Reflectivity measurements of WHT M3 Nasmyth flat mirror before & after wet wash, 3/3/2016

Very dirty (and damaged) mirror was washed using distilled water spray, soap solution and sponges, followed by cloth dragging technique using mixed water and propanol ; dried with compressed air flow. Small oil drops succesfully removed, minimal cleaning residues, faint off-axis "hand smudge" remaining. End result is a 5% increase in reflectivity (CT7 average), but it remains some 2% lower than previous washes. Scattering also higher.

p1: SMS Measurements usually in pairs at same location, to check 0.05% repeatibility.
Those marked "Not rep" are omitted from statistics. Instrument clock is approx. 15 minutes ahead

	SMS Summary characteristics		Lambda	0.67 micron			
			Incident Angle	25 deg			
			BW Limits	1	0.01		

	Scattering at angles Θ,Φ						
	Θs->	0	50	Reflect-ivity	user comm-ent	Rough-ness RMS(Å)	TIME	DATE
datum #	Φs->	0	180					
Initial Reference mirror checks								
444		5.04E-03	2.61E-03	0.867	low!	51.1	13:26:01	03/03/1916
445		7.46E-03	4.45E-03	0.934	OK	59.5	13:26:09	03/03/1916
446		7.46E-03	4.47E-03	0.934	rep	59.5	13:26:16	03/03/1916
447		4.67E-03	3.73E-03	0.933	Ok	47	13:26:23	03/03/1916
448		7.56E-03	2.03E-03	0.93	OK	64.8	13:26:32	03/03/1916
MEASUREMENTS of M3 AFTER WASHING ONLY								
449	pos 1	6.41E-03	9.98E-04	0.838		73.5	13:28:43	03/03/1916
450		6.39E-03	9.91E-04	0.843		73.3	13:28:48	03/03/1916
451	pos 2	6.86E-03	1.01E-03	0.832		78.3	13:29:01	03/03/1916
452		6.85E-03	1.01E-03	0.835		78	13:29:07	03/03/1916
453	pos 3	6.01E-03	8.16E-04	0.849		75.3	13:29:19	03/03/1916
454		5.96E-03	8.08E-04	0.847		75.2	13:29:24	03/03/1916
455	pos 4	7.56E-03	9.36E-04	0.828		89.8	13:29:33	03/03/1916
456		7.58E-03	9.43E-04	0.829		89.6	13:29:38	03/03/1916
457	pos 5	7.87E-03	1.64E-03	0.824		74.3	13:29:44	03/03/1916
458		7.84E-03	1.63E-03	0.812	not rep	74.9	13:29:50	03/03/1916
459	pos 6	7.28E-03	1.07E-03	0.834		80.7	13:29:58	03/03/1916
460		7.28E-03	1.07E-03	0.83		80.9	13:30:03	03/03/1916
461	pos 7	5.46E-03	7.64E-04	0.846		70.8	13:30:14	03/03/1916
averages		**6.79E-03**	**1.00E-03**	**0.836**		**78.3**		
std.deviation		7.78E-04	2.77E-04	0.010		5.9		
std.error		3.18E-04	1.13E-04	0.004		2.4		
range		2.41E-03	8.80E-04	0.037		19.0		

Scattering is ~2x higher and the reflectivity lower (~1%) than for the WHT M1 after wash, 28/5/15

Reference mirror final check

462		1.77E-03	1.09E-03	0.933		29	13:45:29	03/03/1916
463		1.77E-03	1.10E-03	0.932		29	13:45:35	03/03/1916
464		4.60E-03	1.30E-03	0.931		50	13:45:42	03/03/1916
465		5.63E-03	2.12E-03	0.938		53.1	13:45:49	03/03/1916

Final measurement is within 0.2% of the minimum. Others show repeatability.

CT7 data shows that the final reflectivity value for M3 is about 2% lower than that achieved in wash of WHT Primary mirror 20/8/15

CT7 measurements on M3					% Reflectivity per waveband of measurement (nm)						
data #	date-time	C#	Card name	T/°C	365	404	464	522	624	760	970
663	15/02/2016 10:10	5	WHTM3 all	16	82.7	81.7	81.8	82.2	81.6	79.4	84.8
664	15/02/2016 10:10	5	WHTM3 all	17	82.9	82	82	82.5	81.9	79.6	85.1
665	15/02/2016 10:14	5	WHTM3 all	17	84.2	83	83	83.2	82.5	80	85.3
average Reflectivity per waveband					83.3	82.2	82.3	82.6	82.0	79.7	85.1
Average shortfall from fresh Aluminium					10.1	9.5	8.9	8.6	8.2	7.8	8.4
678	03/03/2016 13:43	5	WHTM3 all	21	87	86	86.4	87.1	86.9	84.7	91.4
679	03/03/2016 13:44	5	WHTM3 all	21	87.6	86.6	87	87.4	87.3	84.9	91.5
680	03/03/2016 13:45	5	WHTM3 all	21	87.9	86.8	87	87.5	87.1	84.9	91.2
					87.5	86.5	86.8	87.3	87.1	84.8	91.4
Average shortfall from fresh Aluminium					5.9	5.2	4.4	3.9	3.1	2.7	2.1
Improvement in Reflectivity					4.2	4.2	4.5	4.7	5.1	5.2	6.3
Average reflectivity over all wavebands					**87.3**						
WHT M1 after wash 20/8/15					**89.2**						
Fresh aluminium LT 24/6/15					**91.1**						
DUST index measurements on M3											
663			WHTM3 all		19.5	18.9	19.5	15.1	16.9	13.9	13.7
664			WHTM3 all		19.1	18.5	19	14.5	16.2	13.7	11.6
665			WHTM3 all		16.6	16.1	16.7	13.1	15.3	13.1	13.2
					18.4	17.8	18.4	14.2	16.1	13.6	12.8
AFTER WASH											
678					14	12.4	11.6	7.7	7.6	5.1	4
679					13.2	11.2	10.4	7.1	6.7	4.7	3.6
680					12.7	11	10.2	7.3	7.3	5	4.4
					13.3	11.5	10.7	7.4	7.2	4.9	4.0
Improvement in dust index (%)					5.1	6.3	7.7	6.9	8.9	8.6	8.8
Sum of Dust Index and Reflectivity before					101.7	100.1	100.7	96.9	98.1	93.2	97.9
after					100.8	98.0	97.5	94.7	94.3	89.8	95.4
					365	404	464	522	624	760	970