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P1.28: The mass production of silicon sensors for the Phase-2 CMS Tracker

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The high-luminosity upgrade of LHC (HL-LHC) will boost the design luminosity of the accelerator up to 5x10^{34} cm^{-2} s^{-1} while the total integrated luminosity will reach 3000 or even 4000 fb^{-1}. The increased radiation levels as well as the higher data rates impose new challenges for the tracking system of CMS. The Tracker will undergo a full replacement in order to cope with the advanced environment of HL-LHC and preserve the excellent performance of the current one.

For the Outer Tracker in particular, the so-called Phase-2 upgrade requires about 200 m^2 or 28000 new silicon strip and pixel sensors. Ten years of R&D studies on different material, thickness and design options preceded the large-scale production period of the silicon sensors which began in 2020. This report will provide an overview of the new Outer Tracker silicon sensors, summarize the quality assurance plan and present results and conclusions after qualifying about 50% of the production using pre- and post-irradiation characterization of sensors and the production process.

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