

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS (D2)  
Launch Vehicles in Service or in Development (1)

Author: Mr. Somanath Sreedhara Panicker  
Indian Space Research Organization (ISRO), India, ssnath@gmail.com

Mr. N Narayanamoorthy  
Indian Space Research Organization (ISRO), India, nn\_moorthy@vssc.gov.in  
Mr. Ramakrishnan Sundaram  
Indian Space Research Organisation, India, ramkrish49@gmail.com

GSLV MK-III (LVM3) DEVELOPMENT CHALLENGES AND PRESENT STATUS

**Abstract**

GSLV Mk-III (LVM3) is the next generation launch vehicle of ISRO capable of delivering 4ton class spacecraft to Geo-synchronous transfer orbit. LVM3 is in the advanced stage of development with the completion of static firing of the S200 solid strap-on motor, stage testing of L110 liquid stage, completion of development tests of the engine subsystems of the C25 cryogenic upper stage and development and qualification tests of major sub-systems. In S200, processing of large 100 tone solid propellant segment, flex nozzle system, control actuators with blow down hydraulic power pack are the new developments. In L110 stage twin-engine configuration with two-plane gimbal control is used. The stage engineering being new, an integrated stage level test was conducted to demonstrate the stage performance. The engine uses silica phenolic throat insert which demonstrated an endurance of 240s of engine firing. C25 has a 200 kN engine operating in GG cycle. The injector elements, gas generator, turbo-pumps and engine and stage modules are developed and tested. The choice of GG cycle enables the testing of engine subsystems separately in modules. The major tests scheduled are the integrated turbo-pump tests and the testing of thrust chamber in pressure-fed mode before taking up the integrated engine test by next year beginning. The propellant tanks and stage structures of LVM3 are realised and qualification tests are in progress. Structural load tests of L110 stage structures, propellant tanks and base shrouds are completed. The composite payload fairing is 5 m in diameter with 5m cylindrical length having 110m<sup>2</sup> usable payload volume. The Payload fairing, Equipment Bay structure and Payload Adaptor are realised and are in the process of testing. The vehicle avionics and control systems are also of the new generation with advanced redundancy management and failure protection. The system developments are completed and are being inducted in the present vehicles and in LVM3 sub-assemblies. Vibration and acoustic tests of assemblies, stage separation functional tests are progressing. The ground resonance test (GRT) facilities for full vehicle configuration have been commissioned. The vehicle assembly launch facilities, and spacecraft processing facilities are ready and have been used for the stage preparations. No technology related challenges are foreseen for the development of LVM3. The pacing activity for the launch of LVM3 is the readiness of C25 stage. The integrated stage test is presently planned by end of 2011. The first launch of LVM3 is planned by first quarter of 2012.