VES-700 Acquisition (ACQ) Window

March 7, 2025

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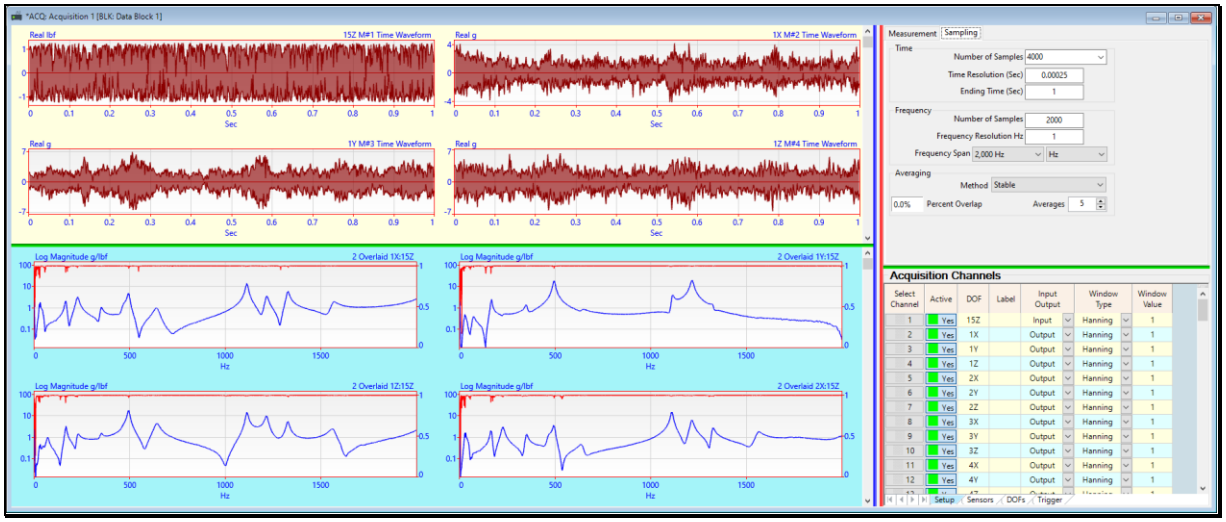
VES-700 Acquisition (ACQ) window

To enlarge this text, click on it, **hold down the Ctrl key** and ***spin* the mouse wheel**.



*Acquisition (**ACQ**) window.*

The commands described in this chapter are for both the **VES-700** & **VES -780 Multi-Channel Data Acquisition** options. Check **Help | About** to verify that your license authorizes one of these options.

The Acquisition (**ACQ**) window is used for

- Setting up a third-party multi-channel **data source** hardware and acquiring fixed length blocks of uniformly sampled time **TWFs TWFs**
- Post-processing the **TWFs** and calculating popular single-channel and cross-channel measurement functions
- Displaying Operating Deflection Shapes (**ODS's**) directly from measurement data on the 3D model in a ***connected*** Structure (**STR**) window

Third-Party Data Source *Software & Hardware*

The software required for each supported third-party **data source** must be installed on the same computer with MEscope.

When the **Acquire | Connect to Data Source** command is executed, an error will occur if the **data source** software cannot be found on your system.

Not all capabilities of the Acquisition (**ACQ**) window described in this chapter are supported by each third-party **data source** system.

Capabilities of the Acquisition (ACQ) window

The **VES-700 Multi-channel Acquisition** Option provides the following capabilities.

1. ODS & OMA Acquisition

Operating Deflection Shape (**ODS**) or Operational Modal Analysis (**OMA**) data is acquired from an operating machine, or from a structure that is excited by ***ambient*** or ***unmeasured excitation forces***.

ODS or **OMA** data can consist of broad-band, narrow-band, or cyclic response data.

Output-only responses can be acquired in two ways,

- All **Channels** of data are ***simultaneously acquired***
- Some **Channels** are simultaneously acquired together with a **(fixed) reference response** in multiple Measurement Sets

ODS or **OMA** data can be post-processed to yield,

- ***Single-channel* TWFs** or frequency domain measurements
- ***Cross-channel*** frequency domain (**Cross spectrum**, **ODS-FRF**) measurements

Using one of the **MEscopeVES Modal Analysis** options, **FRF-based curve fitting** can be used to extract operational modal parameters from a set of **Cross spectra** or **ODS-FRFs**

2. Impact Testing

Impact testing is done using an ***impact hammer*** with a load cell attached to its head to measure the impact force, and ***one or more response sensors*** (typically accelerometers attached to the structure surface).

The impact force channel is typically designated as the trigger channel on the **Trigger** tab of the **Channels** spreadsheet.

Data is acquired when a user-specified trigger condition is met on the trigger channel.

- Trigger conditions include **+/- trigger level** and **pre-trigger delay**
- **Overload** and **double-hit detection** can also be enabled using commands in the Acquire menu

The impact force is acquired on the trigger channel, and responses to the force are ***simultaneously Acquired*** on other **Channels**

FRFs and ***other cross-channel measurements*** between the impact force and each response can also be calculated.

- Using one of the **Modal Analysis** options, **FRF-based curve fitting** can be used to extract experimental modal parameters from a set of **FRFs**
- **Coherence** and **Auto & Cross spectra** can also be calculated from ***simultaneously acquired*** impact testing data

3. Shaker Testing (VES-700 Option only)

Shaker signals can be output through some ***supported*** third-party acquisition hardware.

The **VES-700** option can output ***broad-band uncorrelated signals*** to as many as ***six shakers***.

- Measurements calculated from data acquired using shakers with ***broad-band excitation signals*** is ideal for extracting either experimental or operational modal parameters using **FRF-based curve fitting**
- **Periodic random**, **burst random**, **fast sine sweep (chirp),** and **burst chirp** signals can be output from the Acquisition window

Burst random and **Burst chirp** are ideal excitation signals for acquiring linear, alias-free measurements.

Graphics Areas & Spreadsheets

The Acquisition (**ACQ**) window contains a **graphics** area ***on the left***, and tabs and the **Channels spreadsheet** ***on the right.***

- A **red splitter bar** separates the **graphics** area from the **Channels spreadsheet**
- A **blue splitter bar** separates the **graphics** area from the **M#s** properties spreadsheets for the **active (upper or lower) graphics**
- A **horizontal green splitter bar on the left** separates the **upper & lower graphics areas**
    - The **TWFs** acquired from the ***connected*** data source are displayed in the **upper graphics** area
    - The calculated measurement functions such as **FRFs**, **Coherences**, etc., are displayed in the **lower graphics** area
- A **horizontal green splitter bar on the right** separates the **Channels** spreadsheet from the **Measurement** & **Sampling** tabs

Menu Commands

Menu command descriptions are ordered by command menu ***(from left to right)***, and then by the commands in each menu ***(from top to bottom)***. Each menu command is executed by choosing it from its command **menu**, or by ***clicking*** on its **Tool** of a **Ribbon** or **Toolbar**

Mouse & Keyboard Operations

Right Click Popup Menus

- ***Right click*** on a **graphics** area to display a menu of ***frequently used*** commands
- ***Right click*** on a spreadsheet to display a menu of ***frequently used*** spreadsheet commands

Re-Ordering Spreadsheet Columns

- ***Click & drag*** its column header horizontally to move a spreadsheet column to a new position

Spreadsheet Vertical Scrolling

- If a **vertical scroll bar** is displayed ***on the right side*** of a spreadsheet, ***click*** on the spreadsheet and ***spin*** **the mouse wheel**

Spreadsheet Text Size

- **C*lick*** on the spreadsheet, ***hold down*** **the Ctrl key**, and ***spin*** **the mouse wheel**

Cut, Copy & Paste Text

- ***Select one*** or more spreadsheet text cells
- ***Hold down*** **the Ctrl key** and,
  - ***Press*** **the X key to cut** the ***selected*** text to the Windows Clipboard
  - ***Press*** **the C key to copy** the ***selected*** text to the Windows Clipboard
  - ***Press*** **the V key to paste** text from the Windows Clipboard into the ***selected*** cells

Zooming the Graphics *Display*

- ***Left click*** in the **upper or lower graphics** area and ***spin*** **the mouse wheel**

Panning the Zoomed Graphics *Display*

- ***Click & drag*** the **horizontal scroll bar below the graphics**
- ***Left click & drag*** the **mouse pointer**

Moving the Cursors

Line Cursor

- **Position** the mouse pointer in the **graphics** area and ***click, or click & drag*** the **mouse pointer**

Peak or Band Cursor

- **Position** the mouse pointer ***inside the band***, and ***click & drag*** the **mouse pointer**

Moving an Edge of the Peak or Band Cursor

- **Position** the mouse pointer ***outside the band***, and ***click & drag*** the **mouse pointer**

Selecting a Range of M#s

- In the **M#s** spreadsheet, ***click*** on the **Select M#** button of the ***first*** **M#**
- ***Hold down*** **the Shift key** and ***click*** on the **Select M#** button of the ***last*** **M#** of the range of **M#s**

Toggle M# *Selection*

- ***Hold down*** **the Ctrl key** and ***click*** in the **graphics** area

A ***selected*** **M#** has a ***shaded background*** in the **graphics** area, and its **Select M#** button will change from No to Yes in the **M#s** spreadsheet.

Graphics Scroll Bars

Under certain conditions, scroll bars are displayed next to the **graphics** area. A vertical scroll bar is displayed on the right side of the **graphics** area. A horizontal scroll bar is displayed below the **graphics** area.

Vertical Scroll Bar

If the number of displayed **M#s *is less than*** the total number of **M#s** in the ***active* graphics** area, a scroll bar is displayed ***on the right side*** of the **graphics** area.

- ***Click*** on the scroll bar and ***spin*** the **mouse wheel** to scroll the display of the **M#s**

Horizontal Scroll Bar

When the **graphics** display is **Zoomed,** not all measurement samples are displayed, and a scroll bar is displayed ***below*** the **graphics** area.

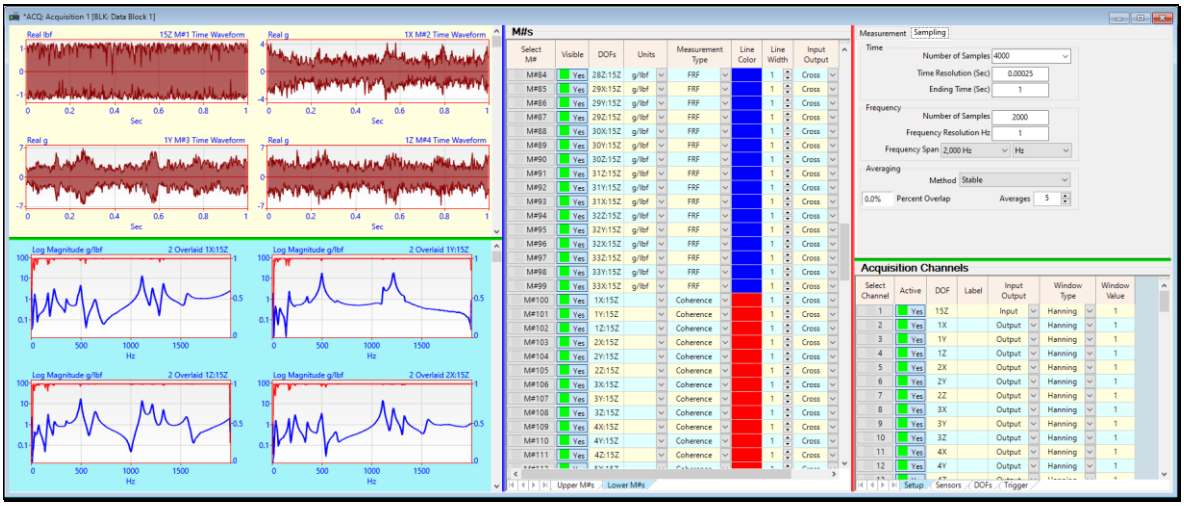
- ***Right click & drag*** in the **graphics** area to scroll through the **M#** samples
- ***Click & drag*** the scroll bar to scroll through the **M#** samples
- Or ***click*** on the scroll bar and ***spin*** the **mouse wheel**

M#s spreadsheet

The **M#s** spreadsheet, on the **right side** of the **graphics** area, displays the properties of either the **upper or lower graph**, whichever is ***active.***

- Execute **Acquire | Save M#s | Active Graph** to toggle the ***active* graph**
- ***Press*** the **Upper M#s** tab or **Lower M#s** tab at the bottom of the **M#s** spreadsheet
- ***Right-click*** on the **upper** or **lower graphics** area to make it active

See the **M#s Spreadsheet** section in the chapter for the **Data Block (BLK)** Window for more details regarding the **M#s** spreadsheet.



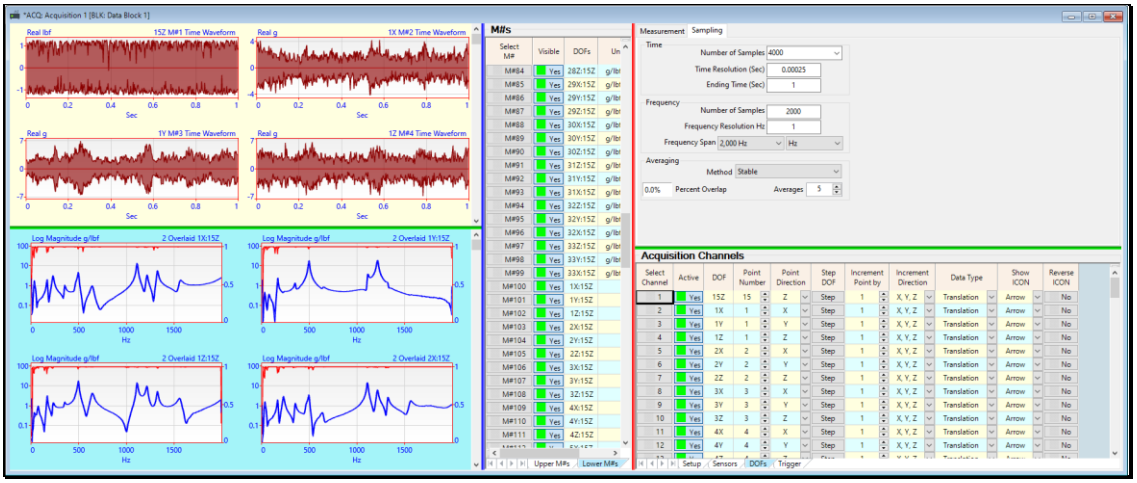
*Acquisition (**ACQ**) window Showing Lower Graph **M#s** Spreadsheet.*

Channels Spreadsheet

The **Channels** spreadsheet lists the properties associated with each **data source** channel.

Each row in the **Channels** spreadsheet contains the properties of **one channel**
Each column of the **Channels** spreadsheet contains a property of **all data source Channels**

- ***Drag*** the **Red Splitter Bar** to the ***left*** to display more of the **Channels** spreadsheet



*Acquisition (**ACQ**) window Showing the **Channels** spreadsheet.*

Setup, Units, DOFs and Trigger Tabs

The **Setup**, **Units**, **DOFs** and **Trigger** tabs are displayed below the **Channels** spreadsheet.
Each tab displays different properties of each **data source** channel.
The **Select Channel**, **Active** & **DOF** columns are common to all **Channels** spreadsheets.

Editing Channel Properties

- ***Click*** on the channel property cell to toggle its button, edit its text contents, or select one of the choices from a drop-down list
- Or ***double click*** on a property **column heading** to change the property of ***all* (or *selected*) Channels**

Active Channel Column

Used to make Channels ***active*** or ***inactive***. If a channel is ***active***, data will be **acquired** from the **data source** for that channel.

- A channel is ***active*** if **Active** ➔ Yes

When data is **acquired** from the **data source**, a **TWF** is displayed in the ***upper* graphics** area for ***each active* Channel**.

DOF Column

Defines the channel **DOF**.

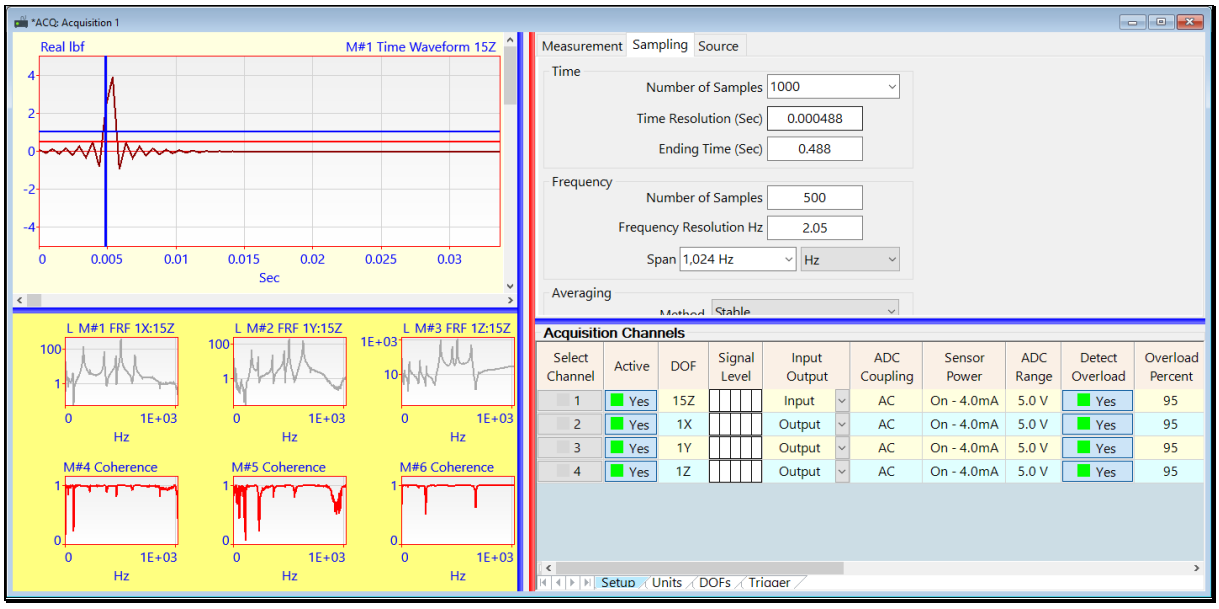
A **DOF** is typically the ***Point number & direction*** of the sensor location on the test article.

- For example, **DOF ➔ 1X** means the sensor for that channel is located at Point **No. 1** on the test article and senses motion in the **X direction**.

Use of the channel **DOF** is optional, but it is strongly recommended as a convenient way of identifying where data was acquired from the test article.

Setup Tab

Several columns of data on this tab must be set up properly before acquiring data from the ***connected* data source**.
If a property in this spreadsheet is not supported by the ***connected* data source**, a **purple background color** is displayed for the property.



*Setup Tab of the **Acquisition Channels**.*

Label Column

A text description of each channel.

Signal Level Column

Indicates the signal level for each channel during acquisition.

Input Output Column

Defines the signal on each channel as either an **Input**, **Output**, or **Both**.

An **Output** is the **numerator** of an **FRF**, or the **Roving (moving)** sensor during acquisition.

An **Input** is the **denominator** of an **FRF**, or the **Reference (fixed)** sensor during a cross-channel acquisition.

ADC Coupling Column

Applies either **AC** or **DC** coupling to the signal of an acquisition channel. **AC coupling** should be applied to all vibration and acoustics signals. **DC coupling** should be applied to all static or quasi-static signals like temperature, pressure, voltage or current.

AC coupling *removes* the **lower frequencies** from a signal by applying a **high-pass analog filter** to the signal before sampling it in the data source. **DC coupling** does not remove the lower frequencies from a signal.

Sensor Power Column

Turns the **power ON/OFF** to the sensor connected to each acquisition channel of the data source.

Many types of sensors have built-in electronics and therefore must be supplied with power in order to operate.

ADC Range Column

Defines the **voltage range** of the **analog-to-digital converter (ADC)** for each acquisition channel of the data source.

Detect Overload Column

If set to **Yes**, the channel is checked for an overload voltage.

Overload Percentage Column

The percentage of the full-scale voltage to check for an overload.

Window Type Column

Defines the type of **time domain window** to be applied to the signal from the data source channel before any frequency domain signal processing is applied to it.

> Refer to the **VES-3600 Advanced Signal Processing Commands** chapter for more details on the use of time domain windows.

Window Value Column

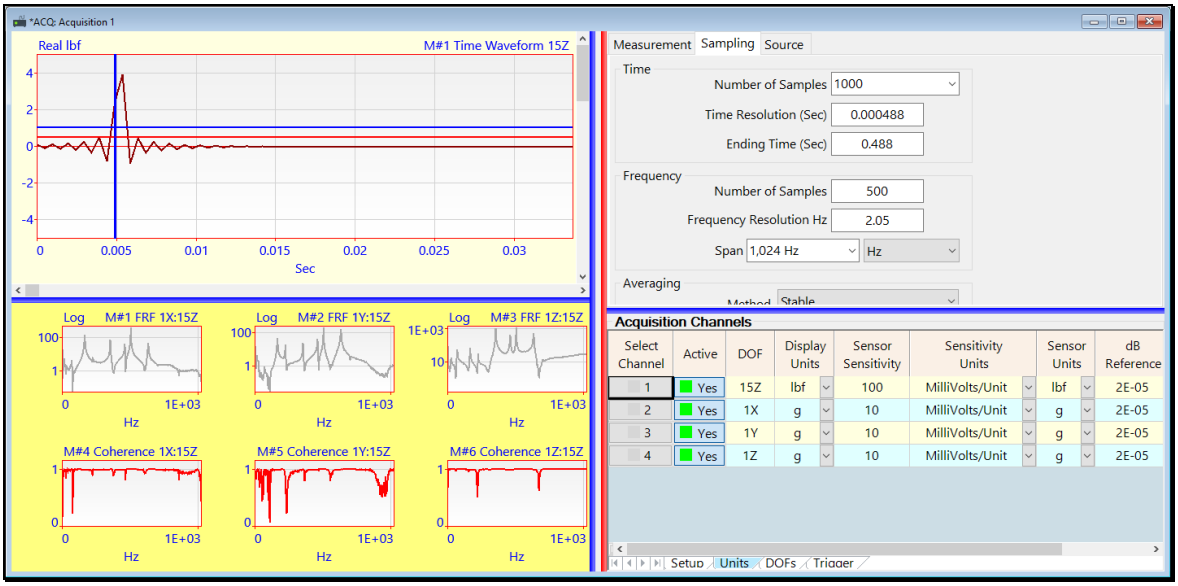
Used to specify a numerical value ***only for the end of an* Exponential** window.

> The **Exponential** window starts at **"1"** at the ***beginning of the window*** and applies the value in this column to the ***end of the window***.

Units Tab

Defines the **engineering units** and Sensor parameters for the data acquired on an acquisition channel.

> Acquired **TWFs** can be displayed in the ***upper* graphics** area in either **engineering units** or **volts**.



*Units Tab of the Acquisition **Channels**.*

Display Units Column

Defines the **units** of each **TWF** displayed in the ***upper* graphics** area as either **engineering units** or **volts.**

> Typical **Output** engineering units are displacement, velocity, or acceleration units.
>
> Typical **Input** engineering units are excitation force units.

Sensor Sensitivity, Sensitivity Units & Sensor Units Columns

These three columns are used together to scale the data on each channel into the engineering units of the sensor using its Sensitivity Units. Sensitivity Units can be one of the following,

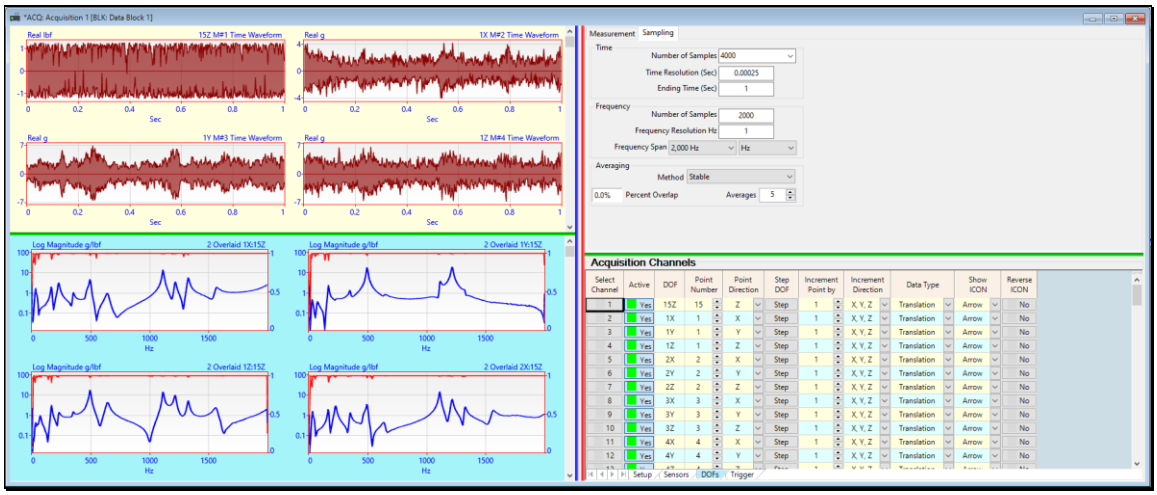
- **Units/Volt** (engineering units per volt)
- **Volts/Unit** (volts per engineering unit)
- **Units/milli-Volt** (engineering units per millivolt)
- **Milli-Volts /Unit** (millivolts per engineering unit)

If the units in the **Display Units** column are ***different*** from the units in the **Sensor Units** column, the channel data will be ***integrated*** or ***differentiated*** from the **Sensor Units** to the **Display Units**, if possible.

DOFs Tab

The properties on this tab are used to *define & increment* the DOF of each acquisition channel as ***each new* Measurement Set** of data is acquired.

Using channel **DOFs** is optional but it is strongly recommended as a convenient way of identifying where measurements were made on a test article.



***DOFs** Tab of the Acquisition **Channels**.*

Point Number & Point Direction Columns

These two columns are used to define the **Point Number & Point Direction** of the **TWF** for each acquisition channel.

- Measurement **Point Number** can be incremented or decremented by using the arrows in each cell, or they can be typed into each cell
- Measurement **Point Direction** is chosen from the drop-down list next to each cell

Step DOF Column

- When each **Step** button *is **pressed***, the Point Number & Point Direction are incremented (in their respective columns), according to the **Increment Point By** and **Increment Direction** columns

Increment Point By & Increment Direction Columns

These two columns are used to specify how the **Point Number & Point Direction** are to be incremented when the **Step** button is ***pressed*** in the **Step DOF** column for each channel.

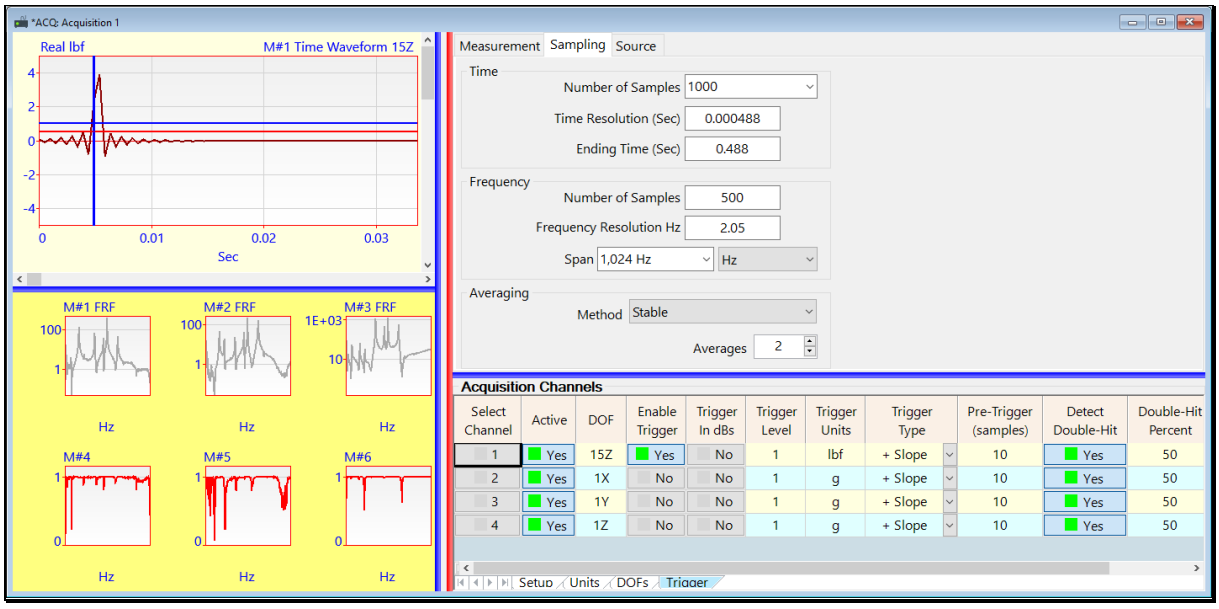
Trigger Tab

The Trigger tab is used to setup triggering on ***one or more*** of the ***active*** acquisition **Channels**.

If the trigger condition is met on any **trigger** channel, data acquisition will occur on all active **Channels**.

When a trigger level is exceeded on a **trigger** channel, data is acquired from that **data source** channel.

For Impact Testing, the **trigger** Channel should be the channel on which the impact force is acquired.



*Trigger Tab of the **Acquisition Channels**.*

Free Run Acquisition

When **Enable Trigger ➔ No** on all ***active* Channels**, data is acquired without waiting for a trigger condition.

Free Run should be used when the test article is excited using a shaker, or to acquire operating (output-only) data.

Triggered Acquisition

When **Enable Trigger ➔ Yes** on an ***active*** channel, data is acquired when the ***trigger condition*** is met for that ***active*** channels.

Enable Trigger Column

Enables an ***active*** channel as a **trigger** channel.

When either **Acquire | Start** or **Acquire | Data Source Scope** is executed, data is ***acquired on all*** channels when a trigger level is exceeded on a **trigger** channel

- If **Acquire | Trigger Line** is ***checked*** a **horizontal blue trigger line** is displayed in the ***upper* graphics** area

Trigger Level Column

Specifies the trigger level on a **trigger** channel.

- If Trigger in dBs ➔ **Yes**, the trigger level must be entered in dB units
- If Trigger in dBs ➔ **No**, the trigger level must be entered in the units of the **Trigger Units** column

Trigger in dBs Column

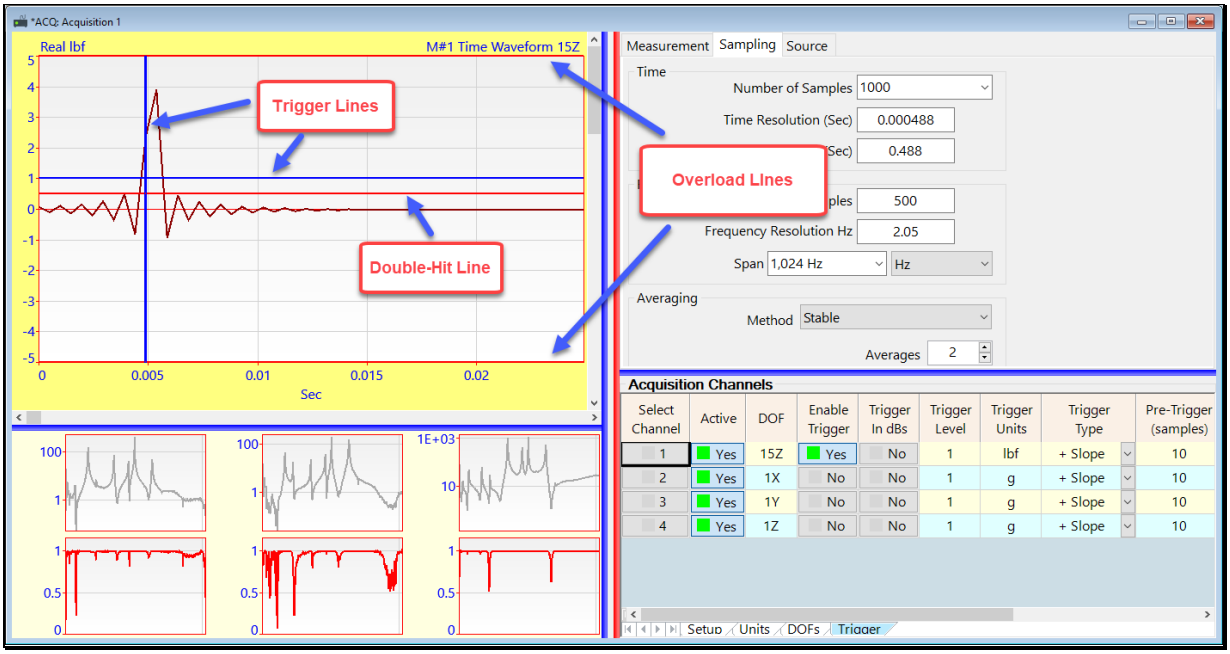
Enables a trigger level in **dB Units** instead of in the units in the **Trigger Units** column.

- If Trigger in dBs ➔ **Yes**, the trigger level must be entered in dB units
- If Trigger in dBs ➔ **No**, the trigger level must be entered in the units of the **Trigger Units** column

Trigger Type Column

The trigger slope (+ or -) is chosen in this column.

- If Trigger Type ➔ + Slope, a trigger will occur when the signal on this channel exceeds the level while moving in a positive (+) direction from its previous value
- If Trigger Type ➔ - Slope, a trigger will occur when the signal on this channel exceeds the level while moving in a negative (-) direction from its previous value



*Acquisition (**ACQ**) window After Triggered **Acquisition** Has Occurred.*

Pre-Trigger Samples Column

The number of samples of data to be acquired ***before the trigger condition*** occurs on a **trigger channel**.

- Pre-trigger samples are the number of samples before the vertical trigger line on the **TWF** of the trigger channel

Several pre-trigger samples (greater than 0) should be entered to ensure that all of the signal will be Acquired prior to a trigger condition.

Detect Double-Hit Column

Enables a ***double-hit*** condition on a trigger channel.

- A double-hit condition occurs when the signal crosses the double-hit line more than once
- When a double-hit condition is detected, the acquired data is rejected
- A double-hit condition is signaled if more than one peak is detected above the **red horizontal double-hit line**

Double-Hit Percent Column

Positions the ***double-hit line*** as a ***percentage*** of the horizontal trigger line.

- If **Acquire | Double-Hit Line** is ***checked*** a **red horizontal double-hit line** is displayed in the ***upper*** **graphics** *area*

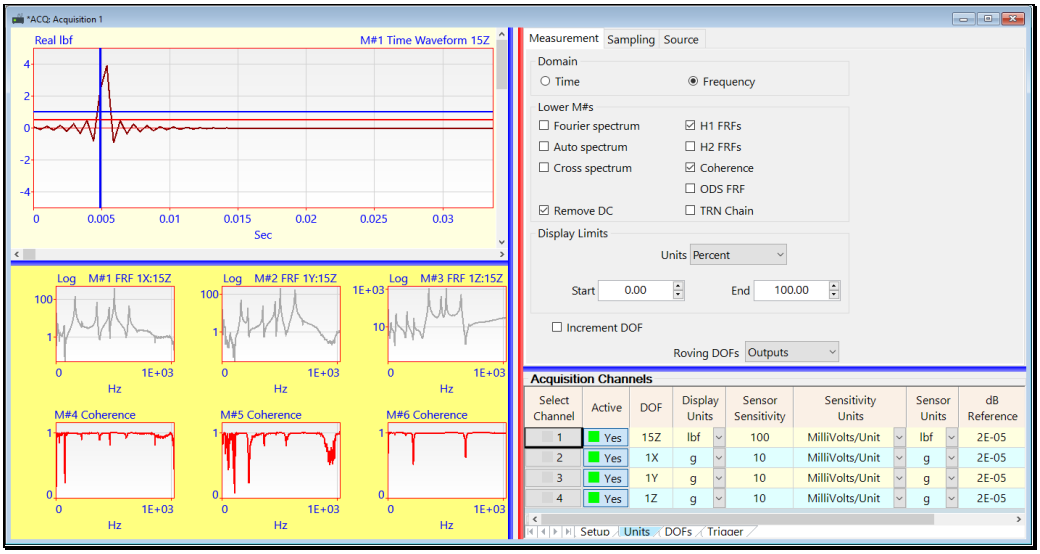
Measurement Tab

The Acquisition (**ACQ**) window acquires finite length ***blocks of TWFs*** from all ***active Channels*** of the connected **data source** hardware.

All acquired TWFs are displayed in the ***upper* graphics** *area* in the Acquisition (**ACQ**) window

The **Measurement** tab is used to choose the following calculation ***prior to acquiring data***,

- The Time or Frequency measurement functions calculated from the acquired **TWFs** and displayed in the **lower graphics** area
- Removal of DC (zero frequency) from the acquired **TWFs**
- The Display limits of the calculated data in the **lower graphics** area
- Whether to increment the Input or Output **DOFs** of the data after each Save operation



Measurement Tab.

Time Domain

If **Time Domain** is ***chosen***, ***check one or more*** of the following functions in the **Calculate** section of the tab.

- Time, Auto Correlation, Cross Correlation, Impulse Response, Inverse Coherence, Inverse **ODS-FRF**

Frequency Domain

If **Frequency** Domain is chosen, ***check one or more*** of the following in the **Calculate** section of the tab.

- Fourier spectrum, Auto spectrum, Cross spectrum, H1 **FRF**, H2 **FRF**, Coherence, **ODS-FRF**, TRN Chain

Remove DC

If ***checked***, the DC component (***zero frequency***) is removed from all acquired **TWFs**.

- DC removal is done by transforming each time domain signal to the frequency domain, deleting the DC (zero frequency) sample, and transforming the signal back to the time domain

Display Limits

Defines the display limits of the ***lower* graphics** *area.*

When measurements are saved into a Data Block from the ***lower* graphics** area, only the data between the Display Limits is saved.

The **Display Limits** can be entered in units of,

- Percent of the frequency Span
- Samples
- X-axis units

Increment DOF (or Measurement Set)

If ***checked***, either the **DOF** or ***all Inputs***, or the **DOF** of ***all Outputs*** will be incremented after each set of **M#s** is saved into a **Data Block (BLK)**.

- Channel **DOFs** are incremented each time **Acquire | Save M#s (F7)** or **Acquire | Save & Start (F8)** is executed
- Channel **DOFs** are incremented according to the Increment Point By & Increment Direction By settings on the **DOFs** tab
- If Measurement **Sets | Use Measurement Sets** is ***checked***, the Measurement Set is incremented after each Measurement Set of data is saved

Roving DOFs Box

This box is used for choosing whether the **DOFs** of the **Input Channels** or **Output Channels** are incremented after each set of data is saved.

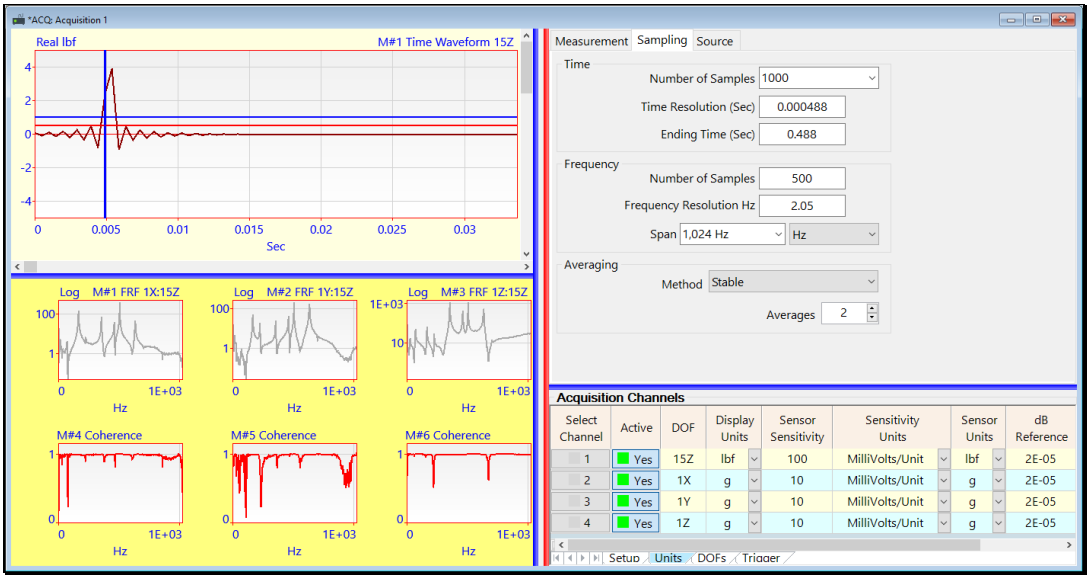
- If Outputs is chosen in the Roving **DOFs** box, then the **DOFs** of all Output **Channels** are incremented after each save operation
- If Inputs is chosen in the Roving **DOFs** box, then the **DOFs** of all Input **Channels** are incremented after each save operation

Sampling Tab

This tab is used to setup the following data Acquisition parameters.

- The Number of Samples ➔ the number of **TWF** samples acquired from the **data source**
- The Frequency Span ➔ 1/2 of the sampling rate of the **TWFs**
- All other parameters in the Time and Frequency groups are calculated from the Number of Samples and the Frequency Span

See the DFT and FFT section in the **Advanced Signal Processing** chapter for details



*Acquisition (**ACQ**) window Showing the Sampling Tab.*

Spectrum Averaging

Defines the ***number of spectrum estimates*** to be used during the calculation of the ***calculated*** measurement functions in the ***lower* graphics** *area*.

- For impact testing, no more than 5 averages (5 spectrum estimates) are recommended
- For shaker testing, between 25 &100 averages (25 &100 spectrum estimates) are recommended

Averaging Method

Stable averaging ➔ all spectrum estimates are *summed* together and *divided by the number of estimates*

The N^{th} stable average is calculated with the formula,

Stable Average (N) = (1 / N) x New Spectrum + (1 - (1 / N)) x Stable Average (N-1)

Peak Hold averaging ➔ the ***peak value*** among all spectral estimates at each sample is retained in the final spectral estimate

- The J^{th} sample of the N^{th} average is determined with the formula,

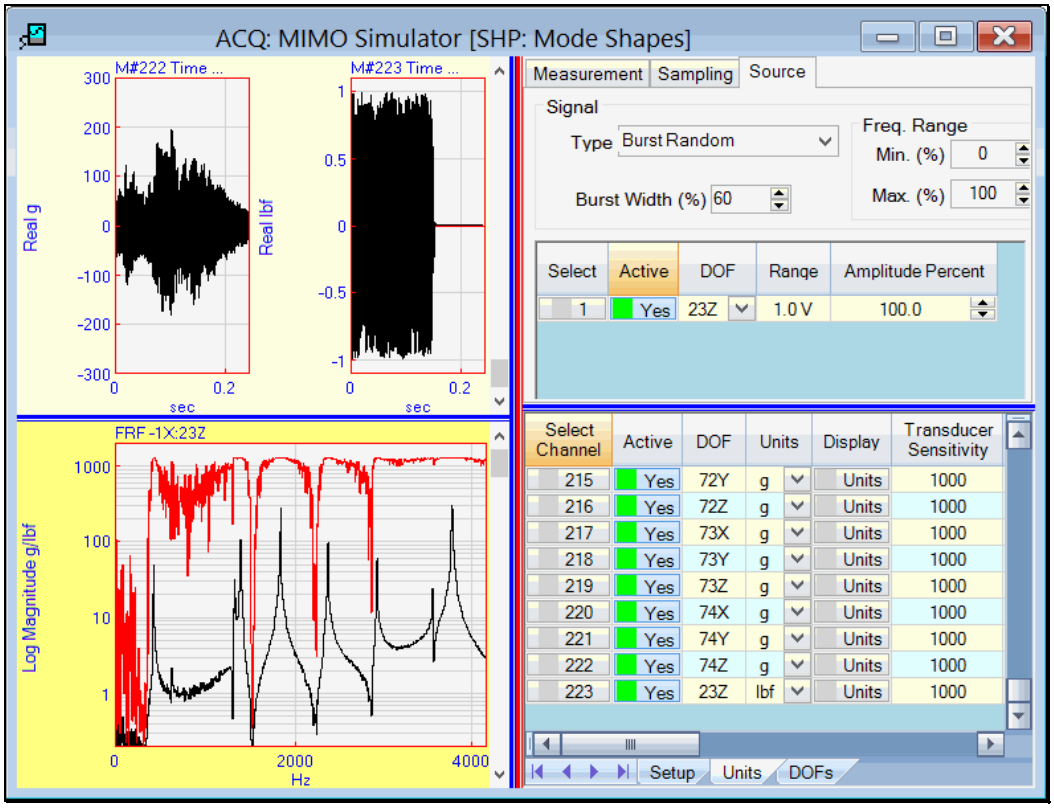
Peak Hold Average (N, J) = maximum (New Spectrum, Peak Hold Average (N-1, J))

Source Tab

WARNING: This tab is only enabled with the VES-700 Option is authorized and can only be used with ***connected*** **data source** hardware that can receive source signals from the Acquisition (**ACQ**) window.

This tab is used to output signals to ***one or more shakers*** to provide controlled excitation of the test article.

- Broadband random or chirp signals are used to excite structural resonances over the Frequency Span of the acquired **TWFs.**



Source Tab Showing Burst Random Output from Source Channel 1.

To setup a Source signal,

- Choose a Signal Type
- Enter a Burst Width percentage
- In the Active column of the spreadsheet, make one or more **Channels** active
- In the Range column, choose a voltage range for the signal
- In the **DOF** column (optional), choose a **DOF** for the Input signal to the shaker

Random & Chirp Signals

Random & Chirp source signals are synthesized over the Frequency Span selected in the Sampling tab.

A random signal is synthesized with a constant magnitude & random phase

A chirp signal is a fast sine sweep signal that is synthesized with a constant magnitude & random starting time

Frequency Range

Defines the frequency range of the Source signals as **Minimum & Maximum percentages** of the **Frequency Span** on the **Sampling** tab.

Burst Width

Defines the ***percentage of sampling window samples*** over which the synthesized random or chirp signals are ***non-zero***.

Outputting a source signal ***with zeros removes all forces*** from the test article.

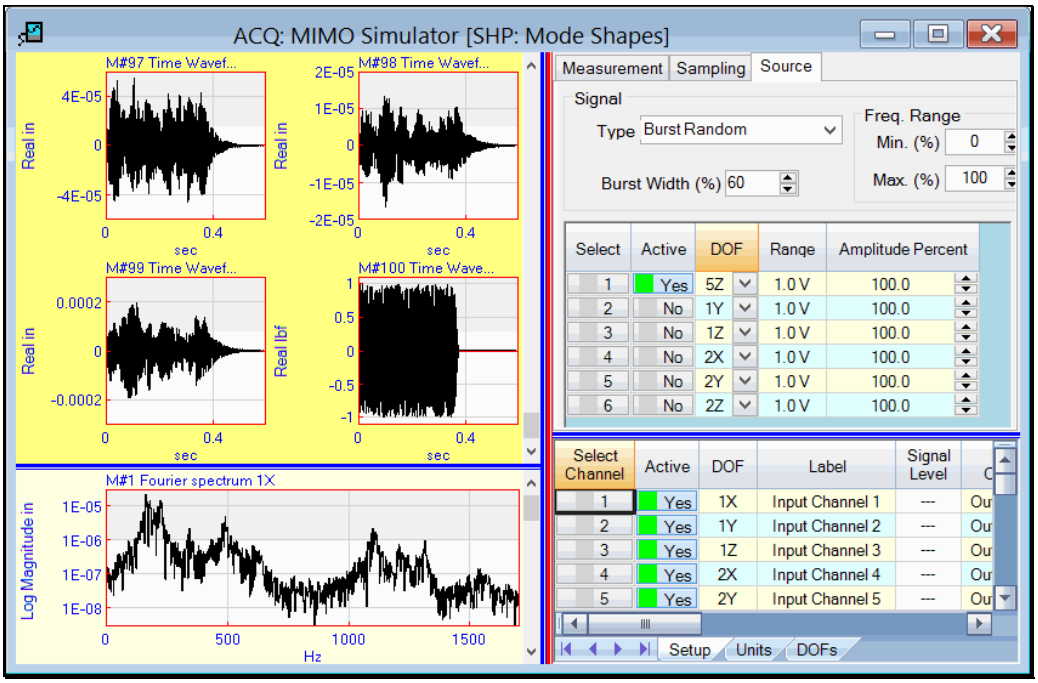
The **Burst Width** should be chosen so that the ***Acquired response TWFs*** will ***decay to essentially zero*** within the sampling window.

- A signal that decays within the sampling window is completely contained within the window, its spectrum is leakage-free and therefore does not require a special window to reduce leakage effects
- The amount of damping in the test article determines how quickly its structural responses will decay to essentially zero within their sampling window

To determine the required burst width,

- Choose a Burst Width percentage
- Execute **Acquire | Data Source Scope** (F2)
- Scroll through the **TWFs** in the ***upper* graphics** area to display the acquired data

If the response signals **decay *essentially to zero* within their sampling window** (as shown below), those signals do not require a special time domain window to reduce leakage in their spectra.



Correct Burst Random Output Showing Responses Contained in The Window.

File Menu

File | Save Acquisition

Saves the Acquisition (**ACQ**) file in the ***current* Project** file.

File | Save Acquisition As

Saves the Acquisition (**ACQ**) file with a ***new name*** in the **Current Project** file.

File | Save* Graphics *in File

Saves the ***upper & lower* graphics *area***s into a disk file in a poplar third party format.

> The upper & lower **graphics** can be saved in the JPG, GIF, PNG or BMP file formats.

***File | Copy to Clipboard | Copy* Graphics**

Copies the ***upper & lower* graphics** to the Windows Clipboard.

File | Copy to Clipboard | Copy* M#s *SS

Copies the **M#s** spreadsheet of the ***active* graph** to the Windows Clipboard.

File | Copy to Clipboard | Copy Channels SS

Copies the displayed tab of the **Channels** spreadsheet to the Windows Clipboard.

***File | Print | Print* Graphics**

Prints the ***upper & lower* graphics** to a ***connected* Windows** printer.

> The installed Windows printer must be a **graphics** printer to use the commands in the Print menu.

File | Print | Print* M#s *SS

Prints the **M#s** spreadsheet to the Windows printer.

File | Print | Print Channels SS

Prints the **Channels** spreadsheet to the Windows printer.

File | Acquisition Properties

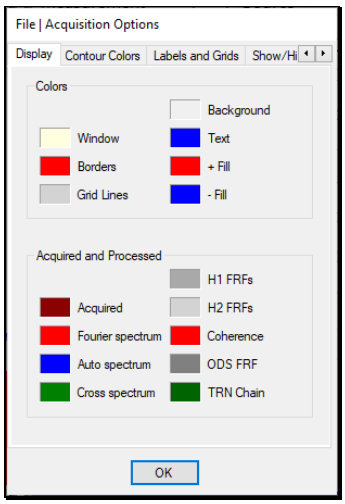
Opens the Acquisition Properties box, showing the properties of the **M#s** in the ***active* graphics** area.

> See **File | Data Block Properties** in the chapter for the **Data Block (BLK)** Window for details.

File | Acquisition Options

Opens the **Acquisition Options** box.

> See **File | Data Block Properties** in the chapter for the **Data Block (BLK)** Window for details.



File | Close Acquisition

Closes the Acquisition (**ACQ**) window.

This window can also be closed by clicking on the close button in the ***upper right corner*** of the window

Opening a Window

To open an Acquisition (**ACQ**) window in the MEscope Work Area,

- ***Double click*** on its name in either pane of the **Project Panel**
- Or ***right click*** on its name in either pane of the **Project Panel**, and execute **Open** from the menu

Display Menu

Display | Center Acquisition Window

Centers the Acquisition (**ACQ**) window in the **Work Area** of the MEscope window

Repeated execution of this command alternately centers the window and returns it to its former position

Display | M#s SS

Moves the **blue splitter bar** to ***show or hide*** the **M#**s spreadsheet.

- The **M#s** spreadsheet for the ***upper* graph** is displayed by pressing the **Upper M#s** tab at the bottom of the **M#s** spreadsheet. The **M#s** spreadsheet for the ***lower* graph** is displayed by pressing the **Lower M#s** tab

Display | Acquisition Toolbars

If ***checked***, the Toolbars are displayed in the Acquisition (**ACQ**) window.

Display | Active Graph

Toggles the ***active* graph** between the ***upper & lower* graph**.

The properties of the **M#s** in the ***active* graph** are shown in the **M#s** spreadsheet.

- ***Click*** on the command tool to toggle the ***active* graph** between the ***upper & lower* graph**
- ***Right-click*** on the ***upper or lower* graph** to make it ***active***

Display | M#s | Real, Imaginary, Magnitude, Phase

Displays the **Real** part, **Imaginary** part, **Magnitude**, or **Phase** of the **M#s** in the ***active* graph**.

See the **Data Block (BLK)** Window chapter for details on these commands.

Display | M#s | CoQuad, Bode, Nyquist

Displays the **M#s** in the ***active* graph** in **CoQuad, Bode**, or **Nyquist** format.

See the **Data Block (BLK)** Window chapter for details on these commands.

Display | Zoom In

Initiates a Zoom-In operation on the ***active* graph**.

***See* Display | Zoom**-In in the **Data Block (BLK)** Window chapter for details.

Display | Zoom Out

Restores the display of ***all samples*** of data on the ***active* graph**.

Display | Maximize

Maximizes the **vertical (Y-axis)** display of the ***active* graph** to make the data more visible.

***See* Display | Maximize** in the **Data Block (BLK)** Window chapter for details.

Display | Fill Under Graph Menu

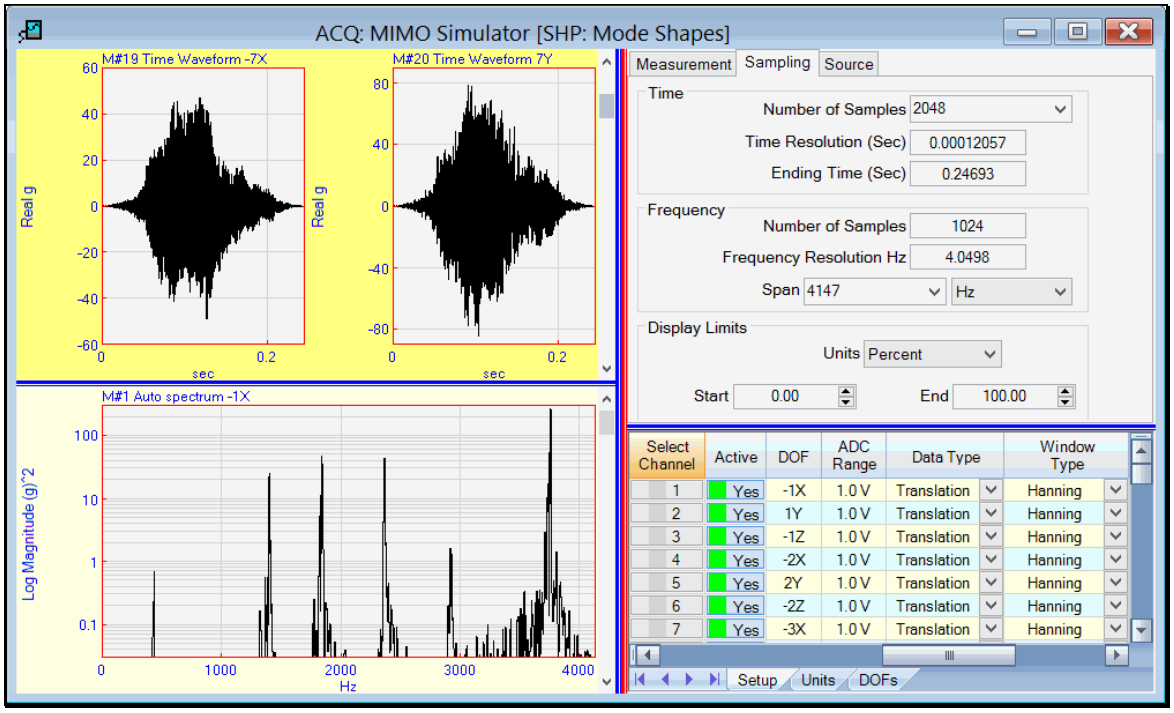
Fills with colors under each **M#** on the ***active graph***

See **Display	Fill Under Graph** in the **Data Block (BLK)** Window chapter for details.

Display | Windowed M#s

If ***checked***, the **TWFs** in the ***upper*** **graph** are displayed after a **time domain window** is applied to them. If ***not checked***, the **TWFs** are displayed without a time domain window applied to them.

The time domain window is chosen in the **Window Type** column of the **Channels** spreadsheet. Choosing a **Rectangular** window is the same as applying ***no*** **time domain window** to the **TWFs**.



*Upper Graph **TWFs** After the Hanning Window is Applied.*

M#s Menu

M#s | Select

The commands in this menu are used to ***select*** or ***un-select*** **M#s** among the **M#s** in the ***active*** **graph**.

A **selected M#** has a **shaded background**, and its **Select M#** button is **depressed** in the **M#s** spreadsheet. ***See*** **Selecting M#s** in the **Data Block (BLK)** Window chapter for details on selecting **M#s**.

M#s | Sort

Opens the **Sort M#s** dialog box that contains options for sorting the **M#s** in the ***active*** **graph**.

See **Sorting M#s** in the **Data Block (BLK)** Window chapter for details on sorting **M#s**.

M#s | Copy to File

Copies ***all*** (or ***selected***) **M#s** in the ***active*** **graph** to a **Data Block (BLK)** file.

See **M#s	Copy to File** in the **Data Block (BLK)** Window chapter for details.

M#s | Select Linked Points

Selects Points on a ***connected*** **Structure (STR)** file based on the **DOFs** of ***active*** **M#s** in the **Channels** spreadsheet.

Cursor Menu

The commands in this menu are used to ***display & move*** the **cursors** on the ***active*** **graph**.

> ***See*** the **Data Block (BLK)** Window chapter for details on these commands.

Format Menu

Format | Rows/Columns, Overlaid, Overlaid by DOF, Strip Chart, Cascade, Contour

Displays the **M#s** in the ***active*** **graph** in the Row/Column, Overlaid, Strip Chart, or Cascade format.

> ***See*** the **Data Block (BLK)** Window chapter for details on these commands.

Format | Overlay By DOF

If ***checked***, all **M#s** in the ***active*** **graph** with the ***same*** **DOFs** are displayed together in **Overlaid** format.

> ***See*** the **Data Block (BLK)** Window chapter for details.

Format | Y-axis, X-axis

Opens dialog boxes for changing the **Y-axis (vertical)** and **X-axis (horizontal)** scaling of the **M#s** in the ***active*** **graph**.

> ***See*** the **Data Block (BLK)** Window chapter for details on these commands.

Acquire Menu

Acquire | Data Source Scope

Initiates ***continuous*** **acquisition** from the ***connected*** **data source**.

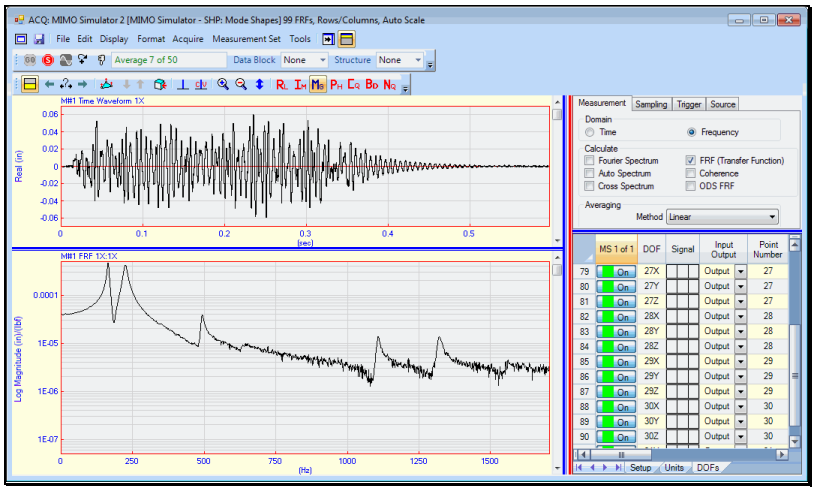
Acquisition from the **data source** will continue until **Acquire | Stop (F6)** is executed.

> The time domain **Number of Samples** and the **Frequency Span** for each block of data are chosen on the **Sampling** tab.
>
> The acquired **TWFs** are displayed in the ***upper*** **graphics** area.
>
> The **Calculated** functions chosen on the **Measurement** tab are displayed in the ***lower*** **graphics** area.

Acquire | Start (F5)

Initiates data acquisition from the ***connected*** **data source**. Acquisition continues until the number of blocks of **TWF** data required to calculate the number of **Spectrum Averages** on the **Measurement** tab are acquired, or until **Acquire | Stop (F6)** is executed.

> The **Number of Samples** in each acquired **TWF** and the **Frequency Span** of each **Calculated** frequency function are both chosen on the **Sampling** tab.
>
> During acquisition, the status of the acquisition is reported in the message box on the Toolbar.



*Acquisition (**ACQ**) window during Data Acquisition.*

Acquire | Stop (F6)

Terminates data acquisition from the ***connected*** **data source**.

Acquire | Auto Range Up

If ***checked***, whenever there is an overload on an ***active channel*** of data in the ***upper*** **graphics,** the **data source** range in the **data source** is increased to the ***next higher range***, if available.

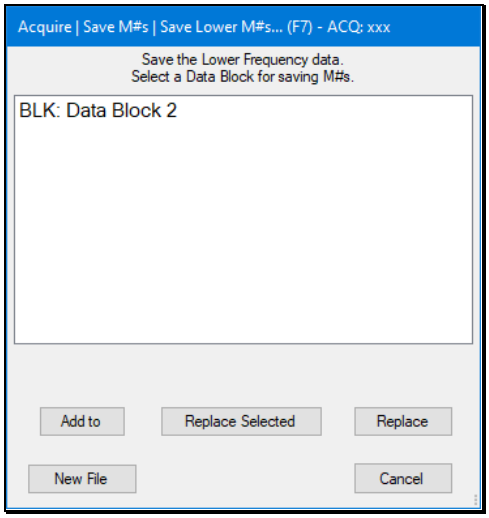
Acquire | Save M#s Menu

The **M#s** in the ***lower or upper*** **graphics** area can be saved into one or more Data Blocks using the following commands.

Acquire | Save Lower M#s (F7)

Saves ***all*** **(or *selected*) M#s** from the ***lower*** **graphics** area into a Data Block file.

- When executed, the following dialog box is opened which contains ***several options*** for saving **M#s** into a Data Block file.



Dialog Box for Saving Lower or Upper M#s

Acquire | Save Upper M#s (F8)

Saves ***all*** **(or *selected*) M#s** from the ***upper*** **graphics** area into a Data Block file.

- When executed, the above dialog box is opened which contains ***several options*** for saving **M#s** into a Data Block file.

Acquire | Impact Menu

Acquire | Impact | Trigger Lines

If ***checked***, vertical & horizontal trigger lines are displayed on all ***active*** **trigger M#s** of data in the ***upper*** **graphics** area.

Acquire | Impact | Double-Hit Line

If ***checked***, **double-hit lines** are displayed on all ***active*** **trigger M#s** of data in the ***upper*** **graphics** area.

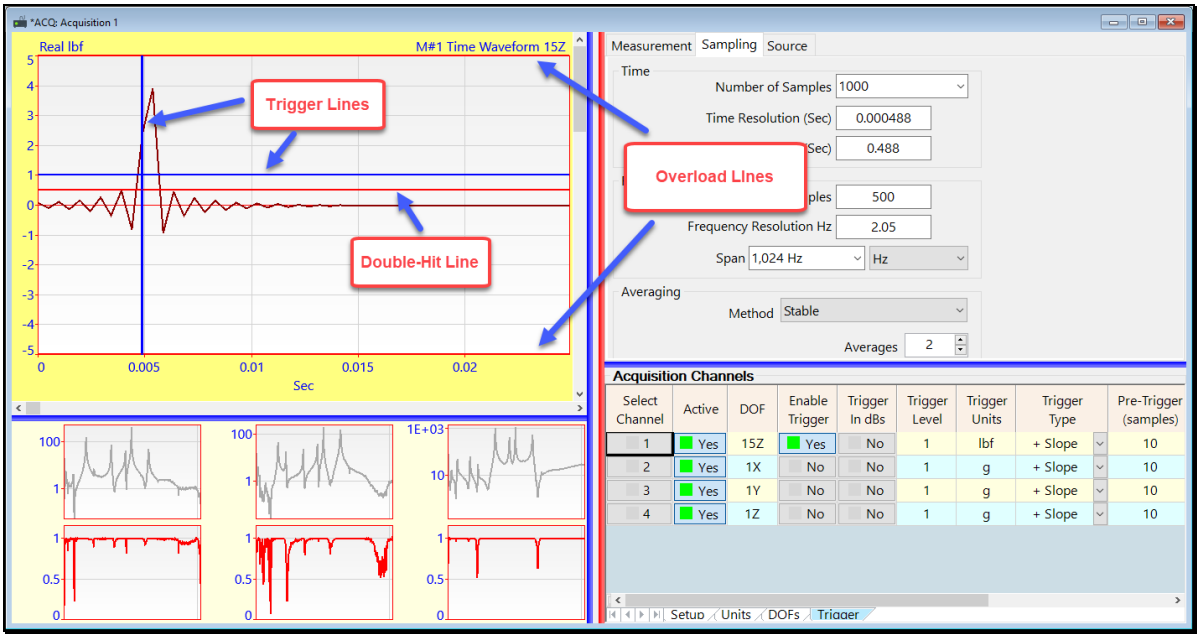
Acquire | Impact | Overload Lines

If ***checked***, **overload lines** are displayed on all ***active*** **M#s** of data in the ***upper*** **graphics** area.

Channel overload is entered in the **Overload Percent** column on the **Setup** tab of the **Channels** spreadsheet.
Channel overload is the **percentage of the full-scale voltage** of each ***active*** acquisition channel.

Acquire | Impact | Reject Impact (F9)

During an Impact test, if a trigger has been enabled on the **Trigger** tab, executing this command will reject the ***last acquired*** block of **TWF** data acquired from the ***connected*** **data source**.



Trigger, Double-Hit and Overload Lines on the Upper **Graphics**.

Acquire | Connection Menu

Acquire | Connect to Data Source

Opens a dialog box with a list of **data source**s, (third-party acquisition hardware or **TWF** Data Blocks), that can be connected to the **Acquisition** (**ACQ**) window.

- Choose a **data source** and ***click*** on **Connect** to connect the **Acquisition** (**ACQ**) window to the **data source**.
- Choose **NONE** from the list to disconnect the **Acquisition** (**ACQ**) window from the ***connected*** **data source**.

Acquire | Connect to Structure

Opens a dialog box with a list of **Structure (STR)** files in the ***current*** **Project** that can be connected to the **Acquisition** (**ACQ**) window. A **Structure** (**STR**) window can be used for two purposes,

1. Creating **M# Links** to link **Channel DOFs** to **DOFs** of the model in the ***connected*** **Structure** window model
2. Creating **M# Links** to link the **M#s** in the **lower graphics** area so that **ODS's** can be displayed in animation from those **M#s**.

If a **Structure** (**STR**) file is ***connected*** to the **Acquisition** window it will be listed on the Acquisition Toolbar.

What is a Measurement Set?

To calculate ***cross-channel*** functions like **FRFs**, **Cross spectra**, or **ODS-FRFs**, or to animate shapes from a Data Block containing **TWFs**, all ***active*** **Channels** of data ***must be simultaneously acquired***.

When all **TWFs** cannot be ***simultaneously acquired***, **Measurement Sets** should be defined before acquiring data from the ***connected*** **data source**.

A **Measurement Set** is defined by adding its set number to the **DOFs** of all acquired **TWFs** for that set in the **Channels** spreadsheet.

Each **Measurement Set** number should be added to the **DOF** of all Channels of data ***simultaneously acquired*** for that set number.

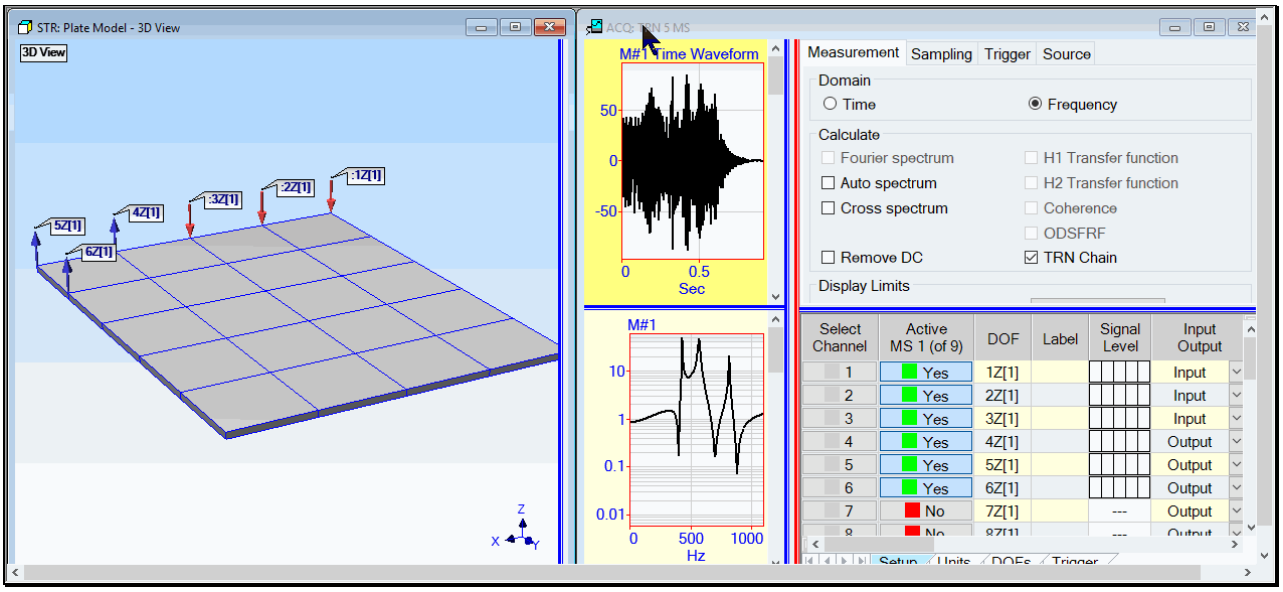
Measurement Sets should be numbered, from 1 to the total number of Measurement Sets

Measurement Sets Menu

Measurement Sets | Use Measurement Sets

When ***checked***, **Measurement Sets** will be used during Acquisition. The current Measurement Set & total number of Measurement Sets is shown in the Active column header of the **Channels** spreadsheet, as shown below.

For example, **MS 1 (of 9)** means that **Measurement Set 1** is the ***current*** **Measurement Set** of **Channel** parameters being displayed, and that **9 Measurement Sets** have been defined, as shown below.



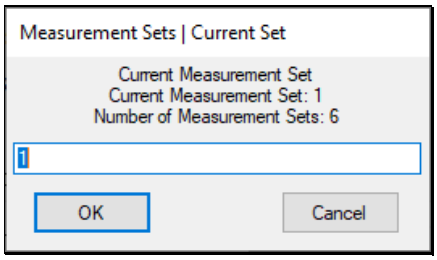
*Channel **DOFs** Showing 3 Input **DOFs** and 3 Output **DOFs**.*

Measurement Sets | Next Set (F6), Previous Set (F5)

These commands change the ***current*** **Measurement Set** to the **Next Set (F4)** or to the **Previous Set (F3).**

Measurement Sets | Current Set

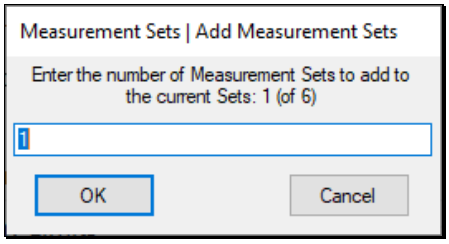
Opens a dialog box from which a ***current*** **Measurement Set** can be chosen.



Measurement Sets | Add Measurement Sets

Opens a dialog box for adding new Measurement Sets to the **Acquisition** (**ACQ**) window.

New Measurement Sets are inserted following the ***current*** **Measurement Set**.



Measurement Sets | Delete Measurement Set

Deletes the ***current*** **Measurement Set** and reduces the number of **Measurement Sets** by one.

Measurement Sets | Create Channel DOFs

Creates **Channel DOFs** by ***selecting*** Points & directions on the model in the ***connected*** **Structure** (**STR**) window.

Before executing this command,

1. Number each test Point on the structure model in the ***connected*** **Structure** (**STR**) window
2. Orient the **Measurement Axes** at each test Point to coincide with the sensor measurement directions
3. Execute **Measurement Sets | Create Channel DOFs**
    1. Select a Point on the structure model
    2. ***Click*** on a **Measurement Axis** at the Point to create a **DOF** for the (highlighted) channel in the **Channels** spreadsheet

When finished creating **Channel DOFs** for the ***current*** **Measurement Set**,

1. Execute **Measurement Sets | Next Set (F6)** or **Previous Set (F5)** and repeat the steps above
2. Execute this command again to terminate creation of **Channel DOFs**

Measurement Sets | Show Channel DOFs

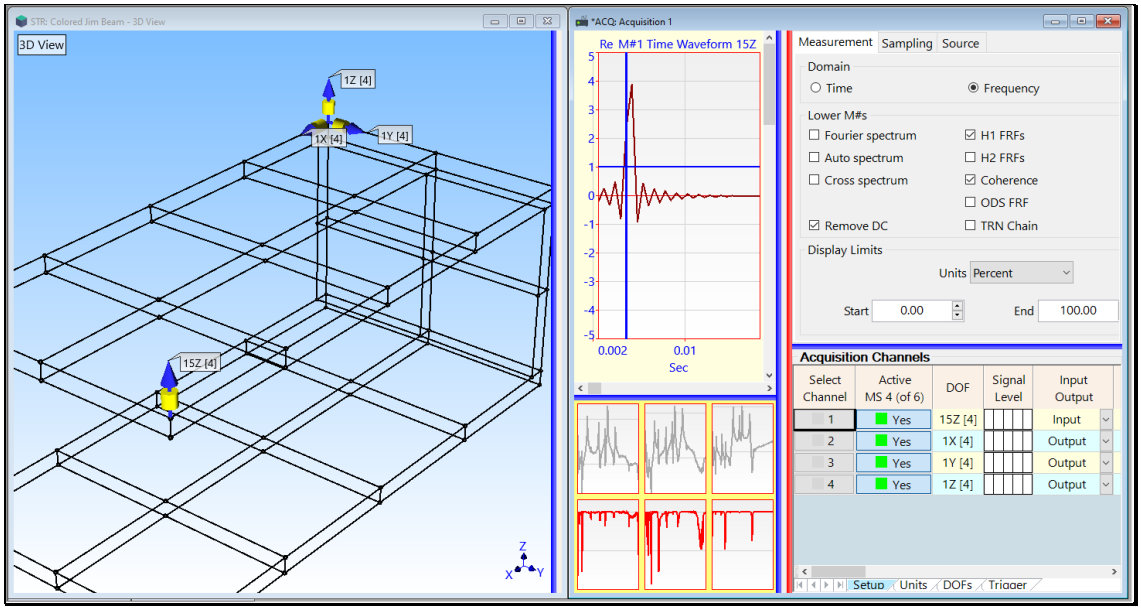
Displays the **Channel DOFs** of the ***current*** **Measurement Set** on the structure model in a ***connected*** **Structure** (**STR**) window.

The ***connected*** **Structure** (**STR**) file is displayed in the list box on the Toolbar.

The following colors are used to display **DOFs** on the model in the **STR** window.

- **DOFs** of **Inputs** ➔ displayed in **RED** on the structure model
- **DOFs** of **Outputs** ➔ displayed in **BLUE** on the structure model
- **DOFs** of **Inputs & Outputs** (Both) ➔ displayed in **GREEN** on the structure model

- Execute **Measurement Sets | Next Set (F6) or Previous Set (F5)** to display the Channel **DOFs** of each Measurement Set



*Channel **DOFs** for Measurement Set 4.*