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ConFlat® vacuum flange application and analysis in various non-circular flange geometries

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The National Synchrotron Light Source II (NSLS-II) facility at Brookhaven National Laboratory uses an ultra-high vacuum (UHV) system to operate, which typically uses circular ConFlat (CF) flanges to connect vacuum components together. With varying equipment design restrictions, the implementation of non-circular CF flanges is being studied as a possible alternative, as it has been used in other accelerators. Here, an analysis of noncircular CF flanges was conducted to identify sealing problems associated with such flanges, particularly at the HEX beamline. Autodesk Inventor and ANSYS Workbench were used to create models and conduct finite element analysis (FEA) simulations, respectively. Parameters relating to the flange rigidity and geometry were performed to find problem areas. The results suggest that the geometry, combined with plastic deformation of the CF knife-edge and uneven pressure distribution, may contribute to the overall sealing failure.

Footnotes

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