

## On the Development of a Controlled Compressible Collet Clamp Micro Mechanism (C4 $\mu$ M) for RF Cables in Spacecraft Components

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### Abstract

Design of Spacecraft components is multidisciplinary in nature involving many iterative engineering fields in the process of product realization. Development of spacecraft components includes rigorous optimization to meet the stringent multifunctional requirement like high strength, stiffness, low mass, eased manufacturing, ease in assembly and functional needs. The spacecraft payload components are integrated with RF cables of various sizes, length and diameters. These cables form heavy RF/DC harnesses integrated with space payload and cause many practical problems like joint breaks, solder cracks and arcing during operational and environmental testing of payload. A similar problem is faced in the recent development of Electronic Power Conditioner (EPC) scheduled for the GEOSAT payload of ISRO's mission. The solution to the problem has culminated in an innovative product called Controlled Compressible Collet Clamp Micro Mechanism (C4 $\mu$ M) which could successfully eliminate joint breaks, cracks and arcing problems. The product design of C4 $\mu$ M is rigorously parameterized, optimized, simulated and analyzed using state of art CAE tools. The product (C4 $\mu$ M) is manufactured, assembled and successfully tested. Presently this design is slated for flight in the upcoming GEOSAT Satellite. This paper describes the challenge faced in the development and realization of the product.

**Keywords:** Finite Element Method, Collet, Spacecraft, Electronic Power Conditioner, clamp, RF cables, Mechanism

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