

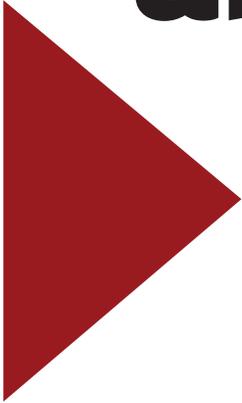
TAYLOR VISION

*stay positive
test negative*

February 2021



about us



BOARD

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Treasurer

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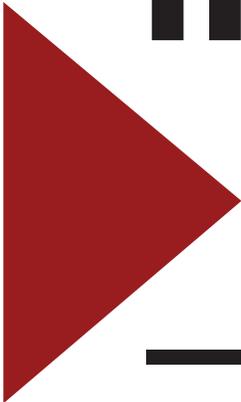
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HISTORY

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

It's that time of the year again where I have to gather all my skills to carry out the most challenging task of all if you ask me. To write about the Board for the Taylor Vision without making it a standard and boring piece of text that everyone skips with just one flinch over a page, written in a small booklet that has a "kerkboekje" like touch to it. This edition, with a special thanks to Myla's crea bea vibes, the Vision has a whole new fresh look!

Time for me to do my part. After half a year of virus-filled experiences with the board and the students, it's time to look back at some great experiences. I'll try to avoid using the word "covid" or "Corona" in every story and sentence, though I must admit that's quite hard in these times. Anyway, here it goes!

If someone would've asked me the prospect for the Corona virus at the end of last year, I probably would've said that I would expect the virus to make a small rise after all the holidays, then get under control in wintertime and by January-February we would all dance, gather and drink happily-ever-after at monthly receptions. Nice guessing Sherlock.

Any regrets so far then? None. (Like I would write it in the Vision if I did). Seriously though, no regrets.

Not only my fellow board-members themselves are the most entertaining and good-laughing group of random people I have ever had the privilege of spending so much time with. PME is a warm, skilled and motivated group of people that made us feel welcome from day one, as you all can probably imagine when thinking back to the atmosphere during the PME talent show.

If people are wondering what a typical "day-at-the-office" looks like, it can be approximately described as: A fresh start of the day with a board meeting that takes about all morning because Matthijs and Jan both have a catchy laughter combined with a coffee machine that takes more time to process a payment than to check my email (I checked). A chat with people like Hans who are always in the mood to share thoughts on new interesting projects and ideas. A lunch, which probably translates to foodtruck meals for us guys and a chinese-tupperware-vegan-leftover lunch for Myla (which often tastes surprisingly good!). An afternoon full of "Koenen" at the square behind PME when focus is lacking, Stan calling ABN all afternoon (never seen such persistence), all combined with the occasional squeaking of the "Mother of all compliant mechanisms",

activated by a new face who couldn't help but to press the button.

It is hard to imagine that it's been half a year since we started with a classical "cabin in the middle of nowhere" board-weekend. You can probably imagine that the bonding started from the moment that Jan opened the door to his house with a smile from left to right cheek and a haircut of a 35 year old with baldness problems (apparently he went bald a few weeks before because.. well, why not). Don't you just love it when people do random stuff? I do. Anyway I'm getting off track here. Long story a bit shorter, it feels great to support our department together with my fellow board members.

Even though activities take more time to organize and most scripts that tell you how to be a proper board could be thrown overboard

(pun intended) after the first week, so far it has been a refreshing and exciting time with plenty of lessons and memorable moments.

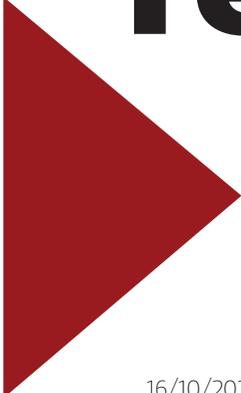
I would like to use the last few lines of this page to thank the students for the effort and participation in our activities so far. We've enjoyed our (virtual) evenings and lunches together and I can only hope that our activities over the last half year have brought you some distraction from sleeping and studying in the same ..m2 for too many days in a row. Keep looking out for one another. When the time comes, I look forward to share a drink and toast to a hard period successfully endured togeHTEr.

Stay positive, test negative.

Jaap Resink, Taylor Board

Taylor Board at the PME's got Talent



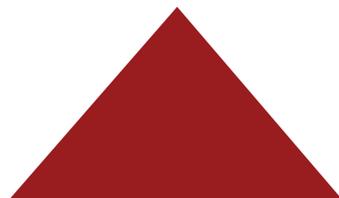


recent

graduates

16/10/2020	Ties Verschuren	Frequency stability of graphene nonlinear resonators
19/10/2020	Vincent van Parijs	Modelling and design of a 2D whiffletree based large deforming hydrostatic bearing
20/10/2020	Kartik Thakur	Locking free discontinuous nonlinear thin-walled structures
26/10/2020	Maurice Valentijn	Thin-walled warping beams for differential mechanism applications
28/10/2020	Dennis van Rooijen	Spread-based stochastic high frequency railway optimization
30/10/2020	Ioannis Pappas	Adaptive structural optimization methods
30/10/2020	Deep Patel	Design of pH sensor for liquid cell transmission electron microscopy
9/11/2020	Bob Brocken	Towards bottom-up fabrication of a boron-doped diamond chip electrode
16/11/2020	Guido Mous	A miniature chemical actuator with a compliant expansion chamber, passive exhaust valve and electrowetting-based fuel injection
16/11/2020	Dexter Thomas	Active metamaterials: unit for tunable damping
20/11/2020	Melvin Kruik	Location optimized hybrid damping for one-dimensional flexible structures
24/11/2020	Boris Daan	Modelling the axis drift of short wire flexures and increasing their support stiffness using polymers (and the application to the Delta Robot)
27/11/2020	Goran Barac	Multimode damping with activated metamaterials: Hexagonal patterned flexure with integrated piezo elements for active damping

27/11/2020	Keerthi Galagali	Inkjet-printed smart actuated robotic fish
27/11/2020	Aditya Wankhade	Design of a novel sensing technique for micro-strain measurement using Fiber Bragg Gratings
30/11/2020	Qingyuan Zhu	A novel thermomechanical modelling framework in metal additive manufacturing process modelling
3/12/2020	Joeri Roos	Experimental benchmarking of energy harvester performance on real world vibrations using a vibration shaker
4/12/2020	Vilius Cechanavicius	Scanning mirror redesign of the EasyScan retinal imaging system
9/12/2020	Pim Vugts	Conceptual design of a compliant hip orthosis for Trendelenburg gait
14/12/2020	Timothy Kramer	Design and optimization of a low-cost direct-drive motor intended for low-duty CNC machines
15/12/2020	Robbert-Jan Bosch	Modelling Discrete Dislocation Dynamics with Discontinuity-Enriched Finite Element Analysis
15/12/2020	Tim Feddes	Compact design of a planar compliant XY precision positioning stage for automated malaria diagnosis using a microscope
15/12/2020	Gerben van der Meer	Modelling self-healing magnetic textures in hydrodynamic bearings
16/12/2020	Hidde Lingmont	Data-driven techniques for finding governing equations of nonlinear dynamical systems
16/12/2020	Bas Lucieer	Experimental investigation of self-healingmagnetorheological surface textures
16/12/2020	Matthijs Zomerdijk	Reducing settling time in high acceleration applications of macro scale robotic manipulators with dynamic balancing
17/12/2020	Jiajin Li	Design of a tunable resonant scanning mirror
18/12/2020	Emma Hoes	Additive manufacturing of locally self-supporting compliant mechanisms. Experimental characterization and topology optimization for successful metal 3D printing
18/12/2020	Roberto Sobhi	Controlling the deposition resolution of nanoparticle aerosols using aerodynamic focusing



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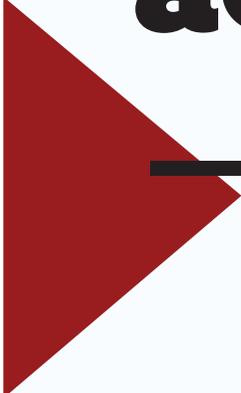
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activities



GAME NIGHT

On the 13th of October, The first edition of the Taylor game night was held. In short, a wide variety of classics like 'Catan' or 'Monopoly' were played among students. By using a common discord chat from the HTE whatsapp group, we could all chat with each other during the online games, which made it much more personal and socially active. Personally, I am a big fan of the new game "Among Us", which is a new game where you have to

find the traitor amongst the group of players. Some heated discussions and genuinely exciting games were the result. Taylor also provided us with some free craft beers which we could pick up behind the university. All in all, I really enjoyed it and had a good time with my fellow students. At least this way we can still get to know some other people, which is always a welcome distraction from our master.

Anonymous HTE student 20/21

LUNCH LECTURE PRODRIVE

On November the 9th, the first lunch lecture of the academic year was hosted by Teun van de Sande. Teun, a former TU Eindhoven student, is a full-time Mechanical Engineer at Prodrive. While having a sandwich from Leo,

First of all, we learned that Prodrive is active in multiple markets. They are currently working on video & sensing devices, embedded computing systems, control systems, power conversion systems and motion & mechatronics. Afterwards, Teun elaborated on the linear lift. This lift doesn't only go up and down, but also goes sideways and can be used to transport people or goods. This lift makes use of a linear motor, that unlike a conventional motor, doesn't spin. Furthermore

no cables for the movement of the lift need to be used. At Prodrive you get the opportunity to develop such unconventional solutions, and there are many other interesting projects you can work on.

Also, some insight was given about how it will be to work at Prodrive. Prodrive has a young team and employees work mainly in smaller teams within the company. Many prototypes are built and tested in-house and you get a lot of freedom to decide when and where you want to work. Prodrive has multiple facilities all around the world, from their main facility in Eindhoven all the way to the US, China and Japan. Especially for High-Tech students, there are many possibilities at Prodrive.

T. Neeft, HTE student 20/21

Game
Night Beer
pickup at
Mekelweg



LUNCH LECTURE ASML

ASML and Taylor organized a lunch lecture on the 23rd of November, which was hosted by Arnela Masic, an engineer at ASML in the department of CS Applications with a focus on Productivity. ASML is an innovation leader in the semiconductor industry, which develops lithography production machines. The company's headquarter is situated in Veldhoven, but 24,900 employees work on providing customers with products worldwide. To satisfy the customer after purchasing a product from ASML, the department of Arnela helps to improve the production on-site and tries to solve problems in case of a malfunction as quickly as possible. Arnela introduced herself by explaining that she got in contact with ASML, due to a scholarship offered by

the company. She continued her presentation with a tour through her entire week, which gave an interesting insight into her day-to-day work life. In that, she was talking about how she must prioritize certain problems and how an issue on the other side of the world can change her entire schedule. Nevertheless, escalations from customers are only around 20 % of her work at ASML. The most important part are new product introductions, in which local teams need to be trained on the new product and important knowledge is transferred to the customer. This deep insight gave a good understanding of her job and how it could look like to work in a High-Tech company like ASML. Especially helpful was the participation of Tessa Talsma as an ASML Campus Promoter, who offered support for questions regarding jobs, internships, or events at ASML.



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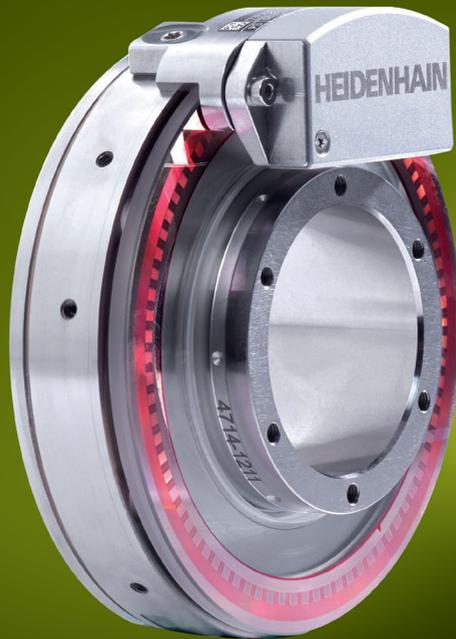
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activities

PUB QUIZ 2

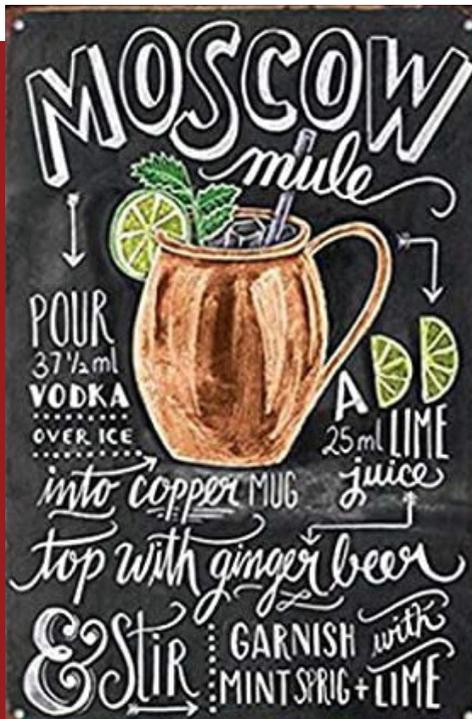
On the evening of Wednesday the 2nd of November it was time for the second Taylor Pubquiz. Just like the previous time, an online version was set up by the Taylor board and Zoom was used as the classic video platform. The night started with a cocktail workshop given by Mathusu. His expertise on cocktails resulted in the classic Moscow Mule, a mix of vodka and ginger beer on

the rocks, finished with some mint and a lime.

Then it was time to go to battle, all students had formed groups and everyone was ready to give it their best shot. The questions were spread out in a variety of difficulties and topics, including questions about insights, (of course a sponsored question) but also trivia, films and music. Especially for Toto - Africa the board had chosen a tear-jerking performance. In the end, after everyone put up their best fight, only one team could win; "where Emma Hoes at [name of one team member, red.]!

After the pubquiz, everyone was free to do as they liked, and the board initiated some more online games to continue the "gezelligheid". Looking back, it was a successful evening in which everyone could get together once again!

Secretly joining BMD student 20/21



Moscow
Mule
recipe



LUNCH LECTURE NEXPERIA

In the last week before the Christmas holidays, on Tuesday the 15th of December, Dispuut Taylor invited Nexperia to give the students of HTE an introduction to their company. Originally the lecture was planned over the whole length of the morning. However due to a tightening of corona measures the event was switched to online. Via Zoom, the three hosts introduced us to the company itself. Started as a subsidiary company of Eindhoven's Philips, the company grew to be an independent company dedicated to the production of essential semiconductors. Nexperia nowadays has its headquarters in Nijmegen, two wafer fabs in Hamburg and Manchester, and three assembly centres. The company has vendors in automotive, portable devices, computing, and telecommunication.

The second host expanded the lecture with an insight into one

of their machines, which places the microdevices on a wafer. The rotating mechanism picks up the small, printed tiles with air pressure and with high accuracy it places the devices in a designated area. The video of this machine in motion had to be made in slow-motion for the human eye to see what is happening.

Lastly, a case study was examined. Nexperia also had their employees work from home. However, the development of their products was not supposed to stand still. Holding a microdevice in place in a package was done by creating a vacuum. However, after a quick calculation, this way would be cheaper with a sort of glue. As glue can deteriorate with time and/or can be harmful to the device, another way was developed and tested at home. This way, using water adhesion, was tested digitally and physically and the host admitted that the outcome was rather dull for there were no real complications found.



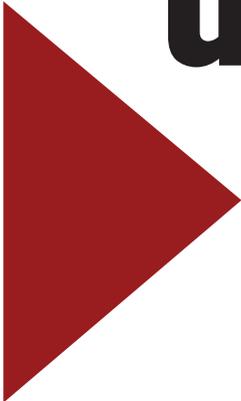
LUNCH LECTURE SIOUX

In the afternoon of the 6th of January Sioux treated us to a lunch lecture. The lecture was given by two enthusiastic employees, who did their very best to make it interactive despite the lecture being online. The main focus of their story was the development and testing of a machine built for ASML that could measure friction of the suction pad on the wafer. It was a very nice example, of how a relatively easy task, becomes very complex when performed in the high-tech domain. It needs to operate in extreme conditions, such as vacuum, while being sterile. We were told that assembly in a cleanroom intensifies

logistics as well as design choices. For example, one needs to wear two pairs of gloves making it hard to handle the smallest bolts.

A fun aspect of the lecture was that they made a quiz about the machine they were telling about, testing the attendees pre knowledge, intuition and alertness. To raise the stakes they awarded a variety of Sioux related prizes, a smart way to gain popularity amongst a well educated group of students focused on the right specialization.

Overall it was a fun and interesting lecture of a diverse company that could offer many of us the challenges and opportunities we will be looking for once we have graduated.



upcoming activities



February 10th

Lunch Lecture

Philips



February 16th

Drinks & Online activity

Taylor



March 4th

Lunch Lecture

PM



Just Herder together with the mother of compliant mechanisms

interview

with Just Herder by Jan van Rijn

Just Herder is a full professor of Interactive Mechanisms and Mechatronics, Chair of the Mechatronic System Design group and Head of Department of Precision and Microsystems Engineering at the TU Delft. In this interview we give you a small insight on Just his drive and motivation as professor at PME.

Suppose you would introduce yourself to me, what would you say?

In my work I like to innovate and experiment. And in my private life I also try to do that, for instance by continuously doing experiments with my children. Even if it's just cooking

something new. I think it's important for them to discover their own style and preferences. So they definitely don't need to study mechanical engineering. There you see some parallels with what I find important in university: put people in a good position for their future. Myself, I think I'm in the right place, where I can do my thing.

How did you end up at Mechanical Engineering and which Master track did you choose?

I was always busy tinkering and building stuff when I was young. During high school it was pretty



obvious and the choice for mechanical engineering was made intuitively quite early. So I started this bachelor, with the idea that I would be busy designing a lot. In that time it was a lot different than now. During the first two years it was mostly math and physics. So I got a little demotivated. One time we had to draw a coupling by hand (which was nice but it existed already 40 years though...) But again, it was not the designing that I came for. Up to the point that I followed a lecture about rehabilitation engineering. Then I thought: 'Ah look, this is where I came for!' So I did my master thesis at that department, human machine systems.

But that sounds more like Biomechanical Design and not High-Tech Engineering right?

That's right, I was active in the BMD department for a quite a long time.

What made you switch to PME then?

Well, I did mechanical design, I was the mechanism guy of the department. Most people were specialized in one type of instrument. I was specialized in the design of mechanisms, in general. It turned out to be very fun, since I came in contact with a lot of interesting projects because of that. So I developed chirurgical instruments and body support apparatus. And those chirurgical instruments became smaller and smaller. Eventually I ended up developing MEMS, which I found very interesting. And then there was a vacancy at the PME department, in the mechatronics group. The professor at that time, Rob Munnig Schmidt, invited me to get to know the department. I already knew the department a little bit, since I did a few projects there. For me it was very

interesting to broaden from solely mechanisms to mechatronics. So actually, that was a move of 10 meters, from my office at biomechanical to PME, but quite a different field and industrial environment!

How was your life as a student back then?

Well I never lived in Delft itself, but I did live in Pijnacker for one year. I already knew my current wife in high school, and she went studying Economics in Rotterdam, so after my stay in Pijnacker I moved with her to Rotterdam. In the north, in a nice neighborhood. I have also joined Sint-Jansbrug for one year. But I think that was too crowded for me. I had a group of friends from the bachelor, with whom we did a lot. Now and then a weekend to the Ardennen and those kind of things. I also did a lot of projects and studying with them, a group of 10 to 12 friends.

Why did you choose academia over industry?

What I find interesting is to work on the next generation of tech; where you have a lot of liberty for coming up with new concepts. Thinking about how you can do it right, and not doing 'the wrong thing better and better'. That danger lurks everywhere, especially in companies. They get good at something and want to become better and better at that. And they manage, but against increasing costs. And what gets less attention, is the ever becoming side effects. Increased energy consumption, material use etc. The performance improves, but the side effects grow faster. Up to the moment where you need to ask yourself if you must continue. And

"I was always busy tinkering and building stuff when I was young"

that's what I like about university, that you get the liberty and the moral justifications to think about just that. To lead the way in innovation, which is also sustainable. That's the main reason why I stuck to university, if you will.

“So it’s also really important to always outfit the people that are already here, such that they can move forward in their own direction.”

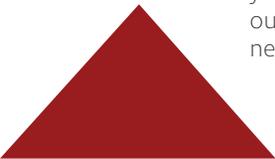
Actually, I think the most important aspect of university is the task to place people in the right place for the rest of their career. It not only goes for students, but also for PhD students, entrepreneurs and for employees. So it's also really important to always outfit the people that are already here, such that they can move forward in their own direction. If that's here at PME, that's fantastic. But if that's somewhere else, I think it's not a disaster. Because for those people it can be really useful to switch from position. I also noticed that from my 10 meter micro relocation, it can be really refreshing. You think by yourself: well okay, this is a whole different world actually. You learn a lot from that. And yes, it's a little drama if you lose someone for the department. But on the other hand, it will also expand the connections, which will give one the opportunity to attract someone else. For the dynamics of the university, a little mobility is actually really good. And for PhD students for example, it's mostly very useful to have an international component in their career. An experience abroad can bring about change, since you're apart from your environment. So that's the reason why I always try to build in a stay abroad for PhD students and even MSc students, so that they also get a broad backpack with experience when they are finished. This emanates from what I find important, which is that you always make sure people are outfitted as well as possible for their next step.

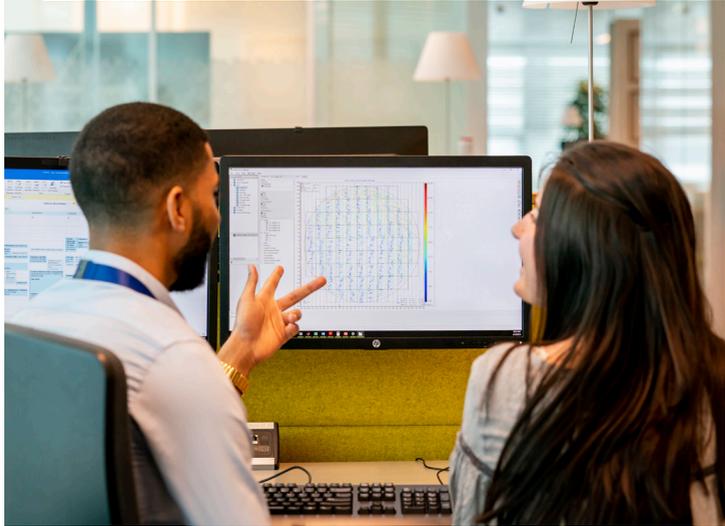
What would be an ultimate goal for research?

Well, there are many open ends that bother me! One of them: 99% of all flexure mechanisms consist of flexures that are initially straight. But now with shell mechanisms and 3D metal printing, we can make so many new mechanisms. We can be inspired by origami. And this is also very relevant, since flexure mechanisms tend to get very big. And if we're able to fold them, that would make the system more compact and potentially reduced internal modes. And if you're busy doing that, you can also make flexures that extend during deformation, for a nice linear guidance, without all those intermediate bodies. So a lot should be possible there. Those are examples of next generation technologies; also companies are interested in them. They want to support us, because they know they can't apply it right away but will need them tomorrow.

It's almost time. Would you like to add something else to this interview?

Well, maybe one addition as the head of department. I also try to manage changes there. The department grows tremendously. When I joined, 6/7 years ago, it was relatively small and now it is twice as big. And that has an impact on the organization of such a group. We attracted great people, from different cultures and backgrounds, so the department has become more diverse. It is a continuous process of change. And my ambition thereby is to create an atmosphere where everyone can do suggestions, express their opinion, and be taken seriously, so that we can shape the future of our department together.





ASML

'More than a tech job'

Meet Pieter Smorenberg, a 2017 Delft University of Technology graduate who recently found himself back at university, this time explaining to students how technologically fascinating his job is. Originally from Amsterdam, Pieter couldn't have guessed that he would find so many technical and social opportunities in Veldhoven at ASML, the fast-growing tech giant.

Pieter studied precision and microsystem engineering, and now works as an applications engineer in customer support at ASML. He also spends some of his time as one of over 400 'ASML Ambassadors', giving guest lectures at his alma mater university or promoting STEM among school-aged children in the region.

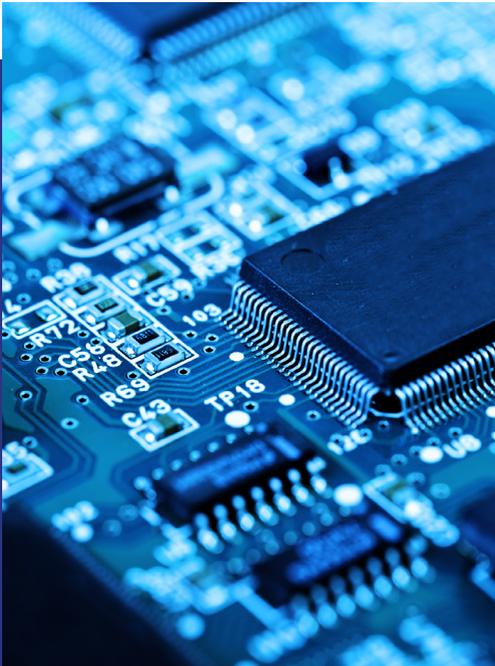
"The more I tell people about working here, the more things I realize I appreciate about the company," he says. "A lot of people don't realize just how big ASML is in the semiconductor industry. You realize it when you visit the campus in Veldhoven. You see the big tower, the cleanrooms, the huge gardens and parking lots; it's impressive. And then at the complete other end of the scale, almost all of the metrics we work with here are practically at an atom level – no other company is producing such advanced chip-making equipment." ASML is the world's leading provider of semiconductor lithography equipment, in an industry worth \$438 billion. All of the world's top chipmakers are our customers, including Samsung, Intel, and TSMC.

Pieter has certainly found more than he expected in Eindhoven. "Coming from Amsterdam and Delft, I was a bit uncomfortable about moving to Eindhoven, but there's a lot going on that you only discover after you get here. It's not a 'small city'. It's a melting pot – people come from all over the world to live here."

Pieter has also found more than a career at ASML. "There's so much going on in our company, technically as well as socially. We have annual technology conferences where you can learn about what's going on in your department, across the company – even across the world. This is really unique to ASML. You can develop your network and learn a lot about what other people are working on. It inspires, and you'll get ideas for yourself. I'm like a kid in a candy store at these conferences."

Celebrating our technology isn't the only way we have fun at ASML. "I sometimes go for drinks with the 'Young ASML' group for young ASML professionals," Pieter says. "You get to meet colleagues from all kinds of different departments. It's a really open-minded atmosphere, because everybody is there for the same reason: to share a good evening with each other." The ASML campuses are like small cities – more than 12,000 people work just at the Veldhoven campus alone. Young, old, male, female, LGBTI+, living abroad, you name it – it's easy to feel at home at ASML.

As a customer support engineer, Pieter also gets to travel a lot, listening to ASML's customers and helping them to achieve their technology roadmaps. During his travels he experiences other cultures first-hand. "You learn a lot – socially and culturally as well as technically. It's been an eye-opener for me. We're diverse, in terms of education, background, and nationality, but we're all working together as one team because we all have the same goal: make this incredibly complicated technology a reality."



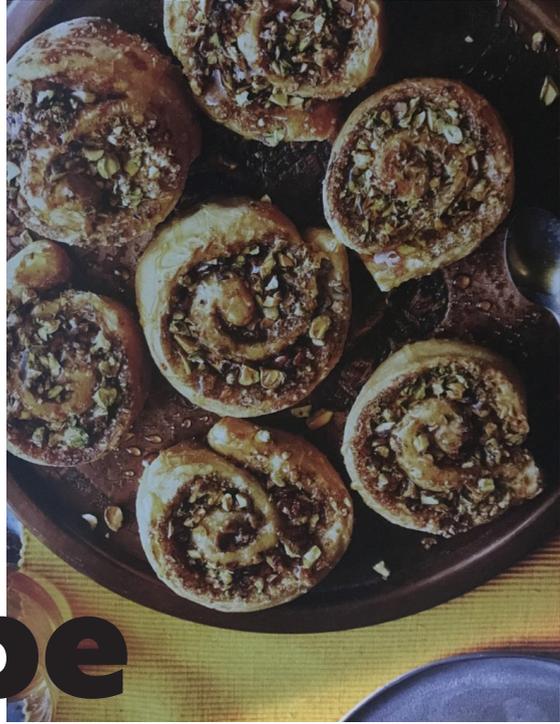
Are you interested to learn more about ASML? Visit www.asml.com/students for more information about our events, internships and scholarship program.

Or get in touch with your ASML Campus Promotor Tessa Talsma by e-mailing to tessa@workingatasml.com

for the buns:
350g white bread flour
1 bag of dried yeast (7g)
big snuf of sea salt
150g greek yogurt
125ml luke warm water
2-3 tablespoons olive oil

for the stuffing:
200g butter at room temperature
1 big teaspoon of cinnamon
125g (demarara) sugar
200g pistachio nuts

liquid honey (optional)



Myla's baklava bun

recipe

These jewels are a combination of cinnamonbuns and middle-east Baklava.

For the buns: Mix the bread flour with the yeast and the salt in a big bowl, add the yoghurt, the water and olive oil and mix it into a dough. It should feel soft en flexible. Form it into a ball, put it into a bowl and close it of with a clean cloth. Let it rise at a warm spot for about 1,5 hours.

Pre-heat the oven till 200 degrees Celcius and prepare two baking trays with baking paper.

For the stuffing: Mix the butter with the cinnamon and put it away.

Add some flour to a clean working area en roll out the dough until a rectangle of about 25 x 50 cm. Devide the butter mixture over the dough and leave about 2,5 cm at the edges. Sprinkle the (demerera)sugar

over the butter, followed by the pistachio nuts.

Roll up the dough from the closest longer side as tight as possible. Cut the roll into 12 evenly spaced rolls, the sides excluded (use the left ofer sides as small snack). Put the 12 rolls on the baking trays with enough space. Then bake them in the oven for about 18 minutes until they have a golden colour.

Sprinkle some extra honey on every bun according to your likings and serve warm.

Enjoy the buns!

Do you have a nice recipe you want to share with fellow HTE'ers? You can send it to intern-taylor@tudelft.nl, and maybe your recipe will shine in the next Vision!

Also this year there will be some challenging puzzles in the Vision for you. I will not start easy on you in this first edition. Let's see who can solve it. Below we have a 'Killer Sudoku'. The rules are simple:

Regular sudoku rules apply, so you have to fill in the numbers from 1 to 9 in every row, column and nonet. You can't have any duplicates in every row, column and nonet.

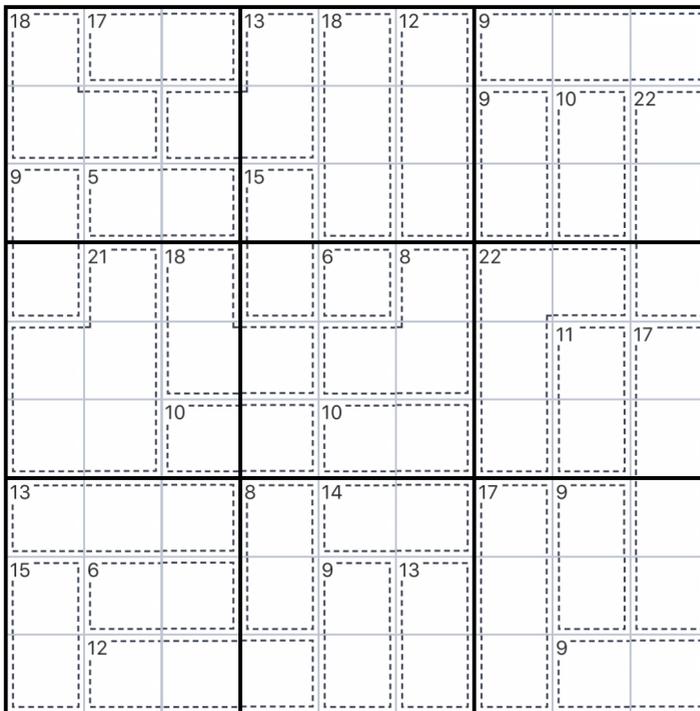
In this sudoku you see also some dotted lines. They are making the so called 'cages'. The rule is that you have to add up all the numbers inside a cage and this has to be equal to the number you see in the top left of the cage. These cages also may not contain any duplicates.

And that's it. So totally not difficult...

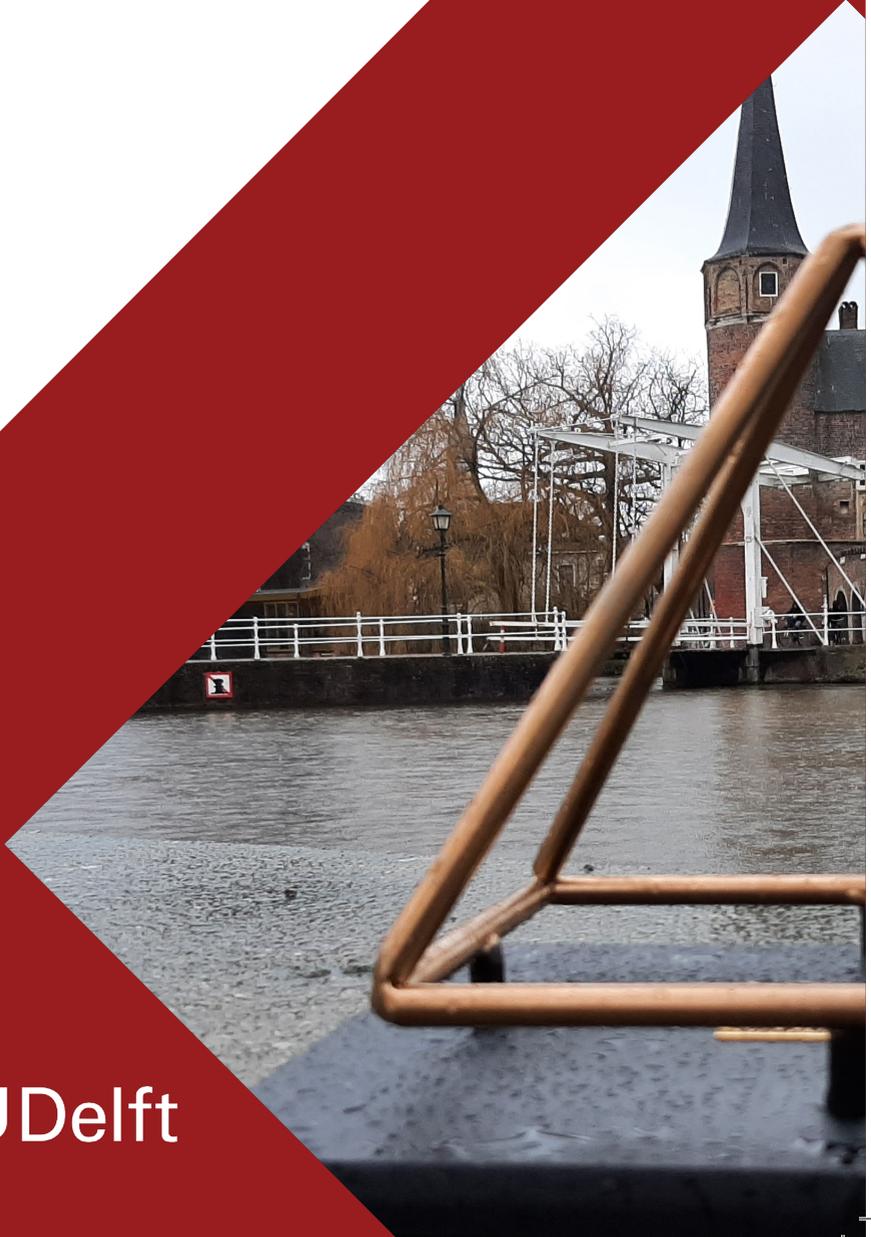
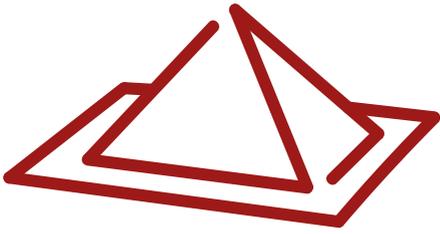
Good luck!

puzzle

by Matthijs



Send a mail to taylor-3me@tudelft.nl with your solution and win a prize!



 **TU Delft**