

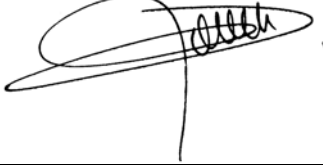





Herschel – SPIRE

SPIRE FM MIRRORS

Optical measurement report

Fichier: LAS.QUA.SPI.PRIV.040117_01_10_FM mirrors_ Optical measurement report .doc

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Change record

Date	Edition	Révision	Modification	Pages affected
17/02/2004	1	0	First Issue	All

Distribution List

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LAM	Roman F.										
LAM	Rousset G.									X	
LAM	Travers B.										
	FM mirror ADP									X	



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1 Introduction

This document gives the results of the measurement carried out on the SPIRE STM mirrors.

Three kinds of measurement have been carried out

1. Mechanical metrology of the optical surface under the subcontractor responsibility
2. Wave Front Error (WFE) at LAM
3. Surface Roughness at LAM

2 Documents

2.1 Applicable Documents

no.	document name	document number, Iss./Rev.
AD1	SPIRE mirrors specification	LAM.PJT.SPI.SPT.200007 ind 9

2.2 Reference Documents

no.	document name	document number, Iss./Rev.
RD1	Rapport de contrôle dimensionnel MECASEM	NBO.02.1033
RD2	Rapport de contrôle dimensionnel MECASEM	NBO.03.0116
RD3	Rapport de contrôle dimensionnel MECASEM	H. Troussard 09-MAR-04 10:53
RD4	ICD structure – mechanical I/F	SPIRE-MSS-PRJ-000 10

3 STM mirrors verification status

The following table gives, for each mirror, the type of verification that has been carried out.

Mirror designation	S/N	WFE	Surface Roughness	Mech Metrology
CM3	03		X	X
CM5	02		X	X
PM10	02	X	X ₍₁₎	X
PM11	03	X	X ₍₁₎	X
PM6	02			X
PM7	03	X	X ₍₁₎	X
PM8	02		X ₍₁₎	X
PM9	01	X	X ₍₁₎	X
SM10A	03	X	X ₍₁₎	X
SM10B	02	X	X ₍₁₎	X
SM11A	03		X	X
SM11B	02			X
SM12A	02	X	X ₍₁₎	X
SM12B	02	X	X ₍₁₎	X
SM6	02			X
SM7	03	X	X ₍₁₎	X
SM8A	03		X	X
SM8B	03			X
SM9A	02	X	X ₍₁₎	X
SM9B	01	X	X ₍₁₎	X

Table 1 : Mirror verification matrix

(1) : measurement done with the batch of the STM mirrors.

4 Wave Front Error (WFE)

In AD1, the surface shape specification is specified at 1 μ RMS and the tolerance on the radius of curvature is specified at : $\Delta R/R < 10^{-3}$.

For the mirrors for which this verification was not possible with the LAM facility, the results of the mechanical measurements performed at the subcontractor's have been used. These mechanical measurements were done with a 3 dimensions measurement machine whose accuracy is given to be 0.1 μ m. A mechanical measurement report was delivered with the mirrors.

5 Surface Roughness

The specification given in AD1 is <10 nm RMS and was driven by the optical alignment procedure in the visible light.

For the mirror manufactured with the first batch, that is to say at the same time as for the STM mirrors, the surface roughness was measured at LAM on a roughness meter "Rodenstock". For all the mirrors the measurement results give a surface roughness that is about 20 nm RMS, so out of the specification. The non-conformance ref: LAM.QUA.SPI.NCR.030002 was issued and considered as acceptable after treatment.

For the mirrors of the second batch, that is to say all the toric mirrors and the CM3 manufactured during the last quarter of 2003, the roughness measured on two mirrors is in the range, 9 - 15 nm RMS.

6 Coordinates system

According to RD3 the coordinates system linked to the mirrors is listed in the figure 1. The Z axis is pointing away from the mirror surface. The Y axis is pointing away from the SOB, (the dowel pin being always on the SOB side so in -Y).

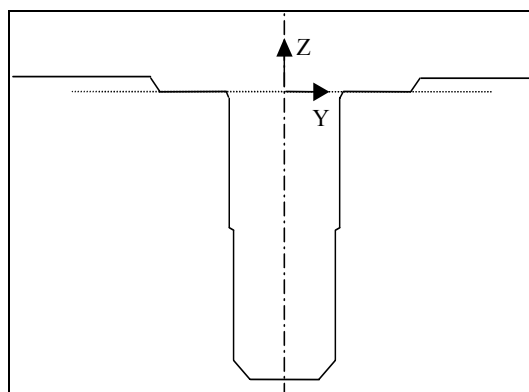


Figure 1: Reference coordinates system for mirrors

7 Measurement results

The table of the following sheet gives the main results of the measurements.



Subassy	Mirrors designation	S/N	Type	Surface Shape (μm) (spec < 1μm RMS)	Surface roughness (nm) (Spec < 10 nm RMS)	R or Rz theoretical (mm) Warm condition	R or Rz measured (mm) Warm condition	ΔR/R (Spec ΔR/R < 10 ⁻³)	Center of curvature Location wrt the Mirrors coordinates Spec < 0,05mm < 0.5 arcmin		CC or Ry theoretical (mm) Warm condition	CC or Ry Measured (mm) Warm condition	ΔR/R (Spec ΔR/R < 10 ⁻³)	Center of curvature Location wrt the Mirrors coordinates Spec < 0,05mm < 0.5 arcmin	
									Xm	Ym				Xm	Ym
Fore optics															
	CM3	03	Off axis Asphere	NM ⁽¹⁾	23 nm	365,963					-0,5095				
	CM5	02	Toric	NM	12 nm	295,861	295,846	10 ⁻⁴			279,573	280,007	3 10 ⁻⁴		
									3,98					2,62	
Photometer															
	PM6	02	Toric	NM	NM	308,766	309,678	2,9 10 ⁻³		0,19	360,912	361,923	2,8 10 ⁻³	0,72	
									2,1 arcmin					6,7 arcmin	
	PM7	03	Sphere	0,3	(2)	332,073	331,899	0,5 10 ⁻³	9,7 10 ⁻³	6,7 10 ⁻³					
									0,11 arcmin						
	PM8	02	Sphere	0,3	(2)	287,841	287,777	0,2 10 ⁻³	15 10 ⁻³	-3,1 10 ⁻³					
									0,18 arcmin						
	PM9	01	Sphere	0,2	(2)	352,307	352,199	0,3 10 ⁻³	0,6 10 ⁻³	12 10 ⁻³					
									0,11 arcmin						
	PM10	02	Flat	0,7	(2)										
	PM11	03	Flat	0,5	(2)										
Spectrometer															
	SM6	02	Toric	NM	NM	271,040	271,023	6 10 ⁻⁵		0, 11	525,964	524,645	2,5 10 ⁻³	0,17	
									1,3 arcmin					1,1 arcmin	
	SM7	03	Flat	0,6	(2)										
	SM8A	03	Toric	NM	15 nm	231,296	230,909	1,6 10 ⁻³		-0,04	202,838	202,831	0,2 10 ⁻³	0,27	
									0,54 arcmin					4,5 arcmin	
	SM8B	03	Toric	NM	NM	231,296	230,844	1,9 10 ⁻³		-0,06	202,838	202,815	0,1 10 ⁻³	0,25	
									0,89 arcmin					4,1 arcmin	
	SM9A	02	Sphere	0,3	(2)	260,577	261,024	1,7 10 ⁻³	7,2 10 ⁻³	2,2 10 ⁻³					
									0,09 arcmin						
	SM9B	01	Sphere	0,3	(2)	260,577	261,008	1,7 10 ⁻³	-1,3 10 ⁻³	-5,4 10 ⁻³					
									0,07 arcmin						

Subassy	Mirrors designation	S/N	Type	Surface Shape (μm) (spec < 1μm RMS)	Surface roughness (nm) (Spec < 10 nm RMS)	R or Rz theoretical (mm) Warm condition	R or Rz measured (mm) Warm condition	ΔR/R (Spec ΔR/R < 10 ⁻³)	Center of curvature Location wrt Mirrors coordinates Spec < 0,05mm < 0.5 arcmin		CC or Ry theoretical (mm) Warm condition	CC or Ry Measured (mm) Warm condition	ΔR/R (Spec ΔR/R < 10 ⁻³)	Center of curvature Location wrt the Mirrors coordinates Spec < 0,05mm < 0.5 arcmin	
									Xm	Ym				Xm	Ym
	SM10A	03	Sphere	0,3	(2)	261,079	261,446	1,4 10 ⁻³	2,8 10 ⁻³	6,9 10 ⁻³					
									0,09 arcmin						
	SM10B	02	Sphere	0,3	(2)	261,079	261,355	1,1 10 ⁻³	12 10 ⁻³	9,7 10 ⁻³					
	SM11A	03	Toric	NM	15 nm RMS	197,808	197,774	0,16 10 ⁻³		0,04	170,545	170,506	0,2 10 ⁻³	0,07	
														1,3 arcmin	
	SM11B	02	Toric	NM	NM	197,808	197,763	0,23 10 ⁻³		0,02	170,545	170,533	6 10 ⁻⁵	0,07	
														1,3 arcmin	
	SM12A	02	Flat	0,4	(2)										
	SM12B	02	Flat	0,2	(2)										

Table 2 : Optical measurement results

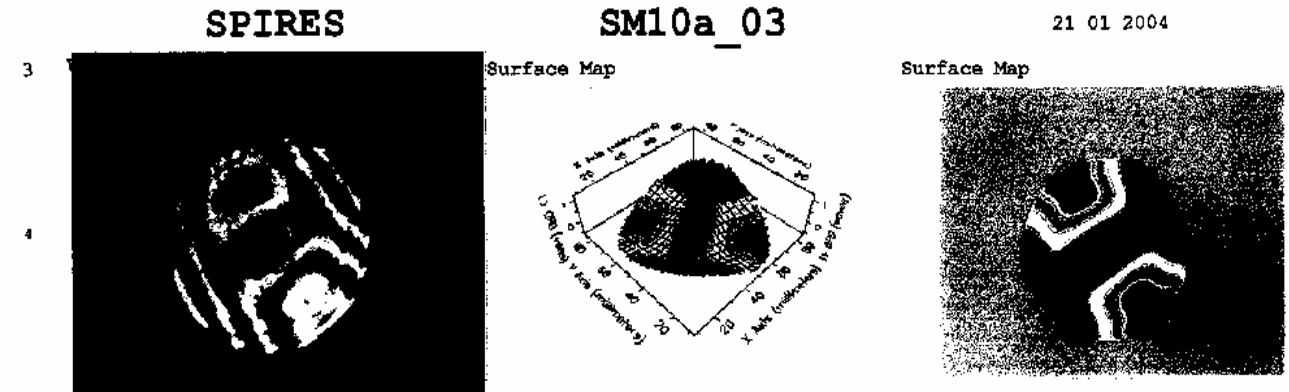
(1) : NM = Not measured at LAM

(2) : All these mirrors have been manufactured with the STM mirror batch
The figures given in the grey cells are out of specification

8 Interferometric measurement results

Here after the interferograms for the flat and the spherical mirrors.

8.1 SM10A-03

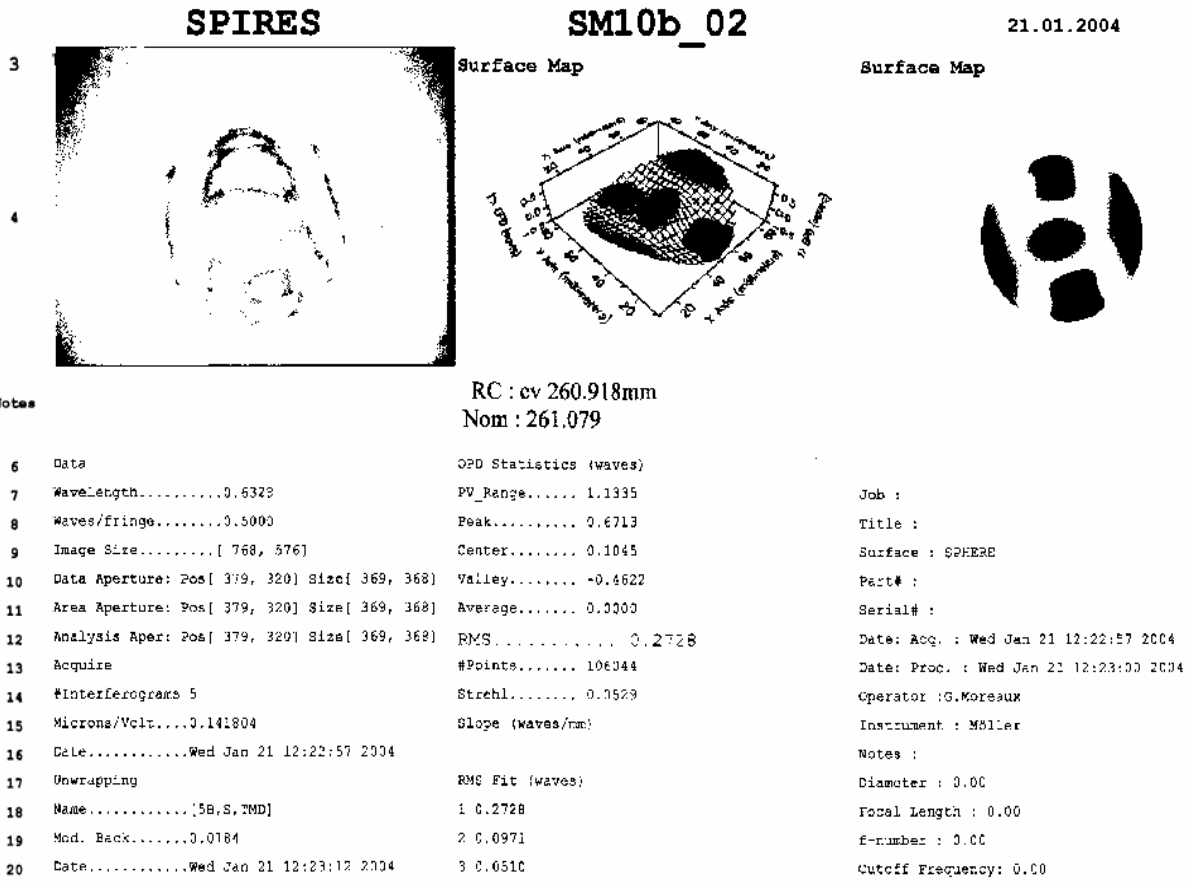


RC : cv 260.949 OK
Nom:261.079mm

Notes

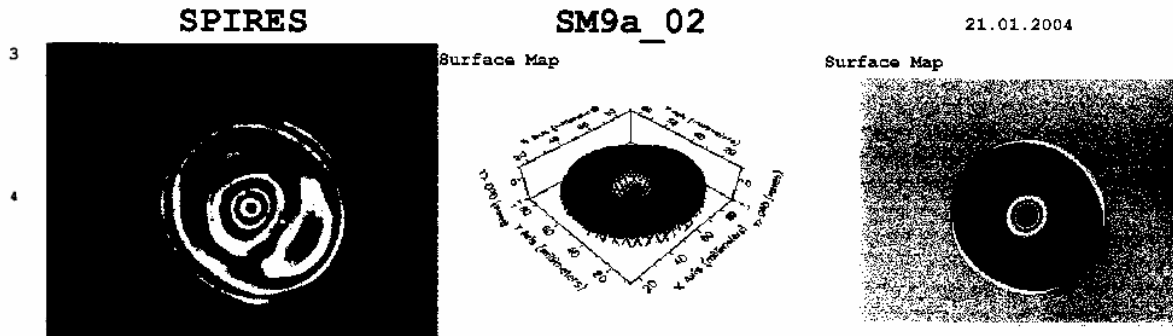
<p>6 Data</p> <p>7 Wavelength.....0.6328</p> <p>8 Waves/fringe.....0.5000</p> <p>9 Image Size.....[768, 576]</p> <p>10 Data Aperture: Pos[369, 322] Size[369, 368]</p> <p>11 Area Aperture: Pos[369, 322] Size[369, 368]</p> <p>12 Analysis Aper: Pos[369, 322] Size[369, 368]</p> <p>13 Acquire</p> <p>14 #Interferograms 5</p> <p>15 Microns/Volt....0.141804</p> <p>16 Date.....Wed Jan 21 11:19:28 2004</p> <p>17 Unwrapping</p> <p>18 Name.....(SB,S,TKD)</p> <p>19 Mod. Back.....0.0169</p> <p>20 Date.....Wed Jan 21 11:19:48 2004</p> <p>21 Aberrations</p> <p>22 Name.....JofA</p> <p>23 Aperture Type...inscribed</p> <p>24 Removed.....2,3,4,</p> <p>25</p> <p>26</p> <p>27 Aber>JofA (waves)</p> <p>28 1 C.0000</p> <p>29 2 C.2877</p>	<p>OPD Statistics (waves)</p> <p>PV_Range..... 0.4785</p> <p>Peak..... 0.8403</p> <p>Center..... 0.1006</p> <p>Valley..... -0.6392</p> <p>Average..... 0.0000</p> <p>RMS..... 0.3284</p> <p>#Points..... 106044</p> <p>Strehl..... 0.0142</p> <p>Slope (waves/mm)</p> <p>RMS Fit (waves)</p> <p>1 0.3283</p> <p>2 0.0808</p> <p>3 0.0304</p> <p>4 0.0173</p> <p>5 0.0000</p> <p>19 -0.0097</p> <p>20 0.0349</p>	<p>Job :</p> <p>Title :</p> <p>Surface :</p> <p>Part# :</p> <p>Serial# :</p> <p>Date: Acq. : Wed Jan 21 11:19:28 2004</p> <p>Date: Proc. : Wed Jan 21 11:19:31 2004</p> <p>Operator :</p> <p>Instrument :</p> <p>Notes :</p> <p>Diameter : 0.00</p> <p>Focal Length : 0.00</p> <p>f-number : 0.00</p> <p>Cutoff Frequency: 0.00</p> <p>Wavelength : 0.63</p> <p>Waves Per Fringe: 0.50</p> <p style="margin-top: 20px;"><i>Poids 43,455gr</i></p>
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8.2 SM10B-02



Poids : 43,35gr

8.3 SM9A-02



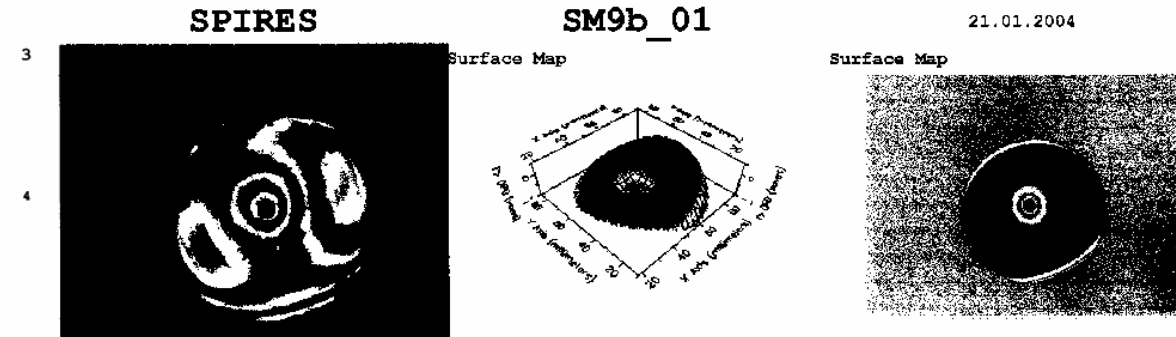
Notes

RC : cv entre 260.5 et 260.6mm OK
Nom : 260.577mm

<p>6 Data</p> <p>7 WaveLength.....0.6328</p> <p>8 Waves/fringe.....0.5000</p> <p>9 Image Size.....[768, 576]</p> <p>10 Data Aperture: Pos[406, 324] Size[369, 368]</p> <p>11 Area Aperture: Pos[405, 324] Size[369, 368]</p> <p>12 Analysis Aperi: Pos[406, 324] Size[369, 368]</p> <p>13 Acquire</p> <p>14 #Interferograms 5</p> <p>15 Microns/Volt.....0.141604</p> <p>16 Date.....Wed Jan 21 15:28:57 2004</p> <p>17 Jowrapping</p> <p>18 Name.....[5B,S,TMD]</p> <p>19 Mod. Back.....0.C153</p> <p>20 Date.....Wed Jan 21 15:29:11 2004</p>	<p>OPD Statistics (waves)</p> <p>PV_Range..... 1.5131</p> <p>Peak..... 0.4541</p> <p>Center..... -0.3025</p> <p>Valley..... -1.0550</p> <p>Average..... 0.0000</p> <p>RMS..... 0.3232</p> <p>#Points..... 136044</p> <p>Strehl..... 0.0162</p> <p>Slope (waves/mm)</p> <p>RMS Fit (waves)</p> <p>1 0.3232</p> <p>2 0.0982</p> <p>3 0.0570</p>	<p>Job :</p> <p>Title :</p> <p>Surface : SPHERE</p> <p>Part# :</p> <p>Serial# :</p> <p>Date: Acq. : Wed Jan 21 15:28:57 2004</p> <p>Date: Proc. : Wed Jan 21 15:29:00 2004</p> <p>Operator : G.Nozeaux</p> <p>Instrument :Möller</p> <p>Notes :</p> <p>Diameter : 0.00</p> <p>Focal Length : 0.00</p> <p>F-number : 0.00</p> <p>Cutoff Frequency: 0.00</p>
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Poids : 31,77gr

8.4 SM9B-01



Notes

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6 Data
7 Wavelength.....0.6328
8 Waves/fringe.....0.5000
9 Image Size.....[ 768, 576]
10 Data Aperture: Pos[ 409, 325] Size[ 344, 344]
11 Area Aperture: Pos[ 409, 325] Size[ 344, 344]
12 Analysis Aper: Pos[ 409, 325] Size[ 344, 344]
13 Acquire
14 #Interferograms 5
15 Microns/Volt....0.141804
16 Date.....Wed Jan 21 15:56:15 2004
17 Unwrapping
18 Name.....{5B,S,TMD}
19 Mod. Rack.....0.0032
20 Date.....Wed Jan 21 15:56:31 2004
21 Aberrations
22 Name.....JcFA
23 Aperture Type...inscribed
24 Removed.....2,3,4,
25
26
27 Aber>JcFA (waves)
28 1 -0.0303
29 2 0.2228
  
```

RC : cv entre 260.422 et 260.500mm (1)
Nom :260.577mm

```

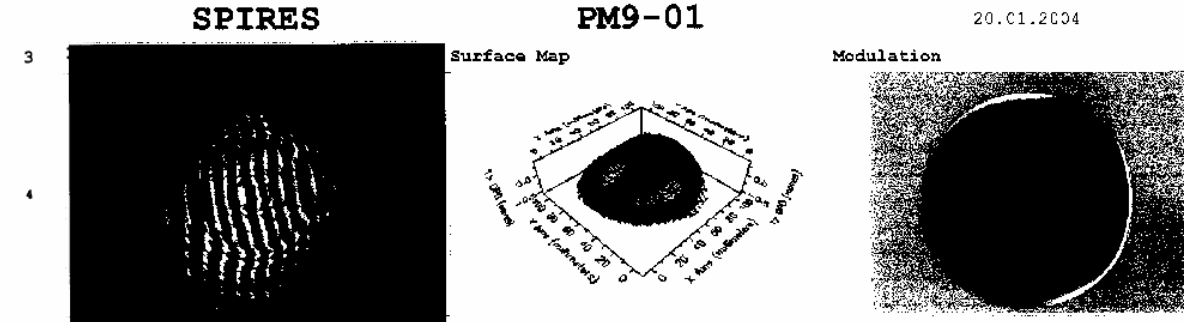
OPD Statistics (waves)
PV_Range..... 1.4439
Peak..... 0.4633
Center..... -0.2586
Valley..... -0.9806
Average..... 0.0000
RMS..... 0.3001
#Points..... 92332
Strehl..... 0.9286
Slope (waves/mm)
RMS Fit (waves)
1 0.3901
2 0.0916
3 0.0562
4 0.0264
5 0.0000
19 -0.0313
20 -0.0269
  
```

```

Job :
Title :
Surface : SPHERE
Part# :
Serial# :
Date: Acq. : Wed Jan 21 15:56:15 2004
Date: Proc. : Wed Jan 21 15:56:18 2004
Operator : G.Moireaux
Instrument : MÖLLER
Notes :
Diameter : 0.33
Focal Length : 3.00
f-number : 0.60
Cutoff Frequency: 0.00
Wavelength : 0.63
Waves Per Fringe: 0.50
  
```

Poids : 34,84 gr

8.5 PM9-01



RC : cv 352.192mm OK
Nom :352.357mm

Notes

<p>6 Data</p> <p>7 Wavelength.....0.6328</p> <p>8 Waves/fringe.....0.5000</p> <p>9 Image Size.....[768, 576]</p> <p>10 Data Aperture: Pos[385, 304] Size[515, 515]</p> <p>11 Area Aperture: Pos[385, 304] Size[515, 515]</p> <p>12 Analysis Aper: Pos[385, 304] Size[515, 515]</p> <p>13 Acquire</p> <p>14 #Interferograms 5</p> <p>15 Microns/Volt...0.141804</p> <p>16 Date.....Tue Jan 20 11:25:05 2004</p> <p>17 Unwrapping</p> <p>18 Name.....[5B,8,7MB]</p> <p>19 Mod. Back.....0.0197</p> <p>20 Date.....Tue Jan 20 11:25:29 2004</p> <p>21 Aberrations</p> <p>22 Name.....Cofa</p> <p>23 Aperture Type...inscribed</p> <p>24 Removed.....2,3,4,</p> <p>25</p>	<p>OPD Statistics (waves)</p> <p>PV_Range..... 1.1297</p> <p>Peak..... 0.3722</p> <p>Center..... -0.1927</p> <p>Valley..... -0.7573</p> <p>Average..... 0.0003</p> <p>RMS..... 0.1509</p> <p>#Points..... 207465</p> <p>Strehl..... 0.4070</p> <p>Slope (waves/mm)</p> <p>RMS Err (waves)</p> <p>1 0.1509</p> <p>2 0.1043</p> <p>3 0.0425</p> <p>4 0.0317</p> <p>5 0.0000</p>	<p>Job :</p> <p>Title :</p> <p>Surface : SPHERE</p> <p>Part# :</p> <p>Serial# :</p> <p>Date: Acq. : Tue Jan 20 11:25:05 2004</p> <p>Date: Proc. : Tue Jan 20 11:25:29 2004</p> <p>Operator : S.MOREAU</p> <p>Instrument : Moller</p> <p>Notes :</p> <p>Diameter : 0.00</p> <p>Focal Length : 0.00</p> <p>f-number : 0.00</p> <p>Cutoff Frequency: 0.00</p> <p>Wavelength : 0.53</p> <p>Waves Per Fringe: 0.50</p> <p style="margin-top: 20px;"><i>Poids : 193,725 gr.</i></p>
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8.6 PM7-03

SEIDEL ABERRATION COEFFICIENTS FROM UNIFORM GRID

Magnitude waves	Angle deg	Aberration
0.040	-134.9	TILT
-0.473		FOCUS
0.521	-10.9	ASTIGMATISM
0.060	174.4	COMA
-2.886		SPHERICAL

PMA-03
OK
RC = 331,834 ± 0.0
nominal: 332,093 ± 0.3

Terms Subtracted From Data

Tilt

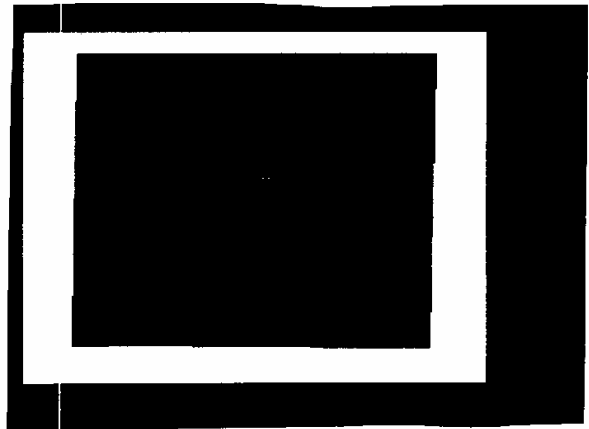
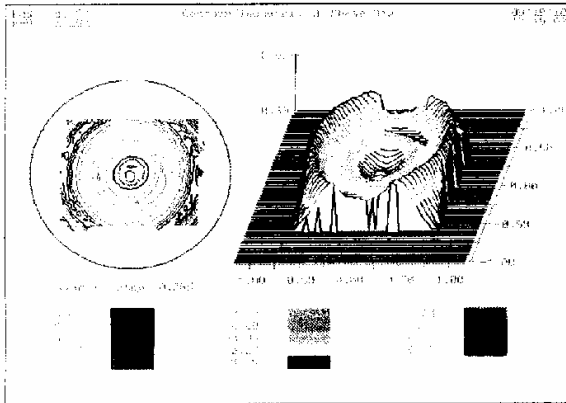
	Wedge	Wavelength
TEST:	-0.50	0.633
USER:	-0.50	0.633

Residual Wavefront Variations Over Uniform Grid (in waves)

Number of pts	Peak	Valley	P-V	RMS	Strehl Ratio
1733	0.507	-0.597	1.104	0.216	0.158

Press <ENTER> to continue!

-Faws 0,271





8.7 PM11-03

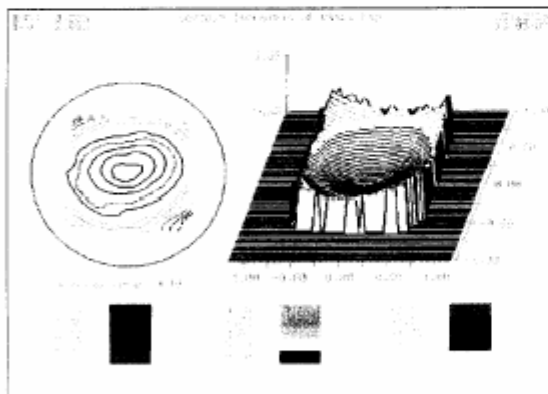
SEIDEL ABERRATION COEFFICIENTS FROM UNIFORM GRID

Magnitude waves	Angle deg	Aberration	Wedge	Wavelength
0.077	42.1	TILT		
2.776		FOCUS		
1.553	-76.8	ASTIGMATISM		
0.293	93.4	COMA		
-0.198		SPHERICAL		
Terms Subtracted From Data			TEST: -0.50	0.633
			USER: -0.50	0.633

Residual Wavefront Variations Over Uniform Grid (in waves)

Number of pts	Peak	Valley	P-V	RMS	Strehl Ratio
1663	1.657	-0.877	2.534	0.526	0.000

Press <ENTER> to continue!



G.Moreaux

PM11_03



8.8 PM10-02

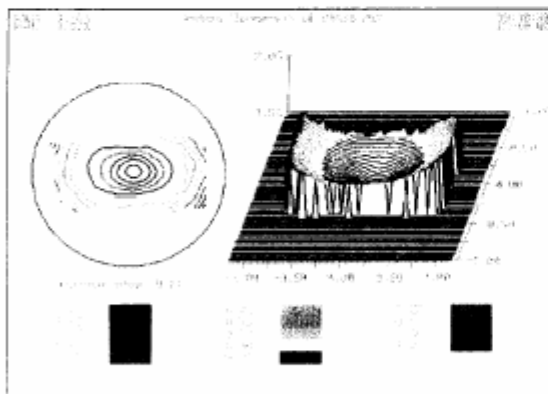
SEIDEL ABERRATION COEFFICIENTS FROM UNIFORM GRID

Magnitude waves	Angle deg	Aberration	Wedge	Wavelength
0.138	-105.6	TILT		
4.496		FOCUS		
3.739	89.9	ASTIGMATISM		
0.289	40.9	COMA		
-1.021		SPHERICAL		
Terms Subtracted From Data			TEST: 0.50	0.633
			USER: 0.50	0.633

Residual Wavefront Variations Over Uniform Grid (in waves)

Number of pts	Peak	Valley	P-V	RMS	Strehl Ratio
1311	2.046	-1.520	3.567	0.703	0.000

Press <ENTER> to continue!



G.Moreaux

PM10_02

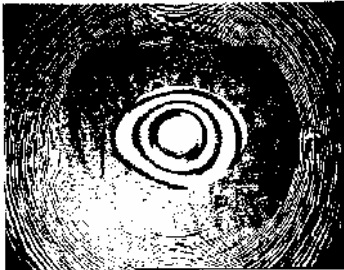
8.9 SM12A-02

SPIRES

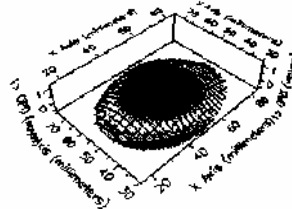
SM 12a 02

20/11/2003

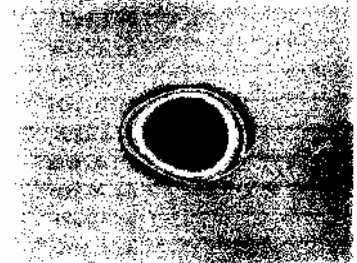
3 **Wrapped Phase**



Surface Map



Surface Map



Surface CV

Notes

<p>6 Data</p> <p>7 Wavelength.....0.6328</p> <p>8 Waves/fringe.....0.8000</p> <p>9 Image Size.....[768, 576]</p> <p>10 Data Aperture: Pos[394, 289] Size[303, 219]</p> <p>11 Area Aperture: Pos[394, 289] Size[303, 219]</p> <p>12 Analysis Aper: Pos[394, 289] Size[303, 219]</p> <p>13 Acquire</p> <p>14 #Interferograms 5</p> <p>15 Microns/Volt....0.141804</p> <p>16 Date.....Thu Nov 20 16:35:00 2003</p> <p>17 Unwrapping</p> <p>18 Name.....[5B,S,TMD]</p> <p>19 Mod. Back.....0.0083</p> <p>20 Date.....Thu Nov 20 16:35:02 2003</p> <p>21 Aberrations</p> <p>22 Name.....U01A</p> <p>23 Aperture Type...inscribed</p> <p>24 Removed.....2,3,</p>	<p>OFD Statistics (waves)</p> <p>PV_Range..... 1.5312</p> <p>Peak..... 0.8713</p> <p>Center..... 0.0757</p> <p>Valley..... -0.7199</p> <p>Average..... 0.0000</p> <p>RMS..... 0.4271</p> <p>#Points..... 51897</p> <p>Strehl..... 0.3007</p> <p>Slope (waves/mm)</p> <p>RMS Fit (waves)</p> <p>1 0.1127</p> <p>2 0.0621</p> <p>3 0.0240</p> <p>4 0.0159</p> <p>5 0.0000</p>	<p>Job : SPIRES</p> <p>Title : SM 12a 02</p> <p>Surface :Plan</p> <p>Part# :</p> <p>Serial# :</p> <p>Date: Acq. : Thu Nov 20 16:35:00 2003</p> <p>Date: Proc. : Thu Nov 20 16:35:02 2003</p> <p>Operator : G.Moreaux</p> <p>Instrument : MOLLER</p> <p>Notes :</p> <p>Diameter : 0.00</p> <p>Focal Length : 0.00</p> <p>f-number : 0.00</p> <p>Cutoff Frequency: 0.00</p> <p>Wavelength : 0.63</p> <p>Waves Per Fringe: 0.50</p>
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8.10 SM12B-02

SPIRES

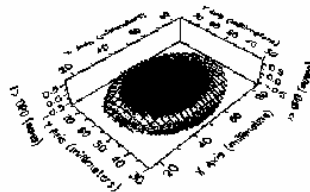
SM 12b 02

20/11/2003

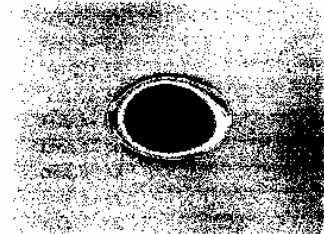
3 **Wrapped Phase**



Surface Map



Surface Map



Notes

```

6 Data
7 Wavelength.....0.6328
8 Waves/Fringe.....0.5000
9 Image Size.....[ 768, 576]
10 Data Aperture: Pos[ 389, 285] Size[ 303, 219]
11 Area Aperture: Pos[ 389, 285] Size[ 303, 219]
12 Analysis Apex: Pos[ 389, 285] Size[ 303, 219]
13 Acquire
14 #Interferograms 5
15 Microns/Volt....0.141804
16 Date.....Thu Nov 20 17:07:37 2003
17 Unwrapping
18 Name.....[5B,S,TMD]
19 Mod. Back.....0.0153
20 Date.....Thu Nov 20 17:07:40 2003
21 Aberrations
22 Name.....UofA
23 Aperture Type...inscribed
24 Removed.....2,3,
25
  
```

```

OPD Statistics (waves)
PV_Range..... 0.5627
Peak..... 0.4795
Center.....-0.0013
Valley.....-0.4822
Average..... 0.0000
RMS..... 0.2456
#points..... 51697
Strehl..... 0.0924
Slope (waves/mm)

RMS Fit (waves)
1 0.0515
2 0.0343
3 0.0202
4 0.0139
5 0.0000
  
```

```

Job : SPIRES
Title : SM 12b 02
Surface : Plan
Part# :
Serial# :
Date: Acq. : Thu Nov 20 17:07:37 2003
Date: Proc. : Thu Nov 20 17:07:40 2003
Operator : G.Moreaux
Instrument : MÖLLER
Notes :
Diameter : 0.00
Focal Length : 0.00
f-number : 0.00
Cutoff Frequency: 0.00
Wavelength : 0.63
Waves Per Fringe: 0.50
  
```

Surface Cx



8.11 SM7-03

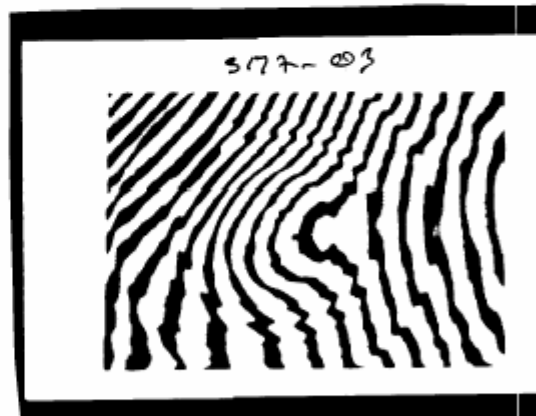
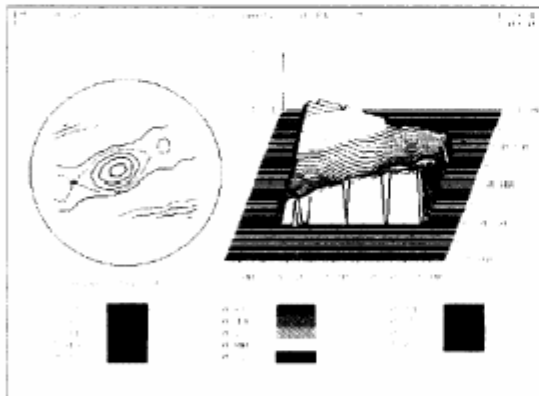
SEIDEL ABERRATION COEFFICIENTS FROM UNIFORM GRID

Magnitude waves	Angle deg	Aberration	Wedge	Wavelength
0.094	-71.5	TILT		
1.542		FOCUS		
4.316	-70.9	ASTIGMATISM		
0.943	119.2	COMA		
-2.580		SPHERICAL		
Terms Subtracted From Data			TEST: -0.50	0.633
			USER: -0.50	0.633

Residual Wavefront Variations Over Uniform Grid (in waves)

Number of pts	Peak	Valley	P-V	RMS	Strehl Ratio
1634	1.624	-1.207	2.831	0.596	0.000

Press <ENTER> to continue!



G.Moreaux

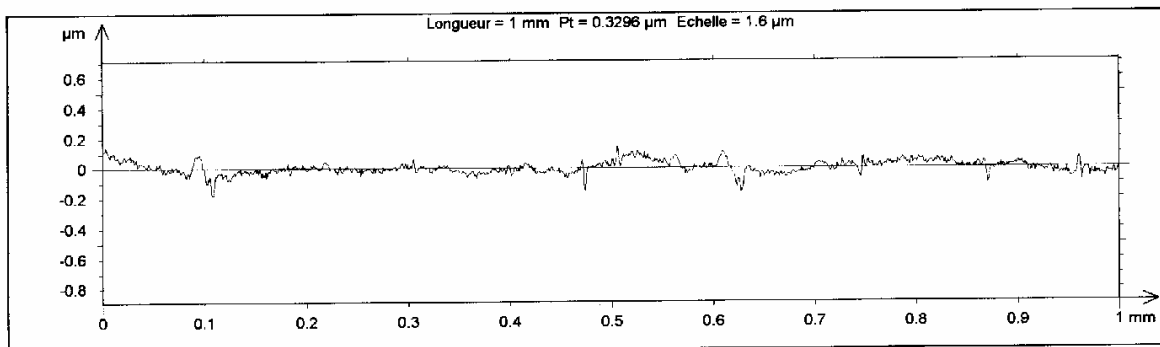
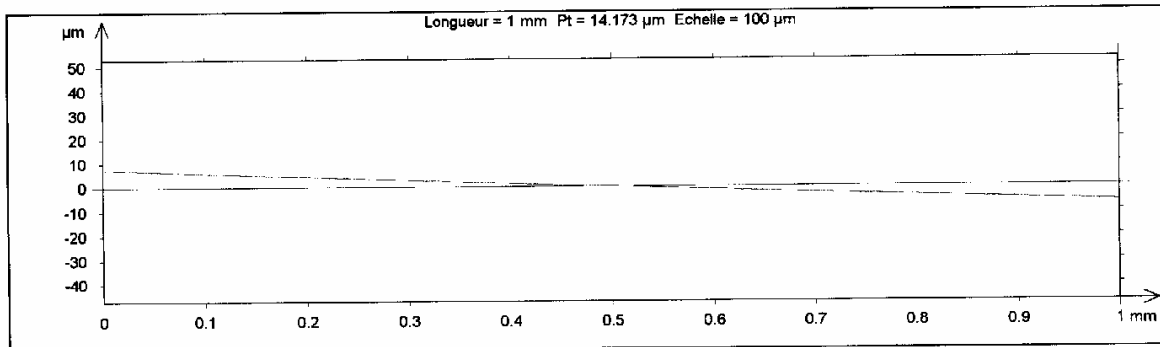
SM7_03

9 Surface roughness measurement

9.1 SM8A - 03

SM8a_03 centre pas

le 24 02 2004



**Paramètres calculés sur le profil sm8a03
centre pas > ... > Forme supprimée :
Polynôme de degré 2**

* Paramètres calculés par moyenne des 5 premières longueurs de base.
* Le filtrage de la microrugosité est désactivé.

Paramètres de rugosité, Filtre gaussien, 0.025 mm

Ra = 0.01148 µm
Ra : Ecart moyen arithmétique du profil de rugosité.
Rq = 0.015371 µm
Rq : Ecart moyen quadratique (RMS) du profil de rugosité.
Rt = 0.17396 µm
Rt : Hauteur totale du profil de rugosité.
RPs = 0 pics/mm (+/- 0.5 µm)
RPs : Comptage des pics du profil de rugosité.

Carte d'identité

Nom : sm8a03 centre pas > Zoomé > Forme supprimée : Polynôme de degré 2

Axe : X
Longueur : 1 mm
Taille : 1001 points
Pas : 0.001 mm

Axe : Z
Longueur : 0.3296 µm
Taille : 36 digits
Pas : 0.0091556 µm

Rq = 0.015371 µm

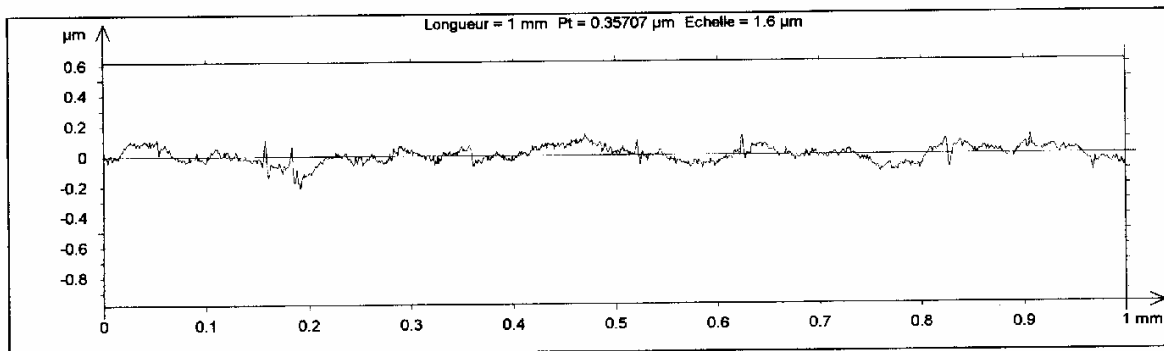
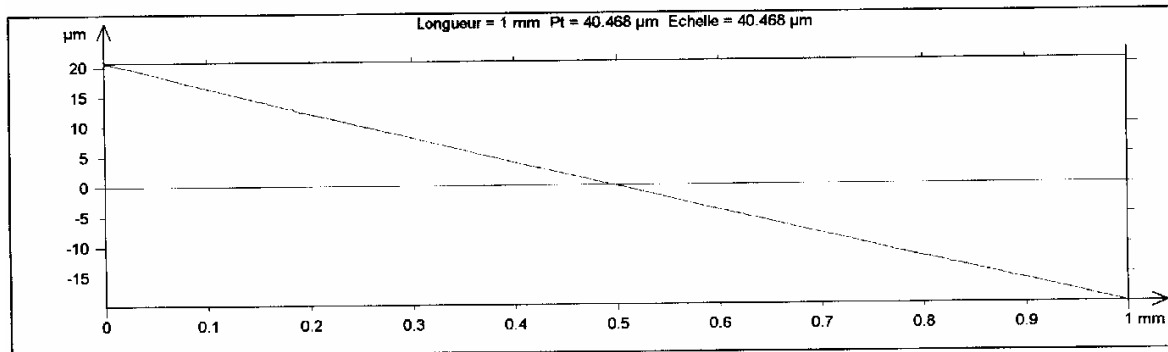
hors normes

Limite basse: 0 µm
Limite haute: 0.01 µm

9.2 SM11A-03

sm11_03 centre pas

le 24 02 2004



**Paramètres calculés sur le profil sm11a03
 centre pas > ... > Forme supprimée :
 Polynôme de degré 2**

* Paramètres calculés par moyenne des 5 premières longueurs de base.
 * Le filtrage de la microrugosité est désactivé.

Paramètres de rugosité, Filtre gaussien, 0.025 mm

Ra = 0.0060568 µm
 Ra : Ecart moyen arithmétique du profil de rugosité.

Rq = 0.0096033 µm
 Rq : Ecart moyen quadratique (RMS) du profil de rugosité.

Rt = 0.21058 µm
 Rt : Hauteur totale du profil de rugosité.

RPc = 0 pics/mm (+/- 0.5 µm)
 RPc : Comptage des pics du profil de rugosité.

Carte d'identité

Nom : sm11a03 centre pas > Zoomé > Forme supprimée : Polynôme de degré 2

Axe : X
 Longueur : 1 mm
 Taille : 1001 points
 Pas : 0.001 mm

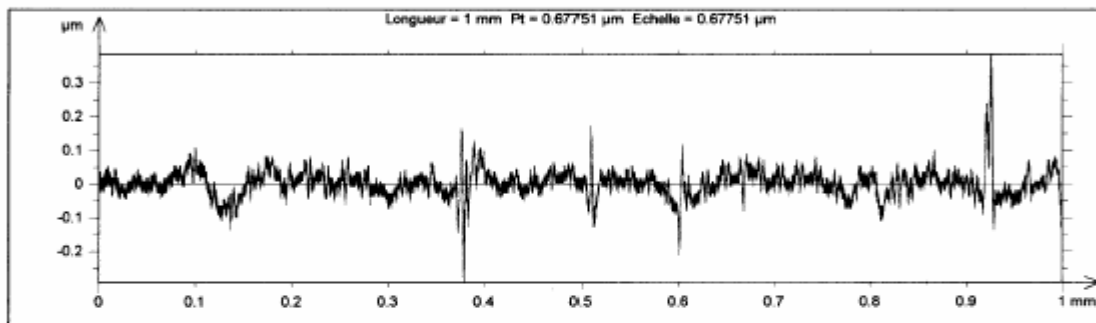
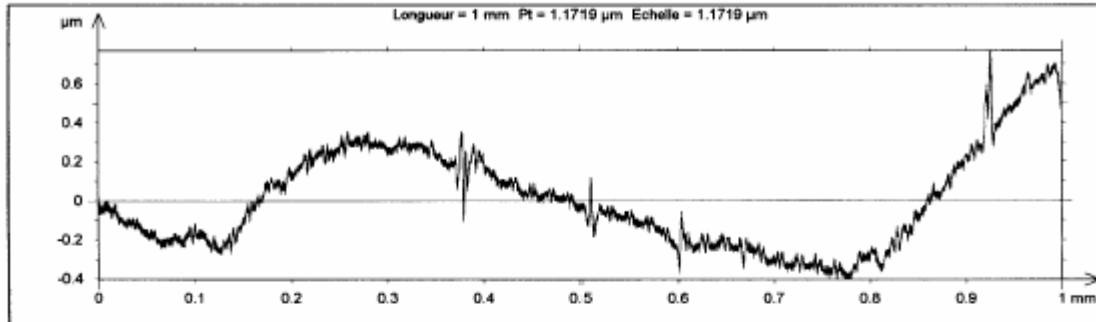
Axe : Z
 Longueur : 0.35707 µm
 Taille : 39 digits
 Pas : 0.0091556 µm

Rq = 0.0096033 µm

Limite basse: 0 µm
 Limite haute: 0.01 µm

9.3 CM5-02

CM5_02 R Centre
 pas à pas 0.1µ
 le 19 03 2004



Paramètres calculés sur le profil CM5_02 R centre (pas 0.1µ) 19 03 04 > Forme supprimée : Polynôme de degré 10

* Paramètres calculés par moyenne des 5 premières longueurs de base.
 * Le filtrage de la microrugosité est désactivé.

Paramètres de rugosité, Filtre gaussien, 0.025 mm

Ra = 0.0085573 µm
 Ra : Écart moyen arithmétique du profil de rugosité.

Rq = 0.012778 µm
 Rq : Écart moyen quadratique (RMS) du profil de rugosité.

Rt = 0.52187 µm
 Rt : Hauteur totale du profil de rugosité.

RPc = 0 pics/mm (+/- 0.5 µm)
 RPc : Comptage des pics du profil de rugosité.

Carte d'identité

Nom : CM5_02 R centre (pas 0.1µ) 19 03 04
 Mesuré par : G. Moreaux
 Fichier : D:\Documents and Settings\gabi\Bureau\still\CM5_02 R centre (pas 0.1µ) 19 03 04.pro
 Créé le : 19/03/2004 10:28:05
 Durée de la mesure : 39 m 14 s

Axe : Y
 Longueur : 1 mm
 Taille : 10001 points
 Pas : 0.0001 mm

Axe : Z
 Longueur : 1.1719 µm
 Taille : 128 digits
 Pas : 0.0091556 µm

Rq = 0.012778 µm
Hors normes

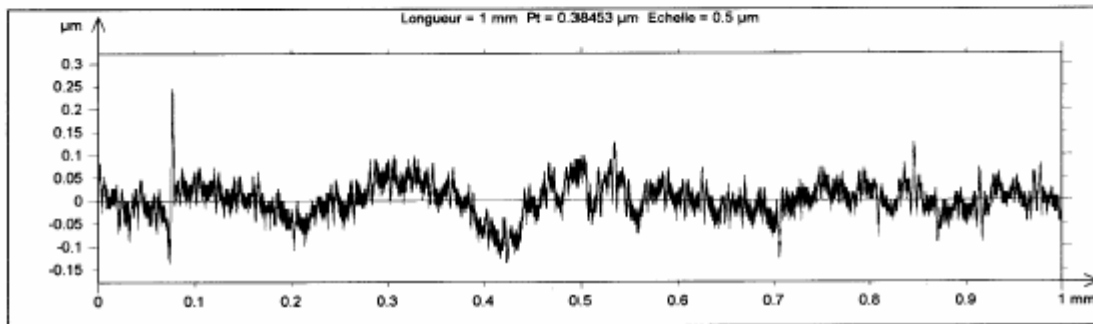
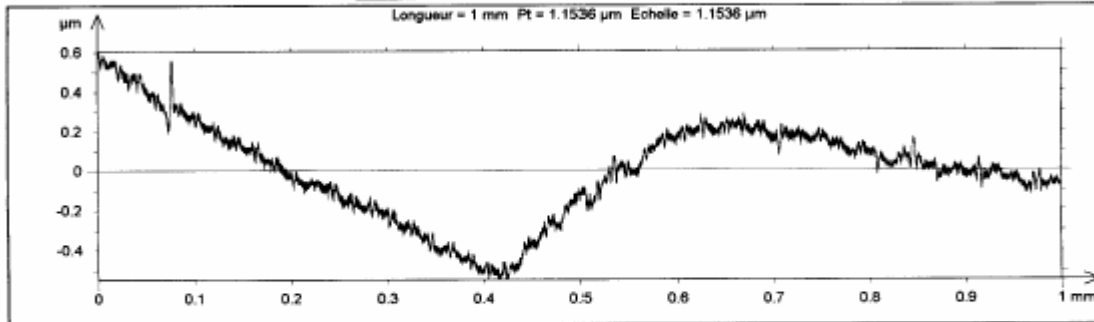
Limite basse: 0 µm
 Limite haute: 0.01 µm

Mesure du 8.12.2003

Rq = 0,0072653

9.4 CM3-03

CM3_03 R Centre pas à pas 0.1µ le 19 03 2004



Paramètres calculés sur le profil CM3_03 R centre (pas 0.1µ) 19 03 04 > Forme supprimée : Polynôme de degré 10

* Paramètres calculés par moyenne des 5 premières longueurs de base.
* Le filtrage de la microrugosité est désactivé.

Paramètres de rugosité, Filtre gaussien, 0.025 mm

Ra = 0.014919 µm
Ra : Ecart moyen arithmétique du profil de rugosité.
Rq = 0.023215 µm
Rq : Ecart moyen quadratique (RMS) du profil de rugosité.
Rt = 0.32044 µm
Rt : Hauteur totale du profil de rugosité.
RPe = 0 pics/mm (+/- 0.5 µm)
RPe : Comptage des pics du profil de rugosité.

Carte d'identité

Nom : CM3_03 R centre (pas 0.1µ) 19 03 04
Mesuré par : G. Moreaux
Fichier : D:\Documents and Settings\gabi\Bureau\still\CM3_03 R centre (pas 0.1µ) 19 03 04.pro
Créé le : 19/03/2004 14:35:16
Durée de la mesure : 39 m 0 s

Axe : Y
Longueur : 1 mm
Taille : 10001 points
Pas : 0.0001 mm

Axe : Z
Longueur : 1.1536 µm
Taille : 126 digits
Pas : 0.0091556 µm

Rq = 0.023215 µm
Hors normes

Limite basse: 0 µm
Limite haute: 0.01 µm

mesure
du 9.12.2003
Rq = 0,023572