

MorphCol Supplement #14: Magnification Test

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Problem:

Due to heavy usage of AMOR 3.2 it was necessary to check whether the MagCorr2 conversion is still valid or whether there is a possibility of a mechanical alteration (shift) of the endpoints of the zoom motor. In order to check this the following tests were made.

Settings:

Specimen 502_0100ccK0201 test slide, field 30 (standard specimen).

AMOR 3.2, Single measurement mode

Tilting at 1.25x

In Settings.ini file: a=0.64732, b=0.0039901

Diaphragm was set to fully open and not to 3.

Illumination was fully open.

Operations: Magnifications, Autocenter, focussing.

Tests:

Two tests A and B were done. In Test A the standard specimen was measured again.

In Test B the control points for the MagCorr2.out program were repeated.

Results Test A:

Images were taken at 0001r@0.63x, 0002r@0.79x, 0003r@1.00x, 0004r@1.25x, 0005r@1.57x, 0006r@1.98x, 0007r@2.49x (readings in AMOR3.2).

Plotting outlines of the same test specimen under the varying magnifications showed too large x,y coordinates at magnifications equal or less than 1.25x. The higher magnifications showed good coincidence with the earlier measurements of the same specimen illustrated in MorphCol Supplement #8, see Figure 1.

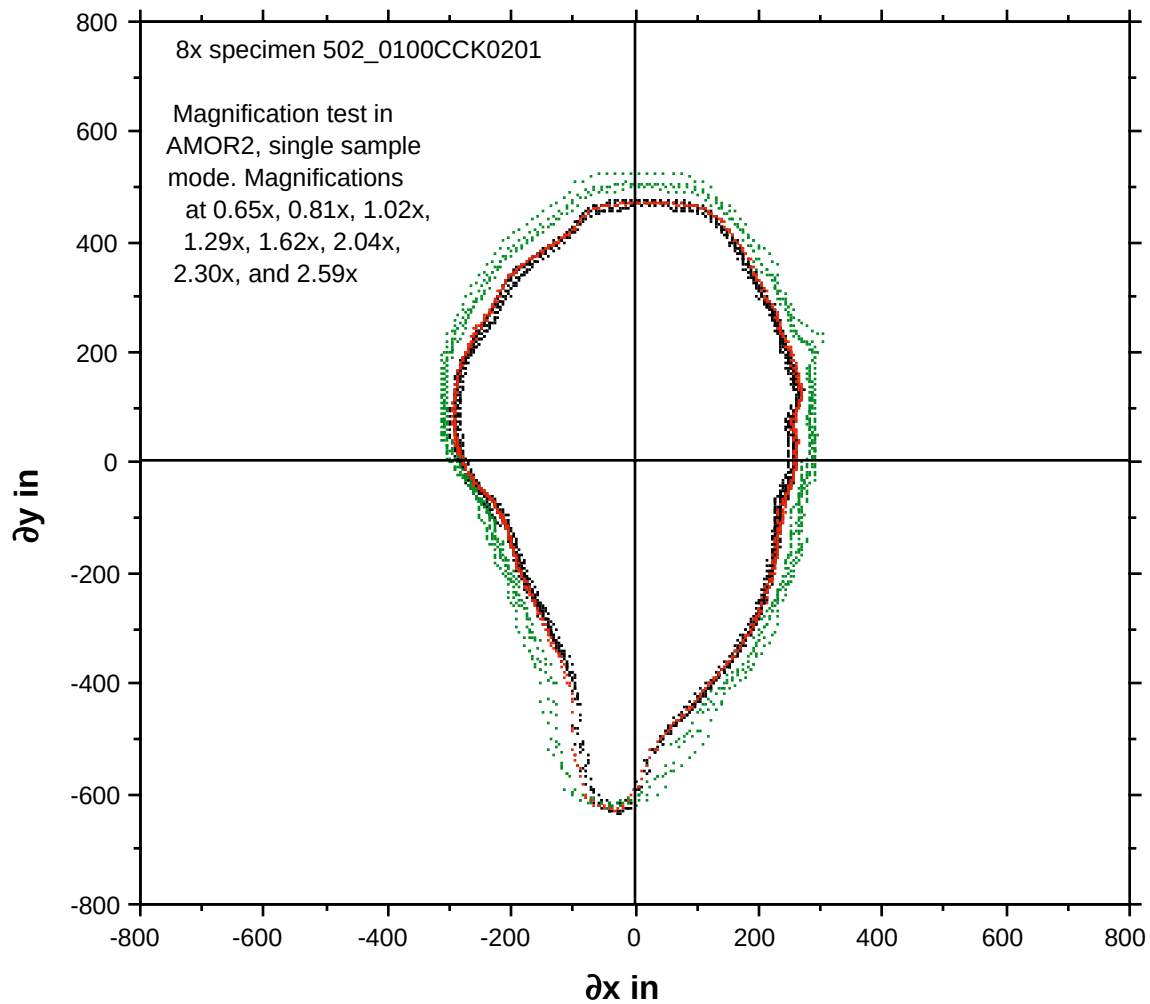


Figure 1. Overlay of outlines taken from standard test specimen from Figure 5 illustrated in MorphCol Suppl. #8 (black outlines) with the outlines from the present magnification test (red and green). The red outlines are generated at magnifications greater than 1.25x, the green outlines are taken at magnifications equal or less than 1.25x. The red outlines show good coincidence with the earlier test while the green outlines are too large due to blooming effects of the camera.

Results Test B:

Test measurements of the correction factors for MagCorr2.out showed to be correct.

Repeating the measurements of the control points for the MagCorr2.out corrections (Table 1 and Figure 2).

Xstandard, Mag	Ystandard, mm	Mag AMOR MagCorr2	X	Y
0,630	0,000	0,635	0,630	0,630
0,800	8,000	0,800	0,800	0,790
1,000	16,000	1,010	0,993	1,000
1,250	23,500	1,250	1,250	1,250
1,600	31,500	1,590	1,600	1,570
2,000	39,000	1,975	2,000	1,980
2,500	47,500	2,505	2,512	2,490
3,200	55,000	3,130	3,200	3,130
4,000	63,000	3,940	4,000	3,930

Table 1. Data for Test B. In columns 1 through 3 are the values used for implementation of the MagCorr2.out program. In the first column are the standard magnification positions of the microscope, in column 2 are the corresponding mm readings at the zoom wheel (=standard curve). In column 3 are the control points to correct the magnification with MagCorr2.out.

In columns 4 and 5 are the results of the new Test B: In column 4 (X) are the magnification readings at the zoom wheel and in column 5 (Y) for are the corresponding values of Mag as read from AMOR 3.2 during test B. The mm reading for X=0.993 was 15.5mm, the mm reading for X=2.512 was 47mm. These two X values were re-calculated following the standard mm-to-magnification curve for the microscope.

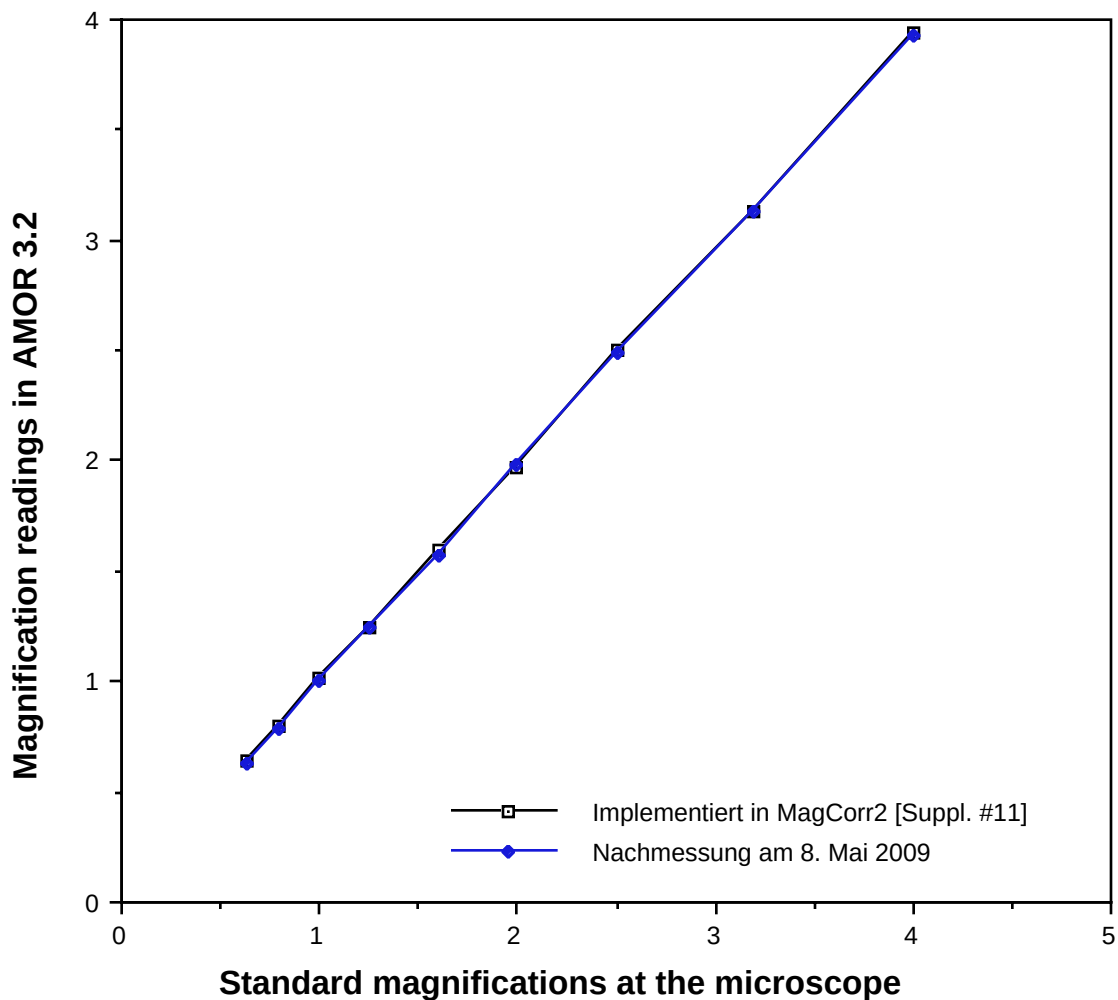


Figure 2. The black line (squares) are the control points used for the MagCorr2.out program (column 1 versus column 3 in Table 1). The blue line (diamonds) are the repeated measurements from Test B (column 4 versus column 5).

Discussion:

The reason for the too large areas of the specimen at lower magnifications is due to pixel saturation (blooming effects) of the camera at the bright pixels in the equal or less than 1.25x magnifications. At lower magnifications the light intensity is higher than at higher magnifications. Current values of over saturated pixels flush over to neighboring pixels leading to saturated pixels in the neighborhood too, and hence leading to too large outlines.

Conclusions:

The conversion (MagCorr2.out) of the magnifications returned from AMOR3.2 to values of the standard curve is still valid. There is no mechanical shift of the end-points from the motor zoom. Blooming-effects, however, can degrade the measurements if illumination is too high as seen at magnifications at or lower than 1.25x. At lower magnifications illumination must therefore be reduced if the measurements are to be compared with measurements at higher magnifications.