

HPTec-Forum***ULTRA MICROS made by HPTec***

ULTRA MICROS are not only rated very highly but are part of the company philosophy of HPTec. As the leading company in terms of technology we have developed our competence for Ultra Micro Drills even more.

The extremely rising demand of ULTRA MICRO DRILLS (acc. to our definition $\varnothing \leq 0.20$ mm) lead to a new generation of tools.

The high standards of these tools could be realised by both new solid carbides and a new geometry. Due to high investments we were able to extend our machine technology - with a 100 % fully automatic inspection process - also to the range of ULTRA MICRO DRILLS. The fully automatic inspection process within the production circle results in an enormous advantage – an extremely high evenness of drills.

The customer benefits directly from the highest possible process safety. Extensive tests performed at various customers and a leading manufacturer of drilling and routing systems prove the excellent performance of the new ULTRA MICROS.

Already in 1997 the HPTec GmbH introduced the first microvia drills very successfully. At that time they were used for the drilling of blind holes. The new generation of tools and the further development of the spindle technology open up new application cases. Today inner layers, cores and multilayers in stacks can be drilled with ULTRA MICROS extremely effective and at a reasonable price.

By the following examples we would like to show you the performance of the new ULTRA MICROS. See for yourself! There are advantages also for your company.

Test:

Machine: Schmoll MX1- Linear (X30-S50); Z-axis with linear drive
Spindle: D1733-05S-300
Hits: 3.000 hits
Material: BT thickness 0.1 mm, 12 μ m thick copper on both sides
Stack height: 4
Entry material: Mitsubishi LE800
Backing material: 2.0 mm SD2 (Cimatec)
Tool: HPTec 210 \varnothing 0.110 mm x 2.0 mm

Analysis:

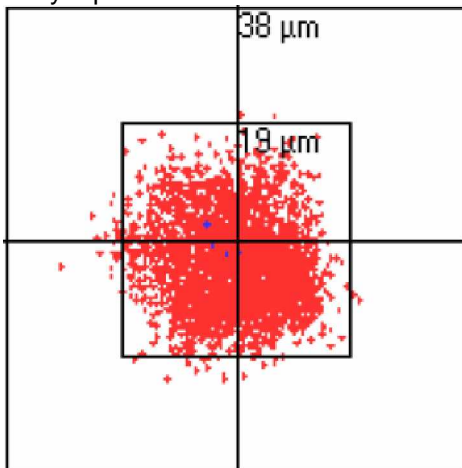
Measuring system: Schmoll AMV ProX3 Scanner
entry top board / exit bottom board

The results below show a small part of the extensive tests:

Trial no.	Speed [1/min]	feed [m/min]	Chip load [$\mu\text{m}/1$]	retraction rate [m/min]	hit count
B01	250.000	2.5	10	7.5	3.000
B04	250.000	2.5	10	25	3.000
B06	250.000	3.0	12	25	3.000
B08	200.000	2.0	10	6.0	3.000
B10	200.000	2.5	12	7.5	3.000
B12	200.000	3.0	15	25	3.000

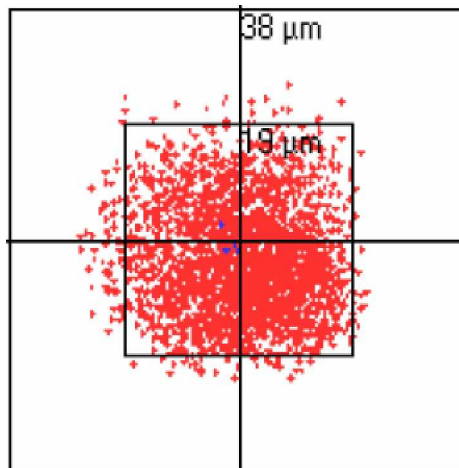
B01: HPTec speed n=250.000 1/min; F=2.5m/min; R=7.5m/min; chipload=10 $\mu\text{m}/1$; max. hits 3.000; **no breakage**

entry top board



	Mittelwert (μm)	Sigma (μm)	CpK
X	-0.4313	7.3894	2.2454
Y	-3.8295	7.2367	2.1362

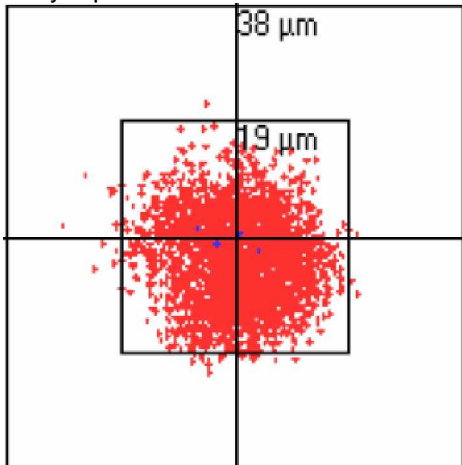
exit bottom board



	Mittelwert (μm)	Sigma (μm)	CpK
X	0.5498	9.2624	1.8017
Y	-3.4453	9.0519	1.7268

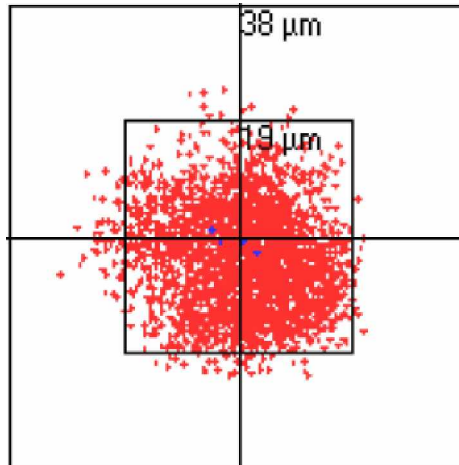
B04: HPTec Speed n=250.000; F2.5m/min; R=25.0m/min; chipload=10 $\mu\text{m}/U$; max. hits 3.000; **no breakage**

entry top board



	Mittelwert (μm)	Sigma (μm)	CpK
X	0.8206	7.3131	2.2462
Y	-3.7804	7.1317	2.1747

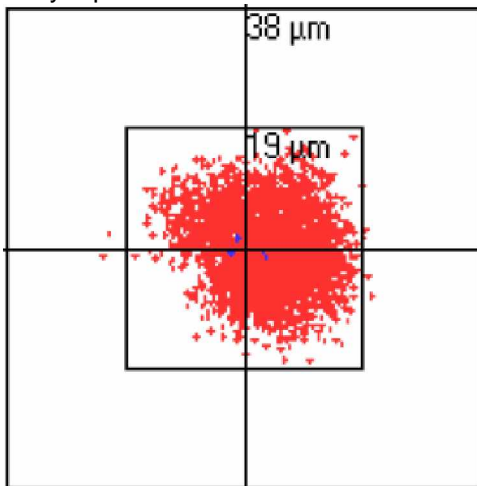
exit bottom board



	Mittelwert (μm)	Sigma (μm)	CpK
X	0.7231	9.0012	1.8364
Y	-3.5109	8.4983	1.8412

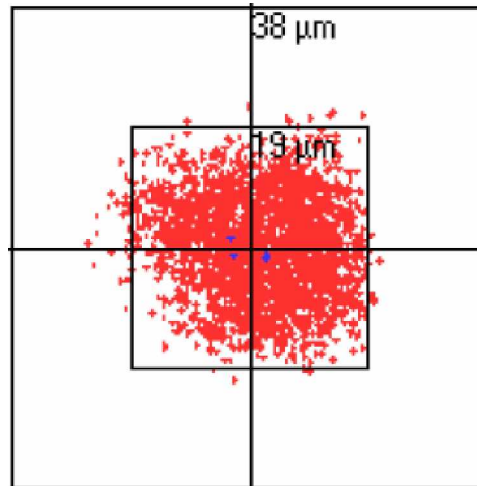
B06: HPTec speed n=250.000 1/min; F=3.0m/min; R=25.0m/min; chipload 12 μ m/1;
max. hits 3.000;

entry top board



	Mittelwert (μ m)	Sigma (μ m)	CpK
X	3.7472	6.7045	2.3047
Y	-0.0807	6.1316	2.7245

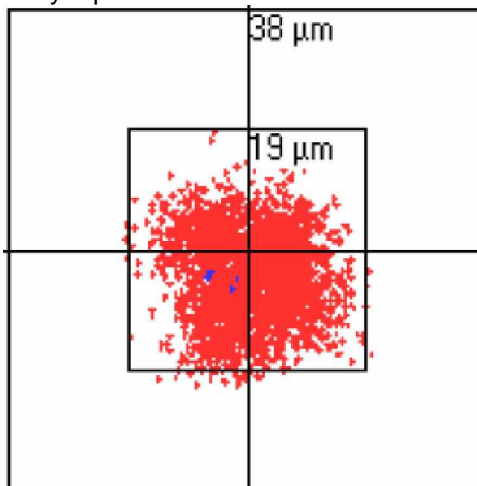
exit bottom board



	Mittelwert (μ m)	Sigma (μ m)	CpK
X	2.0149	8.7192	1.8418
Y	-0.1994	7.7433	2.1692

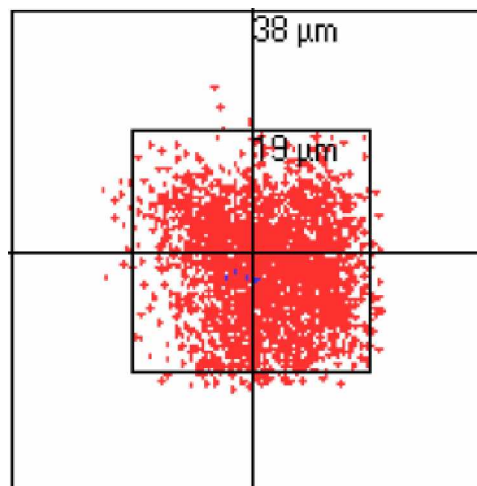
B08: HPTec speed n=200.000 1/min; F=2.0m/min; R=6.0m/min; chipload=10 μ m/1;
max. hits 3.000; **no breakage**

entry top board



	Mittelwert (μ m)	Sigma (μ m)	CpK
X	0.6143	6.7661	2.4391
Y	-4.5755	6.8298	2.2245

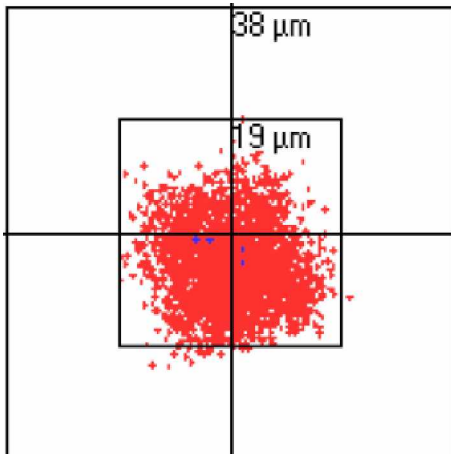
exit bottom board



	Mittelwert (μ m)	Sigma (μ m)	CpK
X	2.6115	8.2166	1.9438
Y	-2.7361	8.4714	1.8738

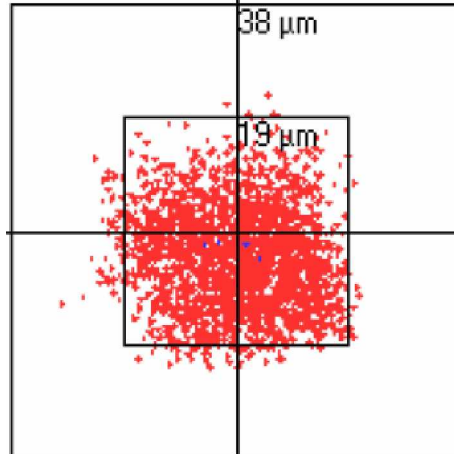
B10: HPTec speed n=200.000 1/min; F=2.4m/min; R=7.5m/min; chipload=12 μ m/U;
max. hits 3.000; **no breakage**

entry top board



	Mittelwert (μ m)	Sigma (μ m)	CpK
X	0.6609	6.8450	2.4064
Y	-5.4672	6.6559	2.2405

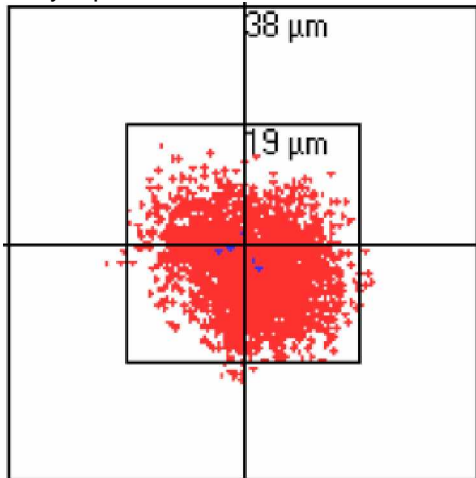
exit bottom board



	Mittelwert (μ m)	Sigma (μ m)	CpK
X	0.4731	9.1748	1.8067
Y	-4.6625	8.2296	1.8555

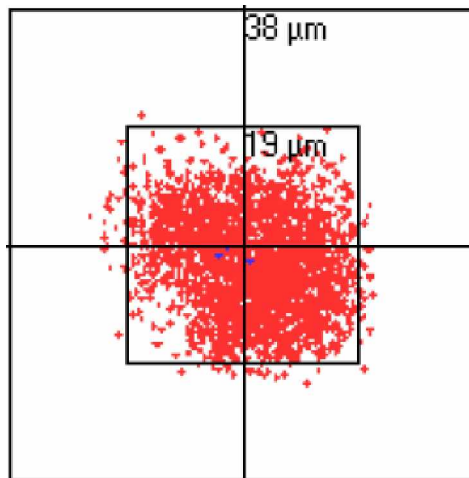
B12: HPTec speed n=200.000 1/min; F=3.0m/min; R=25.0m/min; chipload=15 μ m/U;
max. hits 3.000; **no breakage**

entry top board



	Mittelwert (μ m)	Sigma (μ m)	CpK
X	1.7921	6.9458	2.3192
Y	-4.1177	6.3982	2.4023

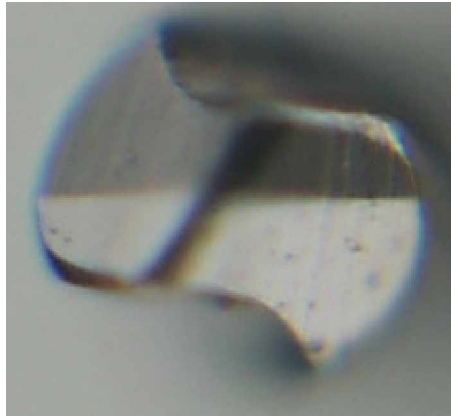
exit bottom board



	Mittelwert (μ m)	Sigma (μ m)	CpK
X	1.8019	8.8261	1.8273
Y	-3.0263	7.9305	1.9892

Wear:

The following picture shows the drill wear after 3.000 hits.



Our regrinding service has also been developed further in order to meet this range of diameters.

ULTRA MICROS can even be reground!

Result:

The new generation of ULTRA MICROS showed a perfect result in all aspects.

With the following parameters the best results could be achieved:

speed $n=250.000$ 1/min; $F=3,0$ m/min; $R25$ m/min; chipload $12\mu\text{m}$

During the complete series of tests no breakage of HPTec tools could be detected.

Could we rouse your interest?

Then please do not hesitate to call your Key Account Manager at HPTec for any further information.

We show new ways into the future!

The HPTec Technology Center would like to say thank you to the company SCHMOLL for the excellent co-operation and for placing the measuring results at our disposal.