



## DIGITALISATIE VAN SPECIMENS WETENSCHAPPELIJKE DIENST PATRIMONIUM

Deze instructie beschrijft de werkwijze voor de digitalisatie van specimens.

	<b>Uitvoerder</b>	<b>Stappen</b>
1	Wetenschapper Conservator Collectiebeheerder	Gebruik volgens de keuze van de conservator één van de volgende digitalisatie toepassingen: photogrammetrie (Agisoft) focus stacking (Zerene Stacker) gestructureerd lichtscanner
2	Encoder Collectiebeheerder Conservator	Digitaliseer de etiketten of de markeringen op het object die identificatie mogelijk maken
3	Encoder Collectiebeheerder Conservator	Digitaliseer de specimens volgens de HOW-TO van elke techniek: A) Focus stacking B) Photogrammetry C) Structured light HDI
4	Encoder Collectiebeheerder Conservator	Bewaar de gegevens in één van de gevraagde formaten
6	Encoder Collectie beheerder Conservator	Plaats de bestanden op <a href="http://virtualcollections.naturalsciences.be">virtualcollections.naturalsciences.be</a> als het de bedoeling is dat het publiek gemaakt wordt of op MARS wanneer het noodzakelijk is dat het privé blijft. Maak een kopie op een Hard Disk als langdurige back-up.



## DIGITALISATIE VAN SPECIMENS WETENSCHAPPELIJKE DIENST PATRIMONIUM

### A) Focus stacking

	Uitvoerder	Stappen												
1	Wetenschapper Conservator Collectiebeheerder	Before switching on the StackShot Controller by connecting it to the Electrical network, make sure the following steps are ok: <ul style="list-style-type: none"> <li>• The camera is connected to the Stackshot controller (Shutter cable)</li> <li>• The StackShot controller is connected to the StackShot Rail</li> <li>• The camera is connected to the PC</li> </ul> All ok? Plug in the StackShot Controller												
2	Encoder Collectiebeheerder Conservator	Switch on the camera <ul style="list-style-type: none"> <li>• Open 'EOS Utility'</li> <li>• Select 'Camera settings/Remote Shooting'</li> </ul> Now the window appears to select your camera settings etc. Follow further instructions												
3	Encoder Collectiebeheerder Conservator	Switch on the light inside the closet												
4	Encoder Collectiebeheerder Conservator	Switch on 'Live View Shoot' (Bottom left in the EOS Utility window)												
5	Encoder Collectiebeheerder Conservator	Set the Shutter speed on 'BULB' (click on the shutter speed and press ↓)												
6	Encoder Collectiebeheerder Conservator	Set the power of the speed lights: if you use a Grey Background <ul style="list-style-type: none"> <li>• ½ or ¼ for 3x to 5x magnification</li> <li>• 1/8 to 1/16 for 1x to 3x magnification</li> <li>• 1/32 or 1/64 for regular macro lenses</li> </ul> test if the flash lights work by pressing the remote												
7	Encoder Collectiebeheerder Conservator	Place the specimen in the closet in the centre of the lens												
8	Encoder Collectiebeheerder Conservator	If you use the MP-E 65 mm Macro Photo, set the approx. desired <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Magnification</th> <th style="padding: 5px;">Sensor filling size</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px; text-align: center;">1x</td> <td style="padding: 5px; text-align: center;">22.5 mm</td> </tr> <tr> <td style="padding: 5px; text-align: center;">2x</td> <td style="padding: 5px; text-align: center;">11.3 mm</td> </tr> <tr> <td style="padding: 5px; text-align: center;">3x</td> <td style="padding: 5px; text-align: center;">7.5 mm</td> </tr> <tr> <td style="padding: 5px; text-align: center;">4x</td> <td style="padding: 5px; text-align: center;">5.6 mm</td> </tr> <tr> <td style="padding: 5px; text-align: center;">5x</td> <td style="padding: 5px; text-align: center;">4.5 mm</td> </tr> </tbody> </table>	Magnification	Sensor filling size	1x	22.5 mm	2x	11.3 mm	3x	7.5 mm	4x	5.6 mm	5x	4.5 mm
Magnification	Sensor filling size													
1x	22.5 mm													
2x	11.3 mm													
3x	7.5 mm													
4x	5.6 mm													
5x	4.5 mm													
9	Encoder Collectiebeheerder Conservator	Make sure that 'Mode: Auto-Dist' is selected on the StackShot controller, if not press 'up' or 'down' on the controller till it appears.												
10	Encoder Collectiebeheerder Conservator	Move the camera up or down by pressing 'Fwd' or 'Back' till the specimen is in-focus (Confirm through Live View in EOS Utility).												
11	Encoder Collectiebeheerder Conservator	Set the distance the camera needs to travel between each picture by pressing 'select' once and 'up' or 'down' to increase or decrease the 'Dist/Step'. Guidelines for the Step Size: <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Magnification</th> <th style="padding: 5px;">Step Size</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px; text-align: center;">1x</td> <td style="padding: 5px; text-align: center;">150 µm to 300 µm</td> </tr> </tbody> </table>	Magnification	Step Size	1x	150 µm to 300 µm								
Magnification	Step Size													
1x	150 µm to 300 µm													



## DIGITALISATIE VAN SPECIMENS WETENSCHAPPELIJKE DIENST PATRIMONIUM

		<p>2x                    120 µm to 200 µm</p> <p>3x                    75 µm to 150 µm</p> <p>4x                    50 µm to 80 µm</p> <p>5x                    30 µm to 60 µm</p> <p>Normally you'll end up with a stack of 15 to 40 pictures for the mean values.</p>
12	Encoder Collectiebeheerder Conservator	<p>Set the appropriate f-stop and speed light power</p> <ul style="list-style-type: none"> <li>• 3x to 5x magnification f/4.0 or f/4.5, flash ½ nd or ¼ th</li> <li>• 1x to 3x magnification f/4.5 to f/5.6 flash 1/8 th till 1/16 th</li> <li>• Press test shooting in the Live view window, a new window appears</li> <li>• close the Live View window, otherwise the speed lights won't flash</li> <li>• press the white squared button upper right</li> <li>• alter the f-stop and/or flash power</li> </ul>
13	Encoder Collectiebeheerder Conservator	<p>Select the upper most part of the specimen by travelling upwards</p> <ul style="list-style-type: none"> <li>• press 'Back' on the controller till the entire specimen is out of focus</li> <li>• press 'Fwd' till a part (the upper most part), is in focus</li> <li>• press 'up' or 'down'</li> <li>• 'Select End Pos' appears</li> </ul>
14	Encoder Collectiebeheerder Conservator	<p>Select the most distant part</p> <ul style="list-style-type: none"> <li>• Press 'Fwd' on the controller till the entire specimen is out of focus</li> <li>• Press 'Back' till a part (the most distant) is in focus</li> <li>• Press 'up' or 'down'</li> </ul>
15	Encoder Collectiebeheerder Conservator	<p>Close Live View window and check again if the speed lights work (press the button of the transmitter on the camera)</p>
16	Encoder Collectiebeheerder Conservator	<p>Select the folder to save the pictures and make sure you take both RAW and Large pictures if desired.</p>
17	Encoder Collectiebeheerder Conservator	<p>Press the 'Up' or 'Down' button to start the process of taking pictures</p>
18	Encoder Collectiebeheerder Conservator	<p>Open Zerene Stacker (not the safe mode)</p>
19	Encoder Collectiebeheerder Conservator	<p>Press 'ok' on the welcome screen</p>
20	Encoder Collectiebeheerder Conservator	<p>Click 'add files' in the 'File' menu Select all the images in the selected folder press 'add'</p>
21	Encoder Collectiebeheerder Conservator	<p>In the 'Stack' menu select one of the following parameters:</p> <ul style="list-style-type: none"> <li>• Align and Stack PMax</li> <li>• Align and Stack DMap</li> <li>• Align and stack both</li> </ul> <p>it is possible to stack without aligning by selecting the images in the 'input' window and select 'Stack selected (PMax)' or 'Stack selected (DMap)' in the Stack menu</p>
22	Encoder Collectiebeheerder Conservator	<p>After the stacking process is done, select all the out files and press 'Save output images' in the 'File' menu.</p>
23	Encoder Collectiebeheerder Conservator	<p>Click on 'Show batch dialog' in the Batch menu tab (a new window appears).</p>



## DIGITALISATIE VAN SPECIMENS WETENSCHAPPELIJKE DIENST PATRIMONIUM

24	Encoder Collectiebeheerder Conservator	In the Batch Queue window the left part is to select folders and to choose what to do with project files. The right part is to decide how to stack and save the stacked images.
25	Encoder Collectiebeheerder Conservator	LEFT: Click on 'Add Projects and Folders' and select the folders to be stacked (important each folder is one view). Decide to Save the project folders in case of type material.
26	Encoder Collectiebeheerder Conservator	RIGHT: Click on 'Add' and Select 'PMax' and 'DMap' (Align and Stack) and press OK
27	Encoder Collectiebeheerder Conservator	Select 'Save in Source Folders' and Press 'Run all Batches'. You can close the Batch Queue Window.
28	Encoder Collectiebeheerder Conservator	If you want that automatically the name of the folder is saved as name for the stacked image, do as follows: Open the 'Preference' submenu in the 'Options' menu and choose 'Image saving'. Below you find 'Output Image Names' and write the following in the space below: {sourcefolder} ZS {method} Press on 'Apply' and OK

### B) Photogrammetry

	Uitvoerder	Stappen
1	Wetenschapper Conservator Collectiebeheerder	Make 3 sets of 36 views of the specimen
2	Encoder Collectiebeheerder Conservator	Import picture(s) in Agisoft
3	Encoder Collectiebeheerder Conservator	Mask <ul style="list-style-type: none"> <li>• create a mask with photoshop/gimp and use automatic masking if smooth background + check mask</li> <li>• manual masking (lasso or lasso+ctrl)</li> </ul>
4	Encoder Collectiebeheerder Conservator	Align picture <ul style="list-style-type: none"> <li>• Delete picture with dot out of the point cloud</li> </ul>
5	Encoder Collectiebeheerder Conservator	Create dense point cloud
6	Encoder Collectiebeheerder Conservator	Create model <ul style="list-style-type: none"> <li>• cleaning the model with the gradual selection or lasso if necessary</li> <li>• close hole if necessary</li> </ul>
7	Encoder Collectiebeheerder Conservator	Create texture (4096x4096)
8	Encoder Collectiebeheerder Conservator	Export in the wanted format DAE for Surface and texture for Meshlab and Unity PLY for Surface and texture for Meshlab STL for surface for Meshlab, Gom Inspect and LhP FusionBox



## DIGITALISATIE VAN SPECIMENS WETENSCHAPPELIJKE DIENST PATRIMONIUM

### C) Structured light HDI

Uitvoerder	Stappen
Wetenschapper Conservator Collectiebeheerder	<p><b>1. Calibration</b></p> <ul style="list-style-type: none"> <li>• Depending on the object size, choose camera position.</li> <li>• Open FlexScan 3.3, in the tab « scanner », choose « Remove » and delete the previous HDI calibration.</li> <li>• Create a new HDI Advance.</li> <li>• On the left part of the screen, select cameras.</li> </ul> <p>! The first camera is the second on the list !</p> <ul style="list-style-type: none"> <li>• Position the calibration back-sided (white) and display the focus pattern (right part of the screen). Move the calibration plate until the black cross is approximately in the centre of both cameras.</li> <li>• Focus the projector so the focus pattern is sharp.</li> <li>• Turn the calibration plate with the checker pattern in front of the camera. Focus the cameras.</li> <li>• Place the calibration plate in front of the camera 1 and start capturing the pattern according to the schema. Then do the same with the second camera.</li> <li>• Press calibrate. Your calibration coverage should be superior to 65 % otherwise start again.</li> </ul>
Encoder Collectiebeheerder Conservator	<p><b>2. Scanning</b></p> <ul style="list-style-type: none"> <li>• Place the object in the centre of the turntable.</li> <li>• Display the focus pattern and check the black cross is in the centre of the camera red cross.</li> <li>• Take out the object. Place the calibration plate, calibrate the turntable (press « Recalibrate » under the scan menu).</li> <li>• Put back your object, check colour texture if required, choose the numbers of scans wished (advice number of scans : 8). Uncheck « automatic combine » and press scan.</li> <li>• Unlock the scans and clean if necessary. To clean, select the unwanted part maintaining the Ctrl button pressed and delete.</li> <li>• Once cleaned, select the scans and press combine. Once combine hide the model by clicking off the check-box next to the thumbnail.</li> <li>• Turn your object on an other side and press scan again.</li> <li>• Clean and combine.</li> <li>• Display the previous rotation by clicking on the check-box next to the thumbnail. With Alt button press, align roughly the two combined scans together and press align.</li> <li>• Combine</li> <li>• Repeat this operations until having a full model.</li> <li>• When your full model is combine, press finalize.</li> <li>• Rename the model and export.</li> </ul> <p>! Don't forget to fill out the data-sheet next to the scanner, the parameters of the scan!</p>
Encoder Collectiebeheerder Conservator	<p><b>3. Shortcuts</b></p> <p>Alt+LMB = rotate selected scan            Alt+CMB = Translate selected scan            Ctrl+LMB = select parts of the scan</p>



## DIGITALISATIE VAN SPECIMENS WETENSCHAPPELIJKE DIENST PATRIMONIUM

Encoder  
Collectiebeheerder  
Conservator

### 4. FAQ

- ***Cameras are not working properly***

Case 1 - Restart computer and unplug/replug the cameras

1) Close the software and try to disconnect the power of the cameras, and plug it back in. Restart the software. (You may want to try that several time in a row)

2) Restart the computer

3) After re-plugging if issue didn't go away, please try case 2.

Case 2 - Reset all the camera settings.

1) Open FlyCap2 > Configure Selected > Advanced Camera Settings > Memory Channel drop down list > select Default, and click on the restore button. From the drop down, then select memory channel 1 > Save. Memory channel 2 > Save.

2) Close this settings Windows. Open FlexScan3D to see if you are still seeing the split issue. Also, it might be good to verify if from FlyCap by opening FlyCap2 > select the camera, and click on "OK". This will generate a live video from FlyCap. If it's not showing up, please go into settings > Trigger / Strobe tab > check the "Enable /Disable Trigger" check box. Check to see if your video is still split in half. If you are seeing a black screen but see the the Framerate and the Timestamp running on the left hand side, then please change the aperture on the lens to make it brighter.

3) If you don't see the video splitting in half, then please continue with step 4. Otherwise please skip to case 2.

4) Go to camera settings > set the "Gain" to 0, "Shutter" to 16.66. Uncheck all the check boxes.

5) Go to Advanced camera settings > save these settings to memory channel 1 and 2.

- ***I have combine misaligned scan, can I undo ?***

« Undo » button or Ctrl+Z doesn't work, but you can uncombine and recombine.

! When uncombining, you are not going back to the previous step but all the scan are uncombined !

Tip : Recombine by chunks of the number of scan of your rotation.