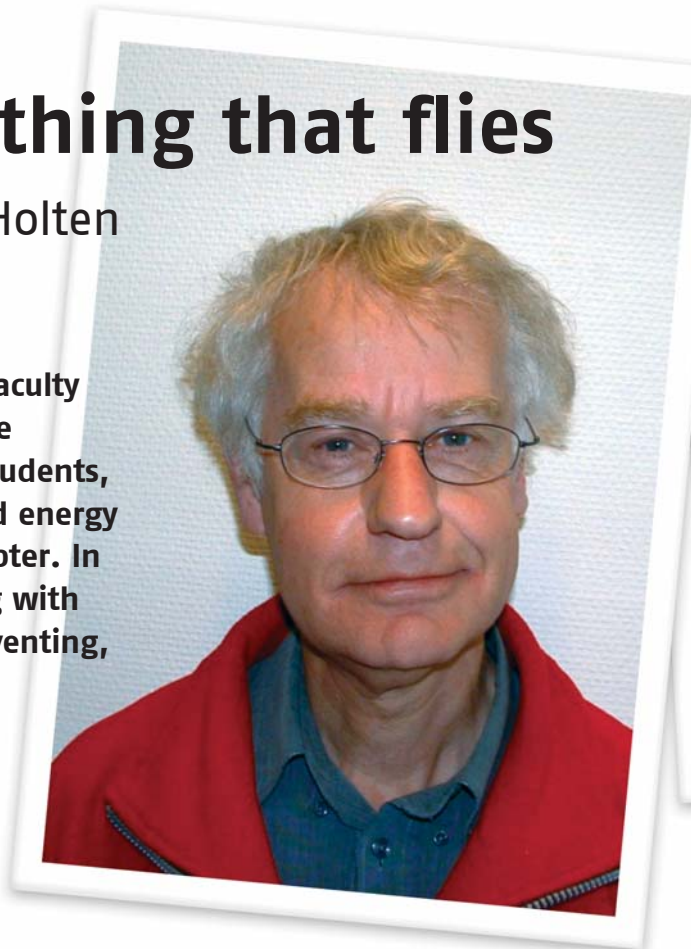


# The passion for everything that flies

interview with prof. dr. ir. Theo van Holten

**Prof. dr. ir. Theo van Holten (65) first arrived at the faculty of Aerospace Engineering in 1960, as a student. In the following forty years, he graduated, educated new students, worked as a researcher on subjects varying from wind energy to helicopters and invented machines like the ornicopter. In 2007, he will leave the faculty, but not before talking with the Leonardo Times about Aerospace Engineering, inventing, and the passion for aeroplanes.**

by: Bas Bennebroek, Editor Leonardo Times



*Could you tell something about your personal history?*

A very long time ago, in 1960, I began my studies here at the faculty. When I graduated after seven years, I was hired by the university. In the mid-seventies, I started, as the third person in the Netherlands, to research wind energy. That eventually led to the department of wind energy here at the faculty. After that, I worked for ten years at Stork as a research manager, but in 1992 I returned to the faculty, as a professor this time. And this year I will leave, after a successor has been found, to enjoy my free time.

*In your farewell address you talk about the 'rebuilding of the faculty' in the 1990s. The current students do not know anything about that.*

Around 1995, all kinds of disasters struck the faculty. Because of lack of money, the faculty had to reorganise, and then Fokker went bankrupt. Because a lot of would-be students had, incorrectly, in mind that we were some kind of 'Fokker school', the number of students decreased dramatically. Then we heard the news that the building was full with asbestos, so we were relocated to offices all over Delft. And last but not least, we had to make the switch from a four-year to a five-year curriculum. All these things together

created a great crisis. The board of the university was already convinced that we were not going to make it, and had already reshuffled the departments over other faculties. But that gave us the excuse to not care about any rule anymore in our effort to save the faculty.

*You worked hard to save Aerospace Engineering?*

I did, together with a lot of other people. And I enjoyed it thoroughly; it is like playing a fireman. During that period, we also got the idea to recruit Belgian students. One day, I stepped into the car with one of the, in those days few, Belgian students and drove to Belgium. Once we crossed the border however, we wondered "What next?" Eventually that idea resulted in BeNeLaiR, which is now a big success.

*Nowadays, at the moment of your retirement, the faculty has had more than 300 first year students for years in a row and Aerospace Engineering is one of the largest and most popular studies in Delft. When you see these results, do you feel proud?*

Yes, absolutely. The high number of applications probably has to do with the conjuncture as well, but the other part is, I think, still a direct result of our hard work ten years ago.

*Have you seen a change in the motivation or attitude of the students over the years?*

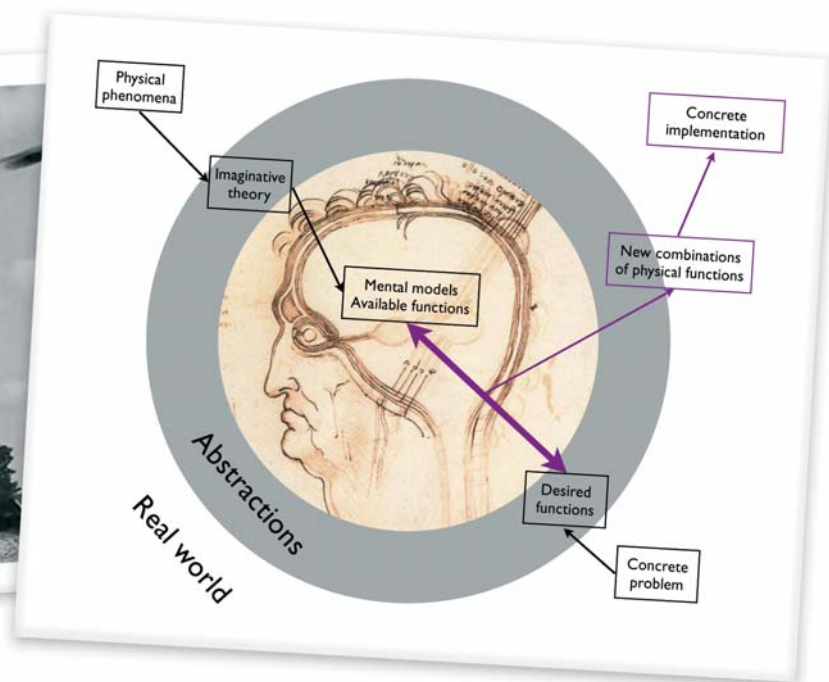
Not really. I have always felt, and still feel, a special atmosphere at the faculty. Aerospace engineering is not just the challenging technology; it is also the heroic story of avian history, the idea of distant journeys. And that special atmosphere is also connected to the study. And the students also share that feeling.

*In your farewell address, you also mention the 'inventor's mentality'. Do you think there is too little of this in the curriculum? Or is it simply important to learn the basics first?*

It is important to learn the basics first; you need the tools before you can build something. But the theory that is learnt in the first two, three years, feed the mental models in what I call the 'imaginative theory'.

*The imaginative theory?*

It is a theory about the development of new technologies, which is completely different from the general view. It occurred to me that when I explain a new invention to someone, I always present it as a linear, evolutionary process based on existing technologies, basically according to the 'standing on the shoulders of giants' concept. However, I do this to



make the explanation simpler. In reality, when thinking of new things, my thoughts were not that linear, quite to the contrary. So I tried to reconstruct how this thought process works. And I found out that my thoughts were on a level much more abstract than existing technologies and machines. I don't think in collections of bolts and nuts, but more in desired functions. For instance, if you want to lift something in the air, you should not think of a wing immediately, but think of how you can create a lift force with natural phenomena. That is much more abstract, but much more useful, since a wing is not the only way to create lift. The next step is to find those natural phenomena. That happens through mental models, which you learnt earlier. Sometimes inventors talk about a sudden flash in which they have a whole new idea, out of the blue. I think these flashes can happen, but they always use knowledge you already had. A toddler cannot invent a rocket, because it simply does not have the basic knowledge. And this combination of thinking at an abstract level with the mental models is what I call imaginative theory.

**Is it a process that happens, or more like a method you can apply?**

I think of it as more of a theory, a hypothesis

about how my thoughts and ideas work. I also do not know if it happens like this with other people. So far I have only had one test person for my theory, which happened to be myself.

**You invented the famous ornicopter, and to improve your understanding about how this vehicle performs, you took helicopter lessons.**

When I look back, I should have started with these helicopter lessons twenty years ago, it would have been a lot easier then. I have always believed that at Aerospace Engineering, people who work here should be able to fly themselves; they should know how the 'real' world works. Years ago, when I was a student, all students could also learn to fly, which is really valuable for a good engineer. The faculty paid for that.

**The former dean, Ben Droste, introduced a reward for people completing their first year in one year: they receive four free flying lessons.**

A lot of people really had to get used to that idea, but Ben and I worked hard to get it through.

**It was your idea?**

Yes. As I said before, you would not be a good

engineer if you do not have an understanding about the real thing. You would be like an automotive engineer without a driver's license. When you fly yourself, you see how an airplane really behaves, including the things you do not learn in class. For example, in lectures we always draw the wings at a ridiculous angle of attack. When students then fly themselves, they ask: "That really small angle difference, is that really it?" That is an eye-opener.

**After more than forty years, you are definitively leaving this faculty. Do you have any grand views about the future of Aerospace Engineering?**

I really am not that kind of person, who has an opinion on everything or who can look into the future. I have always felt at home here, and if other people keep sharing that feeling, then I am happy. Once, a girl graduating at my department told me the story that when she had a bad time - when her boyfriend broke up with her, when she failed her exams - that she would go to the Vliegtuighal, and just wander around this old collection of rusty parts for comfort. And I recognised a lot in that story.

**The passion for everything that flies.**

In the end, that is what I am doing this for. ✨