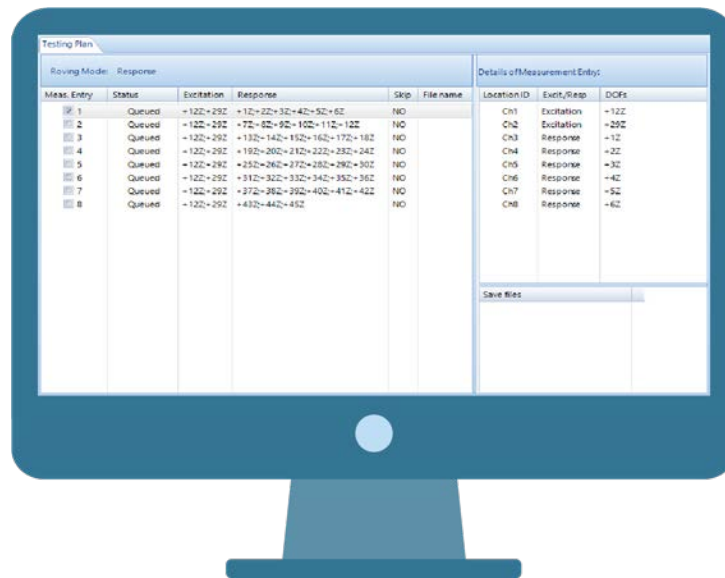


Introducing Testing Plan in EDM Modal

Application Note 066



Mass	Entry	Status	Excitation	Response	Skip	Filename	Location ID	Exit/Step	DCFs
1		Queued	+12Z+29Z	+1Z+2Z+3Z+4Z+5Z+6Z	NO		Ch1	Excitation	+12Z
2		Queued	+12Z+39Z	+7Z+8Z+9Z+10Z+11Z+12Z	NO		Ch2	Excitation	+29Z
3		Queued	+12Z+29Z	+19Z+14Z+15Z+16Z+17Z+18Z	NO		Ch3	Response	+1Z
4		Queued	+12Z+29Z	+25Z+26Z+27Z+28Z+29Z+30Z	NO		Ch4	Response	+2Z
5		Queued	+12Z+29Z	+31Z+32Z+33Z+34Z+35Z+36Z	NO		Ch5	Response	+3Z
6		Queued	+12Z+29Z	+37Z+38Z+39Z+40Z+41Z+42Z	NO		Ch6	Response	+4Z
7		Queued	+12Z+29Z	+43Z+44Z+45Z	NO		Ch7	Response	+5Z
8		Queued	+12Z+29Z		NO		Ch8	Response	+6Z

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With Modal Analysis software, all DOFs on the mesh of a structure under test needs be measured. The common practice is using the Input channel setting, with one incremental value to move on to the next batch of measurement points till all DOFs are measured. With the newly released EDM 9.1 Modal software, the new Testing Plan will solve this issue by providing users the complete picture of the testing DOF layout. Also discussed in this note are the details of the Testing Plan feature.

Testing Plan is a very powerful tool which provides users with the ability to customize and control the flow of the testing process. The testing plan also provides information about the acquisition status. The user can also change or modify the parameter for each individual measurement entry as discussed in more detail below. (Figure 1.1)

A quick glance of the testing plan provides a lot of information about the setup of the modal test. For example, the above screenshot shows that the test is carried out with a roving response method. Hence, the DOF of each measurement entry is incremented by 6 in the response column while the DOFs of the Excitation column are fixed on a couple of particular measurement points. There are 8 measurement entries in the testing plan which reflects that the geometry model of the test structure created has 45 mesh points.

Testing Plan Status and Setup

The Skip column in the test plan shows whether the user has decided to skip the measurement for any DOFs on the geometry model. If the user decides to skip the measurement for a point, this column will display “YES” and the status of the corresponding entry will also be changed from “Queued” to “Skipped” as shown in the screenshot below.

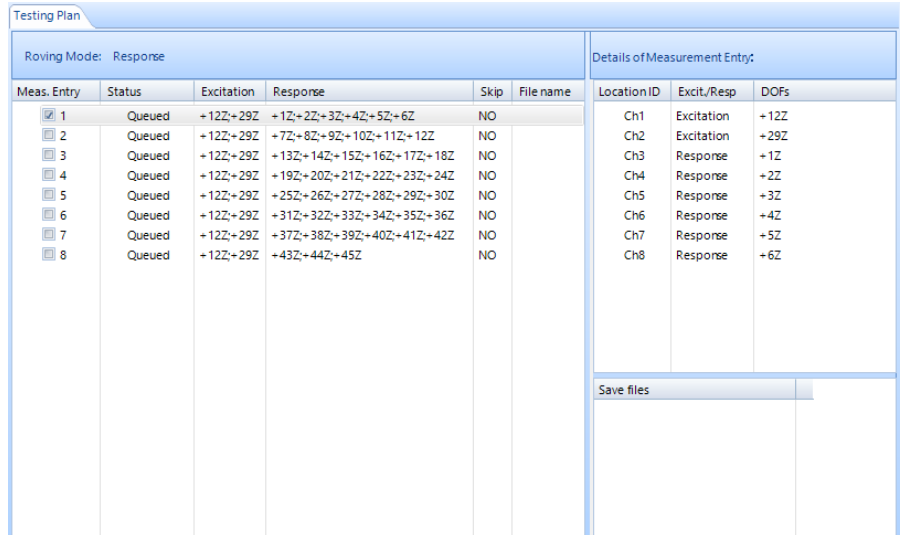


Figure 1.1 Testing Plan in MIMO FRF

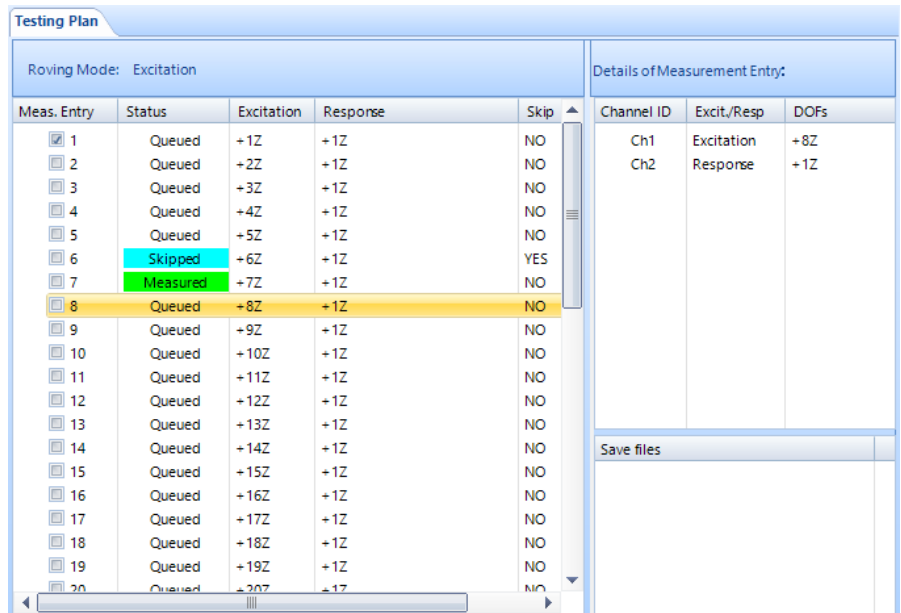


Figure 2.1 Testing Plan with different status

(Figure 2.1)

The Status of each measurement entry can be Queued, Skipped, or Measured. When the testing plan is initialized, all entries have the status of Queued. Users can purposely choose to skip certain entries, which as a result will be not measured. When an entry is run, its status will be Measured. (Figure 2.2)

For the measured entry, the time and frequency signals are saved for each measurement entry as shown in the

bottom right corner under the “Save files” tab. This is particularly helpful when multiple runs are executed for a single measurement entry. Since all the files associated with that measurement point is stored here, it is easy for the user to distinguish the different runs and signals.

Testing Plan Menu Entries

Right mouse clicking the measurement entry area provides a list of options for the user to choose from. (Figure 3.1)

Select this measurement entry

The user can choose this option to select any measurement entry to perform an operation. Another way to select any measurement entry is by clicking on the check box in the first column of any measurement entry.

Run this measurement entry

Users can run any measurement entry. This gives the user the flexibility to carry out the test in any order they want. On some complicated structures, it might be difficult to impact a few locations and the user might want to save those for the last. This is a common example of when this feature is helpful.

Reset Entry

Clears data for the measurement entry and resets it.

Set to skip

If the user decides to skip the entry for a measurement location, they can use this feature.

Re-calculate all following entries

To reset all the measurement entries in the testing plan.

Edit entry

When the user wants to change the measurement point location or the direction of measurement for a specific entry, they can use this option. (Figure 3.2)

For example, the user is carrying out a modal test using a tri-axial sensor and wants to change the measurement direction after a run. Users can use this feature rather than switching back and forth between the input channel setup and the measurement tab.

Insert entry before

The user can add a measurement entry before the selected highlighted measurement entry.

Insert entry after

The user can add a measurement

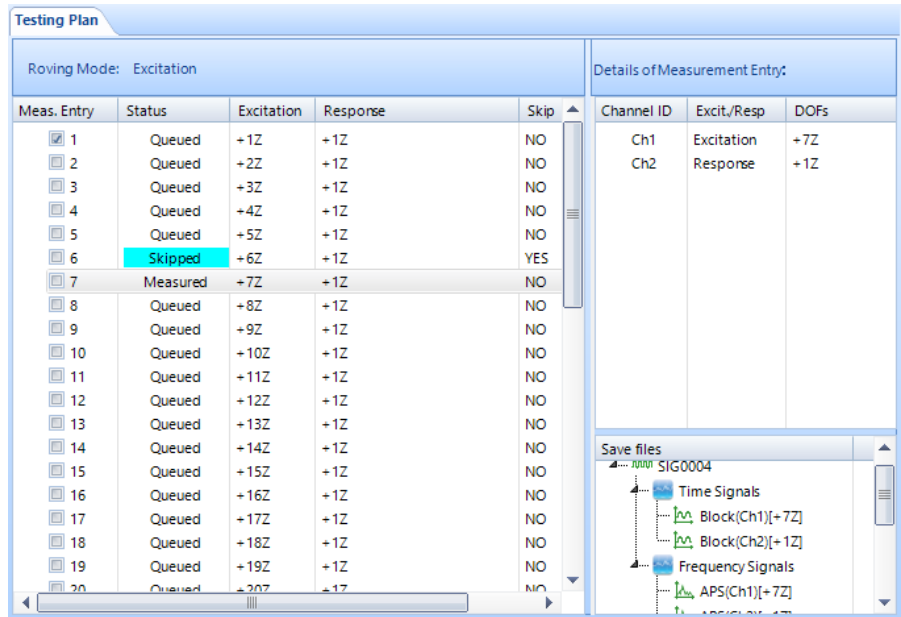


Figure 2.2 Testing Plan measured entry

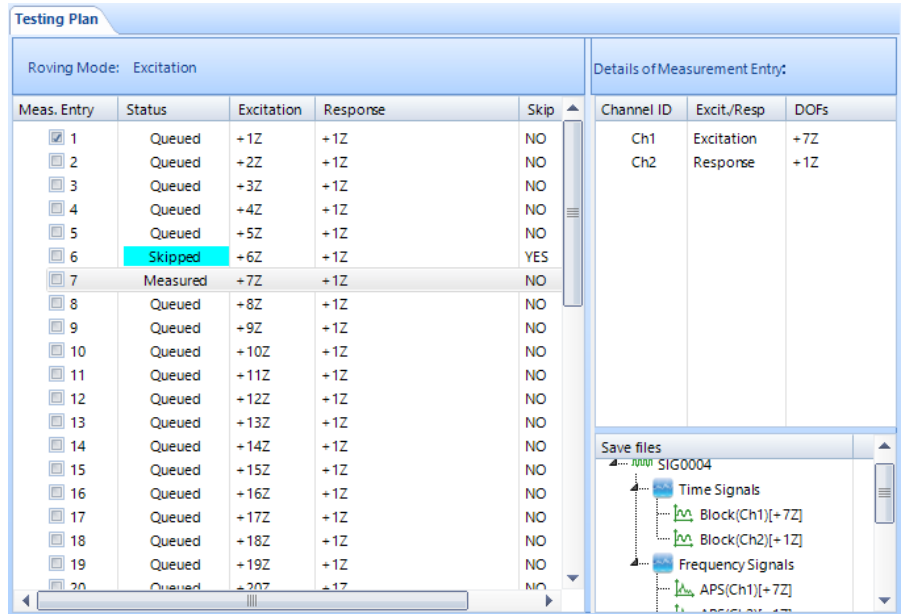


Figure 3.1 Testing Plan Editing Menu

entry after the selected highlighted measurement entry.

Delete this entry

This option can be used to delete the selected measurement entry. Testing Plan Samples for Hammer Impact Test and Modal Shaker Test

With different testing types, the Testing Plan feature could be different based on the test nature. Whether it is a roving excitation or roving response

test types, the Testing Plan will lay out the measurement entries to cover all the measurement DOFs on the structure under test.

The following is a testing plan for the Roving Hammer Impact test. (Figure 3.3)

As it illustrates, the excitation is roving from DOF +1Z to the +45Z, while the response is fixed to the +5Z DOF. This is a very common setup

with impact hammer.

A testing plan is discussed below where a modal test is carried out using two modal shakers.(Figure 3.4)

It is common to fix the modal shaker(s) on fixed DOF(s) and rove the sensors through all the measurement points to obtain a complete FRF data set. The testing plan above indicates that the modal shakers are fixed on +1Z and +2Z DOF while 6 sensors are roved through 45 measurement points on the test structure. The testing plan automatically accommodates and adjusts for the roving sensors according to the response DOFs.

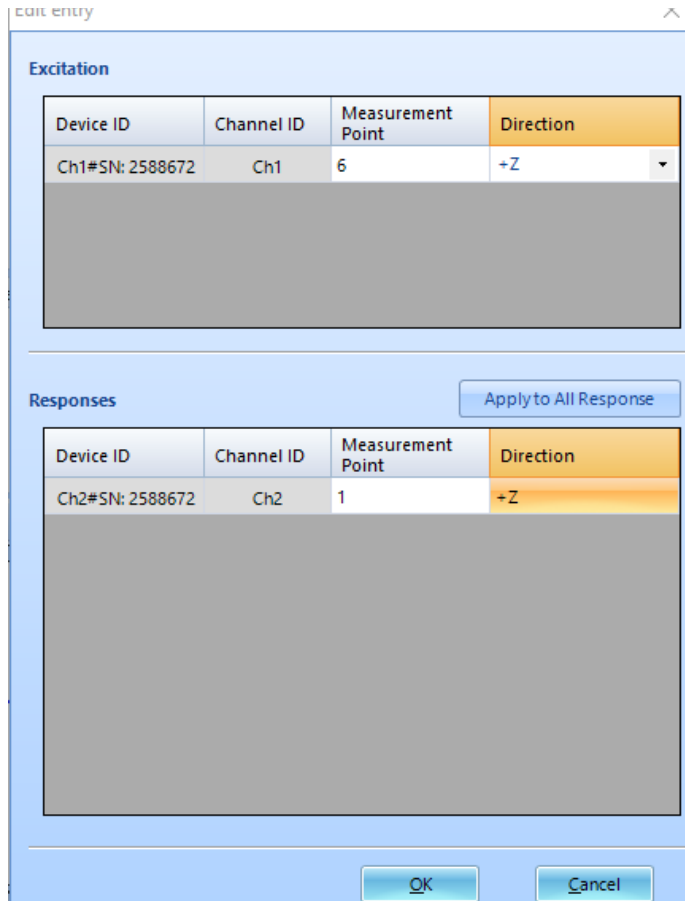


Figure 3.2 Edit entry of Testing Plan

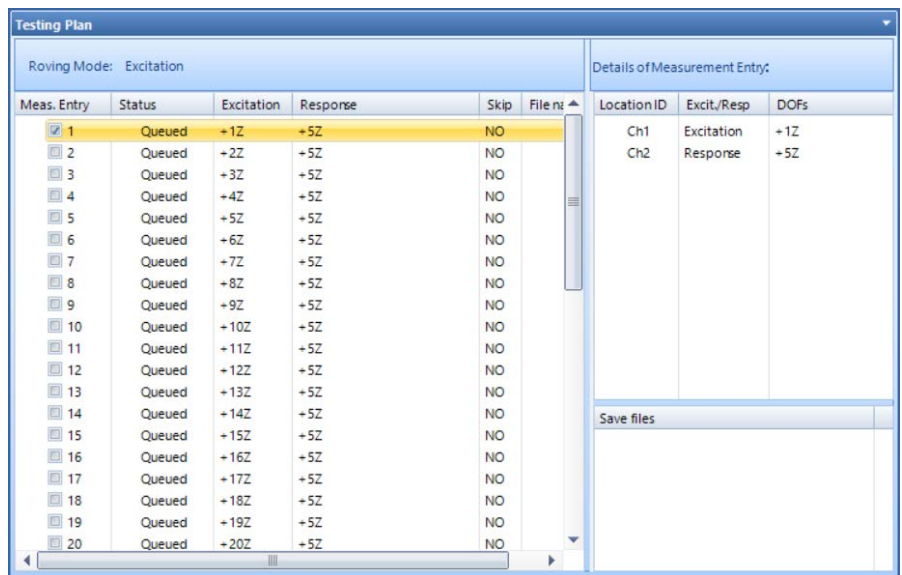


Figure 3.3 Testing plan for roving hammer test

Roving Mode: Response						Details of Measurement Entry:		
Meas. Entry	Status	Excitation	Response	Skip	File name	Location ID	Excit./Resp	DOFs
<input checked="" type="checkbox"/> 1	Queued	+12Z;+29Z	+1Z;+2Z;+3Z;+4Z;+5Z;+6Z	NO		Ch1	Excitation	+12Z
<input type="checkbox"/> 2	Queued	+12Z;+29Z	+7Z;+8Z;+9Z;+10Z;+11Z;+12Z	NO		Ch2	Excitation	+29Z
<input type="checkbox"/> 3	Queued	+12Z;+29Z	+13Z;+14Z;+15Z;+16Z;+17Z;+18Z	NO		Ch3	Response	+1Z
<input type="checkbox"/> 4	Queued	+12Z;+29Z	+19Z;+20Z;+21Z;+22Z;+23Z;+24Z	NO		Ch4	Response	+2Z
<input type="checkbox"/> 5	Queued	+12Z;+29Z	+25Z;+26Z;+27Z;+28Z;+29Z;+30Z	NO		Ch5	Response	+3Z
<input type="checkbox"/> 6	Queued	+12Z;+29Z	+31Z;+32Z;+33Z;+34Z;+35Z;+36Z	NO		Ch6	Response	+4Z
<input type="checkbox"/> 7	Queued	+12Z;+29Z	+37Z;+38Z;+39Z;+40Z;+41Z;+42Z	NO		Ch7	Response	+5Z
<input type="checkbox"/> 8	Queued	+12Z;+29Z	+43Z;+44Z;+45Z	NO		Ch8	Response	+6Z

Figure 3.4 Testing plan with 2 excitation and 6 response sensors

Crystal Instruments Corporation
 2090 Duane Avenue
 Santa Clara, CA 95054

Crystal Instruments Testing Lab
 15661 Producer Lane, STE H
 Huntington Beach, CA 92649

Crystal Instruments Testing Lab
 1548A Roger Dale Carter Boulevard
 Kannapolis, NC 28081

Phone: +1 (408) 986-8880
 Fax: +1 (408) 834-7818
 www.crystalinstruments.com

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