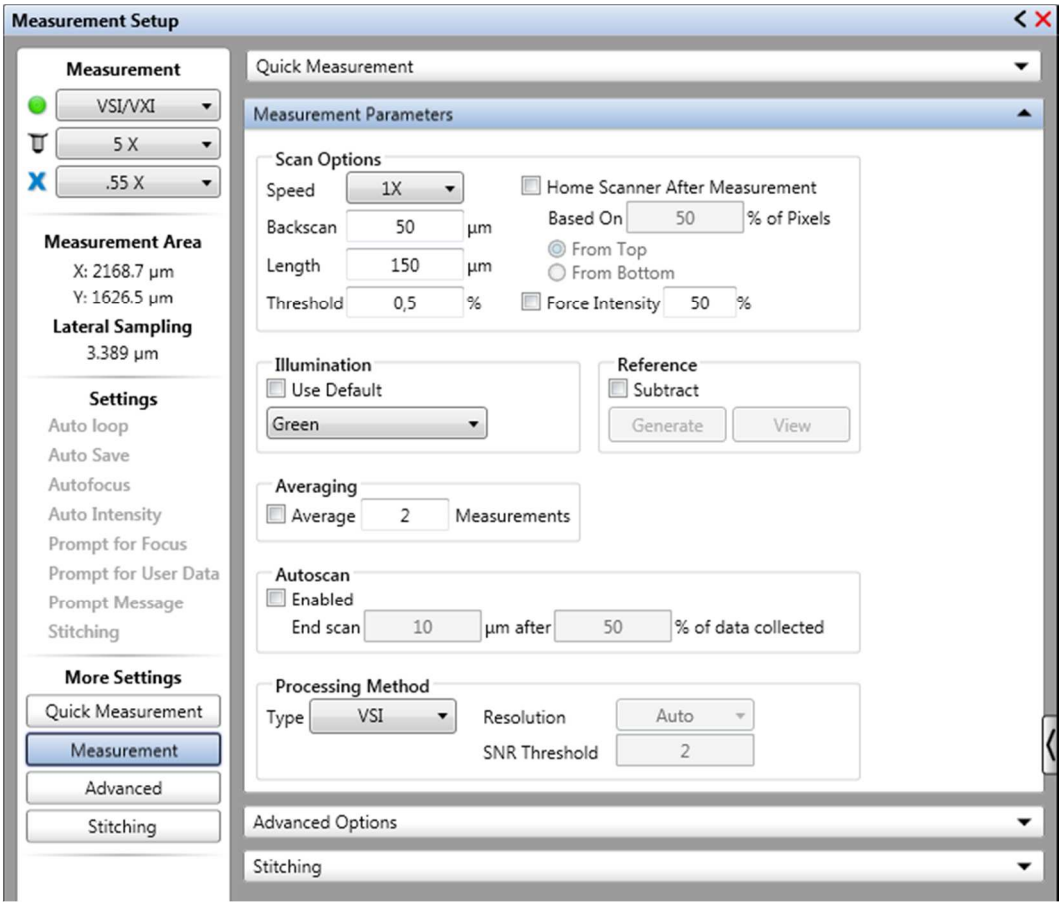
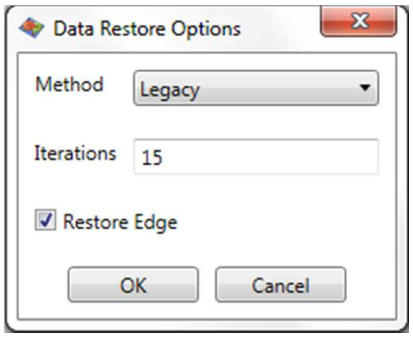
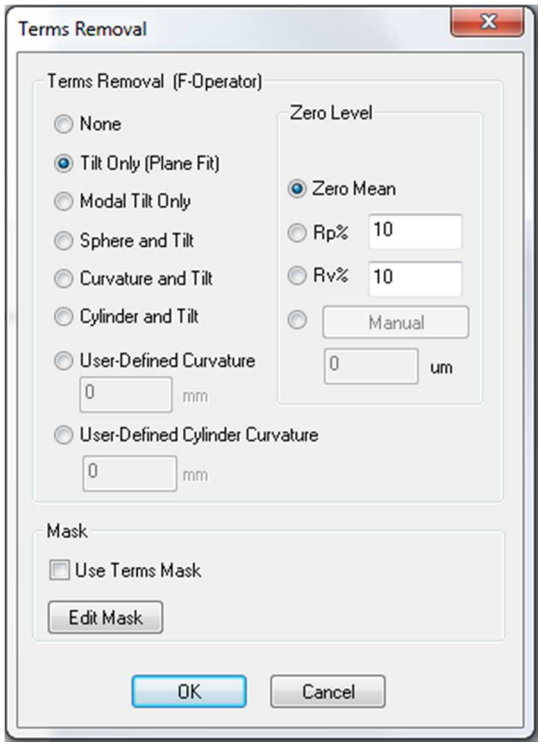
12 SEZNAM PŘÍLOH

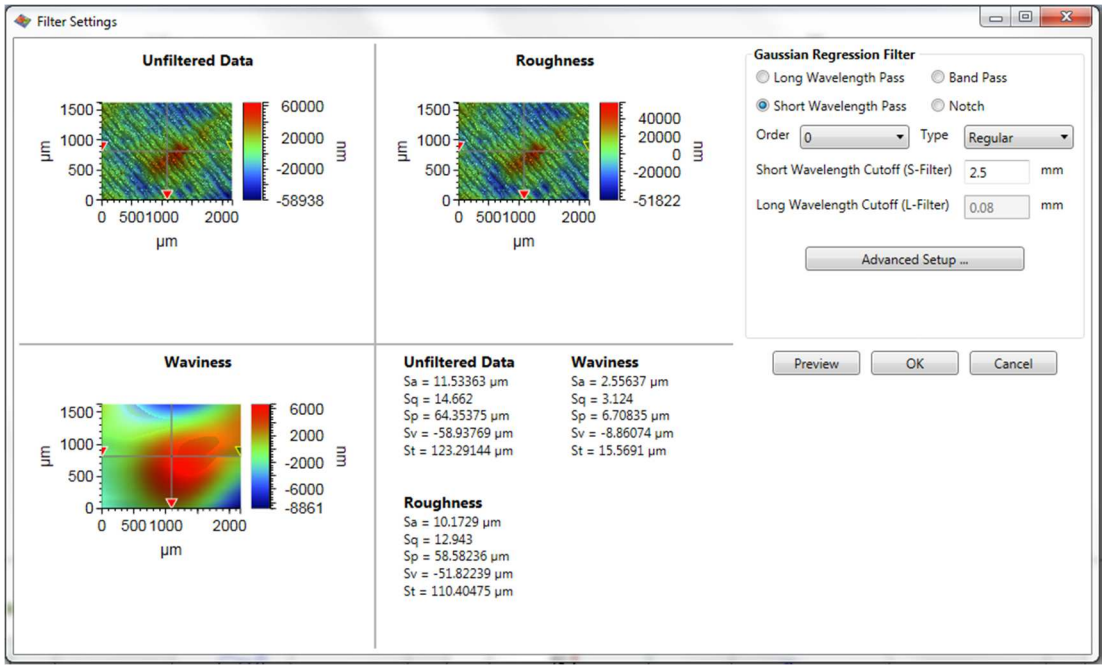
13 PŘÍLOHY

Příloha 1 Nastavení programu Vision64 pro měření a vyhodnocení drsnosti

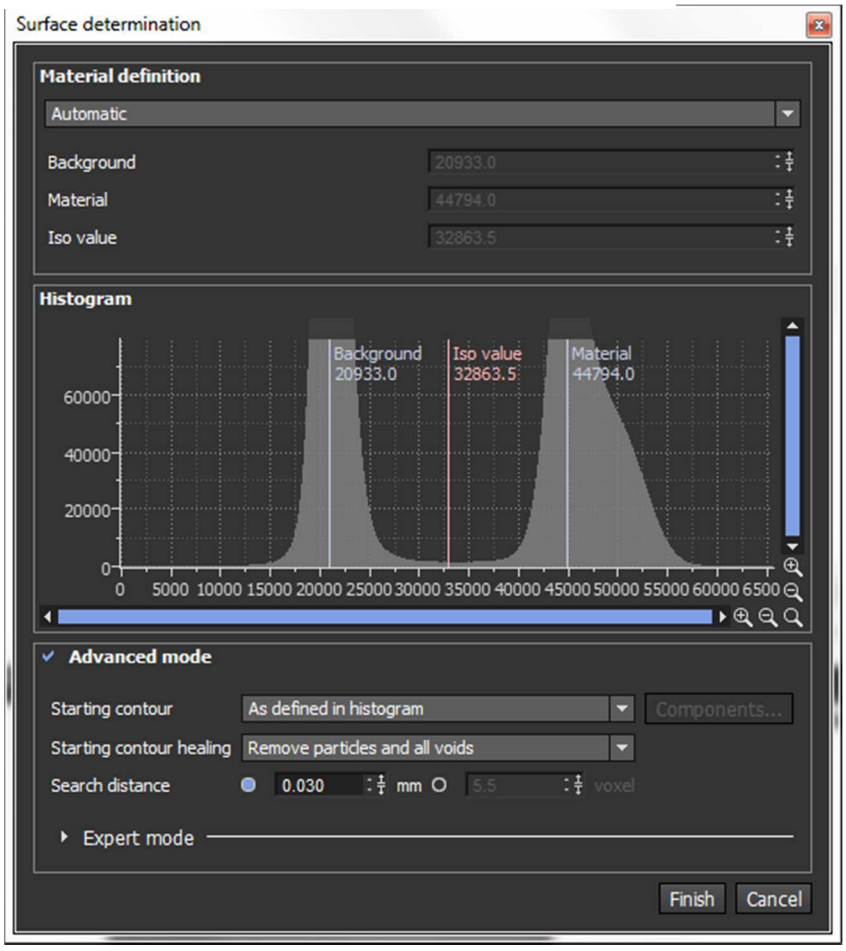


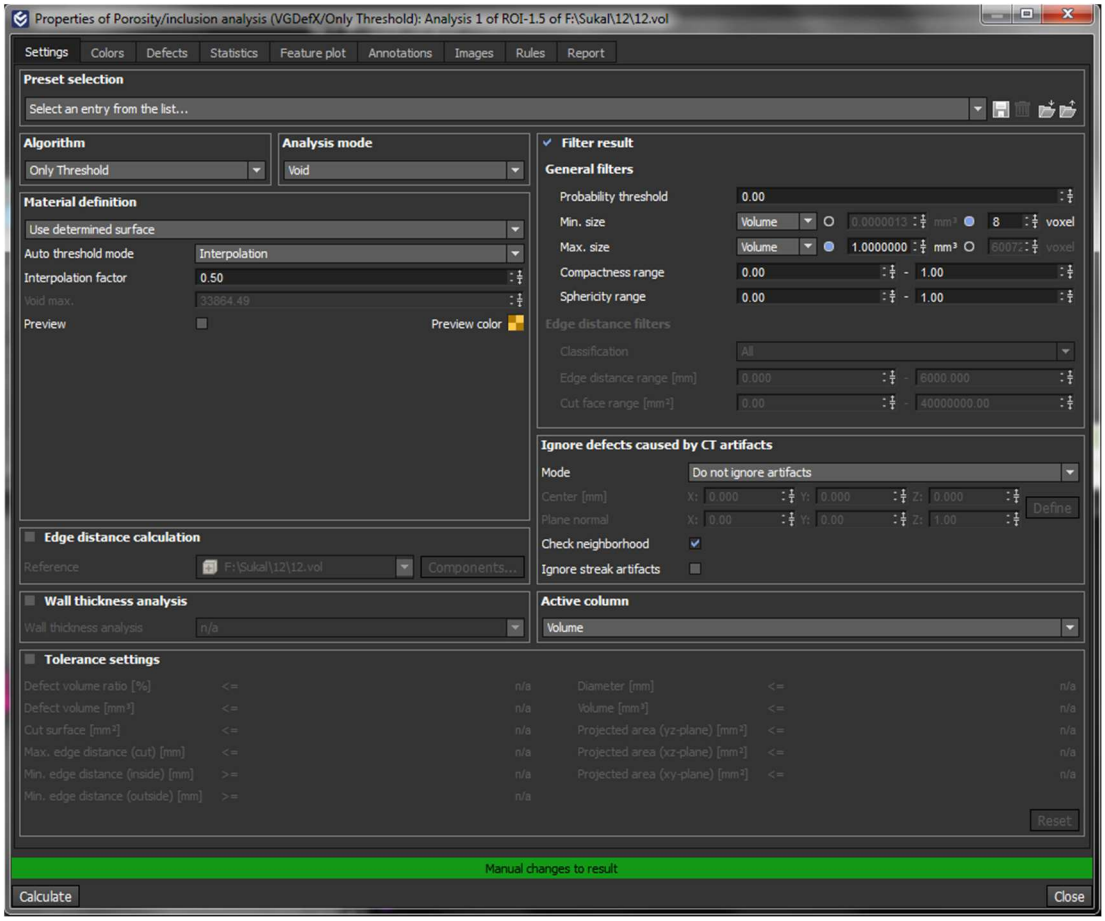






Příloha 2 Nastavení programu VGStudio 3.0 pro vyhodnocení vzorků z µCT



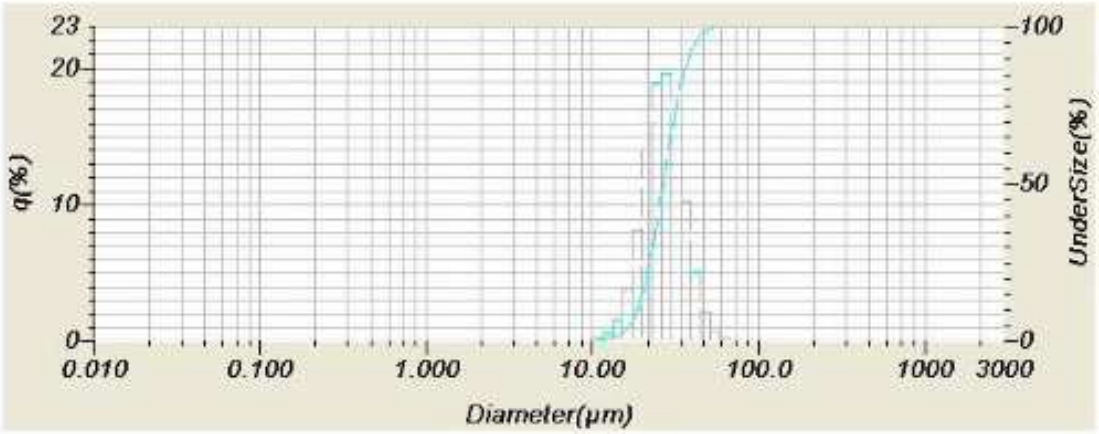

Properties of Porosity/inclusion analysis (VGDefX/Only Threshold): Analysis 1 of ROI-1.5 of F:\Sukal\12\12.vol
Settings
Colors
Defects
Statistics
Feature plot
Annotations
Images
Rules
Report
Preset selection
Select an entry from the list...
Algorithm
Only Threshold
Analysis mode
Void
Material definition
Use determined surface
Auto threshold mode
Interpolation
Interpolation factor
0.50
Void max.
33864.49
Preview
Preview color
Filter result
General filters
Probability threshold
0.00
Min. size
Volume
0.0000013
mm³
8
voxel
Max. size
Volume
1.0000000
mm³
6007
voxel
Compactness range
0.00
1.00
Sphericity range
0.00
1.00
Edge distance filters
Classification
All
Edge distance range [mm]
0.000
6000.000
Cut face range [mm²]
0.00
40000000.00
Ignore defects caused by CT artifacts
Mode
Do not ignore artifacts
Center [mm]
Plane normal
Define
Check neighborhood
Ignore streak artifacts
Edge distance calculation
Reference
F:\Sukal\12\12.vol
Components...
Wall thickness analysis
Wall thickness analysis
n/a
Active column
Volume
Tolerance settings
Defect volume ratio [%]
Defect volume [mm³]
Cut surface [mm²]
Max. edge distance (cut) [mm]
Min. edge distance (inside) [mm]
Min. edge distance (outside) [mm]
Diameter [mm]
Volume [mm³]
Projected area (yz-plane) [mm²]
Projected area (xz-plane) [mm²]
Projected area (xy-plane) [mm²]
Reset
Manual changes to result
Calculate
Close

Příloha 3 Protokoly z měření distribuce částic prášků P0 až P11 oceli 1.2709

2016.12.06 02:37:00

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 26.71878(µm)
ID#	: 201612060227180	Mean Size	: 27.74185(µm)
Data Name	: vz. P0 2minUS	Std.Dev.	: 7.8282(µm)
Transmittance(R)	: 72.1(%)	Geo.Mean Size	: 26.6941(µm)
Transmittance(B)	: 78.6(%)	Geo.Std.Dev.	: 1.3204(µm)
Circulation Speed	: 7	Mode Size	: 27.6526(µm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 02:00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 18.6145(µ
Form of Distribution	: Auto		: (9)90.00 (%)- 38.1771(µ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Materiel	: ocel - Cr		
Source	:		



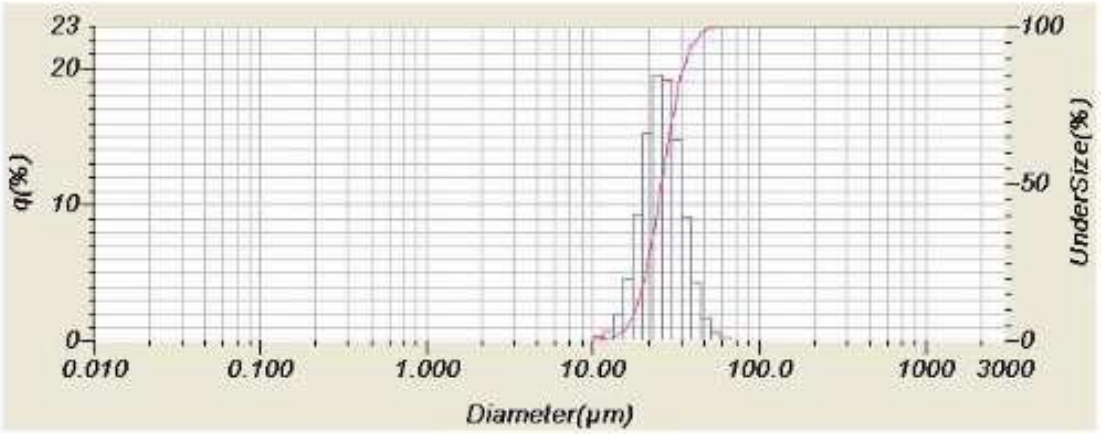
No.	Diameter(µm)	q(%)	UnderSize(%)	No.	Diameter(µm)	q(%)	UnderSize(%)	No.	Diameter(µm)	q(%)	UnderSize(%)	No.	Diameter(µm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000	20	0.150	0.000	0.000	39	1.981	0.000	0.000	58	26.111	18.784	46.702
2	0.013	0.000	0.000	21	0.172	0.000	0.000	40	2.209	0.000	0.000	59	29.907	19.429	66.129
3	0.015	0.000	0.000	22	0.197	0.000	0.000	41	2.599	0.000	0.000	60	34.255	15.771	81.899
4	0.017	0.000	0.000	23	0.226	0.000	0.000	42	2.976	0.000	0.000	61	39.234	10.104	92.004
5	0.020	0.000	0.000	24	0.259	0.000	0.000	43	3.409	0.000	0.000	62	44.936	5.024	97.028
6	0.022	0.000	0.000	25	0.296	0.000	0.000	44	3.905	0.000	0.000	63	51.471	2.087	99.115
7	0.026	0.000	0.000	26	0.339	0.000	0.000	45	4.472	0.000	0.000	64	58.963	0.693	99.808
8	0.029	0.000	0.000	27	0.389	0.000	0.000	46	5.122	0.000	0.000	65	67.533	0.192	100.000
9	0.034	0.000	0.000	28	0.445	0.000	0.000	47	5.867	0.000	0.000	66	77.339	0.000	100.000
10	0.039	0.000	0.000	29	0.510	0.000	0.000	48	6.720	0.000	0.000	67	88.583	0.000	100.000
11	0.044	0.000	0.000	30	0.584	0.000	0.000	49	7.697	0.000	0.000	68	101.450	0.000	100.000
12	0.051	0.000	0.000	31	0.669	0.000	0.000	50	8.816	0.000	0.000	69	116.210	0.000	100.000
13	0.058	0.000	0.000	32	0.766	0.000	0.000	51	10.097	0.000	0.000	70	133.103	0.000	100.000
14	0.067	0.000	0.000	33	0.877	0.000	0.000	52	11.565	0.190	0.190	71	152.453	0.000	100.000
15	0.076	0.000	0.000	34	1.005	0.000	0.000	53	13.246	0.535	0.725	72	174.616	0.000	100.000
16	0.087	0.000	0.000	35	1.151	0.000	0.000	54	15.172	1.476	2.201	73	200.000	0.000	100.000
17	0.100	0.000	0.000	36	1.318	0.000	0.000	55	17.377	3.726	5.928	74	229.073	0.000	100.000
18	0.115	0.000	0.000	37	1.510	0.000	0.000	56	19.901	8.038	13.965	75	262.376	0.000	100.000
19	0.131	0.000	0.000	38	1.729	0.000	0.000	57	22.797	13.964	27.929	76	300.518	0.000	100.000

1 / 1

2016.12.06 02:31:19

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 25.94494(µm)
ID#	: 201612060129166	Mean Size	: 26.95428(µm)
Data Name	: vz. P1 2minUS	Std.Dev.	: 7.6174(µm)
Transmittance(R)	: 72.1(%)	Geo.Mean Size	: 25.9337(µm)
Transmittance(B)	: 78.0(%)	Geo.Std.Dev.	: 1.3208(µm)
Circulation Speed	: 7	Mode Size	: 24.7321(µm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 02.00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 18.0939(µ
Form of Distribution	: Auto		: (9)90.00 (%)- 37.2160(µ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		
Source	:		



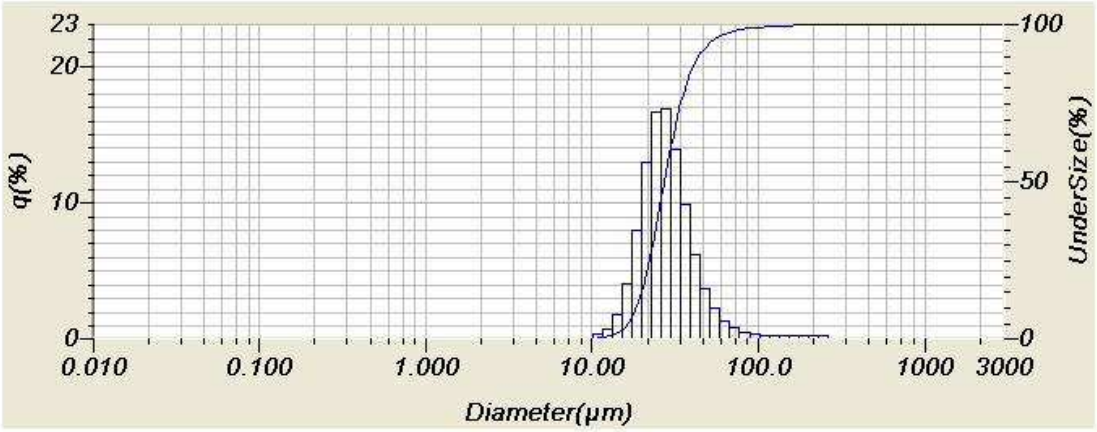
No.	Diameter(µm)	q(%)	UnderSize(%)	No.	Diameter(µm)	q(%)	UnderSize(%)	No.	Diameter(µm)	q(%)	UnderSize(%)	No.	Diameter(µm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000	20	0.160	0.000	0.000	39	1.981	0.000	0.000	58	25.111	10.331	80.929
2	0.013	0.000	0.000	21	0.172	0.000	0.000	40	2.209	0.000	0.000	59	29.907	10.005	89.917
3	0.015	0.000	0.000	22	0.197	0.000	0.000	41	2.556	0.000	0.000	60	34.295	8.636	98.554
4	0.017	0.000	0.000	23	0.226	0.000	0.000	42	2.976	0.000	0.000	61	39.234	8.916	93.469
5	0.020	0.000	0.000	24	0.259	0.000	0.000	43	3.409	0.000	0.000	62	44.936	4.217	97.686
6	0.022	0.000	0.000	25	0.296	0.000	0.000	44	3.905	0.000	0.000	63	51.471	1.645	99.331
7	0.026	0.000	0.000	26	0.339	0.000	0.000	45	4.472	0.000	0.000	64	58.963	0.529	99.860
8	0.029	0.000	0.000	27	0.388	0.000	0.000	46	5.122	0.000	0.000	65	67.533	0.140	100.000
9	0.034	0.000	0.000	28	0.445	0.000	0.000	47	5.867	0.000	0.000	66	77.339	0.000	100.000
10	0.039	0.000	0.000	29	0.510	0.000	0.000	48	6.720	0.000	0.000	67	88.593	0.000	100.000
11	0.044	0.000	0.000	30	0.584	0.000	0.000	49	7.697	0.000	0.000	68	101.469	0.000	100.000
12	0.051	0.000	0.000	31	0.669	0.000	0.000	50	8.816	0.000	0.000	69	116.210	0.000	100.000
13	0.058	0.000	0.000	32	0.766	0.000	0.000	51	10.097	0.000	0.000	70	133.103	0.000	100.000
14	0.067	0.000	0.000	33	0.877	0.000	0.000	52	11.565	0.274	0.274	71	152.453	0.000	100.000
15	0.076	0.000	0.000	34	1.005	0.000	0.000	53	13.246	0.696	0.951	72	174.616	0.000	100.000
16	0.087	0.000	0.000	35	1.151	0.000	0.000	54	15.172	1.850	2.800	73	200.000	0.000	100.000
17	0.100	0.000	0.000	36	1.318	0.000	0.000	55	17.377	4.495	7.295	74	229.073	0.000	100.000
18	0.115	0.000	0.000	37	1.510	0.000	0.000	56	19.904	9.177	16.446	75	262.376	0.000	100.000
19	0.131	0.000	0.000	38	1.729	0.000	0.000	57	22.797	15.133	31.578	76	300.518	0.000	100.000

1 / 1

2016.12.06 02:32:57

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 27.44767(µm)
ID#	: 201612060149169	Mean Size	: 31.35032(µm)
Data Name	: vz. P2 3minUS	Std.Dev.	: 19.2589(µm)
Transmittance(R)	: 70.9(%)	Geo.Mean Size	: 28.5342(µm)
Transmittance(B)	: 80.1(%)	Geo.Std.Dev.	: 1.4779(µm)
Circulation Speed	: 7	Mode Size	: 27.6393(µm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 03:00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 18.4649(µ
Form of Distribution	: Auto		: (9)90.00 (%)- 44.6529(µ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		
Source	:		



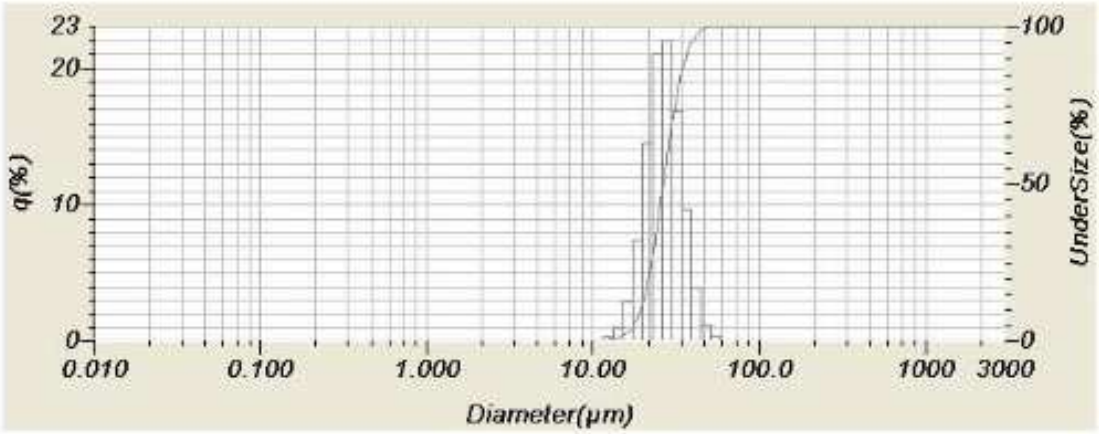
No.	Diameter(µm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.565	0.239	0.239
53	13.246	0.640	0.879
54	15.172	1.661	2.540
55	17.377	3.923	6.463
56	19.904	7.909	14.372
57	22.797	12.905	27.277
58	26.111	16.557	43.834
59	29.907	16.765	60.599
60	34.255	13.842	74.441
61	39.234	9.728	84.169
62	44.938	6.118	90.287
63	51.471	3.662	93.949
64	58.953	2.151	96.100
65	67.523	1.277	97.377
66	77.339	0.735	98.112
67	88.583	0.432	98.544
68	101.460	0.276	98.820
69	116.210	0.196	99.016
70	133.103	0.167	99.183
71	152.453	0.163	99.347
72	174.616	0.170	99.516
73	200.000	0.176	99.693
74	229.075	0.169	99.862
75	262.376	0.138	100.000
76	300.518	0.000	100.000

1 / 1

2016.12.06 02:33:29

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 26.67821(µm)
ID#	: 201612060200173	Mean Size	: 27.42921(µm)
Data Name	: vz. P3 3minUS	Std.Dev.	: 6.7269(µm)
Transmittance(R)	: 88.3(%)	Geo.Mean Size	: 26.6330(µm)
Transmittance(B)	: 91.6(%)	Geo.Std.Dev.	: 1.2753(µm)
Circulation Speed	: 7	Mode Size	: 27.5924(µm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 03.00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 19.4702(µ
Form of Distribution	: Auto		: (9)90.00 (%)- 36.6509(µ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Materiel	: ocel - Cr		
Source	:		



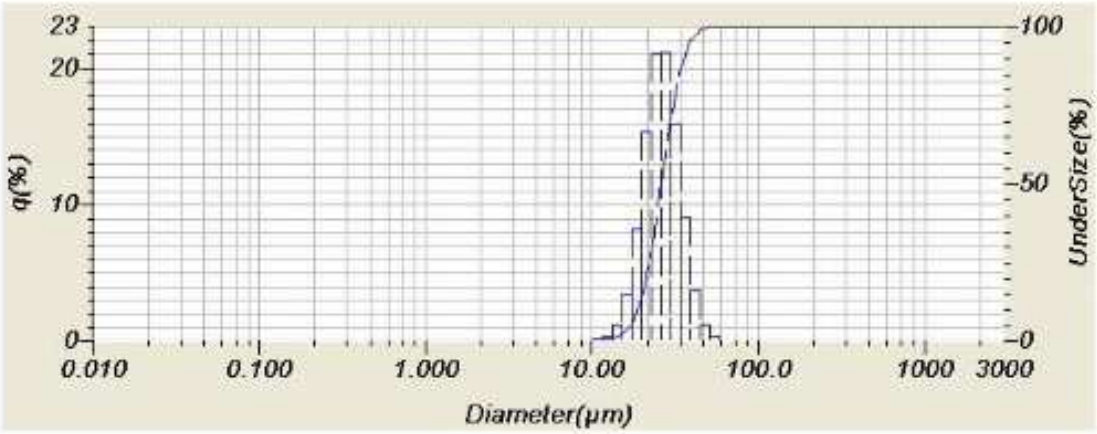
No.	Diameter(µm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.563	0.000	0.000
53	13.246	0.250	0.250
54	15.172	0.880	1.130
55	17.377	2.786	3.916
56	19.904	7.262	11.178
57	22.797	14.441	25.619
58	26.111	20.918	46.537
59	29.907	21.874	68.412
60	34.255	16.829	85.241
61	39.234	9.553	94.794
62	44.936	3.806	98.599
63	51.471	1.144	99.743
64	58.963	0.257	100.000
65	67.533	0.000	100.000
66	77.339	0.000	100.000
67	88.593	0.000	100.000
68	101.490	0.000	100.000
69	116.210	0.000	100.000
70	133.103	0.000	100.000
71	152.453	0.000	100.000
72	174.616	0.000	100.000
73	200.000	0.000	100.000
74	229.073	0.000	100.000
75	262.376	0.000	100.000
76	300.518	0.000	100.000

1 / 1

2016.12.06 02:34:58

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 26.25767(μm)
ID#	: 201612060209175	Mean Size	: 27.05204(μm)
Data Name	: vz. P4 2minUS	Std.Dev.	: 6.8286(μm)
Transmittance(R)	: 86.0(%)	Geo.Mean Size	: 26.2208(μm)
Transmittance(B)	: 89.6(%)	Geo.Std.Dev.	: 1.2847(μm)
Circulation Speed	: 7	Mode Size	: 27.4898(μm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 02.00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 18.9246(μ
Form of Distribution	: Auto		: (9)90.00 (%)- 36.3784(μ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		
Source	:		



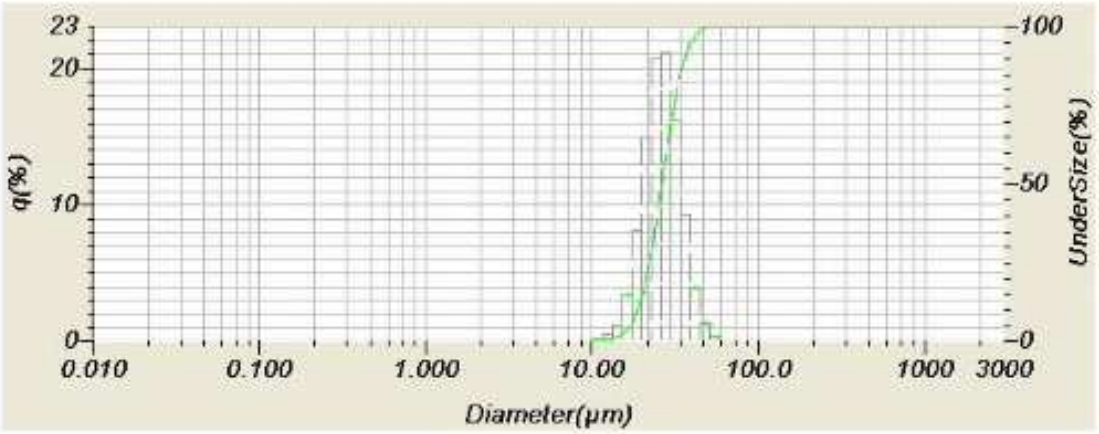
No.	D	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.565	0.302	0.102
53	13.246	0.344	0.446
54	15.172	1.029	1.575
55	17.377	3.329	4.904
56	19.904	8.110	13.014
57	22.797	15.185	28.199
58	26.111	20.932	49.131
59	29.907	21.084	70.214
60	34.255	15.853	86.067
61	39.234	8.020	94.087
62	44.936	3.622	97.709
63	51.471	1.337	99.726
64	58.953	0.274	100.000
65	67.523	0.000	100.000
66	77.339	0.000	100.000
67	88.583	0.000	100.000
68	101.469	0.000	100.000
69	116.210	0.000	100.000
70	133.103	0.000	100.000
71	152.453	0.000	100.000
72	174.616	0.000	100.000
73	200.000	0.000	100.000
74	229.075	0.000	100.000
75	262.376	0.000	100.000
76	300.518	0.000	100.000

1 / 1

2016.12.06 02:35:26

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 26.38276(μm)
ID#	: 201612060219177	Mean Size	: 27.17182(μm)
Data Name	: vz. P5 2minUS	Std.Dev.	: 6.9068(μm)
Transmittance(R)	: 84.1(%)	Geo.Mean Size	: 26.3234(μm)
Transmittance(B)	: 88.3(%)	Geo.Std.Dev.	: 1.2875(μm)
Circulation Speed	: 7	Mode Size	: 27.5375(μm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 02.00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 18.9385(μ
Form of Distribution	: Auto		: (9)90.00 (%)- 36.6169(μ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		
Source	:		



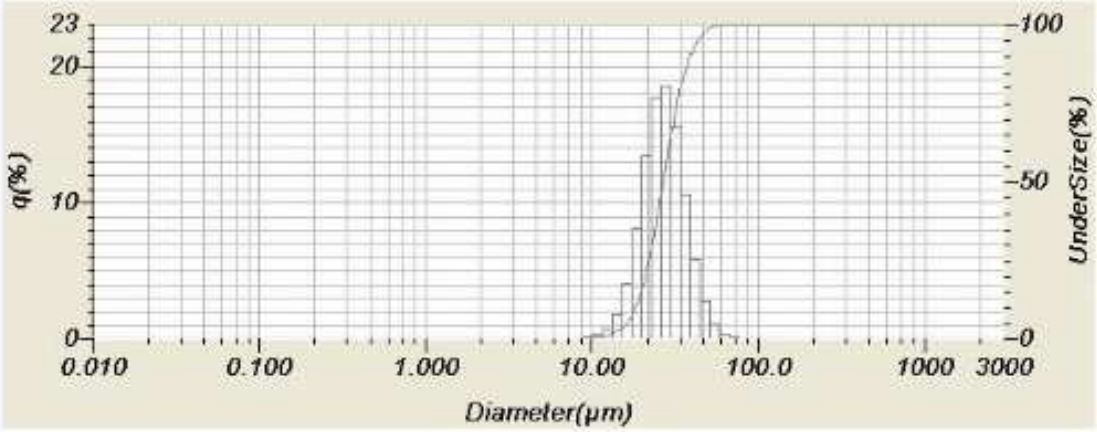
No.	Diameter(μm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.563	0.140	0.140
53	13.246	0.360	0.471
54	15.172	1.351	1.822
55	17.377	3.321	4.943
56	19.904	7.978	12.922
57	22.797	14.873	27.794
58	26.111	20.603	48.397
59	29.907	21.016	69.414
60	34.255	15.958	85.371
61	39.234	9.217	94.589
62	44.936	3.899	98.488
63	51.471	1.211	99.700
64	58.953	0.294	100.000
65	67.523	0.000	100.000
66	77.339	0.000	100.000
67	88.583	0.000	100.000
68	101.469	0.000	100.000
69	116.210	0.000	100.000
70	133.103	0.000	100.000
71	152.453	0.000	100.000
72	174.616	0.000	100.000
73	200.000	0.000	100.000
74	229.078	0.000	100.000
75	262.376	0.000	100.000
76	300.518	0.000	100.000

1 / 1

2016.12.07 07:03:37

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 26.92151(μm)
ID#	: 201612070614182	Mean Size	: 28.12776(μm)
Data Name	: vz. P6 2minUS	Std.Dev.	: 8.5597(μm)
Transmittance(R)	: 64.6(%)	Geo.Mean Size	: 26.9096(μm)
Transmittance(B)	: 73.6(%)	Geo.Std.Dev.	: 1.3470(μm)
Circulation Speed	: 7	Mode Size	: 27.7153(μm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 02.00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 18.3541(μ
Form of Distribution	: Auto		: (9)90.00 (%)- 39.1499(μ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Materiel	: ocel - Cr		
Source	:		



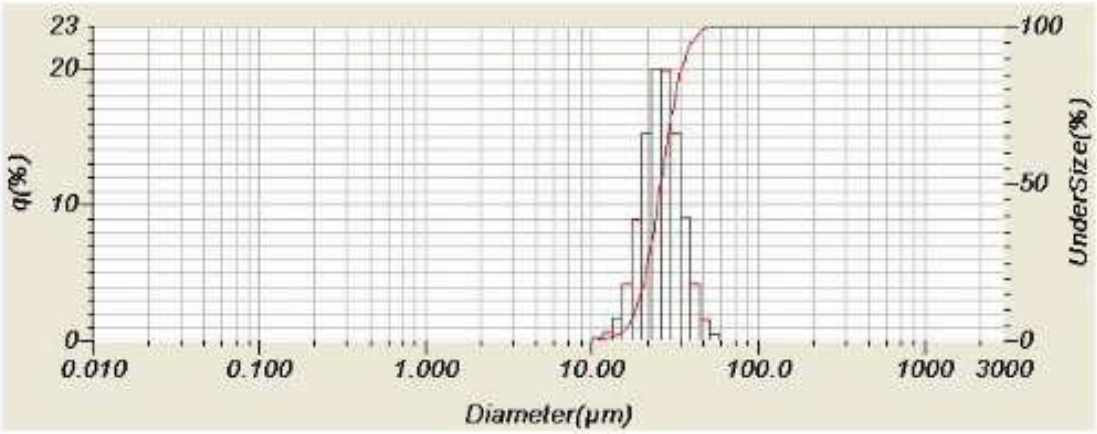
No.	Diameter(μm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.164	0.164
52	11.565	0.293	0.366
53	13.246	0.679	1.046
54	15.172	1.716	2.761
55	17.377	3.993	6.754
56	19.904	8.057	14.811
57	22.797	13.374	28.185
58	26.111	17.664	45.849
59	29.907	15.474	61.323
60	34.255	11.426	72.749
61	39.234	10.462	83.211
62	44.936	8.692	91.903
63	51.471	5.634	97.537
64	58.963	1.942	99.479
65	67.533	0.358	99.837
66	77.339	0.163	100.000
67	88.583	0.000	100.000
68	101.469	0.000	100.000
69	116.210	0.000	100.000
70	133.103	0.000	100.000
71	152.453	0.000	100.000
72	174.616	0.000	100.000
73	200.000	0.000	100.000
74	229.075	0.000	100.000
75	262.376	0.000	100.000
76	300.518	0.000	100.000

1 / 1

2016.12.07 07:05:06

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 26.08251(μm)
ID#	: 201612070624184	Mean Size	: 26.97984(μm)
Data Name	: vz. P7 2minUS	Std.Dev.	: 7.2552(μm)
Transmittance(R)	: 76.6(%)	Geo.Mean Size	: 26.0419(μm)
Transmittance(B)	: 81.6(%)	Geo.Std.Dev.	: 1.3059(μm)
Circulation Speed	: 7	Mode Size	: 24.7877(μm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 02.00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 18.3871(μ
Form of Distribution	: Auto		: (9)90.00 (%)- 36.8890(μ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Meteriel	: ocel - Cr		
Source	:		



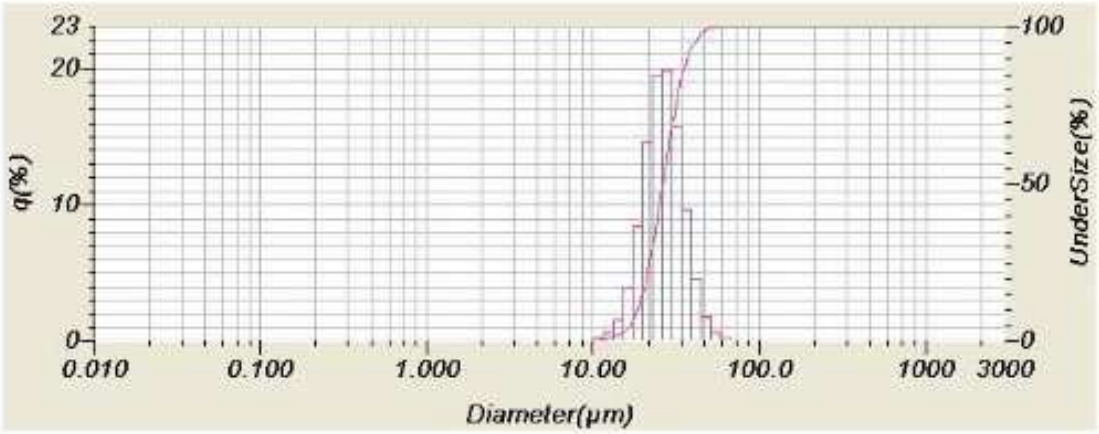
No.	D	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.563	0.169	0.169
53	13.246	0.552	0.741
54	15.172	1.067	2.308
55	17.377	1.731	4.039
56	19.904	2.782	6.821
57	22.797	4.137	10.958
58	26.111	5.896	16.854
59	29.907	7.785	24.639
60	34.255	9.144	33.783
61	39.234	8.966	42.749
62	44.936	7.036	49.785
63	51.471	4.457	54.242
64	58.953	2.422	56.664
65	67.523	0.000	56.664
66	77.339	0.000	56.664
67	88.583	0.000	56.664
68	101.460	0.000	56.664
69	116.210	0.000	56.664
70	133.103	0.000	56.664
71	152.453	0.000	56.664
72	174.616	0.000	56.664
73	200.000	0.000	56.664
74	229.073	0.000	56.664
75	262.376	0.000	56.664
76	300.518	0.000	56.664

1 / 1

2016.12.07 07:05:30

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 26.42067(µm)
ID#	: 201612070633186	Mean Size	: 27.37407(µm)
Data Name	: vz. P8 2minUS	Std.Dev.	: 7.5315(µm)
Transmittance(R)	: 75.9(%)	Geo.Mean Size	: 26.3876(µm)
Transmittance(B)	: 83.2(%)	Geo.Std.Dev.	: 1.3118(µm)
Circulation Speed	: 7	Mode Size	: 27.5773(µm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 02.00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 18.5433(µ
Form of Distribution	: Auto		: (9)90.00 (%)- 37.5146(µ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		
Source	:		



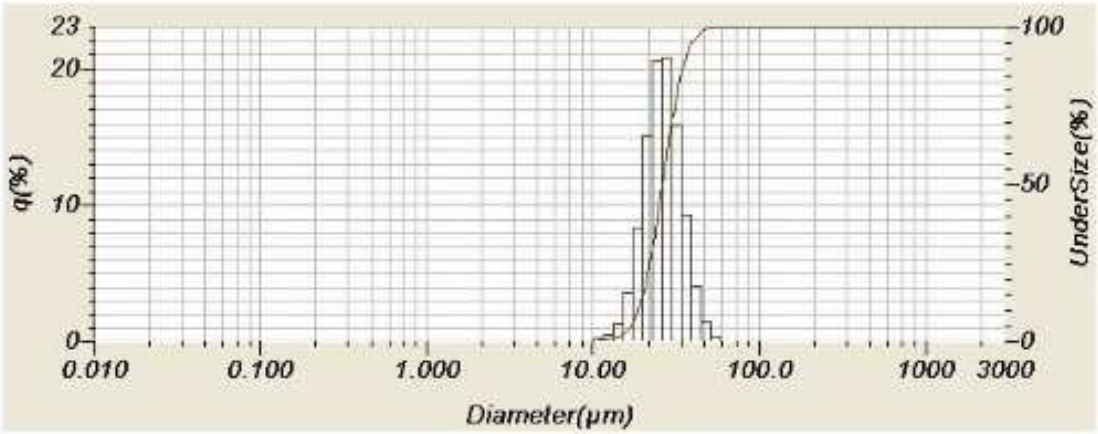
No.	Diameter(µm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.563	0.351	0.351
53	13.246	0.525	0.726
54	15.172	1.483	2.180
55	17.377	3.620	5.800
56	19.904	5.342	11.351
57	22.797	14.025	25.376
58	26.111	19.409	45.285
59	29.907	19.748	65.034
60	34.255	15.558	80.592
61	39.234	9.667	90.260
62	44.936	4.453	94.713
63	51.471	1.704	96.348
64	58.953	0.824	97.170
65	67.523	0.830	100.000
66	77.339	0.000	100.000
67	88.583	0.000	100.000
68	101.469	0.000	100.000
69	116.210	0.000	100.000
70	133.103	0.000	100.000
71	152.453	0.000	100.000
72	174.616	0.000	100.000
73	200.000	0.000	100.000
74	229.078	0.000	100.000
75	262.376	0.000	100.000
76	300.518	0.000	100.000

1 / 1

2016.12.07 07:07:02

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 26.30415(μm)
ID#	: 201612070641188	Mean Size	: 27.14058(μm)
Data Name	: vz. P9 2minUS	Std.Dev.	: 7.0311(μm)
Transmittance(R)	: 81.6(%)	Geo.Mean Size	: 26.2635(μm)
Transmittance(B)	: 86.1(%)	Geo.Std.Dev.	: 1.2931(μm)
Circulation Speed	: 7	Mode Size	: 27.5183(μm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 02.00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 18.7886(μ
Form of Distribution	: Auto		: (9)90.00 (%)- 36.7474(μ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Materiel	: ocel - Cr		
Source	:		



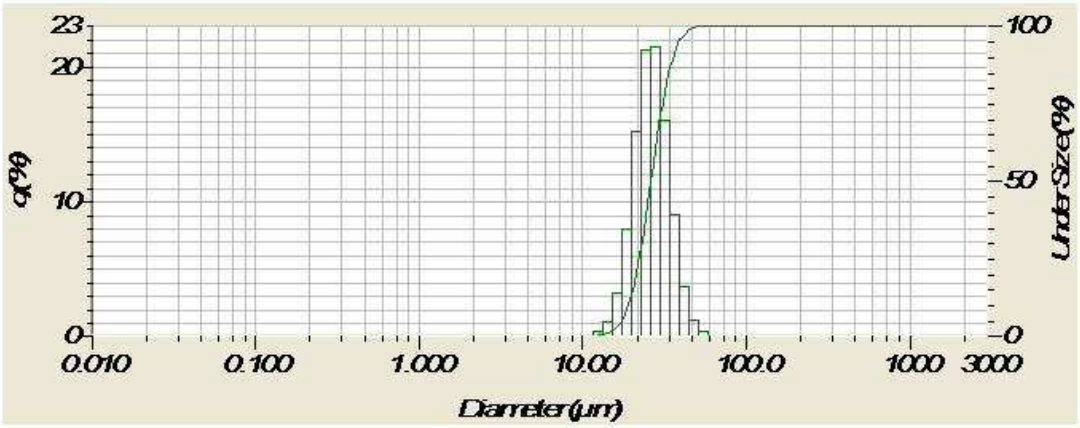
No.	Diameter(μm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.565	0.127	0.127
53	13.246	0.403	0.530
54	15.172	1.249	1.779
55	17.377	3.503	5.282
56	19.904	8.202	13.484
57	22.797	14.972	28.456
58	26.111	20.424	48.880
59	29.907	20.641	69.521
60	34.255	15.747	85.268
61	39.234	9.143	94.411
62	44.936	3.916	98.326
63	51.471	1.323	99.649
64	58.953	0.351	100.000
65	67.523	0.000	100.000
66	77.339	0.000	100.000
67	88.583	0.000	100.000
68	101.460	0.000	100.000
69	116.210	0.000	100.000
70	133.103	0.000	100.000
71	152.453	0.000	100.000
72	174.616	0.000	100.000
73	200.000	0.000	100.000
74	229.075	0.000	100.000
75	262.376	0.000	100.000
76	300.518	0.000	100.000

1 / 1

2016.12.17 08:14:37

HORIBA Laser Scattering Particle Size Distribution Analyzer

Sample Name	: ocel UFM Hynek	Median Size	: 26.31940(µm)
ID#	: 201612070648190	Mean Size	: 27.10865(µm)
Data Name	: vz. P10 2minUS	Std.Dev.	: 6.7446(µm)
Transmittance(R)	: 87.0(%)	Geo.Mean Size	: 26.3019(µm)
Transmittance(B)	: 90.6(%)	Geo.Std.Dev.	: 1.2791(µm)
Circulation Speed	: 7	Mode Size	: 27.4920(µm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 02:00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 19.0893(µ
Form of Distribution	: Auto		: (9)90.00 (%)- 36.3320(µ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		
Source	:		



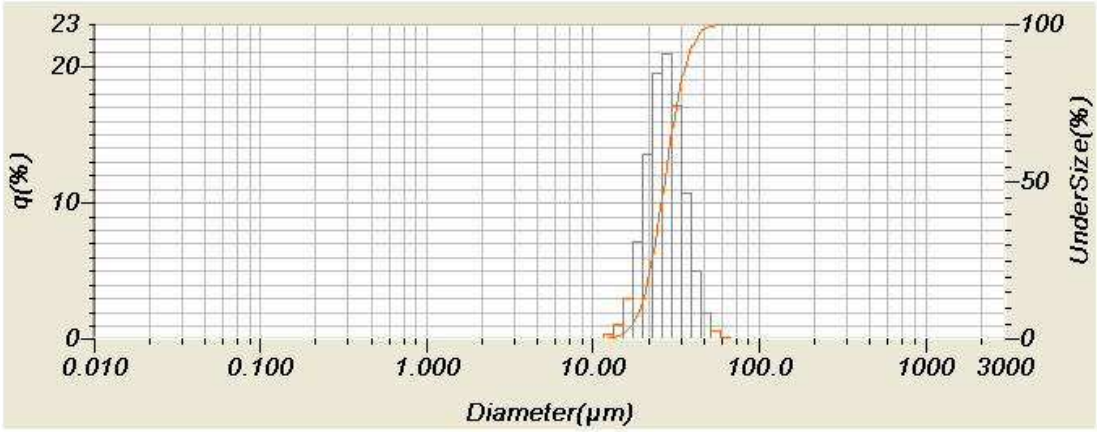
No	Diameter(µm)	q(%)	UnderSize(%)	No	Diameter(µm)	q(%)	UnderSize(%)	No	Diameter(µm)	q(%)	UnderSize(%)	No	Diameter(µm)	q(%)	UnderSize(%)	N
1	0.011	0.000	0.000	20	0.150	0.000	0.000	39	1.961	0.000	0.000	58	26.111	21.144	48.749	7
2	0.013	0.000	0.000	21	0.172	0.000	0.000	40	2.289	0.000	0.000	59	29.907	21.371	70.120	7
3	0.015	0.000	0.000	22	0.197	0.000	0.000	41	2.599	0.000	0.000	60	34.255	16.001	86.121	7
4	0.017	0.000	0.000	23	0.226	0.000	0.000	42	2.976	0.000	0.000	61	39.234	8.941	95.063	8
5	0.020	0.000	0.000	24	0.259	0.000	0.000	43	3.409	0.000	0.000	62	44.938	3.578	98.641	8
6	0.022	0.000	0.000	25	0.296	0.000	0.000	44	3.905	0.000	0.000	63	51.471	1.101	99.742	8
7	0.025	0.000	0.000	26	0.339	0.000	0.000	45	4.472	0.000	0.000	64	58.953	0.258	100.000	8
8	0.029	0.000	0.000	27	0.389	0.000	0.000	46	5.122	0.000	0.000	65	67.523	0.000	100.000	8
9	0.034	0.000	0.000	28	0.445	0.000	0.000	47	5.867	0.000	0.000	66	77.339	0.000	100.000	8
10	0.039	0.000	0.000	29	0.510	0.000	0.000	48	6.720	0.000	0.000	67	88.553	0.000	100.000	8
11	0.044	0.000	0.000	30	0.584	0.000	0.000	49	7.697	0.000	0.000	68	101.460	0.000	100.000	8
12	0.051	0.000	0.000	31	0.669	0.000	0.000	50	8.816	0.000	0.000	69	116.210	0.000	100.000	8
13	0.058	0.000	0.000	32	0.766	0.000	0.000	51	10.097	0.000	0.000	70	133.103	0.000	100.000	8
14	0.067	0.000	0.000	33	0.877	0.000	0.000	52	11.565	0.000	0.000	71	152.453	0.000	100.000	9
15	0.076	0.000	0.000	34	1.005	0.000	0.000	53	13.246	0.304	0.304	72	174.616	0.000	100.000	9
16	0.087	0.000	0.000	35	1.151	0.000	0.000	54	15.172	1.037	1.341	73	200.000	0.000	100.000	9
17	0.100	0.000	0.000	36	1.318	0.000	0.000	55	17.377	3.165	4.507	74	229.075	0.000	100.000	9
18	0.115	0.000	0.000	37	1.510	0.000	0.000	56	19.904	7.936	12.442	75	262.375	0.000	100.000	
19	0.131	0.000	0.000	38	1.729	0.000	0.000	57	22.797	15.163	27.605	76	300.518	0.000	100.000	

1 / 1

2016.12.07 07:09:06

HORIBA Laser Scattering Particle Size Distribution Analyze

Sample Name	: ocel UFM Hynek	Median Size	: 27.11822(µm)
ID#	: 201612070700192	Mean Size	: 28.02260(µm)
Data Name	: vz. P11 2minUS	Std.Dev.	: 7.3752(µm)
Transmittance(R)	: 83.6(%)	Geo.Mean Size	: 27.0975(µm)
Transmittance(B)	: 88.4(%)	Geo.Std.Dev.	: 1.2960(µm)
Circulation Speed	: 7	Mode Size	: 27.7284(µm)
Agitation Speed	: 8	Span	: OFF
Ultra Sonic	: 02:00 (7)	Diameter on Cumulative %	: (2)10.00 (%)- 19.4082(µ
Form of Distribution	: Auto		: (9)90.00 (%)- 37.9316(µ
Distribution Base	: Volume		
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		
Source	:		



No.	Diameter(µm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000

No.	Diameter(µm)	q(%)	UnderSize(%)
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000

No.	Diameter(µm)	q(%)	UnderSize(%)
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.565	0.000	0.000
53	13.246	0.317	0.317
54	15.172	1.007	1.324
55	17.377	2.913	4.237
56	19.904	7.078	11.314
57	22.797	13.497	24.812

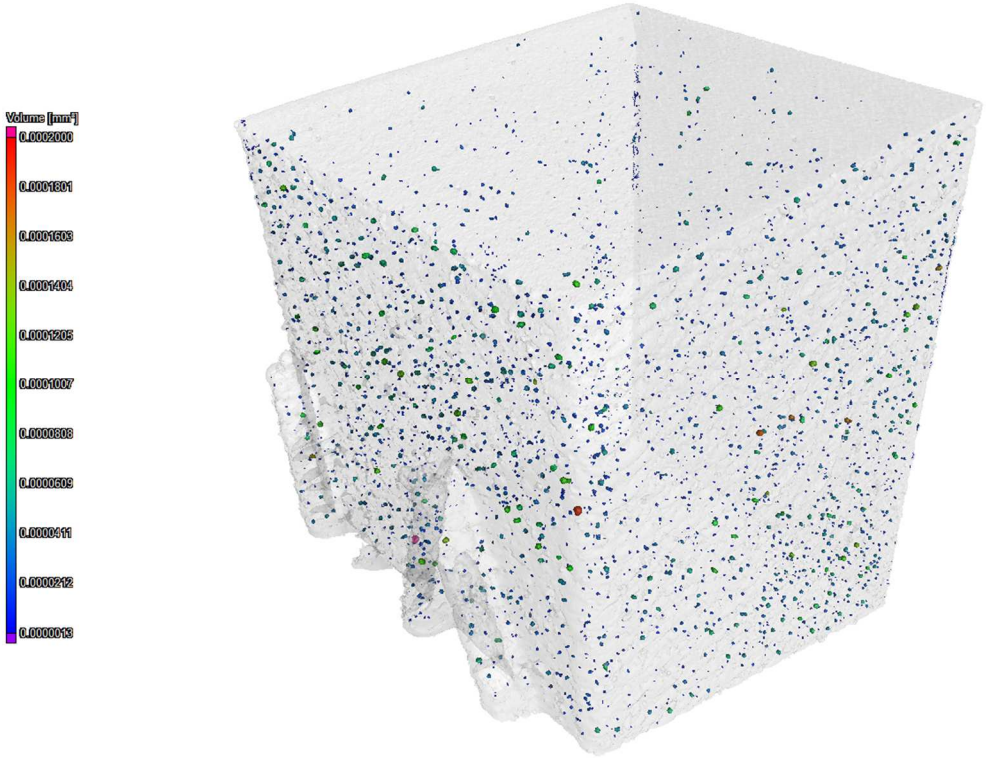
No.	Diameter(µm)	q(%)	UnderSize(%)
58	26.111	19.386	44.197
59	29.907	20.811	65.008
60	34.255	17.004	82.012
61	39.234	10.633	92.645
62	44.938	4.920	97.566
63	51.471	1.800	99.365
64	58.953	0.518	99.883
65	67.523	0.117	100.000
66	77.339	0.000	100.000
67	88.583	0.000	100.000
68	101.460	0.000	100.000
69	116.210	0.000	100.000
70	133.103	0.000	100.000
71	152.453	0.000	100.000
72	174.616	0.000	100.000
73	200.000	0.000	100.000
74	229.075	0.000	100.000
75	262.376	0.000	100.000
76	300.518	0.000	100.000

N
7
7
7
8
8
8
8
8
8
8
8
8
9
9
9
9

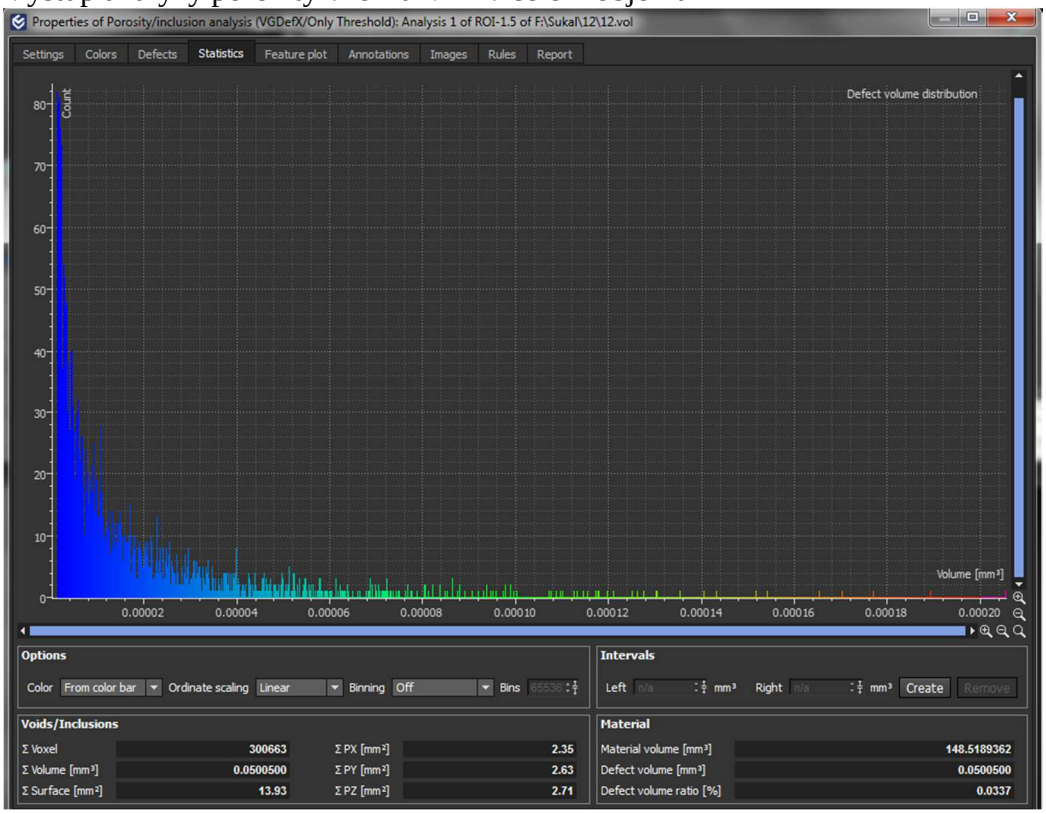
1 / 1

Příloha 4 Výsledky analýz µCT vzorku V12 - nový práškek

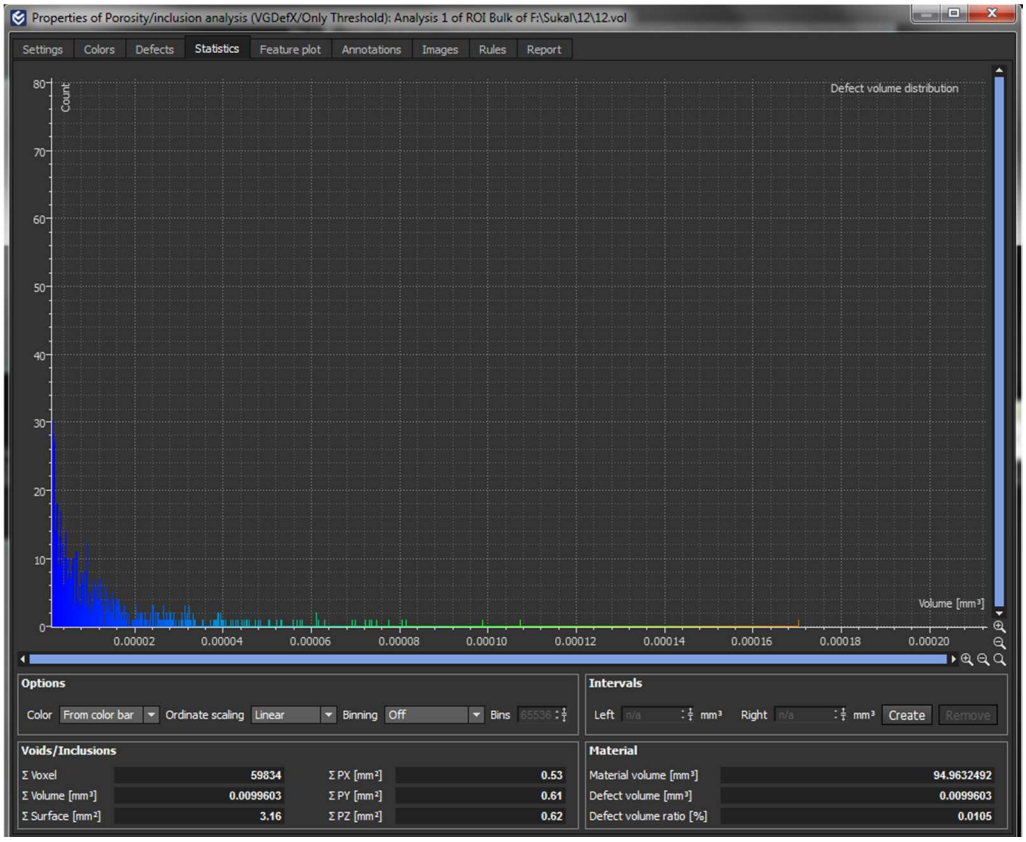
Vizualizace rozmístění porozity ve vzorku V12



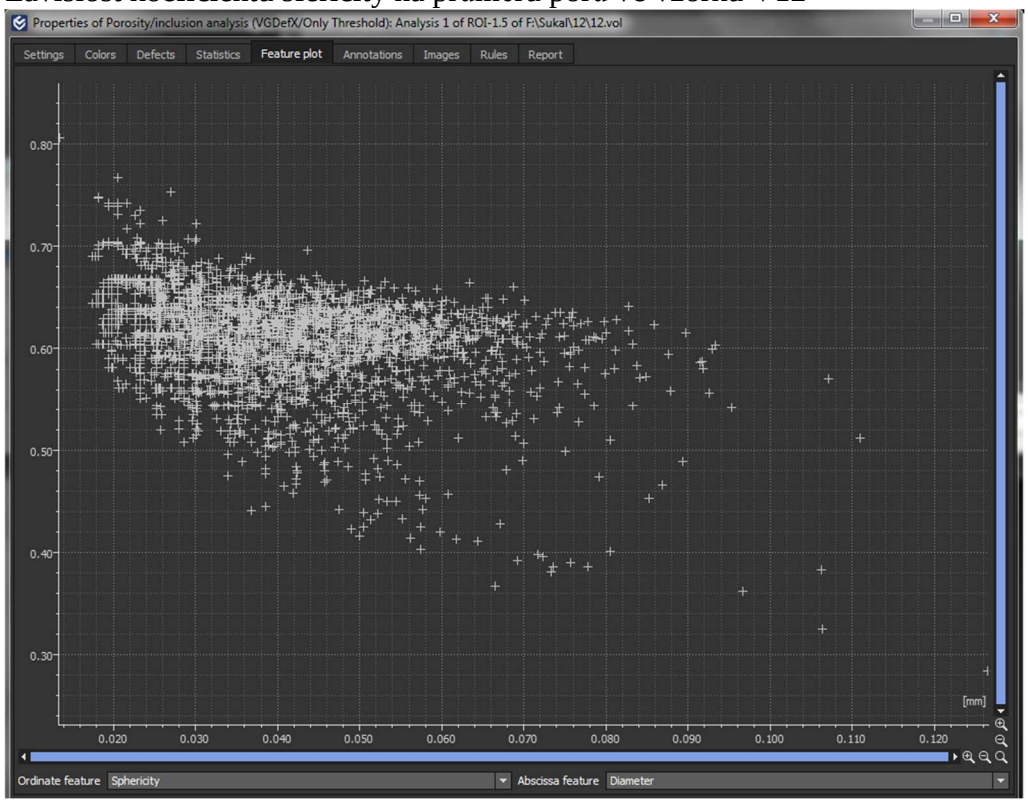
Výstup analýzy porozity vzorku V12 v celém objemu



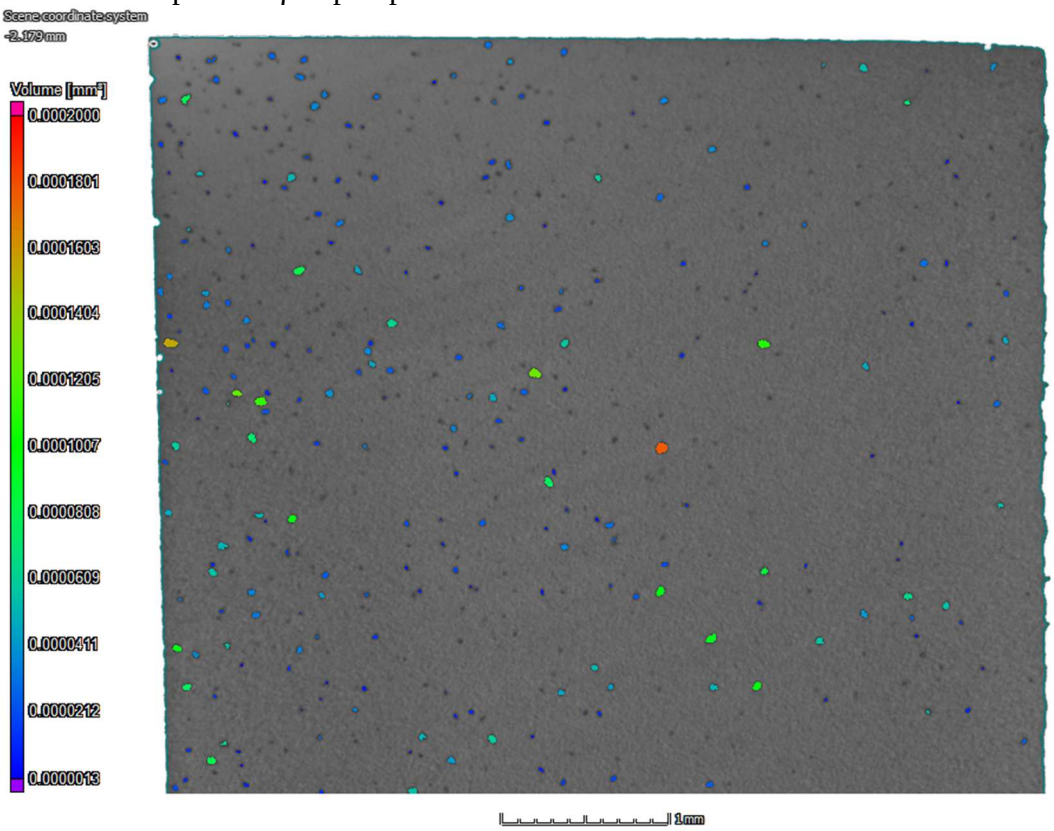
Výstup analýzy porozity vzorku V12 ve šrafovaném objemu



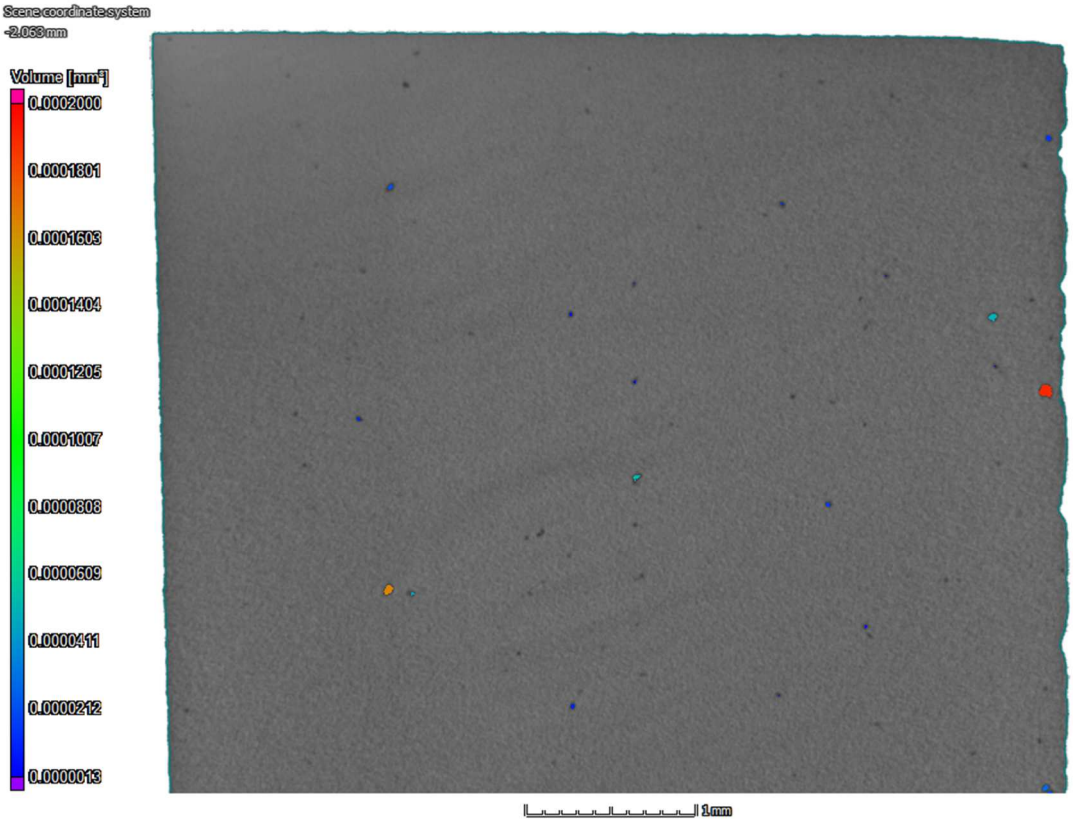
Závislost koeficientu sféricity na průměru pórů ve vzorku V12



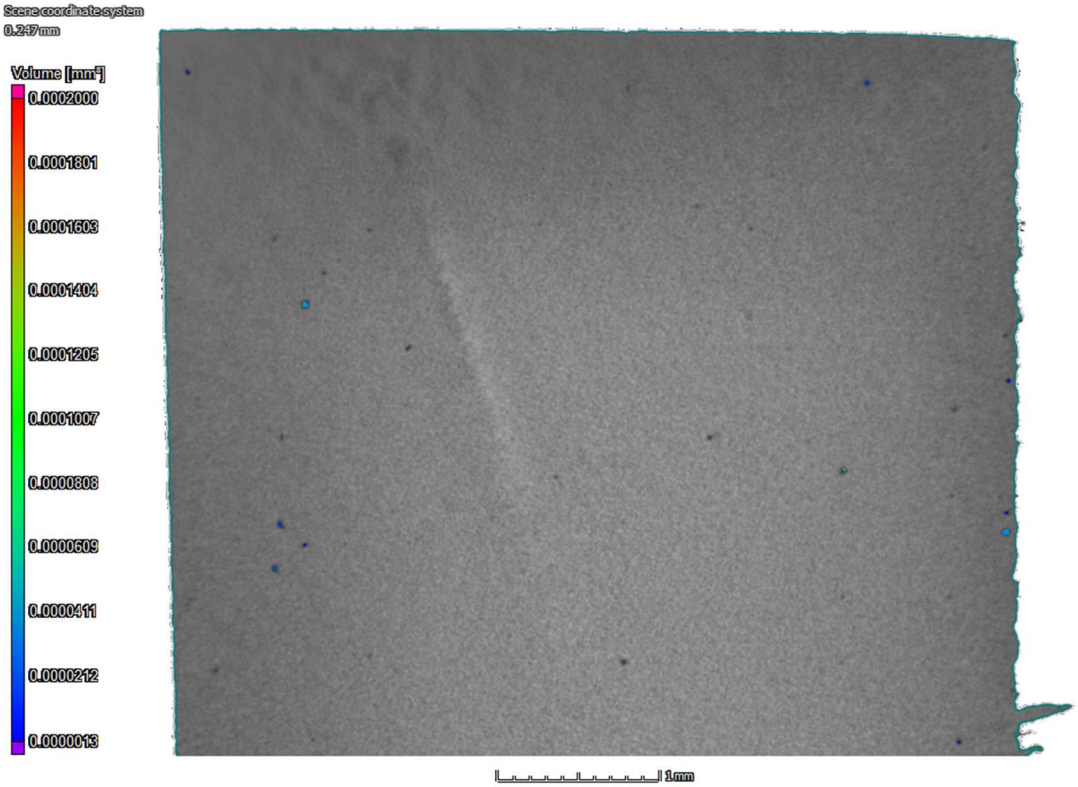
Koncentrace pórů 80 µm pod povrchem u vzorku V12



Koncentrace pórů 200 µm pod povrchem u vzorku V12

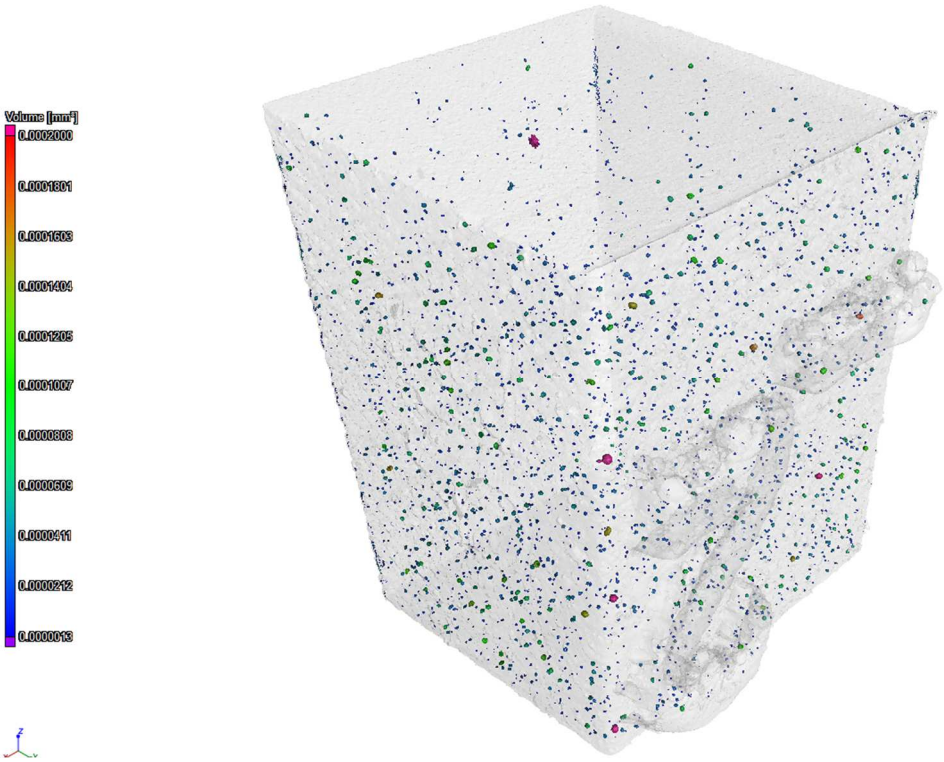


Koncentrace pórů 2500 µm pod povrchem u vzorku V12

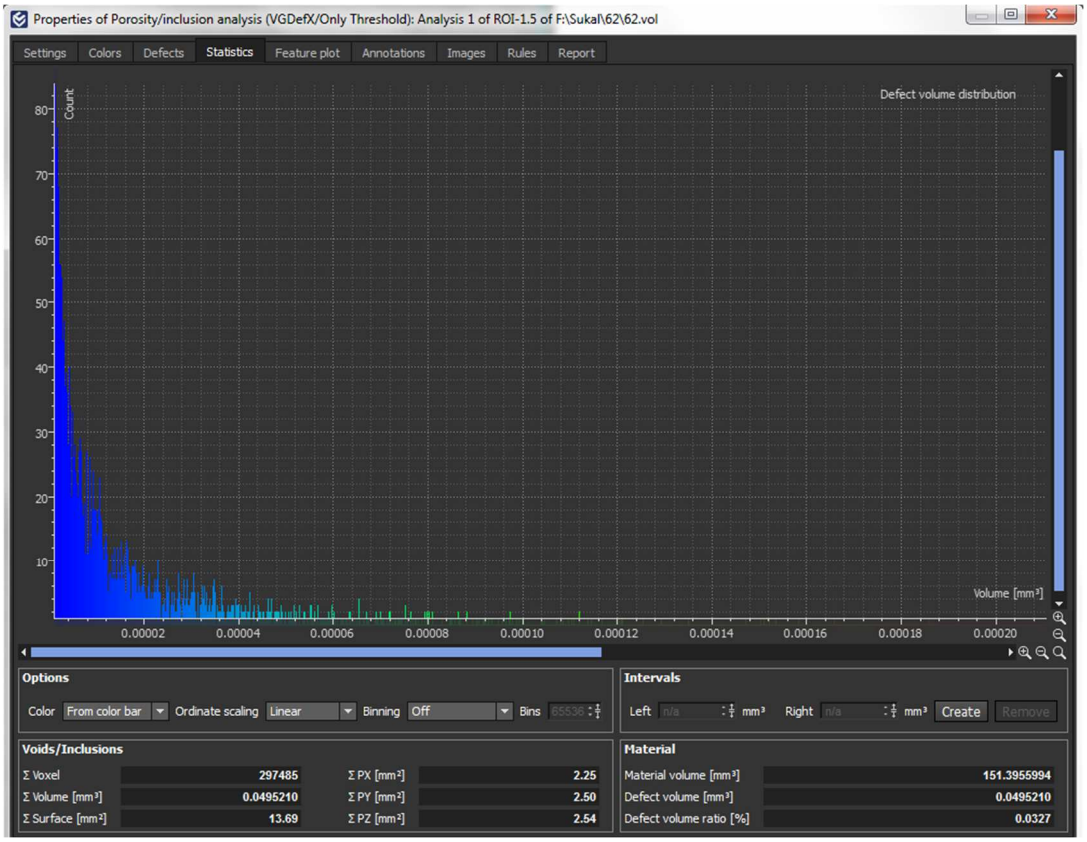


Příloha 5 Výsledky analýz µCT vzorku V62 - 5x recyklovaný prášek

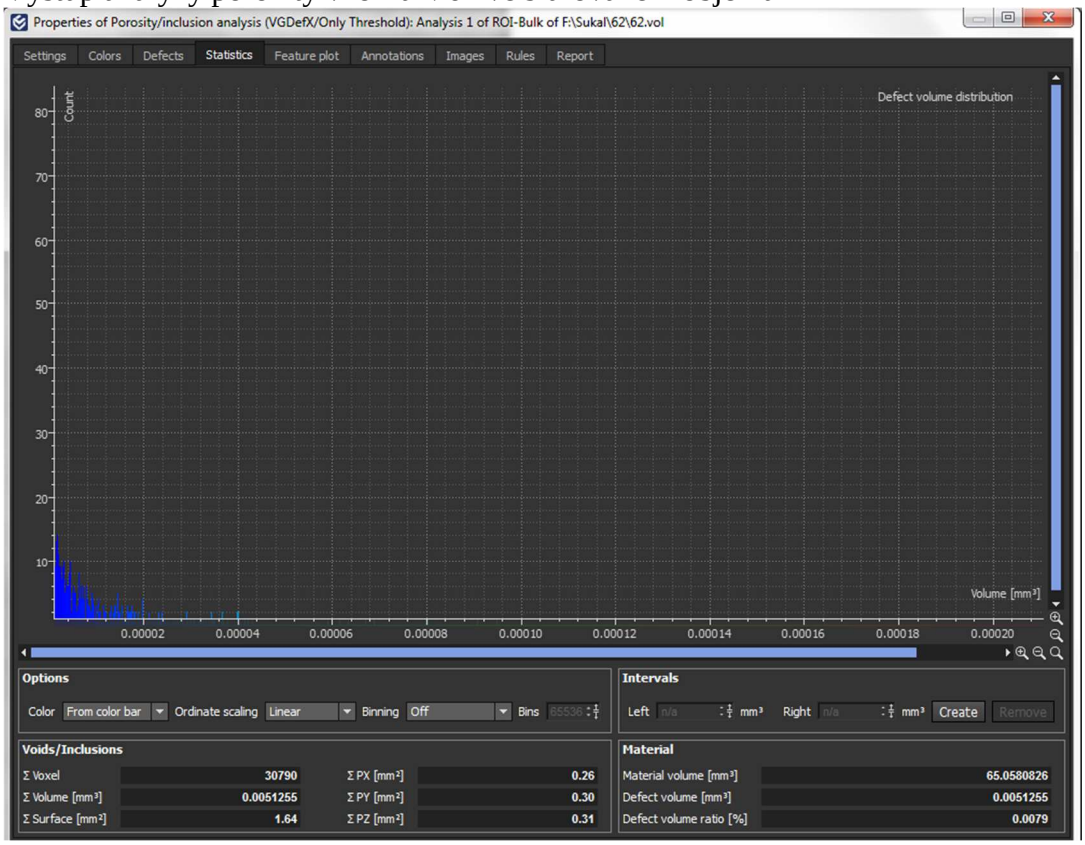
Vizualizace rozmístění porozity ve vzorku V62



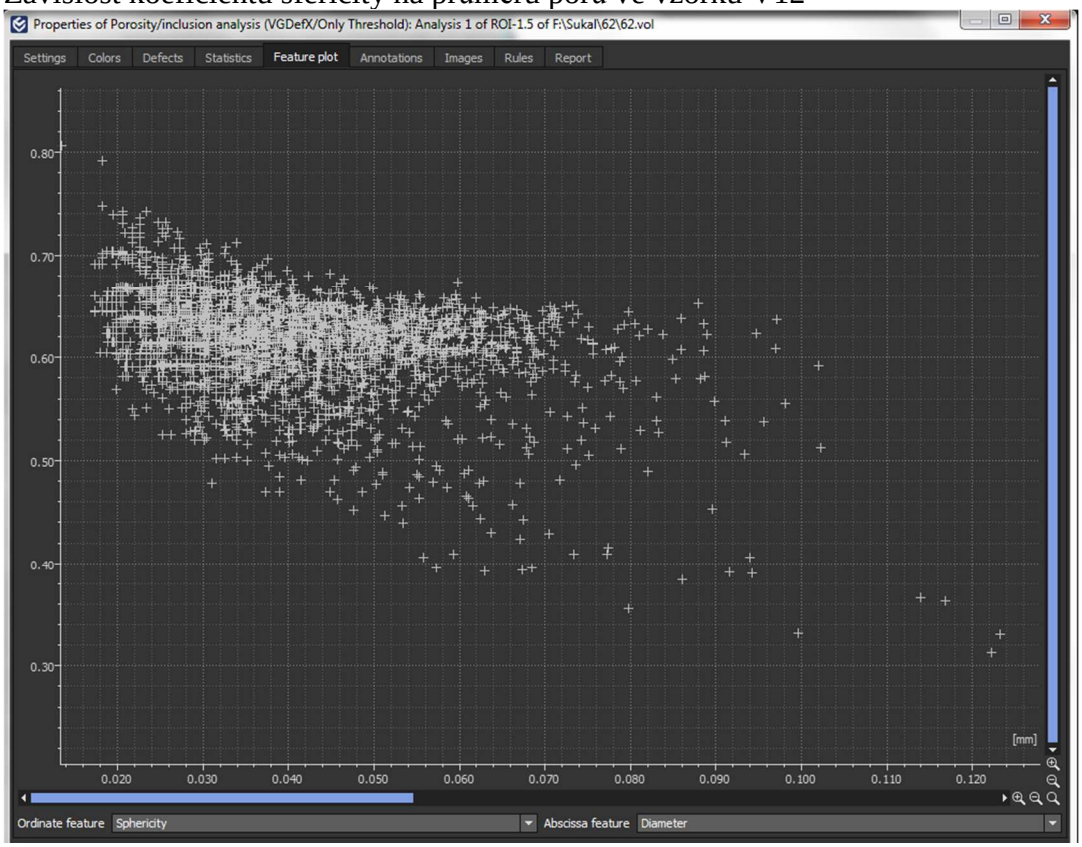
Výstup analýzy porozity vzorku V62 v celém objemu



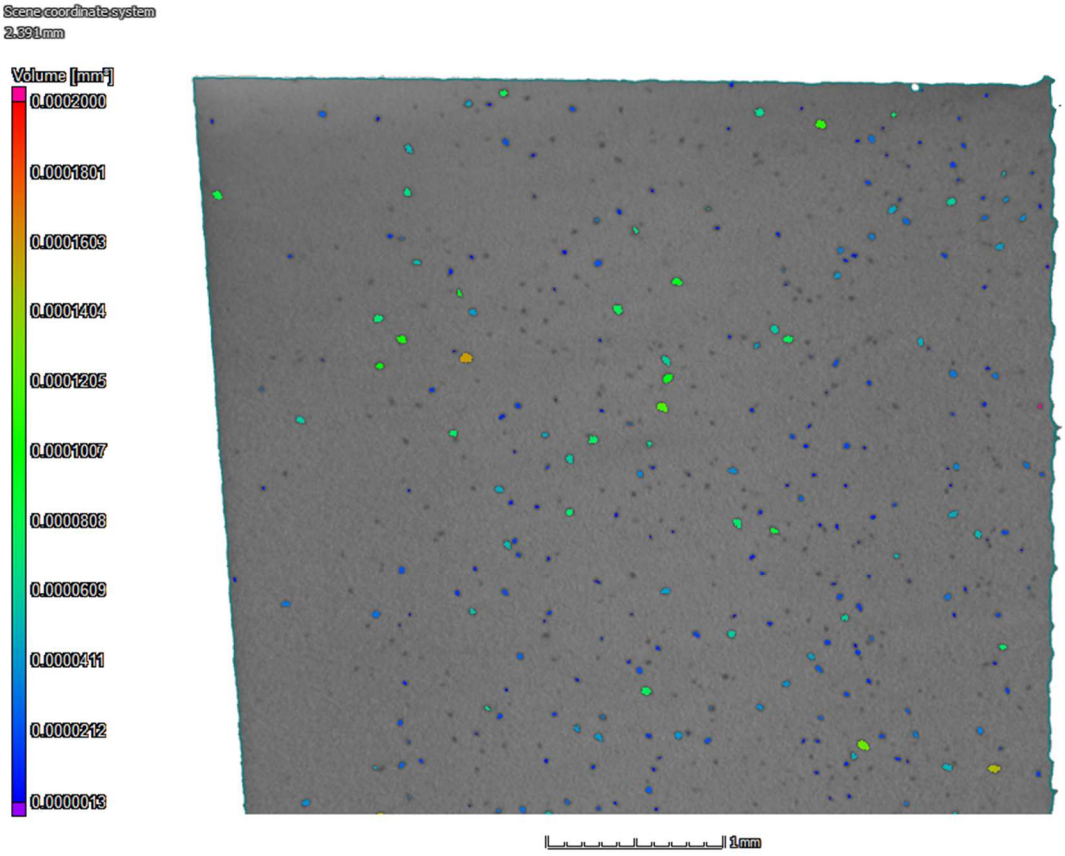
Výstup analýzy porozity vzorku V62 ve šrafovaném objemu



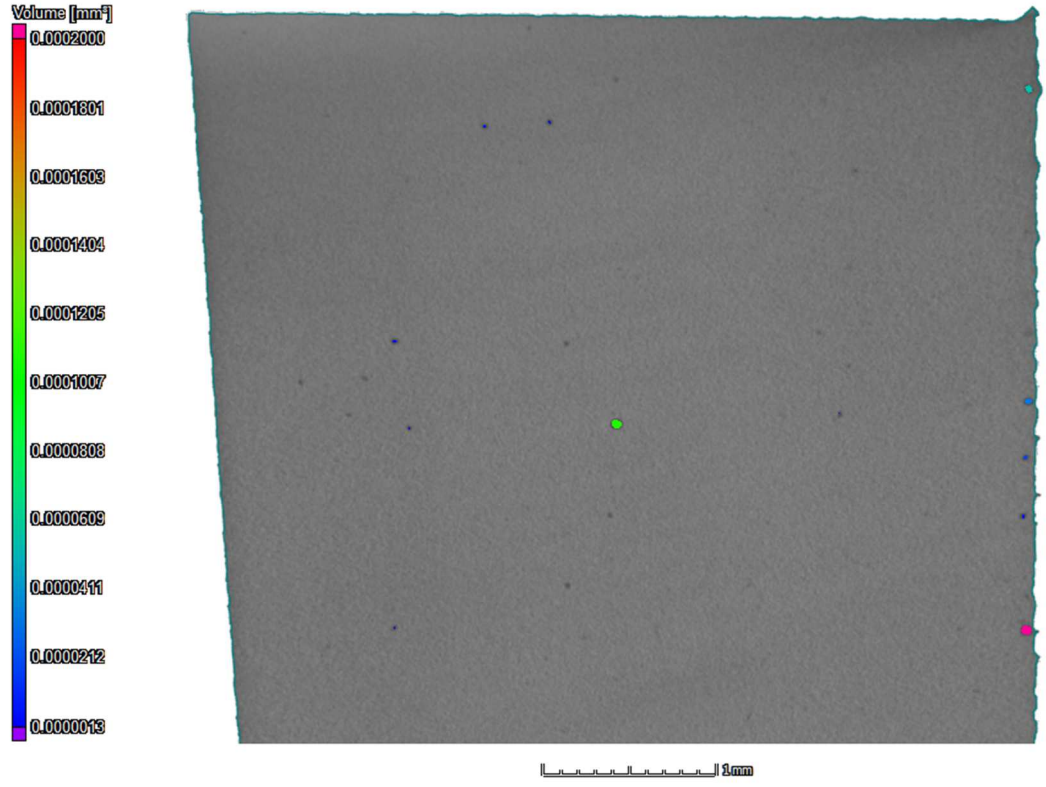
Závislost koeficientu sféricity na průměru pórů ve vzorku V12



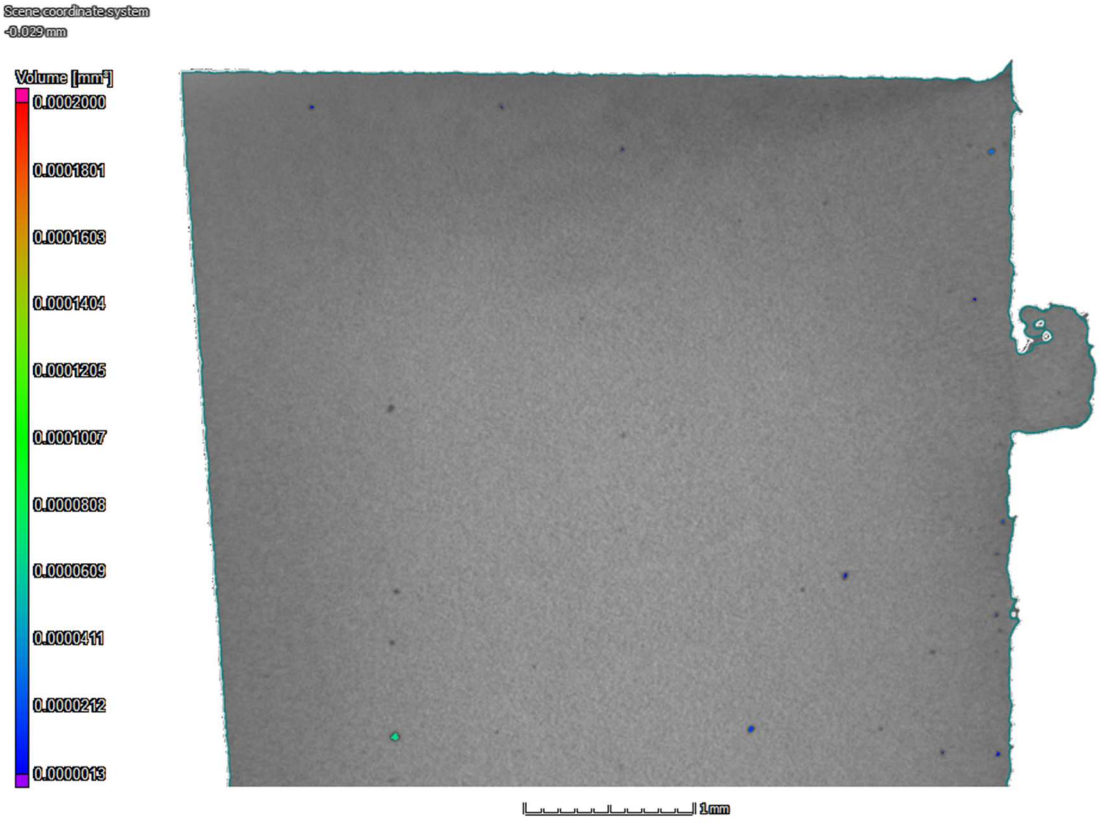
Koncentrace pórů 80 µm pod povrchem u vzorku V62



Koncentrace pórů 200 µm pod povrchem u vzorku V62

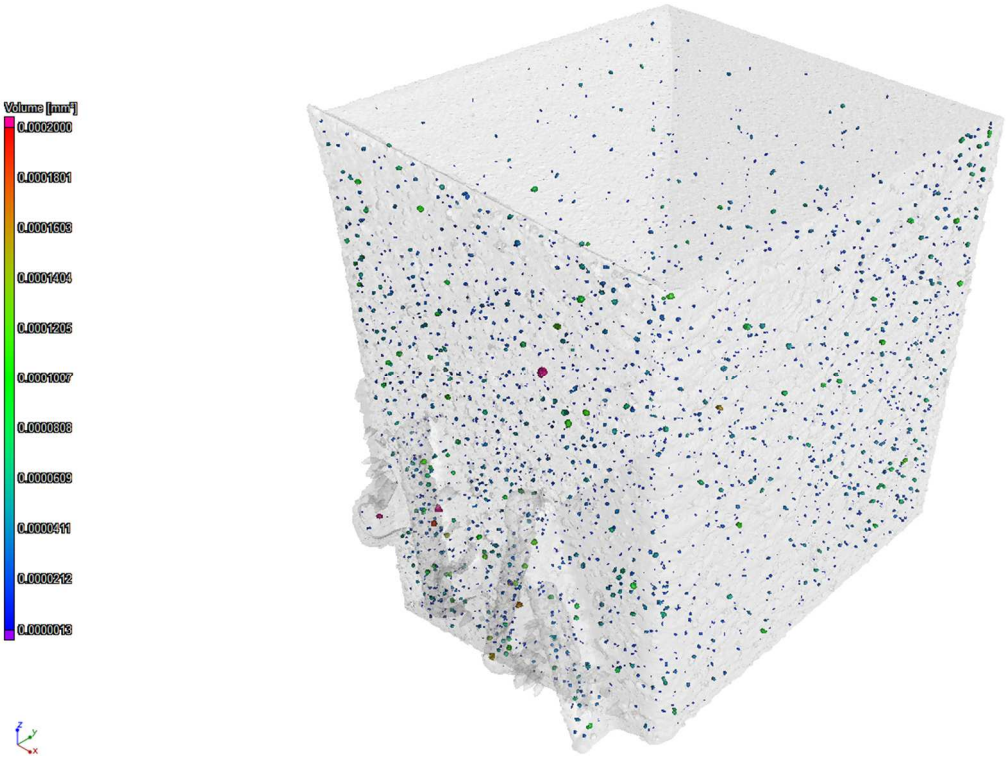


Koncentrace pórů 2500 µm pod povrchem u vzorku V62

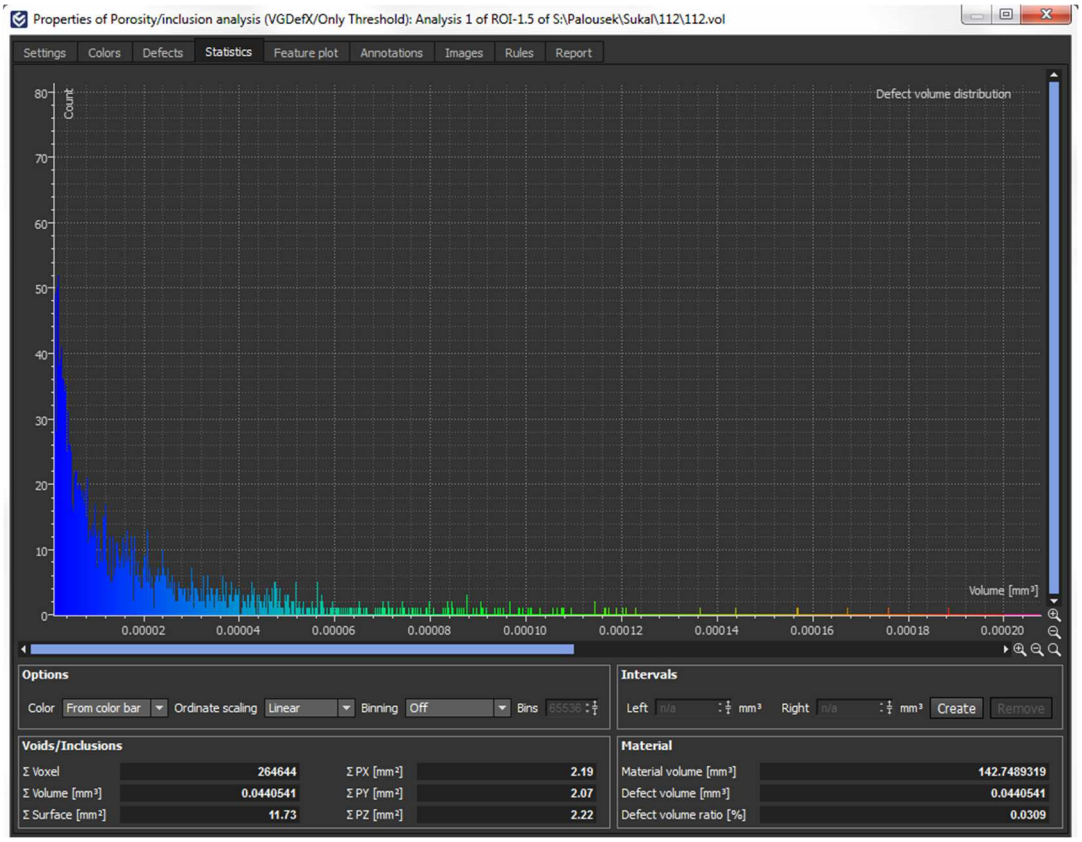


Příloha 6 Výsledky analýz µCT vzorku V112 - 10x recyklovaný prášek

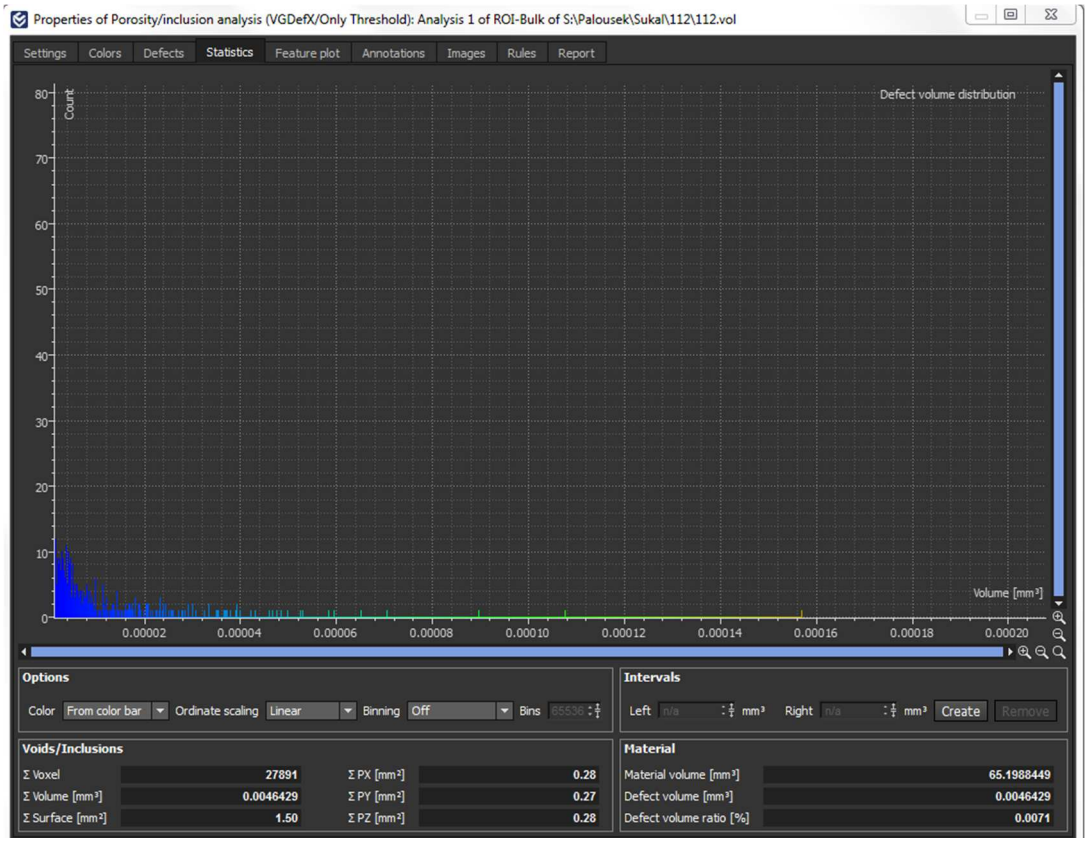
Vizualizace rozmístění porozity ve vzorku V112



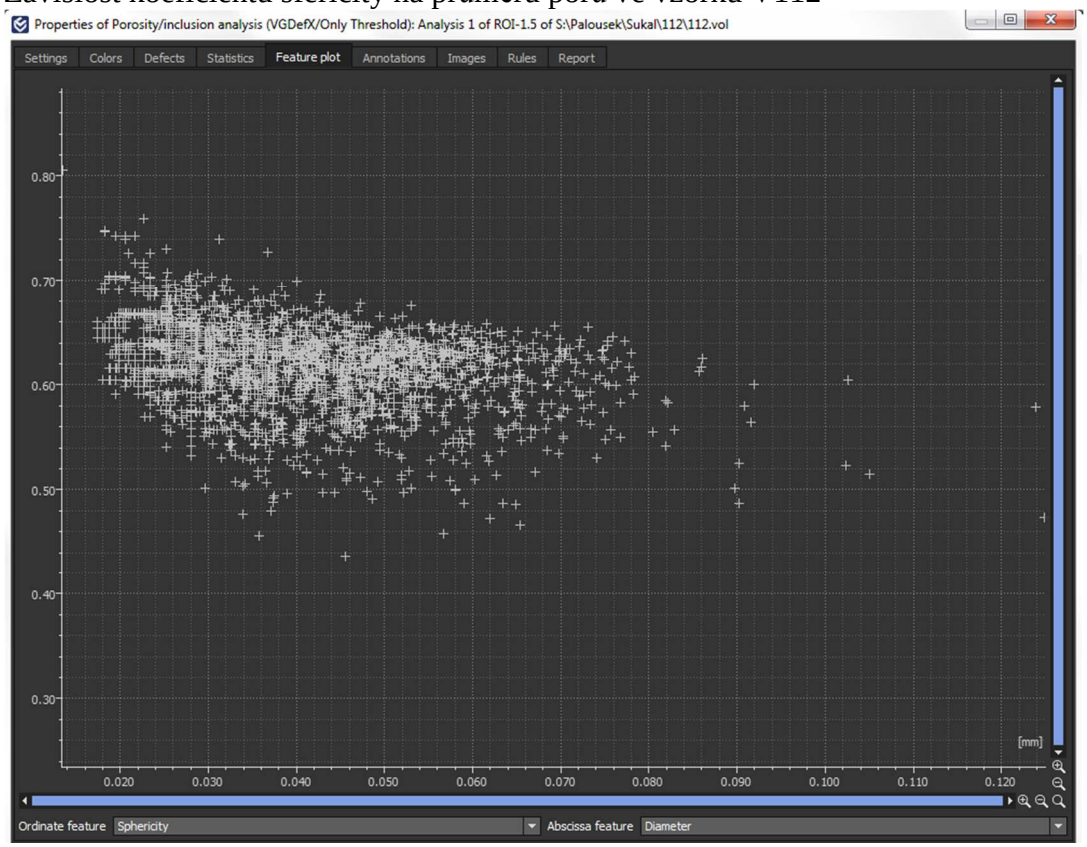
Výstup analýzy porozity vzorku V112 v celém objemu



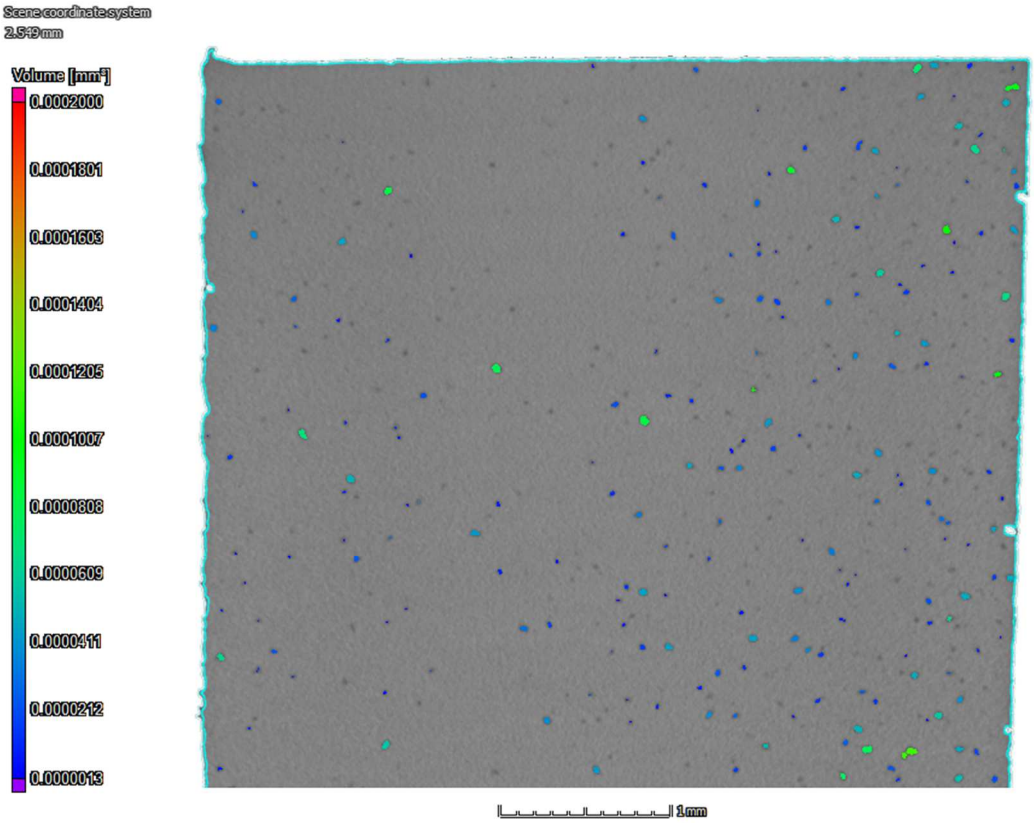
Výstup analýzy porozity vzorku V112 ve šrafovaném objemu



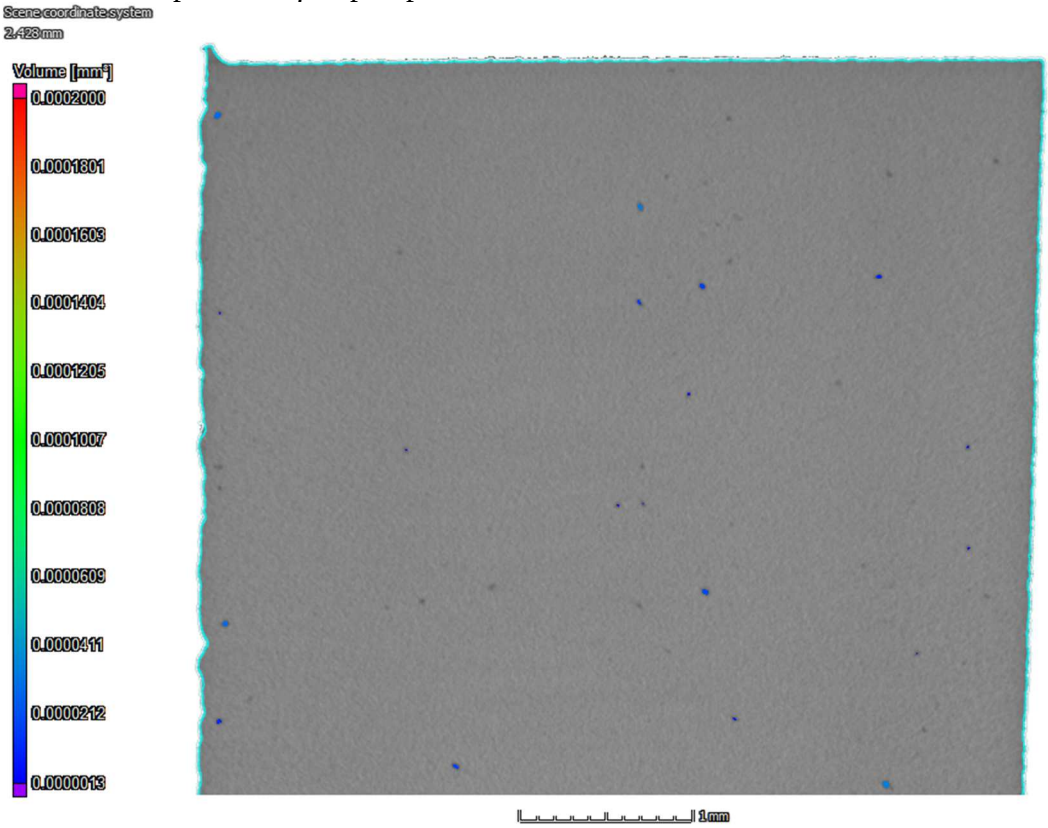
Závislost koeficientu sféricity na průměru pórů ve vzorku V112



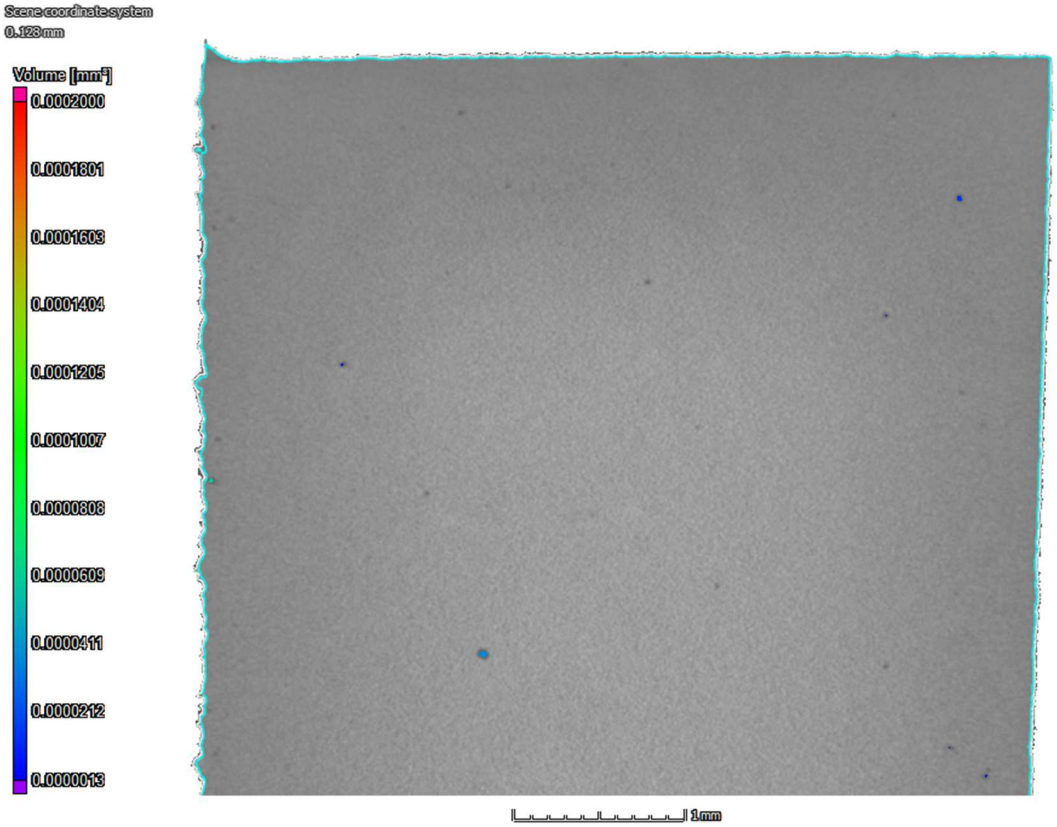
Koncentrace pórů 80 µm pod povrchem u vzorku V112



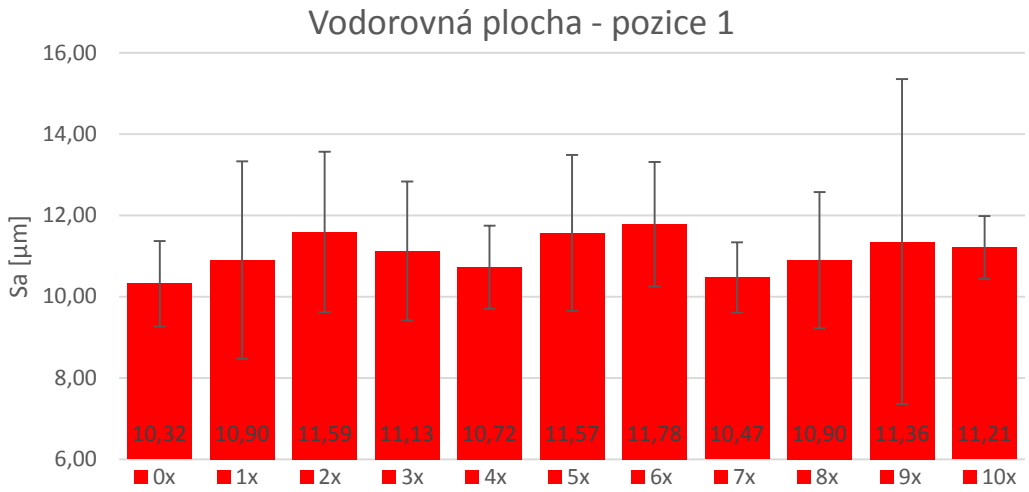
Koncentrace pórů 200 µm pod povrchem u vzorku V112

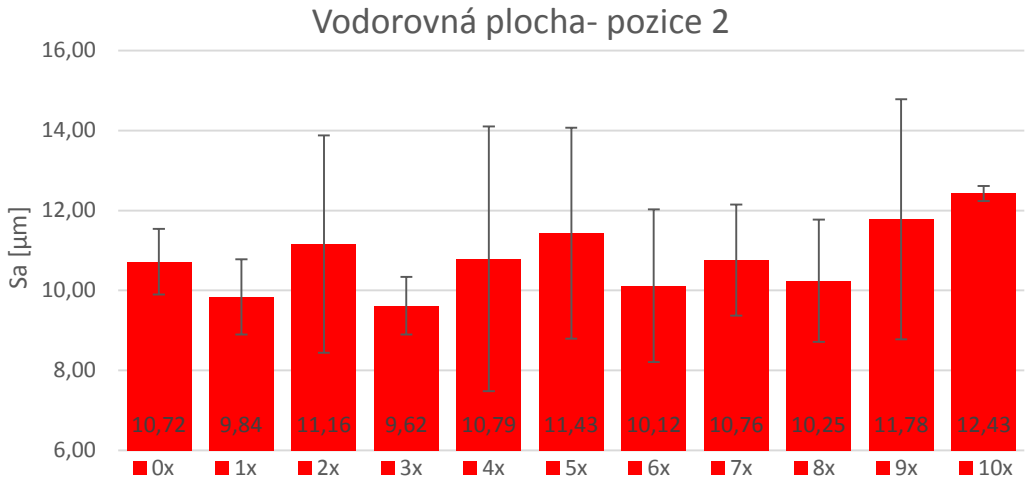


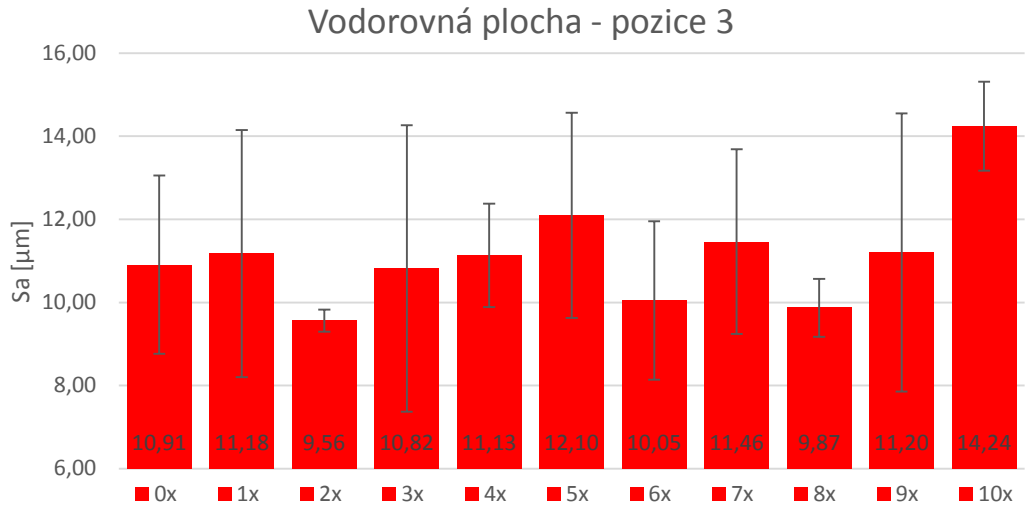
Koncentrace pórů 2500 µm pod povrchem u vzorku V112

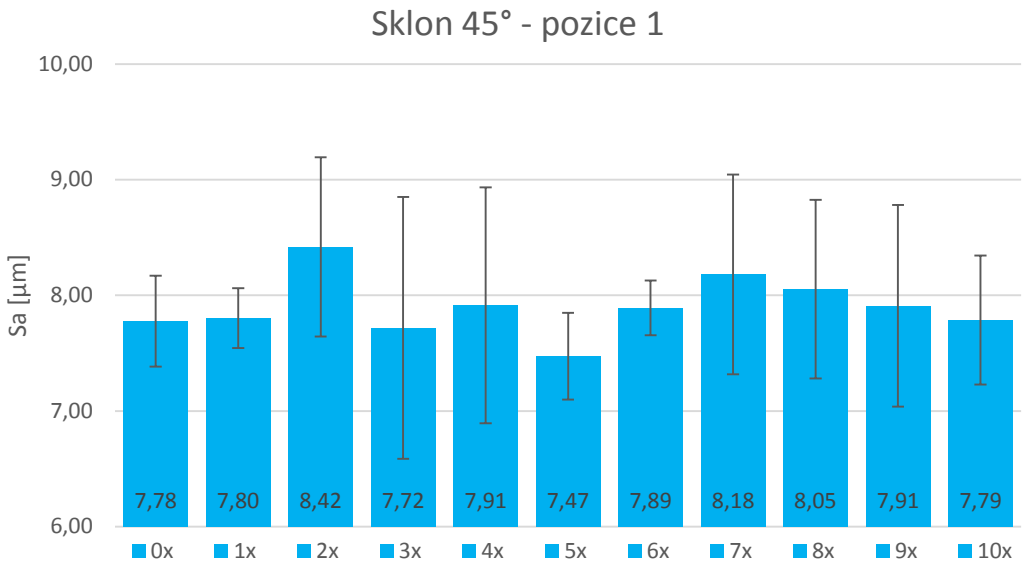

Scene coordinate system
0.128 mm
Volume [mm³]
0.0002000
0.0001801
0.0001603
0.0001404
0.0001205
0.0001007
0.0000808
0.0000609
0.0000411
0.0000212
0.0000013
1 mm

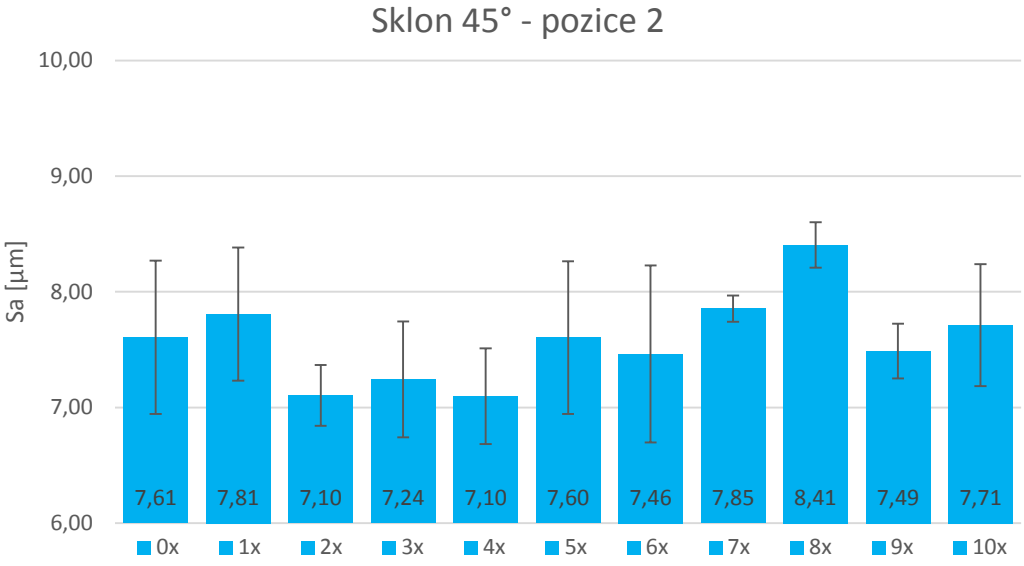
Příloha 7 Vývoj parametru drsnosti Sa v závislosti na počtu recyklačních cyklů

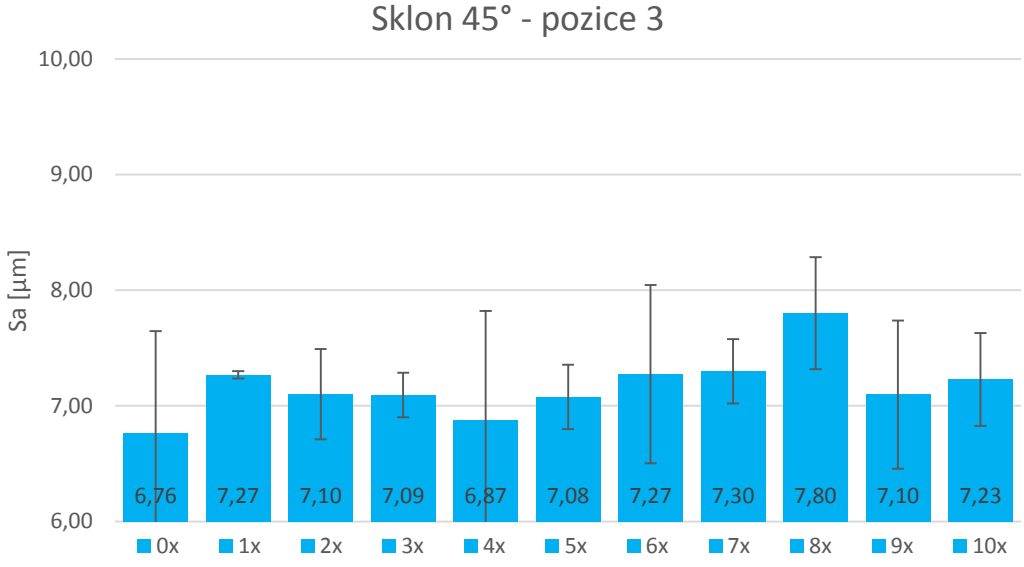


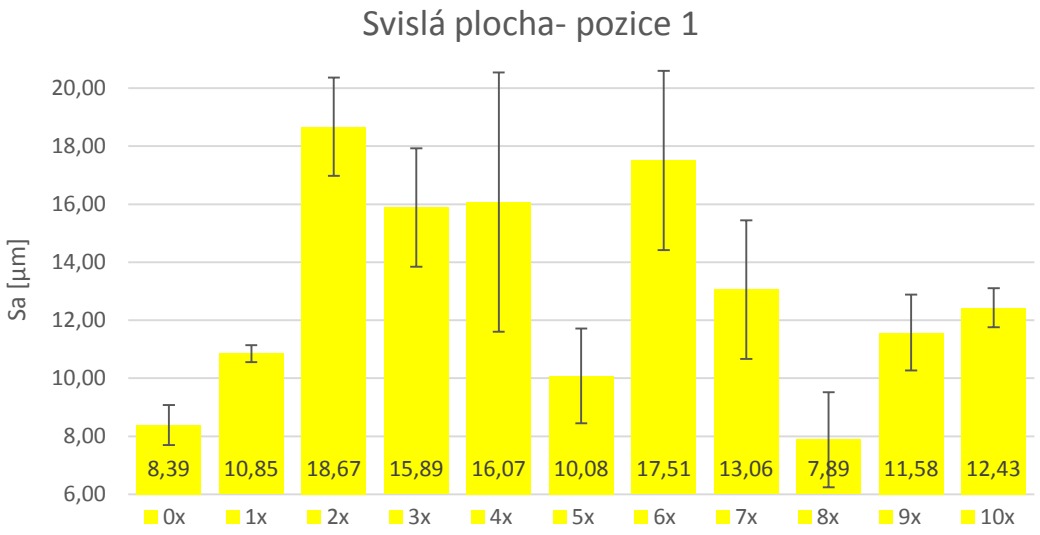




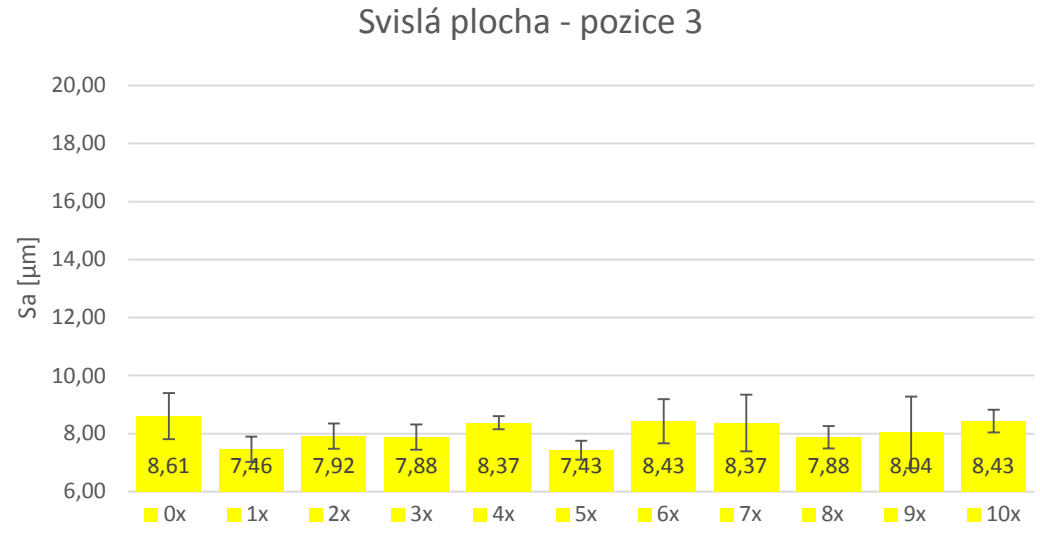

Sklon 45° - pozice 1
10,00
9,00
8,00
7,00
6,00
Sa [µm]
7,78
7,80
8,42
7,72
7,91
7,47
7,89
8,18
8,05
7,91
7,79
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x


Sklon 45° - pozice 2
10,00
9,00
8,00
7,00
6,00
Sa [µm]
7,61
7,81
7,10
7,24
7,10
7,60
7,46
7,85
8,41
7,49
7,71
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x

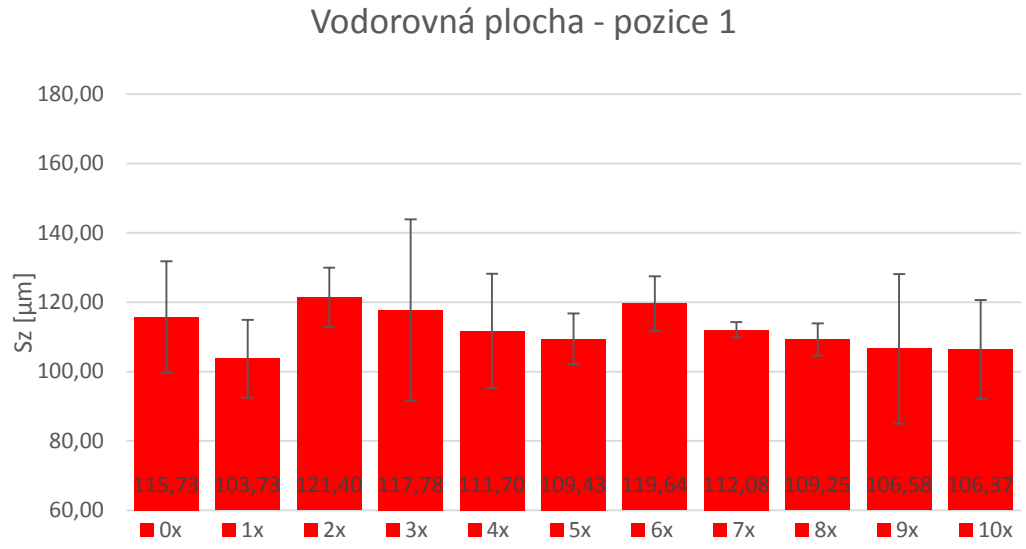

Sklon 45° - pozice 3
10,00
9,00
8,00
7,00
6,00
Sa [µm]
6,76
7,27
7,10
7,09
6,87
7,08
7,27
7,30
7,80
7,10
7,23
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x

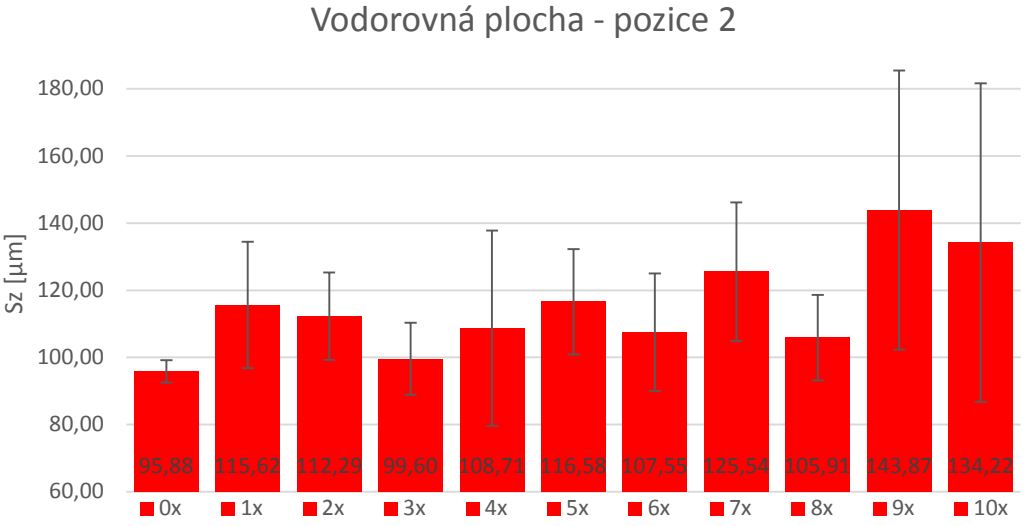

Svislá plocha- pozice 1
Sa [µm]
20,00
18,00
16,00
14,00
12,00
10,00
8,00
6,00
8,39
10,85
18,67
15,89
16,07
10,08
17,51
13,06
7,89
11,58
12,43
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x

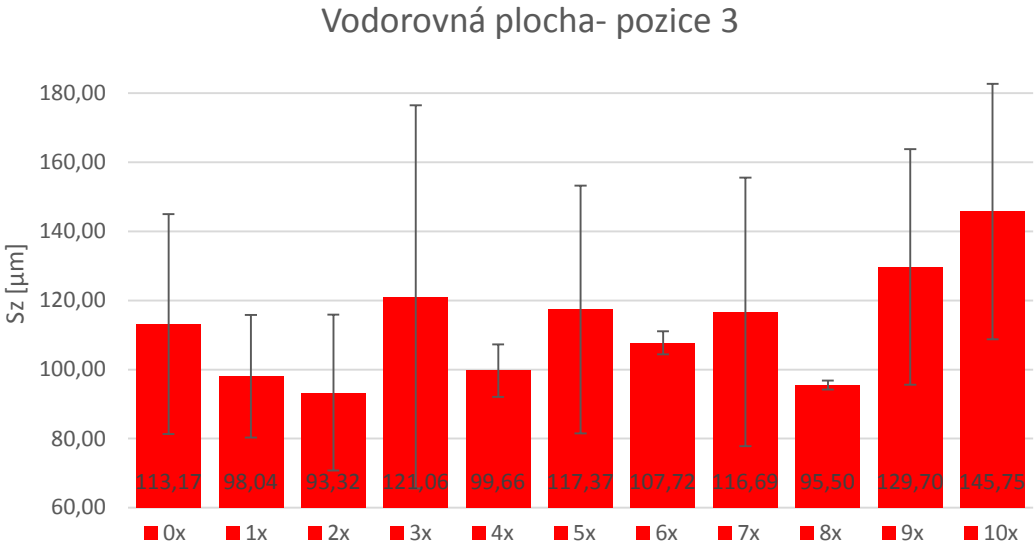

Svislá plocha - pozice 2
Sa [µm]
20,00
18,00
16,00
14,00
12,00
10,00
8,00
6,00
7,98
7,59
7,84
7,82
7,81
7,01
7,38
8,41
7,88
7,51
7,91
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x

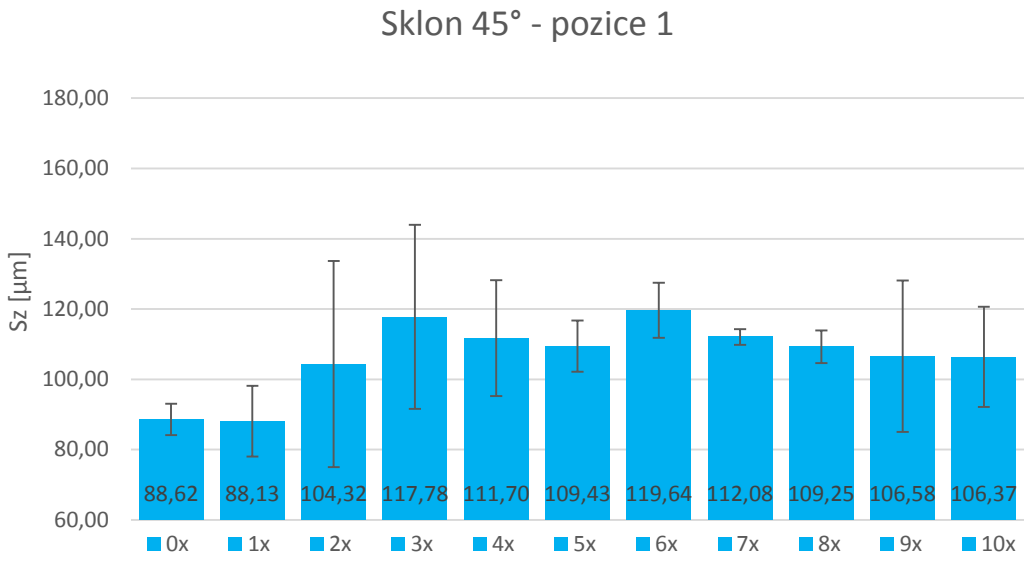

Svislá plocha - pozice 3
Sa [µm]
20,00
18,00
16,00
14,00
12,00
10,00
8,00
6,00
8,61
7,46
7,92
7,88
8,37
7,43
8,43
8,37
7,88
8,04
8,43
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x

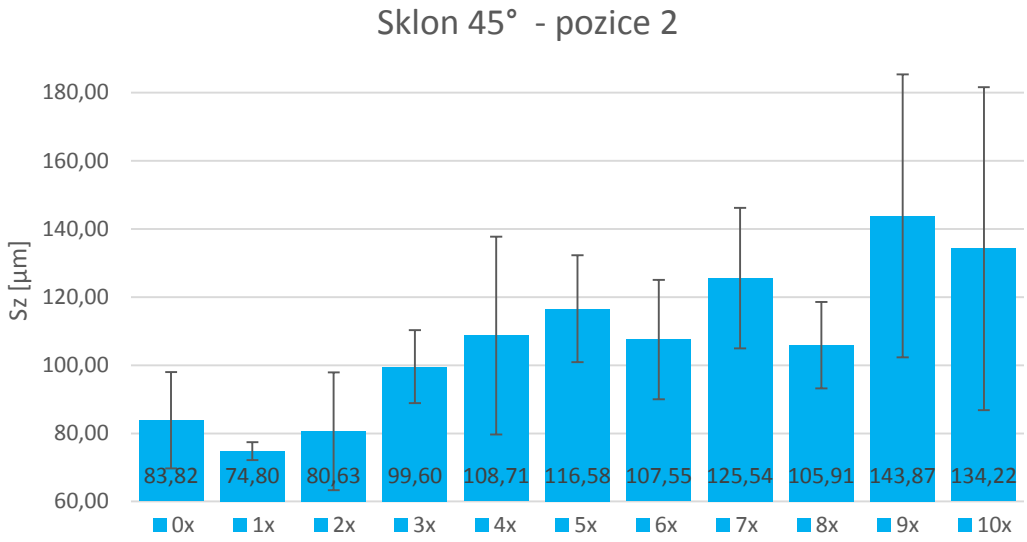
Příloha 8 Vývoj parametru drsnosti Sz v závislosti na počtu recyklačních cyklů

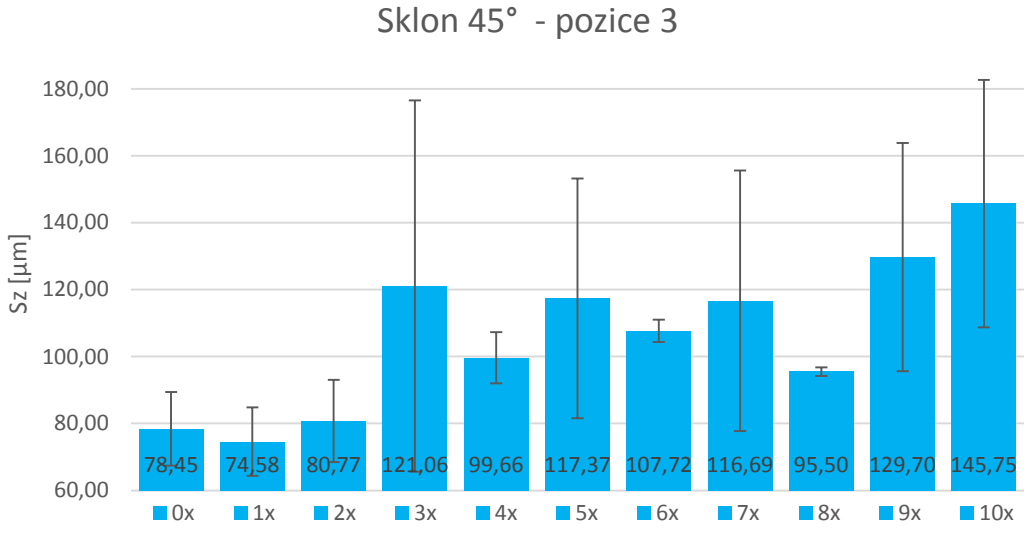


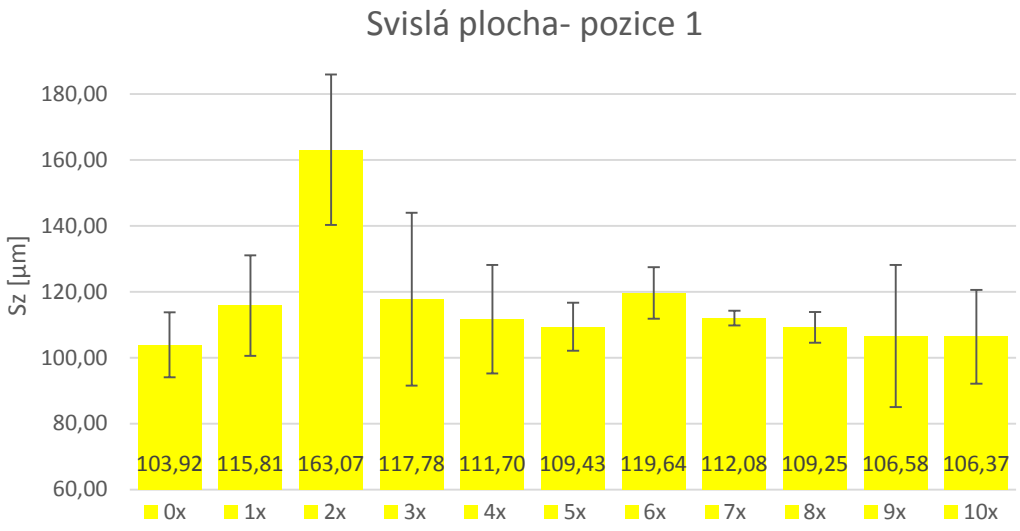


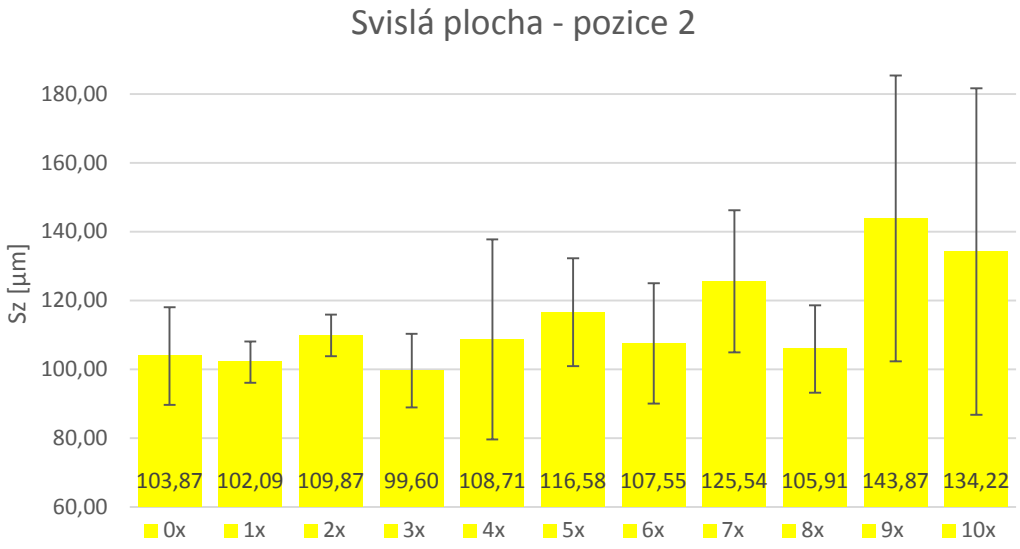


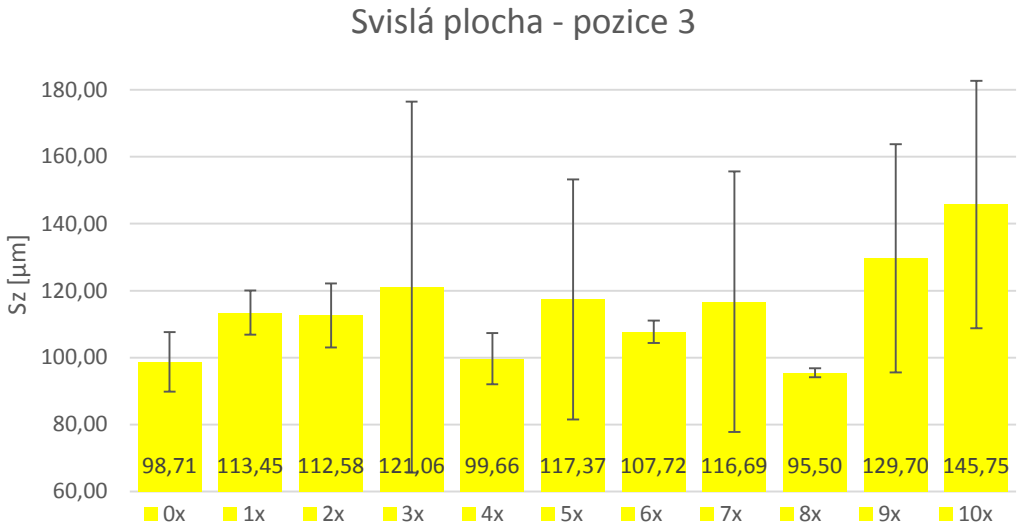

Sklon 45° - pozice 1
Sz [µm]
180,00
160,00
140,00
120,00
100,00
80,00
60,00
88,62
88,13
104,32
117,78
111,70
109,43
119,64
112,08
109,25
106,58
106,37
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x


Sklon 45° - pozice 2
Sz [µm]
180,00
160,00
140,00
120,00
100,00
80,00
60,00
83,82
74,80
80,63
99,60
108,71
116,58
107,55
125,54
105,91
143,87
134,22
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x


Sklon 45° - pozice 3
Sz [µm]
180,00
160,00
140,00
120,00
100,00
80,00
60,00
78,45
74,58
80,77
121,06
99,66
117,37
107,72
116,69
95,50
129,70
145,75
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x


Svislá plocha- pozice 1
Sz [µm]
180,00
160,00
140,00
120,00
100,00
80,00
60,00
103,92
115,81
163,07
117,78
111,70
109,43
119,64
112,08
109,25
106,58
106,37
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x


Svislá plocha - pozice 2
Sz [µm]
180,00
160,00
140,00
120,00
100,00
80,00
60,00
103,87
102,09
109,87
99,60
108,71
116,58
107,55
125,54
105,91
143,87
134,22
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x


Svislá plocha - pozice 3
Sz [µm]
180,00
160,00
140,00
120,00
100,00
80,00
60,00
98,71
113,45
112,58
121,06
99,66
117,37
107,72
116,69
95,50
129,70
145,75
0x
1x
2x
3x
4x
5x
6x
7x
8x
9x
10x

Příloha 9 Měření porozity metalografických výbrusů

Porozita - včetně podpovrchové [%]													
	Použitý prášek Typ bladu:		Recyklováno										
	Ocel	Pryž	0x	1x	2x	3x	4x	5x	6x	7x	8x	9x	10x
Poz.1	0,107	0,116	0,108	0,096	0,097	0,11	0,101	0,106	0,087	0,111	0,125	0,11	0,101
Poz.2	0,123	0,095	0,174	0,136	0,142	0,169	0,121	0,132	0,145	0,16	0,185	0,149	0,145
Poz.3	0,128	0,116	0,166	0,163	0,142	0,145	0,1	0,132	0,107	0,117	0,19	0,147	0,182

Porozita - bez podpovrchové [%]													
	Použitý prášek Typ bladu:		Recyklováno										
	Ocel	Pryž	0x	1x	2x	3x	4x	5x	6x	7x	8x	9x	10x
Poz.1	0,085	0,110	0,097	0,087	0,079	0,088	0,087	0,083	0,097	0,087	0,105	0,091	0,087
Poz.2	0,123	0,081	0,140	0,124	0,098	0,120	0,103	0,107	0,104	0,128	0,174	0,108	0,123
Poz.3	0,102	0,103	0,121	0,121	0,107	0,129	0,081	0,090	0,079	0,109	0,127	0,126	0,147

Příloha 10 Protokoly prášku CL50WS dodané výrobcem

CONCEPTLASER

An der Zeil 8
D 96215 Lichtenfels

Michael Amschler
M.Amschler@Concept-Laser.de

T: 0049 9571 1679 120
F: 0049 9571 1679 499

Test Report

Lichtenfels, December 3, 2015

We hereby confirm that the metal powder CL 50WS, batch no. 013-297, 014-002, has been checked and approved by CL in terms of grain size and grain shape and chemical composition as specified below.

As part of this, the metal powder was subjected to analysis applying the relevant quality standards.

In this case the metal powder was subjected to the analysis in accordance with the valid quality standards. The material was analysed and checked by an external and independent testing laboratory for chemical analysis. The laboratory is certified with the test seal of the German Accreditation System.

Parameter	Min.	Max.
Composition / Element		
Fe	Rest	Rest
C	0,00	0,030
Mo	4,50	5,20
Ni	17,0	19,0
Co	8,50	10,00
Ti	0,80	1,20
Si	0,00	0,10
Mn	0,00	0,15
Cr	0,00	0,25
P	0,00	0,010
S	0,00	0,010

GfE

Akkreditiertes Prüflaboratorium

Chemische Analytik

DAkkS Deutsche Akkreditierungsstelle D-PL-18603-01-00

Die Akkreditierung gilt für die in der Urkunde aufgeführten Prüfverfahren

Lessingstraße 41 09599 Freiberg/Sachsen Tel.: (03731)-375260 Fax: (03731) 375330

Prüfbericht- Nr.: 1296/2013

Auftraggeber: Concept Laser GmbH, An der Zeil 8, D 96215 Lichtenfels
Michael Amschler

Auftrag: **2352.1** Analyse Stahlpulver 1.2709 Charge: 013-297

Auftrag vom: 19.11.2013 Probeneingang am: 21.11.2013

Auftrags - Nr.: 5313194 Labor - Nr. : 133830 - 133831

Prüfverfahren: C, S Verbrennungsverfahren
Säureaufschluss, Schmelzaufschluss
Si, Mn, P, Cr, Mo, Ni, Co, Ti, Al ICP–Verfahren
Feuchte DIN 38409 – H1

Prüfzeitraum: 21.11.2013 – 20.12.2013

Die Probenahme erfolgte durch den Auftraggeber.

Analysenergebnisse:

	Chg. 013-297 Probe # 1	**Chg. 013-297 Probe # 2**
% C	0,008	0,008
% Si	0,13	0,12
% Mn	0,11	0,11
% P	<0,02	<0,02
% S	0,005	0,005
% Cr	0,062	0,065
% Mo	4,95	4,98
% Ni	17,2	17,2
% Co	8,87	9,00
% Ti	0,84	0,83
% Al	<0,05	<0,05
% Feuchte	0	-----

GfE Fremat GmbH, Lessingstraße 41, 09599 Freiberg

Partikelgrößenanalyse HELOS (H2606) & RODOS, R3: 0.5/0.9...175µm

WINDOX 5

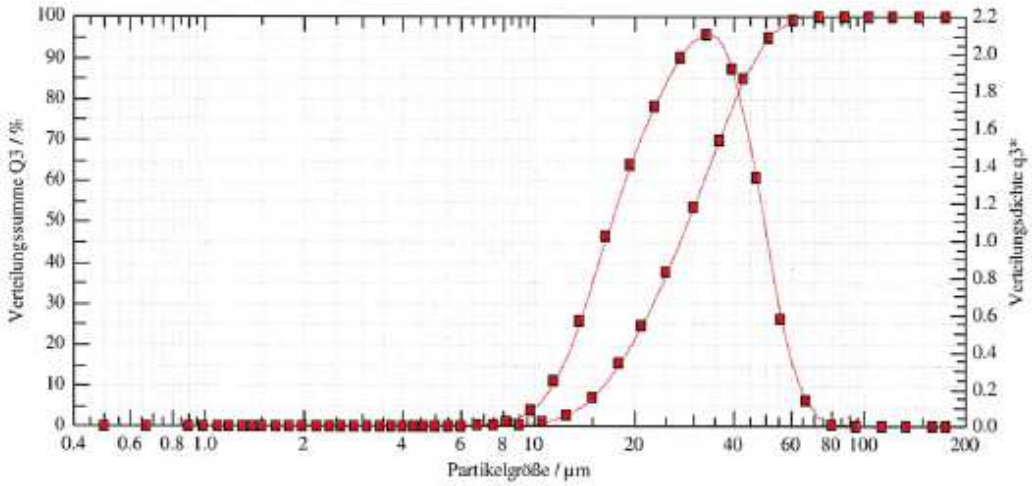
Labornummer: 20131193-02

Datum: 2013-11-27
Benutzer: Hummel

Kunde: Concept Laser GmbH
Auftragsdatum: 25.11.2013
Bestellnummer: 2352.1 vom 19.11.2013

Produkt: Stahl Pulver
Probenbezeichnung: CL50WS 1.2709; Ch.:013-297

x_{10}= 16,07 µm **x_{50}= 28,97 µm** **x_{90}= 47,38 µm**



Verteilungssumme

x_0/µm	Q_3/%	x_0/µm	Q_3/%	x_0/µm	Q_3/%	x_0/µm	Q_3/%
0,90	0,00	3,70	0,00	15,00	7,14	61,00	98,92
1,10	0,00	4,30	0,00	18,00	15,17	73,00	99,98
1,30	0,00	5,00	0,00	21,00	24,58	87,00	100,00
1,50	0,00	6,00	0,00	25,00	37,57	103,00	100,00
1,80	0,00	7,50	0,05	30,00	53,22	123,00	100,00
2,20	0,00	9,00	0,25	36,00	69,84	147,00	100,00
2,60	0,00	10,50	0,82	43,00	84,62	175,00	100,00
3,10	0,00	12,50	2,65	51,00	94,45		

Dispergierung: Trocken
Druck: 1,50 bar
Vakuum: 73,00 mbar
C_{opt}: 4,34 %

Förderer: VIBRI
Förderrate: 70 %
Höhe: 0,5 mm

Auswertung: WINDOX 5.7.1.0,
Dichte : 8,41 g/cm³
Referenzmessung: 11-27 10:36:31
Kontamination: 0,00 %

Prüfbericht 520/2013

Auftraggeber: Herr Michael Amschler
Concept Laser GmbH
An der Zeil 8
96215 Lichtenfels

Aufgabe: Dunkelfeldaufnahmen von Stahl - Pulver 1.2709
Charge: 013-297
Conceptlaser Bestell-Nr. 2352.1

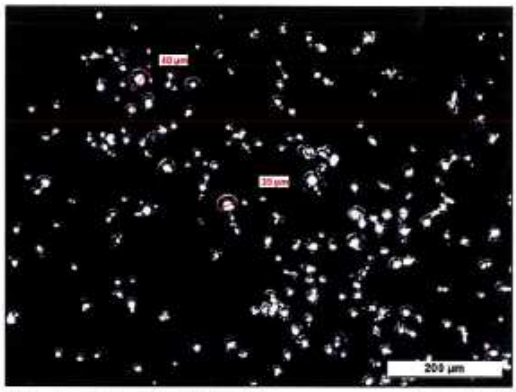


Abb. 1, 2013_520_000003 Dunkelfeld
neigt zu Agglomeraten
Proben-Nr.: # 133830

Abb. 2, 2013_520_000004 Dunkelfeld
meist rundliche Kornform, max. 44 µm
Proben-Nr.: #133830

Bearbeiter: T. Schmidt

Prüfzeitraum: 22.11.2013 bis 22.11.2013
Erstelldatum: 22.11.2013
Seitenanzahl: 1

Příloha 11 Protokoly prášku 1.2709 dodané výrobcem SLM Solutions

Analysis Certificate
Powder Material

SLM SOLUTIONS

Material

Material:	1.2709 / A646 M300		Atomize Gas:	-	
Batch No.:	2016000540		Particle Shape:	Spherical	
			Particle Size:	10 - 45	µm
			Apparent Density:	4,10	g/cm³

Flowability[1,2]

Powder Temp.:	21,0	°C	Weight:	232,0	g
	69,8	F		0,5	lb
Air Humidity:	58,0	%RH	Processing Time:	33,0	s
Relative Humidity:	8,6	%RH	Filter Hopper SN:	106-PM-SLM-QM	

Chemical Analysis[3]

Element	Minimum [wt%]	Actual [wt%]	Maximum [wt%]
Fe	Balance	Balance	Balance
Al	0.05	0.08	0.15
C	-	0.00	0.03
Co	8.50	9.19	9.50
Mn	-	0.02	0.10
Mo	4.70	4.76	5.20
Ni	18.00	18.35	19.00
P	-	0.00	0.01
S	-	0.00	0.01
Si	-	0.05	0.10
Ti	0.50	0.66	0.80

Grain Shape[4]

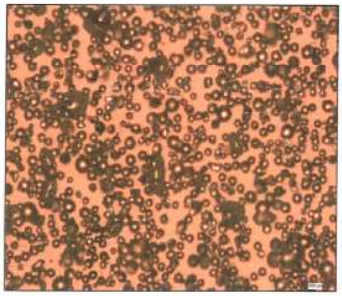


Fig. Grain shape with 100x-magnification [SLM].

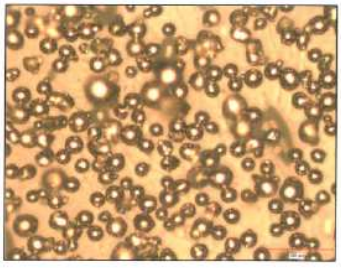


Fig. Grain shape with 200x-magnification [SLM].

SLM Solutions GmbH
Roggenhorster Straße 9c
D-23556 Lübeck
Germany

Telephone: +49(0)451 16082-0
Fax: +49(0)451 16082-250
E-Mail: info@slm-solutions.com
Internet: www.slm-solutions.com

Commerzbank AG (BLZ 230 400 22) 19 397 900
Deutsche Bank AG (BLZ 230 707 10) 0 359 000
Dresdner Bank AG (BLZ 230 800 40) 3 506 666
VAT-ID. DE 814 772 548

Analysis Certificate

Powder Material

SLM SOLUTIONS

Particle Size distribution[5]

Sample ref.	: 2016000540_3
Material	: 12709_M300_7_18Ni300
Lieferant	: 8
Comments	:
Liquid	: Isopropanol
Dispersing agent	: None
Operator	: TW
Company	: SLM Solutions
Location	: Lübeck
Date : 14.07.2016	Time : 08:42:02
Index meas.	: 1437
Database name	: CilasDB1

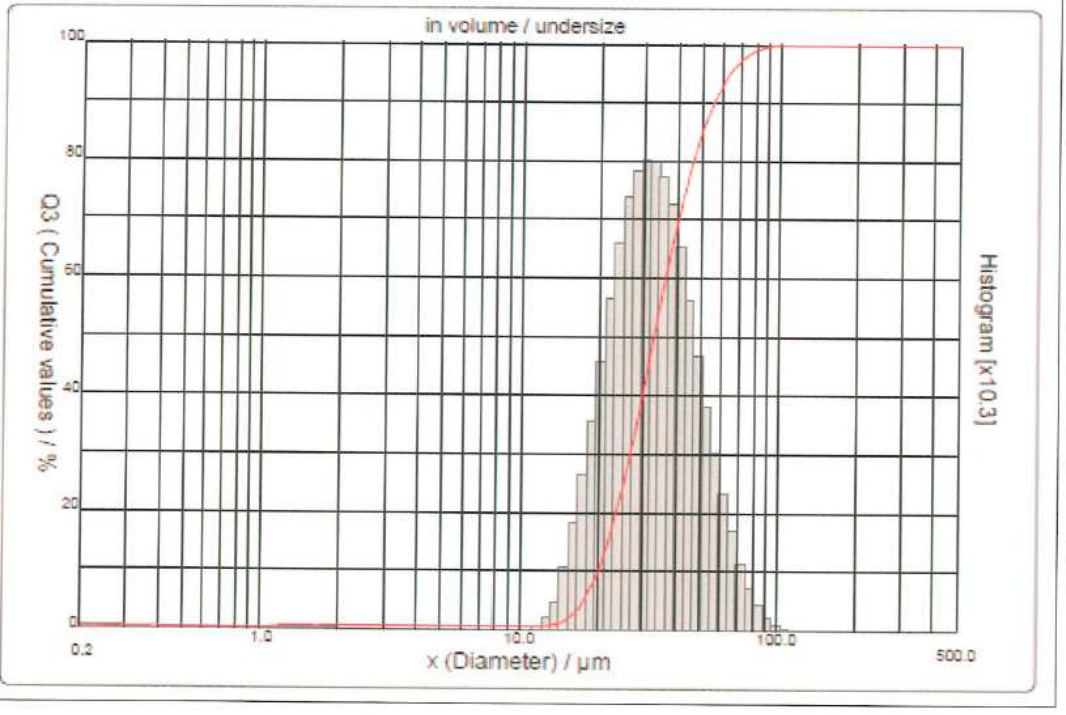
Ultrasounds	: 60	s
Obscuration	: 18 %	
Diameter at 10%	: 20.15	µm
Diameter at 50%	: 32.78	µm
Diameter at 90%	: 55.14	µm
Mean diameter Fraunhofer	: 35.55	µm
Density/Factor	------	
Specific surface	------	
Automatic dilution	: No / No	
Meas./Rins.	: 30s/60s/3	
SOP name	: 990L 5.00 Grob	

Customer defined classes — in volume / undersize

x	0.20	0.50	1.00	2.00	3.20	4.00	5.00	6.00	8.00	10.00
Q3	0.24	0.54	0.54	0.71	0.71	0.71	0.71	0.71	0.71	0.71

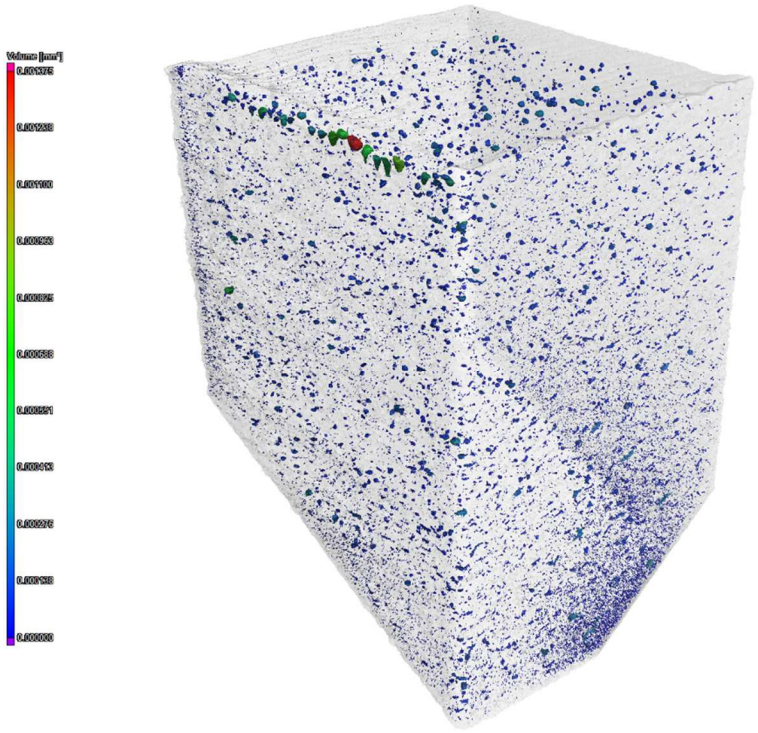
x	15.00	20.00	32.00	45.00	63.00	112.0	224.0	315.0	400.0	500.0
Q3	1.53	9.59	47.65	78.41	94.86	100.00	100.00	100.00	100.00	100.00

x : diameter / µm Q3 : cumulative value / % q3 : density distribution

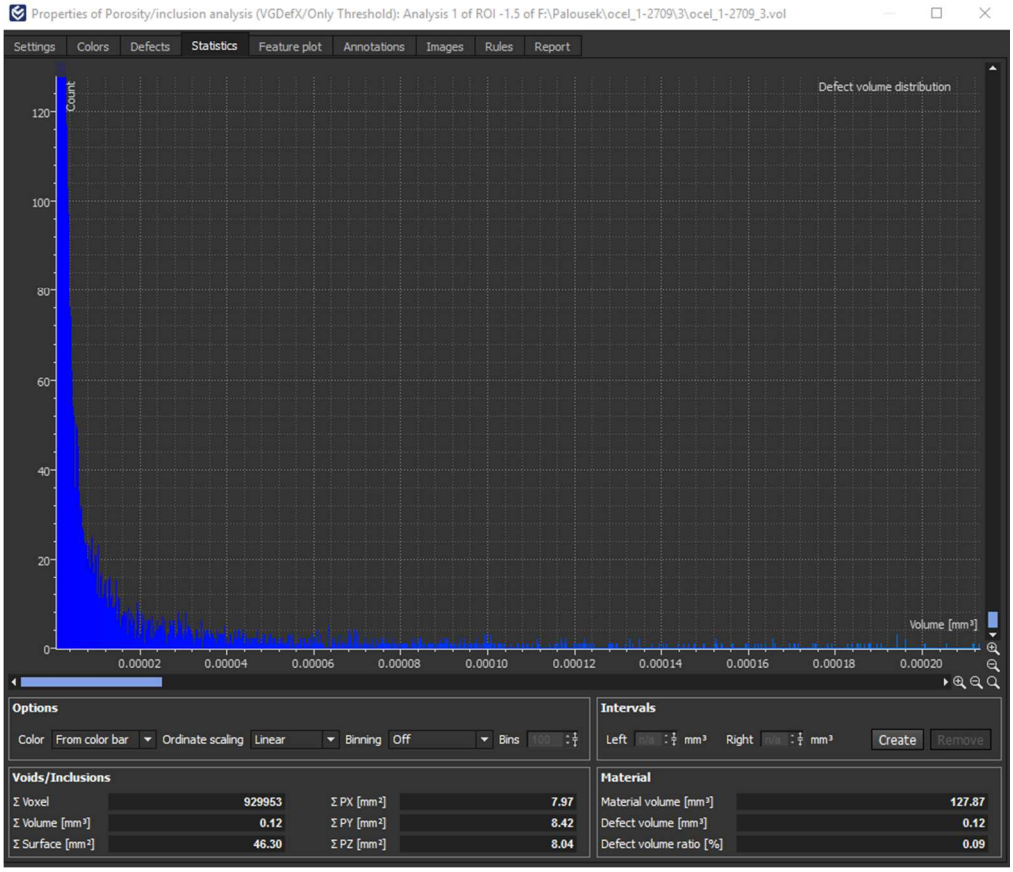


Příloha 12 Výstup analýzy µCT vzorku 3

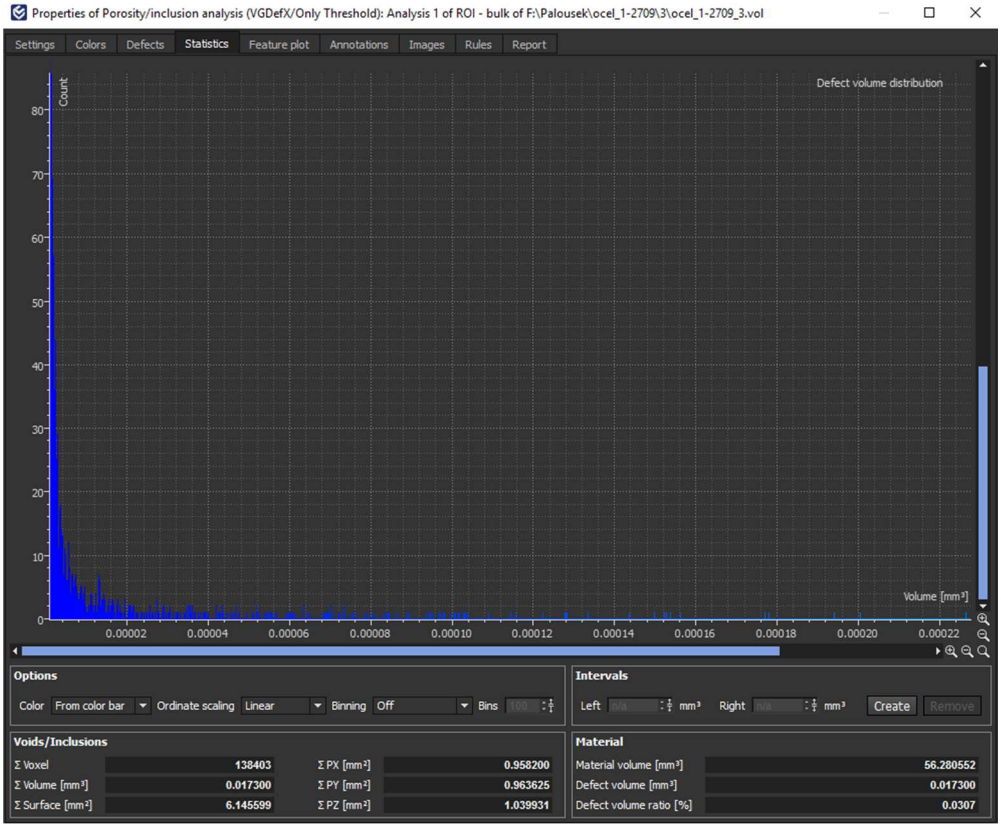
Vizualizace rozmístění porozity ve vzorku 3



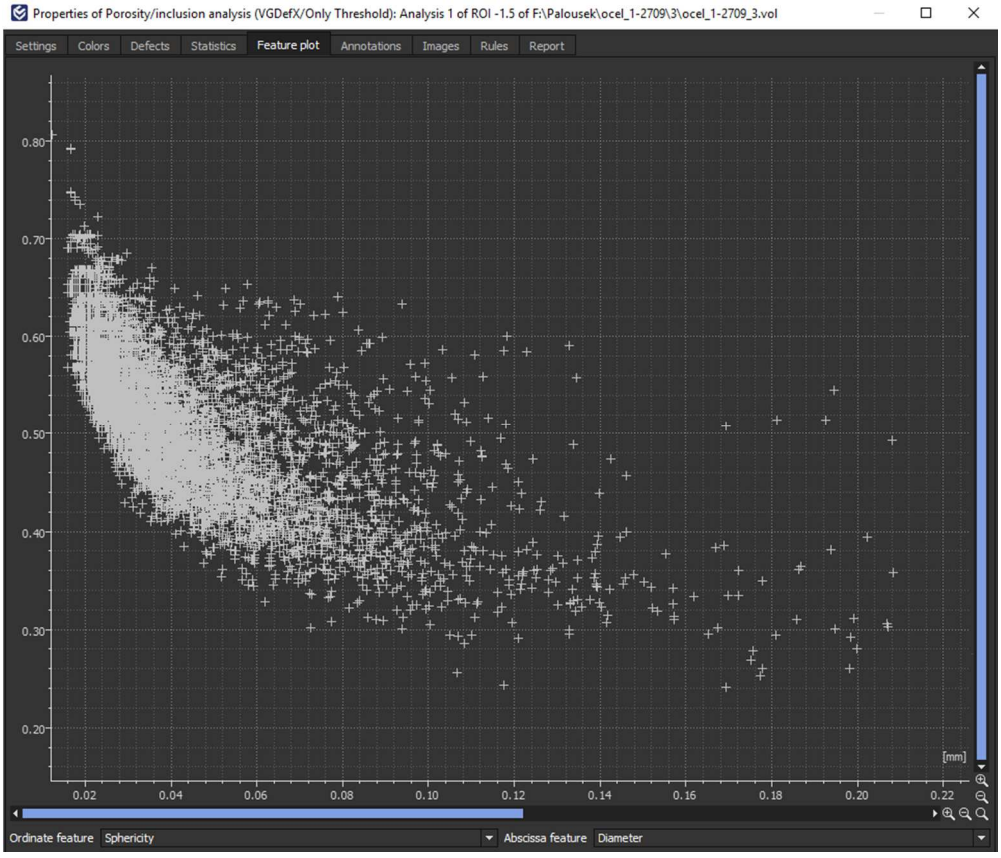
Výstup analýzy porozity vzorku 3 v celém objemu



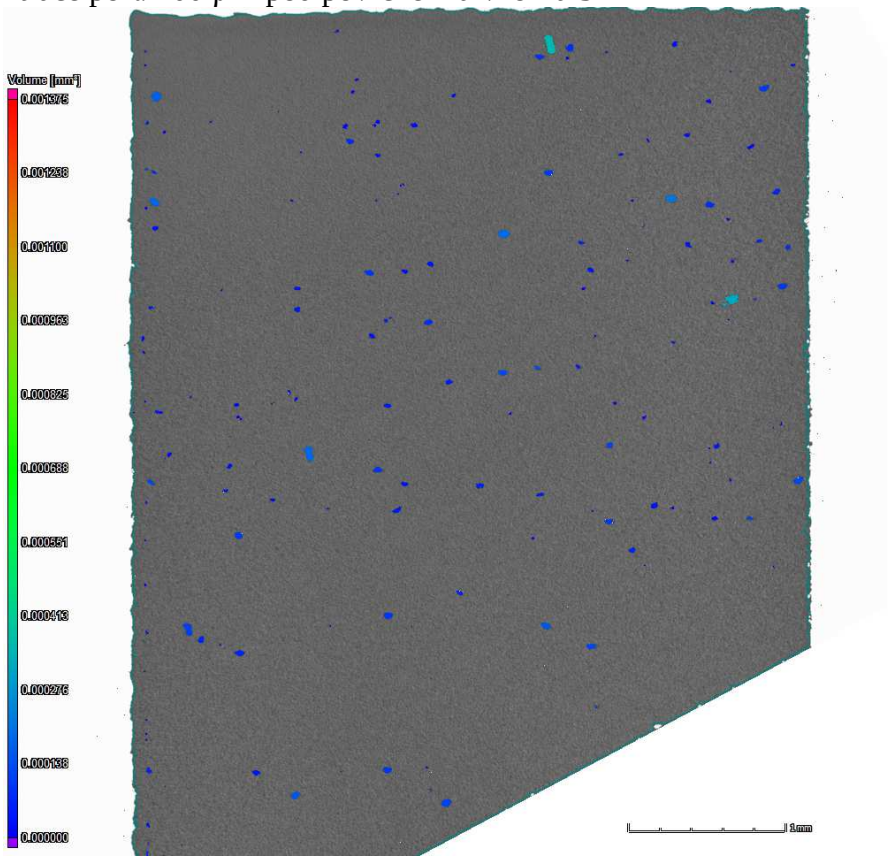
Výstup analýzy porozity uvnitř vzorku 3



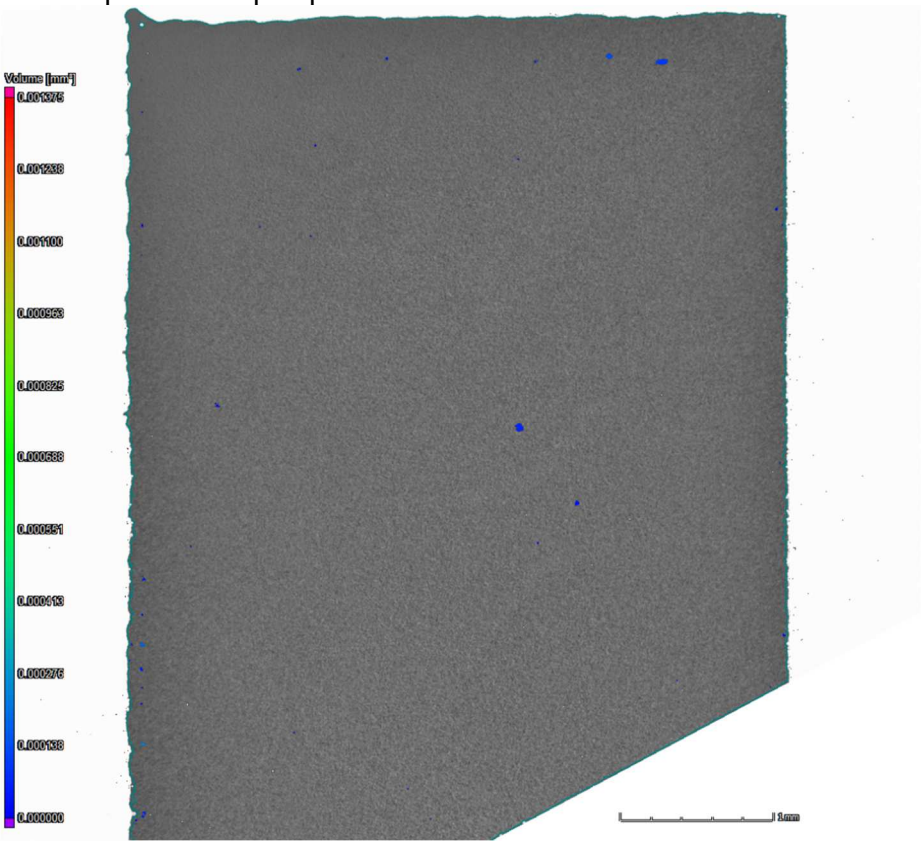
Závislost koeficientu sféricity na průměru pórů ve vzorku 3



Koncentrace pórů 200 µm pod povrchem u vzorku 3

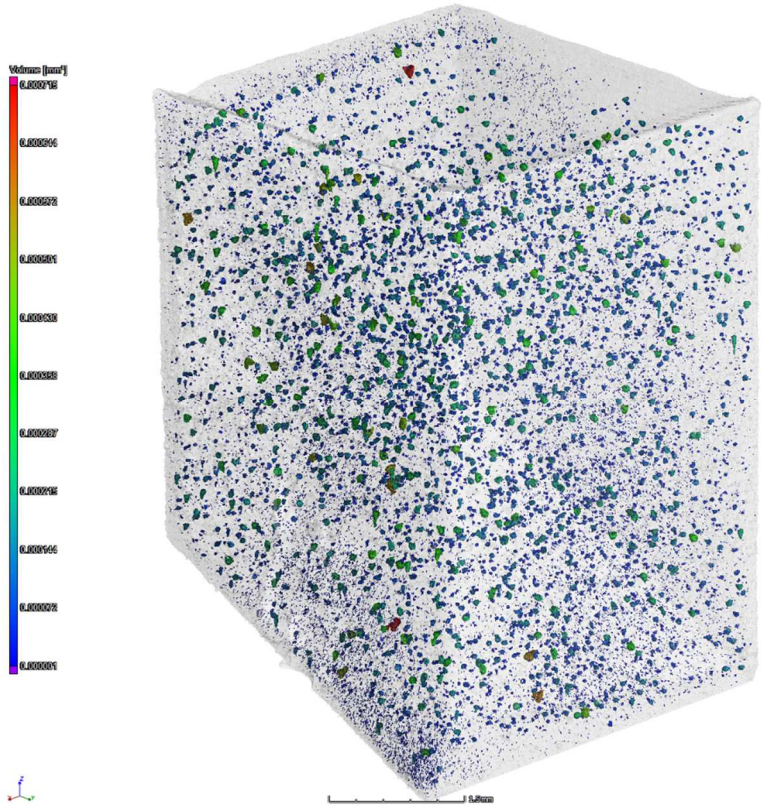


Koncentrace pórů 2 mm pod povrchem u vzorku 3

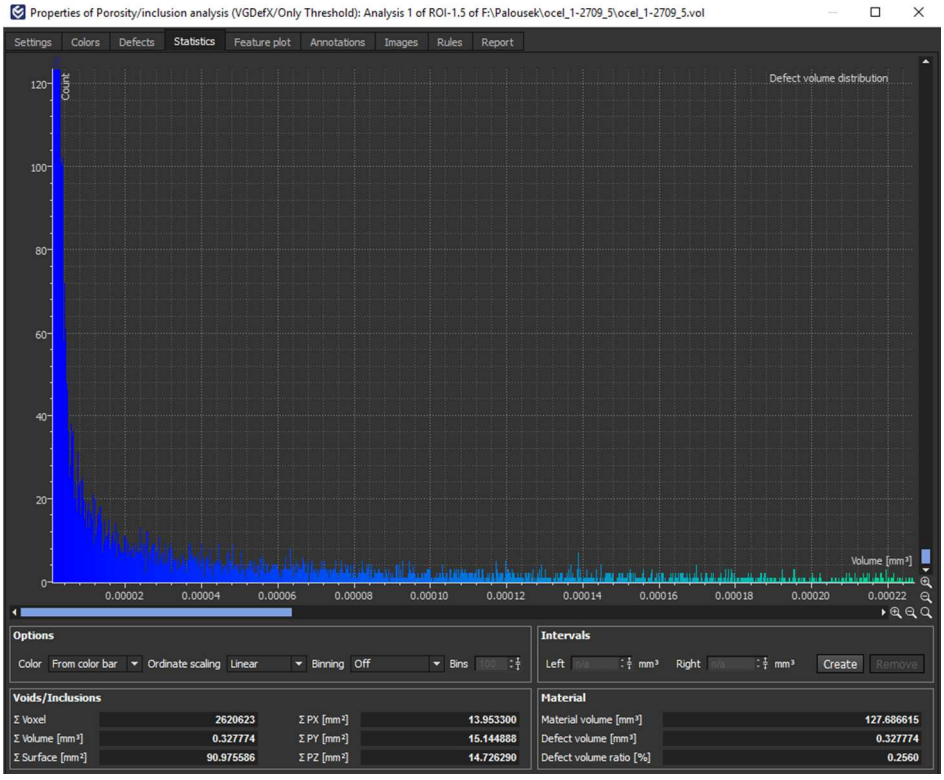


Příloha 13 Výstup analýzy µCT vzorku 5

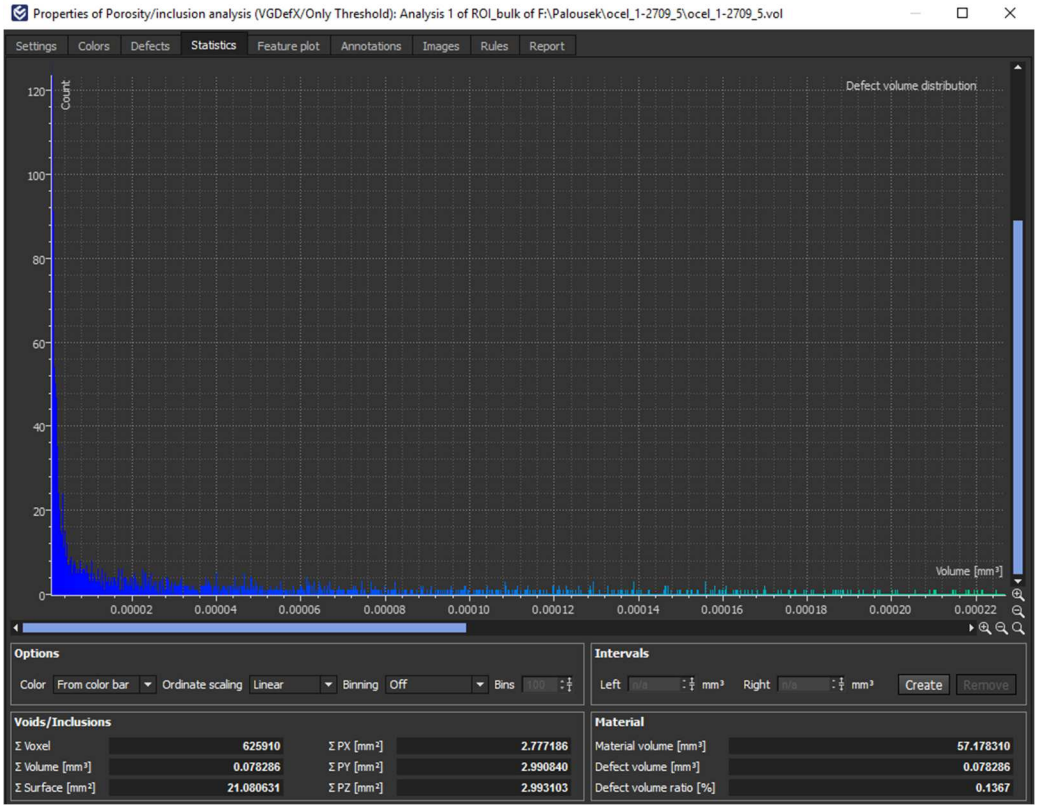
Vizualizace rozmístění porozity ve vzorku 5



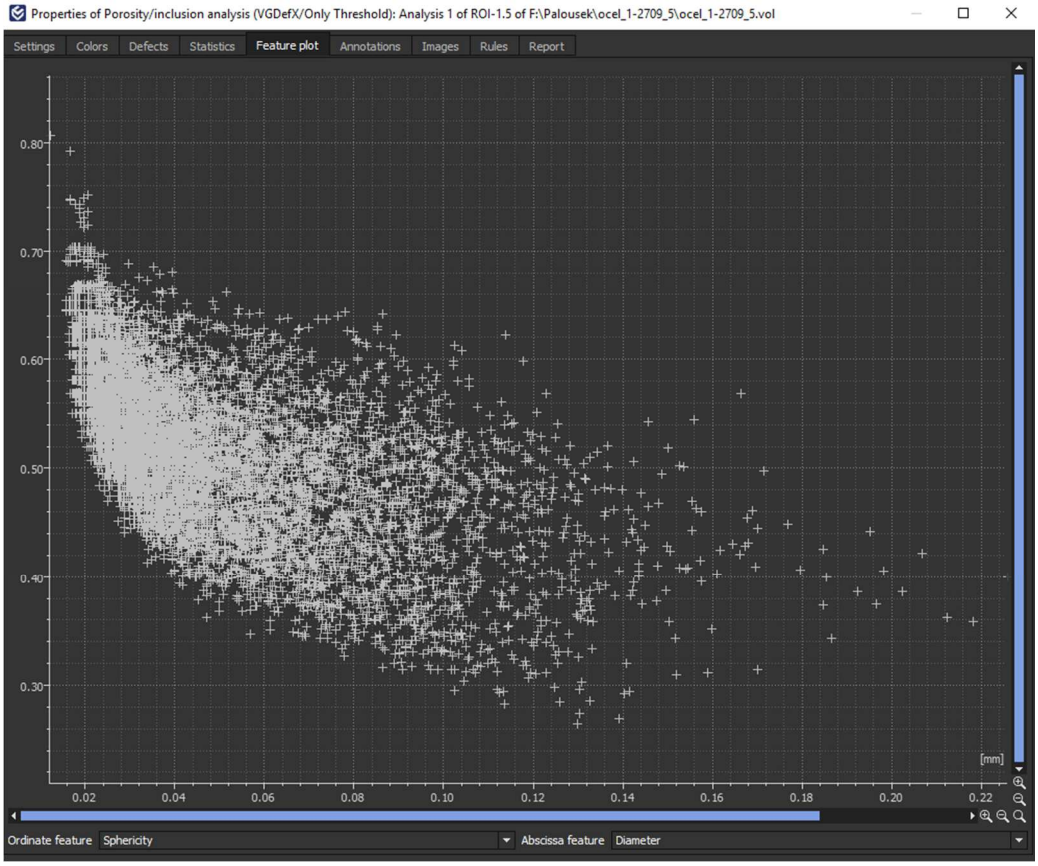
Výstup analýzy porozity vzorku 5 v celém objemu



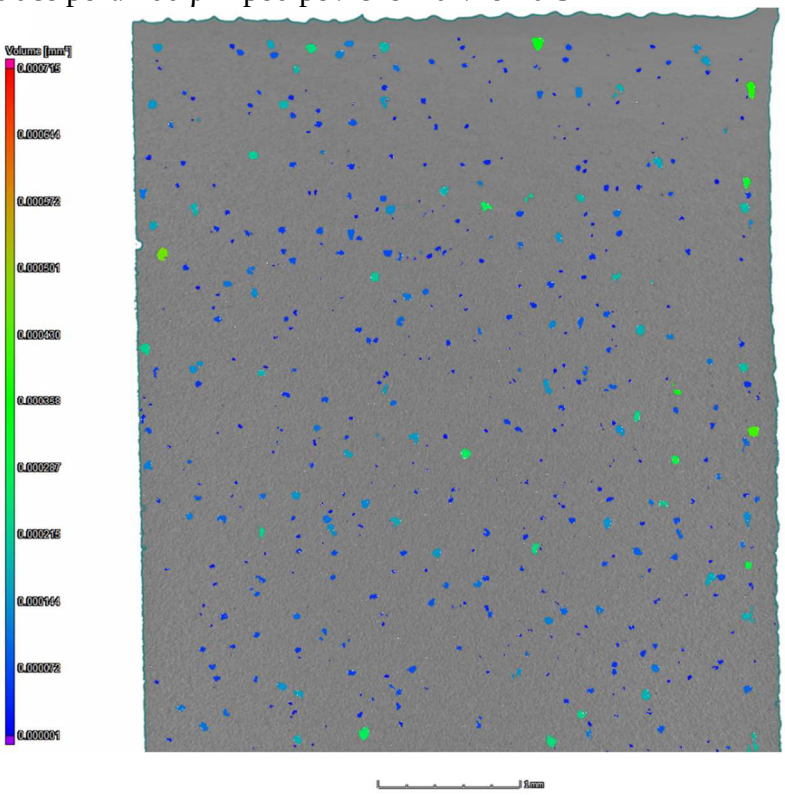
Výstup analýzy porozity uvnitř vzorku 5



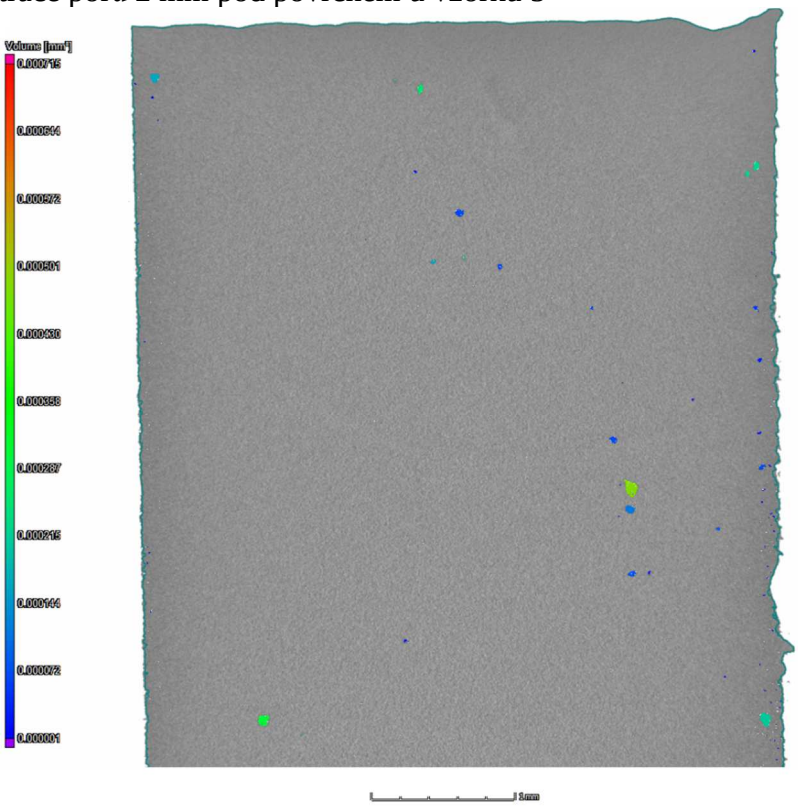
Závislost koeficientu sféricity na průměru pórů ve vzorku 5



Koncentrace pórů 200 µm pod povrchem u vzorku 5

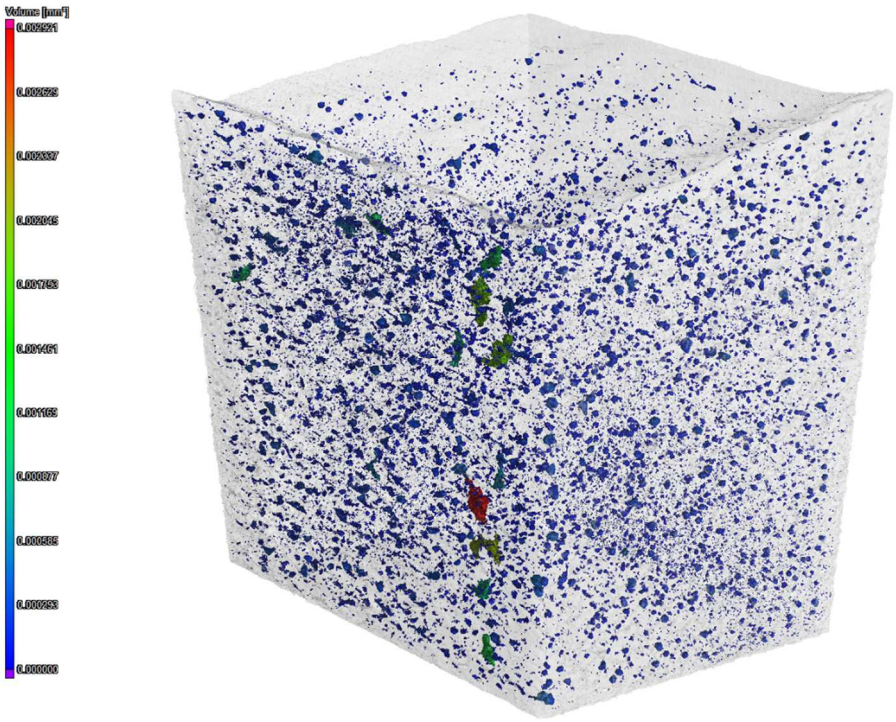


Koncentrace pórů 2 mm pod povrchem u vzorku 5

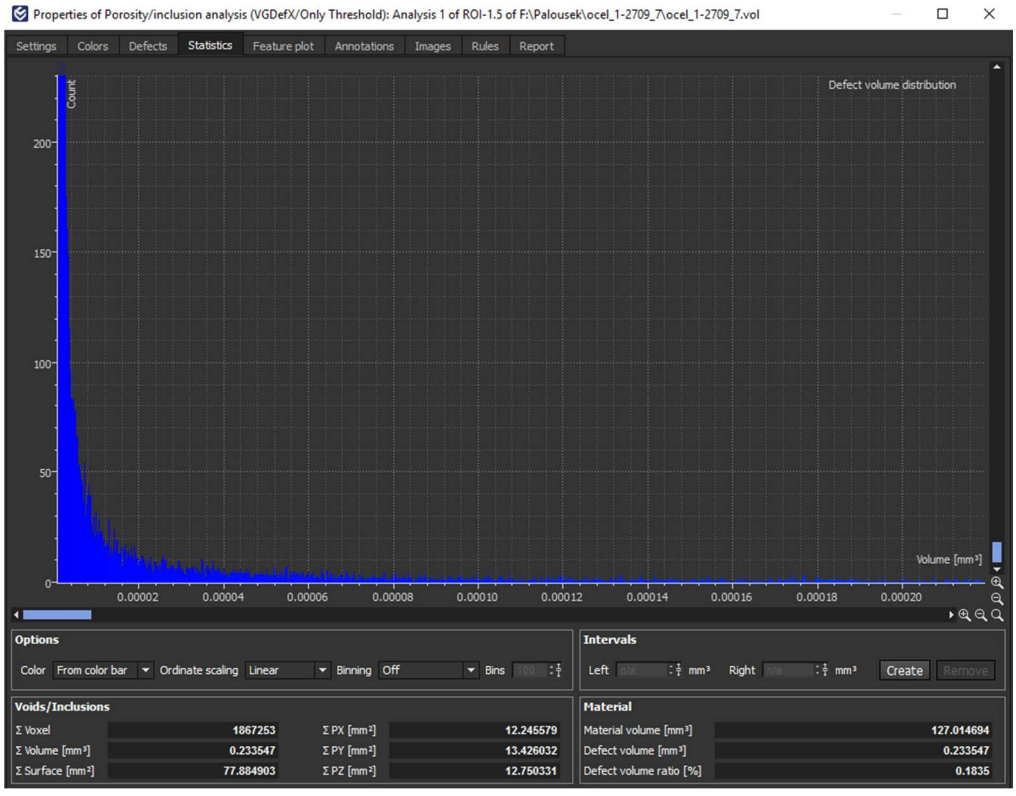


Příloha 14 Výstup analýzy µCT vzorku 5

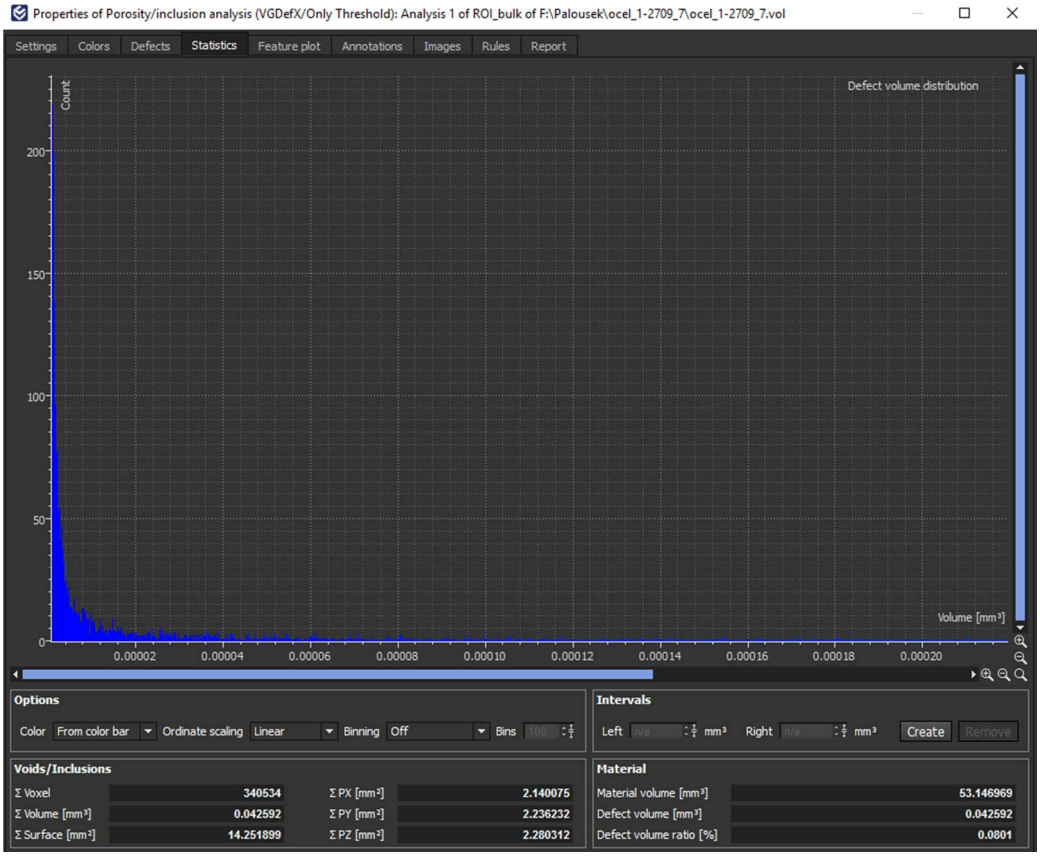
Vizualizace rozmístění porozity ve vzorku 7



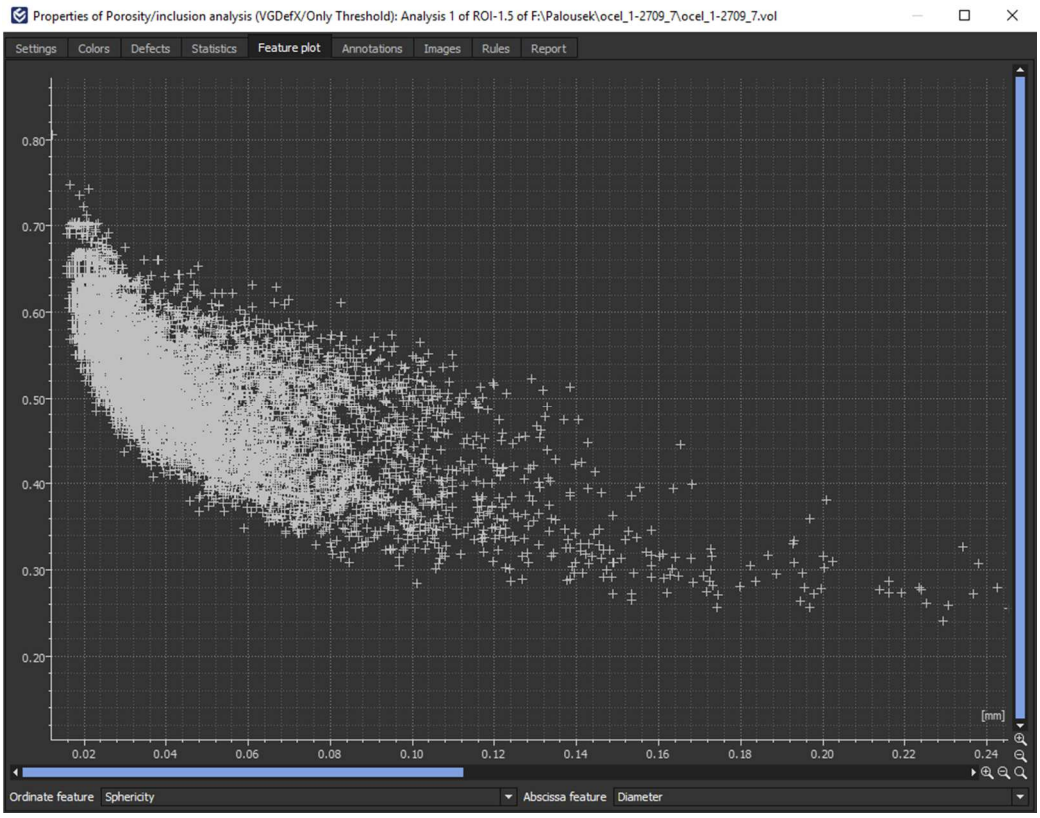
Výstup analýzy porozity vzorku 7 v celém objemu



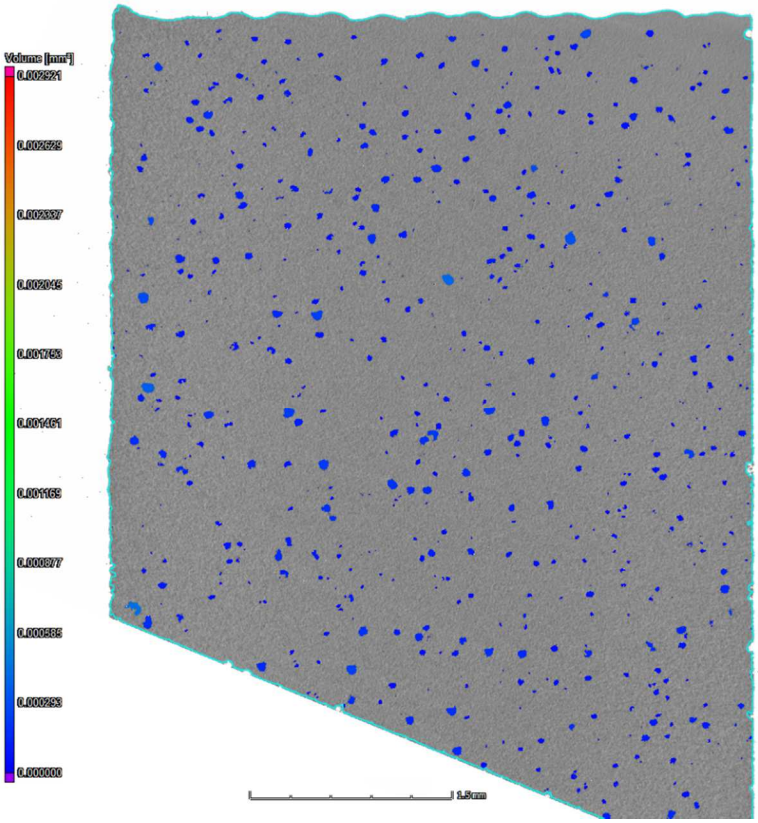
Výstup analýzy porozity uvnitř vzorku 5



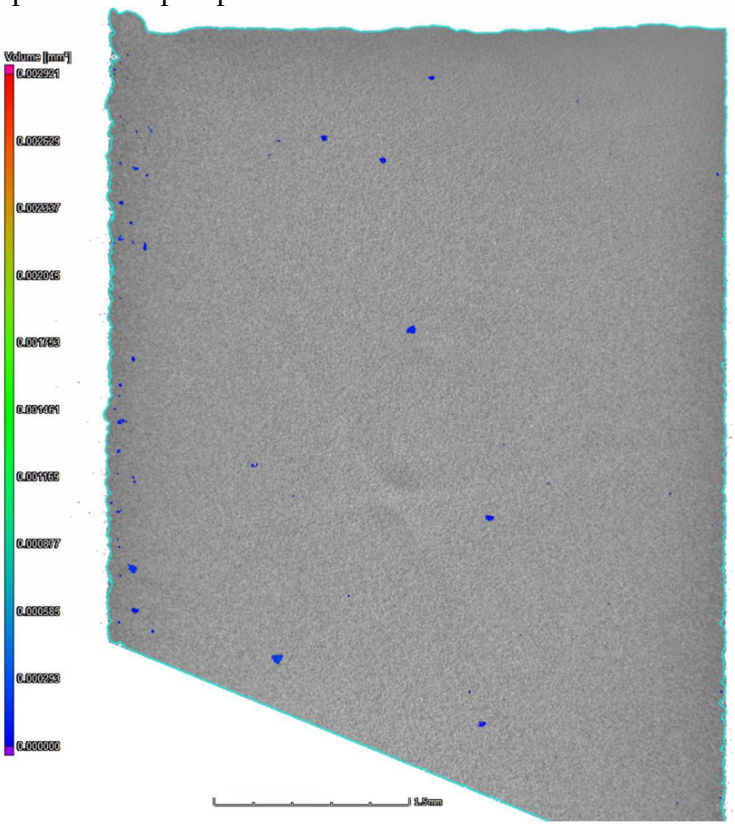
Závislost koeficientu sféricity na průměru pórů ve vzorku 5



Koncentrace pórů 200 µm pod povrchem u vzorku 7



Koncentrace pórů 2 mm pod povrchem u vzorku 7



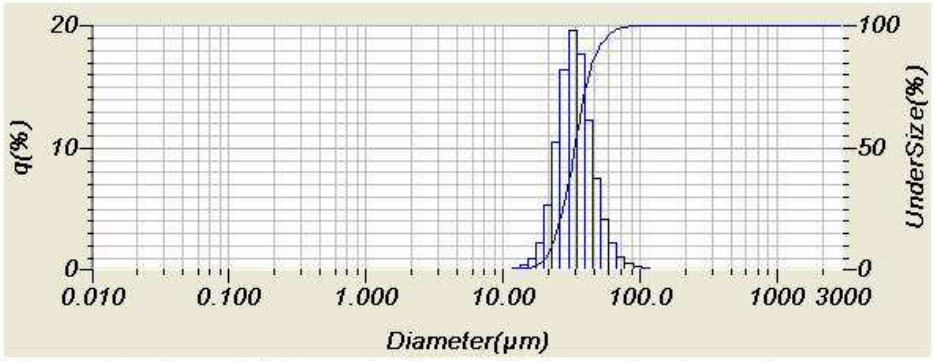
Příloha 15 Protokoly měření distribuce velikosti částic z testu přesívání kontaminovaného prášku

Velikosti částic nového prášku 1.2709 SLM Solutions

2017.04.27 02:25:55

HORIBA Laser Scattering Particle Size Distribution Analyzer LA-950

Sample Name	: ocel UFM Hynek	Median Size	: 33.12546(µm)
Data Name	: 1.2709 SLM solutions	Mean Size	: 35.19961(µm)
Transmittance(R)	: 82.5(%)	Std.Dev.	: 11.5533(µm)
Transmittance(B)	: 88.5(%)	Geo.Mean Size	: 33.5707(µm)
Circulation Speed	: 6	Geo.Std.Dev.	: 1.3539(µm)
Agitation Speed	: 6	Mode Size	: 32.1472(µm)
Ultra Sonic	: OFF	Span	: OFF
Form of Distribution	: Auto	Diameter on Cumulative %	: (2)10.00 (%)- 23.2157(µm)
Distribution Base	: Volume		: (9)90.00 (%)- 49.5957(µm)
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		



No.	Diameter(µm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000

No.	Diameter(µm)	q(%)	UnderSize(%)
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000

No.	Diameter(µm)	q(%)	UnderSize(%)
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.565	0.000	0.000
53	13.246	0.112	0.112
54	15.172	0.298	0.410
55	17.377	0.819	1.229
56	19.904	2.176	3.405
57	22.797	5.202	8.607
58	26.111	10.391	18.998
59	29.907	16.316	35.314
60	34.255	19.503	54.816
61	39.234	17.571	72.387
62	44.938	12.239	84.626
63	51.471	7.396	92.022
64	58.953	4.047	96.069
65	67.523	2.089	98.158
66	77.339	1.016	99.174
67	88.583	0.477	99.652
68	101.460	0.230	99.881
69	116.210	0.119	100.000
70	133.103	0.000	100.000
71	152.453	0.000	100.000
72	174.616	0.000	100.000

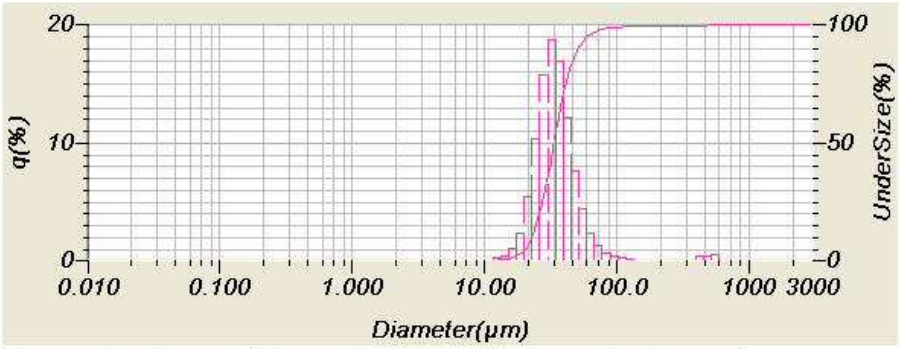
Velikosti částic recyklovaného prášku 1.2709 SLM Solutions

2017.04.27 02:31:54

HORIBA

Laser Scattering Particle Size Distribution Analyzer LA-950

Sample Name	: ocel UFM Hynek	Median Size	: 33.37638(µm)
Data Name	: 1,2709 SLM solutions Q8 (přesátý)	Mean Size	: 40.57246(µm)
Transmittance(R)	: 71.0(%)	Std.Dev.	: 49.3041(µm)
Transmittance(B)	: 78.6(%)	Geo.Mean Size	: 34.7795(µm)
Circulation Speed	: 6	Geo.Std.Dev.	: 1.5223(µm)
Agitation Speed	: 6	Mode Size	: 32.1435(µm)
Ultra Sonic	: 00:01 (7)	Span	: OFF
Form of Distribution	: Auto	Diameter on Cumulative %	: (2)10.00 (%)- 23.0992(µm)
Distribution Base	: Volume		: (9)90.00 (%)- 51.4885(µm)
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		



No.	Diameter(µm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.026	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000

No.	Diameter(µm)	q(%)	UnderSize(%)
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000

No.	Diameter(µm)	q(%)	UnderSize(%)
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.565	0.000	0.000
53	13.246	0.135	0.135
54	15.172	0.346	0.481
55	17.377	0.910	1.391
56	19.904	2.312	3.702
57	22.797	5.304	9.007
58	26.111	10.240	19.247
59	29.907	15.710	34.957
60	34.255	18.603	53.560
61	39.234	16.876	70.436
62	44.938	12.037	82.474
63	51.471	7.516	89.989
64	58.953	4.279	94.268
65	67.523	2.311	96.579
66	77.339	1.180	97.758
67	88.583	0.584	98.342
68	101.460	0.298	98.641
69	116.210	0.165	98.806
70	133.103	0.107	98.913
71	152.453	0.000	98.913
72	174.616	0.000	98.913

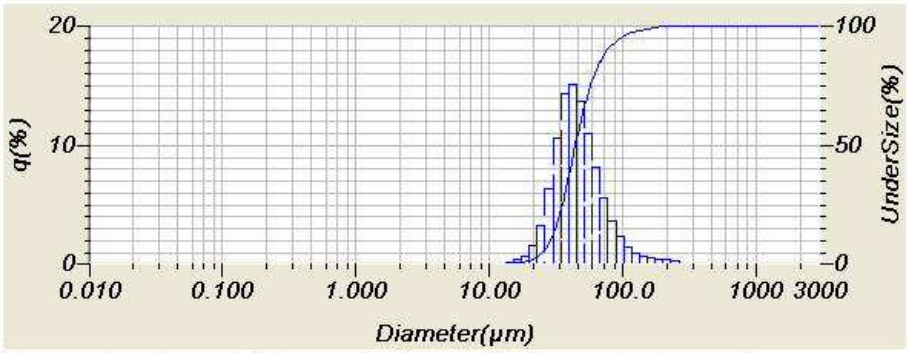
Velikosti částic kontaminovaného prášku ze stavební komory 1.2709 SLM Solutions

2017.04.27 02:28:23

HORIBA

Laser Scattering Particle Size Distribution Analyzer LA-950

Sample Name	: ocel UFM Hynek	Median Size	: 44.22166(µm)
Data Name	: 1,2709 SLM solutions Q6 (komora)	Mean Size	: 50.79909(µm)
Transmittance(R)	: 88.9(%)	Std.Dev.	: 26.7179(µm)
Transmittance(B)	: 92.9(%)	Geo.Mean Size	: 46.1667(µm)
Circulation Speed	: 6	Geo.Std.Dev.	: 1.5122(µm)
Agitation Speed	: 6	Mode Size	: 41.8819(µm)
Ultra Sonic	: OFF	Span	: OFF
Form of Distribution	: Auto	Diameter on Cumulative %	: (2)10.00 (%)- 28.6888(µm)
Distribution Base	: Volume		: (9)90.00 (%)- 77.5001(µm)
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		



No.	Diameter(µm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000
2	0.013	0.000	0.000
3	0.015	0.000	0.000
4	0.017	0.000	0.000
5	0.020	0.000	0.000
6	0.022	0.000	0.000
7	0.025	0.000	0.000
8	0.029	0.000	0.000
9	0.034	0.000	0.000
10	0.039	0.000	0.000
11	0.044	0.000	0.000
12	0.051	0.000	0.000
13	0.058	0.000	0.000
14	0.067	0.000	0.000
15	0.076	0.000	0.000
16	0.087	0.000	0.000
17	0.100	0.000	0.000
18	0.115	0.000	0.000
19	0.131	0.000	0.000
20	0.150	0.000	0.000
21	0.172	0.000	0.000
22	0.197	0.000	0.000
23	0.226	0.000	0.000
24	0.259	0.000	0.000

No.	Diameter(µm)	q(%)	UnderSize(%)
25	0.296	0.000	0.000
26	0.339	0.000	0.000
27	0.389	0.000	0.000
28	0.445	0.000	0.000
29	0.510	0.000	0.000
30	0.584	0.000	0.000
31	0.669	0.000	0.000
32	0.766	0.000	0.000
33	0.877	0.000	0.000
34	1.005	0.000	0.000
35	1.151	0.000	0.000
36	1.318	0.000	0.000
37	1.510	0.000	0.000
38	1.729	0.000	0.000
39	1.981	0.000	0.000
40	2.269	0.000	0.000
41	2.599	0.000	0.000
42	2.976	0.000	0.000
43	3.409	0.000	0.000
44	3.905	0.000	0.000
45	4.472	0.000	0.000
46	5.122	0.000	0.000
47	5.867	0.000	0.000
48	6.720	0.000	0.000

No.	Diameter(µm)	q(%)	UnderSize(%)
49	7.697	0.000	0.000
50	8.816	0.000	0.000
51	10.097	0.000	0.000
52	11.565	0.000	0.000
53	13.246	0.000	0.000
54	15.172	0.117	0.117
55	17.377	0.264	0.380
56	19.904	0.618	0.998
57	22.797	1.443	2.441
58	26.111	3.190	5.631
59	29.907	6.299	11.930
60	34.255	10.549	22.478
61	39.234	14.229	36.707
62	44.938	15.078	51.785
63	51.471	13.689	65.444
64	58.953	10.945	76.388
65	67.523	8.030	84.419
66	77.339	5.527	89.945
67	88.583	3.579	93.524
68	101.460	2.235	95.759
69	116.210	1.369	97.128
70	133.103	0.899	98.027
71	152.453	0.631	98.658
72	174.616	0.464	99.122

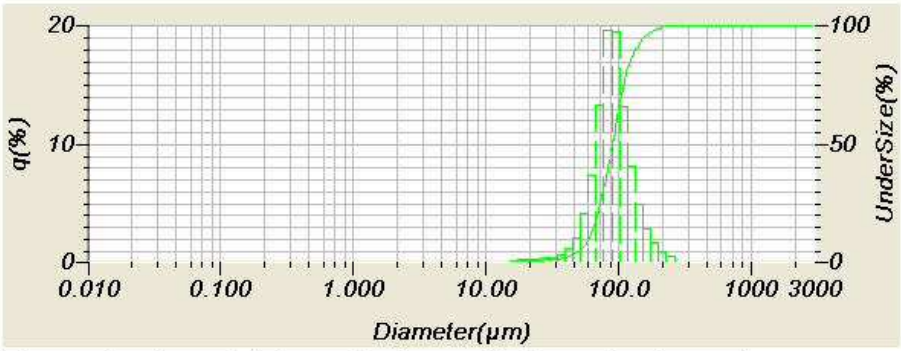
Velikosti částic odpadního prášku 1.2709 SLM Solutions

2017.04.27 02:31:18

HORIBA

Laser Scattering Particle Size Distribution Analyzer LA-950

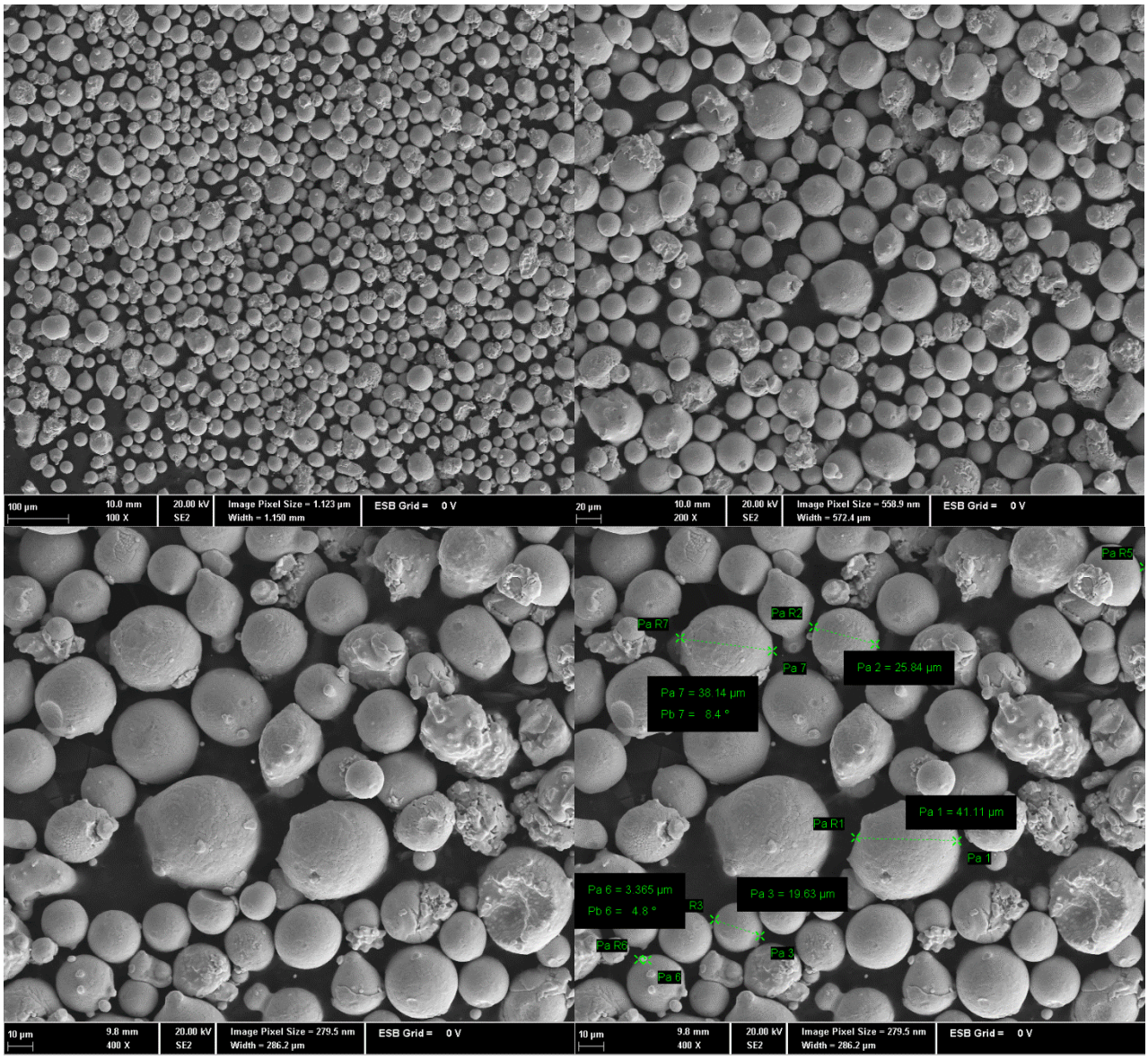
Sample Name	: ocel UFM Hynek	Median Size	: 89.22301(µm)
Data Name	: 1,2709 SLM solutions Q7 (odpad)	Mean Size	: 94.52101(µm)
Transmittance(R)	: 85.2(%)	Std.Dev.	: 33.1545(µm)
Transmittance(B)	: 91.4(%)	Geo.Mean Size	: 89.1503(µm)
Circulation Speed	: 6	Geo.Std.Dev.	: 1.4153(µm)
Agitation Speed	: 6	Mode Size	: 84.5729(µm)
Ultra Sonic	: OFF	Span	: OFF
Form of Distribution	: Auto	Diameter on Cumulative %	: (2)10.00 (%)- 60.1179(µm)
Distribution Base	: Volume		: (9)90.00 (%)- 135.4095(µm)
Refractive Index (R)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Refractive Index (B)	: Iron[Iron(3.500 - 3.800i),Water(1.333)]		
Material	: ocel - Cr		



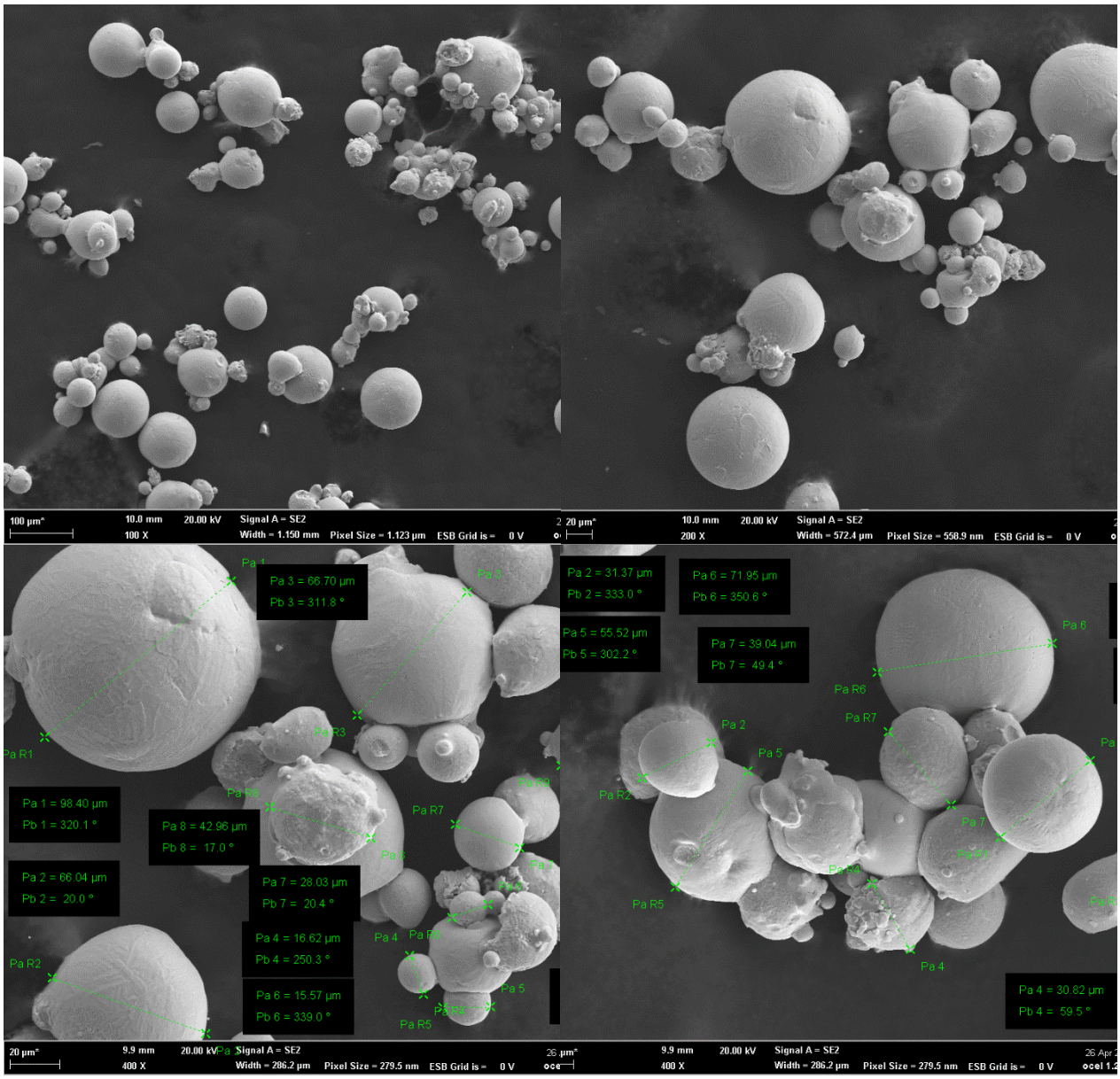
No.	Diameter(µm)	q(%)	UnderSize(%)	No.	Diameter(µm)	q(%)	UnderSize(%)	No.	Diameter(µm)	q(%)	UnderSize(%)
1	0.011	0.000	0.000	25	0.296	0.000	0.000	49	7.697	0.000	0.000
2	0.013	0.000	0.000	26	0.339	0.000	0.000	50	8.816	0.000	0.000
3	0.015	0.000	0.000	27	0.389	0.000	0.000	51	10.097	0.000	0.000
4	0.017	0.000	0.000	28	0.445	0.000	0.000	52	11.565	0.000	0.000
5	0.020	0.000	0.000	29	0.510	0.000	0.000	53	13.246	0.000	0.000
6	0.022	0.000	0.000	30	0.584	0.000	0.000	54	15.172	0.000	0.000
7	0.026	0.000	0.000	31	0.669	0.000	0.000	55	17.377	0.106	0.106
8	0.029	0.000	0.000	32	0.766	0.000	0.000	56	19.904	0.134	0.240
9	0.034	0.000	0.000	33	0.877	0.000	0.000	57	22.797	0.169	0.409
10	0.039	0.000	0.000	34	1.005	0.000	0.000	58	26.111	0.214	0.623
11	0.044	0.000	0.000	35	1.151	0.000	0.000	59	29.907	0.278	0.901
12	0.051	0.000	0.000	36	1.318	0.000	0.000	60	34.255	0.381	1.282
13	0.058	0.000	0.000	37	1.510	0.000	0.000	61	39.234	0.582	1.864
14	0.067	0.000	0.000	38	1.729	0.000	0.000	62	44.938	1.043	2.907
15	0.076	0.000	0.000	39	1.981	0.000	0.000	63	51.471	2.029	4.936
16	0.087	0.000	0.000	40	2.269	0.000	0.000	64	58.953	4.007	8.943
17	0.100	0.000	0.000	41	2.599	0.000	0.000	65	67.523	7.332	16.275
18	0.115	0.000	0.000	42	2.976	0.000	0.000	66	77.339	13.164	29.439
19	0.131	0.000	0.000	43	3.409	0.000	0.000	67	88.583	19.533	48.972
20	0.150	0.000	0.000	44	3.905	0.000	0.000	68	101.460	19.365	68.337
21	0.172	0.000	0.000	45	4.472	0.000	0.000	69	116.210	13.050	81.387
22	0.197	0.000	0.000	46	5.122	0.000	0.000	70	133.103	8.005	89.392
23	0.226	0.000	0.000	47	5.867	0.000	0.000	71	152.453	4.806	94.197
24	0.259	0.000	0.000	48	6.720	0.000	0.000	72	174.616	2.798	96.995

Příloha 16 Fotografie SEM nového a odpadního prášku SLM Solutions

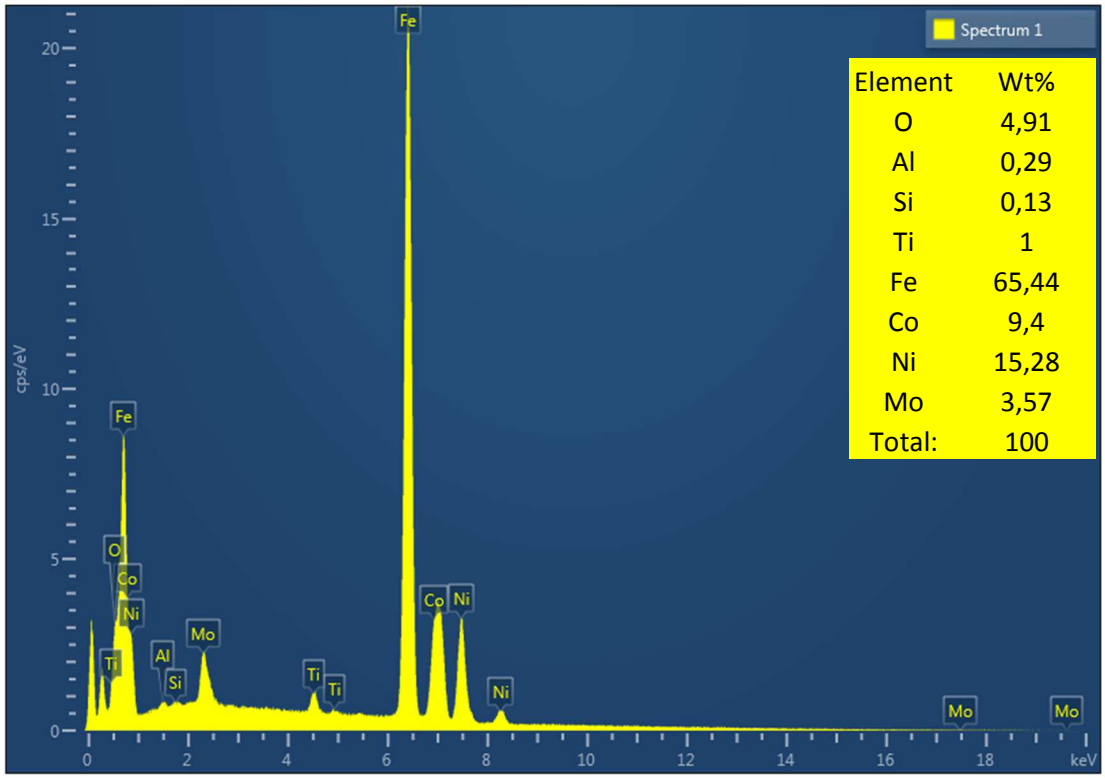
Fotografie nového prášku

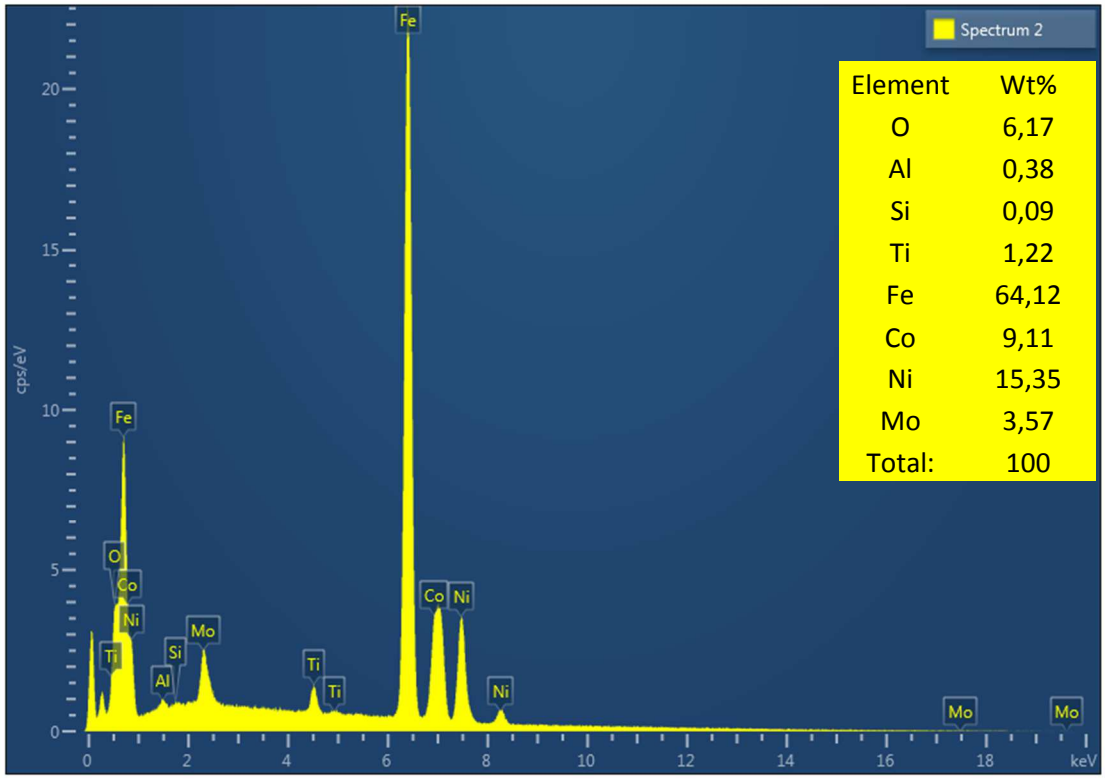


Fotografie odpadního prášku



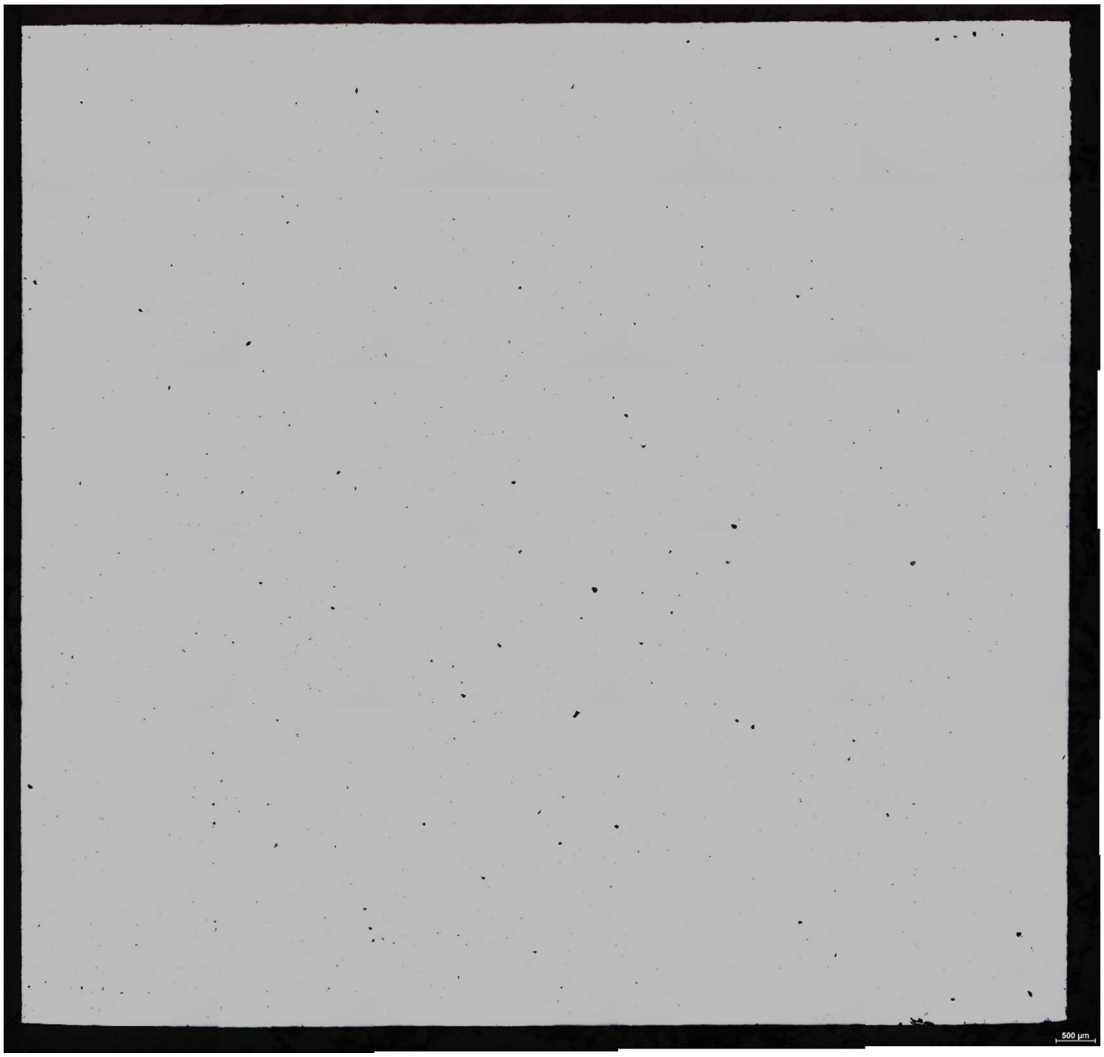
Příloha 17 EDS analýza odpadního prášku SLM Solutions

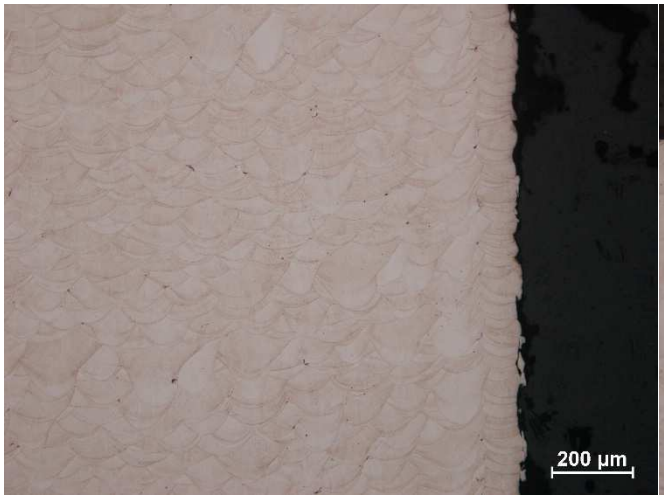


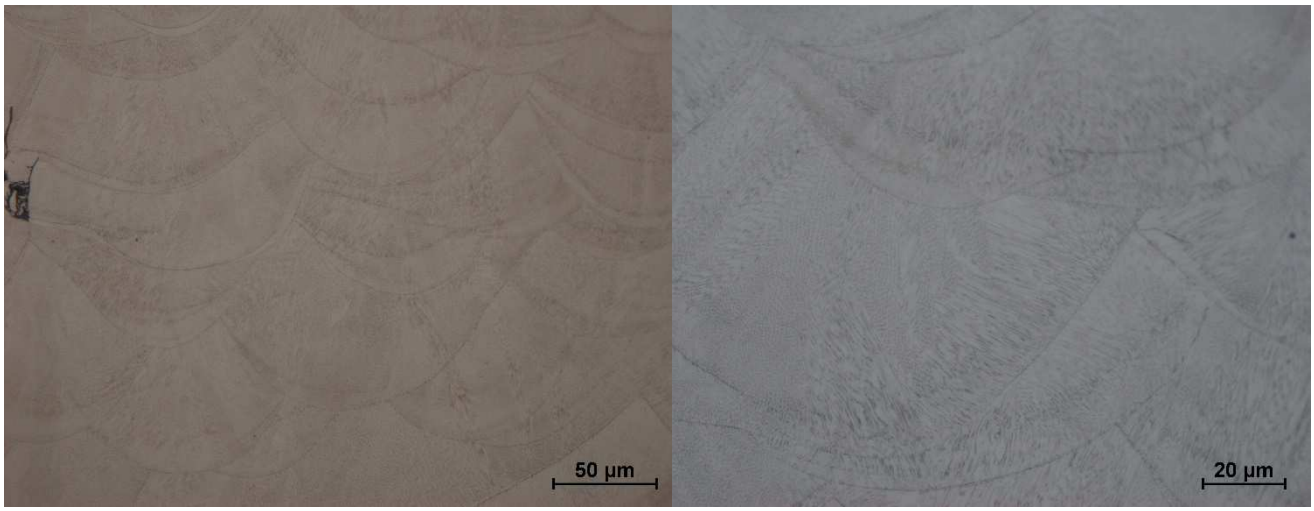


Příloha 18 Metalografický výbrus intenzivněji chlazeného vzorku (SLM 280HL)

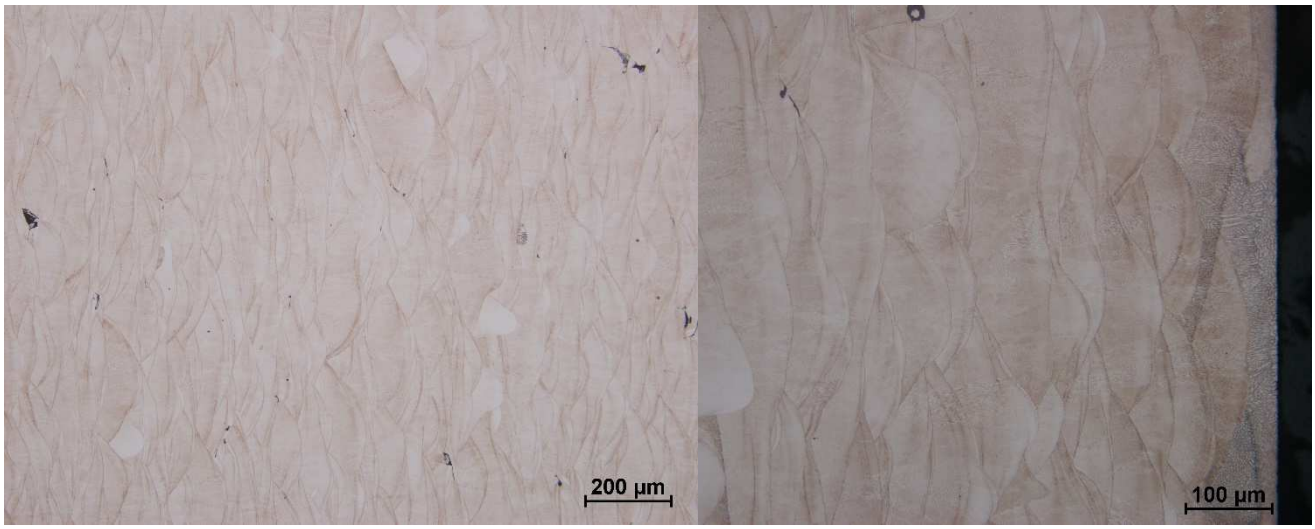
Výbrus v rovině kolmé na platformu v příčném směru vzorku

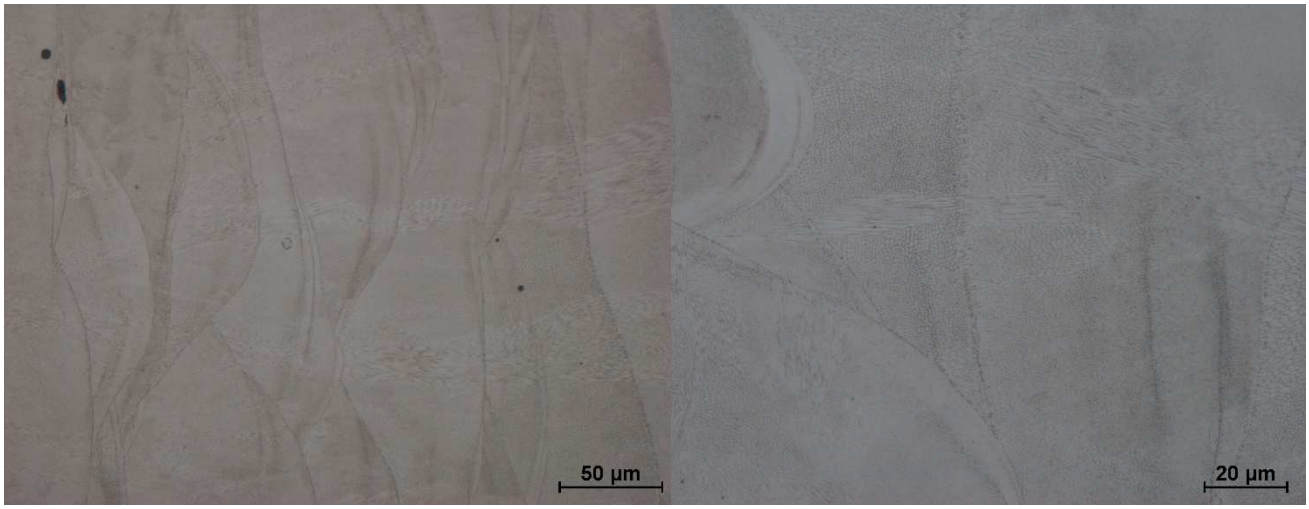






Výbrus v rovině kolmé na platformu v podélném směru vzorku




50 µm
20 µm