

Fabrication and measurement challenges associated with the development of large antenna housing structure

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Abstract

Active array antenna unit (AAAU) assembly is the salient structural assembly which encompasses the construction of the electronics in such a way that each array elements acts as miniature radiating antenna. The electronic packaging of such complex system composing of approx. 250 components poses lot of design and realization challenges.

The fabrication of this large sized antenna housing required for surface-based application presents significant challenges for dimensional accuracy, measurement, structural integrity and assembly. These fabrication challenges directly impact the system's overall performance.

This paper discusses about the realization challenges of large sized complex AAAU housing of 6m x 6m x 1m assembly, consisting of arrangement of 6 Nos. of Radiating Assemblies ensuring alignment of all hardware units during assembly in predefined order maintaining design tolerance, establishing the manufacturing process, introduction of intermittent stage inspection using advanced measuring techniques to minimize the geometry errors at subsequent stages and challenges involved in the planarity measurement of this large structure.

Meticulous assembly sequence plan, usage of proper jigs & fixtures, advanced welding techniques to join Aluminium alloy sections of varying thickness and safe handling of large structure using suitable material handling equipment are discussed in detail.

Keywords: Large Aluminium structure, Structural integrity, Mechanical tolerance, Advance measurement, Thin wall welding techniques.

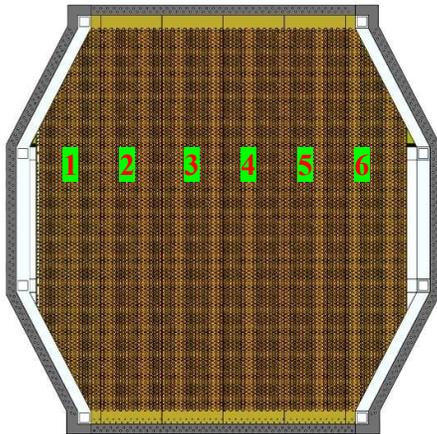


Figure 1: Antenna frame with AAAU and PCB mounted on front face

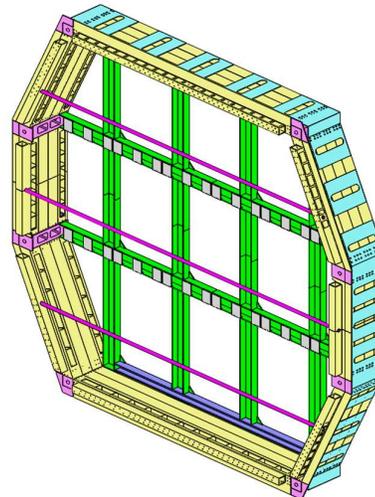


Figure 2: AAAU housing structure
Size: 6m x 6m x 1.0m