Shim Adjustment Range For The AA-International Magnets

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 We wish to modify the magnet keepers when we use the AA-International magnets to build the delta undulator prototype. The magnets must be moved as shown in the following figure:



 The required x-motion range for the undulator tuning is estimated to be +-350 microns. This means we need “X-adj” in the figure to be 350 microns on both sides of the magnet holder (orange). In order to do this, the channel in the magnet keeper (blue) needs to be increased in width. At present, the keeper is approximately 125 microns wider than the block holder as measured by Scott. We need the keeper to be 700 microns wider than the block holder.

 The required y-motion range for the undulator tuning is estimated to be 300 microns. We can achieve the tuning by only moving blocks away from the beam. The nominal dimension of the Y-adj shim must be 300 microns. To do the tuning, we need to move the blocks away from the beam in 25 micron steps. We request the following shim assortment:

0.300 mm – must order for all blocks (120 x 2 x 4 = 960 shims plus spares)

0.275 mm - 200 each

0.250 mm - 200 each

0.225 mm – 200 each

0.200 mm – 100 each

0.150 mm – 100 each

0.125 mm – we have them

0.100 mm – 100 each (50 to be used for the soldered blocks)

0.075 mm – 100 each (50 to be used for the soldered blocks)

0.050 mm – 100 each (50 to be used for the soldered blocks)

The larger block motions are expected to happen less frequently, so fewer of the small shims are required.

 We may wish to “roll” the magnets for horizontal field correction. We will do this by placing different size shims on either side of the magnet and translating horizontally. The present shim dimensions are adequate for this purpose and no additional clearances are required for magnet roll.

 At present “Y-adj” in the figure is 125 microns. In order to change it to 300 microns, the keeper will need to be machined on its bottom side. Please note that only block motions for tuning are being addressed in this document. Clearances to the beam pipe need to also be addressed. We must make sure to leave approximately 100 microns clearance between the magnet blocks and the beam pipe. The amount of material removed from the bottom of the keeper must be calculated to include the 300 micron shims and the clearance to the beam pipe.

 As Scott pointed out, the thicker shims will require longer screws to hold the magnet holder to the keeper.

 The block motion in x needs to be studied to make sure there is adequate clearance to the fins on the beam pipe and also to the beam pipe itself.

Tuning Plan:

 Our plan is to test the assembled quadrant while the keepers are being machined. When we get the keepers back, the AA-International magnet measurements should be finished. We will sort the blocks and start assembling the quadrants in the machined keepers. The keeper with the soldered magnets will have the soldered magnets removed and will then be sent in for machining. The prototype undulator will be built with the AA-International magnets.