SwissCube's longevity marks its success

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Credit: EPFL, J.Caillet

Launched more than five years ago, the small Swiss satellite designed by EPFL and several other Universities of Applied Sciences, will soon have orbited the Earth 30'000 times. Against all odds, its systems are still fully functional. For the students who built it, it is a great testament to the quality of their work. This feat is the subject of an article in the latest issue of Flash.

It was supposed to work for only one year. However, it has already been five since SwissCube orbits around the Earth. Launched in 2009, the Cubesat –a satellite model designed in the form of a cube of 10 cm per side- is still in good condition. It orbits at a height of 720 km and moves at a speed of nearly 7'500 meters per second, that is: about 28'000 km per hour, making nearly 15 daily tours of the Earth.

Indeed, the satellite's long life marks its success. Few people would have bet on it after the realization, only hours after its launch, that it was spinning too fast. In fact, it took nearly a year before its systems could finally be exploited. Moreover, its scientific mission -to document the phenomenon of aurora- has not been fully completed. But the data it provides are still the subject of ongoing research and student work.

SwissCube demonstrates, with its endurance and the consistency of its beeps, that some risky design choices taken before its launch turned out to be the right ones. These include the use of low cost materials that had not been yet used in space, or the fact of giving it an essentially educational purpose. Conducted over three years, from 2006 to 2009, in conjunction with several Universities of Applied Sciences, the program not only allowed 200 students to study space technology, but also to learn to take responsibility, to take into account every detail and to work as a team. Thus, in hindsight, the reliability of the SwissCube systems highlights the excellent quality of these young people's work.

"It was a great adventure, gushes Muriel Richard, project leader. We were lucky to find talented and motivated students, with a great sense of humor! To see them evolve, both professionally and personally, was very rewarding. Many of them became first-rate engineers. Since they were involved from the beginning until the launch of the satellite, they acquired practical knowledge and a global vision that are well worth a 10 to 15 years' experience in business."

As for the ex-students, they emphasize the unique and very educational opportunity offered to them, also noting a particularly good and supportive atmosphere within the team. Undoubtedly, their participation in this project has served as a springboard for their careers.

"SwissCube put my creativity into orbit"

Fabien Jordan was in charge of the part relating to the generation, storage and distribution of energy on the SwissCube. At the time an Energy Systems student at Yverdon's engineering school, he worked on the project from April 2007 up to the launch in September 2009.

"Having the opportunity to build a satellite from the outset was just incredible!", he says. In addition to the warm working atmosphere, the young man also focuses on the "managing excellence" of the supervising team." Since it was a first, this experience was bound to set an example. So it pushed us to provide a very high level of quality which, as SwissCube's longevity proves, was accomplished."

But this adventure did not only make possible to project 10 cm3 of hi-tech into space, "it simply put my creativity into orbit," explains Fabien Jordan. He now runs his own company, named Else, which offers a very innovative product: the xU, a platform that facilitates the assembly of electronic subsystems for cubesat type satellites. "The idea was born from the nights spent in EPFL's cleanrooms seeking for solutions to assemble all systems." A task complicated by the highly restrictive miniaturization and weight constraints imposed by the cubesats.

"I learned to work with people from different disciplines"

During his final year of Microengineering at EPFL, William Röthlisberger was named responsible for the satellite's mechanical structure. "Even though my studies provided me with valuable technical knowledge, I really learned to work thoroughly and with people from different disciplines with this project." A skill he currently puts every day into practice as an engineer at a distinguished watchmaking firm.

Among the highlights, he mentions the journey that took him to India to

take the satellite to its launch base, from where it took off six weeks later. Knowing that five years later his work is still operational and continues circling the Earth is "extremely rewarding for me and for the SwissCube team."

"Hearing the first beep was an incredible moment"

Nicolas Steiner was an electrical engineering student at Yverdon's engineering school when he tackled the temperature measurement systems as well as the energy production from solar panels attached to the Cubesat. Today, he works in Nyon for Ruag, a very active company in the field of space technology.

Undoubtedly, the fact of having learned techniques specific to space work, that is to say: the most demanding in terms of rigor and quality, gave him tools to go after the labor market. "SwissCube also allowed us to come into contact with all the stages of a project, to approach different disciplines, to solve practical problems and to experience things directly. All this taught us to be very pragmatic and to understand each challenge in all its complexity."

And there were also moments of laughter, sharing and friendship, which remain in the form of dinners held every year on the anniversary of the launch. Nicolas Steiner also remembers SwissCube's first beep once in orbit. "It was an amazing moment! It showed us that everything had started as planned and that all our efforts made sense."

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