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HOW TO BUILD A SATELLITE IN A WEEK – THE ROAD TOWARDS SATELLITE MASS MANUFACTURING

Abstract

Satellites are still largely bespoke devices built in single or very low quantity by a team of highly skilled engineers. The unbroken trend towards constellations and mega constellations requires a shift in how satellites are manufactured. Before 2015 a typical small satellite at BST required a team of 10 people over a period of 2 years. In addition, hardware of approximately 500kEUR needs to be procured. That means at a labour cost of 100kEUR a satellite will not be cheaper than 2.5 MEUR. In addition, the cadence of which satellites are being built is very low. In the key range of 50-150 kg satellites there are very few manufacturers which build more than 5 satellites per year. On the other hand, constellations and mega-constellations aiming for production cost of ¡500kEUR and quantities of 100+ devices. Based on the traditional way to design and build satellites this is unfeasible – both economically as well as from a technical perspective. The paper will thus focus on these two aspects, 1 which technologies can be used to increase the speed and ease in which satellites are being built and 2 how the cost can be reduced to fit the demand of the market. Over the last 5 years BST has worked to improve the metrics of small satellites manufacturing. This includes the system design of the platform (modular, separation of payload and bus) as well as the subsystems (industrial production, automated testing). Most of the technologies needed have already been proven in the labs of BST. As an example, the BST star tracker may can be mentioned, whose manufacturing time is now less than 10h. As a result, the authors believe that the space industry in general and the small satellite industry in particular is awaiting its Henry Ford moment. Meaning the time in which a product emerges from a hand-crafted luxury good for the select few to a commodity accessible and affordable for the many. The next step on the road towards true mass manufacturing of satellites is currently underway. BST has formed a joint venture with the Indian company Azista to build a factory for satellites in India. This factory which will have an initial production capability of 100+ satellites per year. The facility which will be ready for production on October 2018 uses a highly parallel production scheme and will allow to increase to 1000+ satellites per year easily.