

# Using the Fixed Length Perspective Calculator in ProAnalyst®

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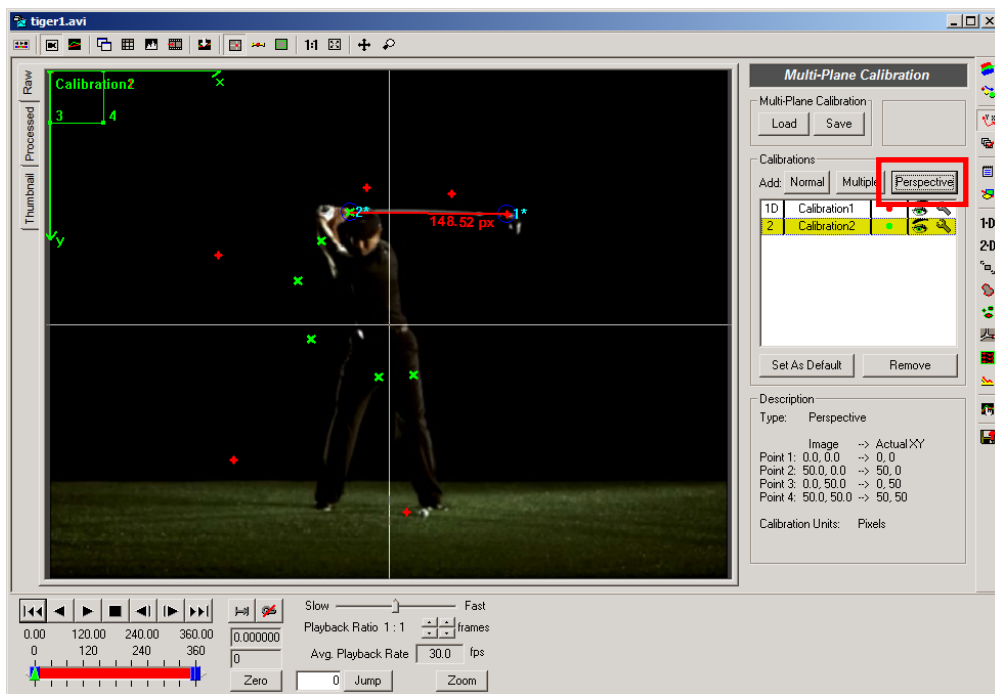
## Abstract

The Fixed Length Perspective Calculator is a ProAnalyst tool that calculates a 2-D perspective calibration that minimizes the variation of the distance between two tracked targets across multiple frames in a video. This tool can be useful for golf, baseball, or any application where a known-length object is moving in a flat plane. For example, once the calibration is completed, users can measure angular velocity of the object in the plane or velocity of various points on the object.


## Using the Calculator

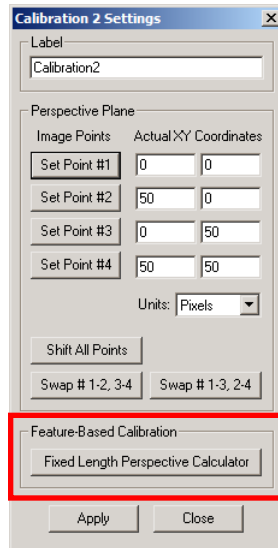
ProAnalyst opens new videos with a single Normal calibration. To use the Fixed Length Perspective Calculator, you must add a Perspective calibration.

Click **Perspective** to add a Perspective calibration.



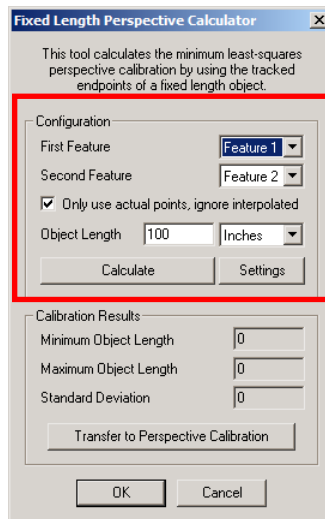
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Click the **wrench**  icon for the Perspective calibration that was just added to bring up the Settings dialog window.



Click **Fixed Length Perspective Calculator** to bring up the calculator dialog window.

The calculator requires that Feature Tracking be enabled. At least two features must be tracked within Feature Tracking. These two features must be located in at least 3 frames of video. These features can be manually tracked or automatically tracked. The features can also be actual tracked points or interpolated tracked points. The features should mark the two end points of an object of known length that moves in a single plane of motion.

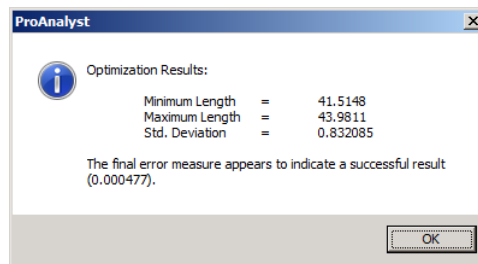


To use the Fixed Length Perspective Calculator:

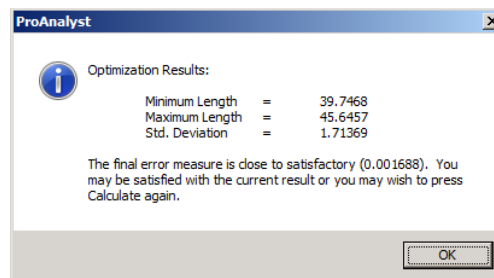
1. Select the feature number for the first and second features that were tracked using Feature Tracking.
2. Check the **Only use actual points, ignore interpolated** box if you wish to only use actual tracked points. Uncheck the box if you wish to also use interpolated tracked points.
3. Enter the length of the object and select the proper units.
4. Click **Calculate**.

### Interpreting the Optimization Results

ProAnalyst will attempt to find the Perspective calibration that minimizes the variation of the length of the object. Upon completion, a results window will be shown.

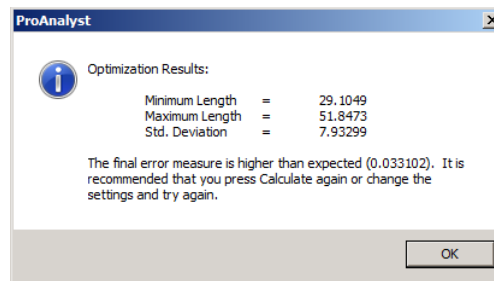


The minimum length, maximum length, and standard deviation over all the pairs of tracked points are reported. If the final error measure is less than 0.001, the result is typically excellent for mapping a fixed plane to the motion of the object. If the final error measure is less than 0.002, the result may be satisfactory for most applications, or you may be able to obtain better results by calculating again.



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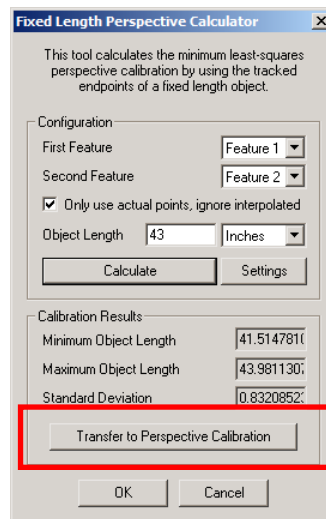
If the final error measure is greater than 0.002, the tracked points may not actually lie on a plane.



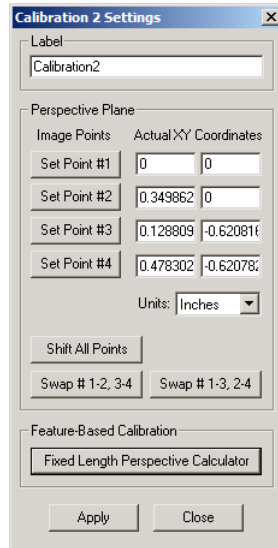
If your final error is in excess of .002, we suggest that you try recalculating the result. The Fixed Length Perspective Calculator will automatically use a different set of initial conditions on subsequent clicks to optimize the plane of motion. To recalculate using a different set of initial conditions, simply click **Calculate** again. The optimization settings should not need to be changed during normal usage. However, if you wish to experiment with different optimization settings, click **Settings** to expose some parameters used during optimization.

### Applying the Results

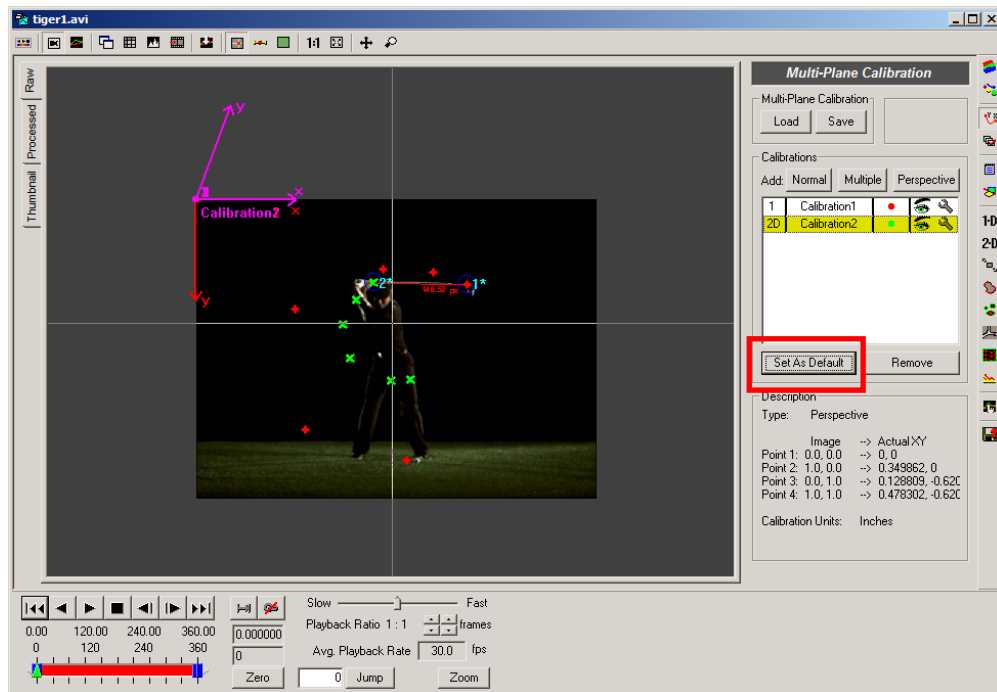
Once you have obtained satisfactory results, you can click **Transfer to Perspective Calibration** to apply the results to the Perspective calibration.



The optimized solution for the Perspective calibration will be transferred to the Calibration Settings window.

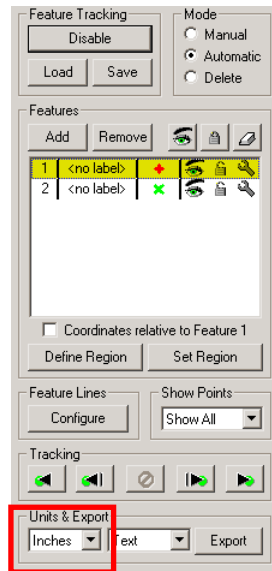


The calibration will be automatically applied. The resulting coordinate frame should appear in the upper left corner of the image. To avoid confusion, you may wish to delete the first Normal calibration or make the newly defined second calibration the Default calibration. To make the second calibration the Default calibration, select the second calibration and click **Set As Default**.

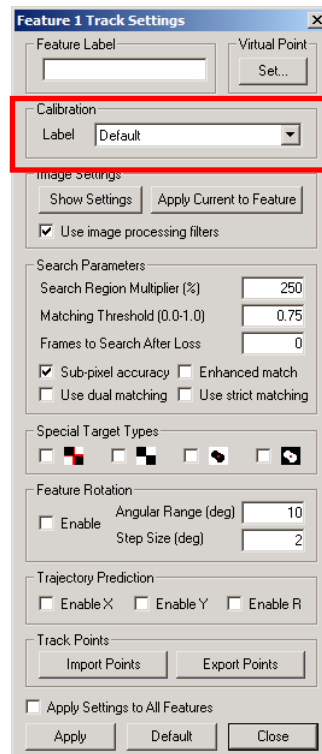


The new Perspective calibration is now ready to use. Below are some key points to remember when using the new calibration.

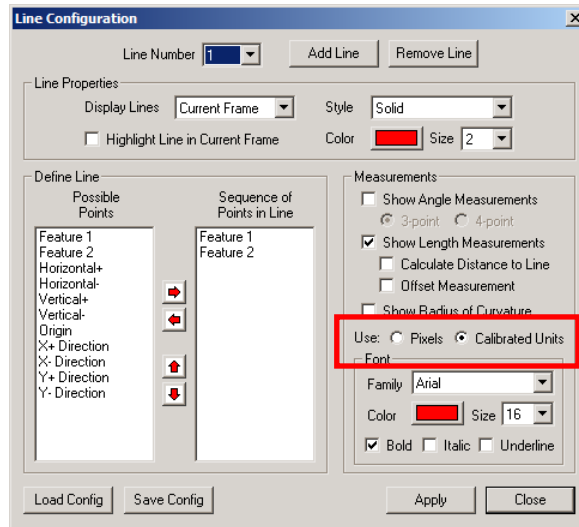
- Be sure you have selected the correct type of Units in the bottom of the Feature Tracking panel. If Pixels is selected as the Units, the Perspective calibration will not be applied.



- Make sure that the calibration selection for each feature is correct.



- If creating Feature Lines to measure the distance between tracked points, be sure to select **Calibrated Units** in the Line Configuration dialog.



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