

MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
Space Structures I - Development and Verification (Space Vehicles and Components) (1)

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DEVELOPMENT OF PROPELLANT TANK STRUCTURE FOR KOREA SPACE LAUNCH VEHICLE

**Abstract**

Propellant tank of space launch vehicle is a major structure constructing launch vehicle. Since its size is large compared to other structures, it should be carefully designed and manufacturing process should be also precisely controlled to achieve high reliability. In this paper, a domestic development of propellant tank for the future application of Korea Space Launch Vehicle is described. Light weight structural design is carried out considering the result of load analysis and the system requirements. Moreover the manufacturability is concurrently taken account at the design stage. Each part consisting of propellant tank like skin panels, ring frames, domes, and so on is manufactured by employing the proper manufacturing technologies. Upper and lower domes are prepared by hot spin forming with welded blanks and single piece blanks. Skin panels with isogrid pattern which can sustain compressive buckling load and internal pressure are machined and roll bending process is consequently followed to obtain the required curvature. Ring frames are machined into the required configuration within the allowable tolerance by using ring rolled or roll forged frames. Final integration of each part is conducted by fusion welding process with precisely designed welding jigs and fixtures. Throughout the first domestic development of large propellant tank for Korea Space Launch Vehicle, technical skills and experiences can be obtained. However, it is thought that more cost effective manufacturing route should be studied in order to increase the production rate of large propellant tank.