

SPACE PROPULSION SYMPOSIUM (C4)
Propulsion Systems II (2)

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S200 SOLID BOOSTER DEVELOPMENT

Abstract

S200 solid booster is conceived as strap on motor for a new generation launch vehicle GSLV-MkIII which is being developed by ISRO to launch 4 ton class satellites in Geosynchronous Transfer Orbit. This solid booster is developed based on the large experience gained in developing, testing and operationalising, the S139 solid motor for PSLV/GSLV vehicles. The S200 solid booster with flex nozzle powered by electro hydraulic actuators with 40 ton capability is unique in its design, architecture and high performance in terms of mass ratio. This solid booster which was under development for the past seven years has been static tested successfully in January 2010 meeting all the test objectives. S200 motor is the third largest motor in the world next to Space Shuttle SRM and P230 motor of ARIANE-5 launch vehicles which are in active service.

The S200 motor consists of three segments made out of maraging steel M250 material which has been successfully used in S139 motor of PSLV/GSLV vehicles. The motor consists of one short head end segment with star propellant grain followed by long middle and nozzle end segments with cylindrical port. The HTPB propellant currently employed in S139 motor is adopted in S200 motor development also. The segment realization and proof pressure testing of the segments especially nozzle end segment with floating piston was successfully carried out at industry before acceptance for propellant casting. The propellant processing for the S200 motor segment called for establishing a dedicated solid propellant plant at ISRO with extensive automation. The flex nozzle system with vectoring capability of + 8° employs compression moulded flex seal with alternate layers of spherical shims and natural rubber layers. The nozzle which is one of the largest nozzles ever realized by ISRO was conceived as five major subassemblies in modular fashion. The Flex Nozzle Control System with electro hydraulic actuators driven in blow down mode was successfully tested in cold condition at the integrated test facility followed by trial actuation and hot test.

The integration of S200 motor segments, flex nozzle and igniter was carried out successfully at Satish Dhawan Space Centre, Sriharikotta in a dedicated solid stage assembly building (SSAB) and static testing of the same was carried out in the horizontal mode at the six component test bed. S200 static test indicated performance of the motor as expected.