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Development and fabrication of a dummy vacuum chamber for straight sections in the Siam Photon Source-II storage ring

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A dummy vacuum chamber for the straight sections of the Siam Photon Source-II storage ring has been successfully developed to validate the mechanical design and fabrication process. The main chamber was fabricated using extruded aluminum alloy from a local company and chemically cleaned prior to welding. A custom circular cross-section with an inner diameter of 62.71 mm and a wall thickness of 4 mm was adopted to optimize vacuum conductance, incorporating racetrack-shaped cooling channels. Tapers with a slope of less than 1/5 were welded to connect to the standard elliptical beam ducts. Structural and thermal simulations were performed on the tapers to ensure integrity under synchrotron radiation heat load. TIG welding was conducted in a cleanroom to minimize contamination, eliminating the need for post-weld heat treatment. To control deformation, a welding training program and butt joint tests were carried out. After welding and assembly, deformation was measured to assess post-weld geometric accuracy. The successful development of this dummy chamber provides critical experience for the manufacturing and mechanical quality assurance of SPS-II vacuum chambers.

Footnotes

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