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Do the right things right

Helicon Focus

Helicon Remote

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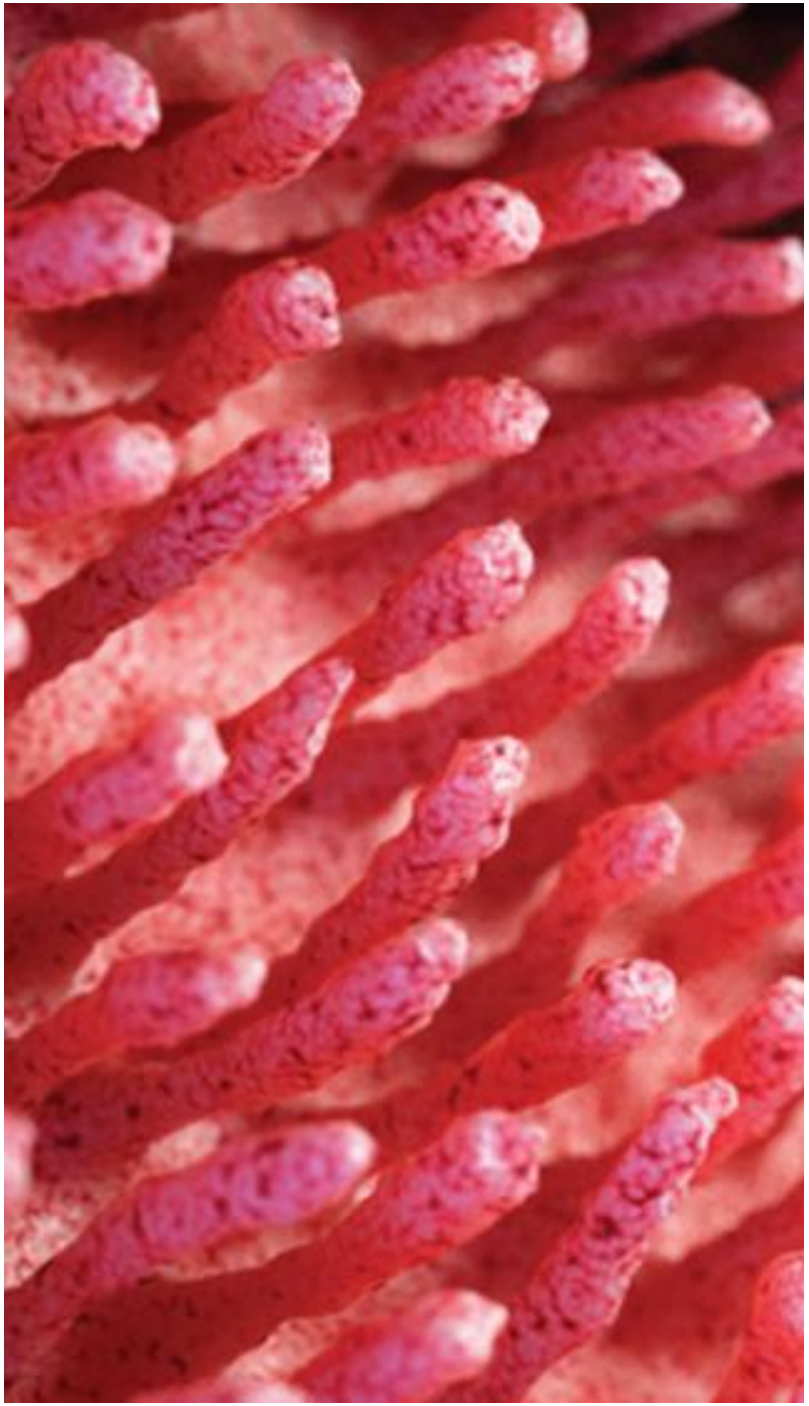


INTRODUCTION

Focus stacking is the second half of a workflow that enables photographers to obtain more depth of field (DOF) than is possible with one image. Particularly when photographing close-up or at high magnifications (macro work), the depth of field is very narrow – even for small apertures. e.g., a 105mm macro lens focussing on a subject at a 30cmm distance, using f16 yields a DOF of just over 1mm. Just as exposure bracketing combines several images of the same subject taken at different exposures, in order to yield an image that can encompass a dynamic range wider than the camera can capture in one image, so taking multiple images at different focal distances can yield an image that encompasses the DOF that is beyond the range of one image alone. The taking of multiple images of differing focus distance is called *focus bracketing*, and the action of merging them into one image is called *focus stacking*.

Note: There is also *image stacking*, where multiple images taken at the same focal distance are stacked to reduce noise – such as in astrophotography.

A stack of images can be as small as just 2 images. The maximum number of images that can be stacked is limited only by the power of the software, the available RAM of the computer and the speed of the processor. General macro work, such as photographing flowers or fungi, usually involves a stack of 10 to 50 images.

Focus bracketing (taking the image stack) can be done manually – either though manually changing the lens focus ring in small steps, or through the use of a Focussing Rail. Many cameras now provide internal control over stepping the lens through the required distance, taking the images automatically. HeliconSoft have a product called Helicon Remote that allows a computer or smartphone connected to the camera to fully control the focus bracketing – users just set the start and end point and the software calculates what the step should be for the camera, lens, aperture and distance and then takes the stack of images.

OPTIONS FOR STACKING

The three main software products that provide focus stacking computations are Photoshop, Zerene Stacker and Helicon Focus.

Photoshop

Very good for landscape stacks. Works best for small stacks – up to a dozen images. Can be complicated to refine any stacking errors (requires a good knowledge of Layers in Photoshop). Has the advantage that Photoshop can align images before stacking them.

Workflow:

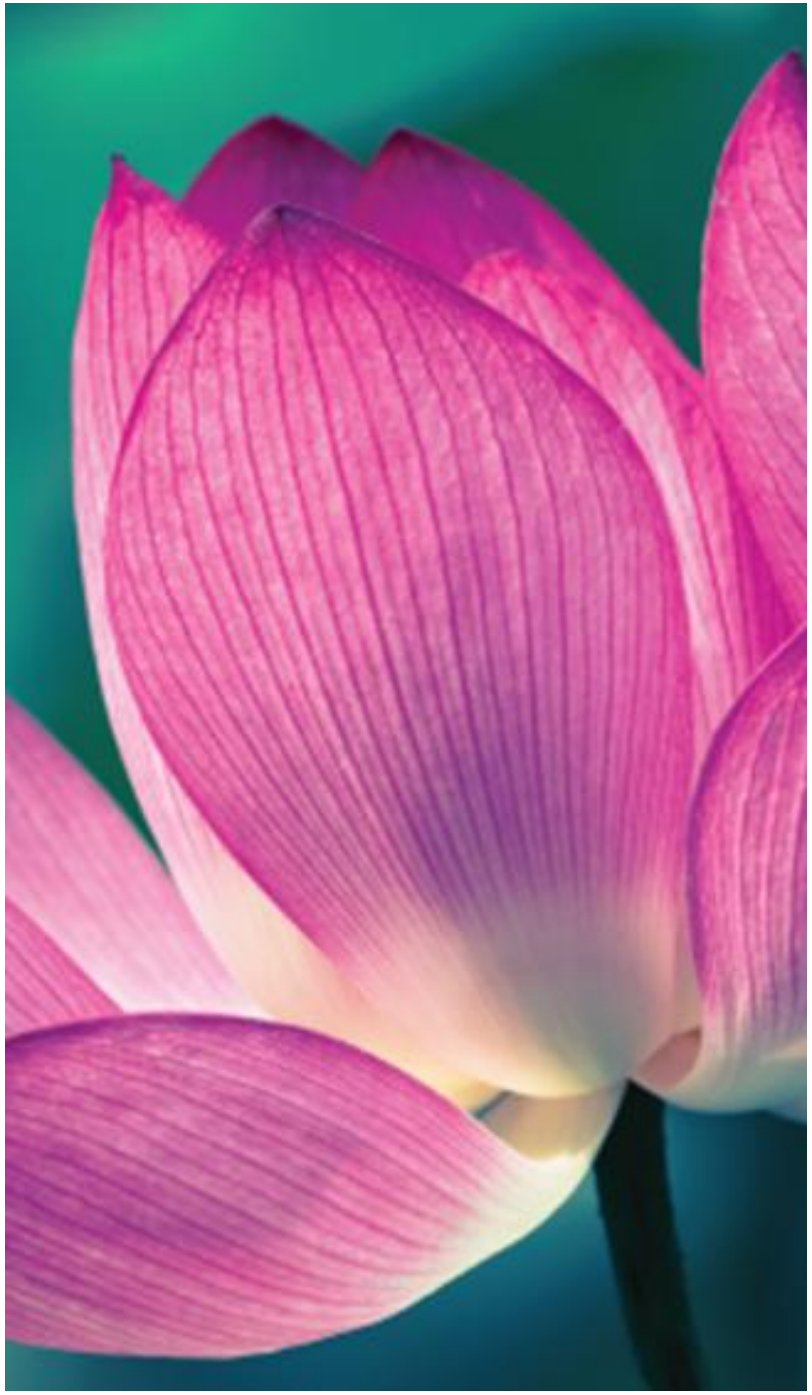
1. Select the images in Lightroom to be stacked.
2. Right-click and select the option to ***Edit in → Open as layers in Photoshop.***
3. In Photoshop, select all the layers.
4. Select the menu item to ***Edit → Auto-Align layers…*** (use the default settings).
5. Select to ***Edit → Auto-Blend layers…*** (check Seamless Tones and Colors to minimise tonal changes; check Content Aware Fill Transparent Areas if the alignment produced blank spaces that you want Photoshop to fill).
6. Photoshop will apply masks to use the areas in each image that are sharpest and produce a composite image blending these areas together. Either delete the layers with masks to keep the final image, or select the menu item ***Layer → Flatten image.***

Zerene Stacker

Very good for microscopy images as well as general macro images. Can align and correct for focus breathing. Can handle very large stacks. Has good tools for touch-up. Considered by many to produce higher quality images than other options. Used to be more difficult to use but later versions have a simple workflow.

Helicon Focus

Very easy to use. Has a simple touch-up workflow. Mostly equivalent quality output to Zerene but may struggle with very large stacks (over 200 images). Has the advantage of having a companion product, Helicon Focus, that can simplify and improve focus bracketing.



USING HELICON FOCUS

Helicon Focus operates both stand-alone and also as a plug-in for Lightroom. To focus stack images from Lightroom, first select all the images, and then choose the menu item, ***File → Plug-in Extras → Export to Helicon Focus.*** Often, the better option is to not import all the focus-bracketed images into Lightroom. Rather, first stack them in Helicon Focus and then only import the final stacked image. Open Helicon Focus and either navigate to the files to be stacked either by using the ***Open File*** dialog, or use File Manager (Windows) or Finder (Mac) to select the files and drag them to the open Helicon Focus window.

Note: Helicon Focus requires the images to be in continuous order – from closest to furthest, or vice versa; and works best if there is no movement between frames.

Often, particularly when using the automated focus bracketing function in a camera, the stack of images includes focus points well behind the subject. If the entire stack is rendered, the subject and background will all be in focus. Sometimes, this is desirable. Most often, a sharp subject framed against a blurry background is a better image. Before importing images into Helicon Focus, only select the images that are needed for sharp focus.

Helicon Focus operates with four views of the workflow: Rendering – Retouching – Text/Scale – Saving. When files are loaded into the programme, they open on the Rendering view. Rendering can use several different algorithms for stacking and some control over how it detects sharpness is possible. Usually, the default settings work fine. To stack all the images, just click ***Render***.

REFINING THE IMAGE

After the stack is rendered to a single image, it pays to inspect the result to see if there are any errors and whether simple retouching is feasible. Magnify as needed to see fine details. If needed, change the algorithm or settings and render the stack again. Helicon Focus keeps each render (displayed at the bottom of the screen) so that you can compare the result of the different approaches.

After rendering, clicking the button for **Retouching** displays the tools to repair any areas where the algorithm has not used the sharpest regions, or there are detracting artifacts.

Retouching

Areas of blur or other anomaly that should be sharp can be corrected by copying from an image that has clearer detail to replace the affected part. Hovering the cursor over the affected area will display the name of the image that was used, and hovering over nearby sharp areas will display the names of images that might be sources for a better result. Clicking on an image in the image list on the right of the display will load that image into the left panel. Try several images to find the best one to replace the affected area. Once the better image is loaded in the left panel, the brush can be used to paint from the selected image into the rendered . *Copy from source* allows you to paint on the rendered image to replace what you paint-over with the same, but better, pixels from the image on the left. The *Clone*, *Pattern* or *Texture* options allow you to replace pixels with other areas of the rendered image – either exactly, using the pattern, or using the texture but not colour. There are several brush settings that can be adjusted to get the best result, with **Undo/Redo** options at the bottom of the panel.

Not all aberrations are best fixed in Helicon Focus. Retouching works best when a particular image has a clearer alternative for the affected region. Sometimes, the effect of focus breathing or “blooming” of out-of-focus items makes it difficult to retouch from other images. Some fixes require Photoshop tools. Mostly, the new Remove Tool is all that is needed. Occasionally, the **Clone Tool** or **Patch Tool** might be needed; and, if larger or messier, the **Content Aware Fill** function might be needed. (Or even **Generative Fill**, if you use it).

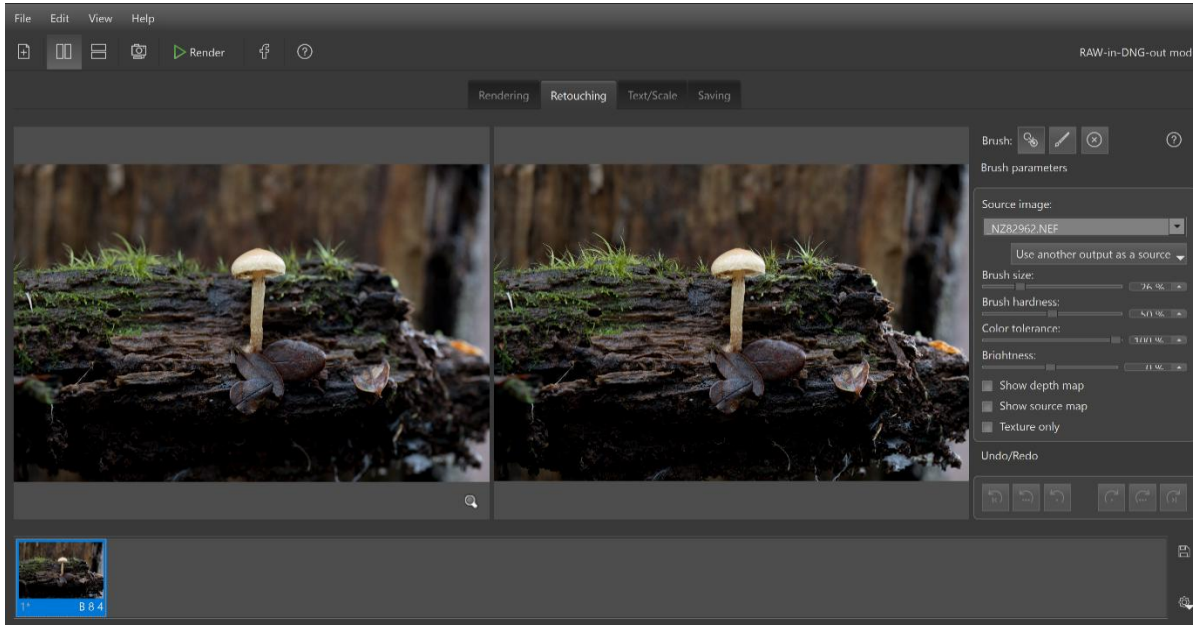
Image by Victoria Viki - https://www.instagram.com/viktoria_v84/

Text/Scale

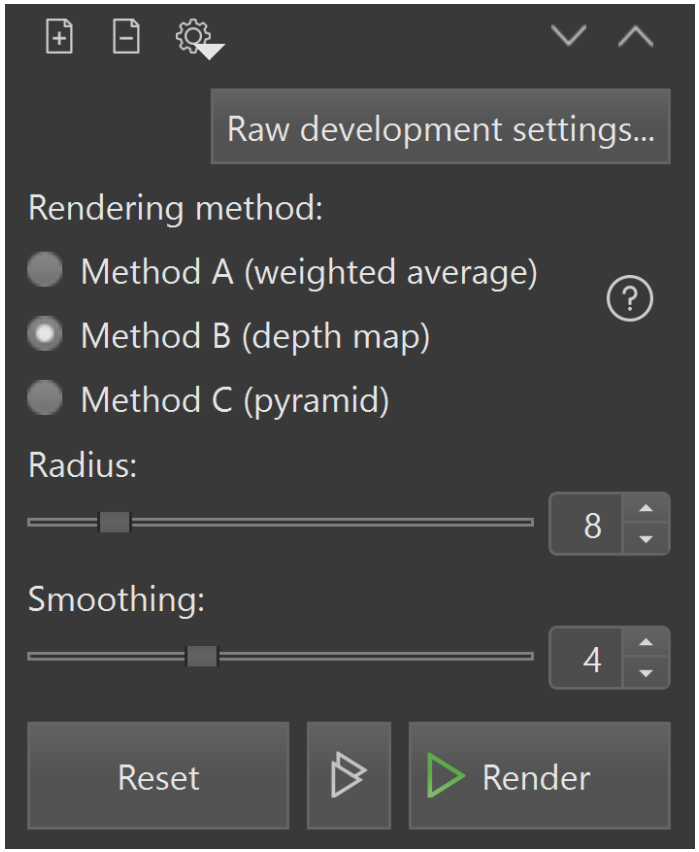
The **Text/Scale** button provides options to add text or a scale on the image.

Saving

The fourth button provides options for saving the image. Usefully, Helicon Focus can output images as DNG or TIFF files. After saving, it's usual to use the options in the **File** menu to remove all files and outputs before starting on the next image stack.



UNDERSTANDING THE OPTIONS



Most often, the default settings work well. However, some types of images are rendered more accurately with different settings. There are three rendering algorithms –

Method A computes the weight for each pixel based on its contrast, after which all the pixels from all the source images are averaged according to their weights. Best for when preserving colours and contrast is a priority.

Method B finds the source image where the sharpest pixel is located and creates a "depth map" from this information. This method requires that the images be shot in consecutive order from front to back or vice versa. Best for images that have a simple surface with no sudden changes in surface level or if there is glare in the image. Also good with colours and contrast.

Method C uses a pyramid approach to image representation. It gives good results in complex cases (intersecting objects, edges, deep stacks) but increases contrast and glare. Best if the image has many crossing lines and changes in surface level, or the stack is very large (>100 images).

The **radius** parameter defines the number of pixels around each pixel that are used to calculate its contrast. Increasing the value can get rid of any noise or artifacts, particularly halos along the edges. Best to experiment with different values.

Smoothing defines how the sharp areas are combined. Low smoothing produces a sharper image, but the transition areas may have some artifacts. High smoothing will result in a slightly blurry image without any visible transition areas. Again, best to experiment.

The amount of **alignment** adjustment used in the programme can be adjusted in the **Preferences** dialog box. To change the alignment parameters, go to the Main Menu, open the **Preferences** dialogue (Main menu → Edit → Preferences...) and switch to the "Auto adjustments" tab.

FULL INSTRUCTIONS ARE AVAILABLE ONLINE- Helicon Focus-Tutorials- Helicon Soft