



DEWESoft™
measurement innovation

SINE PROCESSING

(Copyright ©2000 - 2013 Dewesoft. All rights reserved.)

(Document version 1.0)

I. Introduction

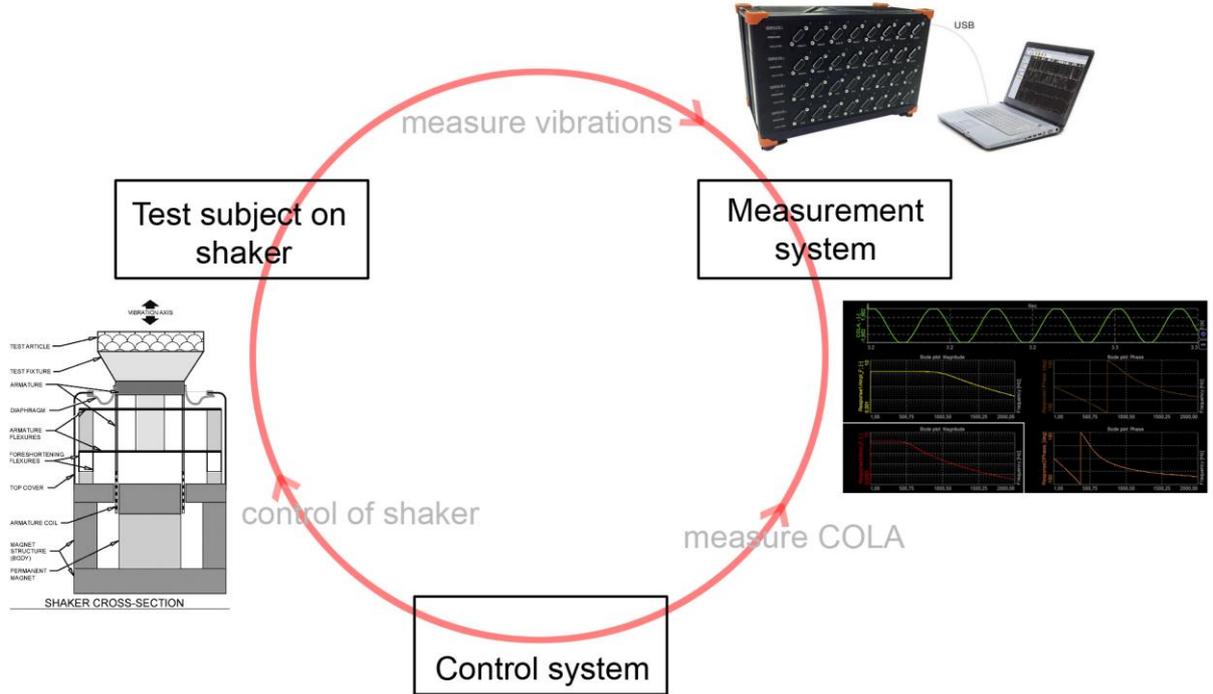
Dewesoft sine processing function is a one-line DFT based amplitude and phase extraction procedure. Sine processing uses COLA signal to calculate instantaneous frequency and then it extracts amplitude and phase at that frequency. Amplitude and phase data are put into histogram.

Sine processing module is located inside Dewesoft in "Math" section under "Spectral analysis->Sine processing".

Example application system:

- a) Shaker
- b) Shaker controller
- c) Dewesoft hardware
- d) Dewesoft software

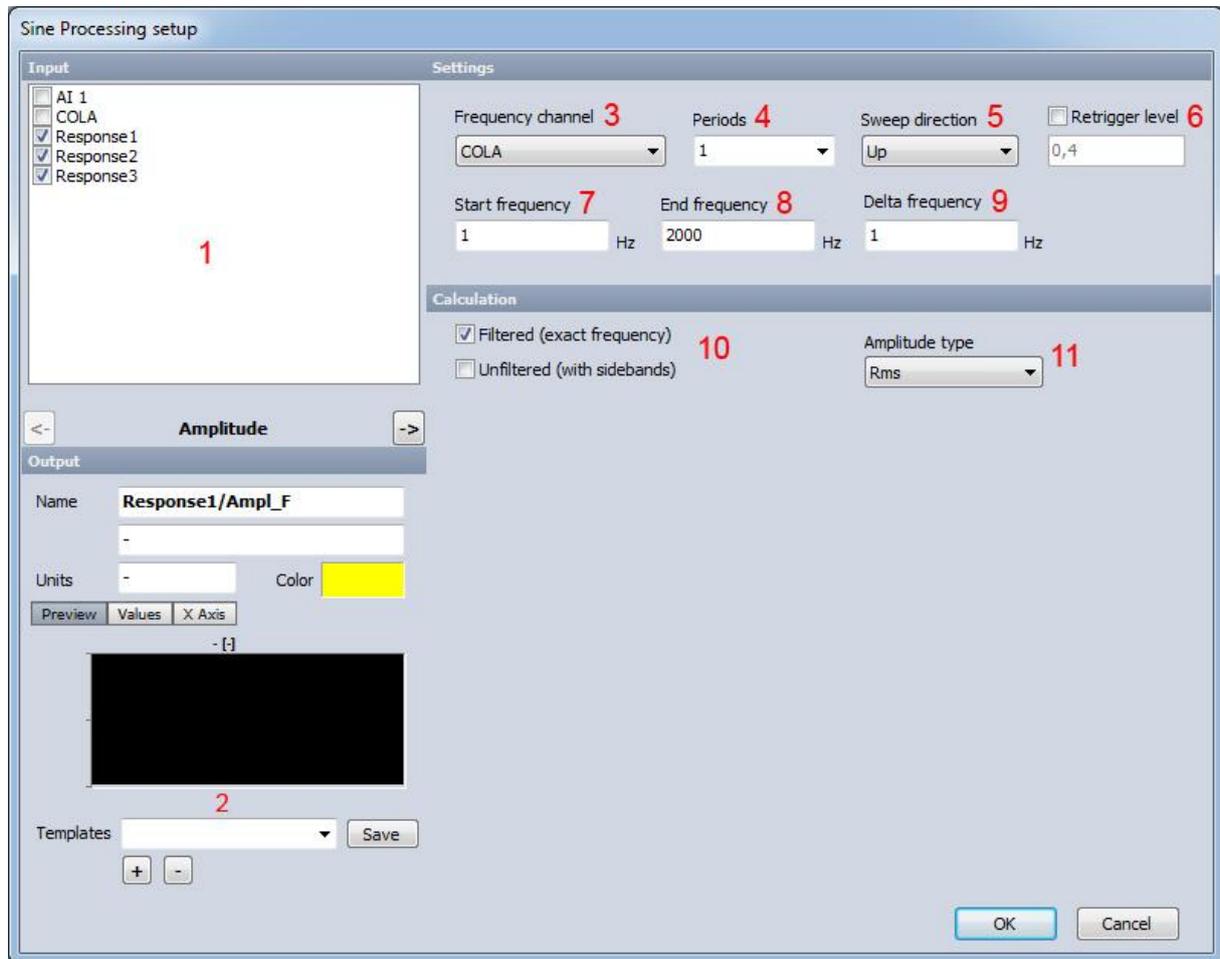
Below you can see an example of setup for such measurement. Control system drives the shaker (regulates frequency phase and amplitude) and provides COLA signal for measurement system. Measurement system reads COLA from control system and vibration data from test subject and calculates resulting histograms.



(Image 1.0: Sine processing - basic loop overview)

COLA signal must be constant level amplitude signal without noise. The tracking filter is done in frequency domain as a standard DFT line extractor.

II. Settings



(Image 1.1: Sine processing - setup screen)

1. Input vibration channels

Input channels must be set in analog channels setup in correct physical units (g, ms²,...). You can select as many channels as your hardware allows. This depends mostly on the CPU speed of your computer.

Note: Sample rate divider is not supported (channels must run with sampling frequency).

2. Settings for output vibrations channels

Sine processing outputs amplitude and phase histograms. You can edit here different settings, like unit, color, description,...

3. COLA (frequency) channel)

COLA (constant output level amplitude) is a sine wave (voltage) at constant amplitude that is used for reference when calculation exact frequency for DFT calculation at instantaneous frequency.

4. Number of averaged periods

Depends on the speed of sweep we can calculate phase and amplitude from 1 or more periods. More periods will give as better result. The drawback is the this will not work with fast sweeps, because frequency changes to fast and on the beginning of the run-up you will get lower amplitude because there is not enough of data for that many periods. So the sweep should be started before the wanted frequency.

5. Sweep direction

Amplitude and phase histogram will be update on the runup, coastdown or both.

6. Retrigger level

If COLA signal is noisy then then re-trigger level should be used. Frequency calculation triggers on zero crossing, but if the signal goes down it can retrigger again to soon. Re-trigger level makes sure that the COLA goes again over re-trigger limit and then searches for zero.

Note: it is best to avoid noisy COLA signals, because frequency calculation will have errors or the whole calculation can fail.

7. Start calculation frequency

Start for calculation of sine sweep. The graph axis will be also set on this value.

8. Stop calculation frequency

End of calculation of sine sweep.

Note: Sample rate for calculation should be at 10 or 20 times end frequency.

9. Delta frequency

X axis on the graph will be divided on delta frequency. Also sine sweep calculations will be performed each full divider of delta frequency.

10. Filtered, unfiltered

For unfiltered calculation simple peak or rms of current period is taken. For filtered calculation DFT (discrete Fourier transform) for one line is performed and the value is put into histogram.

11. Amplitude type:

Peak or rms (root-mean square) value are possible for amplitude display.

Note: Phase is always in degrees.

III. Measurement

Standard Dewesoft screen is used for starting, stopping and storing measurements.



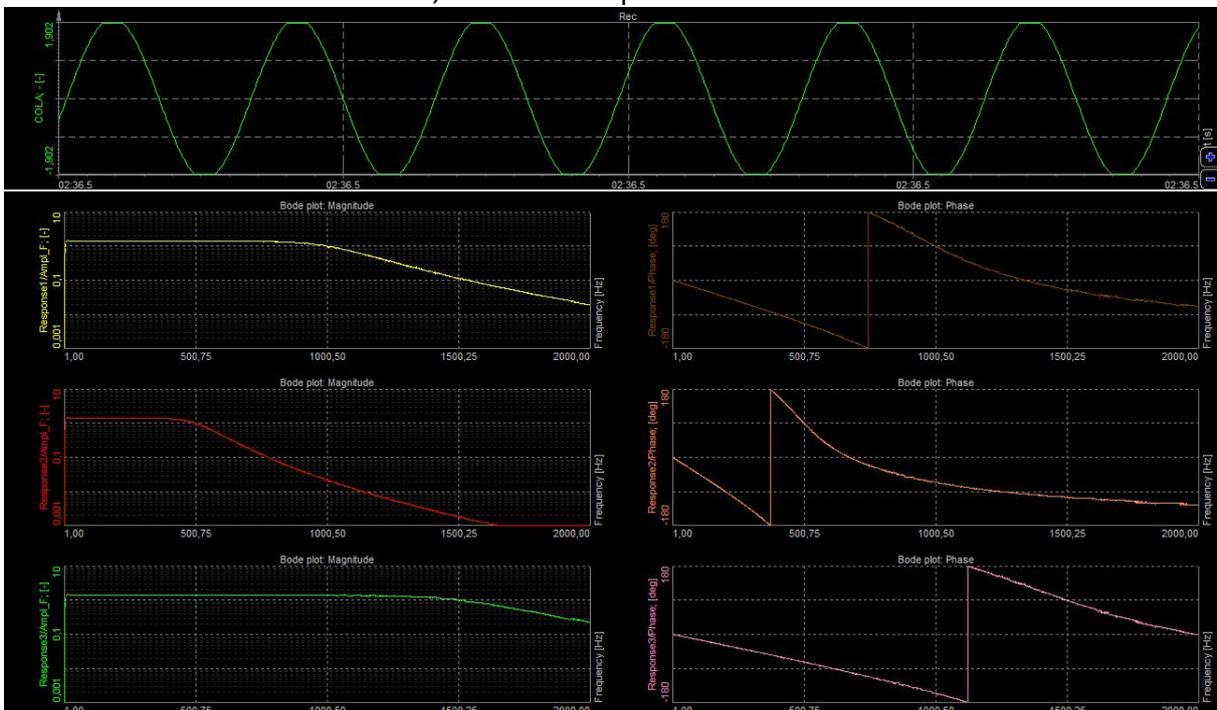
(Image 1.2: Sine processing - store, stop, freeze buttons)

2D graph is able to display histogram produced out of sine processing math.



(Image 1.3: Sine processing - 2D graph icon in red quadrant)

Bellow you can see an example of three COLA (on top) and three resulting amplitudes (left) and phases (right). Data can be stored directly to D7D file and exported to standard export formats supported by Dewesoft. Time data does not need to be stored if there will be no recalulation needed in later time, to save disk space.



(Image 1.4: Sine processing - measurement screen)