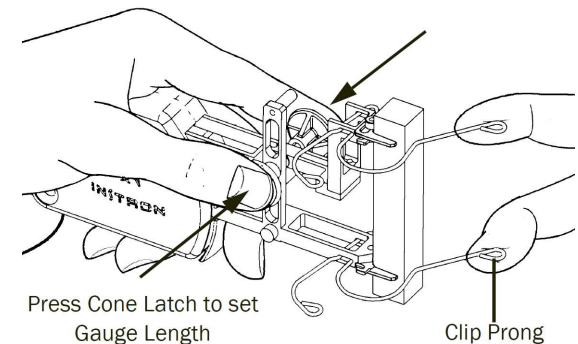
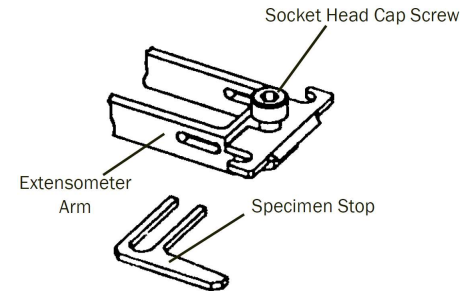
IV.E. Deflectometer – 1/4

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



IV.E. Deflectometer – 2/4

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



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

IV.E. Deflectometer – 3/4

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

13. Protect the **Extensometer** by removing it before it gets broken!
14. Ensure that “**Remove extensometer during test**” is checked under the **Methods > Test Control > Strain** section
15. Select “**Measurement event**” as the Removal criteria
16. Select “**Strain 1**” as Measurement and “**-10%**” as Value
17. Select “**Pause test but suspend data capture**” as the Action during removal

The screenshot shows a software interface with a left-hand navigation menu and a main configuration panel. The navigation menu includes options: General, Sample, Specimen, Measurements, Calculations, and Test Control. Under Test Control, there are sub-options: Start Test, Strain (highlighted with an orange circle), Pre-Test, and Test. The main panel is titled 'Set the parameters for tensile strain' and includes a descriptive text: 'The method uses this strain measurement for some calculations, such as modulus and energy.' Below this, the 'Tensile strain (Extension)' section contains several settings: 'Primary source' is set to 'Extension'; the checkbox 'Remove extensometer during test' is checked; 'Removal criteria' is set to 'Measurement event'; 'Measurement' is set to 'Strain 1'; 'Value' is set to '-10.00000' with a percentage unit selector; and 'Action during removal' is set to 'Pause test but suspend data capture'.

General

Sample

Specimen

Measurements

Calculations

Test Control

- Start Test
- Strain**
- Pre-Test
- Test

Set the parameters for tensile strain

The method uses this strain measurement for some calculations, such as modulus and energy.

Tensile strain (Extension)

Primary source: Extension

☒ Remove extensometer during test

Removal criteria: Measurement event

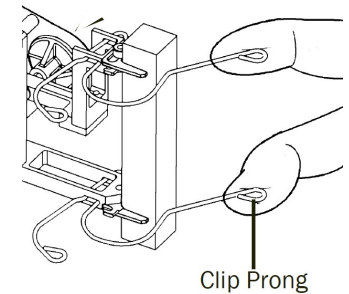
Measurement: Strain 1

Value: -10.00000 %

Action during removal: Pause test but suspend data capture

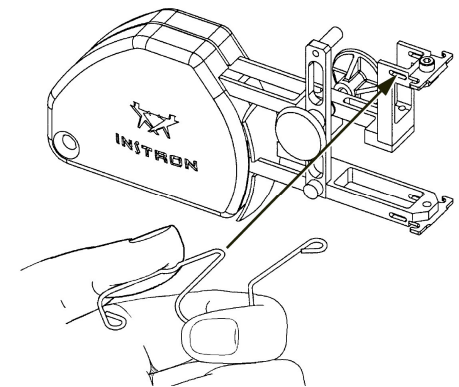
IV.E. Deflectometer – 4/4

18. 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!

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



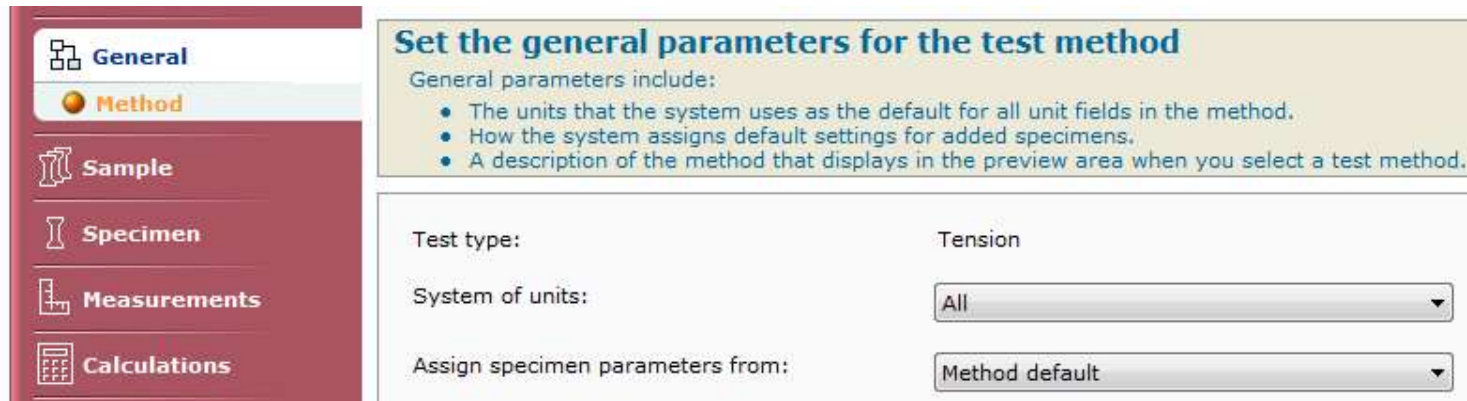
V. Configuring Test – 1/

1. The following questions should be answered prior to creating or executing a test procedure:
 - a) What is the test going to do?
 - b) What starts and stops the test?
 - c) What speed or speeds should the test run?
 - d) What is the shape and dimensions of the test specimen?
 - e) What data is collected and at what rate?
 - f) What output (graphs, reports) are required?
 - g) What answers from the test do you require?
 - h) What information is going to be supplied by the operator?
2. Click **Method > Open Method > Create Method**
3. Choose the appropriate **Test Type** and click **Next**
 - **Tension method**
 - **Compression method**
 - **Flexure method**



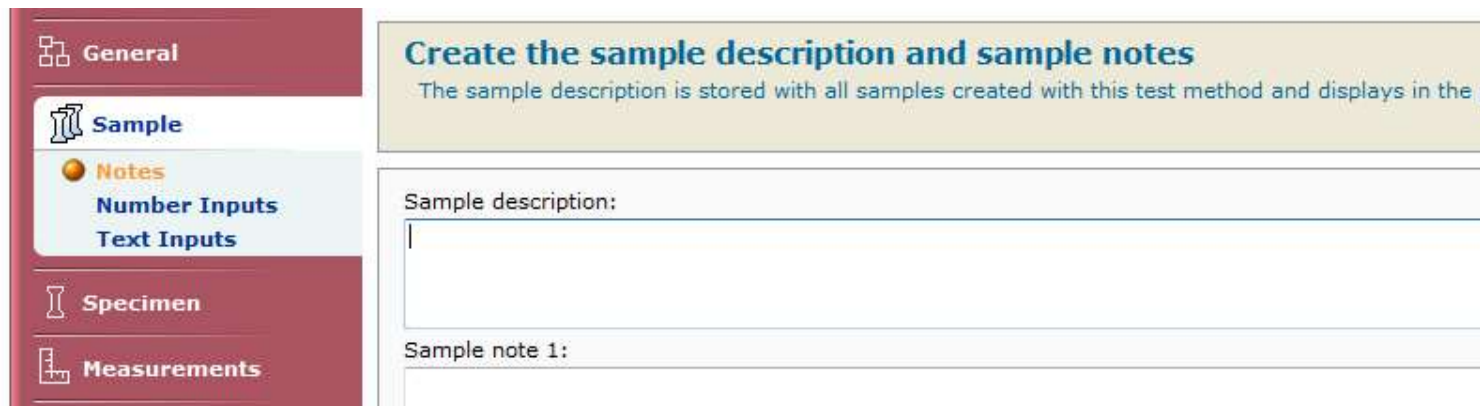
V. Configuring Test – 2/

4. Select **General** parameters for your test such as:
- System of units: (SI, Metric, US, or All) – Recommend “**All**”



The screenshot shows a software interface for configuring test parameters. On the left is a vertical sidebar with icons and labels for 'General', 'Method' (highlighted with an orange circle), 'Sample', 'Specimen', 'Measurements', and 'Calculations'. The main area has a title 'Set the general parameters for the test method' and a list of general parameters: 'The units that the system uses as the default for all unit fields in the method.', 'How the system assigns default settings for added specimens.', and 'A description of the method that displays in the preview area when you select a test method.' Below this, there are three fields: 'Test type:' with the value 'Tension', 'System of units:' with a dropdown menu set to 'All', and 'Assign specimen parameters from:' with a dropdown menu set to 'Method default'.

5. Select **Sample > Notes** to create any sample description or notes
- Sample description is stored with all samples created with this test method
 - Sample notes are available for display when notes are included with sample



The screenshot shows a software interface for creating sample descriptions and notes. On the left sidebar, 'General' and 'Sample' are visible, with 'Notes' highlighted under 'Sample' (indicated by an orange circle). Below 'Notes' are 'Number Inputs' and 'Text Inputs'. The main area has a title 'Create the sample description and sample notes' and a subtitle 'The sample description is stored with all samples created with this test method and displays in the'. It contains two text input fields: 'Sample description:' and 'Sample note 1:'.

V. Configuring Test – 3/

6. Click ***Specimen > Properties*** to specify the specimen default properties for each specimen
 - Geometry and default dimensions are important for the calculations

General

Sample

Specimen

Properties

Notes

Number Inputs

Text Inputs

Choice Inputs

Measurements

Calculations

Test Control

Console

Workspace

Set the specimen properties and the default values

Dimensions are used to calculate stress and strain. Specimen label is an option in the legend settings for a graph.

Specimen properties

Specimen label:

Geometry and default dimensions

Geometry: Rectangular

Width: 12.70000 mm

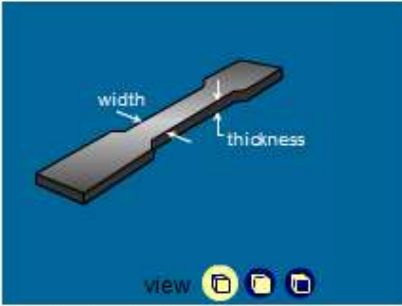
Thickness: 6.00000 mm

Length: 25.40000 mm

Final width: 12.70000 mm

Final thickness: 6.00000 mm

Final length: 25.40000 mm



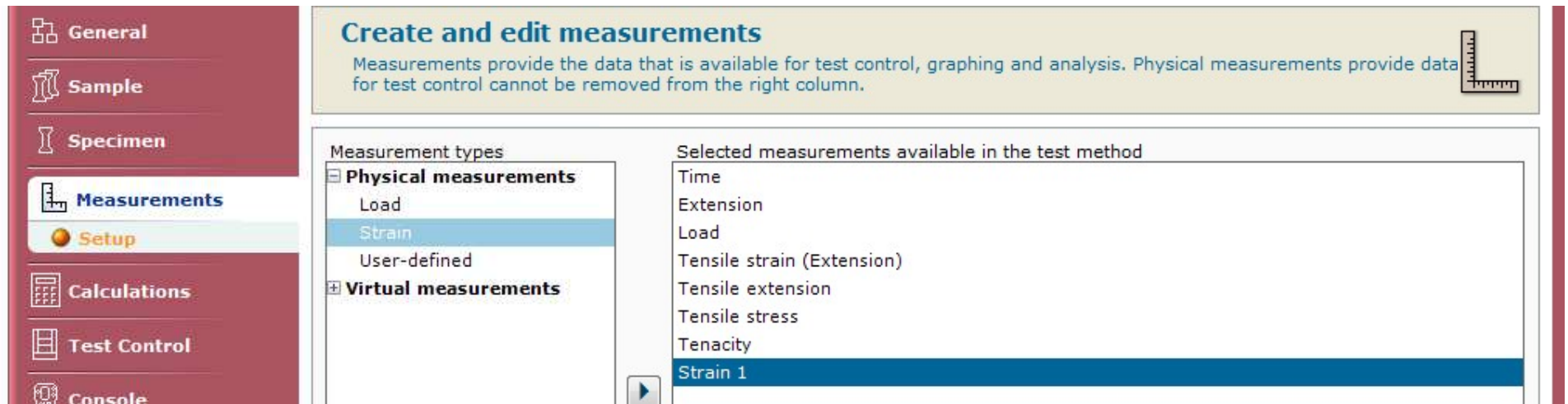
width

thickness

view

V. Configuring Test – 4/

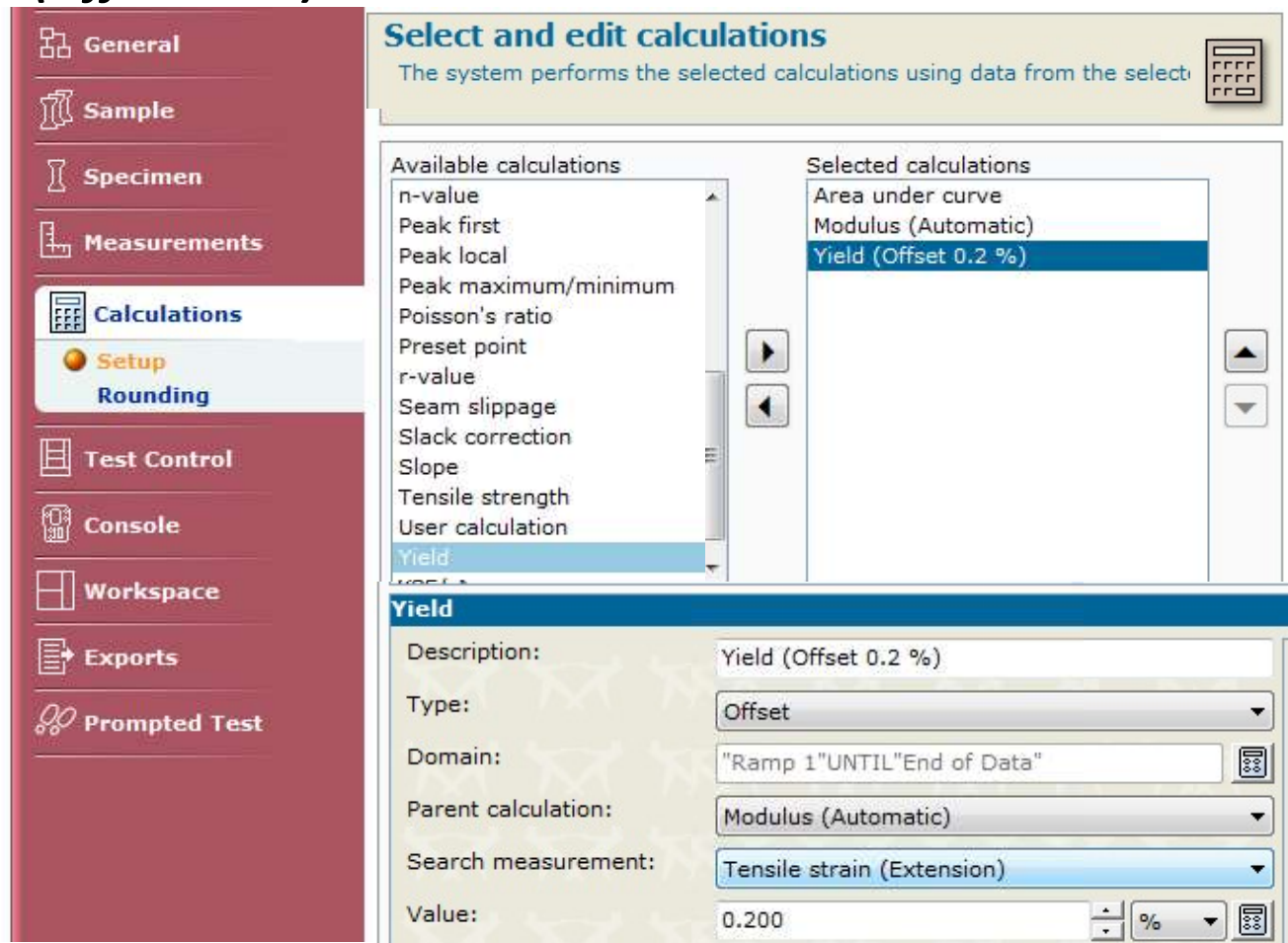
7. Click **Measurements > Setup** to specify the data that is available for the test control, data analysis and live displays



8. Physical Measurements directly measured from physical transducer include:
 - Time
 - Extension (determined based on **Crosshead** location)
 - Load
 - Strain 1 (only when using the **Extensometer**)
9. Virtual Measurements are calculated from one or more physical measurements include:
 - Strain (compressive, tensile, or flexure)
 - Stress (compressive, tensile, or flexure)

V. Configuring Test – 5/

10. Click **Calculations > Setup** to identify desired calculations that will be performed during or after the test is run
11. Use of **Extensometer** with Tension tests, will require calculation of the **Yield (Offset 0.2%)**



V. Configuring Test – 6/

12. Click **Test Control > Start Test** to and choose **Start button** (default)
13. Click **Test Control > Strain** to specify primary source of data for strain measurements
 - Choose “**Extension**” as the Primary source using the **Crosshead** location
14. If using **Extensometer**, you **MUST** check “**Remove extensometer during test**”
 - Choose “**Yield (Offset 0.002 mm/mm)**” or “**Measurement event - (Strain 1 = 100%)**” as the Removal criteria
 - Choose “**Pause test but suspend data capture**” as the Action during removal

Set the parameters for tensile strain
The method uses this strain measurement allows the extensometer to be removed

Tensile strain (Extension)

Primary source: Extension

☒ Remove extensometer during test

Removal criteria: Yield (Offset 0.002 mm/mm)

Action during removal: Pause test but suspend data capture

Removal criteria: Measurement event

Measurement: Strain 1

Value: 100.00000 %

Action during removal: Pause test but suspend data capture

V. Configuring Test – 7/

15. Click **Test Control > Pre-Test** to assign a preload, auto balance, or precycling
- Preload – used to remove slack from test fixtures that requires specifying the control measurement, preload rate, target measurement, and target value
 - Auto balance – used to automatically balance transducers associated with selected measurements after preload or precycling
 - Precycling – may be required for some tests and not available in every testing type

The screenshot shows a software interface for configuring test parameters. On the left is a sidebar with a red header and white text. The sidebar has a 'Test Control' section with a sub-menu where 'Pre-Test' is highlighted with an orange circle. Other sidebar items include 'General', 'Sample', 'Specimen', 'Measurements', 'Calculations', 'Console', and 'Workspace'. The main area is titled 'Set the pre-test parameters for the test' and contains two sections: 'Preload' and 'Auto balance'. The 'Preload' section is checked and includes fields for 'Control mode' (set to 'Extension'), 'Rate' (0.00000 mm/min), 'Changeover criteria' (set to 'Measurement event'), 'Measurement' (set to 'Load'), and 'Value' (0.00000 N). The 'Auto balance' section is also checked and includes a table with 'Available measurements' and 'Selected measurements'. The 'Available measurements' table has one entry 'Load', and the 'Selected measurements' table has one entry 'Tensile strain (Extension)'. A small graph icon is visible in the top right corner of the main area.

Set the pre-test parameters for the test
Pre-test parameters include preable for test control modes.

☒ **Preload**
Preload can remove slack in a specimen or remove compressive load on the specimen caus

Control mode: Extension

Rate: 0.00000 mm/min

Changeover criteria: Measurement event

Measurement: Load

Value: 0.00000 N

☒ **Auto balance**
Automatically balance selected measurements after preload and before the test starts.

Available measurements	Selected measurements
Load	Tensile strain (Extension)

V. Configuring Test – 8/

16. Click **Test Control > Test** to identify parameters specific to the test type such as the speed of the test and the number of speeds
- Choose a Ramp 2 control to separate a slow speed in elastic region and a faster speed in the plastic region
 - Choose a Changeover (1 to 2) criteria such as **Yield (Offset 0.002 mm/mm)**

Set the control parameters for the test
The control mode and rate determine the frame movement. Only physical measureme

☒ **Ramp 1**

Control mode 1: Extension

Rate 1: 10.00000 mm/min

☒ **Ramp 2**

Control mode 2: Extension

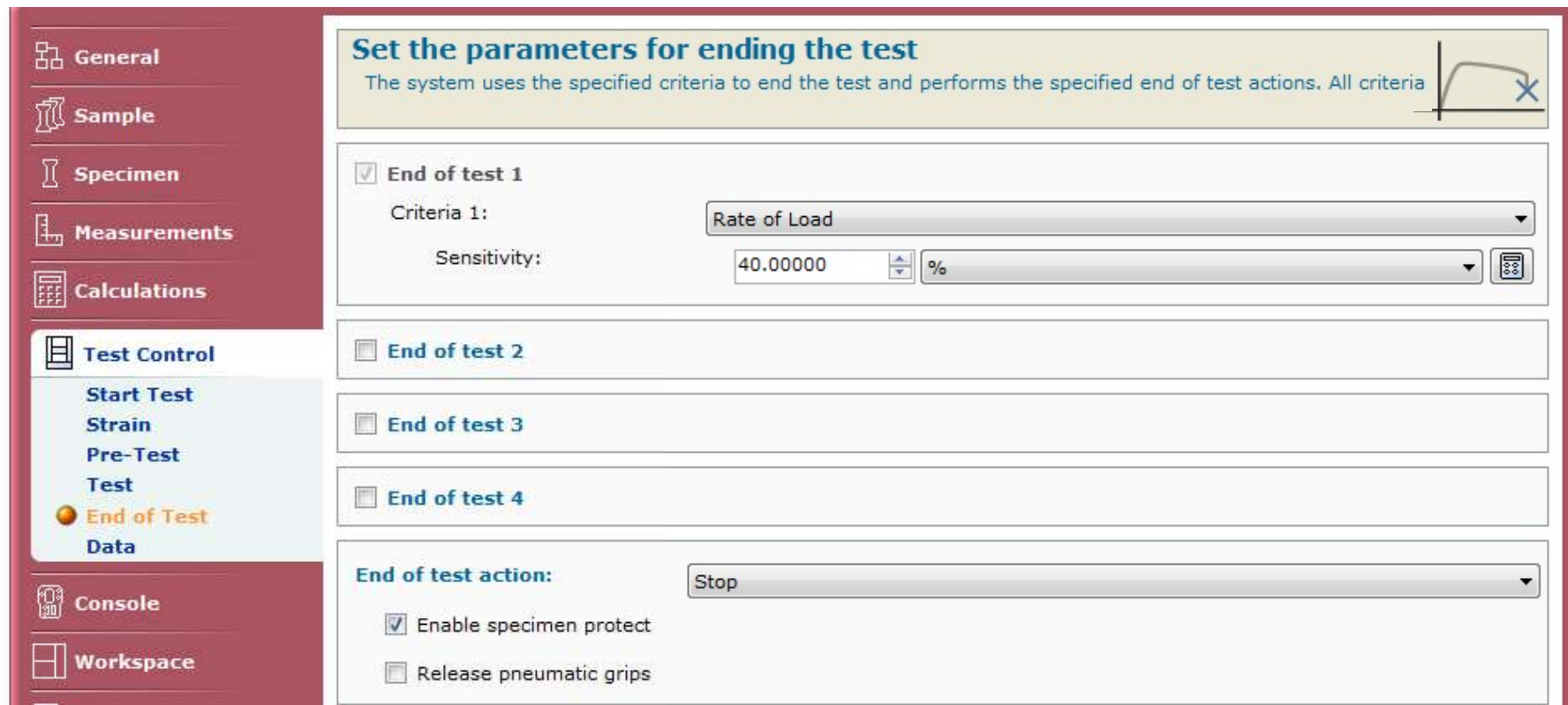
Rate 2: 0.00000 mm/min

Changeover (1 to 2): Yield (Offset 0.002 mm/mm)

Changeover override: 0.00100 mm/mm

V. Configuring Test – 9/

17. Click **Test Control > End of Test** to set up to 4 criteria for ending the test and the actions that the system performs when one of the end of test criteria is satisfied



Set the parameters for ending the test
The system uses the specified criteria to end the test and performs the specified end of test actions. All criteria

☒ **End of test 1**
Criteria 1: Rate of Load
Sensitivity: 40.00000 %

☐ **End of test 2**

☐ **End of test 3**

☐ **End of test 4**

End of test action: Stop

☒ Enable specimen protect
☐ Release pneumatic grips

V. Configuring Test – 10/

18. Select the appropriate **End of Test Criteria**:

- **Rate of load** – test ends when load drops by Sensitivity value within 100 ms time period
- **Load threshold** – test ends when load falls to **Load drops to value**, but is only active when load attains a value of 1.5 x **Load drops to value** first
- **Load with delay** – detector is inactive for the **Delay period** specified and ends when load falls to the **Load drops to value**
- **% Peak Load** – detector is inactive until **Load threshold** field is exceeded and ends test when load drops by specified **% Peak Load**
- **Measurement Event** – transition occurs when system detects a specified measurement criteria being satisfied

19. Select the appropriate **End of Test action**:

- **Stop** – the **Crosshead** stops (good default)
- **Return** – the **Crosshead** stops and returns to gauge length (**NEVER SELECT!**)
- **Stop, then Return** – **Crosshead** stops, prompt to remove specimen first then return to gauge length (good for multiple specimens)

V. Configuring Test – 11/

20. Click **Test Control > Data** to determine the number of data sets stored in the test data file
- Automatic (default) – default data capture criteria captures 10 points/sec and whenever load changes 0.25% of load capacity
 - Manual – set up to three separate data logging criteria to tailor data logging to application needs

Set the data capture parameters for the test
Specify how often the system captures test data. All criteria operate independently and the system captures c

Data capture: Manual

☒ **Criteria 1**
Measurement 1: Time
Interval 1: 50.00000 ms

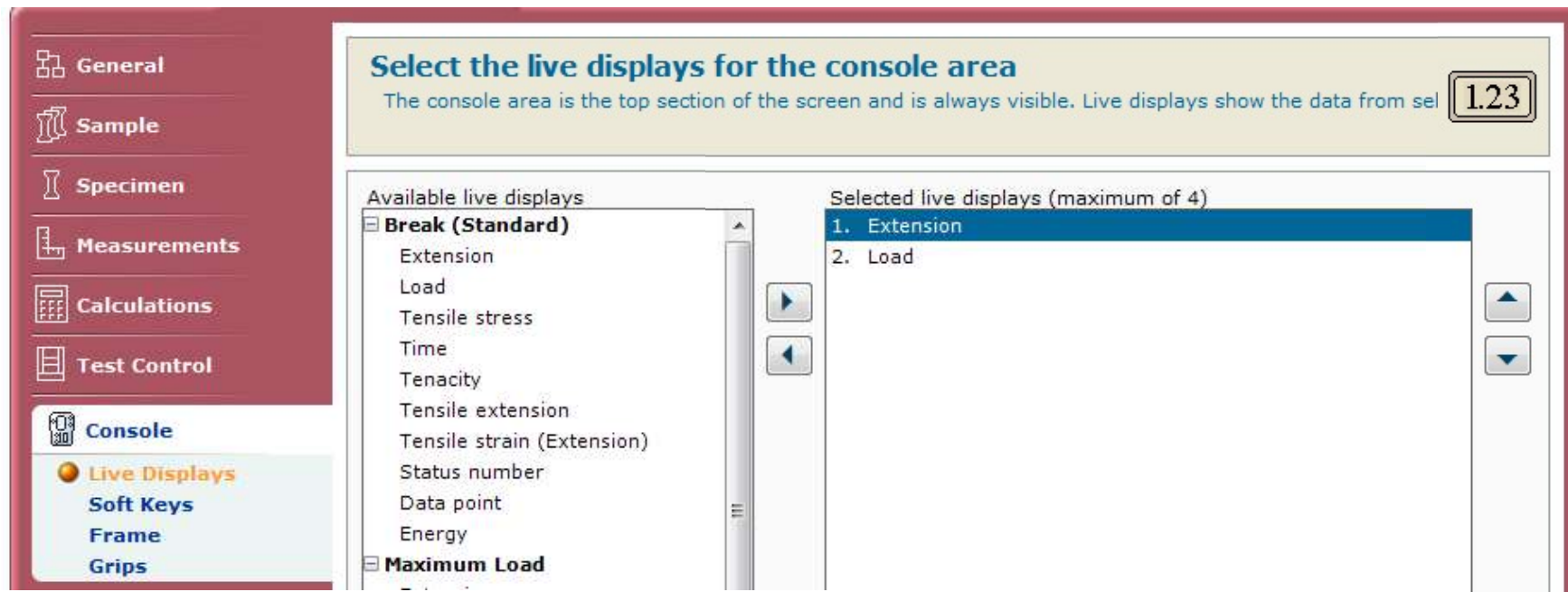
☐ **Criteria 2**

☐ **Criteria 3**

☐ **Record with TestCam**

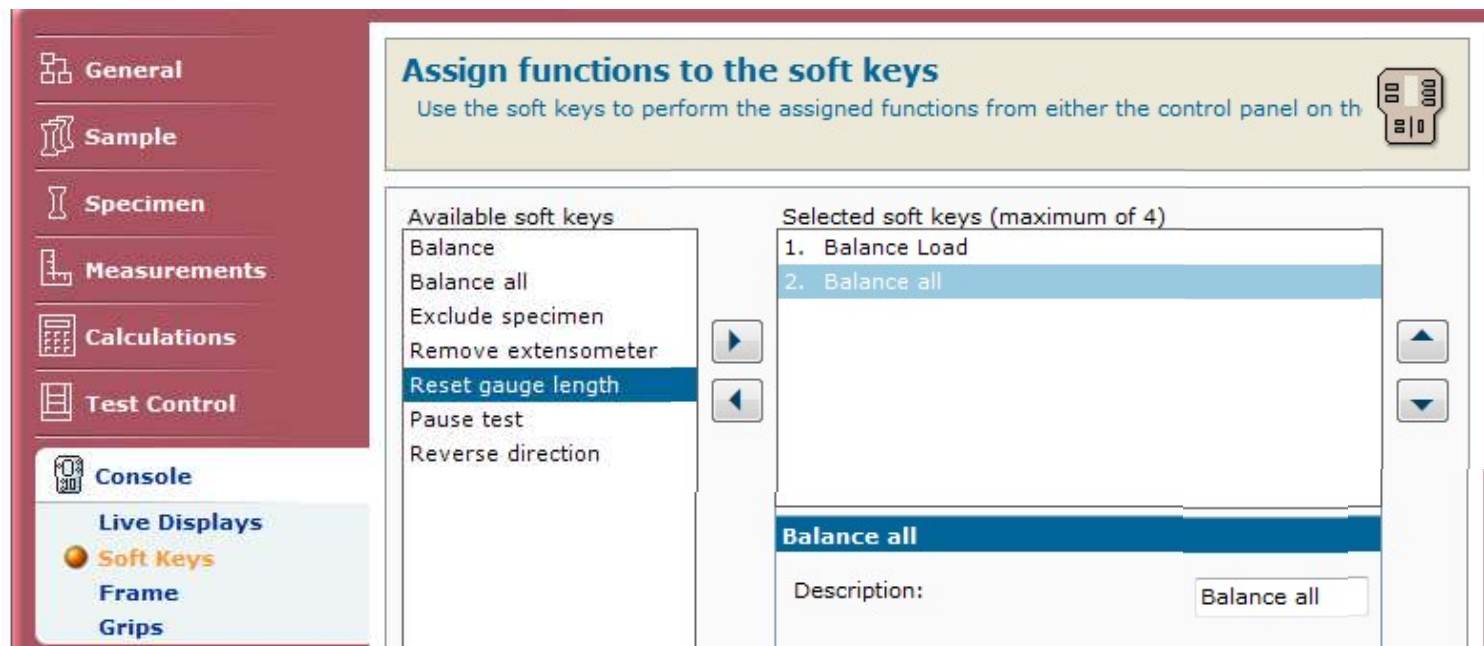
V. Configuring Test – 12/

21. Click **Test Control > Live Displays** to customize up to 4 live displays on the console (if desired)
22. Recommended **Live Displays** are:
 - Load (N)
 - Extension (mm)
 - Strain 1 (%) – if using **Extensometer**



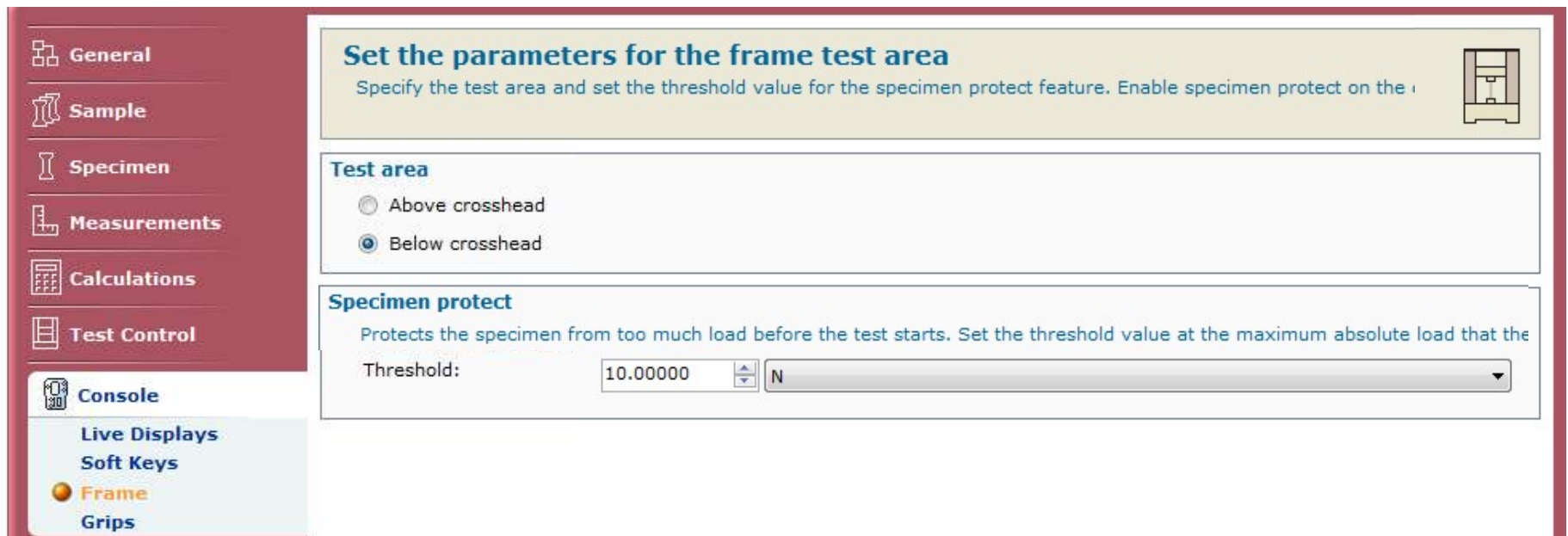
V. Configuring Test – 13/

23. Click **Test Control > Soft Keys** to selectively program up to 4 functions on the control panel
24. Recommended **Soft Keys** are:
- Balance Load
 - Balance Strain 1 – if using **Extensometer**
 - Balance all
 - Reset gauge length



V. Configuring Test – 14/

25. Click **Test Control > Frame** to specify the test area to be **Below crosshead**
26. Specify the maximum absolute load that the specimen can experience without damage under the **Threshold** value for **Specimen protect**



General

Sample

Specimen

Measurements

Calculations

Test Control

Console

Live Displays

Soft Keys

Frame

Grips

Set the parameters for the frame test area

Specify the test area and set the threshold value for the specimen protect feature. Enable specimen protect on the

Test area

☐ Above crosshead

☒ Below crosshead

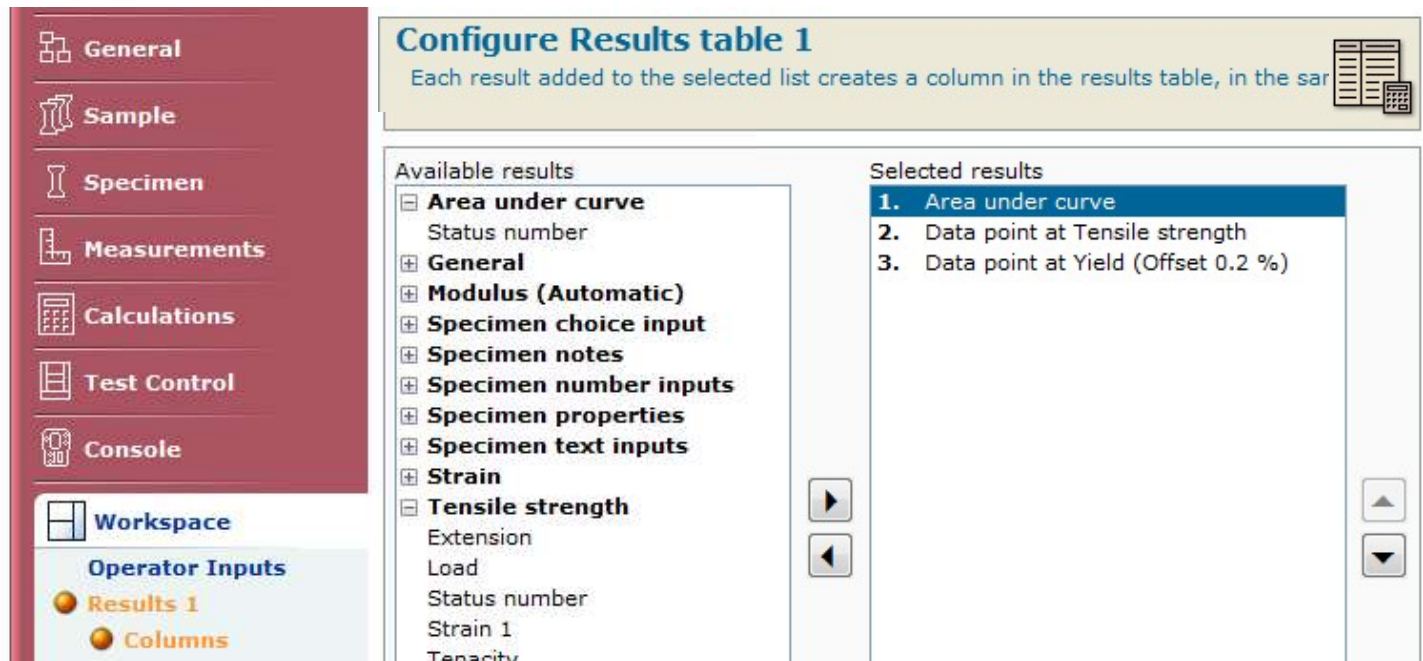
Specimen protect

Protects the specimen from too much load before the test starts. Set the threshold value at the maximum absolute load that the

Threshold: 10.00000 N

V. Configuring Test – 15/

27. Click **Workspace > Results 1 & 2 > Column** to add specified calculation to be added into results table in the report



28. Click **Workspace > Results 1 & 2 > Statistics** to add specified statistics to a row in results table
29. Click **Workspace > Results 1 & 2 > Format** to select how the results table appears in the test workspace and in the report

V. Configuring Test – 16/

30. Click **Workspace > Graph 1 & 2** to select the graphics for this method in the test workspace and in a report
31. Click **Workspace > Graph 1 & 2 > X & Y-Data** to choose axes variables

The screenshot shows a software interface for configuring a graph. On the left is a vertical sidebar with a red header and a light blue footer. The red header contains icons and labels for 'General', 'Sample', 'Specimen', 'Measurements', 'Calculations', 'Test Control', and 'Console'. The light blue footer contains a 'Workspace' section with a list of items: 'Operator Inputs', 'Results 1', 'Results 2', 'Graph 1' (highlighted with an orange circle), 'Type', 'X-Data', 'Y-Data', and 'Advanced'. The main area has a yellow header with the title 'Select the type of graph and basic format for graph 1' and a subtitle 'The graph format determines how the graph appears in the test workspace and in the report. To include the graph in the r'. Below the header is a section titled 'Select a graph type' with three radio buttons: 'Multi-specimen' (selected), 'Double Y-axis', and 'Multi-measurement'. To the right of these buttons is a text box stating 'A multi-specimen graph can display up to 25 specimen curves on each graph.' Below the radio buttons are four input fields: 'Graph title:' with the value 'Specimen %n to %m', 'Domain:' with the value '"Start of Data" UNTIL "End of Data"', 'Curves per graph:' with a value of 4, and 'Offset each curve by:' with a value of 'Auto'. Below these fields are two checkboxes: 'Show excluded specimens' (checked) and 'Enable data point selector' (unchecked). At the bottom of the main area is a graph preview showing a coordinate system with a y-axis from 20 to 24 and an x-axis with labels 1, 2, 3, 4, 5. A legend in the top right corner of the graph area shows a triangle marker and the text 'Marker Style'.

Select the type of graph and basic format for graph 1
The graph format determines how the graph appears in the test workspace and in the report. To include the graph in the r

Select a graph type

- ☒ Multi-specimen
- ☐ Double Y-axis
- ☐ Multi-measurement

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"

Curves per graph: 4

Offset each curve by: Auto

☒ Show excluded specimens

☐ Enable data point selector

Spe

24

22

20

1 2 3 4 5

▲ Marker Style

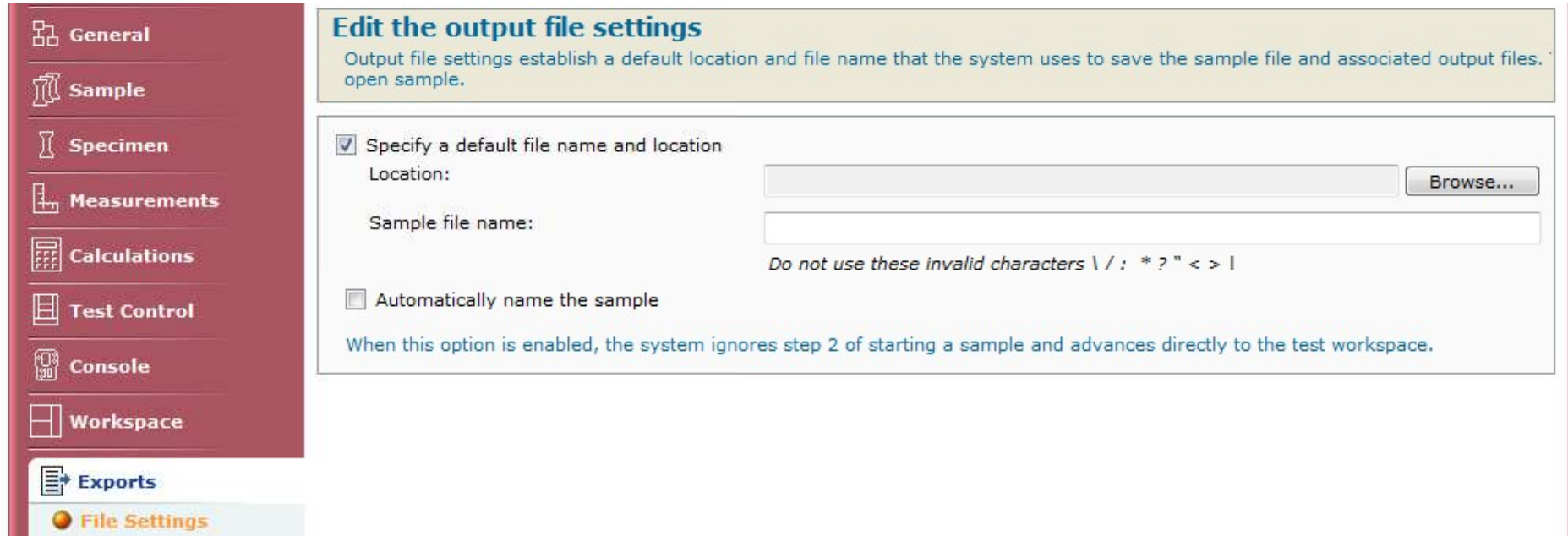
V. Configuring Test – 17/

- 32. Click **Workspace > Raw Data** to set up the content for the raw data table
- 33. Click **Workspace > Raw Data > Columns** to arrange the order
- 34. Click **Workspace > Layout** to set up what is displayed on the test workspace

The screenshot shows a software interface with a left-hand navigation pane and a main workspace area. The navigation pane includes sections for General, Sample, Specimen, Measurements, Calculations, Test Control, Console, and Workspace. The Workspace section is expanded, showing a list of items: Operator Inputs, Results 1, Results 2, Graph 1, Graph 2, Raw Data (highlighted with an orange circle), and Columns (highlighted with an orange circle). The main workspace area has a title bar that reads "Create a table to display raw data on the workspace" with a subtitle "Each measurement added to the selected list creates a column in the raw data table, in the same order as they appear in the list." Below the title bar, there are two columns: "Available measurements" and "Selected measurements". The "Available measurements" column lists: PIP count, Tenacity (highlighted in blue), Tensile extension, Tensile strain (Extension), and Tensile stress. The "Selected measurements" column lists: 1. Time, 2. Extension, 3. Load, and 4. Strain 1 (highlighted in blue). There are arrow buttons between the two columns and scroll bars on the right side of each list.

V. Configuring Test – 18/

35. Click **Exports > File Settings** to set a default file name and location for all your output files such as Reports, Results, and Raw Data
36. Click **Exports > Reports** to determine how the system produces the report when it generates output for a sample



The screenshot shows a software interface with a sidebar on the left and a main panel on the right. The sidebar contains several menu items: General, Sample, Specimen, Measurements, Calculations, Test Control, Console, Workspace, Exports, and File Settings (which is highlighted with an orange circle). The main panel displays the 'Edit the output file settings' dialog box. At the top of the dialog, there is a title bar and a subtitle: 'Output file settings establish a default location and file name that the system uses to save the sample file and associated output files. open sample.' Below this, there are two main sections. The first section is titled 'Specify a default file name and location' and is checked. It contains two input fields: 'Location:' and 'Sample file name:'. The 'Location:' field has a 'Browse...' button next to it. Below these fields, there is a warning message: 'Do not use these invalid characters \ / : * ? " < > |'. The second section is titled 'Automatically name the sample' and is unchecked. Below this section, there is a note: 'When this option is enabled, the system ignores step 2 of starting a sample and advances directly to the test workspace.'

Edit the output file settings

Output file settings establish a default location and file name that the system uses to save the sample file and associated output files. open sample.

☒ Specify a default file name and location

Location:

Sample file name:

*Do not use these invalid characters \ / : * ? " < > |*

☐ Automatically name the sample

When this option is enabled, the system ignores step 2 of starting a sample and advances directly to the test workspace.

V. Configuring Test – 19/

37. Click **Exports > Export Results** to export results tables to .CSV file that the system generates
38. Click **Exports > Export Raw Data** to export raw data and determine the additional content in the raw data output file that the system generates

Edit the raw data export settings

If enabled, the system saves the raw data table to a separate file for each specimen when you finish a sample.

Export raw data

☒ Export raw data

Include additional specimen information

Available results	Selected results
<input checked="" type="checkbox"/> Area under curve Status number	Modulus (Automatic): Modulus (Automatic)
<input checked="" type="checkbox"/> General End date Excluded Specimen number (included) Start date Unique identifier User	Area under curve: Area under curve
<input checked="" type="checkbox"/> Modulus (Automatic) Energy to X-intercept Status number X-intercept	

V. Configuring Test – 20/

39. Click **Prompted Test > Prompt Sequence** to specify if the test would proceed with or without a sequence of prompts
40. Select which **Prompts** to be included in the test

The screenshot shows a software interface for configuring a prompted test sequence. On the left is a vertical sidebar with icons and labels for various sections: General, Sample, Specimen, Measurements, Calculations, Test Control, Console, Workspace, Exports, and Prompted Test. The 'Prompted Test' section is expanded, showing 'Prompt Sequence' as the active option, with sub-options 'Before Start' and 'Before Test'. The main panel is titled 'Create a prompted test sequence' and includes a descriptive text: 'A prompted test provides a series of steps that overlay the test workspace'. Below this is a visual timeline diagram with icons for specimen, test, calculations, and workspace, connected by arrows. The configuration area contains a checked checkbox 'Run as a prompted test', a numeric input field for 'Number of specimens in sample' set to 10, and a list of prompts with checkboxes: 'Prompt before start' (checked), 'Prompt before specimen' (unchecked), 'Prompt before test' (checked), 'Show workspace after test' (unchecked), 'Prompt before calculations' (unchecked), 'Show workspace after calculations' (checked), 'Prompt after specimen' (unchecked), and 'Prompt at finish' (unchecked).

Create a prompted test sequence
A prompted test provides a series of steps that overlay the test workspace

☒ Run as a prompted test

Number of specimens in sample: 10

- ☒ Prompt before start
- ☐ Prompt before specimen
- ☒ Prompt before test
- ☐ Show workspace after test
- ☐ Prompt before calculations
- ☒ Show workspace after calculations
- ☐ Prompt after specimen
- ☐ Prompt at finish

V. Configuring Test – 21/

41. Click **Prompted Test > Before start of the sample** to enter instructions for the operator and select the parameters that are common to all specimens

Prompted test - Before start of the sample
Enter instructions for the operator and select the parameters that are common to all specimens in the sample. ➔

Prompt before start:
Enter the following values before the start of the sample.
(This input information can be added/deleted in the METHODS tab-> Test Prompts)

Available parameters

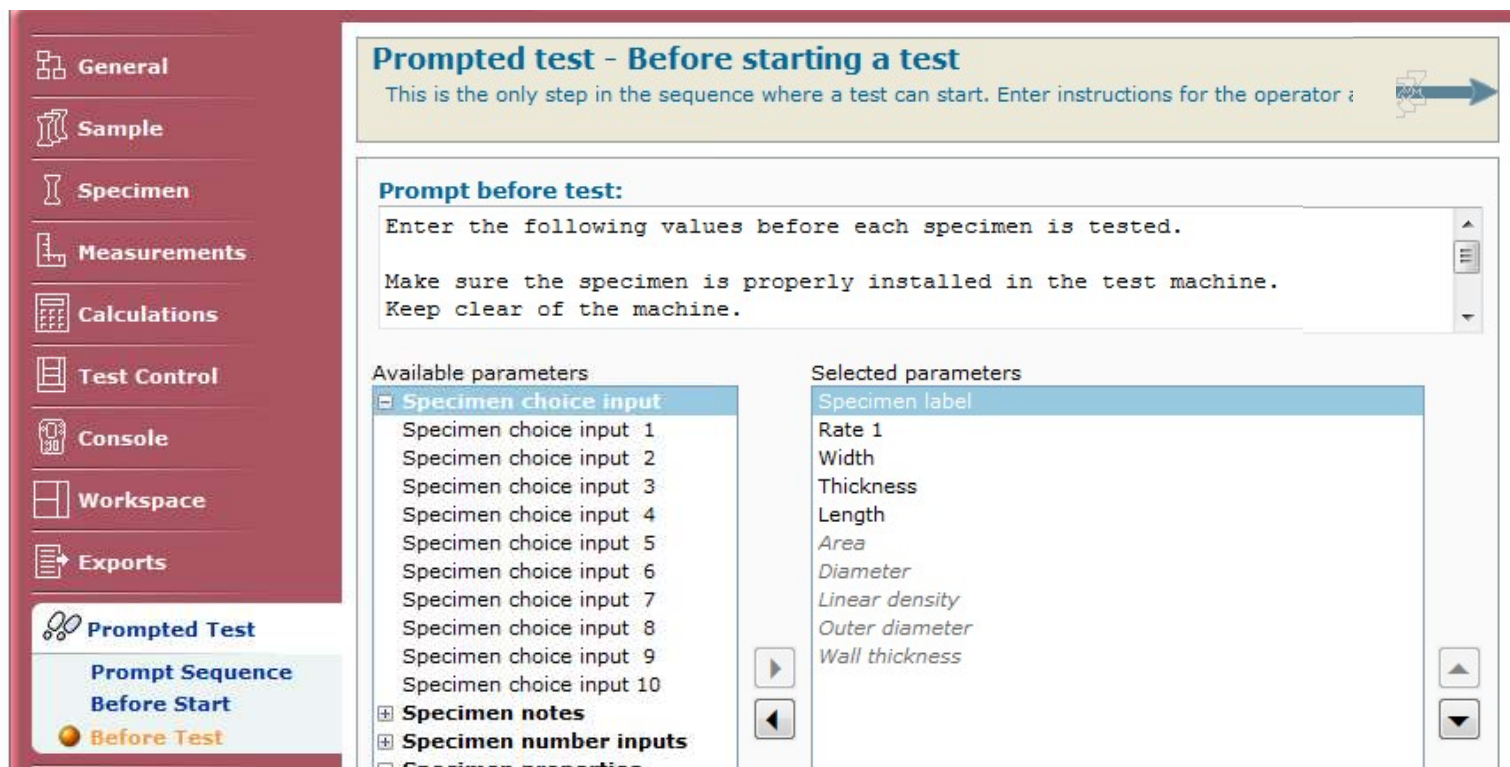
- General
 - Number of specimens in sample
- Sample notes
- Sample number inputs
- Sample text inputs
- Specimen choice input
- Specimen notes
- Specimen number inputs
- Specimen properties
- Specimen text inputs
- Test

Selected parameters

- Company
- Laboratory Name
- Geometry
- Thickness
- Width
- Length
- Outer diameter
- Linear density
- Area
- Diameter
- Wall thickness
- Sample description

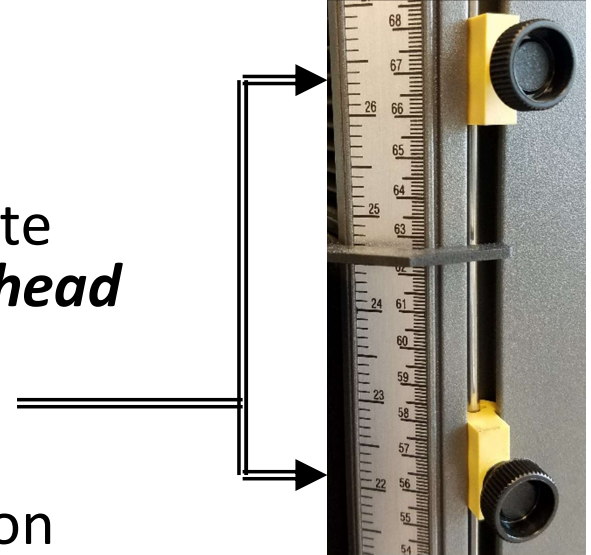
V. Configuring Test – 22/

42. Click **Prompted Test > Before test** to enter instructions for the operator and select the parameters that required before each specimen is tested



VI. Running Test – 1/

1. Always set **Upper and Lower Limits** before operating the Instron and ensure appropriate limits are enabled before moving the **Crosshead**
2. Loosen and move the slides to the desired positions and tighten the thumb screws
3. Position the **Crosshead** to its starting position for the test using **Jog $\Delta \nabla$** and **Fine Jog** controls



NOTE: ALWAYS RESET EXTENSION GAUGE LENGTH AFTER JOGGING OR MANUALLY CHANGING POSITION OF CROSSHEAD BEFORE STARTING TEST



4. Determine how you would like to measure strain (if applicable)
 - a) "Extension" is determined by the location of the **Cross Head** (default)
 - b) "Strain 1" is determined by **Extensometer** via the knife edge distance

VI. Running Test – 2/

5. Collect all ***Specimens*** together that will make up your sample
6. Identify each ***Specimen*** (e.g. with markings) by 1, 2, 3....
8. Load your ***Specimen*** appropriately into installed fixture or grip
9. Click “***Balance All***” or if desired, click on individual measurements to be balanced (e.g. ***Load, Strain, Gauge Length***)



10. Click ***Test*** on the ***Home screen***
10. Click ***New Sample > Select Method*** in the navigation bar
11. Click ***Browse...*** to find desired test method file, click ***Open***
12. Input desired ***Sample Name***
13. Determine the location to save the file in ***Location*** field, click ***Next***



VII. Cleanup – 1/

1. Remove ***Specimen*** from the installed grip or fixtures
2. Remove the ***Preload*** if performing Tension tests, see ***II.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***

