Development of a tool for CBM STS module assembly *

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The assembly of a silicone strip sensor with microcable and the readout chip is called in the CBM STS collaboration a “module”. To connect the double-sided CBM sensor with 1024 channels on each side via microcables to the CBM STS-XYTER chip the tab-bonding process was chosen. One microcable has 64 channels with a pitch of 116 μm and a lead width of 46 μm. The thickness of the aluminium lead is 14 μm and the thickness of the polyimide substrate is 10 μm. Consequently the microcable is easily floating, fragile and not easy to handle without tooling. For the assembly of the chip or of the sensor to the microcable, the microcable has to be moved in two translational and one rotational directions (see Fig. 1). Therefore the assembly tool needs at least two translational and one rotational degree of freedom to assure a correct alignment of the microcable to the sensor or chip. To realize these three degrees of freedom the microcable can be fixed and the sensor, respectively the chip, can be movable. Alternatively the microcable is movable and the sensor, respectively the chip, is fixed. Finally the microcable as well as the sensor respectively the chip are movable. For the first test version the decision was taken to move only the microcable and keep the sensor, respectively the chip, on a fixed position.

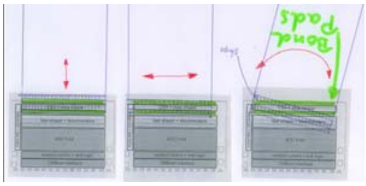

Figure 1: Degrees of freedom of the microcable.

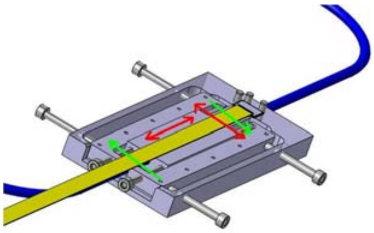

Figure 2: CAD model of assembly tool with chip and microcable (yellow). Red and green arrows indicates the different degrees of freedom.

To fixate the sensor respectively the chip and the microcable on the assembly tool it is a good choice to use vacuum, because the microcable would be deformed by mechanical clamping, and the clamping tools for sensor respectively chip will reduce the accessibility of the bond pads.

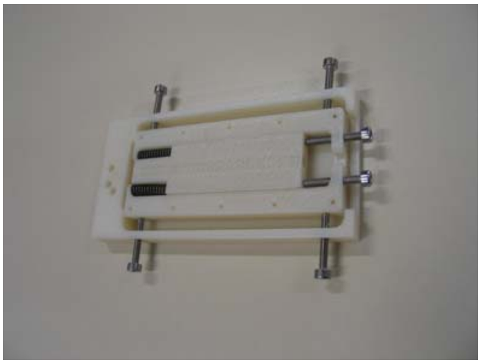

Figure 3: 3D model of the tool.

To speed-up the development the 3D CAD data (see Fig. 2) were printed using a 3D plotter and tested by the bond experts before the final tool was machined out of aluminium. Due to the printing process some fine structures on the tool were not perfectly shown (see Fig. 3), but it was precise enough to decide about the handling properties of the tool. In Fig. 4 the final tool in aluminium is shown.

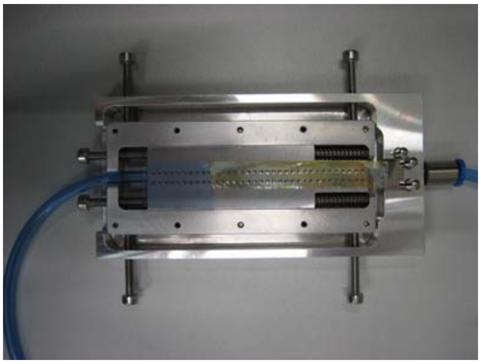

Figure 4: Final tool.

While using the final version of the tool it turned out that it works well and fulfills all requirements.

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* Work supported by FAIR@GSI PSP code: 1.1.1.2.1.2.

doi:10.15120/GR-2014-1-FG-S-FRS-01