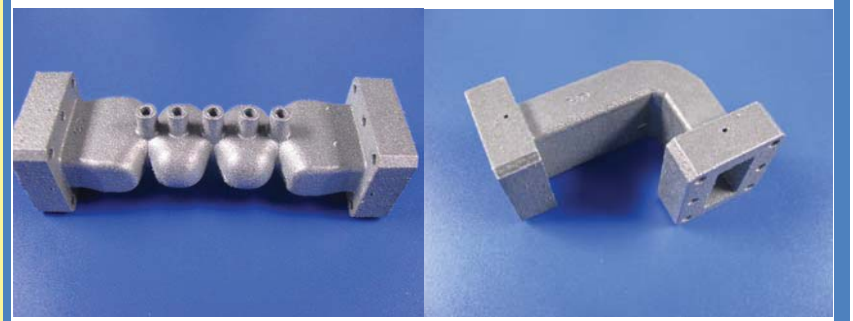
Activity Title:	***3D Manufacturing of Microwave Passive Components***		
Contract type	**ARTES 5**	**Budget** *(k€)*	
Company (-ies) *(including country)*	CFK (Deutschland), Fraunhofer ILT (Deutschland), TESAT (Deutschland)		
Team *(name of the participants in the project)*	Andre Berger (TESAT) Manuel Garcia (TESAT) Jose Lorente (TESAT) Damien Buchbinder (Fraunhofer ILT) Christoph Over (CFK)		
(*) **Speaker (s)**	Andre Berger, Jose Lorente	**Email**	andre.berger@tesat.de, jose.lorente@tesat.de
Short Speaker Information *(experience and involvement in this project – maximum 60 words)*	Andre Berger is an Engineer in the Technology Department at Tesat Spacecom. His focuses are the processes for Passive Components. In this program, he was responsible for CT-Analysis and plating of the simple demonstrators. Jose Lorente is a RF Engineer in the Passive Products Department at Tesat Spacecom. His main tasks in this program were the design, development and sustaining of the RF simple demonstrators.		
Summary of the activity *(maximum 400 words and 2 pictures)*	Previous studies and research provided many consolidated findings about several additive manufacturing processes, possibilities for the surface treatment and the effect of process parameters during the selective laser melting process. Furthermore, we achieved some experience in the field of powder handling and powder quality and their monitoring. It could be shown that a thermal treatment by means of hot isostatic pressing and T6 heat treatment are mandatory. However, even by the HIP process it is not fully guaranteed that the components are completely free of voids larger than 200 micrometers. Furthermore, it should be noted that all the functional areas must be reworked by milling and tapping. Also, the surface treatment (chemical polishing and silver plating) of RF functional hollow structures can be quite challenging, especially for complex shaped internal geometries which are part of the goal of this work. The internal visual inspection of hollow structures can also be difficult. On the other hand, the manufacturing of mechanical parts like brackets does not constitute a real problem. Regarding the electrical performance of the manufactured RF parts it can be concluded, that due to the big tolerances (in comparison to mature milling techniques), electrical tuning is necessary for narrowband components. This step increases the post-processing time, increases the mass, and introduces extra losses, which reduces the advantages of additive manufacturing. To conclude, the production of RF functional components that require adjusted tolerances and reduced losses, such as narrowband components, is complicated according to the actual state of knowledge. However, good application potential is seen for wideband components that do not require so tight tolerances and surface treatments, such as switches, circulators, and waveguide runs, as well as for structural parts. 		

(*) The speaker needs to do the registration through this website