

FP Auto Baseline

Setting the [FP ZERO](#) parameters for Instrumented Treadmills can be quite challenging because the unloaded frames aren't readily identified automatically, and one would prefer to use all of the unloaded frames for determining the zero range. For Visual3D Version 6 we have introduced the new **FP Auto Baseline** pipeline command.

This command does three things:

1. Zeros the force signal without having to specify a [frame range](#) (AUTO_ZERO)
2. Defines the [minimum force platform value](#) based on the noise in the signal (AUTO_FP_MINIMUM)
3. Looks at the before/after the signal loaded - and finds when the signal crosses the reduced FP minimum to ensure as much of the signal is used as possible (USE_REDUCED_FP_MINIMUM_AROUND_FORCE)

The [minimum force platform value](#) is determined by identifying the values of the plate during all the periods where the plate is unloaded. Each force component is used to determine the set of frames containing median values for each component, and a single representative minimum force frame is determined from these values.

Pipeline Command

The command can be found in the Pipeline Workshop within the **Force** folder as so:

```
FP_Auto_Baseline
! /FP_NUMBER=
! /AUTO_ZERO=TRUE
! /AUTO_FP_MINIMUM=TRUE
! /USE_REDUCED_FP_MINIMUM_AROUND_FORCE=TRUE
! /REDUCED_FP_MINIMUM=5.0
;
```

Command Parameters

The following table shows the command parameters seen above and their descriptions:

FP Number	An empty parameter will work on all plates in the C3D file. Or you can specify individual plate numbers, separated by a plus sign (ex. /FP_NUMBER=1+3)
Auto Zero	This parameter is used to zero the signal. The value of the zero baseline is stored in the C3D parameter FORCE_PLATFORM::BASELINES
Auto FP Minimum	Visual3D determines the minimum force platform value by finding when the platform is unloaded and the maximum noise value is found. This ensures the minimum value is used, and less data is lost compared to setting an arbitrary minimum force platform value
Use Reduced FP Minimum Around Force	True or False: Visual3D determines when the force platform is loaded, and finds when the signal drops below the specified minimum value

Reduced FP Minimum	Specified minimum FP value. Used when USE_REDUCED_FP_MINIMUM_AROUND_FORCE parameter is set to TRUE
Event Sequence	A sequence of events over which this command will be applied (defined as a list e.g. RHS+LHS)
Exclude Events	Exclude sequences including these events

Note About Reduced FP Minimum Around Force

Why is this parameter so important?

When there are two platforms in the treadmill there may be times when one foot is on two platforms (the other foot is not). The transitions from one foot on one platform to two platforms (or vice-versa) often causes an artifact (sudden change) in the force signal that is about the magnitude of the minimum force threshold. This artifact is most commonly seen with a front to back treadmill than a side to side. This parameter is used to resolve this discontinuity by using an alternate minimum force surrounding known contiguous force intervals to include relevant force readings that may be below the noise threshold, but still rising or lowering from the REDUCED_FP_MINIMUM value. This avoids the FP Minimum value discontinuity when FP transitions occur and combines the two signals into one force and cop signal, then reapplies the force minimum threshold.

Dialog

The command can be edited as text or using the dialog box shown below:

The dialog box is titled "FP Auto Baseline Dialog". It contains the following fields and controls:

- FP Numbers:** A text input field containing the value "1".
- Use Auto Zero:** A checked checkbox.
- Use Auto FP Minimum:** A checked checkbox.
- Use Reduced FP Minimum Around Transition:** A checked checkbox.
- Reduced FP Minimum:** A text input field containing the value "5.0".
- Defined Events:** A list box containing the following events: LHS, LOFF, LON, LTO, RHS, ROFF, RON, RTO.
- Event Sequence:** A text input field containing the sequence "LHS LTO".
- Exclude sequences containing these events:** A text input field that is currently empty.
- Navigation Buttons:** There are four buttons between the "Defined Events" and "Event Sequence" fields: ">>", "<<", ">>", and "<<".
- OK and Cancel Buttons:** Located at the bottom right of the dialog.

Example: Defining Auto Baseline for FP Under Left Foot

FP_Auto_Baseline

```
/FP_NUMBER=1
! /AUTO_ZERO=TRUE
! /AUTO_FP_MINIMUM=TRUE
! /USE_REDUCED_FP_MINIMUM_AROUND_FORCE=TRUE
! /REDUCED_FP_MINIMUM=5.0
/EVENT_SEQUENCE=LHS+LTO
! /EXCLUDE_EVENTS=
;
```

Important notes when using FP_Auto_Baseline with noisy analog data:

Visual3D estimates the baseline force using a clustering algorithm to find the most representative force. This approach uses only the force signal to identify the minimum force and does not include center of pressure or free moment signals in its calculation.

The baseline values for the COP and FREEMOMENT are specified by the frame number at which the representative force is found. As the representative force is a statistical measure, it can vary with the data set (i.e. the frame of data for the representative force could be different for different ranges of frames).

For filtered data, the COP and FREEMOMENT signals at the representative FORCE frame are usually consistent across different ranges of frames. For unfiltered noisy data spurious noise at the representative force frame will result in an incorrect COP and FREEMOMENT.

As such, when using FP_Auto_Baseline with noisy signals we recommend using the filtered analog signals (this can be done in settings) and first filtering the signals and recalcing before using FP_Auto_Baseline.

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