Subject: 5-axis endstation support table
From: Chitra Venkataraman <chitra.venkataraman@axilon.de>
Date: 06/16/2015 08:04 AM
To: "bruce.ravel@nist.gov" <bruce.ravel@nist.gov>
CC: Andreas Schacht <andreas.schacht@axilon.de>

Dear Dr Ravel:
I understood you had some discussion with my colleague, Andreas Schacht, at the NSLSII Users' Meeting and expressed interest in a 5-axis support table for your experimental station.
I am sending you a brief description below of such a support table which is very similar to the one we are building to house the harmonic rejection mirror for the ISS beamline at NSLSII. We have adapted it in size and to include the additional degrees of freedom which you require. Below are listed some preliminary specs which we can discuss and refine if needed. As Andreas mentioned to you, we could also provide the control system to operate the table based on the NSLSII standard Delta Tau Geobrick. The budgetary price for this table is about €82,000 (not including shipping, installation or the control system). We would be happy to discuss the information provided or detail/adapt it further if needed to meet your needs.

Preliminary specifications:

- Design based on a massive granite base with vibration-damped M6-hole pattern breadboard table
- Vertical/horizontal stages support the table to provide 5-degrees-of-freedom alignment of the table
- Kinematic mounting of the table to the alignment stages
- Additional manual adjustments allowing alignment of the granite in x, y (+/- 10 mm) and yaw (+/- 0.5°) by means of pushers on the grouting base plate.
- Option of control system based on Delta Tau Geobrick

parameter	**value**
Size of bread board	2.4 x 1.2 m^2
Flatness of bread-board	< +/- 0.1 over 600 mm
Component load	Max. 500 kg
positioning units for support table	Vertical, horizontal, pitch, roll yaw
vertical adjustment range	at least 150 mm
horizontal adjustment range	At least 50 mm
Pitch adjustment range	at least ± 2°
Roll adjustment range	at least ± 1°
Yaw adjustment range	at least ±1°

axis	type	stroke	mech. resolution[1]	mech. repeatability (uni-dir.)	encoded
z, along the beam	manual	± 5 mm	0.1 mm		no
x, across the beam	manual	± 5 mm	0.1 mm		no
common yaw	manual	± 0.5°	0.01°		no
y, vertical	stepper	150 mm	1 µm	< 5 µm	yes / 0.5 µm
x, horizontal	stepper	50 mm	1 µm	< 5 µm	yes / 0.5 µm
pitch (using vertical jacks)		± 2°	1 µrad	< 10 µrad	yes / 0.33 µrad
roll (using vertical jacks)		± 1°	1 µrad	< 10 µrad	yes / 0.33 µrad
yaw (using horizontal jacks)		± 1°	1 µrad	< 10 µrad	yes / 0.33 µrad

With best regards
Chitra

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[1] Mechanical resolution for motorized movements is given in full step mode