

TAYLOR VISION

Manifest
positivity!

July 2022



About us

BOARD

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HISTORY

Taylor is the study association related to the department Precision and Microsystems Engineering of Delft University of Technology. The association was founded in 1988 to enhance the study experience of the students. The Taylor Foundation, in its legal form, was subsequently founded in 1992, making it an official organ in the TU Delft. During this time, the department changed its name from "Production Engineering" to the PME you are all familiar with. In contrast to what many people think, Taylor is not named after the famous mathematician known for the Taylor expansion. It is named after the mechanical engineer Frederick Winslow Taylor, who was active in production engineering and industrial efficiency. The logo of Taylor was inspired by the tip of an Atomic Force Microscope, an instrument that requires technology from all the divisions of the department. Taylor aims to enhance the study experience of the students by: trying to improve the relation between the students and the department staff, bringing the students in contact with the industry, providing the department with student feedback about courses and, last but not least, organizing recreational events to de-stress from the hard working life as a PME student.

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From the board

Dear HTE'ers,

The year comes to a close and thus lies in front of you the last Taylor Vision of the year. It has been an eventful year, with both hybrid and small-scale events due to COVID, but luckily also full-scale events were able to take place!

The last quarter has been filled with many activities. Multiple company visits; Hittech, VDL and Huisman provided a way to take a look into the kitchen of these companies. Also, the Taylor Gala was an immense success. It was amazing to see everybody dressed up, in a good mood and ready for a good dinner and dancing.

A new introduction was the Potluck, which is an event to stay. It was fantastic to taste all the different types of dishes and flavours. Also, the drinks were so successful that halfway

through extra crates of beer needed to be bought, well done!

Also, the next Taylor Board has been selected and we are very delighted to pass on the board to Paulien, Maurits, Niels, Mark and Jelle after the holidays. A proper introduction will of course also take place in the first Vision of the coming year.

The coffee breaks at the Taylor Office have skyrocketed, indicating that many people at HTE are fully focussing on finishing their last courses or maybe even graduating. To all of you, good luck and enjoy your well-deserved holiday!

To all students (and staff) still present during the holidays, we still welcome you for coffee breaks and conversations since most of the board will also still be here!

On behalf of the board,

Sophie den Boer



Recent graduates

14/4/2022	Maarten Blankespoor	Liquid dosing on the micro-scale: A quest for increased resolution
26/4/2022	Bart Friederich	Design and validation of manoeuvring caging gripper for cluttered environments
3/5/2022	Kees Pijnenburg	Development of a novel manufacturing method for a contactless handling system using a variable outlet restriction
6/5/2022	Jan van Rijn	A system level performance analysis method for the design of a C-shape hexapod leg operating on compactive terrain
12/5/2022	Lauran Leermakers	Photonic crystal nanobeam cavities as hydrogen sensors
20/5/2022	Stijn Rietmeijer	Design and tuning of a bi-stable compliant mechanism
23/5/2022	Robbert Koene	Design and validation of ungrounded wrist perturbator based on parallel mechanism
24/5/2022	Pepijn van Esch	Real time state estimation of surgical energy devices for use in an integrated OR
24/5/2022	Ruben Willemen	Optimization of controlled motion systems using robustness response surfaces

Congratulations!

Study Year Recap

With many activities throughout the year, it is impossible to recap all the great moments we shared with all of you. From educational excursions or lectures to drinks with port and cheese or amazing homemade food, we can only thank the great community that exists inside our department! We hope to see everyone back again after the summer or we wish you success in everything that comes after the time at HTE.



Taylor Lustrum Gala

What an amazing evening it has been! We can only conclude that the Taylor Lustrum gala was a great success. With PME staff and students all dressed up as fancy as you might ever see, it was for sure a special evening to never forget.

With a dinner, party and special act included in the evening, the most-asked question was why is there not such an activity every year?

This is of course because there is not a lustrum every year and also no lustrum committee (old Taylor) as good as the one who organized this event.

We want to thank the gala commission for the work they put into this evening.







Connect Event

On the 19th of May, Taylor organized its biggest networking event for the master High-Tech Engineering. In collaboration with Young Hi Delta, they invited ten interesting companies from different sectors.

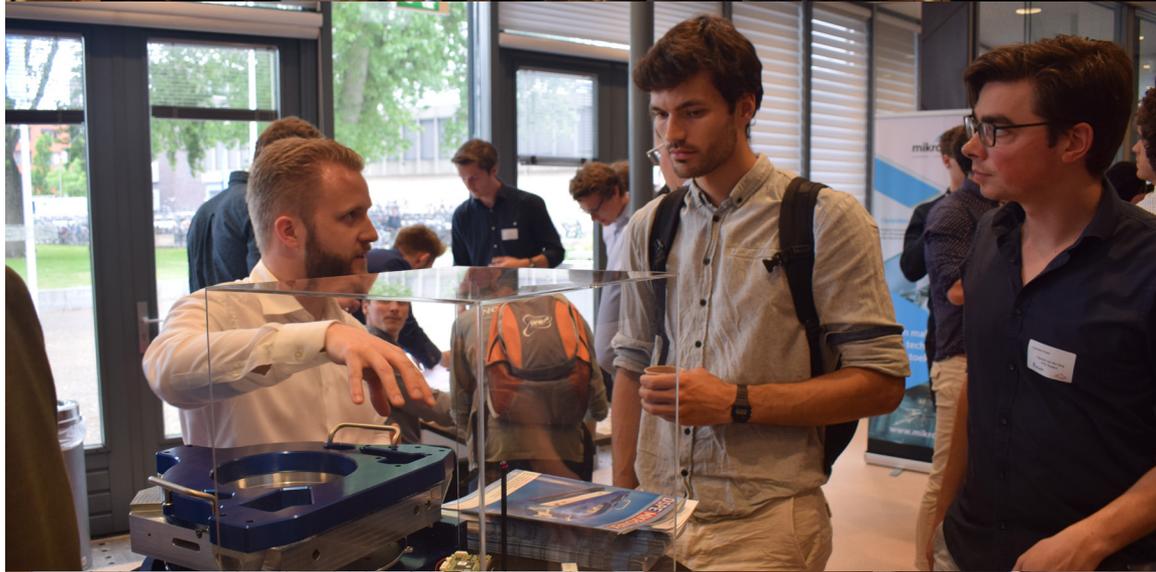
First on the list is AAC Hyperion, which is a space company specialized in satellite components. ACE, Hittech, and MI Partners are engineering firms specialized in high-tech product development. Flexologic, a leader in mounting and pre-press equipment. Houdijk Holland, market leader in biscuit handling systems. Lely, making the future for dairy farmers more sustainable and profitable by combining robotization and engineering. Spectral Industry, developing spectroscopy solutions. TNO, an organization for applied research. And Viro, helping industrial organizations to perform better through their expertise in innovations, capacity, and flexibility. Very remarkable was that almost every company was from the province of South-Holland. That is something new for us high-tech engineers. ;)

The event started off with the company pitches where they had eight minutes to tell what the company stands for and what kind of projects they do. The pitches were very helpful to create a good understanding of the companies and how they differ from each other.

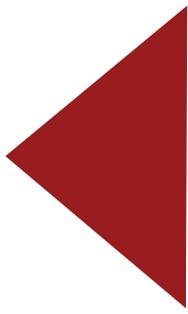
After the pitches, we went to the Lagerhuysch for the company fair. Here the companies had set up their stands and everyone was free to walk by and talk to employees and recruiters. The ambiance was great and there was a lot of connecting going on as all stands were occupied.

Altogether it was a successful networking event where students could meet lots of companies from different kinds of specialization fields in the nearby region.









Huisman

Cycling Event

Today the biking trip with Huisman was planned. Wearing the sponsored kit of Huisman, Dehlia and I left Delft and headed over to Huisman. Biking along the Schie, we very quickly were passed by Stan and Jan. With our group of four we continued until we arrived at our destination. Outside of the gates of Huisman, more and more people started arriving and the hype started building up. After having to get visitor badges and then not having to get visitor badges anymore, we entered the Huisman facility.

Inside we were met by some very friendly faces from Huisman. Together with 22 High-Tech students and roughly the same amount of people from Huisman, everybody posed together to make a nice group picture. Then the group was divided into two subgroups, one group biking 60+ km and the other group 30+ km. I joined the 60 km group so I won't be telling you about the other group, which also had a tandem bike by the way!

With a peloton of roughly 20 people, the long ride group left and I immediately noticed there was some serious riding coming. I started in the back of the group since I did not have the route and I first wanted to see in which way the cat jumped. Enjoying my low drag, the number of kilometres travelled started to increase. However as the number of kilometres started to increase, the peloton started

to become slimmer and slimmer. A few mechanical failures saw people having to drop out, but Huisman employees stepped in very nicely to prevent people from being left alone.

As the ride entered the halfway point and fatigue started to occur, more and more people started to lose the rear of the group. The last piece of the ride also included a headwind, but the peloton leaders were set on improving the average speed. This meant I had to abort the conversation I was having with one of the employees and focus all the energy on keeping up.

Upon arriving again at the Huisman facility everyone had given their everything and we were very content with the ride. As a nice surprise, we could eat spaghetti, grab a bowl of soup and eat a nice salad. And to top it all off, drinking beers at the Tacke Bar poured by Charlotte Roodenburg, daughter of Joop Roodenburg. She even told the interesting fact that across the world in the Huisman Facilities, there are identical copies of the Tacke bar that can be found. It is of course very important for employees to have a nice atmosphere to close off the week and drink a couple of drinks.

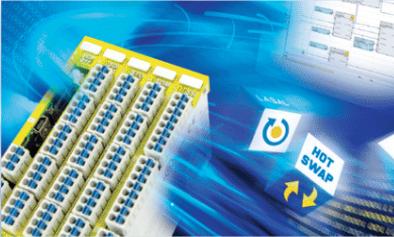
All in all, I can say that I enjoyed this event. Friendly employees interested and open to a conversation about whether or not Huisman could be the right match for you. A very pleasant atmosphere and to top it all off, a nice bike ride.

by Daniël Blommestein



SIGMATEK

SIGMATEK



MACHINEONDERDELEN
SWAPPEN TIJDENS RUNTIME



SAFETY OVER WIRELESS



COMFORTABEL
PROGRAMMEREN MET LASAL

SUPERCOM

MULTI-AS SERVOS



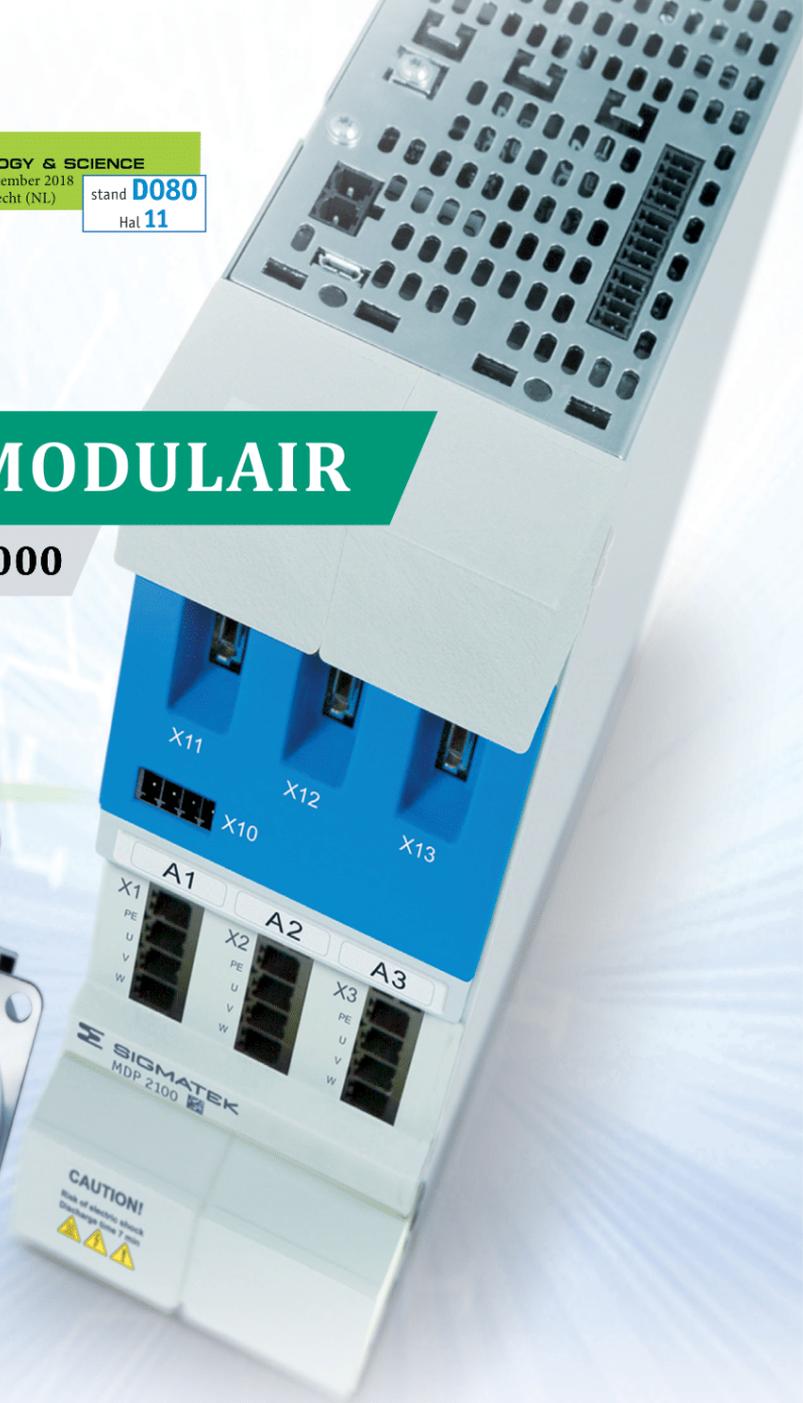


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Potluck

The last quarter starter

How did the time fly! On Tuesday the 31st of May we already had the last Taylor drinks of the year. To make it extra special we organized a potluck. This means that everyone was invited to make, bring, and share their favorite food.

High Tech Engineering is a very diverse Master's program with students from all over the world and it showed! What a great variety of dishes you all brought along. We enjoyed a tasty and wonderful drink to end the year in a great way.



Taylor Trip

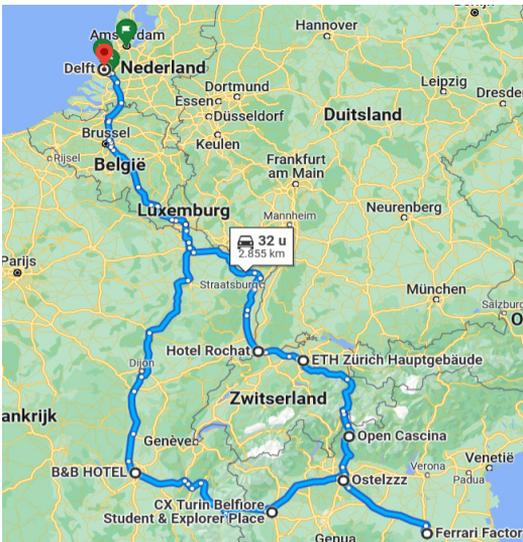
Sneak Preview of Taylor Trip 2022!

The Taylor trip is now only a month away, so I can imagine people are getting very excited to hear about any updates from the planning. The wonderful Taylor Trip Committee has been working hard, and since the last update they have looked at activities, accommodations, and companies, to make the trip as fun and smooth as possible.

I have the pleasure of giving you guys a little sneak peek at what the Taylor Trip Committee has accomplished so far.

Route & Accommodations

Since the last update, there have been some changes made to the route and accommodations. Now, everything is booked, so the route is final! If you want, you can have a closer look at



all the accommodations by googling the names that are shown next to the destinations on the route.

Companies & Universities

The Taylor Trip Committee is still working on finalizing all the company & university visits, but I can already share a couple of them.

D-Orbit: offers solutions based on proprietary technologies that enable the optimization of operations both in orbit and on the ground through last-mile delivery of satellites, orbital transportation, space logistics, and space waste management.

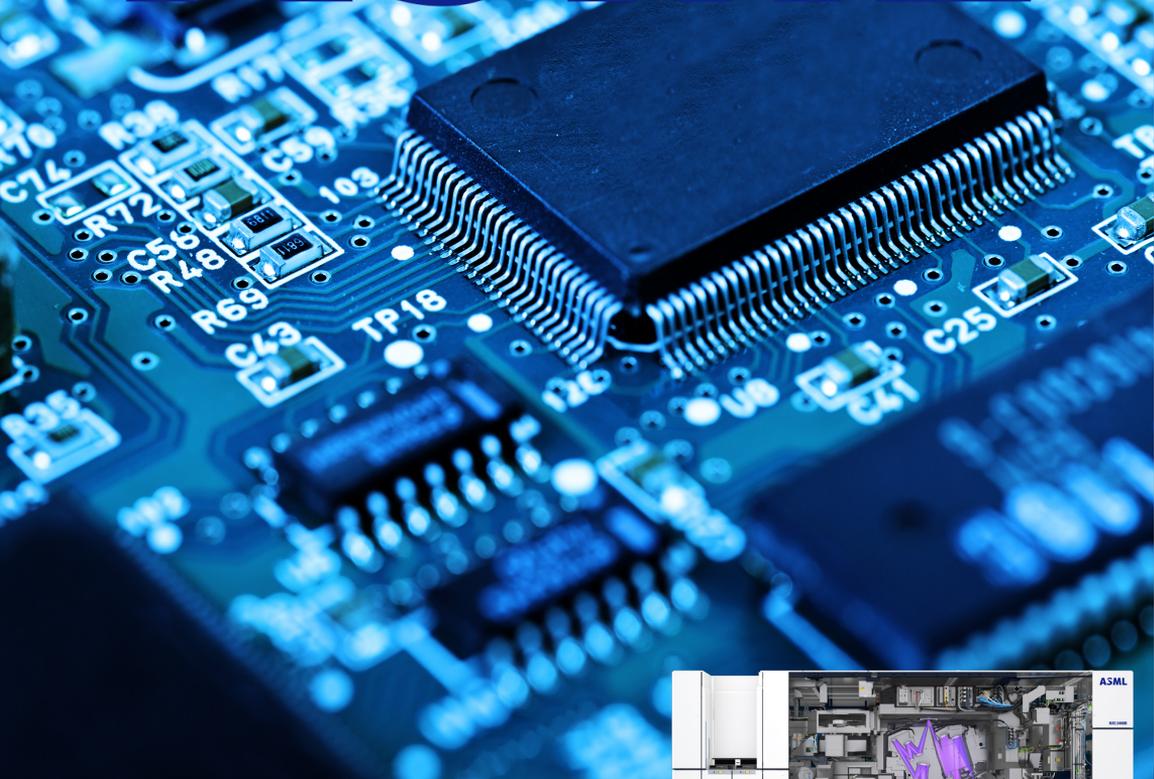
Comau: develops Industry 4.0-enabled systems, products, and services.

ETH Zurich: One of the most prestigious universities in the world, especially for engineering.

Ferrari: Ferrari needs no introduction. When you think about speed, luxury, and Italy, you think of Ferrari

All in all, it is looking like another great edition of the Taylor Trip. I know I'm not only speaking for myself when I say that I am very excited.

ASML



ASML innovates with the future in mind

To work with extreme specifications to build a machine that meets the requirements that are still years ahead from now. For ASML's engineers, it's everyday's business. They follow the in 1965 invented Moore's Law, that serves as the heartbeat for technological evolution that manufacturers of microchips, ASML's customers, strive for. So, ASML basically has a glass sphere that predicts what its lithography machines should be able to do. However, the development of these machines requires ASML to venture on technological adventures – expeditions that often seem impossible, but are ever surprising.

Those adventures of development demands from ASML's engineers a strong mindset: to keep believing that you can make the impossible possible. To see setbacks as challenges and to practice solution-oriented thinking. Exactly this mindset lays the groundwork for one of the most complex machines that was ever made by men: the EUV system.

Etteplan

Interested in starting your career with a project organization? Feel free to contact us:
<https://www.etteplan.com/careers>.

Etteplan provides comprehensive automation and robotics solutions for machines, factories and production lines and maximize your production performance in terms of efficiency and quality. We do this through a unique combination of expertise in the field of mounting optimization, manual and automated mounting equipment, joining & gluing and virtual commissioning.

We have our own cleanroom and workshop where we work on the most innovative projects.



INTERVIEW

with Peter Steeneken

by Cas van Ruiten

To start off, can you tell me something about yourself?

I was born in Groningen and raised in the Northern part of Drenthe, the Netherlands. I went to a secondary school in Groningen and afterwards studied physics there too. Before studying however I went to the United States for a year. I went to a liberal arts college where you could choose your own courses of which I mostly did physics courses, but also photography, philosophy and sports like skiing. The physics courses were also very cool and challenging because in some of the courses there were only two students and the teacher went round a classroom with blackboards on all walls writing them full of equations on topics like black hole theory. This was a great way to take an educational gap year away from my parents. Other than that I always liked to play the piano, play tennis and to play games on the Commodore 64 and Amiga computers I had.

How was your time as a student?

After returning from the US, I studied physics at the University of Groningen in the field of solid state physics. During my graduation project I studied superconductivity, and optical spectroscopy, mostly focusing on theoretical and experimental physics. I liked research so much that I applied at three places to do my promotion research. I had to choose between Amsterdam (2x) and Groningen and ended up in Groningen. This was partly because I started doing sports climbing and

mountain climbing quite a lot. I even became a board member of the Groningen student Alps association (GSAC) for two years. We often went on trips to Belgium, Germany or France for outdoor rock climbing and in the summer holiday, we were climbing '4000s', mountains of 4000 meters and more. On one of those trips I even met my current wife Nicole.

So up till now, it has been a lot of physics, so when did you become interested in the more mechanical engineering field?

Yes, that's true, my promotion research was in the same field as my MSc. graduation topic, although it was more aimed at electron spectroscopy. By using UV and X-rays, electrons were shot out of the material, and by measuring the energy of these electrons you could get to know a lot about the electronic structure of the material, and on the origin of phenomena like magnetism and superconductivity. At the end of this rather fundamental research project, I really wanted to focus more on applied science. This was the reason why I declined an offer as a postdoc at Stanford University and accepted a job at Philips Research in 2002. The group I joined was great and almost felt like a university, in fact more than half of the people have become professors now. In this group, I first started working in a project on RF MEMS (radio frequency microelectromechanical systems) which was an emerging field back then. We first worked on mechanical micro resonators/switches that were supposed to be used in mobile devices to switch the high frequency 2.4 GHz electrical communication

signals and to realize miniaturized clocks with silicon resonators. Despite the large potential, international efforts at many companies and technical successes, the RF switches sadly never came to production due to reliability issues. The clocks eventually reached the market however. At the end of 2006, Philips sold its semiconductor division, which is now called NXP. As a consequence the research group was split up and I joined NXP to continue research on MEMS, working on mechanics in watches and microphones as an example.

So you started in the industry, how did you end up in academia?

That is also a nice story. For the resonator I just mentioned, we did have a great breakthrough. We invented that we could realize a small clock that was driven by Joule heating of a small beam. Due to a combination of the piezoresistive effect and the thermal expansion force, an intrinsic feedback loop caused it to vibrate on its own at a well-defined frequency without the need for electrostatic actuation. Trying to get publications of your work was part of the job (next to patenting and business) at Philips and NXP, so I really wanted to get this research into a high impact journal like Nature. With two years of hard work and at least four times resubmitting I managed to get it published in Nature Physics! It is not that easy to publish in such a journal when working in industry while not being known relatively. The publication attracted the attention of universities as well, where I was invited to present the work. At that time the department of TNW was trying to get a stronger link to industry. For this reason, they offered me the opportunity to become a part time professor at the Kavli Institute in the department of Quantum Nanoscience. At the TU Delft, I first started doing research into graphene and implementing them into NEMS sensors as part of the EU Graphene Flagship project. During that time I also got in touch

with professors Urs Stauffer and Guido Janssen from PME who were also active in graphene research. They had a vacant spot as a professor in the dynamics group for some time and with the department wanting to focus more on the small micro and nano, and with me greatly enjoying the work at the university, this seemed like a perfect fit. This is how in 2017 I became the professor of the newly renamed group of DMN (Dynamics of Micro and Nanosystems).



So what do you like most about academia?

Personally, I enjoy doing things that have never been done before, researching brand new things, solving new problems, and pushing the limits of knowledge and technology. Also, the opportunity to contribute to improving the world, and to bring the research to application in collaboration with companies is very important for me. Another thing that I like about working at the university is to work with young people, since they are often very innovative, energetic and enthusiastic to try out new ideas. I like helping and teaching them, transferring expertise and knowledge gives a feeling of purpose. The freedom to shape your own research, striving to understand things that have never been understood before, make the university the perfect place for me.

Since you are working in two different departments, is there any preference you have for research in either physics or mechanical engineering?

You could say that I indeed do different types of research, physics, mechanical engineering and also electrical engineering. I perform more fundamental research and work on more applied research projects with companies. I like to do both and to combine fundamental and applied research. The reason is that the very fundamental research is nice for the knowledge generation, but its use and impact in our daily life is often small. For instance if you discover a physical phenomenon that only occurs at very low temperature, it will unlikely find application. On the other hand, if you perform very applied research, your results are often only useful for that specific application. I prefer to be in the middle, working on quite fundamental topics that might find application in a broad range of technologies.

On a final note, is there anything you would like to add?

Firstly I want to emphasize that I really enjoy working in this department where we collaborate a lot between the different sections. Another thing that I really like is that we have a great group of staff, PDs, PhDs and MSc. students that create a nice atmosphere. I always enjoy the interaction with the students that for example Taylor makes possible with the activities they organize for students and staff.



“I enjoy doing things that have never been done before”

Company visit

Hittech



A little impression of the ambience

It's not every day that we can visit a company by bike. With only a few minutes of cycling or public transport, we arrived at Hittech Multin in The Hague. After enjoying a presentation about the company and what types of projects they do, it became clear that you do not have to travel far from Delft to work on interesting High-tech projects.

After the presentation, we split up into five groups and were given a tour of the facilities. Such as their workplaces, assembly rooms and the cleanroom. After having seen a lot of technology they have been working on, it was our turn to put our minds to work! We performed a short case study on designing a rotating stylus for a measurement device. Keeping in mind the high precision, low mass and strict financial constraints it was a challenging project.

After we presented our solutions, the people from Hittech Multin showed their decision-making process and final design. We had an interesting discussion about their engineering decisions and could clearly see that the theoretical knowledge we are taught in our studies had to be applied to solve these challenges

As a final part of the visit, we had a drink and the opportunity to talk to employees to ask any questions we still had about the company.

Recipe

Victoria sponge

I am not much of a cake person myself but as my last recipe was savoury, I thought to switch it up this time. The recipe I like to share this time is one to make a Victoria Sponge. Victoria Sponge is a classic English cake that is surprisingly easy to make. The following recipe will make a cake large enough for 8 to 10 people.



Ingredients:

For the cake

200 g caster sugar
200 g softened butter
4 eggs, beaten
200 g self-raising flour
1 tsp baking powder
2 tbsp milk

For the filling

100 g butter, softened
140g icing sugar, sifted
drop vanilla extract (optional)
170g good-quality strawberry jam
icing sugar, to decorate

Cooking instructions

Heat oven to 190C/fan 170C/gas 5. Butter two 20cm sandwich tins and line with non-stick baking paper.

In a large bowl, beat 200g caster sugar, 200g softened butter, 4 beaten eggs, 200g self-raising flour, 1 tsp baking powder and 2 tbsp milk together until you have a smooth, soft batter.

Divide the mixture between the tins, smooth the surface with a spatula or the back of a spoon.

Bake for about 20 mins until golden and the cake springs back when pressed.

Turn onto a cooling rack and leave to cool completely.

To make the filling, beat the 100g softened butter until smooth and creamy, then gradually beat in 140g sifted icing sugar and a drop of vanilla extract (if you're using it).

Spread the buttercream over the bottom of one of the sponges. Top it with 170g strawberry jam and sandwich the second sponge on top.

Dust with a little icing sugar before serving.

Metrohm

Lunch lecture

On the 19th of April, Metrohm hosted a lunch lecture for the HTE students. Metrohm is one of the world's most trusted manufacturers of high-precision instruments for chemical analysis. CEO Timoer Frelink kicked off with a presentation about the company, where its roots lie, and how Bertold Suhner's (founder) philosophy still guides the company in its independence.

After that, Ferry, who is a mechanical engineer at Metrohm, gave a presentation about a project he's currently working on. The project was about designing a mounting system to mount the process analyzer modules onto a rack/wall. He took us through his process of iterations, what challenges he had to cope with and how he tackled them.

We want to thank Metrohm for their effort in hosting a lunch lecture and it was nice to finally see a company located near Delft.

By Julian Keizer



VDL

Company visit

In short, educational, exciting, and enlightening. This is how I would describe our visit to VDL. Although VDL has always kept a close collaboration with TU Delft and especially the PME department at 3mE, it was not until I visited VDL and received an all-around, yet far from ordinary presentation at their headquarters when I grasped the full scope of their activities in several industrial sections, their mission, and how they are shaping the future of the industry. After being warmly welcomed with coffee, cookies, and drinks, we saw a presentation that could only be described as a scene from a sci-fi movie.

Our visit on this enchanting spring day continued by visiting VDL ETG, which is one of the companies owned by VDL Groep, and specializes in manufacturing of high-tech tools and products and is a major manufacturing partner in the high-tech industry, working closely with companies such as ASML. Not too long ago VDL ETG also started working on products from the design stage.

At VDL ETG, we got a tour from the engineers currently working at VDL to see parts of their manufacturing facilities and getting familiar with some of their processes and how they tackle engineering challenges in their line of work. This was exceptionally informative as they also shared some of their personal experiences of

working in this industry. What made this tour even more marvelous, was the fact that both of the inspiring engineers that kindly accompanied us on this tour were TU Delft alumni.

What fascinated me the most about VDL was how much they are investing in the future and the long-term advances of technology. Furthermore, the atmosphere and the work environment at VDL mesmerized me. Being overwhelmed by taking course after course at the university, we might sometimes feel a bit lost and yearning for the light when we feel as if the path to become a professional engineer has got opaque. However, these kinds of trips always shed a light upon that path and help us continue our journey mindfully.

by Sina Abouheidari



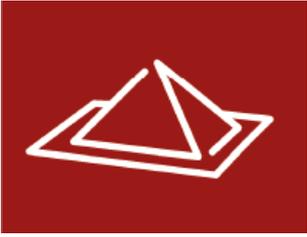
Puzzle

A Calcudoku is similar to a Sudoku, except that (1) any operation can be used to compute the result of a "cage" (not only addition), (2) the puzzle can be any square size, and (3) the Sudoku rule of requiring the numbers 1..9 in each 3x3 set of cells does not apply. Good luck solving the final puzzle of the academic year!

Good luck!

21+			9	8 :	6	26+		
	216×		120×		24×		70×	
11+				7				72×
			2-					
3	1-		16×			5-		5
7-	16+		15+			17+		5+
		19+		4	315×			
576×				9+		29+		
			2		5			

Send an email to taylor-3me@tudelft.nl with your solution and you might be the lucky winner!



Taylor

