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Series Production and Test of Hybrid Modules for the ALICE ITS Upgrade

ALICE is one of the four experiments at the LHC located at CERN. As part of the upgrade of the detector, the current Inner Tracking System (ITS) will be replaced by an all silicon detector constructed from pixel sensors with a pitch of $29 \times 27 \mu\text{m}^2$ using CMOS Monolithic Active Pixel Sensors (MAPs) technology. The goal of this upgrade is to enable precise measurements of low momenta particles by significantly improving the impact parameter resolution, tracking efficiency and readout capacity. The detector consists of 7 concentric layers split into two barrels, an inner barrel and an outer barrel. To construct a layer in the detector several sensors are arranged and glued to an FPC and electrically connected through wirebonds to create a hybrid module. These modules are then joined together to make the staves and then finally the barrels that vary in size depending on the layer. The module production was carried out at five assembly sites and has now finished. In total over 2500 modules were produced with a yield of 85% for detector grade modules. Each module underwent wire pull tests to assess the quality of the bonds, extensive electrical tests to evaluate the functionality of the module and classify it based on the results. Metrology was also carried out on selected modules to better understand the mechanical properties and the quality of the assembly during the construction phase. This poster will present the assembly procedure of the modules, give details and results of the tests carried out and a summary of the production as a whole.

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