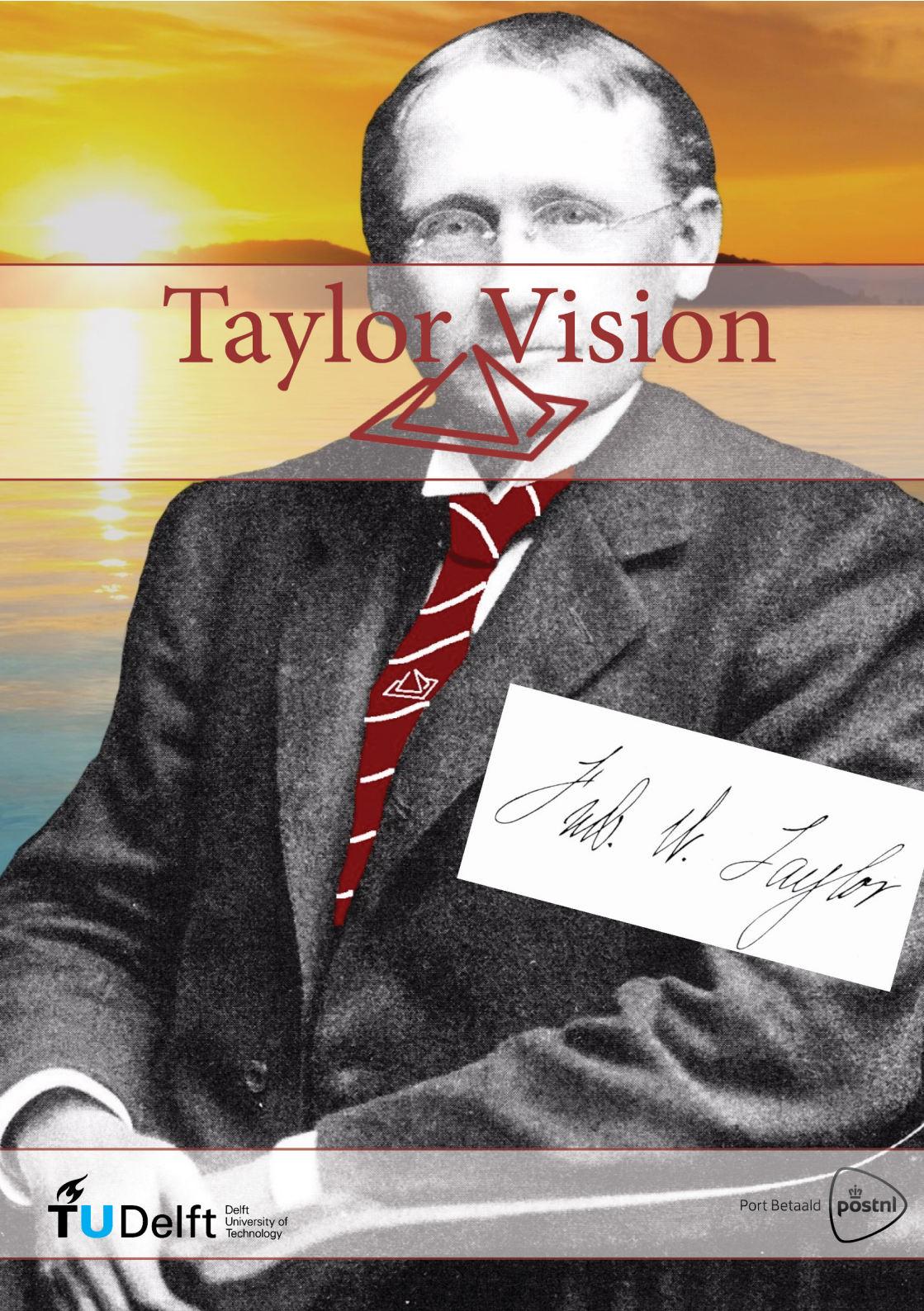
Taylor Vision



TU Delft Delft University of Technology

Port Betaald postnl

About us

Board

Gijs van der Velden- Chairman
Justin Smid - Secretary
Marc de Graaf - Treasurer
Ad Huisjes - Education
Richard Pleeging - External Affairs

Location

Dispuut Taylor
Department Precision and Microsystems Engineering
Mekelweg 2
2628 CD Delft

Contact

Tel: +31 (0) 15-2786850
Email: taylor-3me@tudelft.nl

Edition

Summer Edition

History

Taylor is the study association related to the department Precision and Microsystems Engineering of DelftUniversity 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 notnamedafterthefamousmathematicianknown 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 enhances 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.

Contents

From the board 4
Activities 2017-2018 5
Recent graduates 6
Activities
- Lunch lecture: ASML 7
- Lunch lecture: FESTO 9
- Excursion ASML 10-11

Study abroad: India 12-13
Are you soft enough for the job - by ASML 14-15
Activities
- Lunch lecture: Demcon 16
- Lunch lecture: Nexperia 17

The iDance Groove 18
The PME Football Match 19
Interview : Volkert, Art & technology 20-21
Games & Winner 22-23

From the board

Dear reader,

Dear reader,

It is my pleasure to present the third and final Taylor Vision of our year. I can hear you think: 'The final Vision already?!', and unfortunately I have to tell you that the year is almost coming to an end. Not only the academic year, but also our time as the Taylor Board will soon be over. On May 17 we had our final excursion and on the 5th of June we had our last lunch lecture. It was very nice to see that even at the end of the year many students joined our activities. I think we had a great group of students, that were dedicated and almost always present. Since High-Tech Engineering and Opto-Mechatronics are becoming more popular every year, I have no doubt that the attendance of students at activities will be even higher next year. It was also great to work together with the companies that helped us organizing the lunch lectures and the excursions. I would like to thank these companies and I hope to see them again next year.

Two more things are planned for the current board, one reception at June 18, and of course the organization of the trip to San Francisco. The preparations for the trip are going well and I think we could not wish for a better way to end our year. We have a group of 19 enthusiastic students, but also one PhD student and even a professor (Alejandro) are joining! It will become a nice trip with a combination of educational and cultural activities.

Of course where our year ends, a new year with a fresh board begins. We are happy with the applications we received and the new board will soon be chosen. I can assure you that we will guide the fresh board well and we will make sure that Taylor will continue the way we left it or even better! The first time that the new board will present themselves will be at the introduction week.

To conclude I would like to mention once more that I had a great time this year and I look forward to joining more Taylor and PME activities next year. Have fun reading our last Vision and I will see you around!

Yours sincerely,

Gijs van der Velden

Taylor Activities 2017-2018

Upcoming events

The end of the year is approaching, which also means that we are completely out of activities for you this year! But personally I think that we have provided you with enough in the past year to keep you satisfied during the summer break.

Here is a short summary of the year.
We started Q1 off with an application training by Brunel. We had lunch lectures by Demcon, Huisman and Aegir, a company visit to PM Bearings and of course our monthly receptions!

In Q2 we had lunch lectures by Denso, Prodrive, ACE and TMC, a company visit to Prodrive, our very first Network drinks with Denso (which went into the books as the Denso BitterBallenBorrel) and of course a COMSOL workshop.

Q3 we started off with a Python workshop by our own Alejandro and we went to Denso in Germany. We also had lunch lectures by CCM and ASML. We shall never forget the amazing Lustrum Celebrations we had, and thanks again to everyone that attended this amazing evening full of festivities and dancing!

Our last Q4 we did not sit idly and organized a company visit to ASML. We also had our second lunch lecture by Demcon, and two new sponsorship deals were signed providing us with two brand new lunch lectures by Festo and Nexperia!

The only event on our list is of course the fantastic Taylor Trip, but you will hear more about this in our next Taylor Vision which will be a Taylor Trip Special!

I want to thank everyone for their attendance and enthusiasm which really made our activities worth organizing!

Richard Pleeging – External Affairs

Recent graduates

The following students have recently graduated from PME, congratulations to all!

Floris van Elteren, specialisation: MSD
Actuation of an origami inspired curved-crease gripper with a planar bending actuator

Alejandro Rozene Vallespin, specialisation: MSD
Optimization techniques for electromagnetic deformable mirrors

Martijn de Jong, specialisation: MSD
Synthesis of a Force Generator using Two-Fold Tape Loops

Joost Leemans, specialisation: MSD
Characterization of non-linear compliant shell mechanisms

Henri van der Deijl, specialisation: MSD
The Dynamics of Compliant Rotational Power Transmissions

Activities

Lunch lecture: ASML

On Wednesday the 21st of March the Taylor Board cheered up our day to provide us with yet another interesting lunch lecture. Although the prospect of a nice 'broodje Leo' was very enticing, the fact that they had invited a speaker from a very famous company among PME students made the decision to attend this lecture as easy as pie. The company I am talking about is of course ASML and it was nice to see that the speaker was in fact an old PME student himself, Alexander Steenhoek. It's quite a coincidence that most of the speakers of lunch lectures turn out to be affiliated with Taylor or the department in some way or another. Or is it?
Alexander began his presentation by telling about a project he had been working on at ASML and it was nice to hear first-hand about an example of the many projects that the company has been working on. After his project he showed us more about all the ingenuity and different engineering skills that are needed to build and operate their famous wafer stepper. The shear amount of components and technologies that are combined into one functioning machine was mind-boggling and made my engineering heart beat a little faster.
Thank you ASML and especially Alexander for this interesting lunch lecture!

Richard Pleeging

Activities

Lunch lecture: Festo

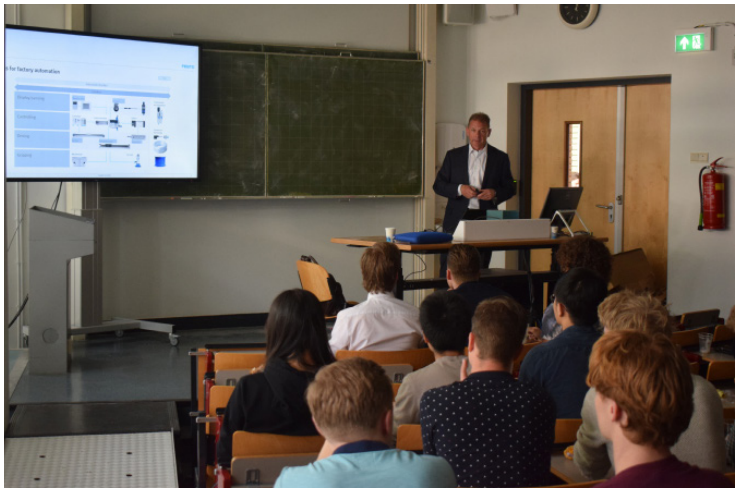
Festo lunch lecture

After a long weekend, due to the Pentecost, it was finally time for another lunch lecture. This time the lunch lecture was given by Festo on the 22th of May. When everyone got their lunch, it was time to know more about Festo.

Festo is leading world-wide supplier of automation technology and the performance leader in industrial training and education programs. Most students already knew Festo from their pneumatic and electrical drives. But I think some also from their bionics, as they have developed some impressive biologically inspired robots during the last few years. During this lunch lecture we got to learn and see more of their bionics. For example a gripper inspired by the tentacles of an octopus, this gripper can pick up and hold a variety of different shapes. Or the BionicMotionRobot, its movements are inspired by an elephant's trunk and octopus's tentacles. Creating a pneumatic lightweight robot, which features 12 degrees of freedom and with a payload of 3 kilograms, it can approximately carry its own weight. Another gripper, the FlexShapeGripper, is inspired by the chameleon's tongue. As the chameleon uses its tongue to catch inspects by putting its tongue over the insect and securely enclose it. The FlexShapeGripper uses this principle to grip the widest range of objects in a form-fitting manner. This gripper uses an elastic silicone cap, to pick up just anything (spheres, coffee mugs, spoons, glasses, keys, etc.) and is able to do various tasks.

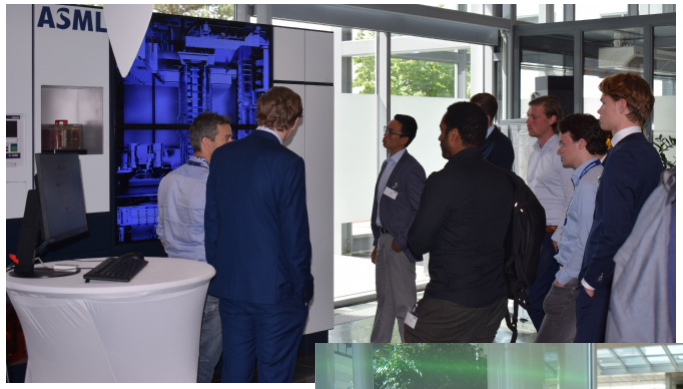
Although these examples are not being used by the industry (mostly due to the durability of the materials), these projects shows how Festo acquires new findings from nature for its core business of automation. All in all it was a very inspiring and interesting lunch lecture.

Chi Wai



ASML Excursion

ASML excursion
On the 17th of May, a group of PME students visited ASML. The day started at 7:30 in the morning at the TU Delft aula, where we met and all boarded a bus which then left for Veldhoven. Due to the large amount of traffic we arrived just on time for the coffee and tea. Several other universities were also present at ASML as well as a small group from Leeghwater. There was a small introduction about what we were going to be doing and seeing during the day, after that there was a small game in which we were introduced to some of the crazy numbers with ASML, like the small amount of customers, the large amount of money involved and many different nationalities at ASML. After the game and some more coffee, there was a presentation which was about the same as the lunch lecture from a while ago so most of us were already familiar with what ASML does and how the machines work. Groups were made and we all got an employee assigned to us who showed us around the buildings and told about his/her experiences while working for ASML. The tour was interrupted by a lunch which was provided to us and we could enjoy while sitting outside in the sun.



Activities

ASML Excursion

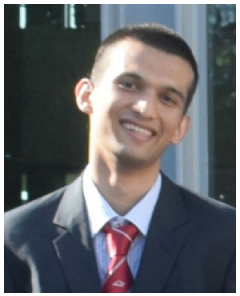
After the tour there was a case prepared for us to get a feeling of what they are doing in Veldhoven. The groups were randomized and everybody was sitting with primarily people from other universities which was quite interesting because we were able to have a chat about how they felt about ASML. The case was divided into two parts, part one was a series of calculations concerning an old part of the machines, the second part was a creative assignment. Our job was to create a new system which could work in vacuum and present the new system to the other groups. In the end the employees showed what the real system looked like and it consisted of leaf springs as was expected by our group. There were drinks and multiple recruiters after the case to end the day off with a chance to have an informal talk about internships and job opportunities at ASML. The day went by really quickly because of how interesting everything was. All the employees were really enthusiastic and open about the working environment which was surprising to me for such a big company. We took the bus back to Delft and were back at the aula around 19:30.

Jeroen Huisman

Study abroad

The quest for exploring a completely different country and being part of a new culture landed me the opportunity to study at TU Delft, a university renowned world over, and with it came the baggage to interact with new people, both Dutch and international alike. I am a mechanical engineer from India, a land of a billion people with varying demographics, climate, culture people and the Taj Mahal. People love their cows, but not everyone talks like Apu from the Simpsons and loves their curry. Upon arriving at the Netherlands, the scenic beauty was complemented with the wonderful weather and the sophisticated architecture. It was the time of Autumn and after a year of being here, I have come to understand that seasons need not necessarily represent what they truly stand for. I have a good laugh explaining this to my friends and family back home when they are curious about the weather at delft. Being born in a tropical country which can have extreme temperature variations across seasons, I was taken aback by the concept of climate fluctuation within seasons and during the duration of the day.

The fascination for biking fits in perfectly with the flat terrain and have noticed that the bikes far outnumber the number of vehicles on the road. They say that you have a higher probability of getting knocked down by a bike than anything else. This was far from the chaos I am used to with highly congested roads and crowded public transport. In India, usually bikes are almost never seen on roads and solely restricted to mountain biking. This solution could work in a country like this and a news article on the emerging biking culture surfaced after a Dutch expat decided to popularise it after experiencing the culture first hand. I used to live close to Rotterdam and decided to experiment with biking all the way to Delft. I can't recollect the number of times I was overtaken, and it was an embarrassment if old people were involved. I was never into arts and architecture but somehow, I had an instant connection to the art here. Reminds me of 18th century Europe I have read about and the cultural heritage can still be seen in the government buildings and the churches. The perfect night would be one eating stroopwafels and taking a stroll through one of the alleyways with the sounds of church bells and a musical symphony providing the perfect backdrop.
much. One person pays for the entire group and they take turns paying each time.



India vs Netherlands.

The next significant difference were the varieties and the price of Alcohol. The price of beer is less than that of packaged drinking water and people are spoilt for choices seeing a pub at almost every corner of every major province. Also, I was surprised to find clubs that have accommodation and food being served to partygoers who can continue their streak after having a quick rest. Quite efficient, eh? In contrast, a majority of people prefer spirits in India. There are quite a few alcohol hotspots within cities and in the country. Might be a good idea to research on these if you plan to visit. In some cities, the pubs close by 11 pm and the clubs by 1am. Thus, people plan well in advance if they need to party in places where these restrictions don't hold. Also, people find it annoying to keep track on who owes who how much. One person pays for the entire group and they take turns paying each time.

Through my interaction with Dutch people, I have come to understand that Dutch come straight to the point when having a discussion. There is no scope for 'maybe' in the decision-making process. I have been brought up considering it rude to tell someone no straight to the face. That is where the head bobble which everyone has heard about comes into play. If you are not sure, why not confuse the other? Well, the differences are what make us appreciate humanity even more. If you are looking for an exotic experience in a similar way, try visiting India. Each of the states in the country have something unique to offer. For me personally, towards the south, taking a boat trip along the backwaters of Kerala was perfect in getting away from the hustle and bustle of city life. You could also make a quick stop over at the Andaman Islands if you are planning a trip to southeast Asia.

Though these were some of the differences that I came across, there are some things I could really relate to. The family culture can be clearly seen when students visit their families during the weekends. In my university hostel, students miss their homecooked food and long to visit their families during the breaks. Also, the smooth student teacher relationship and the Taylor reception sessions in breaking the ice further. I hope that I have highlighted some of the major differences I noticed but the list surely goes on.

Vishaal Venkatakrishnan

ASML

Be part of progress

Are you soft enough for the job? The future of soft skills in technology.

Think you can get away with merely having great 'hard' skills in a technical job? Think again. Soft skills are becoming increasingly important in the workplace, and especially crucial in customer service departments, which companies are beginning to focus on more as customers become increasingly demanding.

Service vs. support

'Customer service' at ASML is not what the term typically brings to mind: call centers, item return forms, and drop-down menus with frequently asked questions. Ever since ASML produced and sold its first computer chip-making machine in 1984, the customer support department has been proactive in resolving issues at the customer's site.

James Cowden, senior recruiter for Customer Support, explains why this department is so important at ASML. "If one of our machines stops working for a single minute, it costs our customers (like Samsung, TSMC, and Intel) thousands of euros per hour. You can see why they get upset when a machine's not working."

ASML

Be part of progress

Hard meets soft

"To deal with this kind of pressure, we need people with soft skills who are good at managing conflict and de-escalating the situation," says James, "But they also need to be strong technically."

The goal is to work not just for but also with the customer, coaching them on how to use the machines and making them a partner in the machine's success.

How ASML customer support works

The ASML customer support department is organized into three main segments: Field Factory, High Volume Manufacturing, and New Product Introduction & Node Transition. Each segment corresponds to a stage in the process of introducing a new machine at a customer site, and the segments all work together in a kind of relay race.
A fourth customer support segment called CS Applications gathers information from the customer and uses it to optimize the products according to the customer's needs and wishes.
The department is also organized into four separate 'lines of escalation', in order to solve the customer's problems as quickly and efficiently as possible. Patrick van de Vijver, Customer Support Manager for ASML's global support center describes this process: "Working in Customer Support is challenging due to the changing dynamics and pressure to repair machines as quickly as possible. But the work is also very rewarding since you work directly with the customer and the impact of your solutions delivered is directly visible and the end result is always a happy customer."

An explorer's dream job

In CS, you essentially get paid to travel the world. But the opportunity to travel isn't the only benefit of working at ASML. The company is expanding rapidly – sales for 2017 closed in at over €9 billion, our profit margin is high, and we make sure that all our employees reap the benefits. In the Netherlands, this includes perks such as 40 days paid vacation, a 13th month (end-of-year bonus), 8% holiday allowance, profit sharing, and an attractive pension scheme.

By Kate Brunton - senior communications specialist at ASML

Lunch lecture: Demcon

They were here in September to give this years very first lunch lecture and on the 30th of May they were back! I am, of course, talking about Demcon, a high-end company that specializes in both High Tech Engineering and Opto-Mechatronics, which is quite a nice fit with our department and our Master tracks. In September the lecture was more HTE oriented, but in Demcons second presentation of the year, Léon Woldering and Ruben Biesheuvel focused more on the OM side of the company.
The presentation started with a short introduction to refresh our memories, but when we all remembered the facts that we learned in September, it was time to see some examples of optical systems. We saw that this part of Demcon is growing rapidly and they are producing really cutting edge systems. It was a very interesting presentation and a positive thing about the opto-mechatronic part of Demcon is that they work in Delft, so students that are interested don't have to travel all the way to the other side of the country!

A very dedicated PME student

Lunch lecture: Nexperia

Tuesday June 5th a new company presented itself to the students of PME, this day was the day of the lunch lecture given by Nexperia. Nexperia is a Dutch global semiconductor manufacturer headquartered in Nijmegen. They are the former Standard Products business unit of NXP Semiconductors (formerly Philips Semiconductors).

Joep Stokkermans started with an introduction and told us that Nexperia is a company with a long history, broad experience and a global customer base. For example in 2016 they had 1.1 billion US$ reveneus and their volume production is 85 billion units annually. After this Hans Kuipers showed us some high-end mechatronic equipment design, the high-speed, fine pitch IC bonding machine and furthermore showed us the importance of virtual prototyping. At last Gijs Bruining, a fresh employee of Nexperia and former PME'er, talked about his experience and projects he works on within Nexperia. He showed us that there are great opportunities and possibilities within Nexperia for a PME'er who is on a quest for a challenging job.
All in all, Nexperia offers many great opportunities for now and in the future and just like Joep Stokkermans said: "People work here because our plans come to life. We have some ideas that are just too beautiful not to make real."

Marc de Graaf

The iDance Groove transportable Bluetooth speaker!

As you may remember, we had a lot of great receptions over the years, with nice snacks and drinks and some music in the background. At one point we noticed that the sound of our carefully chosen playlists was not really audible everywhere at the PME square during the receptions. That is when we asked ASML to help us out, and they sponsored us with a brand new speaker!

Now, what is so great about our new iDance Groover?

- Great, tuneable sound
- Adjustable 'heavy bass'
- Wireless microphones for speeches and karaoke
- 400 W power
- LED disco show
- Minimum of 4 hours battery
- Bluetooth connection

If you don't believe that this new speaker is amazing, then we would like to invite you to our next reception to find out!

The PME Football Match

Before everyone is off to their holiday destination, we would like to organise one more event. One that has never happened in the history of Taylor before: a PME Football Match! It will be a "friendly" match between staff members and students of PME. We want to see if there are enough people interested to make this happen. If you are interested, please send an e-mail to secretaris-taylor@tudelft.nl.

If we can get enough people, we will reserve a field at Sports & Culture (probably in the evening around 18:00).

Don't worry if you think you're not good enough, it will be a friendly, relaxed match with nothing at stake. Except for this:

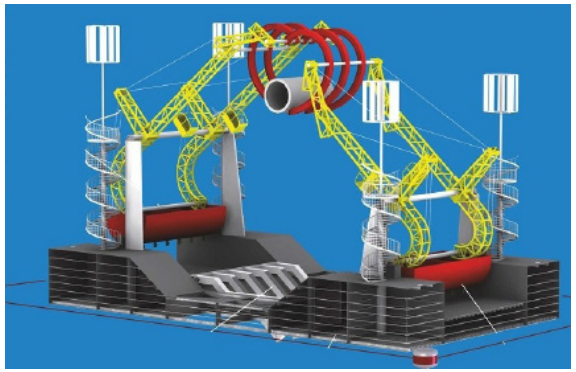
The Taaie Tiller: never give up hope

For this episode we have an exclusive interview with one of the PME Assistant Profs. Volkert van der Wijk. Besides his work as a researcher he made a lot of artworks, starting in 2000 as a first year student. In this article he gives us insight in his last and biggest project 'the Taaie Tiller'. In this project he combined his research about dynamically balanced systems with his passion of art.

The Taaie Tiller is a machine which lifts a heavy load. The idea came in 2002 and is based on the Greek myth of Sisyphus which is about the everlasting punishment of a man who has to lift a load endlessly. On the contrary, the aim of this machine is to encourage the spectator to never give up hope. This functionality is very interesting to show, because it is a completely different design specification, instead of the common industrial requirements for a machine (e.g. 120 picks and placements/min) we are all familiar with. Its functional requirements are not based on industrial specs which must be met, but by less quantitative measures of the artist (Volkert). The velocity of the Taaie Tiller during its cycle time of 70 min is designed to trigger human emotion, making the audience curious of what will be next, and in the end to enjoy them. It shows a game of tension building up during the lifting process and a big energy release, the splash of the heavy weight in the water. The dimensions of the mechanism, the placement of the tanks and shape of the bars are driven by the fact that it has to look nice and by the message the artist wants to bring to the audience.

Volkert has designed a lot of different concepts for this functionality which can be seen on his website. Most of them work well on small scale, but were not scalable to a couple of meters. During Volkert's studies he gained a lot of engineering knowledge by which he could develop his concepts further and further. This led in the end to the Taaie Tiller. The first real scale model was placed and opened in 2017 at the campus of the University of Twente in Enschede. This version was built out of 4.5 tons of steel, manufactured by himself with the help of students and was painted externally. In the future a much larger version is planned to be realised in the Maas river in the centre of Rotterdam.

The Taaie Tiller is in essence a four bar mechanism which lifts a heavy tube out of the water. The tube is 1 meter long has a steel wall thickness of 16mm which is encircled with a 7cm thick rubber layer. To maximize the impression of the heavy job upon the audience, it was necessary to minimize the size of the machine in comparison with the load. Therefore a special four bar mechanism was selected, the Watt straight-line mechanism. The midpoint of the floating bar of a Watt mechanism moves along an approximate straight line, which makes the Watt mechanism suited for straight guidance. The Taaie Tiller has been dimensioned in such a way that the heavy tube (for Rotterdam it will be 32 tons!) travels along a vertical path in the centre with a relatively small machine surrounding it. This makes the Watt mechanism in combination with dynamic balancing appropriate for the job.



The floating bar of the Taaie Tiller has a curved shape with which it is one part of a gripper. While the 300kg tube is lying under water this bar encircles the tube to lift it. On the outer sides of the driven yellow bars ther aretwo big red 1350 liter watertanks , which are filled with computer controlled waterpumps. The energy for the pumps is in Enschede generated with solar panels but these will be replaced with windmills for Rotterdam. First the tanks are fully emptied by which the grasper lowers and grasps the tube. Filling the tanks increases the moment on the yellow bars making the Taaie Tiller move upwards. Further filling of the tanks rises the tube out of the water. A couple of meters above the water the four bar mechanism comes in a singular state. This means that the floating bar is positioned in the extension of one of the two yellow bars. Singular positions could be difficult to overcome when driven by a motor with an angular rotation, but are easy to overcome with this force driven dynamically balanced system. At a singular position the system gets 2 degrees of freedom and a mode change occurs. This is used to flip to floating bar over by which the gripper opens. This is controlled by a process were one tank is emptied first while the other tank remains full. The tube then is released and splashes into the water. Then the tanks are emptied together, and the mechanisms moves down again with open grasper. When the floating bar reaches the water another singular position occurs which is used to close the grasper to grasp the tube again. A technical challenge was to shape the gripper in a way that the forces acting on the tube are always upwards, preventing friction and blocking. Another challenge was to catch the tube is such a way that a perfect vertical drop is ensured and that the tube is positioned well for the next cycle to grip it again.

The solar panels generate far enough energy for 2 cycles a day during the summer, while in the winter it is just sufficient. The amount of cycles have been limited to keep the performance special and to restrict wear. This proof of concept was also intended to convince the city of Rotterdam together with the industry to develop the large Taaie Tiller there.
Volkert van der Wijk is planning to develop the large version of the Taaie Tiller – about 40 meters long and 22 meters wide - in the Maas river in the centre of Rotterdam within the next years, to demonstrate the audience a combination of technology, art and Greek myth all together in the Taaie Tiller.

Ad Huisjes.

interview with,
Volkert van der Wijk.

More info:
http://www.taaietiller.com/

The QUIZ

A day In the MNE lab:

You were printing nanopillars on top of glass slides. You had a productive day and you were able to produce 80 slides with nanopillars. Then your mate comes by and decides to have a little fun. He flips 10 glass slides upside down and he puts all the slides in a big pile. He says that he will only tell you which slides are upside down if you manage to solve the riddle: 'Make two piles with the same amount of slides that are upside down.'

The facts of the riddle:

- You have one pile of 80 glass slides: 70 have nanopillars on top of the slide, 10 slides have the pillars on the bottom of the slide.
- You don't know which slides are upside down, you cannot see this, because they are nanopillars.
- You have to make two piles of slides with an equal amount of slides that are upside down, this does not have to be 5, but can also be for example 7 slides upside down in each pile.
- The two piles do not have to be the same amount of slides.
- You are allowed to flip the slides.

Let us know how you would solve this and win an amazing price!

Send your answers to Gijs van der Velden, your highness raffles a great prize!! ;)
See next page for the winners of the previous Puzzle!

The Great Gijs Game TV2

WINNER

RObbert-Jan, come pick up your amazing price at the Taylor office!