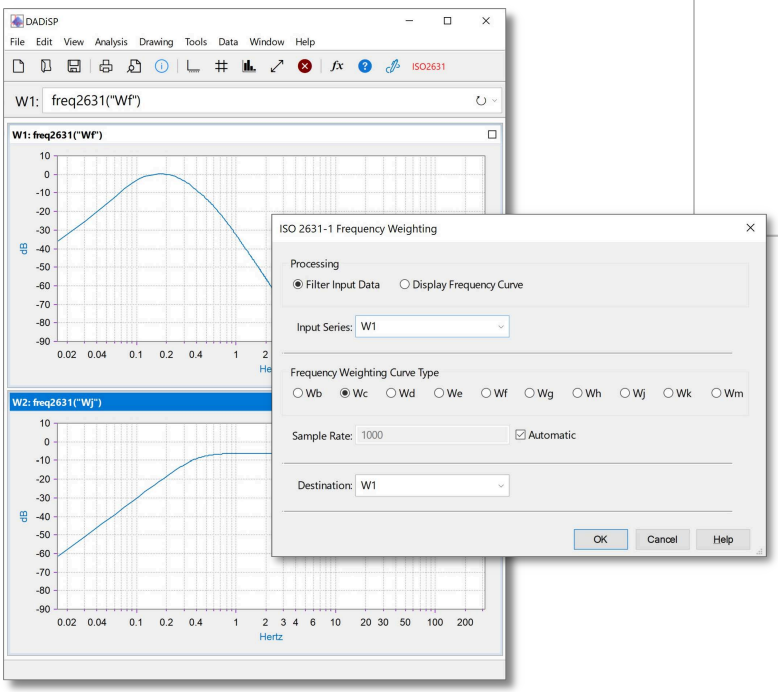
DADiSP / ISO 2631

ISO 2631 Frequency Weighting Module

The ISO 2631 Module designs and processes data with ISO 2631 frequency weighting curves. Three principal frequency weightings are described in the ISO 2631 Standard: Wk for the Z axis or vertical direction, Wd for the X and Y axes, or horizontal direction, and Wf for motion sickness.

Additional frequency weightings defined for the special cases of seat-back measurements, rotational vibration and vibration under the head.

The ISO 2631 Module supports all 8 of the defined ISO 2631 frequency weighting curves, Wb, Wc, Wd, We, Wf, Wj, Wk and Wm weighting filters. In addition, the the ISO 5341 Wh and British BS 6841 Wg frequency weighting filters are included to provide a complete, standards based frequency weighting solution.



KEY FEATURES

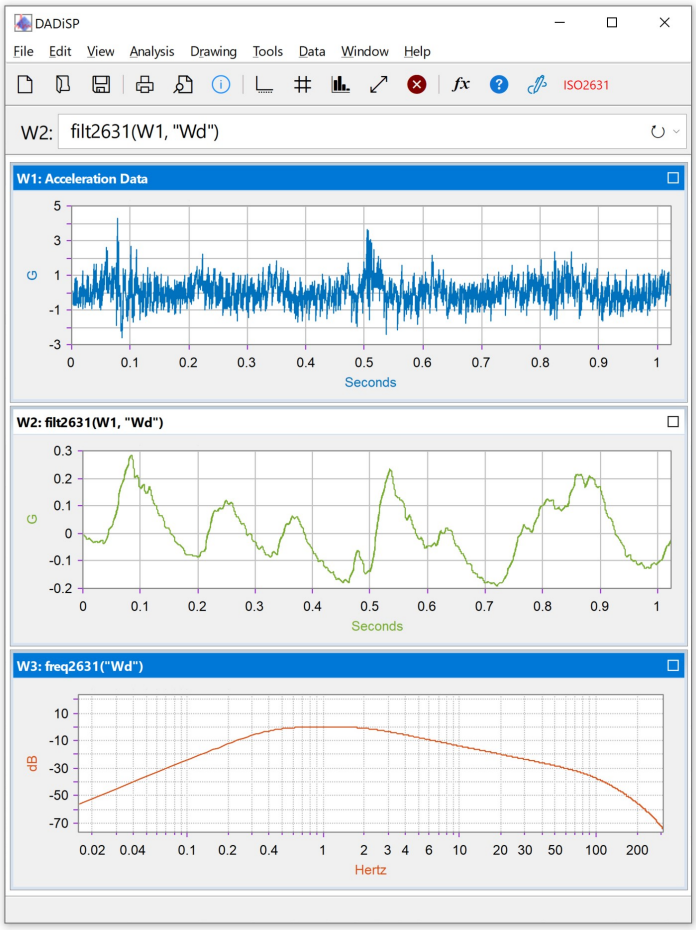
- Simple Dialog Box User Interface
- Conforms to ISO 2631-1, ISO 2631-4, ISO 5341-1 and BS 6841 Specifications
- Supports ISO 2631 Wb, Wc, Wd, We, Wf, Wj, Wk and Wm Frequency Weighting Filters
- Supports ISO 5341 Wh Frequency Weighting Filter
- Supports BS 6841 Wg Frequency Weighting Filters
- One Step Design and Data Processing
- High Precision Digital IIR Cascaded Bi-Quad Filter Implementation
- Optional Frequency Domain Weighting Curve Display
- Complements DADiSP/CFC for Impact Testing Filter Needs

Acceleration data is processed by the frequency weighting filter in one step, where the filter is designed as per the selected specification and the data is filtered in the time domain with a high precision digital filter.

ISO 2631 Frequency Weighting Module

The international ISO 2631 Standard outlines methods for the measurement, evaluation and assessment of human exposure to Whole - Body Vibration (WBV). An evaluation of the effect of exposure to vibration on humans is performed by weighting the root-mean of acceleration data transmitted via supporting structures.

Because the human response to vibration is a function of frequency, acceleration data is filtered with frequency weighting curves as specified by the standard to correlate the vibration measurements to a person's response to vibration



ISO 2631 Standard

It is necessary to use standard methods for frequency weighting so that results from different measurements using different equipment can be compared. The ISO 2631 standard describes weighting filters for combinations of sitting, standing, and recumbant positions for the analysis of health, discomfort, perception and motion sickness.

Several frequency curves are presented covering the most significant combinations of vibration axes and effects (health, comfort, perception, motion sickness). Three of these curves are used in the evaluation of vibration from the point of view of health effects, and two in the procedure of assessment of vibration severity.

Standard Frequency Weighting Filters

The ISO 2631 Standard defines 8 frequency weighting curves. In addition, the ISO 5349 Standard defines a frequency weighting curve for hand vibration and the British BS 6841 Standard defines a curve for activity interference. The ISO 2631 Module supports all ten of these standard filter types as described to the right:

ISO 2631, ISO 5349, BS 6841 Frequency Weighting Filters		
Wb	Vertical Whole-Body Vibration, Z Axis, Standing, Seated or Recumbant Person	ISO 2631-4
Wc	Horizontal Whole-Body Vibration, X Axis, Seat Back, Seated Person	ISO 2631-1
Wd	Horizontal Whole-Body Vibration, X or Y Axis, Standing, Seated or Recumbant Person	ISO 2631-1
We	Rotational Whole-Body Vibration, All Directions, Seated Person	ISO 2631-1
Wf	Vertical Whole-Body Low Frequency Vibration, Z Axis, Motion Sickness, Seated or Standing Person	ISO 2631-1
Wg	Vertical Whole-Body Vibration, Z Axis, Activity Interference	BS 6841
Wh	Hand-Arm Vibration, All directions	ISO 5349-1
Wj	Vertical Head Vibration, X Axis, Recumbant Person	ISO 2631-1
Wk	Vertical Whole-Body Vibration, Z Axis, Seated, Standing or Recumbant Person	ISO 2631-1
Wm	Whole-Body Vibration in Buildings, All Directions	ISO 2631-2

High Precision Filters

The desired filter coefficients are generated by converting the analog filter specifications detailed in the supported standards into the digital domain using the bilinear transform method. Because the filter is comprised of several cascaded sub-filters, the coefficients of each sub-filter are calculated and combined via convolution to produce the equivalent coefficients of the resulting monolithic digital filter.

The resulting coefficients are in second order CASCADE form and are used to process the data with high numeric precision and stability.

One Step Processing

The design and processing of data with a supported frequency weighting filter is accomplished in one easy step. Both an interactive dialog box interface and simple command line functions are provided. For example, to process acceleration data in Window 1 with an ISO 2631 Wk frequency weighting filter:

```
filt2631(w1, "Wk")
```

To display the ISO 2631 Wk weighting curve in the frequency domain:

```
freq2631("Wk")
```

The dialog box interface makes selecting and processing data with a frequency weighting filter as simple as a mouse click.

DADiSP / ISO 2631 Functions

DADiSP/ISO 2631 includes several simple stand-alone functions to design, perform and evaluate ISO 2631, ISO 5349 and BS 6841 frequency weighting filters.

ISO 2631 Functions

filt2631	Process acceleration data with a specified frequency weighting filter
freq2631	Display a frequency weighting curve in the frequency domain
wbfcoef	Generate Wb frequency weighting coefficients
wbfilt	Process acceleration data with a Wb frequency weighting filter
wcfcoef	Generate Wc frequency weighting coefficients
wcfilt	Process acceleration data with a Wc frequency weighting filter
wdfcoef	Generate Wd frequency weighting coefficients
wdfilt	Process acceleration data with a Wd frequency weighting filter
wefcoef	Generate We frequency weighting coefficients
wefilt	Process acceleration data with a We frequency weighting filter
wffcoef	Generate Wf frequency weighting coefficients
wffilt	Process acceleration data with a Wf frequency weighting filter
wgfcoef	Generate Wg frequency weighting coefficients
wgfilt	Process acceleration data with a Wg frequency weighting filter
whfcoef	Generate Wh frequency weighting coefficients
whfilt	Process acceleration data with a Wh frequency weighting filter
wjfcoef	Generate Wj frequency weighting coefficients
wjfilt	Process acceleration data with a Wj frequency weighting filter
wkfcoef	Generate Wk frequency weighting coefficients
wkfilt	Process acceleration data with a Wk frequency weighting filter
wmfcoef	Generate Wm frequency weighting coefficients
wmfilt	Process acceleration data with a Wm frequency weighting filter