

# DESIGN APPROACH ADOPTED FOR ENSURING THE STRUCTURAL INTEGRITY OF CONDUIT PIPE LINE ASSEMBLY ALONG THE SOLID ROCKET MOTOR FOR AN AIR BREATHING TECHNOLOGY DEMONSTRATION FLIGHT

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## Abstract

ISRO has demonstrated air breathing propulsion concept through a demonstration Vehicle (ATV-D02). A 1 ton Solid Rocket Motor (RH560 M) was used to function as the Booster and sustainer stages of the demonstration Vehicle. This Vehicle will carry the scramjet engine module in flight through the atmospheric regime. Weld pads are provided on the Motor case for routing the wire harness on both booster and sustainer and also for routing the conduits of GH<sub>2</sub> and GO<sub>2</sub> from storage tank to scramjet engine module in sustainer hardware. The two tubes for the gaseous fuel and oxidiser are routed through the clamping system placed over the weld pad, welded on the Motor hardware. The structural integrity of the assembly of conduits system is assessed through an integral analysis using ANSYS for the identified critical load cases. Analytical approach is used to estimate the margins in the fillet welds connecting the pad to Motor case for which loads from analysis are used. This report covers the detail of the analysis, results and integration scheme implemented in the flight. An assessment on the natural frequency of the conduit assembly is also attempted.

**Keywords:** Conduit Pipe, FEM, Motor Case, Weld Pad, FFS