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NEW CHALLENGES IN THE DESIGN OF COMPONENTS FOR MICRO AND NANO SATELLITES

Abstract

Actual we see a drastic change in the design requirements for components for micro and nano-satellites which comes from the new mission requirements for these systems.

Main topics for the micro satellite (100 to 300 kg) components are reduced delivery times (typically under 6 month for FMs), much higher life times (7 years and more in LEO), increased reliability requirements, complete ITAR-freeness and, in most cases, exclusion of class 1 and 2 EEE-parts. Source for this are the new commercial player on the market, the real scientific and commercial use of multiple spacecraft constellations as well as new launcher opportunities. But the market cannot live with higher prices than actual components or it will lose much of its competitiveness to bigger satellites.

This requires new approaches in the design and the redundancy philosophy, as well as the EEE-parts programs. The presentation will show some principle solutions that Astro- und Feinwerktechnik uses to cope with these challenges and shows an actual example for it.

An other part is the upcoming market of satellites in the 10 to 50 kg class. Coming from the former cubesat community the actual cubsat philosophy is not ready for real scientific and commercial use. We see (similar to the micro-satellites) a growing mass because of higher demands in power, volume and mass for the payloads. Additional to that the commercial and scientific customer wants a higher quality and a "space" documentation.

One point for this is the urgent need for a kind of verification standard to make it possible to compare the different items from different suppliers. Actual a working group, lead by Prof. Mengu Cho is working on this topic.

Another point is the fact that the price and delivery time requirements are much lower than on the micro satellite market. To combine the new reliability, quality and documentation requirements with the "old" accepted cubesat philosophy is a big challenge. The presentation will show some ideas how this can be done without falling into a classical dear space agency approach.