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New design flexibility for non-magnetic UHV chambers by using AluVaC®-Technology

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Aluminum is one of the preferable materials for reaching the UHV/XHV level. Comparable outgassing rates in the $1\text{E-}14$ mbar \cdot l/s/cm 2 regime using stainless steel components are only achievable by vacuum firing. Furthermore, stainless steel chambers for UHV/XHV applications are typically welded using different parts of tubes and CF weld flanges. After the welding and vacuum firing it is almost impossible to reach defined geometric dimensions and tolerances in the range of some micron.

The talk covers non-monolithic and monolithic UHV vacuum chambers made from aluminum by using AluVaC®-technology. Combining the advantages of a well machinable material with the extremely low outgassing rates, in unbaked and in-situ baked condition, UHV vacuum chamber design can be rethought. Monolithic chambers can be machined rapidly, avoiding weldseams and ensuring a more compact chamber design, with minimum space requirements for maximal amount of ports.

In the talk, the new chamber design flexibility is discussed in detail, examples are given and experimental results are presented for stress tests, outgassing rate measurements and thermo-cycles.

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