

Using Focus Stacking with Promote Control

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NOTE

These videos are annotated below. If you would like to have a written reference, please read the text supplied in this article.

The Promote Control firmware version 2.25 beta adds a long awaited feature to Promote Control - ability to do focus stacking. At this time it is only compatible with Canon cameras that have Live View on their rear LCD - that includes 5D Mark 2, 7D, 1D Mark 4, 50D and some others. Future firmware updates will extend this compatibility list. Please note that focus stacking feature will not work with cameras that do not have Live View on their rear LCD. As such, Canon 30D, 40D and others without Live View on their rear LCD are not compatible.

The new focus stacking firmware can be downloaded on Promote Systems website in the Support section. We would like to note that it is a beta firmware, which means it has not yet been tested on all possible cameras with different combinations of settings. So please make sure you have some time to give it a test with your camera if you plan on going to the field with it. If you find any issues with it, you can always put a previous firmware version into your Promote Control - at this moment 2.20 is the latest official release.

So what is focus stacking? Imagine you have a situation where you need a large depth of field in your shot - for example, macro photography, an interior shot etc. You would normally achieve greater depth of field by stepping down your aperture. This approach may not be the best - in some situations you need both a reasonably fast shutter speed, a low ISO setting to minimize noise, and at the same time you cannot increase amount of light indefinitely. All this effectively limits your flexibility with aperture.

This is where focus stacking comes in. You simply focus your camera on a few consecutive points and then stack resulting images together in a software program. The result is a perfectly sharp image where both near and far objects are in focus.

Before Promote Control firmware update, you needed a computer in order to automate camera focusing. With the new Promote Control firmware, it can be done automatically without a computer.

In this video we will use a popular Canon 5D Mark 2 camera. To begin, let's connect Promote

Control to the camera. Note that we only need USB cable for the focus stacking. Even if the shutter cable is connected, it will be ignored. This is because shutter cable operation is not guaranteed with Live View, and focus stacking relies on Live View very heavily. After connecting USB cable, we turn on both camera and Promote Control, and navigate to the new Focus Stacking mode.

A few pre-requisites for the Focus Stacking mode are:

1. Camera and lens have to be in Autofocus mode, and autofocus must be set to One Shot (not AI Servo). This is contrary to other modes on Promote Control which require manual focus. The Focus Stacking mode relies on being able to drive lens focusing mechanism, and this is why it requires autofocus to be on.
2. Camera must be in Manual Exposure mode (this is the same as with other modes). Here's a useful hint for those new to Canon system - if you are not sure which exposure to use for Manual Mode, check out the little exposure indicator on the bottom of top camera LCD. As you change your exposure, it moves around, indicating how far off are you from what it thinks ideal exposure is. Once it is in the center, the ideal exposure for the current scene is obtained.
3. Camera must be on a tripod. For this video we will keep the camera on the desk, but the most important thing is to ensure that camera position is stable and is not changed during the shooting sequence.
4. Check out your memory card free space. Focus stacking, just like HDR, tends to fill memory cards very fast - and if your card is filled up in the middle of the sequence, you will not have time to replace it and the sequence will have to be restarted.

To configure Focus Stacking, begin with changing your Step from "None/Reset" to any other value. This step value will control how far your lens will travel in one focus "click". Depending on your lens, you might want to use different steps. Macro lenses might require small steps, while wideangles might need large steps. To magnify the difference, we will use Large step in this example.

As soon as you change the Step, Promote Control tells the camera to activate its Live View mode. If the Live View mode cannot be activated, an error message may be shown. In that case please power down both camera and Promote Control, then turn them back on and try again.

Now we can see the actual image on the camera LCD. Begin by focusing your camera using your camera AF (or by manual focus override) on the closest position where you want to start your focus bracketing sequence.

Promote Control uses a concept of focusing range for focus bracketing. There are two points - start and end. Both of them default to zero, which means that focus stacking range is empty. Let's change the "END" setting by scrolling there and click "UP" a few times. You can see how the lens focuses farther away with each button click. The amount it travels will depend on the Step setting. If you feel like Step setting is inadequate, go back and change it to something more suitable. We will try Medium setting now. Then refocus your lens on the closest position and try setting your end point again.

Note that every time you refocus your lens manually (as opposed to using Promote Control

settings), you must reset the Step value to "None", and then back to your preferred step size. This is because camera does not tell Promote Control that it has been refocused manually - and Promote Control needs to know how far it should drive your lens. So again - if you refocused your lens manually, always Reset your Step, and re-do your focusing positions.

Once you are done setting the range, specify number of images you want taken in that range. By default every click you made will result in an image - but that may result in too many images. You can reduce that number by changing "Frames" setting.

Once you are happy with your settings, click "START". You will see Promote Control is driving your camera focus back to beginning of the chosen range. Once it's there, it starts making pictures, trying to fit the number of frames you specified within the focusing interval you have chosen.

When done, Promote Control will leave your lens focused at the same position where it was before you began shooting. You can go to the "END" setting and adjust it, if you don't like the result you have just obtained. Don't forget that you cannot manually focus the camera, or you will need to Reset your steps as shown before.

It is also possible to begin from the farthest point, and work towards the closest. To do that, focus your camera on the farthest point first. Then Reset your steps, but instead of tweaking the END point, change the START point using "Down" button. You will see the camera is driving its focus backwards, and the start point is changing towards more negative numbers. Once you reach the required point, set the number of frames as desired, and click START on Promote. It will drive your camera back to the farthest point first, and then proceed from there, gradually focusing closer and closer until it reaches the point you have just specified.

A few words of caution. Canon cameras do not report whether focusing attempt was successful or not. If your lens is at one of its focusing extremes, and you try to drive it past that extreme, it won't go there. But Promote Control will assume that it worked, and this will result in an incorrect focusing sequence. If you happen to hit your lens focusing limits, make sure to Reset your Step and then re-configure your settings.

Some times Canon cameras may stop reacting to external focusing commands. If this happens, simply turn the camera and Promote Control off, and then turn them back on. After this focus stacking should function as expected.

Finally, once you began setting your focusing settings using END point, you should continue using END point - or your positions will be reset. Again, the reason is that we do not have absolute control over focusing positions - we can only tell camera to jump back and forth. If you find yourself lost, start from the beginning - manually pre-focus to the beginning of the range, Reset your Step, and extend your END position to the desired point.

When you are done, you can use any commercial software capable of processing images for focus stacking to get the final result. One option is to use Adobe Photoshop CS4 or higher. There is a number of other popular software titles capable of producing focus-stacked images.

Promote Control also allows to merge focus stacking technique with High Dynamic Range, so that you can create focus stacked images in HDR. The idea is simple - instead of taking only one picture

at each focus location, your camera will take many pictures per location. Then each image set is merged into a High Dynamic Range image, and those HDR images in turn are processed in a focus stacking application.

To create a High Dynamic Range focus stack, first configure the High Dynamic Range parameters using HDR screen. You already know about switching modes on Promote Control with Mode button. You can also switch modes backwards if you hold "Left" button while clicking "Mode". Let's switch back to HDR mode, and configure our exposure bracketing for HDR. You may want to run a single HDR bracket first to make sure our settings are correct. After that, click Mode button to get back to the Focus Stacking mode, and configure the settings as described before. But in addition to that, let's set "Exposure" setting to "HDR" instead of "On camera". You will see that Promote Control now replaced "Frames" label with "HDR sets". So instead of one frame at each location it will take a bracketed series. Each bracketed series will be done using settings you just selected on the HDR screen.

Finally, press START and watch the wonders of automation at work.