MADMax Moisture and Density Interface: Quick Start Guide

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Introduction

This guide is designed to help scientists use the Moisture and Density (MAD) interface called MADMax. For detailed information on the MAD procedure, please refer to the Moisture and Density User Guide at http://mckinley.ship.iodp.tamu.edu:8080/sites/.

*****Please have a technician give you an overview before using this instrument*****

Procedure

Starting MADMax

Click the icon for **MADMax** on the computer desktop and Login to LIMS (***Figure 1***).

Figure 1. MADMax Icon.

Measuring Mass (wet and dry)

1.	When the *User Interface* appears (***Figure 2***), click the dropdown for **Currently Viewing Results For** and choose the method for determining MAD values. Generally, *METHOD* C (Wet Mass, Dry Mass, and Dry Volume) is used onboard; for a description of methods please review the **Methods** section in the *Moisture and Density User Guide.*
2.	Measuring **Mass Wet:** in the tabular data sheet find the sample to be analyzed and double-click the **Mass Wet** (***Figure 3***) cell for the particular sample.
3.	A window opens to verify the sample being measured as well as the container number; ensure that both are correct. Further down there is the prompt for the number of mass measurements to be averaged (the general number of measurements is 300; *Note: if sea state increases increase number of measurements for better accuracy*). (***Figure 4***).
4.	Click **Measure**. This will bring you to the "measuring window." Expand the measurement window to the desired size.
5.	Balances need to be Tared if they have not been used for >6 hours or if anything has changed (e.g., a spill was cleaned up). Tare the balances with both pans empty. Once the tare is complete, the user can weigh reference masses to ensure the balances are working properly (see Step 6).
6.	Once the balances have been Tared, enter the **Reference Mass** (the known mass of the reference weight being used). Use a weight similar to expected sample + container (20–30 g). It is worthwhile to ensure this "weight match" even if it requires several reiterations because it enhances the quality of the data significantly if the reference and unknown balance loads are within 5 g. Place the reference mass on the '*Reference'* balance and the sample on the '*Unknown*' balance, and click **Weigh** (***Figure 6***).
7.	Once the measurement has been completed and the user is satisfied, click **Accept** (***Figure 7***). Note that the **Mass Wet** field is now populated in the tabular data sheet.
8.	After **Mass Wet** has been measured, place sample in oven to dry for 24 hr. The samples must be cooled to room temperature before measuring the dry mass. Leave them in the desiccator for about 3 hours. ***Important****: Double check the proper operation of the oven and its power plug. Sometimes the power plug can unlock itself and cause an error due to power failure. Of course, an oven also always presents high temperature hazards.*
9.	After drying the sample, measure **Mass Dry**. Double click the **Mass Dry** column in the correct sample row (***Figure 8***). Once the sample ID and container number are verified, click **Measure**.

	From here, *repeat* steps 5–7 listed above. Make sure to record the data into a corresponding log sheet (same with data for the drying and pycnometer working steps).

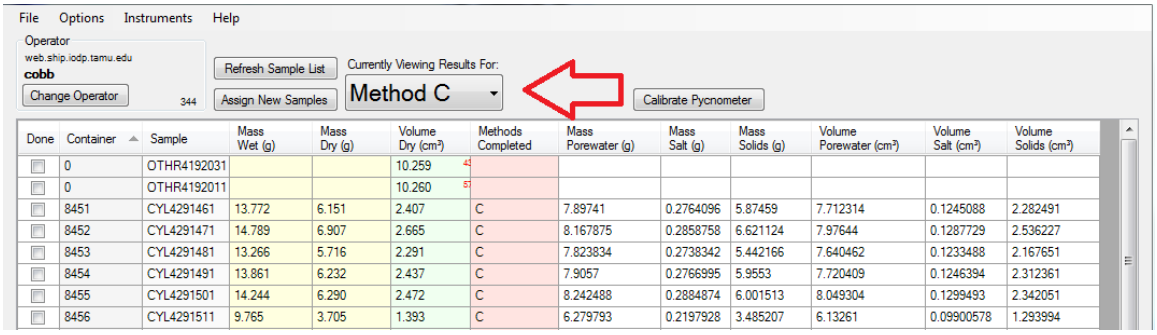


Figure 2. User Interface Screen.

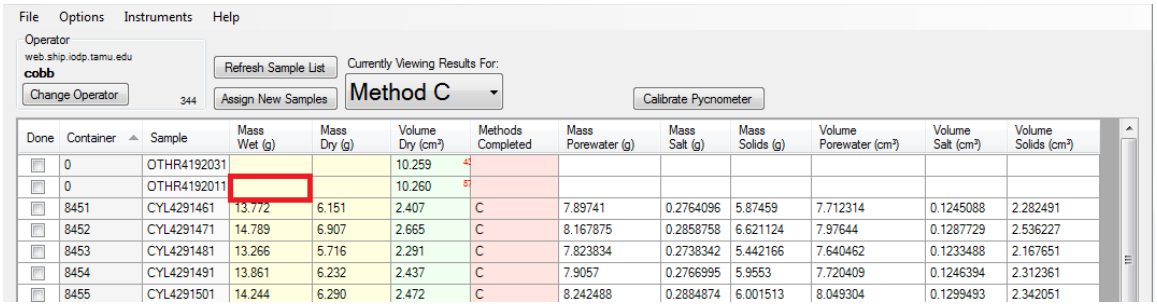


Figure 3. Mass Wet.

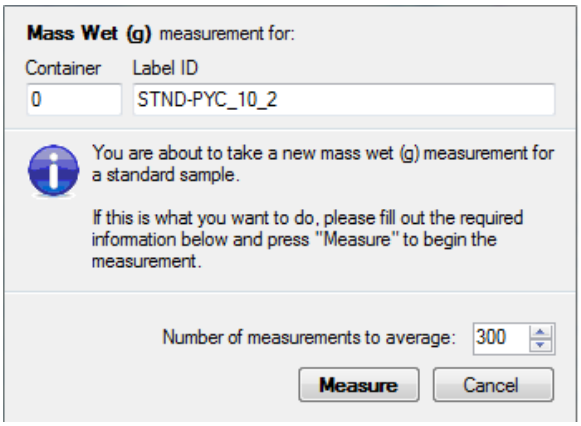


Figure 4. Number of Measurements.

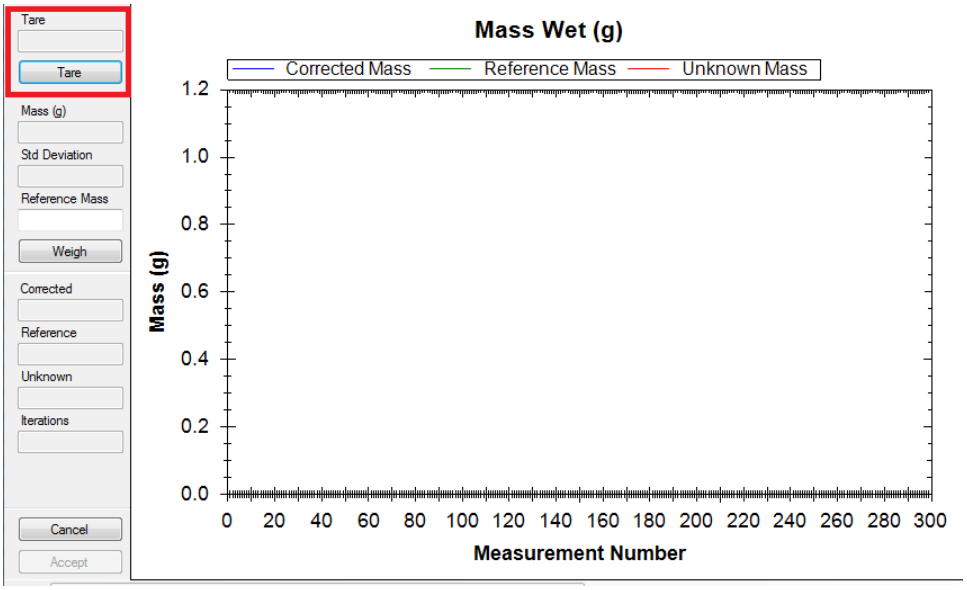


Figure 5. Tare the Balance.

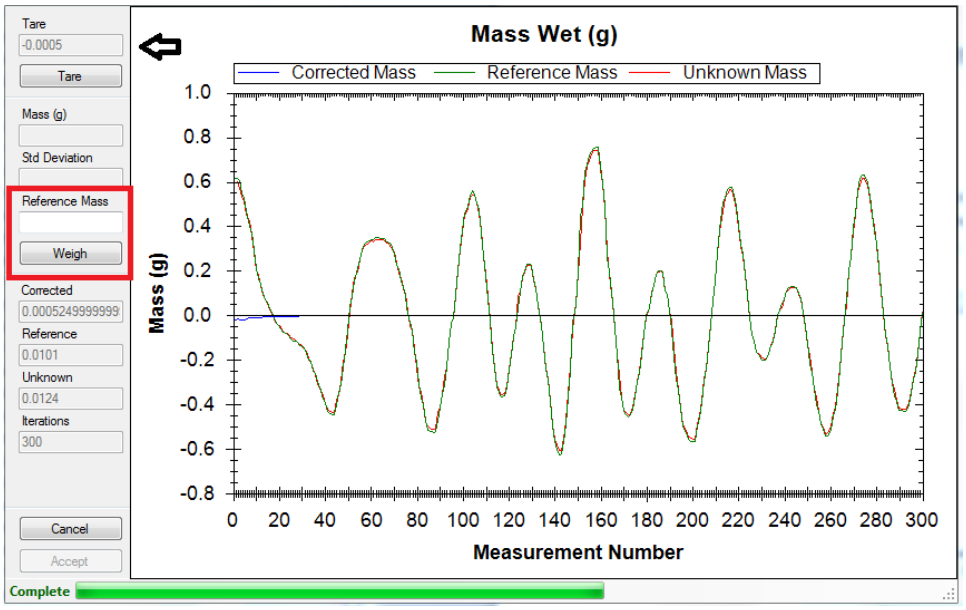


Figure 6. Weigh Sample.

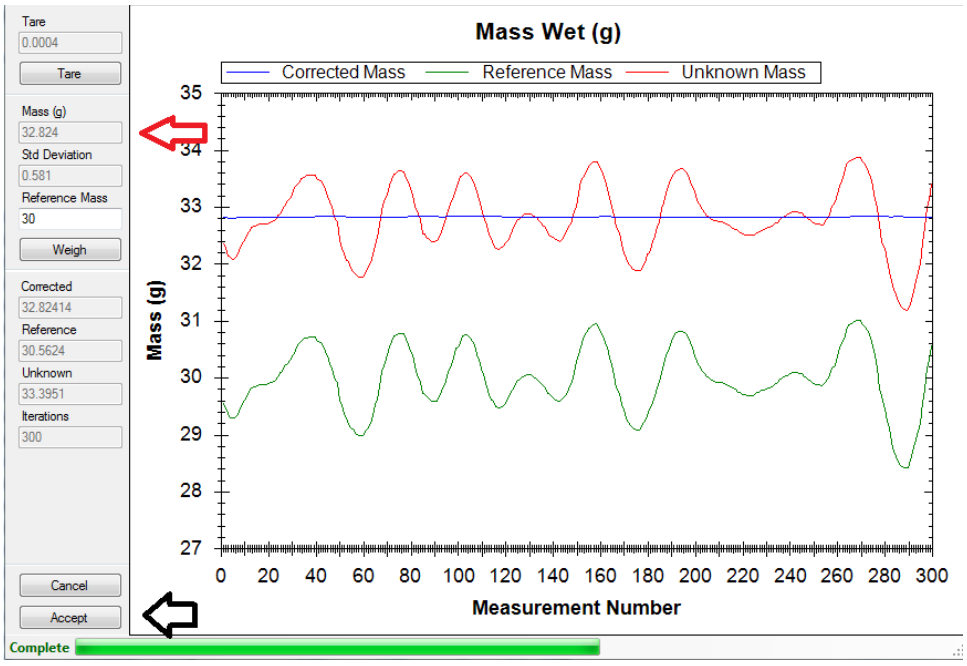
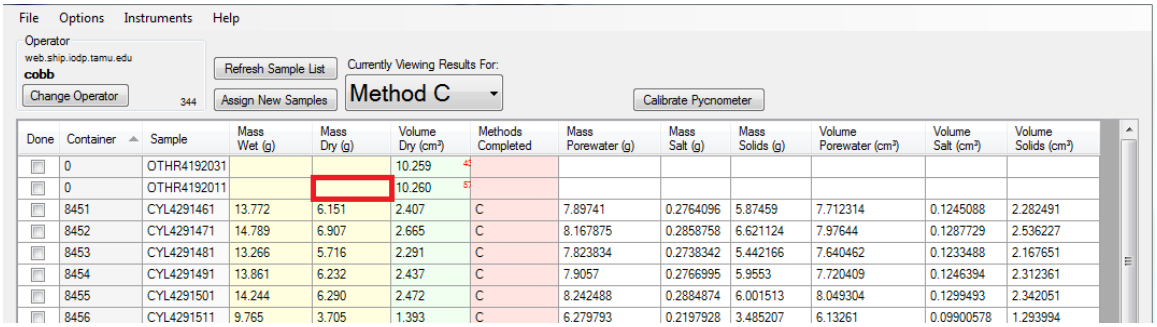


Figure 7. Accept Weight.



Done	Container	Sample	Mass Wet (g)	Mass Dry (g)	Volume Dry (cm³)	Methods Completed	Mass Porewater (g)	Mass Salt (g)	Mass Solids (g)	Volume Porewater (cm³)	Volume Salt (cm³)	Volume Solids (cm³)
	0	OTHR4192031			10.259							
	0	OTHR4192011			10.260							
	8451	CYL4291461	13.772	6.151	2.407	C	7.89741	0.2764096	5.87459	7.712314	0.1245088	2.282491
	8452	CYL4291471	14.789	6.907	2.665	C	8.167875	0.2858758	6.621124	7.97644	0.1287729	2.536227
	8453	CYL4291481	13.266	5.716	2.291	C	7.823834	0.2738342	5.442166	7.640462	0.1233488	2.167651
	8454	CYL4291491	13.861	6.232	2.437	C	7.9057	0.2766995	5.9553	7.720409	0.1246394	2.312361
	8455	CYL4291501	14.244	6.290	2.472	C	8.242488	0.2884874	6.001513	8.049304	0.1299493	2.342051
	8456	CYL4291511	9.765	3.705	1.393	C	6.279793	0.2197928	3.485207	6.13261	0.09900578	1.293994

Figure 8. Measure Mass Dry.

Measuring Volume

After measuring **MASS WET** and **MASS DRY,** the dry volume can be measured. (Be sure to let your samples cool in the desiccator before analyzing in the pycnometer or making the dry mass measurement.)

1.	Double-click on he desired sample cell under **Volume Dry**. The prompt to verify sample ID and container number will appear; check to ensure they are correct.
2.	Choose the pycnometer cell number to measure (***Figure 9***). Place the sample in the selected pycnometer cell, and tighten the lid. Enter the number of measurement cycles (generally 3 measurements is acceptable). Once all parameters are set as desired and the sample has been entered into the chamber, click **Measure.**
3.	The **Volume Dry** measurement interface will appear (***Figure 10***); to begin measurement click **Start**. This will initiate the pycnometer analysis; the process will automatically run through the total number of cycles selected in Step 2.
4.	Once the measurement is complete the **Calculated Volume** interface will appear. If this volume is acceptable click **Accept;** otherwise the sample can be reanalyzed by choosing **Rerun** (***Figure 11***).
5.	Note the **Volume Dry** field is now populated with the newly calculated volume.
6.	Under the **Methods Completed** column, double-click the cell for the particular sample run (***Figure 12***) to bring up a prompt for *MAD Calc.* Ensure that container number and sample ID are correct and click **Run MAD Calc** (***Figure 13***). This calculates the remaining data for the sample being measured (i.e., Mass Pore water, Mass Salt, Mass Solids, Volume Pore water, etc.).

7.	Expand list of parameters of choice in the result by clicking on one of the visible parameters (e.g., Mass Solids (g)), which opens a list with all the variables. These variables can be dragged per mouse click from the left to the right-hand side.
8.	A standard should be run within each cycle measurement between cells 1–6. Also remember to fill in the log sheet in Excel. The log sheet is very important for figuring out what went wrong.
9.	Data is automatically uploaded into LIMS once the MAD calc is complete (this includes any recalculation). Check the MAD LIMS report to verify.

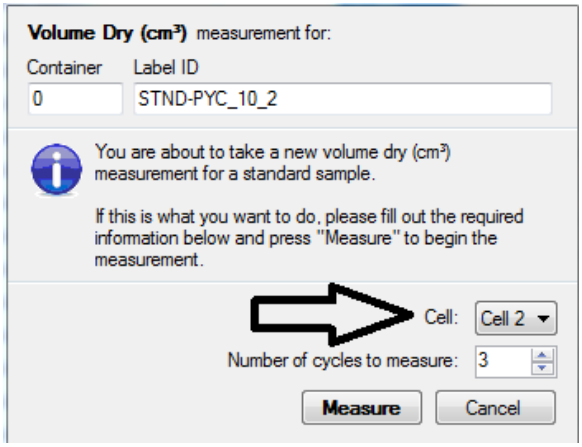


Figure 9. Choose Pycnometer Cell.

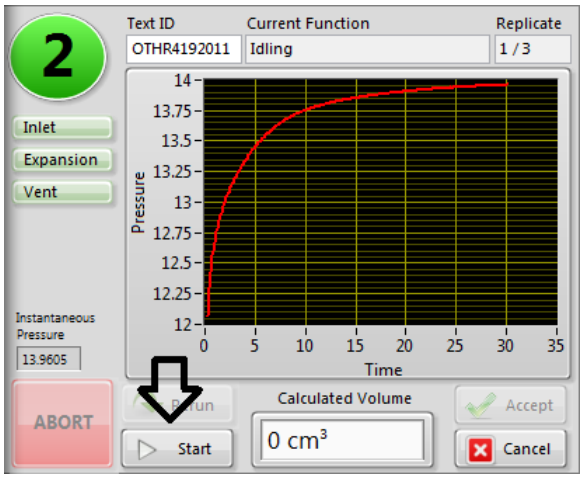


Figure 10. Volume Dry Instrument Interface.

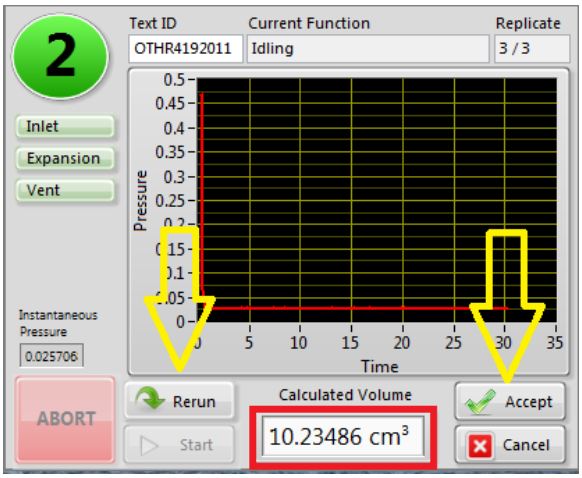
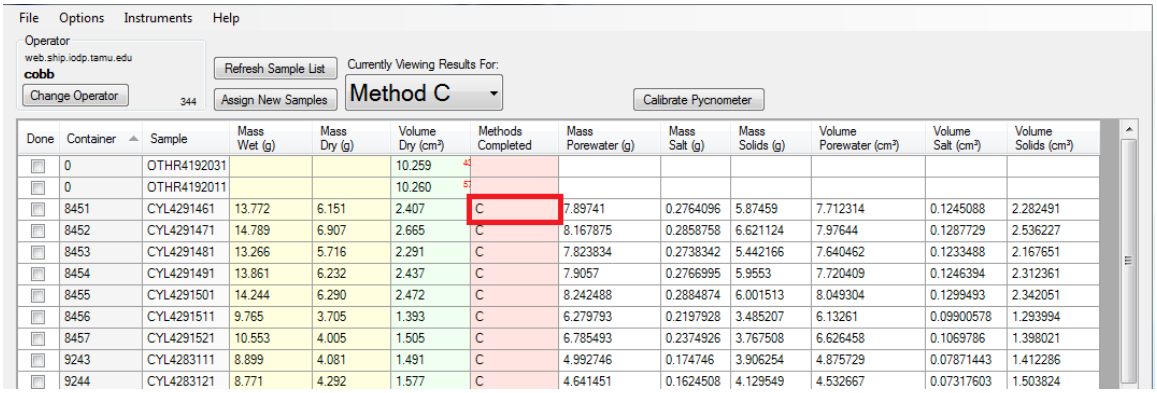


Figure 11. Calculate Volume Interface.



Done	Container	Sample	Mass Wet (g)	Mass Dry (g)	Volume Dry (cm³)	Methods Completed	Mass Porewater (g)	Mass Salt (g)	Mass Solids (g)	Volume Porewater (cm³)	Volume Salt (cm³)	Volume Solids (cm³)
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☐	8457	CYL4291521	10.553	4.005	1.505	C	6.785493	0.2374926	3.767508	6.626458	0.1069786	1.398021
☐	9243	CYL4283111	8.899	4.081	1.491	C	4.992746	0.174746	3.906254	4.875729	0.07871443	1.412286
☐	9244	CYL4283121	8.771	4.292	1.577	C	4.641451	0.1624508	4.129549	4.532667	0.07317603	1.503824

Figure 12. Methods Completed.

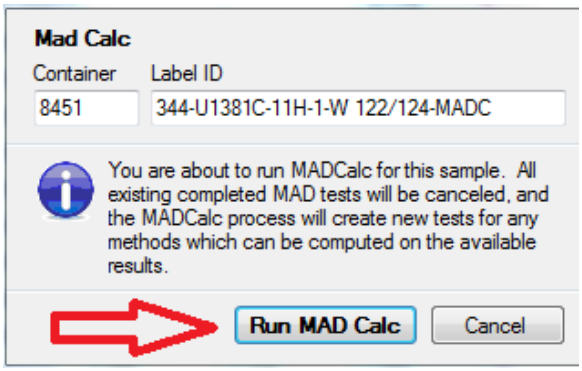

Figure 13. Run MAD Calc.

Important Notes

Use this only in the case of entering samples not already listed, as MADMax downloads samples directly from Sample Master.

Click on **Assign New Samples** (***Figure 14***) to load new (or old) samples into the tabular data sheet, which then allows a user to enter/scan sample label, verify the sample, then add it to a list of selected samples (***Figure 15***). By pressing **OK** the sample is added into the tabular data sheet.

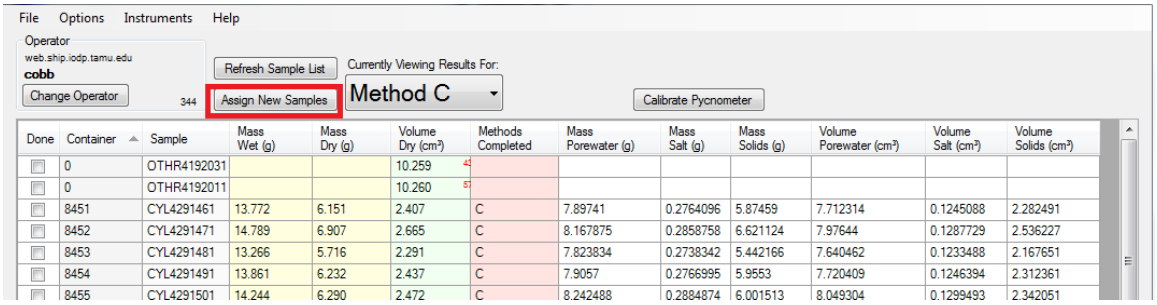

Figure 14. Add Sample.

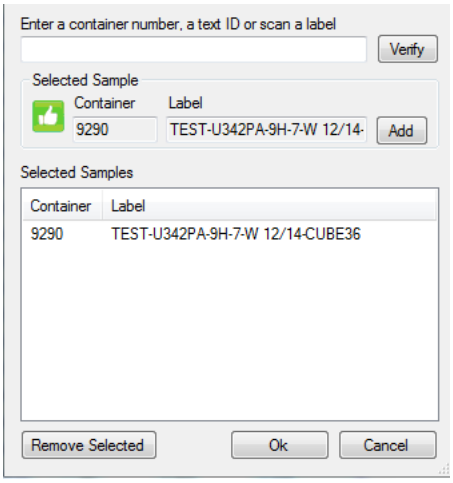

Figure 15. Add Sample.

Another note: if wet/dry mass is reversed, user can right click in either (wet/dry mass) cell to swap the result, remember to recalculate under **Method Competed**.

When the *User Interface* is opened there is also a *Status Bar* that appears (***Figure 16***). This bar is mainly for troubleshooting purposes or use by a Technician. For the best operation experience with software, please click **Display ON** upon opening the program to turn off the *Status Bar* display.

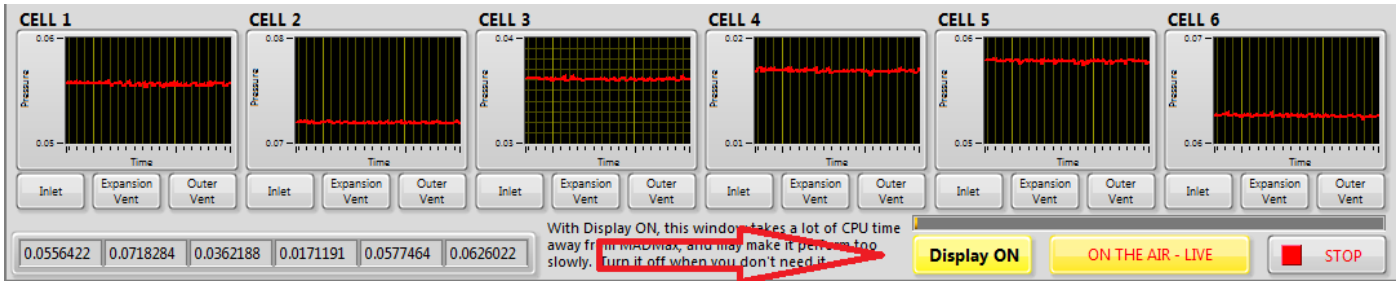

Figure 16. Status Bar.

The individual pycnometer cells can be calibrated by clicking on the **Calibrate Pycnometer** button on top of the MADMax user interface. Dialog windows open, which guide the user through the next working steps in an easy-to-follow manner.

Calibration data is logged in an EXCEL sheet that is either on the DESKTOP and/or server. It is imperative to log this data and keep track of the calibration to assure high-quality measurements throughout an entire expedition! ***Ask your technician for further instructions to learn this important skill. It is simple to learn, but essential to your success!***