	Comparison of Klocke Nanotechnik Nanorobotics manipulators with other manipulators	High Performance Nanorobotics	Low-Cost Nanorobotics	Tilting device	Hybrid drives
1	Cartesian movement of independent axes (important for an easy operation)	Yes	Yes	No	Yes
2	Absolute positioning vertical axis (in the "blind" direction of a SEM), repeatability better 60 nm	Yes	Yes	No	No
3	Optional position sensors also for XY axes, repeatability better 60 nm	Yes	No	No	No
4	Small design (to fit in any chamber)	Yes	Yes	Yes	No
5	Many options to fix tools easily	Yes	Yes	No	Yes
6	Robust (crash resistant)	Yes	Yes	No	Yes
7	Movable (by hand or by collisions) without loosing the position information	Yes	No	No	No
8	Pure piezo drive from nm to cm stroke and not an electro motor coupled with a piezo	Yes	Yes	Yes	No
9	Resolution of single Nanometers	Yes	Yes	Yes	No
10	A real fine positioning stroke of at least 1 micron	Yes	Yes	Yes	No
11	Vibrations of the whole manipulator below 10 nm	Yes	Yes	Yes	No
12	Stroke selectable in a range between 5 and 50 mm	Yes	No	No	Yes
13	Modular design to choose size and stroke for each axis	Yes	No	No	No
14	Stationary assembly designed => sample can move independent from manipulator. If necessary also movable with sample stage	Yes	Yes	No	No
15	"Micro-Jackhammer" mode (with e.g. 50 G accelerations) to process material	Yes	Yes	Yes	No
16	Network Electronics with external intelligence to ease the attachment to any SEM or FIB	Yes	Yes	No	No
17	Secure approach of the sensor/actuator by different probe techniques	Yes	No	No	No
18	Force Feedback option including electronics and software	Yes	Yes	No	No
19	Assembly of a series of different Microgrippers	Yes	Yes	No	No
20	Upgrade to form Wafer Probing Systems available	Yes	No	No	Yes
21	Option as Micro Tensile Machine available	Yes	Yes	No	No
22	Upgrade to form the first real Dimensional SEM/FIB with nm precision available	Yes	No	No	No
23	Option of Vision System for pattern recognition available	Yes	Yes	No	No
24	Plenty expendable items available: Small sensors and actuators including adapters	Yes	No	No	No
25	Compatible absolute positioning sample stages available, to form complete systems	Yes	Yes	No	Yes
26	Software on three levels: DLL, Manual Control (keypad, force feedback joystick) and Automation by Macros & Process Control Sequencer	Yes	No	No	No
	TOTAL YES:	**26**	**17**	**6**	**6**
	"Performance factor":	**> 4 / 1**			
	"Price factor for comparable items":	**<< 4 / 1**			