Development and Adjustment of Tools for Superconducting RF Gun Cavities.

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Abstract:
For the superconducting radio frequency (SRF), 1.6-cell gun cavities (CV) developed at DESY, a similar fabrication and treatment process, as for the European XFEL 9-cell cavities is foreseen. The different length and geometry of these cavities lead to a number of adjustments to existing and the development of new tools. This paper covers the new designs and adaptations of a tuning tool, chemistry flanges, a wall thickness measurement device, as well as a new high-pressure rinsing spray head and an optical inspection camera for the 1.6-cell, 1.3 GHz DESY SRF gun cavities.

The IV2 from Keyence is a far-reaching upgrade to the previously used See3Cam CU. The changes include an improvement of the lighting concept and increases the flexibility of the camera system, which avoid the disassembly of the mirror components as at V1.0.

**Chemical Treatment**

- The current design combines a rotational and translational movement
- The new one will operate with both movements separately

**Inspection Tool**

- The tuning device allows for easy adjustments to the applications
- The crown shaped contact surface of the probe, together with a designed former plate allows a precise vertical and local reproducible measurement to rounded surfaces

**Test results of SRF gun cavities**

- 16G2 met our requirements, but had a weak back wall, susceptible to leaks at the cathode plug sealing
- 16G3 and 16G4 have a mechanically induced wall, but showed initially poor performances due to an immature surface treatment, which blemished the surface of the back wall
- Investing quite some effort, we learned how to apply the surface treatments at the special geometry of these cavities
- All recent prototypes, like 16G7, show the desired gradients after BCP, likewise 16G4 after mechanical grinding and horizontal E/P