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A STUDY ON DEVELOPMENT TEST RESULT OF A SUBSCALE PROPELLANT TANK

Abstract

Pressure loading test result of a subscale propellant tank for KSLV (Korea Space launch vehicle)-II are presented in this paper. Results of design and development of a subscale propellant tank are described and the applied manufacturing processes are also described. Structural design for light weight is tried by taking into account of the result of load analysis. Isogrid structure design is adopted for the cylinder sections of the tank by optimizing the design parameters. Upper and lower domes are developed by hot spin forming of aluminum blanks for the variable thickness of the domes. Final integration of the propellant tank is conducted by two types of fusion welding process for the cylinder and the domes with the precisely designed welding jigs and fixtures. The stress and strain levels of the tank by the pressure loading test is compared with those by structural analysis. The proof factor and the burst factor of the tank is confirmed by the pressure loading test and the ductile fracture mode of the tank is observed. The structural integrity of the propellant tank design is verified for the two different types of welding methods through the pressure loading test. The two different welding methods shows a slightly different strain levels at the welding joints during the pressure loading test.