Development of a Compliant Mechanism Based on Additive Manufacturing

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In the framework of the development of a Compliant Mechanism based on Additive Manufacturing, a Mechanism consisting of Ti6Al4V for translating a rotation was developed (Compliant Rotation Reduction Mechanism; CRRM). In order to mitigate developments risks associated to the manufacturing of the CRRM, a tailored test plan for material characterisation and critical features test plan has been devised. This included besides the mechanical properties, temperature resistance, microstructure also and especially the fatigue effects. The SLM manufacturing limitations relevant to the geometry and the critical features for compliant mechanisms particularly the built up of thin structures with outstanding fatigue behaviour has been equally evaluated. Representative Breadboard Models has been built up and post-processed for a functional, performance and environmental testing campaign to prove suitability of the manufacturing process in combination with the Material Ti6Al4V for fatigue critical items for space application.