**Ceramic Radomes (Gel Cast Process) for ASTRA / QRSAM Missiles**

 Ceramic Radome Technology is the state of the art technology for Missiles across the world. ASTRA/ QRSAM, high Mach missiles experience high surface temperatures during its traverse due to atmospheric thermal heating. To mitigate the thermal heating, Ceramic is considered as radome material. Design and development of ceramic radomes is an involved job with multidiscipline activities. Technology transfer document covers all the above topics in detail.

**Radome fabrication:** Ceramic radome fabrication is a two stage process, gel-casting followed by sintering. To form a shape of radome, matched moulds are developed through aluminum as per profile with proper allowances. slurry is filtered and added with a catalyst for gelling and casted in preheated and prepared moulds. The casted piece is allowed to cool at room temperature and separated from the mould. Test coupons are also processed along with component for evaluation of parameters. Dried radome is fired in an electrically heated furnace for extended hours at high temperature to allow the binder chemicals to sublimate. The binder removed radome is further sintered for densification under air atmosphere. The sintered radome and sintered samples are processed as per requirement.

Radome is thoroughly tested of defects before next stage activities. Defects can be air traps in radomes, inclusion of foreign particles, linear cracks, non uniform sintering with varying density, etc. X ray Radiography and CT scan are the preferred NDTs for defect identification.

**Radome Machining:** Ceramic Machining to the correct radome profile, both outside as well as inside ceramic radome and bulkhead machining are carried out using diamond cutting tools and proper fixtures on CNC machines. The dimensional correctness is ensured through CMM measurements.

**Radome joining:** Ceramic radome, having low CTE and brittle in nature has to be integrated with the following sections of missile. Therefore, a suitable bulkhead material, with low CTE, is considered. A suitable joining scheme is planned and executed with precision using special fixtures.

**Radome Coatings:** The inner as well as outer surfaces of radome are coated with electromagnetic transparent paints to protect from damping. The coatings are qualified for EM transparency.

**Electromagnetic testing:** A radome errors in terms of loss as well as pointing angle are to be measured and the radome has to essentially work with angle errors as minimum as 18 arc minutes and 85% electromagnetic transparency.