Mirror surface quality before and after coating

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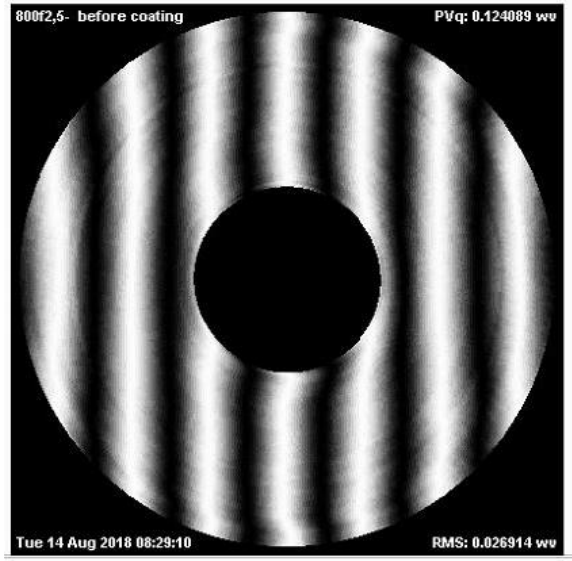
1 Scope

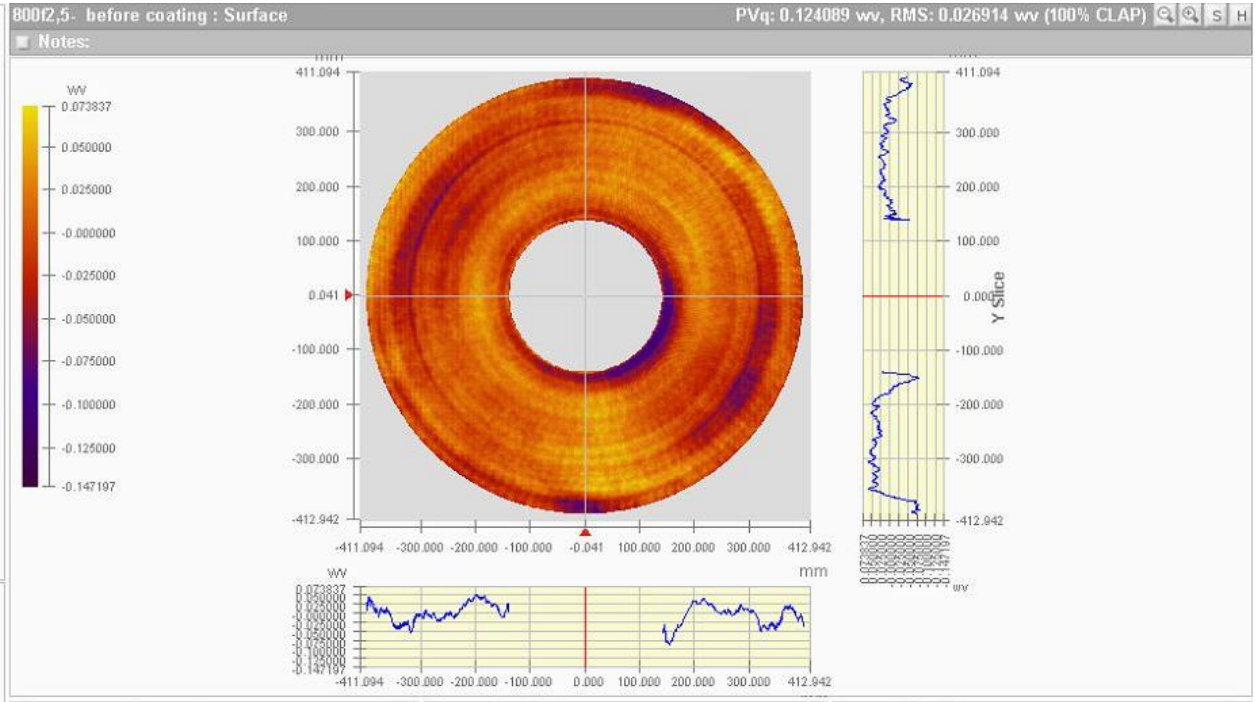
This document describes the influence of coating to the mirror surface quality.

ASA has experienced that applying reflective coating onto a mirror does not have a significant influence on surface quality. This has been proven by interferometrical measurements of several mirrors before and after coating.

The following example shows the interferograms of an 800mm f2.5 RC primary mirror measured before and after coating.

2 Before Coating



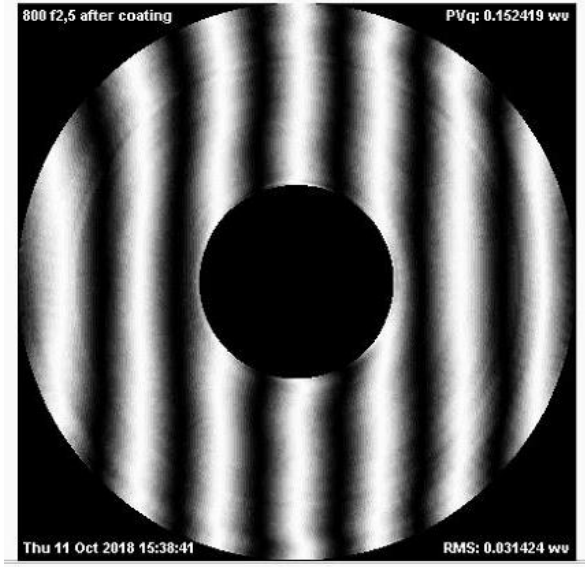


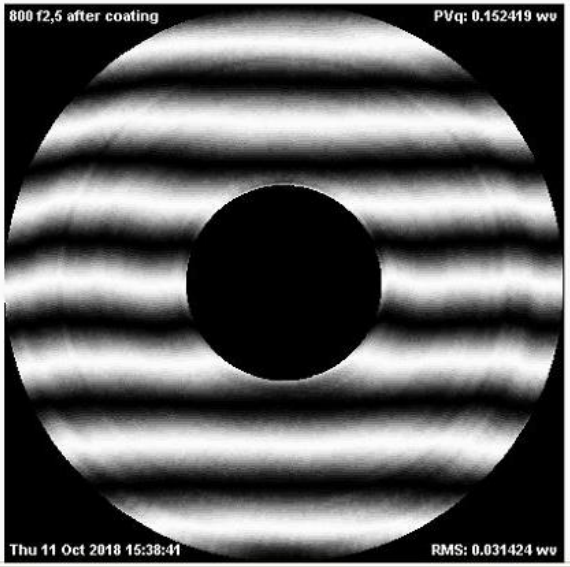
Measurement Parameters	
Title	800f2,5- before coat...
Date	Tue 14 Aug 2018 08...
Notes	
User Config	H400f3-direkt-obj70-...
Averages	N/A
Head ID	A205
Resolution	855 x 855
Meas Wavelength	632.800 nm (wv)
Equiv Wavelength	0.000000 nm (eqwv)
Sampling	1
Wedge Factor	1.000
Index of Refraction	--
File Status	Saved: 825f2,5-nr4-s...
Database Status	No Database
Correlation Paramet...	Not Applied
Camera Settings	
Anchor Point	--
Phase Algorithm	None

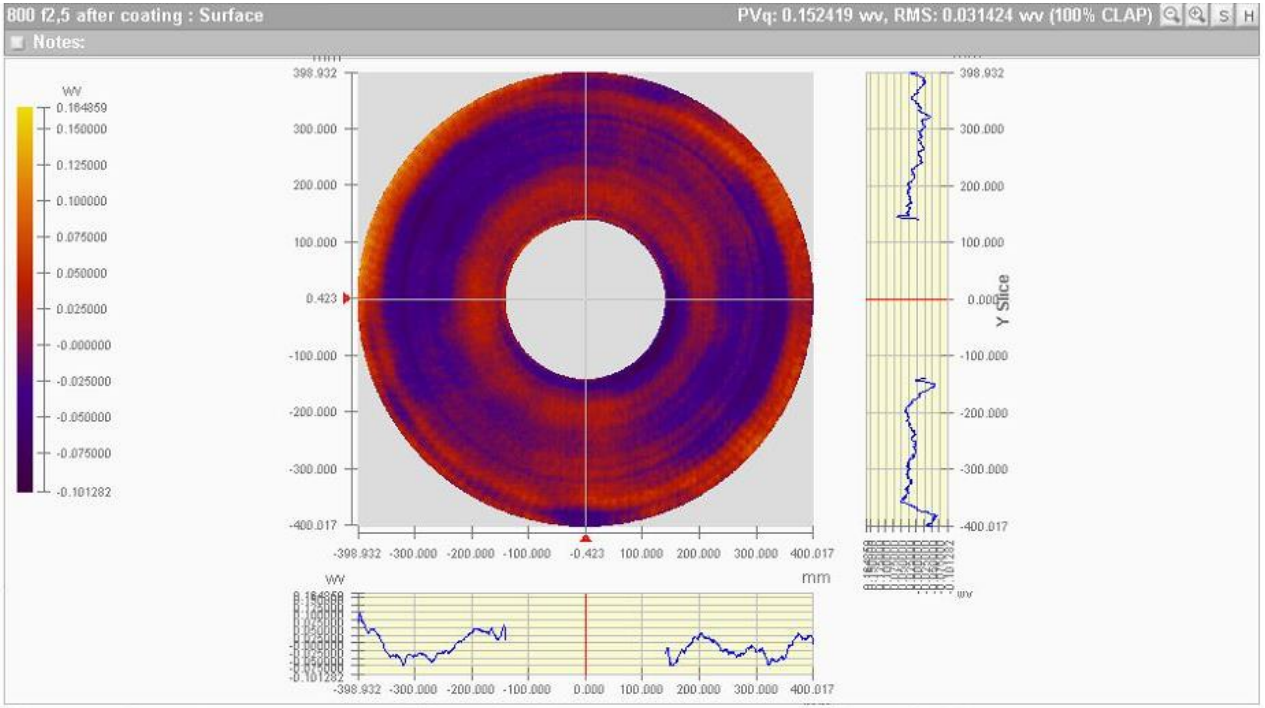
Processing Options	
Terms Removed	TiltX;TiltY;Power;Co...
Terms Type	Zernike Seidels
Detector Mask	None
Analysis Mask	Applied
Terms Mask	None
Pupil Mask	None
Filters	None
Pupil	100.0%
Ref Subtracted	No
Mod Thresh	30.0%
Data Fill	No
Min Island Size	1000
Trim Pixels	0
Transform	No
Island Leveling	No

Dataset Statistics	
PV (100% CLAP)	0.221034 wv
PVq (Q=98%, 100% CL...	0.124089 wv
RMS (100% CLAP)	0.026914 wv
Peak (100% CLAP)	0.073837 wv
Valley (100% CLAP)	-0.147197 wv
Ra (100% CLAP)	0.021252 wv
Mean (100% CLAP)	0.001986 wv
Valid Points (100% CL...	473,301
Unit Circle	(426,426)r=414 px
ROI	855 x 855
ROI Size	825.001 mm x 825.0...
Strehl	0.972

3 After Coating







Measurement Parameters	
Title	800 f2,5 after coating
Date	Thu 11 Oct 2018 15:...
Notes	
User Config	H400f3-direkt-obj70-...
Averages	N/A
Head ID	A205
Resolution	829 x 829
Meas Wavelength	632.800 nm (wv)
Equiv Wavelength	0.000000 nm (eqwv)
Sampling	1
Wedge Factor	1.000
Index of Refraction	--
File Status	Saved: 825f2,5-nr4-b...
Database Status	No Database
Correlation Paramet...	Not Applied
Camera Settings	
Anchor Point	--
Phase Algorithm	None

Processing Options	
Terms Removed	TiltX;TiltY;Power;Co...
Terms Type	Zernike Seidels
Detector Mask	None
Analysis Mask	None
Terms Mask	None
Pupil Mask	None
Filters	None
Pupil	100.0%
Ref Subtracted	No
Mod Thresh	30.0%
Data Fill	No
Min Island Size	1000
Trim Pixels	0
Transform	No
Island Leveling	No

Dataset Statistics	
PV (100% CLAP)	0.266141 wv
PVq (Q=98%, 100% CL...	0.152419 wv
RMS (100% CLAP)	0.031424 wv
Peak (100% CLAP)	0.164859 wv
Valley (100% CLAP)	-0.101282 wv
Ra (100% CLAP)	0.025132 wv
Mean (100% CLAP)	3.85480E-10 wv
Valid Points (100% CL...	473,987
Unit Circle	(413,413)r=414 px
ROI	829 x 829
ROI Size	799.913 mm x 799.9...
Strehl	0.962

4 Explanation of Results

There is always a certain measuring error due to air turbulence, temperature, the way the mirror is put into its holder etc.

When we compared measurements before coating against the measurements after coating, we could never find any reproducible errors that could be assigned with coating and where larger than our measurement error.

The results in the example here show a typical minor change that can as well be attributed to simple random measurement errors.

We would also like to point out, that coatings can change mirror shapes only, if the substrate is very thin and multilayer thick coatings are applied (like dielectric coatings with 10 or more layers). These coatings on very thin substrates can cause indeed a deformation of the mirror. But this is absolutely not the case here.

That is why ASA decided not to perform the laborious interferometric measurements again after coating.