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PREDICTION OF BRAZE JOINT STRENGTH OF DISSIMILAR MATERIALS BY NUMERICAL AND EXPERIMENTAL METHODS.

Abstract

Most of the highly performance rocket engines have double walled construction that enable optimum use of material and allows it to be re-used multiple times. The thrust chamber being developed by LPSC has an inner wall made of a Copper alloy (NFTDC copper) that is brazed to the outer wall made of High strength stainless steel alloy. Literature survey shows that the brazing process generally produces a joint with higher mechanical properties than that of the base material. This paper discusses on the studies carried out to evaluate the strength capability of the braze joint between Copper alloy and High strength stainless steel alloy. Studies have been carried out by numerical and experimental simulations. The test article was configured such that the loads experienced by the joint during its service life could be simulated. Pressure load that causes the failure of the the braze joint was obtained from experiment. The results obtained from tests were used to carry out numerical simulations by finite element techniques using kinematic hardening plasticity material model. The stress-strain curves obtained from specimen level tension tests for both materials are used for numerical simulation studies. Results from numerical studies are compared with experimental test results. The material model which captures the failure pressure that is closer to the failure pressure obtained from tests could be used to design and predict the behavior of braze joints for similar material combinations.