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Applying advanced manufacturing techniques to improve in-vacuum cooling within the SWIFT beamline.

Tuesday 16 September 2025 17:00 (1 hour)

SWIFT is one of the flagship beamlines being developed in the Diamond-II programme. As part of D-II upgrades, the electron beam energy will be increased from 3GeV to 3.5GeV, leading both to a brighter beam and higher power deposition onto beam conditioning components (filters, slits, beam shutters) presenting new thermal management challenges. These components are usually water cooled via a copper pipe loop brazed around the main component, requiring a double vacuum brazing process (copper-to-copper and copper-to-stainless-steel). Requiring multiple vacuum brazing passes, this approach is costly, complex, and restrictive. Following several iterations with suppliers, I developed a design which only requires one brazing process. This novel process involves drilling a borehole into the component and installing a stainless-steel helix (manufactured via laser sintering) designed to shape the coolant flow. In addition to the reduced cost the concept is applicable across a variety of components, allowing for more rapid designs, simpler assembly, and more design flexibility.

Footnotes

Funding Agency

Author: HARDING, Owen (Diamond Light Source)

Presenter: HARDING, Owen (Diamond Light Source)

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