Work package 2: Technologies for big constellation systems and Internet of Space

Objectives

O2.1 Developing additive manufacturing techniques for the fabrication of microwave/terahertz components for space applications.

O2.2 Synthesizing novel materials for additive manufacturing suitable for space applications.

O2.3 Developing specific design strategies for RF payload components to adapt the additive manufacturing process.

O2.4 Advancing additive manufacturing technologies for terahertz frequency applications.

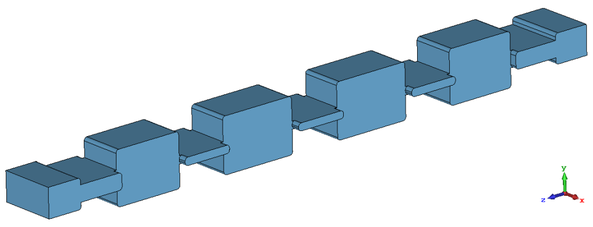
O2.5 Developing new miniaturization techniques for RF payload components.

O2.6 Fabricating prototypes with experimental characterizations.

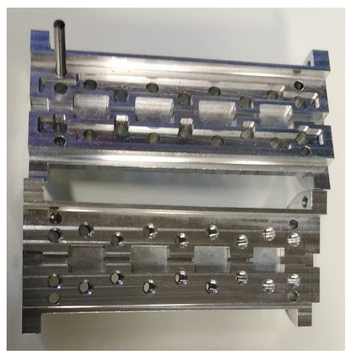
Progress

ESR 2: Microwave and millimeter-wave componentes aiming for an easy fabrication

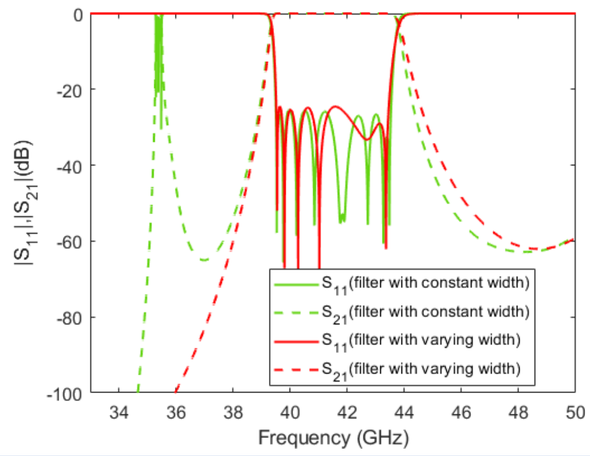
- Waveguide bandpass filter based on commensurate lines with varying width and height topology for Q-band
- The design technique was useful to obtained high fabrication yield, improved frequency response and reducing overall filter size



3D schematic of the device

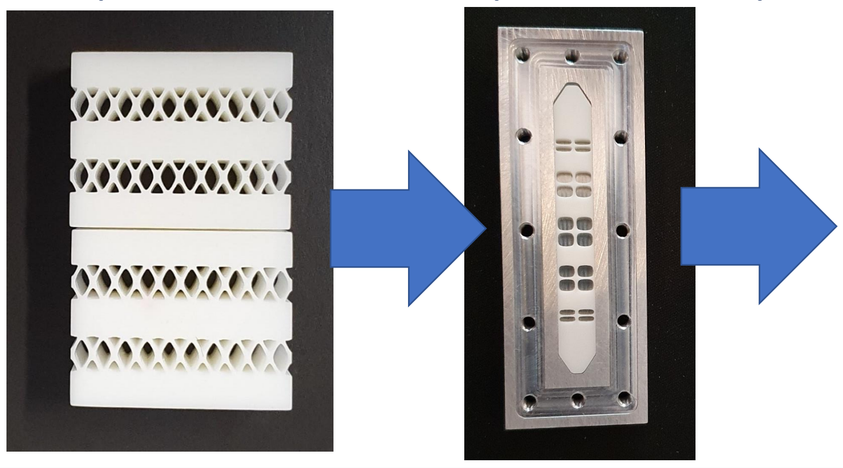


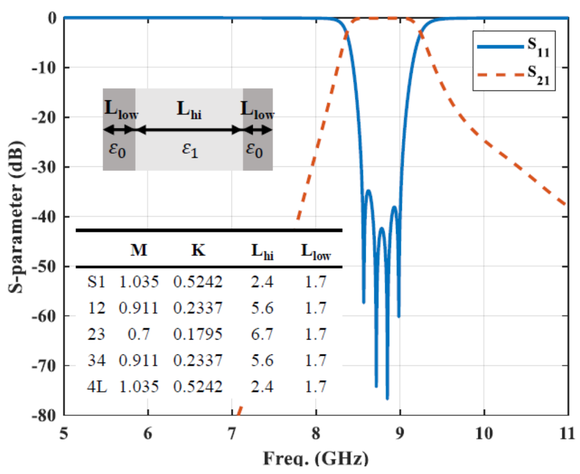
Prototype



ESR 10: Additive manufacturing of non-planar microwave passive components

- 3D printing of Alumina with varying geometries and infills to influence dielectric properties.
- Combinations of solid dielectric sections with high impedance lattice structures to achieve filtering.
- Combining the flexibility of geometries and materials



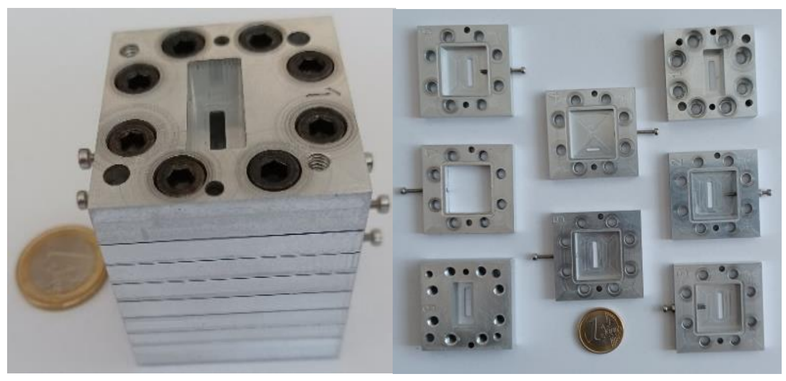


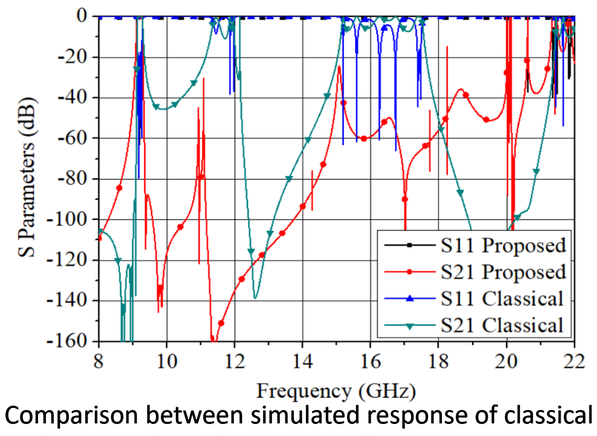
	M	K	L_{hi}	L_{low}
S1	1.035	0.5242	2.4	1.7
12	0.911	0.2337	5.6	1.7
23	0.7	0.1795	6.7	1.7
34	0.911	0.2337	5.6	1.7
4L	1.035	0.5242	2.4	1.7

Simulated 4 pole bandpass filter performance.

ESR 12: High performance miniaturized components for aerospace applications

- Design of high performance miniaturized filters using TM mode cavities with improved stopband performance.
- Avoiding the use of low pass filters (or at-least reduces its dimensions) to improve out of band performance, reduces cost and volume of overall satellite payload communication system.





Comparison between simulated response of classical and proposed 6 pole TM cavity filter.

ESR 13: Use of additive manufacturing for microwave components for space applications

- Exploring new unconventional geometries that provide high quality responses using additive manufacturing (AM) techniques.
- Study how to obtain better manufactured components taking advantage of the AM.
- Use of different AM techniques (e.g., Stereolithography (SLA), Selective Laser Melting (SLM)).

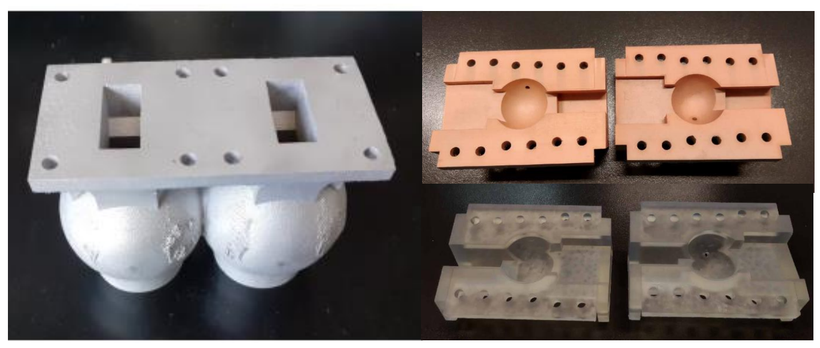
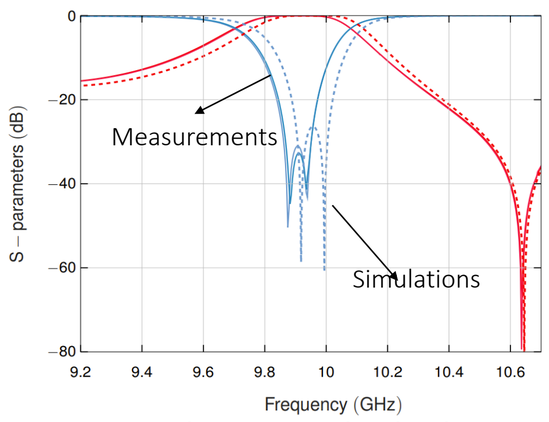


Photo of a 2-pole filters fabricated with an SLM 3-D printer

Photos of a 2-pole filters fabricated with an SLA 3-D printer: before and after metallization



Comparison between simulated and measured responses of 2-pole filter prototypes

Advanced Technologies for future European Satellite Applications

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie grant agreement No. 811232. However, the content of this poster reflects the opinion of its authors and does not in any way represent the opinions of the European Union. The European Commission is not responsible for any use that may be made of the information the poster contains.