

Racing Surfaces Testing Laboratory

907 National Ave
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ORONO BIOMECHANICAL SURFACE TESTER

STANDARD OPERATING PROCEDURE

July 7th, 2023



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Testing Laboratory

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Summary

The OBST (Orono Biomechanical Surface Tester) is a system designed to apply mechanical loading to the track/surface at the rate and loads consistent with those applied by a horse's forelimb during a gallop. Dirt and synthetic tracks are sampled using the OBST.

Sampling occurs in two lanes around the track at 7' and 15' from the inner rail. Three replicate OBST samples are taken, at each 1/8th pole, moving in the WRONG DIRECTION (opposite of Racing), 7' from the inner rail. Sampling then continues for a second lap with three replicate OBST samples at every 1/8th pole, this time 15' away from the inner rail.

The track must be in race ready condition (moisture, harrowing) between ~5-17' from inner rail. It is important to be efficient in OBST testing around the track, especially when evaporation is high, as track conditions (e.g. Moisture, Temperature) are constantly changing.

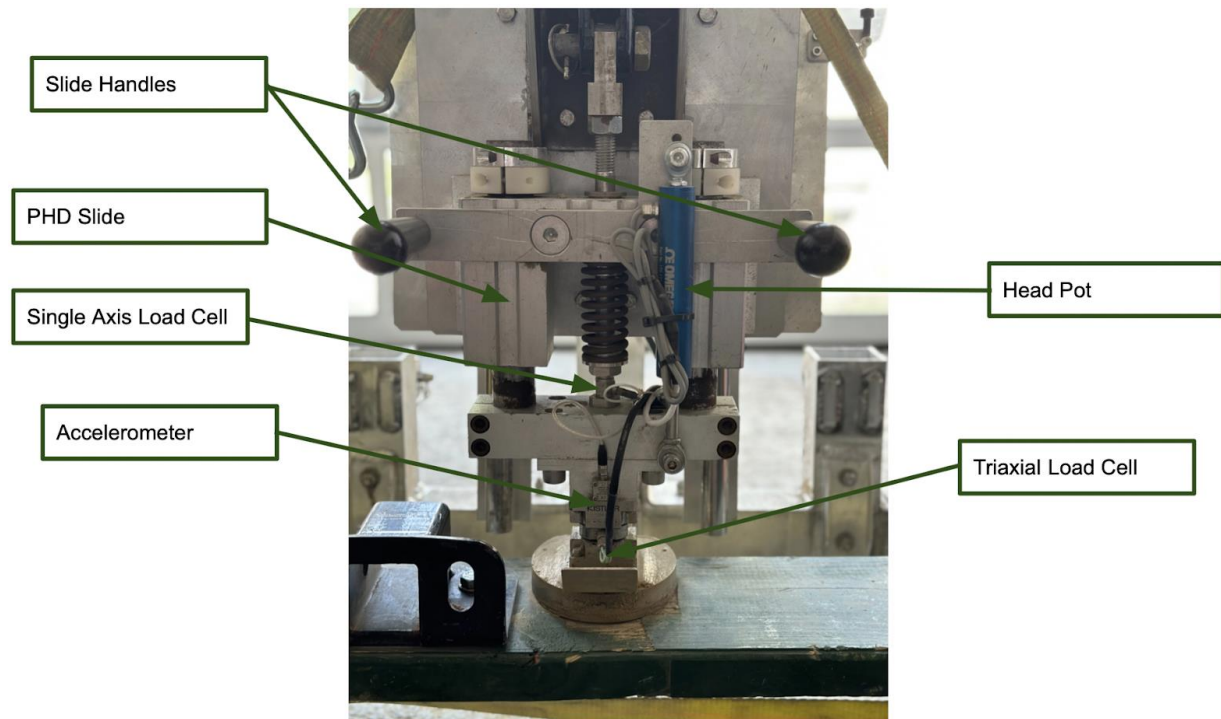
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Unloading UTV

1. Park Trailer and Van in an area away from high traffic
2. Lower trailer jack and relieve tongue weight
3. Check hitch pins- ensure 3 point hitch is completely attached to OBST and to the UTV
4. Back out UTV
 - **Ensure String Pot is removed**
 - Turn Battery on and lift OBST slightly off the ground
 - Back up slowly ensuring not to hit top of OBST on back of trailer
 - Once OBST has cleared the back of the trailer lift up to full height
 - Park UTV on flat surface and lower OBST to rest on ground
5. Get String Pot from the bed of UTV and attach to OBST
 - **ATTACH CABLE BOTTOM TO TOP (hoof sled to upper bracket)**
 - Connect Amphenol connector to String Pot.
 - Ensure correct orientation when plugging in and use threaded cap to tighten (NEVER TWIST CABLE)
6. Check sensor connections to instruments, should be tight with no play in the connection.
 - Green- Triaxial Load
 - White Accelerometer
 - Blue Single Axis Load Cell
 - Head Pot



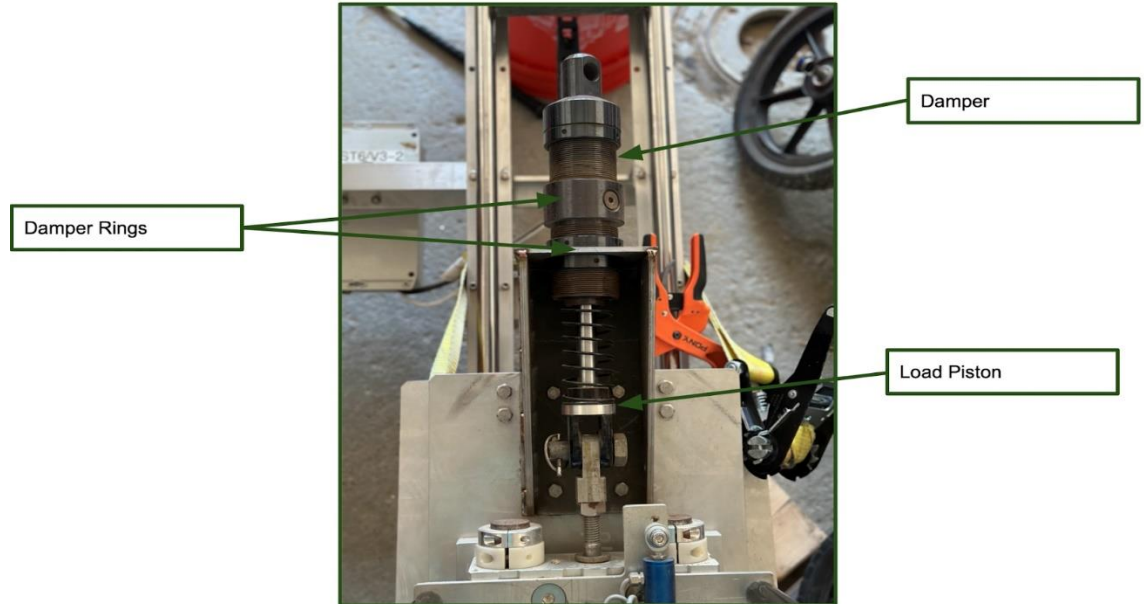
7. Damper Check

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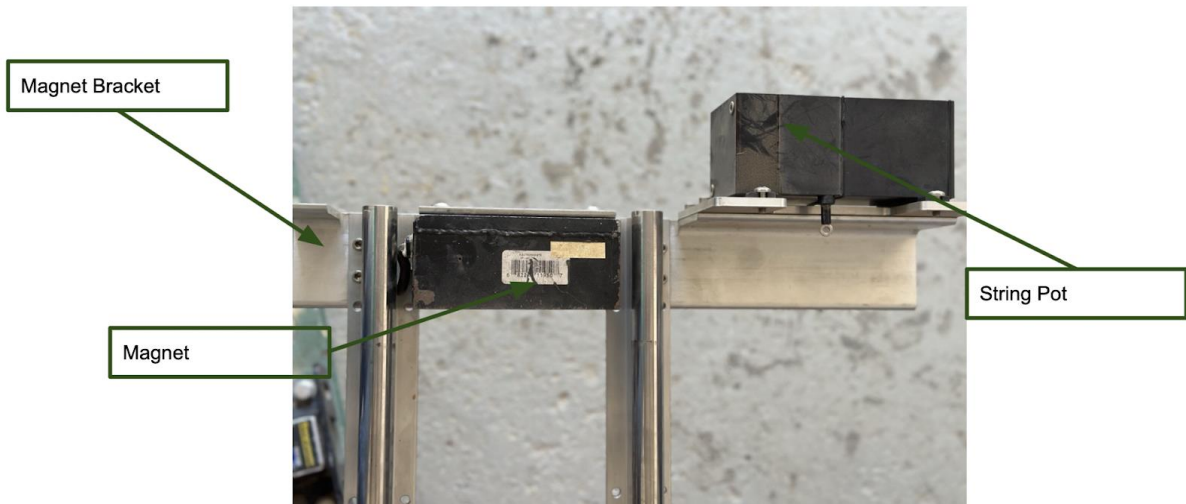
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- Ensure damper set to (2)
- Check Damper Rings to ensure tightness



8. Ensure Load Piston Not Bound on PHD slide by pressing down and releasing handles
9. Ensure PHD Slide moves freely and is not hung on rust by pressing down on handles and releasing
10. Check Magnet cable connection
11. Ensure magnet bracket is secure



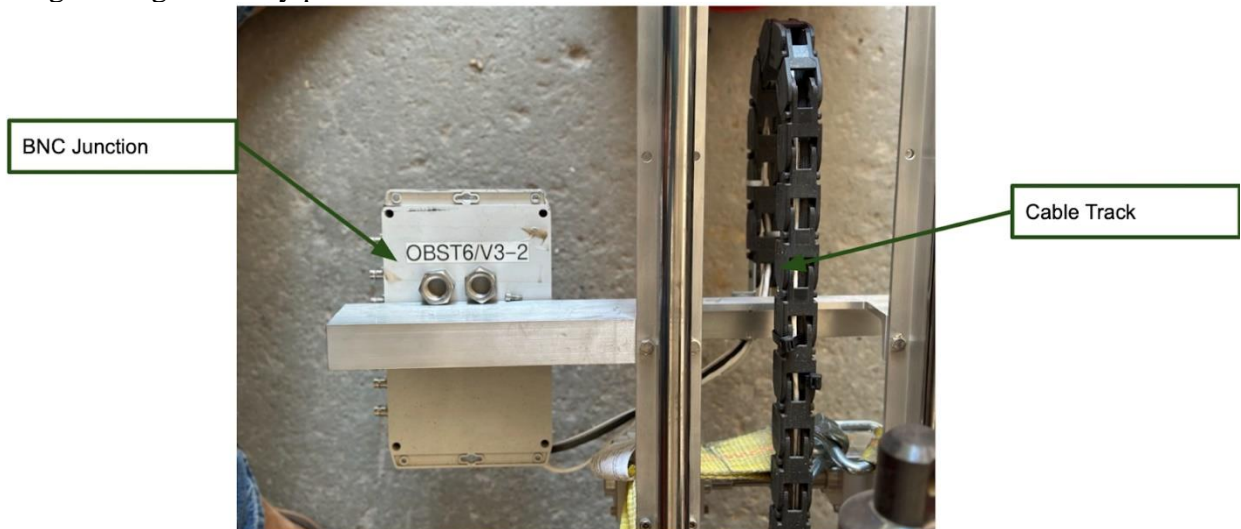
12. Check cables in cable track
 - No excess hanging out

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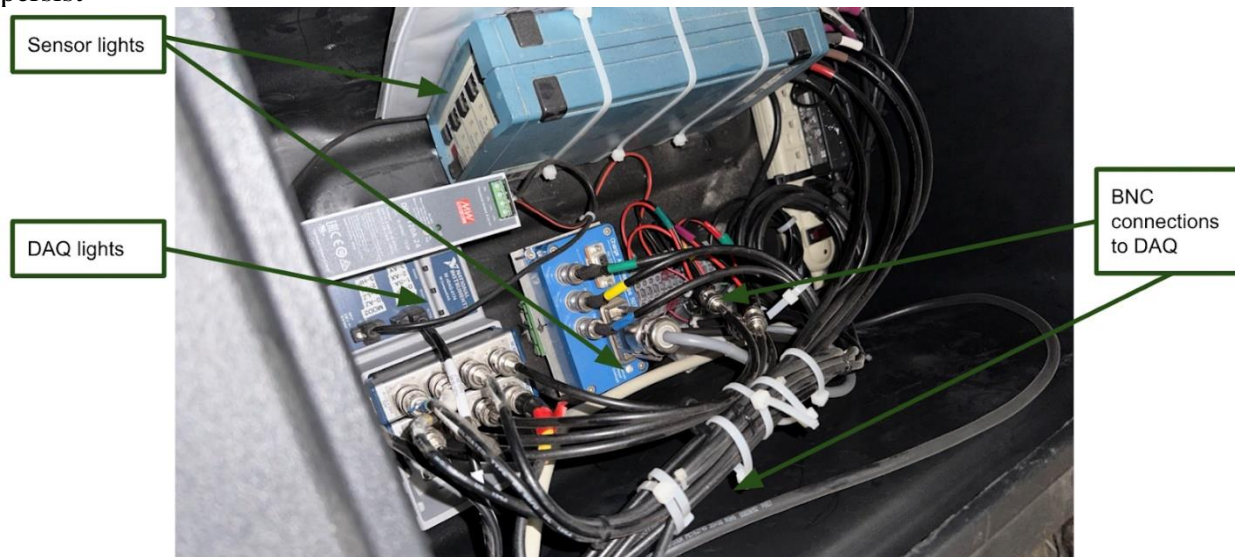
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- No tension running to BNC Junction Box
- 13. Check BNC Junction Box connections
- 14. Bring 2 charged battery packs to UTV and turn on



- Hold button to power on
- Switch to AC on battery pack
- 15. Plug in DAQ to battery box 1
 - Check system lights in DAQ box (green Blinky lights)
 - If a fault light is on recheck connections and see troubleshoot section if problems persist



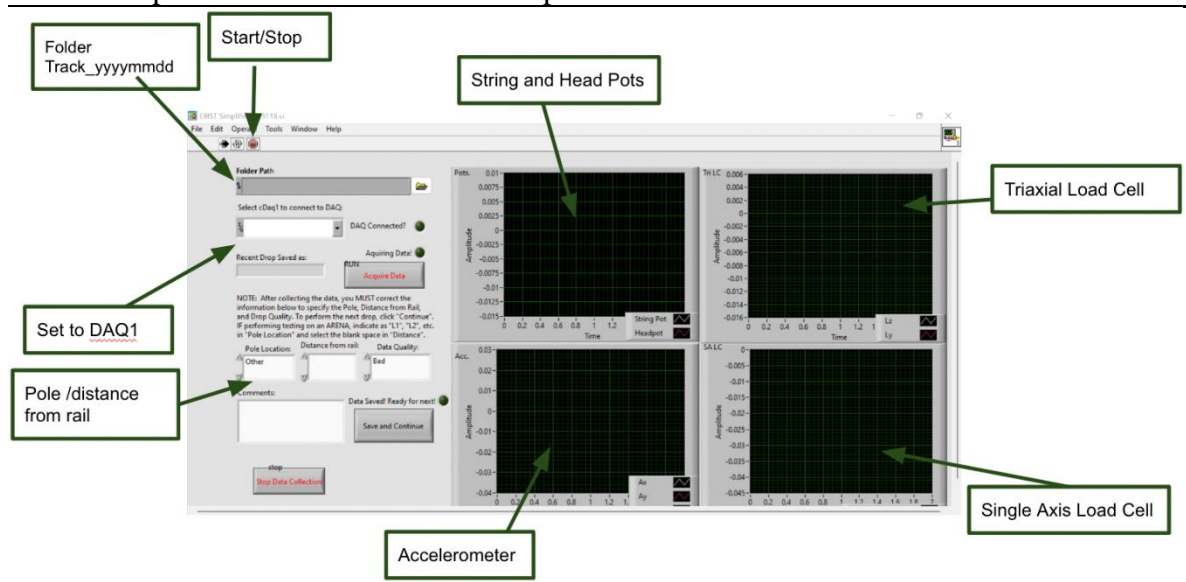
- 16. Get Computer from bed of UTV and secure on platform
- 17. Plug in computer power cord to laptop and to battery box 2 and attach usb

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18. Power computer on and select OBST Simple V4.0 on Home Screen



19. Stop Program from running

20. Go to Folder Path

- Select new folder
- Name - TrackCode_yyyyymmdd
-

21. Go to DAQ

- Select CDAQ1

22. Turn battery in UTV on

23. Raise Sled to magnet and secure with clamp

- ensure flush connection to magnet

24. Lower Sled back to platform

25. Test “Drops”

- Run program
- Press acquire data
- Lift slightly and drop sled three times
 - Must be done within 2 seconds of pressing acquire data

26. Inspect Results

- Lines for LZ and LY
- Lines for String pot and headpot
- Line for single axis load cell
- Lines for AX, AY and AZ
- If any variation recheck connections to BNC Junction box and sensors, refer to troubleshoot section

27. If everything is operational proceed to the track to test at each 1/8th pole

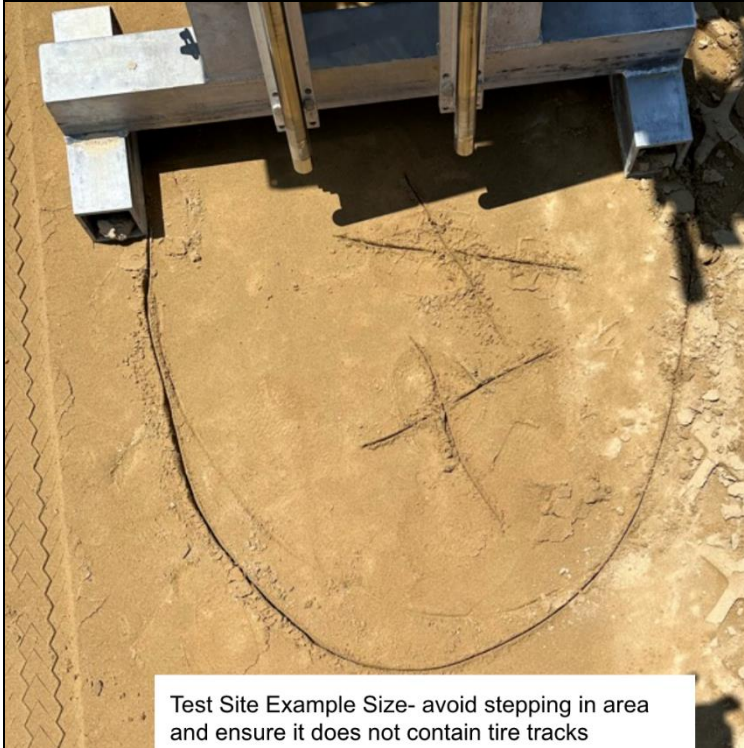
28. Position OBST at drop site and lower using controllers on UTV. Make sure the frame is firmly planted on the ground.

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29. Raise Slide to magnet using the handles on its front. Avoid stepping in the test area while doing this.
30. Clamp slide up and remove the platform at the base of the OBST and place away from testing site
31. Clear testing site and remove clamp if attached



32. **NEXT STEP MUST BE COMPLETED ALMOST SIMULTANEOUSLY.** Press acquire data and within a second press the drop button to release the slide from the magnet.
33. Inspect graphs for errors or sensor failures
 - Lines for LZ and LY
 - Lines for string pot and head pot
 - Line for single axis load cell
 - Line for AX, AY, AZ
34. If all looks normal record pole position and any observations at that point and save data
35. Raise sled back up to the magnet and raise the OBST frame two inches (2”) from the ground.
36. Pull forward at least three feet from the previous testing site
37. Repeat steps 28-36 for second and third drops continue to step 38 following three (3) drops completion
38. Clamp slide in place and replace the platform on the base of the OBST.
39. Remove the clamp and while holding the OBST press the drop button and gently lower slide onto platform
40. Using TDR and a steel ruler test moisture and cushion depth in front of each drop site. Start with the first and work your way to the third recording the measurements as you go.

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41. Repeat Steps at each 1/8th pole (Green and white or Red and white) at distances of 7 and 15 feet.
42. Close application and power down computer
 - o Remove from battery pack and turn battery pack 2 off
 - o Close all covers on computer and store in UTV Bed
43. Power off DAQ battery pack 1 and unplug
44. TURN OFF BATTERY IN UTV
45. Store battery packs in front of trailer/in van

Prepare OBST/UTV for Travel

46. OBST Breakdown
 - o Disconnect Amphenol cable from string pot
 - o Turn cover to remove not the cable
 - o Secure platform for sled to OBST
47. Take String pot off upper bracket lower to sled and disconnect cable
 - o Store in box in bed of UTV bracket screws re threaded into string pot thread cable bolt back into OBST Slide
48. Prep Trailer for loading
 - o Sweep out main area
 - o Go through equipment check list make sure nothing is forgotten
 - o Ensure DAQ and Computer batteries are stable and plugged in
49. General Maint. Check Trailer & Van
 - o Check tire pressure on all
 - o Record Van Mileage
50. Load UTV
 - o Start UTV and Turn on battery
 - o Lift OBST to full height
 - o Drive UTV into trailer lowering OBST as you get to entrance and stopping at 2X4 in front of trailer
 - o Lower OBST to the floor and relieve pressure on UTV
 - o **TURN OFF BATTERY AND DISCONNECT TOP LINKAGE OF 3 POINT HITCH**
 - o Strap UTV Down
 - Strap front- DO NOT PULL UP OR OVER STOPS LEAVE SLACK AS TIGHTENING
 - Strap Rear - Strap Through LOWER HITCH 3 point hitch
 - o Strap Down OBST
 - Run Strap over slide and secure on side rails
 - Run Strap between frame and secure on side rails

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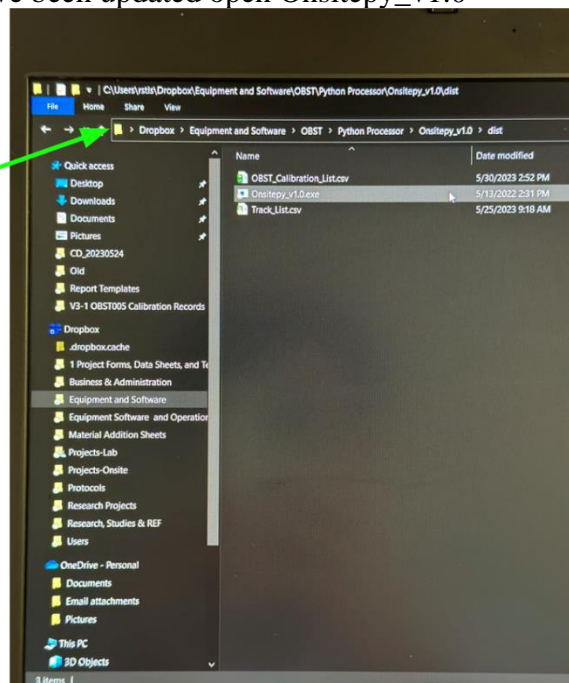
Trailer Hook Up & Final Checks

51. Ensure trailer is fully hooked up
 - Check Trailer Break
 - Check Chains - Ensure they are crossed and do not drag
 - Pick up trailer jack
52. Check locks and door latches
53. Relevant Directions/Chargers

Data Processing For OBST

54. Open Dropbox
 - Equipment & software ⇒OBST⇒Python Processor⇒Onsitepy_v1.0⇒Dist.
55. Three tabs will appear: OBST_Calibration_List, Onsitepy_v1.0 and Track_List. Ensure that the lists have the track and OBST set up used for the testing.
56. Once the lists have been updated open Onsitepy_v1.0

Open file progression to get to Onsitepy_v1.0.exe

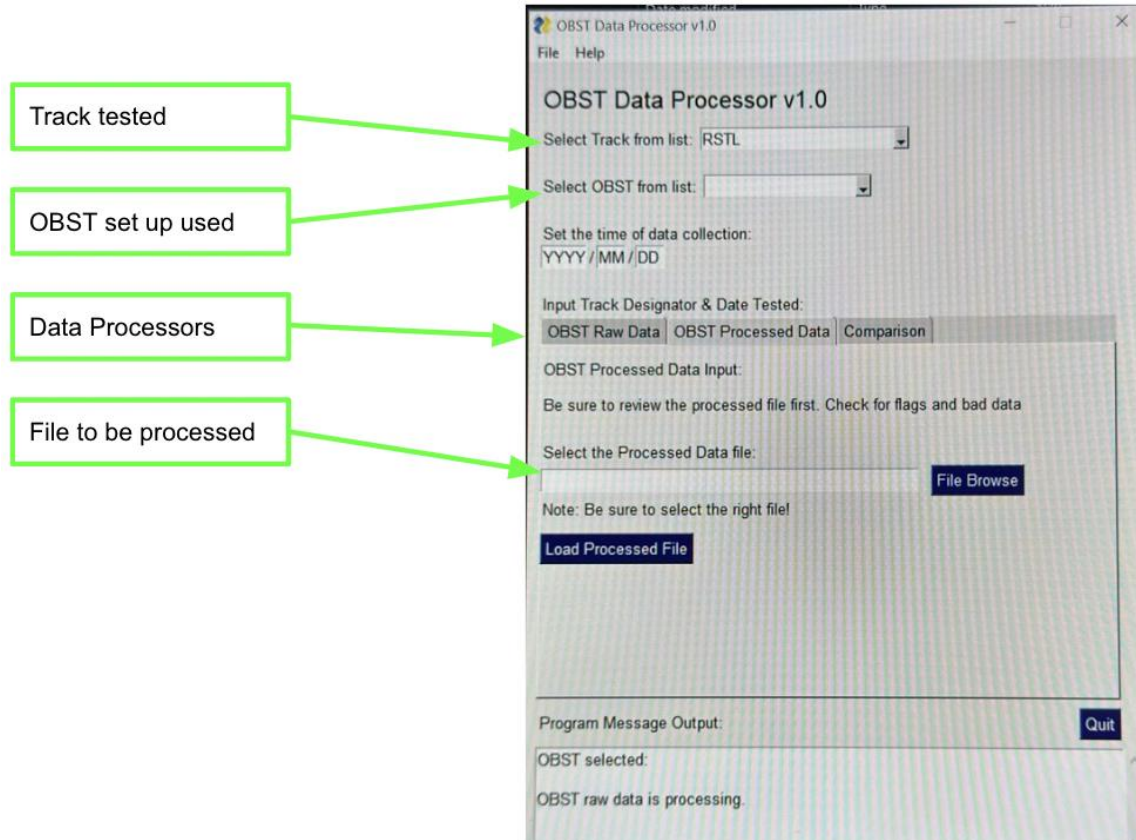


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57. Select Track tested and OBST set up from list and set the date for the day the data was collected.



58. Select OBST Raw Data for the processor tabs.

59. Find the OBST raw file you wish to process.

- Projects-onsite ⇒ track tested ⇒ Track_date tested ⇒ OBST

60. Load raw data CSV and process data points

61. Open processed data file and inspect results

- Remove any tests marked bad and look over any marked check
- Save file

62. In the OBST python processor select “OBST Processed Data” and select browse File

- Projects-onsite ⇒ track tested ⇒ Track_date tested ⇒ OBST ⇒ OBST_Processed Data
- Load processed file
- This will auto generate and save your graphs for cushioning, slide, and impact firmness.

63. Select Comparison

- Using the same path find processed OBST data for tracks in the same area/circuit, same material, or same ownership
- Select at least 5 tracks to compare to

64. Select generate comparison: this will auto save and generate images for cushioning comparison, slide comparison and impact firmness comparison.

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Revisions

1. Date: July 7th, 2023
Revisor: Branden Brookfield
Change: Creator of SOP