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Production, quality assurance and integration of staves mechanics for the new ALICE Inner Tracking System

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The Inner Tracking System detector of the ALICE Experiment at CERN laboratory will be replaced in 2020. The upgraded system will be equipped with seven layers of Monolithic Active Pixel Sensors. The Tracking layers are divided in two groups: the Inner Barrel, grouping the innermost three layers, and the Outer Barrel, consisting of the outermost four layers. Each Layer is azimuthally segmented in elements called Staves. The Staff, which extends over the whole length of the respective Layer, is the basic building block of the detector. The Staff contains all structural and functional components, thus making it the smallest operable part of the detector. An array of sensors is aligned and glued on a mechanical substrate that provides stable positioning and thermal control of the sensors with use of minimum material thickness.

The production of the Staff mechanical substrates has been based at CERN to guarantee a close control of the quality of the non-standard manufacturing process, based on ultralight carbon plies lay-up with embedded kapton pipes. A quality assurance plan has been closely followed with the implementation of inspection and structured testing throughout every phase of the manufacturing process. Production of the Inner Barrel and Outer Barrel Staff mechanics has been completed and the carbon composite parts have been delivered to the four Staff construction sites, worldwide, for the integration of sensors and services.

The Staffs, fully equipped with sensors and services from the construction sites, are arriving back to CERN, where they are being integrated in Layers. Finally, a detailed integration and test procedure guarantees the Staffs correct installation.

In this work all aspects related to Staff mechanics mass production and quality control will be presented, while Staffs installation in layers will be detailed in term of developed procedures and progress status report.

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