

Advanced design of tools for sheet metal forming processes through numerical simulations for RF cavities at CERN

A. Amorim Carvalho^{1, a)}, J. Brachet¹, B. Bulat¹, O. Capatina¹, T. Capelli¹, A. Dallochio¹, M. Garlaschè¹, R. Leuxe¹, M. Narduzzi¹, L. Prever-Loiri.¹

¹*CERN*
CH-1211 Geneva 23 Switzerland

^{a)} alexandre.amorim.carvalho@cern.ch

Abstract. The installation of superconducting Radio Frequency (RF) Crab Cavities is one of the key upgrades in the framework of the High Luminosity Large Hadron Collider (HL-LHC) at CERN. These devices – built out mostly of 4 mm thick niobium sheets – are shaped into complex geometries entailing very tight tolerances, in order to comply with strict RF requirements. Numerical simulations of the sheet metal forming processes are used for optimizing the fabrication of these RF cavities: different shaping approaches and tooling are assessed. Results of thickness distribution and geometrical shapes obtained from simulations are explored for an advanced design of the tools. These tools yield optimized shapes respecting the rigorous demands from the RF design. The following contribution details the numerical model used, presents the outcome of the advanced modeling of tools and compare simulation results with fabricated pieces.