Version 1.12

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Legal

Dragon Vision™ is a product of Optical Vibration S de RL de CV. Please review the Dragon Vision terms and conditions and licensing agreement located at https://www.optical-vibration.com/terms-conditions/

By Installing or using Dragon Vision the user agrees to abide by the aforementioned terms and conditions and licensing agreement.

About

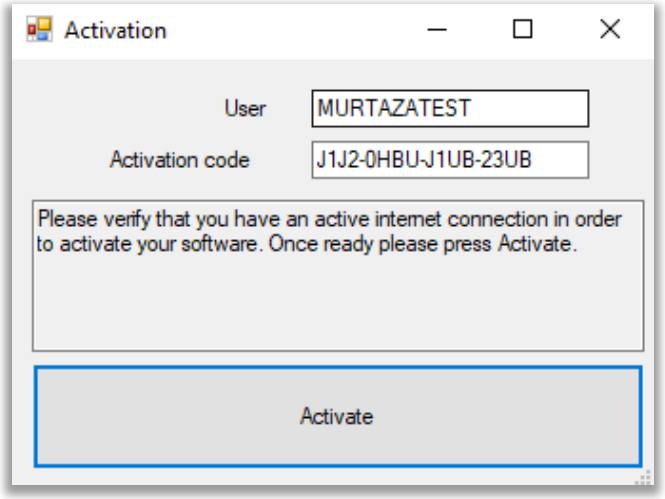
Dragon Vision™ Video Deflection Technology is Vibration Analysis software that tracks very small movements within ordinary video recordings. Through complex algorithms, Dragon Vision™ compares each one of the frames of the video, looking for microscopic movements of specific points. It subsequently converts the results into vibration signals. In fact, Dragon Vision™ can detect thousands of vibration points in a single video. Thus, making it an ideal tool for various types of vibration analysis that would otherwise take a long time to complete.

Getting Started

Dragon Vision is a software only application. Recordings analyzed within Dragon Vision can be taken with any video recording device available. The higher the resolution, the higher the frame rate, the better the results.

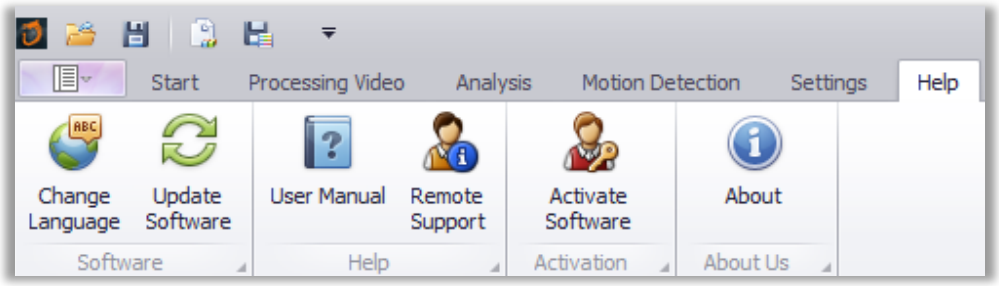
Installation

For Microsoft Windows, download and run the Installation File. Upon first use of the software you are prompted to activate your software. Enter the User ID and Activation Code provided to you when you purchased the software.



Main Menu

Help Menu



Change Language: Choose from several languages.

Update Software: Check to see if a newer version of Dragon Vision is available.If a newer version is available you will be invited to download/install.

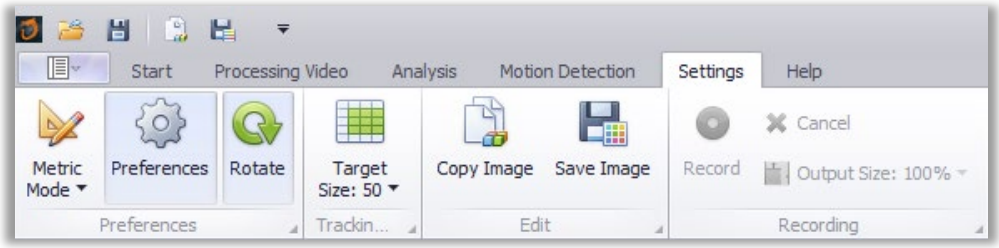
User Manual: Opens the User Manual in PDF format.

Remote Support: Will automatically download TeamViewer software to the computer.

Activate Software: View or Enter a UserID and Activation code.

About: Shows the currently installed software version and the Terms and Conditions of use.

Settings Menu



Imperial or Metric Mode: Click to toggle between modes.

Preferences: see *Processing Video* section below for details .

Rotate: Once a video is opened, the image can be rotated before processing.

Target Size: This is the size of a point to be tracked, in pixels. Larger targets do not result in better tracking. Smaller ones are more independent to show movement.

Copy Image: Copy any image in the video playback frame to the clipboard.

Save Image: Save any image in the video playback frame to a selected directory on the device.

Recording: See Start Menu below.

Recording Videos

Dragon Vision allows the user to import and analyze video from any source. Be sure to know the frame rate of the camera being used as it may be required to provide accurate analysis of the video within the software.

As an example, the iPhone 10 and above can record in slow motion mode at HD resolution with a sample/frame rate of 240 frames per second.

Similarly, other cameras now available can record much higher frame rates.

Camera mounts

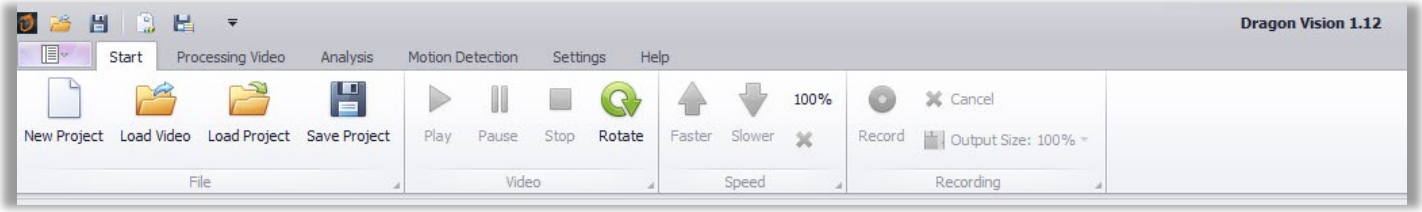
Use of a gimbel stabilizer (hand-held or tripod-mounted) is recommended to limit camera vibration, and improve results.

Understanding Maximum Frequency

Calculating fMax is important as the recorded frame rate directly corresponds to the maximum frequency.

Example: 240fps * 60 = 14400 / 2 = 7200rpm fMax (if the recording was taken using 240fps sample rate)

Start Menu



New Project: Once a video is loaded this option allows the user to create a new project for analysis without having to close any preexisting work. This allows the user to have a number of different projects using the same video without having to reload the video or restart the software.

Load Video: Allows the user to load any video file supported by Dragon Vision, which includes most common video file formats.

Load Project: Load a previously completed project.

Save Project: Saves a project into the desired folder on the computer.

The following controls apply to the video file (processed or unprocessed) in the video playback frame:

Play: Plays the loaded video file.

Pause: Pauses the loaded video file.

Stop: Stops the video file.

Rotate: Allows the user to rotate the video within the software. This is often helpful if a video being imported is not oriented as the user would like.

Faster: Speeds up the playback of the loaded video file.

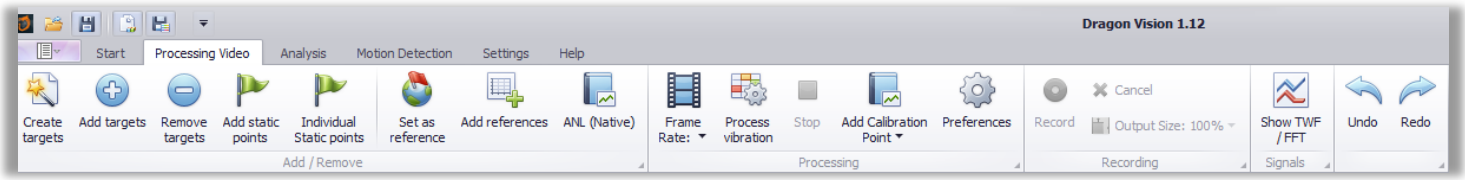
Slower: Slows down the playback of the loaded video file.

Record: Used to save a recording of any phase or motion detection animation within the Video Playback Frame.

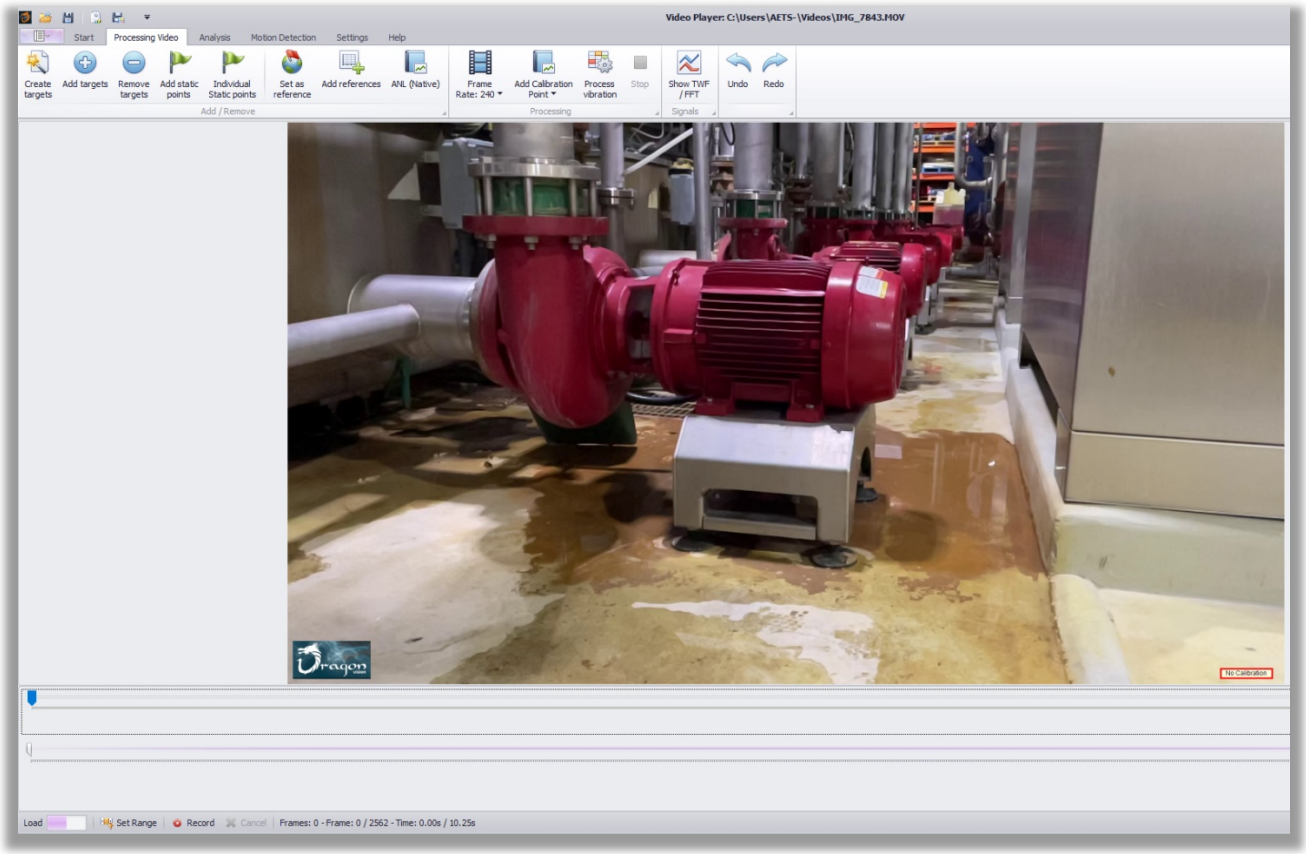
Cancel: Stop recording.

Output Size: Adjust scale as desired.

Processing Video

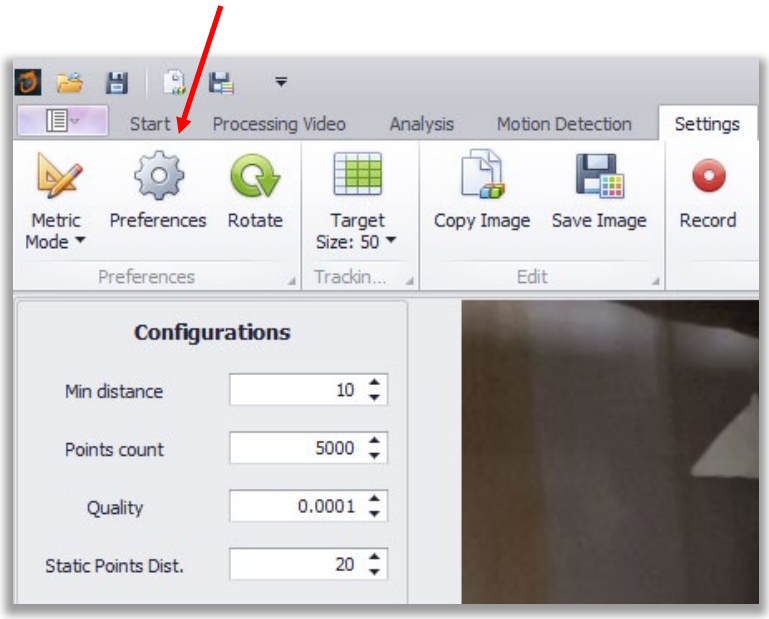


Click **Load Video** on the Start menu. Upon loading a video to Dragon Vision for analysis, the first frame will be displayed in the Video Playback area.



The first step in processing the video is to review the **Settings** to ensure they are appropriate for the Dragon Vision project, based on the intended analysis method and desired results.

Click on the **Settings** Tab of the Main menu and select **Preferences**. Another link to Preferences is provided in the Processing Video menu.



Min Distance: Is the minimum distance between targets (pixels).

Points Count: Is the maximum number of points the target identification algorithm will attempt to identify. Increase this number to obtain more points on the objective area of the video.

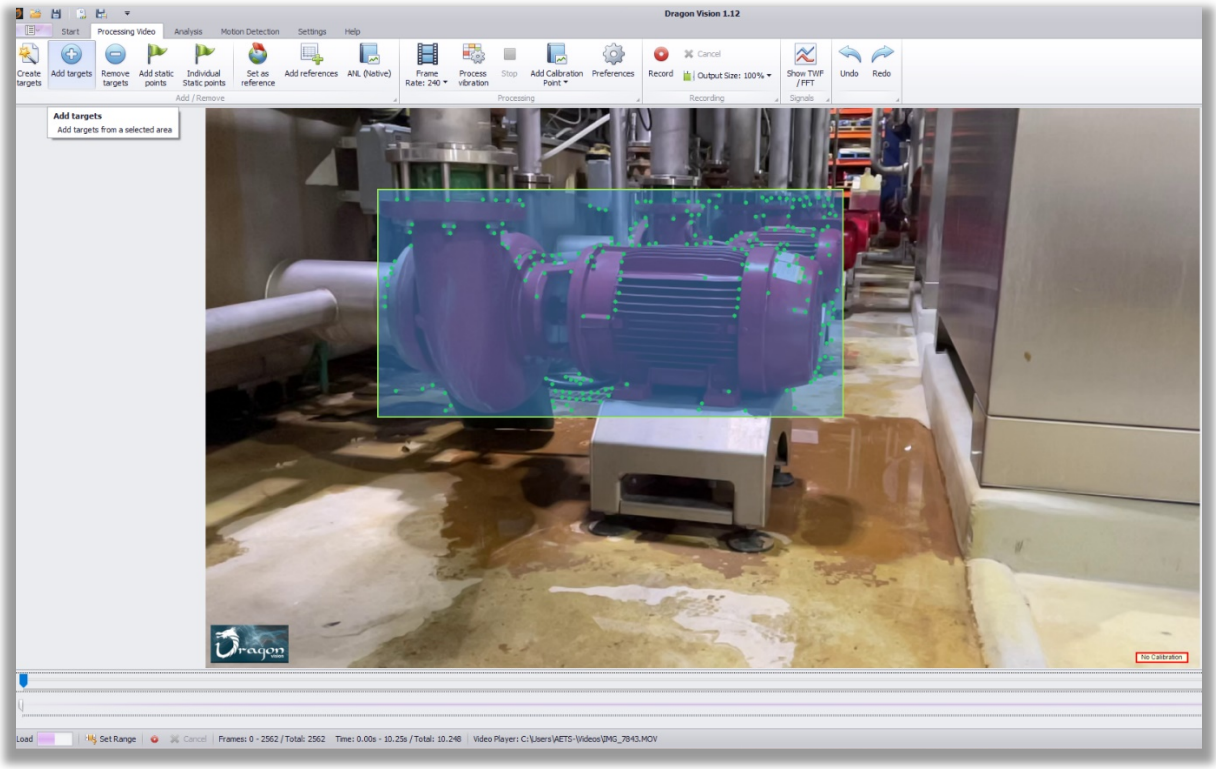
Quality: This is the resolution, the more decimal points(the smaller the number), the higher the analysis.

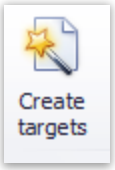
Static Points Dist.: Is the minimum distance between static points the algorithm will identify. Decrease this to increase the density of points.

Once the appropriate settings have been selected, click **Close** to save and begin the project.

Step 1: Add Targets

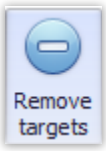
Dragon Vision uses a proprietary algorithm to identify targets with the selected starting frame, based on changes in angle and color. Targets may be identified based upon the entire frame within the Video Playback Frame or within a selected area within the frame based upon left clicking and drawing a box with the mouse and then selecting **Add targets.** Think of targets as each being a bi-axial sensor, moving in the X and Y axis.





Will add targets to the entire image.

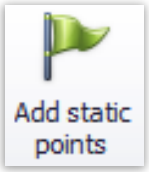
Adds targets only in the selected area.



Erases one or more targets from a selected area. You can also simply highlight any target and press the Delete button.

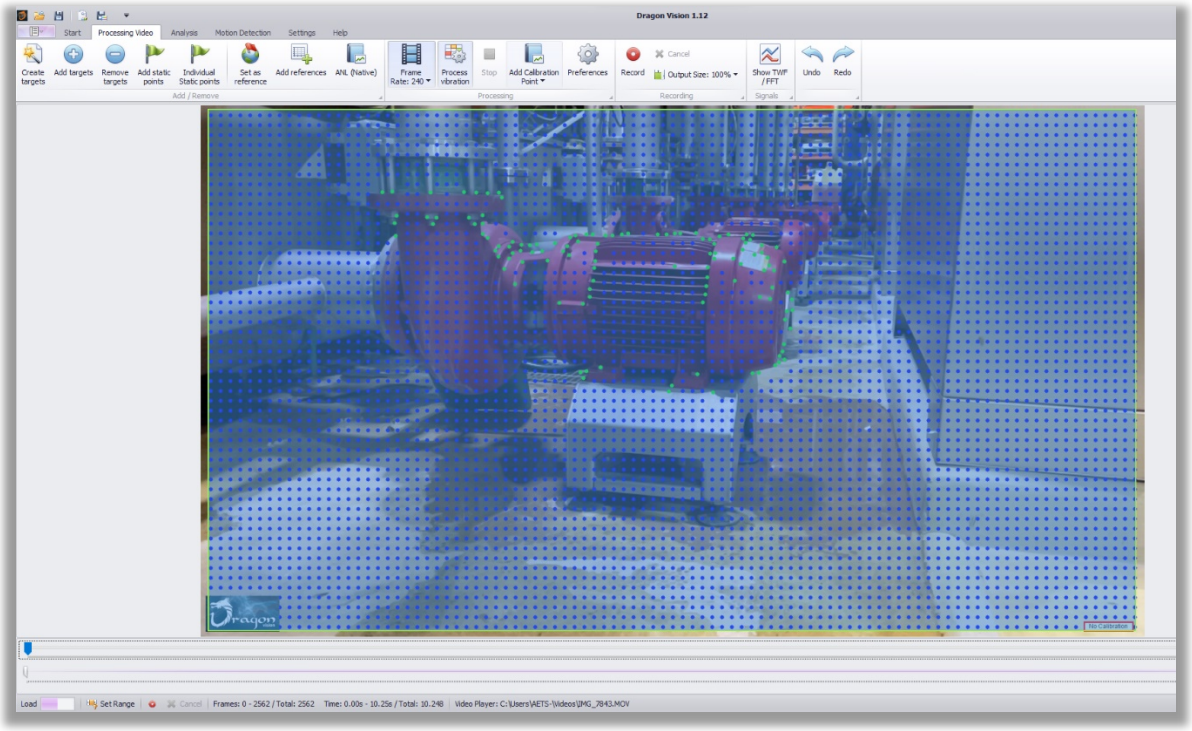
Step 2: Adding Static Points

Start by left clicking and drawing a box within the Video Playback Frame areas in where you want to add static points (areas that are not of interest for movement) and select **Add static points.**



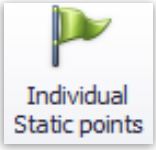
Note - You can select the entire image, and only those areas not populated with target points will be assigned static points.

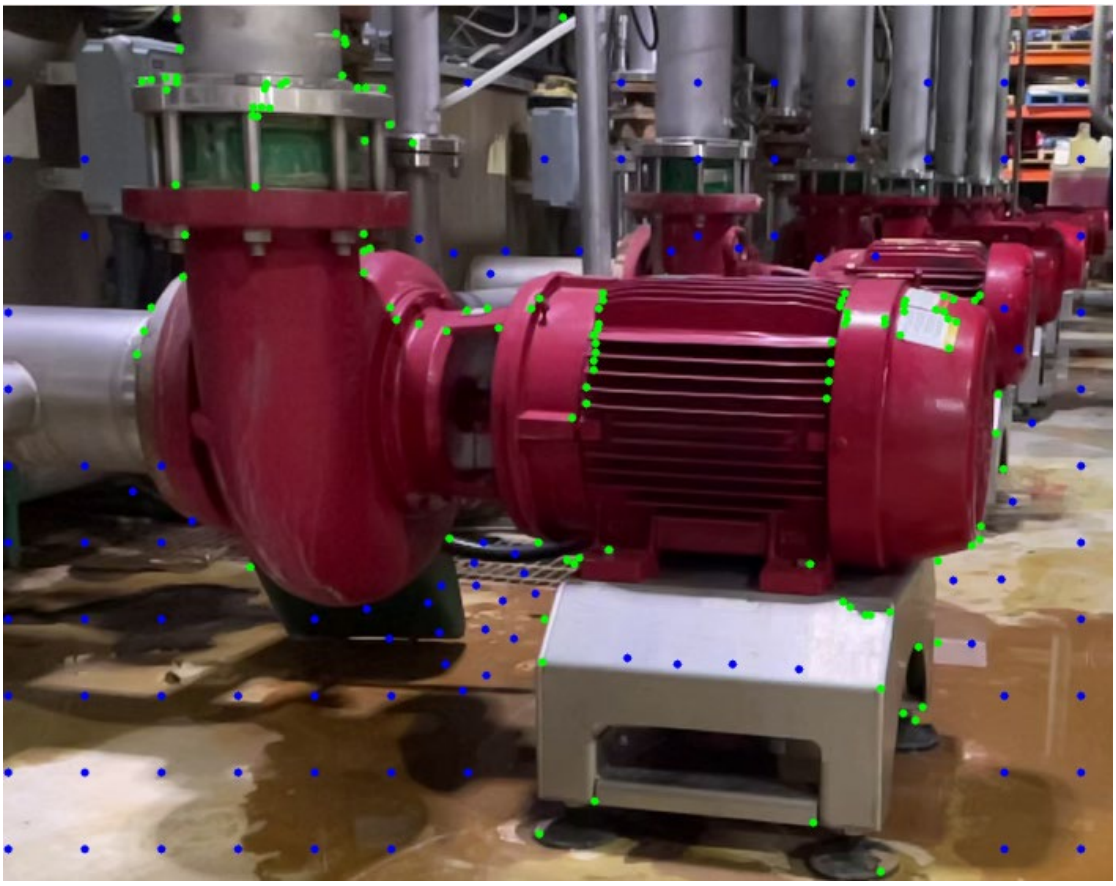
Static points are colored blue.

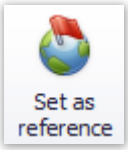


Note: Any static or target points may be deleted by simply left clicking and highlighting the area and pressing the delete key.

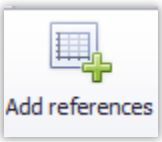
Once the majority of static points have been identified, it is possible to further refine the static area by selecting **Individual Static points** and left click within the video playback frame to add points where desired In the example below, individual static points were added on the stand and below the coupling.







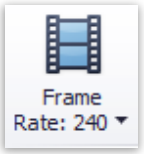
Set Reference: Used to select a target or series of targets to set as a reference. The selected target(s) average movement will be subtracted from the rest of the unselected targets to calculate the difference in vibration. This is optional, but useful in a case where the camera was subject to vibration when recording. Reference points are shown in red in the Video Playback Frame.

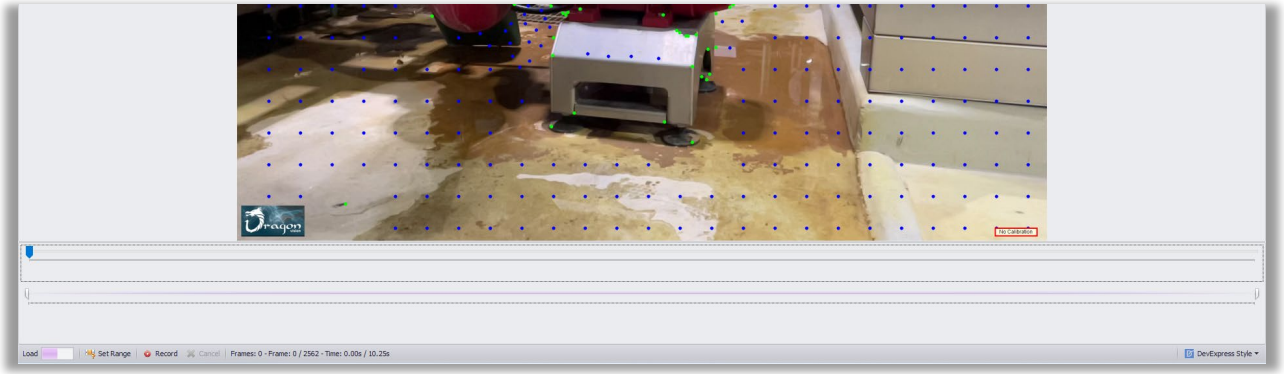


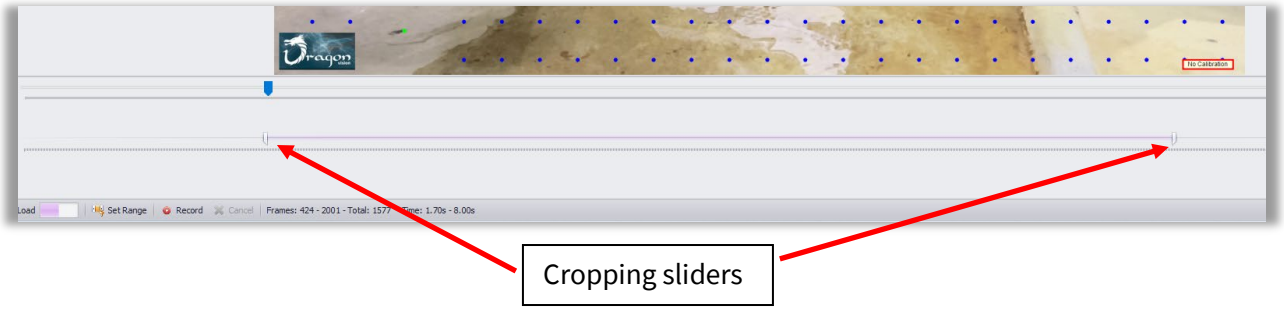
Add References: Additional Reference targets can be identified to track and then will be subtracted from filtered targets from normal targets to filter camera movements.

Step 3: Analysis

1. The frame rate of the video loaded will be detected automatically (see note below). Check the Frame Rate button selector to ensure it is set correctly.
2. **Note:** It is recommended to crop the length of a video to 10 seconds or less to reduce processing time. Only a few seconds of video are required to use Dragon Vision. Adjust the starting and ending point of the video for analysis, use the cropping sliders in the footer of the program.





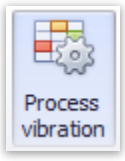


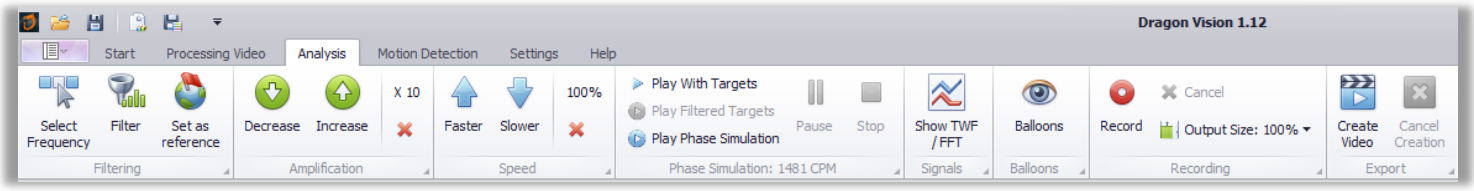
Note – Many phone cameras will begin a slow-motion recording at 30fps for a few frames then switch to 240 fps.

By using the cropping sliders, these frames are removed from processing.

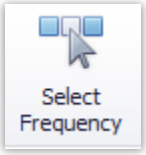
Dragon Vision may not be able to parse the fps metadata from the video file automatically. If the frame rate shown is not accurate, set it manually to the fps at which the video was actually recorded.

3. Once the frame rate and start/stop position of the video to be analyzed has been set, select **Process vibration.** Dragon Vision will indicate the processing progress in the bottom left footer menu.

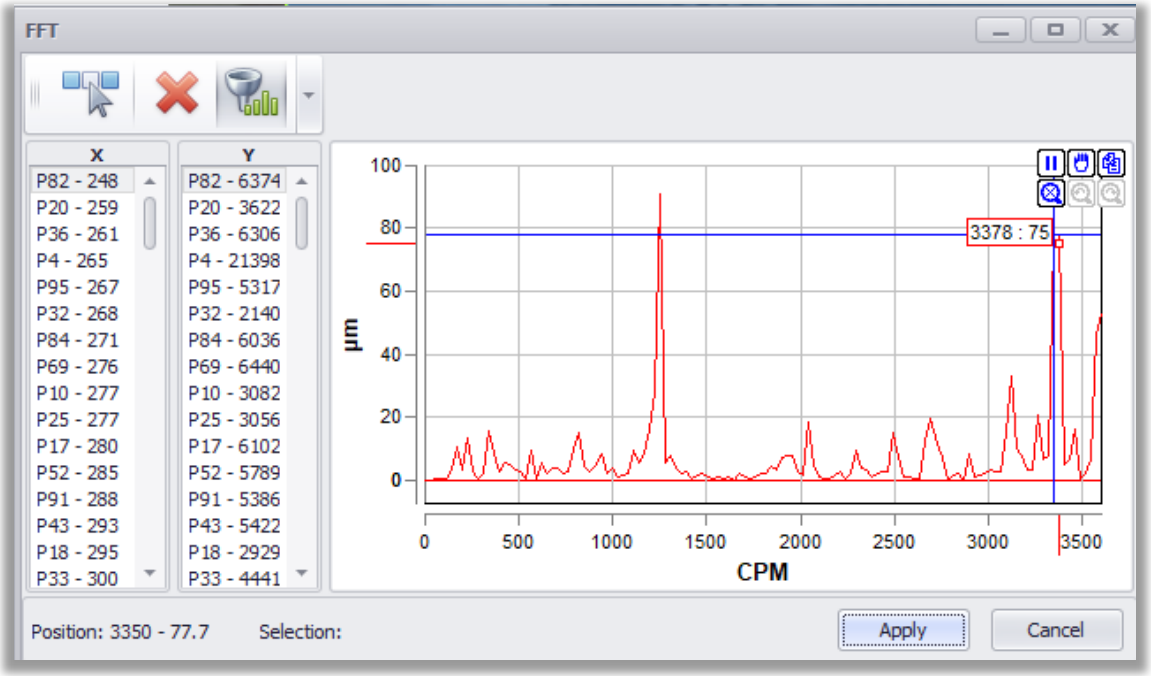




4. Upon successful completion of processing, click the **Analysis** Tab on the Main menu, then the **Select Frequency** button. A pop-up window will appear and the user will be prompted to review all targets and their applicable x/y FFT plots. Select the dominant peak of interest by left clicking within the plot and then selecting **Apply.**

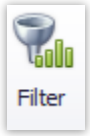


Note: A blue crosshair target will be shown in the Video Playback Frame to indicate which target is currently being selected in the FFT window. Click on any point listed in the left panel under X and Y axes to see the associated FFT.



Anti-Aliasing Filter

Dragon Vision™ incorporates an anti-aliasing filter developed by Optical Vibration that uses cross-channel comparison. In this way, nonexistent frequencies produced by the Aliasing phenomenon due to the low sampling rate of video cameras are eliminated from the FFT.



For more information on the “Aliasing” effect, visit: https://en.wikipedia.org/wiki/Aliasing

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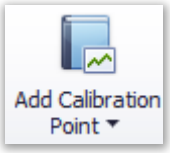
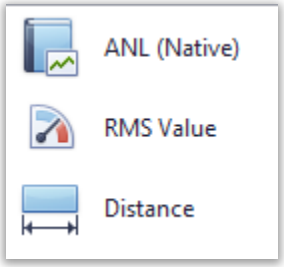
Step 4: Calibration

Dragon Vision allows the user to select from 3 different calibration methods.





ANL Method

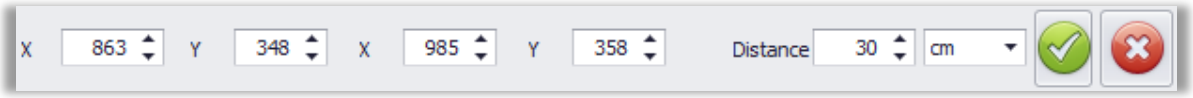
While taking the video recording the user can record a vibration signal using any ERBESSD INSTRUMENTS data collector (WiSER 3x or Phantom) and either DigivibeMX software or the WiSER Vibe pro App. This recording is saved on the recording device as an .ANL file. Select or highlight an area within the Video Playback Frame to identify where the sensor was placed when collecting the ANL file. The ANL file is then imported into Dragon Vision and used as a full FFT calibration (the most accurate calibration method). Since video is 2D, the sensor can be oriented in any direction as long as one axis is oriented vertically, and the other is oriented horizontally. The software then applies the frequency and amplitudes of the respective FFT's and applies that data as a back-to-back NIST and ISO17025 compliant calibration method. When placing the vibration sensor on the object, ensure it is oriented as close to vertical or horizontal as possible.

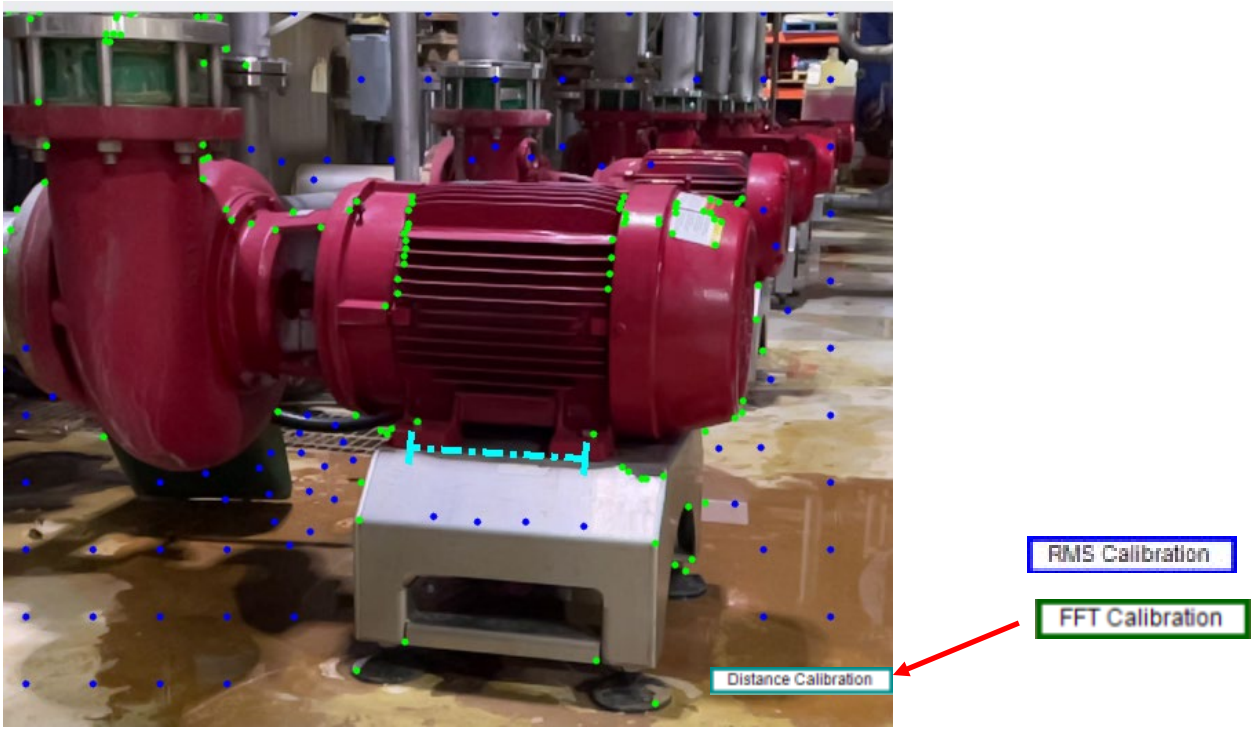
RMS Value

This method allows selecting an area within the Video Playback Frame using the mouse to identify a location where the user placed another vibration sensor during the video recording and subsequently enter x/y displacement values. This method does not take frequency into consideration for calibration purposes and thus is not as accurate as the ANL method.

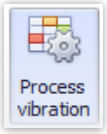
Distance

Allows the user to identify a known distance between any two points within the Video Playback Frame. A toolbar opens at the top of the screen to input the distance.





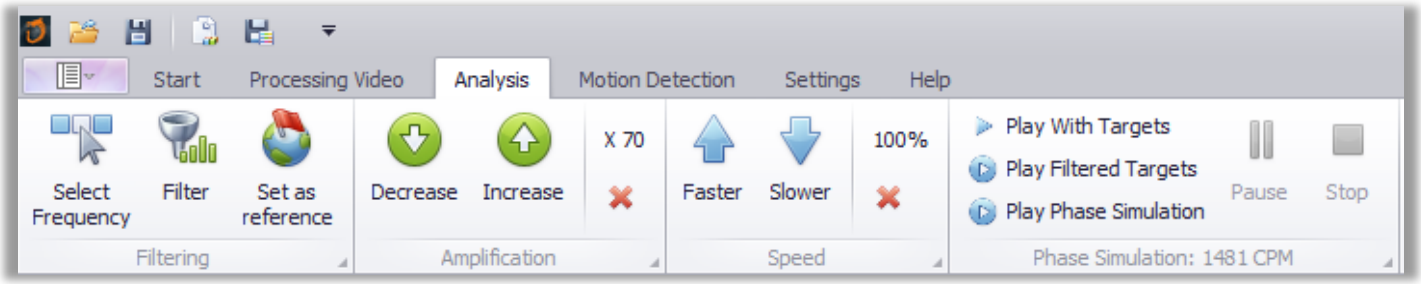
Click a point in the video playback frame and drag the cursor to identify a known distance. In the example above, the distance between motor mount bolts is 30 cm.

Once set, it is recommended to return to the **Processing Video** menu and press 

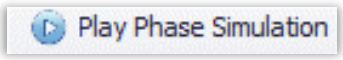
to re-process using the distance information.

NOTE: the calibration method selected and completed can be changed at any time and will be displayed in the bottom right of the Dragon Vision Video Playback Frame.

Step 5: Phase Simulation

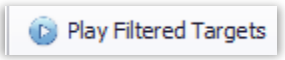


To visualize the target behavior throughout the processed Video Frames select **Play Phase Simulation.** This tool allows the user to quickly observe target movement. Press **Stop** or **Pause** at any time.

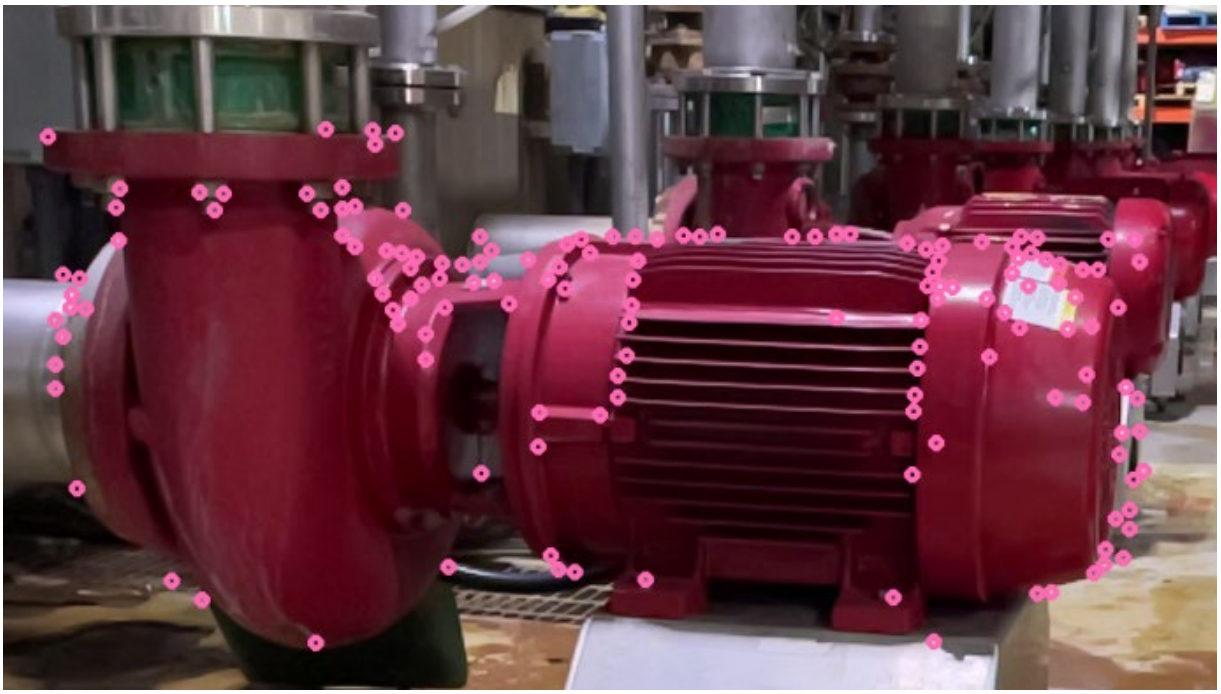


Note: Increase Amplification and Speed as needed to achieve the desired results.

It may be necessary to amplify by 100 x or more to see the simulation clearly, depending on the resolution of the source video.

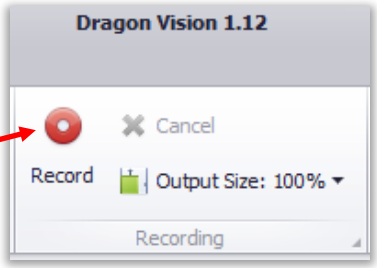


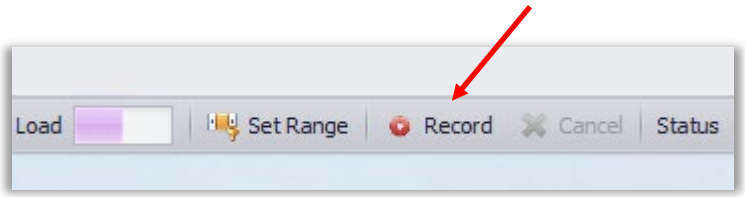
Press **Play Filtered Targets** to play only the targets with the filter applied. They are shown in red on the Video Playback Frame.



Exporting Animations from within the Video Playback Frame:

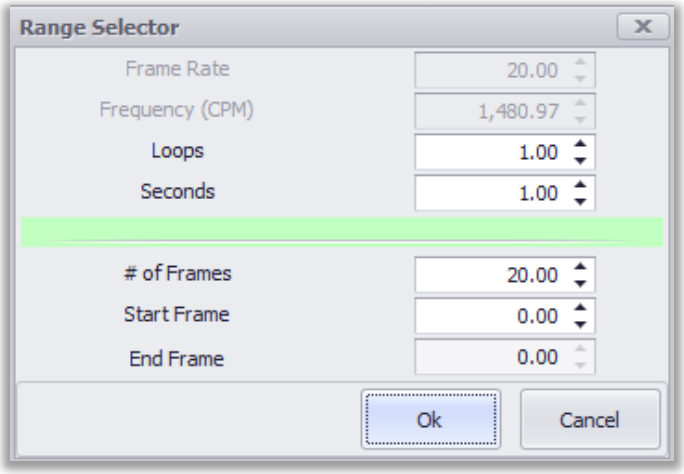
To save a recording of any **phase** or **motion detection** animation within the Video Playback Frame, select **Record** from either the footer or the **Analysis** menu and follow the corresponding instructional window to create an animated .gif file.

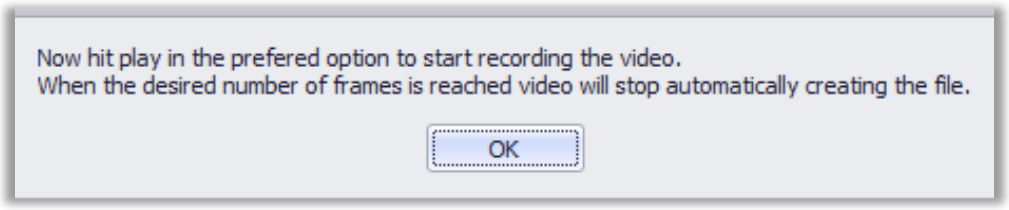




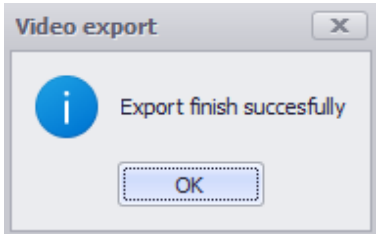
The **Range Selector** will open to set the length of the GIF based on time or number of frames. Click **OK**.

Then click **OK** again and press the Play button.



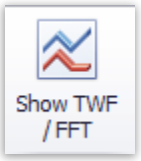


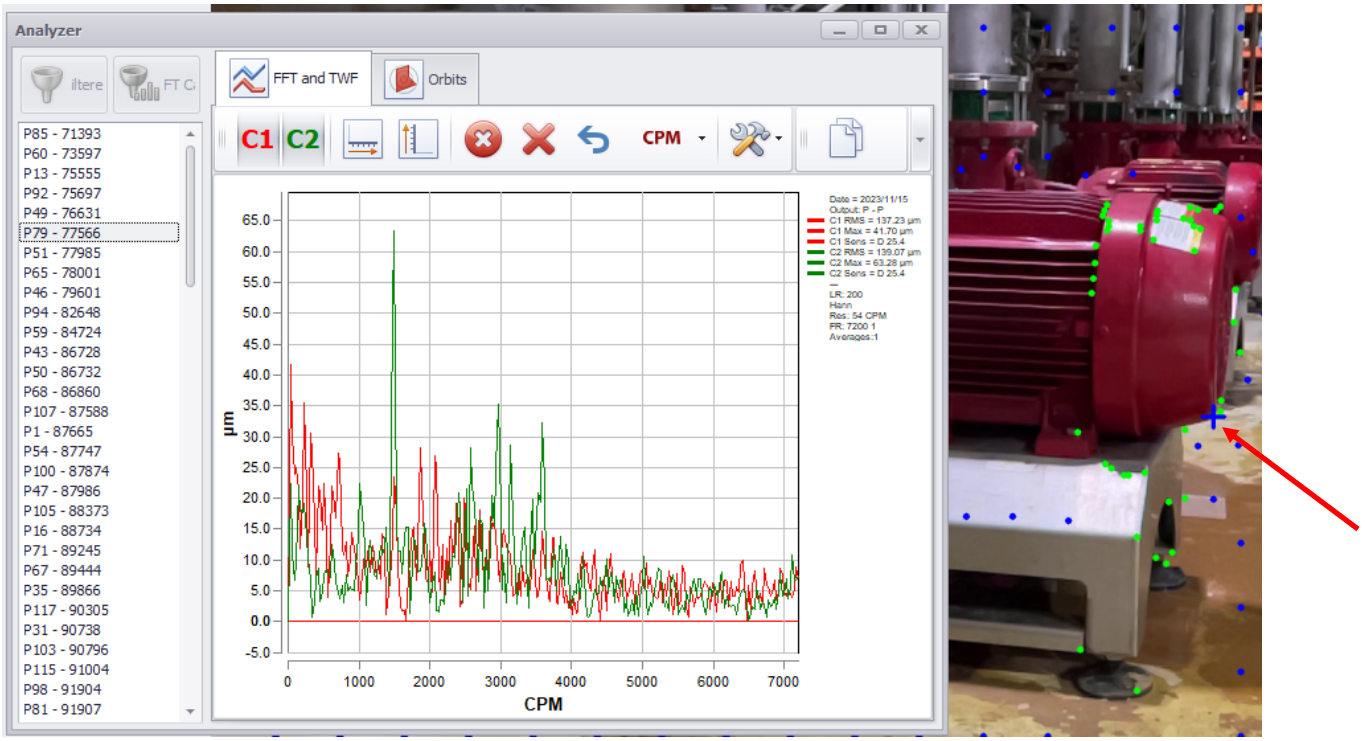
A **success** message is flashed upon completion of the video export.



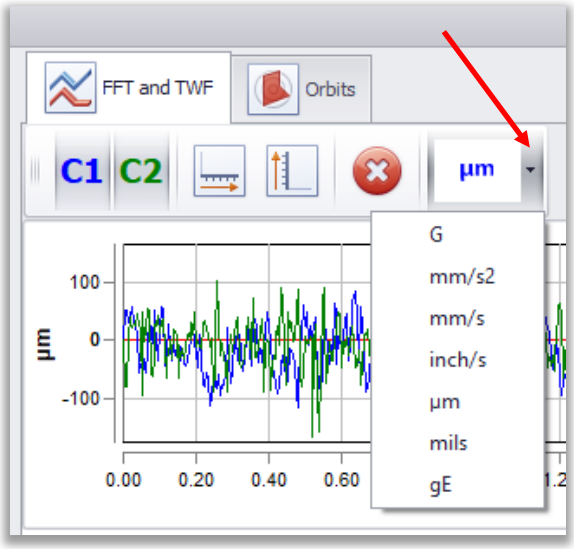
Step 6: Target Waveform & FFT Analysis

NOTE: The user may at any time select the **Show TWF/FFT** button at any time to review either all targets or a user selected target for analysis. Similar to the **Select Frequency** function during the initial processing, any targets selected in the **Analyzer** menu will display as a blue crosshair in the Video Playback Frame.





Channel 1 represents the X axis for each target, and Channel 2 represents the Y axis. In **Analysis** mode, the time waveform or FFT can be independently analyzed. Frequency can be displayed in CPM, Hz, or Orders.The units of measurement available during the analysis mode are selected from the drop-down box:

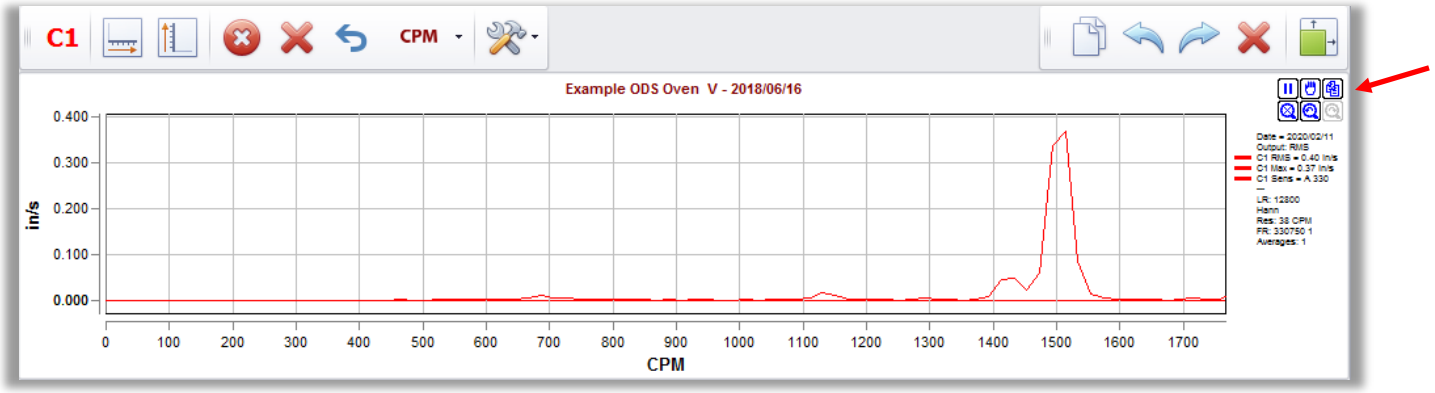


Selecting & Zooming

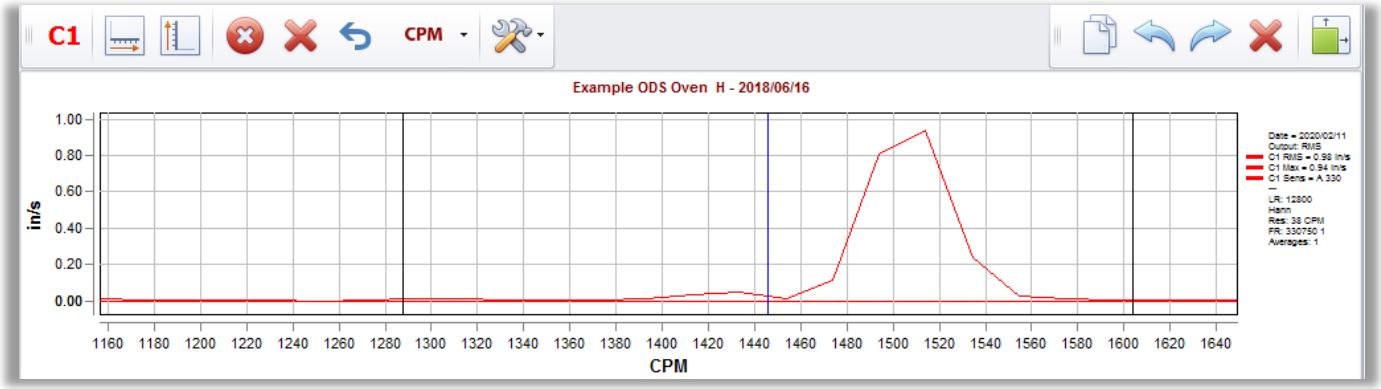
Magnifying a desired section of waveform or spectrum can be accomplished in a variety of ways. To select a section of the waveform or FFT for closer inspection, press and hold the left mouse button then slide it along the graph over the desired section to magnify. When the left mouse button is released, the selected section will be magnified.

- To increase/decrease zoom on only one axis, place the mouse pointer over the axis scale and roll the mouse scroll wheel.
- To move the graph view while zoomed, place the mouse pointer over the desired axis scale. Press and hold the left mouse button, then drag the axis scale up/down or left/right

Floating zoom control buttons also appear automatically when the mouse pointer is positioned over an axis.



NOTE: Zooming in on any section of the Time Waveform automatically re-renders the FFT, which will appear to be at lower resolution than the FFT of the entire waveform.



Time Waveform/FFT Graph tools

A number of panel control buttons are located above each waveform/spectrum graph.

C1 Click to hide/display channels (more channels may appear if multiple channels are recorded or opened for analysis)

 Vertical measurement cursors

 Horizontal measurement cursors

 Remove cursors

 Clear all markers from graph

 Clear last marker from graph

 Changes the graph units between CPM, Hz and Orders

 Analysis tools

 Copy graph to paste into a document

Undo zoom

Reset zoom

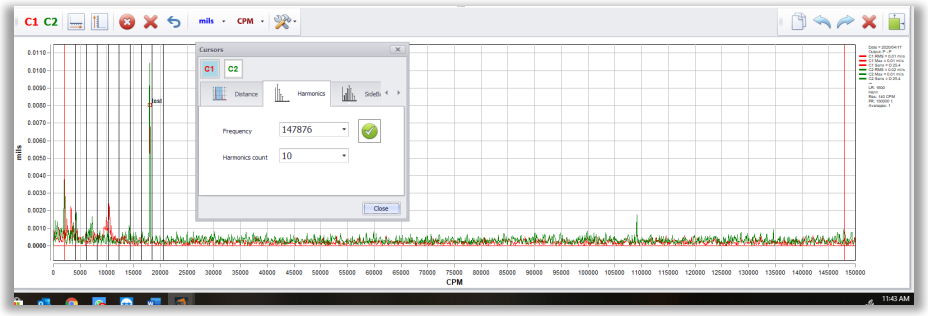
Clear zoom

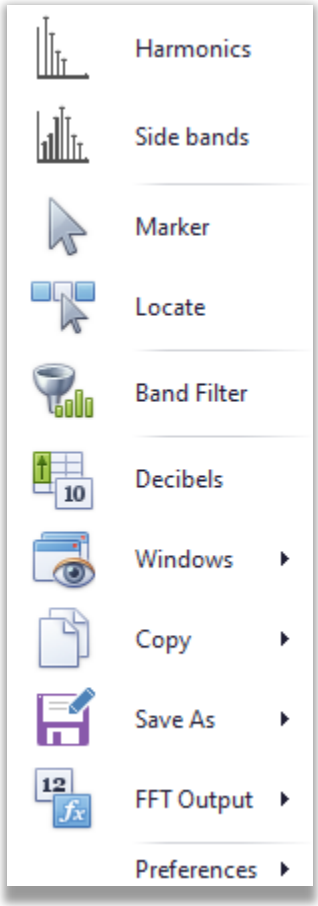
Expand / collapse panel

Analysis Tools

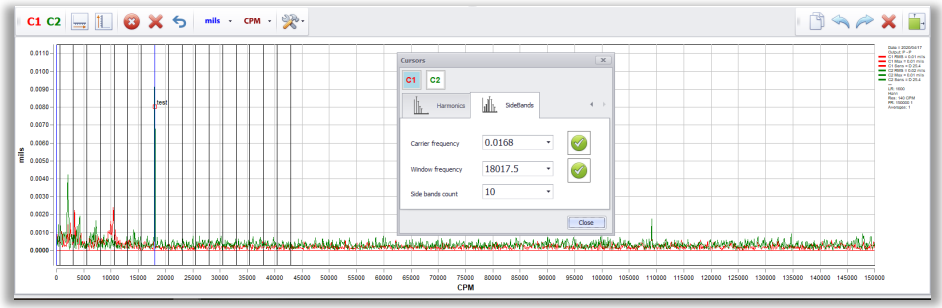
Any recording opened for analysis can be re-rendered immediately to suit user preferences. The Analysis Tools menu contains essential functions for analyzing collected vibration data:

Harmonics: Allows user to select a frequency and plot harmonics of that frequency.

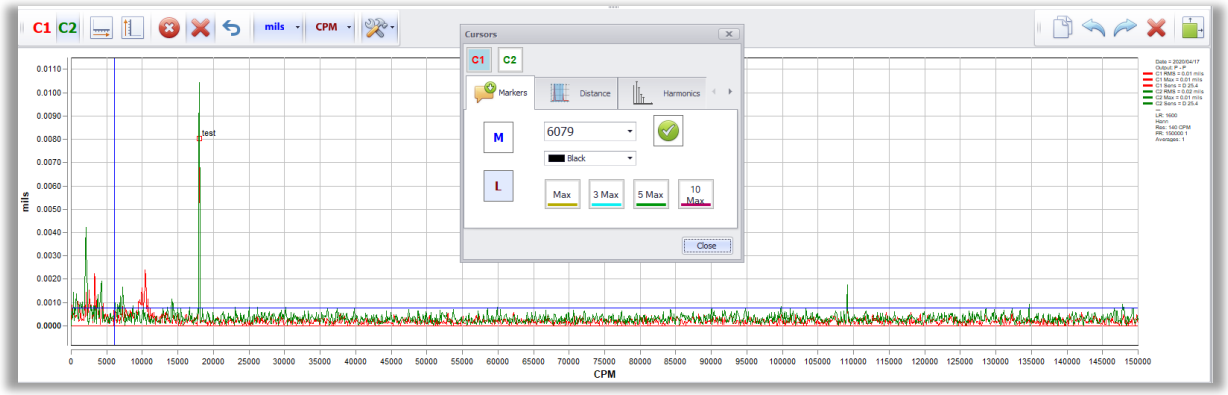




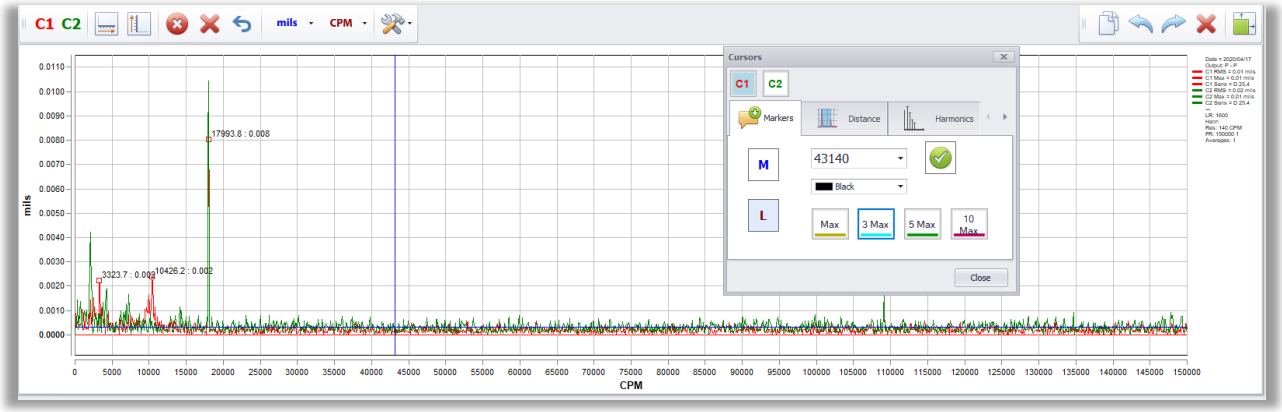
Sidebands: Allows the user to select a frequency and plot sidebands of that frequency.



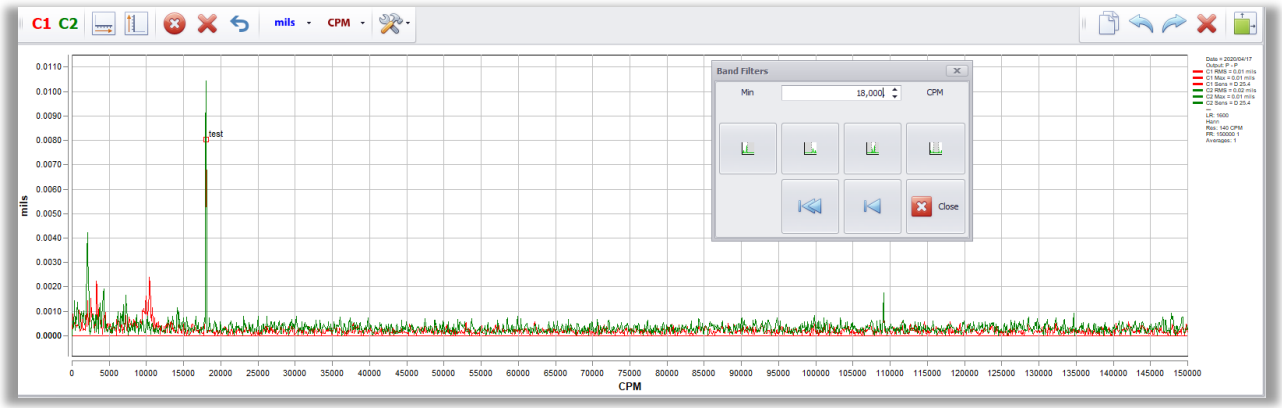
Marker: Allows user to add simple text markers to any point within the graph.



Locate: Allows user to identify Max, Max 3, Max 5 and Max 10 peaks within an FFT



Band Filters: Allows user to apply low pass, band pass, high pass, and band reject filter methods



Decibels: Converts FFT units to Decibels.

Windows:Hanning is the default windowing view for FFT spectra. Other options include: Rect, Bartlett, Blackman, Hamming, Kaiser, CosSum and FlatTop.

Copy: Allows user to copy FFT or Waveform to clipboard as an image.

Save as: Save the current view as FFT or TWF.

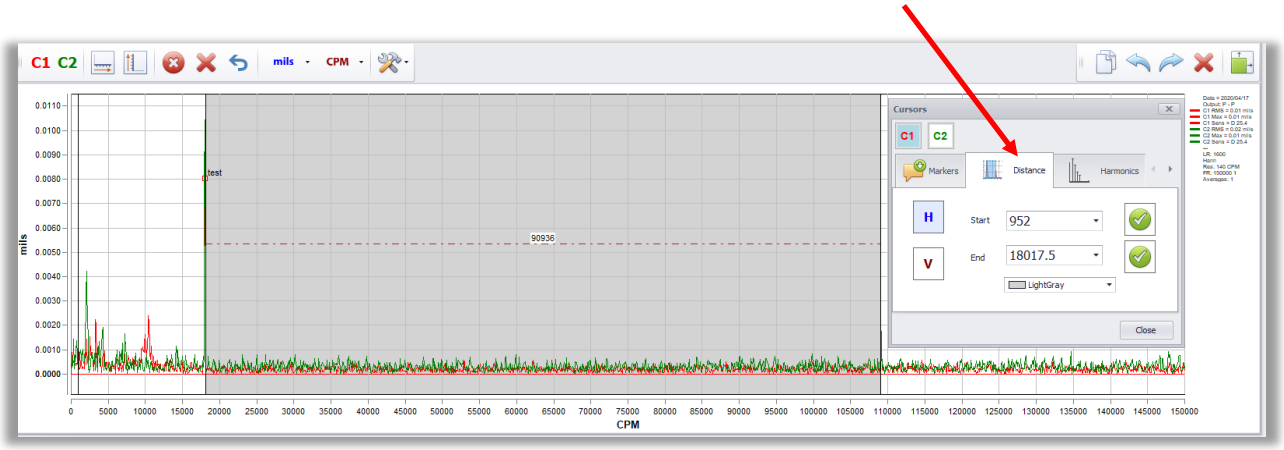
FFT Output: Allows user to select 0-P, P-P, RMS, and Default for FFT view option.

Preferences:

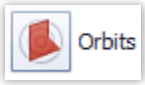
Tie/Untie scopes: When tied, the TWF and FFT amplitude units will be tied together in a common specified unit. When untied, the TWF and FFT amplitude units can be specified independently.

Low Frequency Attenuation: Applies Low frequency attenuation of the signal below 11Hz.

Distance: Allows user to determine the distance between two markers.

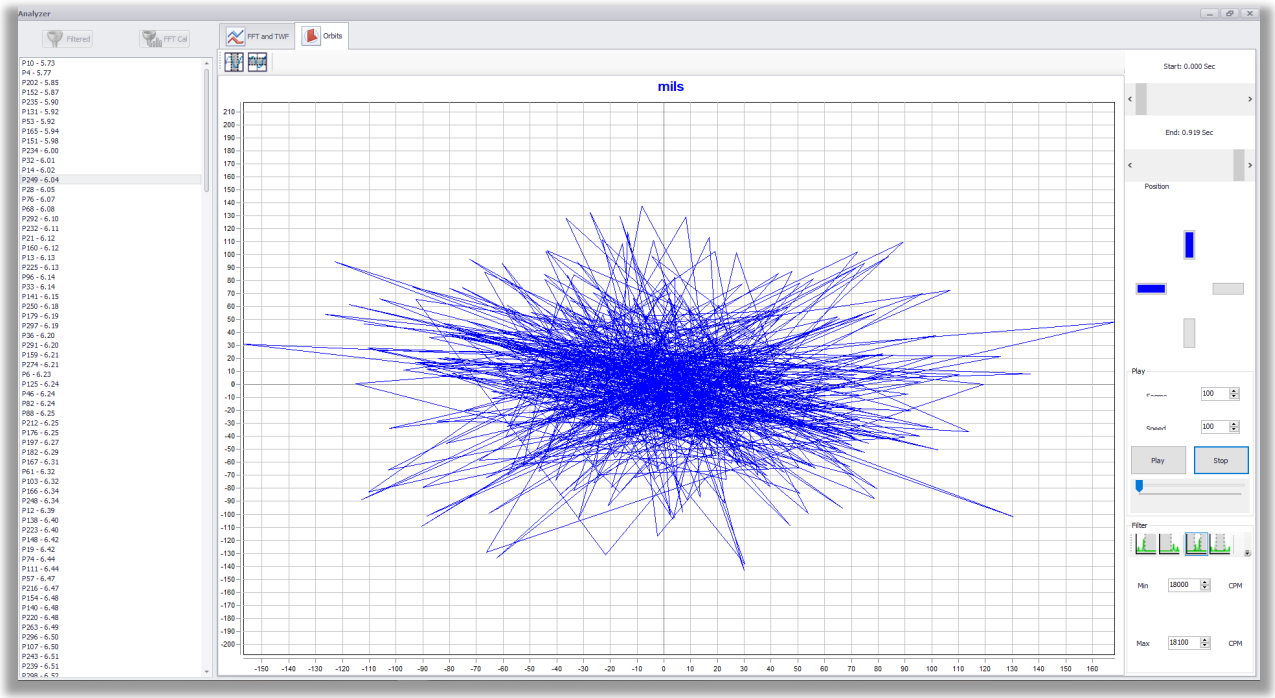


Orbits: Displays a static or dynamic graph representing the end travel of a rotating shaft.



NOTE: Orbit Analysis requires simultaneous data collection in the vertical and horizontal planes which each target represents within Dragon Vision.

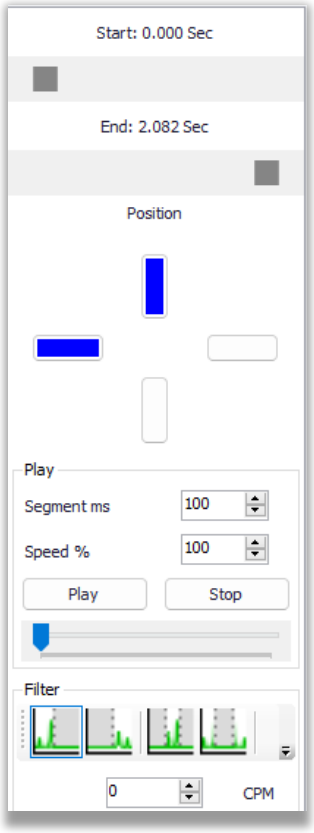
Create an orbit plot from the data by clicking on the Orbit button located in the AnalyzerMenu toolbar.



In the orbit view, the duration of the drawing can be adjusted in milliseconds. The rendering speed of the graph can be adjusted by percentage. It is also possible to zoom in to fit an appropriate size. The image can be copied from Dragon Vision with the right mouse button and pasted elsewhere as a still image.

Observe the dynamic graph in video format by clicking the Play button. Playback can be paused and restarted at any point. A slider bar under the Pause and Stop buttons can be used to manually scroll through the entire Orbit plot.

Below the configuration settings on the right-hand side are Filter tools that can be used to filter Low Pass, Pass Band, Pass High and Block Band to improve the graphical interface.



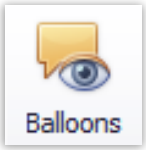
Saving Data for Export & Analysis

There are four toolbar button options for exporting data:

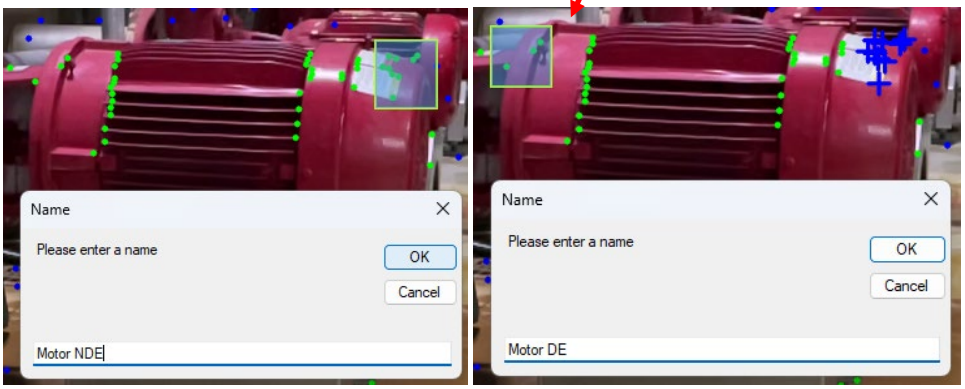
- ANL - save the applicable data as an .ANL file for further analysis in DigivibeMX software from Erbessd Instruments.
- ASCii - save the applicable data as an ASCii file.
- UFF58 - save the applicable data in Universal File Format (UFF58).
- CSV - save the applicable data as a Comma Separated Value (CSV) file (compatible with spreadsheets)

Phase Visualization – Phase Balloons

This feature allows the selection of points within the Video Playback Frame, used to complete comparative phase analysis of any processed targets.



1. Click on **Balloons**. The Balloons Panel will open.
2. Select targets of interest by highlighting them.
3. Press **Plus**.

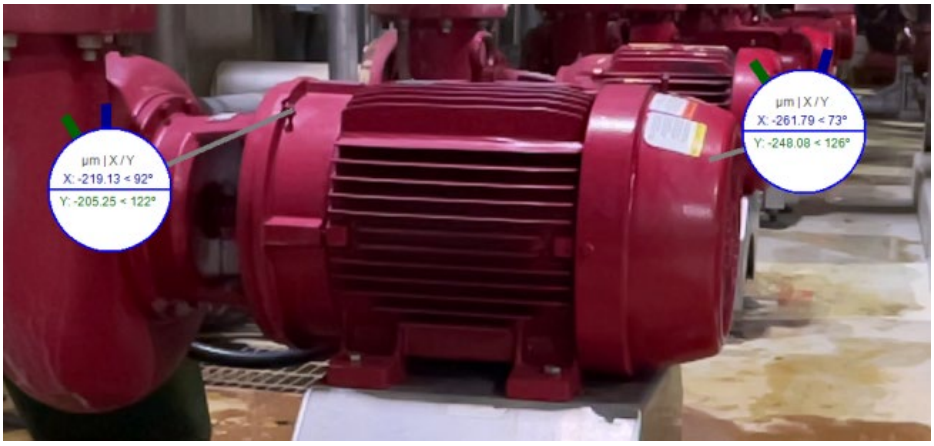


4. Enter a name to identify the points 
5. Select **View** to view and compare **phase balloons.** 

Balloons can be dragged anywhere within the Video Playback Frame as desired.

Increase/decrease the font size.

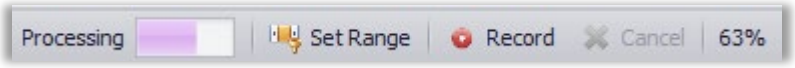
Note: Balloons can be toggled on and off by selecting either the **Balloons** or **View** buttons.



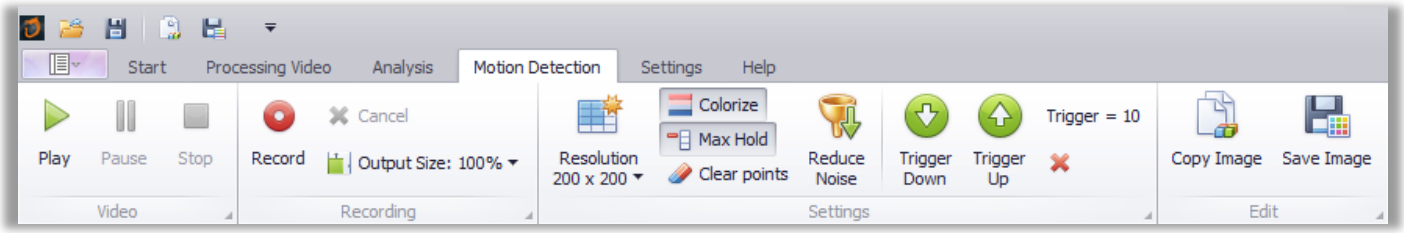
Step 7: Create Video Deflection Model

After processing, the **create video** button on the **Analysis** menu can be used to create an animated Video Deflection Model based upon the **Amplification** and **Speed** settings.

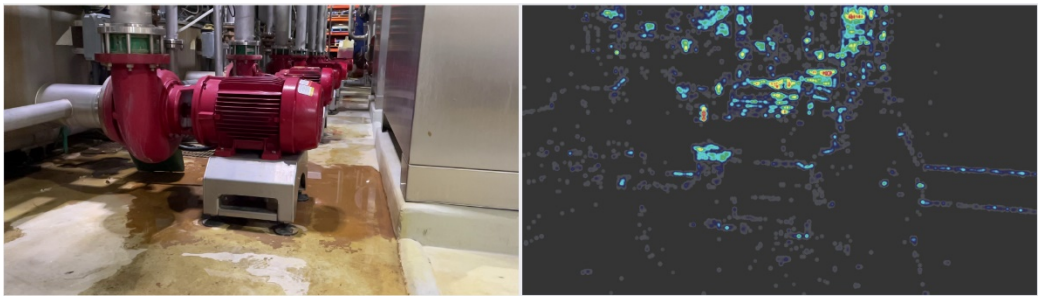
Note: The model created will be saved to a directory, based upon user settings, as an animated .gif file. Model completion status will be displayed in the bottom left of the screen.



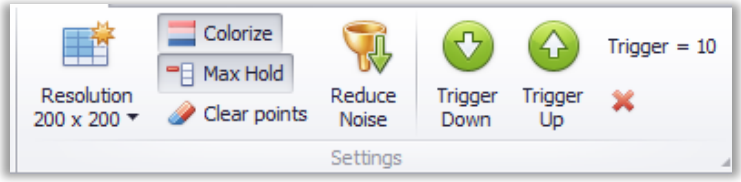
Step 8: Motion Detection Menu



The **Motion Detection** menu allows visual comparison of the source video and a Colorized or Grayscale animated model that shows the values of displacement for each **target** in a side by side comparison with the source video. Press



Motion Detection Model Settings



The **Video** and **Recording** sections of the Motion Detection Menu are identical to those on the Start Menu.

Resolution: Select the output resolution of the model

Colorize: Choose either a color or grayscale output model.

Max Hold: shows the maximum value within each target.

Clear Points: Sets the entire matrix of targets to 0.

Reduce Noise: reduces signal interference not related to target activity.

Trigger Up/Down: Increases or reduces the level of displacement required to visualize movement.