How to Use Depth Acquisition (DPQ)

Introduction

The Depth Acquisition (DPQ) feature provides a quick, non-contact method for acquiring relative depth information from microscopic surface variations, such as grooves, holes, and stepped surfaces. Through controlled refocusing in DinoCapture, DPQ reflects changes in focal plane position and outputs the depth information as a Focus Shift value.

This guide explains how to acquire depth information and provides the related technical specifications for DPQ.

Terminology & Key Actions

The following terms and actions are used in the procedure.

Manual Focus: Adjusting focus via the knob on the Dino-Lite or a compatible stand.

Manual Refocus: Pressing Ctrl + scroll wheel to fine-focus via software.

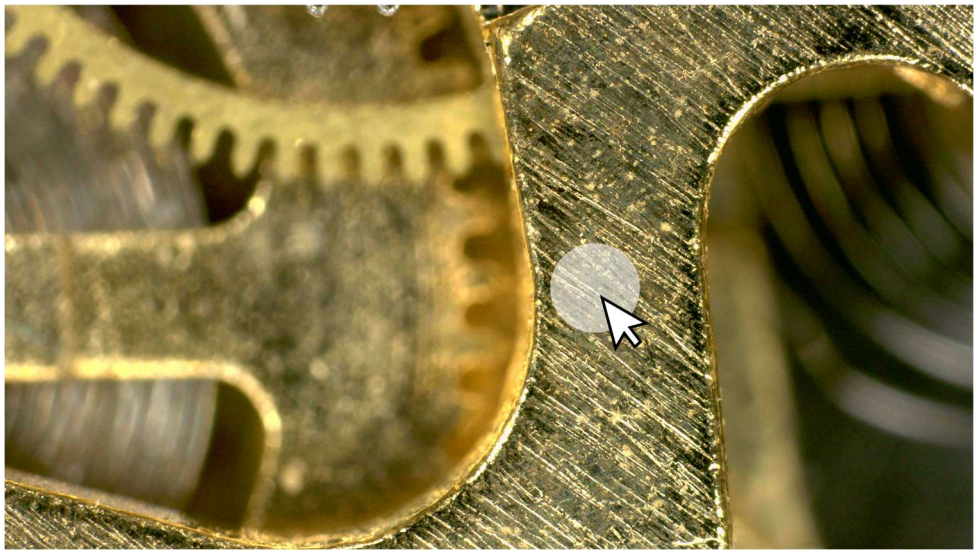
Auto Refocus: Clicking the mouse wheel to automatically refocus on the targeted position.

Refocus Mode: A state entered as soon as Manual or Auto Refocus is used, allowing for further focus adjustment via the mouse wheel (cursor changes to ).

Focus Shift: Reflects relative depth from the reference plane. Positive values mean a Downward shift (deeper), while negative values mean an Upward shift (closer to the lens).

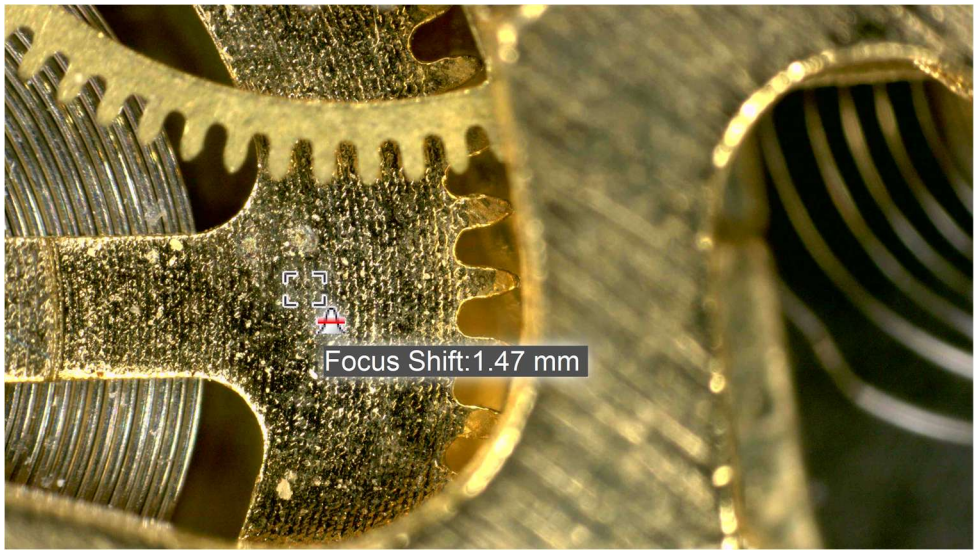
Steps

1. Manually focus on the starting position to define it as the reference plane.



The arrow indicates the reference plane.

2. Refocus on targeted position by either **Manual Refocus** or **Auto Refocus**. The **Focus Shift** value will be displayed below the cursor.



The refocused positions are below the reference plane, resulting in positive Focus Shift values.

3. Now **Refocus Mode** is active, the focus can be further adjusted via mouse wheel.

4. Left-click or press ESC to exit **Refocus Mode** and return to starting position (reference plane).

Focus Shift Range and Tolerance

The Focus Shift indicates the Z-axis displacement from reference plane, reflecting the relative depth or topographical variations of the sample. The maximum focus displacement and associated tolerances vary by model and magnification. The tables below specify the maximum focus range from the reference plane in both the downward (+) and upward (-) directions.

Table 1. Focus Shift Refence Data (AF7915MZT, AM73915MZT(R10), AM4917MZT, AM8917MZT, and AM83917MZT)

Mag	Max. Focus Shift Range (mm) Downward (+)	Max. Focus Shift Range (mm) Upward (-)	Tolerance (+/- mm)
20x	28.14	19.00	0.145
30x	13.06	10.10	0.083
40x	7.99	6.58	0.058
50x	5.60	4.79	0.045
60x	4.25	3.73	0.038
70x	3.41	3.04	0.033
80x	2.81	2.55	0.029
90x	2.39	2.19	0.027
100x	2.07	1.91	0.025
110x	1.82	1.69	0.023
120x	1.62	1.51	0.022
130x	1.46	1.37	0.021
140x	1.32	1.24	0.020
150x	1.19	1.13	0.019
160x	1.09	1.04	0.018
170x	1.00	0.95	0.018
180x	0.92	0.88	0.017
190x	0.85	0.82	0.017
200x	0.78	0.75	0.017
210x	0.72	0.70	0.016
220x	0.67	0.65	0.016

Table 2. Focus Shift Refence Data (AF7915MZTL, AM73915MZTL (R10A), AM4917MZTL, AM8917MZTL, and AM83917MZTL)

Mag	Max. Focus Shift Range (mm) Downward (+)	Max. Focus Shift Range (mm) Upward (-)	Tolerance (+/- mm)
20x	34.94	25.25	0.251
30x	16.89	13.62	0.149
40x	10.65	9.04	0.108
50x	7.59	6.65	0.087
60x	5.83	5.22	0.074
70x	4.69	4.26	0.065
80x	3.91	3.59	0.059
90x	3.34	3.09	0.054
100x	2.90	2.70	0.051
110x	2.55	2.40	0.048
120x	2.28	2.16	0.046
130x	2.05	1.94	0.044
140x	1.84	1.75	0.042

Table 3. Focus Shift Refence Data (AM73915MZT4, AM4917MZT4, AM8917MT4A, and AM83917MT4A)

Mag	Max. Focus Shift Range (mm) Downward (+)	Max. Focus Shift Range (mm) Upward (-)	Tolerance (+/- mm)
415x	0.21	0.21	0.0039
420x	0.20	0.21	0.0039
430x	0.20	0.21	0.0040
440x	0.20	0.21	0.0040
450x	0.20	0.20	0.0040
460x	0.20	0.20	0.0041
470x	0.20	0.21	0.0041

Table 4. Focus Shift Refence Data (AM73915MT8, AM4917MT8, AM8917MT8A, and AM83917MT8A)

Mag	Max. Focus Shift Range (mm) Downward (+)	Max. Focus Shift Range (mm) Upward (-)	Tolerance (+/- mm)
700	0.04	0.04	0.0007
750	0.04	0.04	0.0008
800	0.03	0.03	0.0009
850	0.03	0.03	0.0009
900	0.03	0.03	0.0010