

Taylor Vision

Port Betaald



Contents

1.	From the board	4
2.	Meet the new board	7
3.	PME news	8
4.	Photo pages	
	11	
5.	Trip stories	22
6.	Studying abroad	36
7.	Pjotr's Predicament	41
8.	Get involved	43

From the board

Dear reader,

A lot has happened since the last time you received this magazine. We as board have passed the half-way mark, and we have had 6 great months. During this time we organized 4 receptions, 1 apparatus drink, 4 lunch lectures, 3 excursions, 2 education evaluations and 2 social activities, which is another way of saying it was busy but rewarding.

In this edition of the Taylor Vision, you can read about many of these activities, as well as a story about studying in Sweden. Taylor Board member Rolf has been thinking long and hard about an interesting problem, resulting in Rolf's Riddle.

What can you expect in the coming months? Of course more Taylor activities, culminating in the Taylor Trip to Japan this summer. More information on this 10-day business trip can be found on page

A big thanks to everyone who wrote material for this edition, and to Daan Roethof, who did a lot of work on the layout. We hope you enjoy reading this Vision!

The Taylor Board 2014-2015

Thomas, Sarah, Anton, Stefan & Rolf



Jimmy van Schoubroeck is a winner!

In the last edition of the Vision, we asked you a difficult question about saving a princess from her castle. Jimmy was the first person to hand in the correct solution. Using 6 m² of whiteboard, some knowledge of Python, and a lot of computing power, he proved that the prince will indeed open the right door.

Not only has he won movie tickets, but he also gets to live happily ever after with the princess!

Changes in staff

Many of the existing vacancies in our department have been filled, including that of the new dynamics chair. On behalf of Taylor, we would like to welcome all the new staff members!

Also, in December Paulo Tiso has left our department. He has since moved to Zurich, where he has found a job at the ETH. Paulo, we wish you all the best in Switzerland!

Taylor office

Since a few months, we have been granted the use of a second office, right next to the Taylor office. This is very convenient, because we now have enough room to study at the office as well, which means that the office is nearly always staffed during office hours. If you want to contact us, feel free to drop by in room G-1-375 or G-1-385.

More than your canti-liver can handle

Board

Chairman

Thomas van der Linde

Secretary

Sarah Aalbers

Treasurer

Anton Driesen

Internal Relations

Stefan Lampeart

External Relations

Rolf Swuste

Location

TU Delft

Faculty of Mechanical,
Maritime and Materials
Engineering (3ME)

Section Precision and
Microsystems Engineering

Mekelweg 2
2628CD Delft
34 G - 1 - 375

Contact

015-2781318
taylor-3me@tudelft.nl

Website

www.dispuuttaylor.nl

Edition

April 2015

Print Volume

280 pieces



Keeping you
Precisely informed

Recent Graduates

Congratulations!

Since the last edition of the Taylor Vision, 17 students have graduated. Congratulations to you all!

Automotive

S. Jain

Estimation of Vehicle Handling States

Engineering Mechanics:

T.T. Yap

A New Strategy for Combined Topology and Fiber Angle Optimization

D.C. Noorman

Cohesive Zone Modelling in Adhesively Bonded Joints: Analysis on Crack Propagation in Adhesives and Adherends

S.N. Kadam

Failure Criteria for Evaluating Strength of Adhesive Joints

E.A. Pasma

Fowards a Robust Component Transfer Path Analysis Method – Application and Validation in Automotive Research

E.A. van de Ven

Topology Optimization For Transient-Thermal-Mechanical Systems

S.J. van den Boom

Topology Optimisation Including Buckling Analysis

Mechatronic System Design

M. Ochoa Navarrete

Zero-settling Errors by exploiting Common Zeros in the Wafer Stage/Reticle Stage Feedforward Design

A.G Verweij

Markerless Position Measurement for Ship to Ship Transfer Operations

C. van der Schoor

Design and Control of a Low Power Bi-directional Hybrid Reluctance Actuator, and its Implementation in a Linear Coarse-fine Stage

S.H.J. van der Kleij

Shape Estimation of a Compliant Wafer Chuck in Lithography Systems

J.J.M. Karregat

Design of an Air Actuator with Deformable Geometry for Planar Actuation of Large Substrates

M.W. Koornneef

Energy Based Error Formulation for Optimizing Compliant Joint Parallel Manipulators

G. Mok

The Design of a Cost Effective Planar Precision Stage using Optical Mouse Sensors

H.N. van den Heuvel

Conceptual Development of a Catalytic Expansion Actuator for a Resonating-body Flapping-wing Micro Air Vehicle

A.T. Steinorsson

Design of Compliant Static Balancers with Stiffness Tuning for Application in a Laparoscopic Grasper

J. Rommers

Modeling and Design of Origami Mechanisms with Compliant Facets



HEIDENHAIN



How do you identify the right measuring technology?

To identify the right person in a group of thousands, you only need to look at his fingers. But where do you look when you want to find the best measuring and control technology? You can recognize HEIDENHAIN by many characteristics, but especially by our passion for precision. From the everyday encoder in the machine tool to the nanometer-precise length comparator... for more than 120 years, HEIDENHAIN has been the measure for accuracy. We invest continuously in this technical difference. And you profit from products that are not only innovative, economical and reliable, but also characterized down to their smallest details by unmistakable precision.

HEIDENHAIN NEDERLAND B.V. 6710 BB Ede, Nederland Telefoon: 0318-581800 www.heidenhain.nl

Angle Encoders + Linear Encoders + Contouring Controls + Position Displays + Rotary Encoders

Activities

ASML - Stefan Lampeart

November 10th, 6:30 pm, a group of about 25 PME students is waiting in Delft together with Gezelschap Leeghwater for the bus which would bring them to ASML in Veldhoven. Just like during our last trip to the south of the Netherlands, we got stuck in a traffic jam. Fortunately we still arrived just in time for a cup of coffee together with students from Eindhoven and Twente before the first presentation. After a general presentation about ASML and its photolithography systems a number of engineers and an intern from TU Eindhoven got the chance to explain us their job in exactly seven minutes. These presentations gave a nice impression of the different job opportunities at ASML.

Next we got a campus tour which brought us to different marble covered buildings. The tour started at a stand which explained the working principle of the photolithography systems. After that we went to the cleanrooms, which unfortunately stay closed for visitors. Finally the workplaces of the engineers were visited, to experience the working environment. After the lunch break it was time to show our own creative skills in a case study. The task was to think of a better alternative for the masks which are used in the current photolithography systems in small groups. Apparently part of the challenge was to get to understand where, how and why the masks were applied, since not all groups seemed to have figured that out precisely when it was time to present a new solution. It was interesting to see that the 15 groups came to only 4 different principles.

Finally an engineer of ASML showed us what his agenda would look like in an average week. After that, the day was concluded with some drinks and snacks.

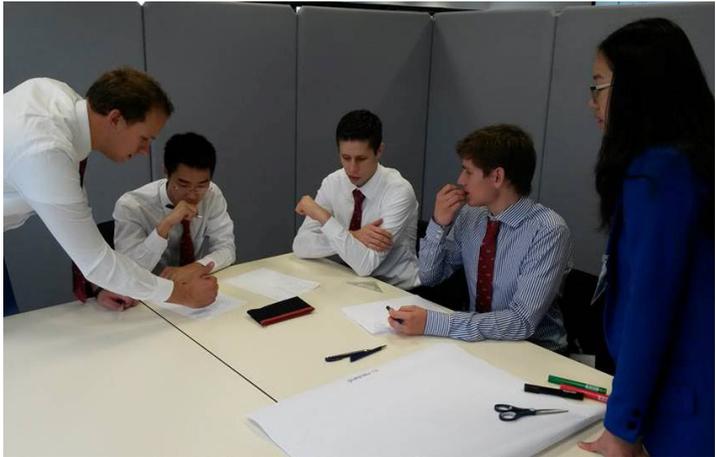


Bosch - Daan Roethof

Activities

Thursday the 16th of October, a delegation of 16 PME students traveled to Tilburg to battle in the Bosch Challenge. A short report by Daan Roethof, one of the participants:

After an early morning traffic jam drive to Tilburg, we arrived at Bosch transmissions. We started with a presentation about what Bosch is up to and of course what our career opportunities within Bosch could be. Interesting is in what kind of extent this complex builds the push belt, including everything from research facilities till manufacturing. One of the research engineers gave a presentation about working at Bosch through the eyes of an engineer, which gave a nice impression of what kind of subjects they are working on. During the factory tour we walked through the complete manufacturing cycle, it surprised us how many steps are needed with the amount of equipment for producing the push belt.



And then the time was for us to design, produce, present and test our own push belt. The easy and safe way is to use the Bosch example, which was proven concept. But if you want to be different you have to think out of the box. Most groups came with minor changes on the Bosch example and one group came with an astonishing round concept, which received the most likes during the voting session for being the most promising concept. During testing, all push belts were performing better than expected. Unfortunately the Eindhoven teams were slightly better. So next year teams have the opportunity to recover the honour of Delft.

Phyton - iemand

In January we introduced a Python Course which was very well received by the participants. After a good New York Pizza, the interesting lecture, given by Professor Hoekstra from the faculty Aerospace Engineering was a pleasure to attend. We, MatLab-minded students, learned exactly what we needed to get started with Python. Due to the success of this try-out, the Taylor Python Course might get a follow-up next year.

If you missed this event, but still want to know the basics of Python, please contact us. We can send you the material used during this evening.

Activities VDL - iemand

The first lunch lecture of this year was given by VDL ETG. The lecture was about “3D printing in the High-Tech sector”, and also included a lot of information on thermal control, applied to wafers. This topic was apparently quite interesting for our students, so nearly 70 people attended the lecture.

The 3D printing process has gained a lot of publicity lately because it is now becoming to get competitive with conventional production method. The presentation defended that the 3D printing process will probably not become cheaper than conventional methods in the near future. However, the technology does allow you to create features that were traditionally impossible, such as internal cooling channels. As an example, VDL showed a table used for temperature control of wafers. The use of internal cooling channels caused a much lower thermal resistance, and thus better performance.

VDL Enabling Technologies Group is a contact manufacturing partner operating worldwide. The costumers are leading high-tech companies and users of advanced production lines. The company has sites in Eindhoven, Almelo, Singapore, Suzhou and the USA.

Philips - Frank Pasteuning

The 27th of November, Frank Pasteuning, technologist at Philips Innovation Services, came to our faculty to give the second lunch lecture of this study year. More than 50 students attended his lecture about creating damping by using visco-elastic materials.

In between the projects for customers of Philips, Pasteuning conducted a project researching damping with visco-elastic materials together with a graduate student from Eindhoven. Hereto they tested the behavior of various materials. With the results material models where made. The models could be used to simulate the dynamic behavior of metal structures with visco-elastic material applied in different ways. The structures were also built and tested. Building the structures with very thin visco-elastic films was apparently quite tricky. Nevertheless, the dynamic behavior of the computer model and the experimental set up agreed very accurately. The knowledge obtained will be used in future projects for customers.

Philips Innovation Services offers access to a range of advanced innovation services, expertise and high-tech facilities across the whole innovation process. Their main services extend from concept creation support, product and process development, prototyping and small series production, equipment development, quality and reliability, industrialization, right through to sustainability and industrial consulting. 950 technical experts work at Philips Innovation Services, among which 450 mechatronic engineers.

Activities

Brief insight on the job of former Taylor-chairman Wijnand Harmsen

‘ASML is a high-tech company with a pragmatic approach’

Combining high speed and picometre precision is the challenge of Wijnand Harmsen. After graduating in Precision and Microsystems Engineering at TU Delft, Wijnand started working at TNO. Through several projects, he got in touch with ASML. The technical challenges at this company drew his attention and made him move to the company in Veldhoven.

For those not familiar with ASML, this is a manufacturer of lithography machines dedicated to the production of integrated circuits. ASML serves all major chip producers - such as Intel, Samsung and tsmc - with products that defy the limits of what is scientifically possible. With the latest generation of machines, ASML is able to print lines and components of less than 20 nanometres. That is like printing a complete novel of 500 pages on one centimetre of a human hair!

Wijnand: “I am team leader of a small Development & Engineering team that works on the measurement of the reticle (projection mask) and wafer stage (handler of the chip ground material) in the machine. Measuring on a picometre scale is very challenging; at the speeds we require, it can only be done through a combination of hardware and software. I chose for ASML because of its technical drive and pragmatic approach. We serve very demanding clients. This asks for speed, accuracy and understanding. That’s a game I like. Furthermore, I found out that leading a team is my added value. I am not entirely into going deeply into one tech subject; I’d rather like having an overview of what’s possible. And if you succeed in motivating people and booking results, then leading a team is a very rewarding job. A lot has changed since my time at Taylor, but I still use one important lesson in pragmatism I still bear in mind: present what you want to accomplish based on the advantage for the other party!”



Comsol - iemand

In the evening of Wednesday the 19th of November, Taylor organized an introduction course on COMSOL for students who were not familiar with COMSOL yet. COMSOL is a software package that can be used to model multiphysical problems by the use of finite element analysis. Two employees from COMSOL were invited to introduce us to the basics.

The course started with a lecture on the possibilities and impossibilities of the program. The program is very strong in multiphysical calculations but not very effective in very deep, fundamental models focusing on only one physical domain. After the introduction we had a bit of hands-on experience with the program by building a calculating model by ourselves. As last we had a small workshop on how to connect MATLAB with COMSOL which turned out to be very easy and efficient.

The introduction course to COMSOL was very informative and we hope that this event is the start of a lasting cooperation between Taylor and COMSOL.

The COMSOL group is a fast growing high tech engineering software company active all around the world. Their flagship program COMSOL Multiphysics is specialized in modelling multiphysical models. The software is able to be linked to different CAD software packages, MATLAB and EXCEL.

PME DAY: FRIDAY 12TH DECEMBER 2014

Inspire! Be Inspired! Be so good that they can't ignore you.

That was the theme of the PME day at Friday 12 December 2014.

Urs Stauer opened the day with a general talk about the department issues, after which the group was divided in different focus groups. The theme of the day for the (support) staff and PhD's was to get trained on presentation and pitching skills. The students followed a separate inspiring program.

-To be quite honest giving a presentation and pitching is not my strongest point! So I was a bit afraid that my worst nightmare would come true and that I would really make a big fool out of myself in front of my colleagues.-

But nevertheless I went and the trainer, Thomas Platzer, started with a nice exercise. Everyone needed to walk through the room and on his sign needed to do or say something opposite to what he requested. For example when Thomas said green we needed to say red, when he gave the mark for standing still we needed to jump. This exercise was to confuse your mind, free you from your controlling mind and stimulate creativity. Apparently comedians do this before they need to perform. Then they perform better on stage. At the end everyone was somehow relaxed and confused. Then we needed to split up in groups and Thomas revealed the big secrets behind a good presentation, pitch or talk. In small groups we needed to practice by presenting what we enjoyed in our work, in only 2 minutes. The other group members needed to give feedback. In my group someone practices to pitch why he was the best person to teach mathematics to students. There was also someone who tried to teach us how to moonwalk. –You would think that everybody knows the moonwalk and who invented it. But some professors really did not have a clue.-

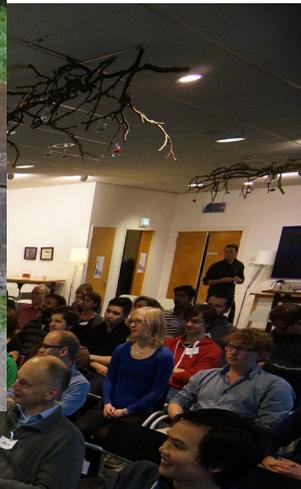
After the group session some performed their new presentation skills live on stage in front of the whole department. Then we enjoyed a very nice Christmas lunch together with the students. Followed by a musical get-together. Where students and staff members sang songs while playing a guitar or other musical instrument. That was really nice to listen too. We closed off with a jam session.

As for me. My worst nightmare did come through. I did suck at giving a presentation. But at least I accomplished one thing. I was really good at giving the worse presentation with a very red face so they could not ignore me. J But my colleagues were very helpful with tips.

So was this an inspiring day? For me it was. And as I asked around the most people enjoyed this day and learned a lot. Even me. I can only get better.....

Birgit Rademakers

HR-secretary department PME



Be ingenious



about ACE

ingenious solutions through analysing, development, design,
engineering, prototyping and realisation.

ace.eu





business units

hightech systems

product development

industrial automation

construction technology

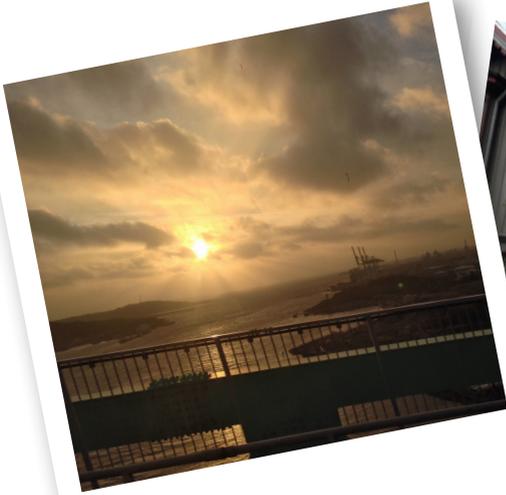
locations

Eindhoven

Delft

Lummen

Gent



Study Abroad

About 6 months ago I left for a new adventure, to the high (or at least higher) north: Göteborg, Sweden. After searching for a while for an automotive internship, I was given the opportunity to start at Volvo on a novel steering controller.

Arrival

Upon arrival you encounter a rather beautiful countryside, followed by a sprawling city. Given the size of the city, you would expect the difficulties to find a student room to be less... After managing to find a room in a bonafide Villa Villekulla (look for Pippi Longstocking)! Three dogs, two cats, 9 chickens and 4 other students (and a kind but slightly crazy landlady) made up a very cosy and nice mix.

At work at Volvo

On October 13th I started working at Volvo. Those first days are exciting of course, among other things because I had no idea what the working atmosphere would be (full suit required, dress shirts, casual and other essential 'How to survive the office' questions).

Upon arrival I found several T-shirt wearing people, and certainly no suits (those seemed to be worn exclusively by people who concerned themselves exclusively with money). Furthermore, Swedes apparently detest the notion of hierarchy: everyone sat in a large open work space, so the chassis director sat 2 desks to my right... My subject was a beautiful challenge: designing a new steering controller from scratch in CAE, and later in a car was nice, but finally managing to get it going and have a proof of concept just hours before my scheduled presentation, that was priceless!

Living in Sweden

Comparable to the Netherlands, but totally different... Makes sense right? In Sweden, public transport and other large public service offices are all nicely organised. In Göteborg, you definitely do not need a car or bike, trams and busses will take you anywhere at any time. On the other hand, Swedes are rather reserved. It takes quite some time until you befriend a swedeSwede, and doing stuff that is out of the ordinary apparently is only allowed when completely drunk (not that I would know that, of course...). Thanks to the two universities student parties can be found aplenty, and if you like sports, Sweden is your place (seriously, everyone does at least 2 kinds of sports regularly).

In the end, living and working in Sweden has been a tremendous experience, learning loads of stuff and seeing a country that I probably would not see as soon otherwise.



DENSO



For a Future Where Cars Are Part of the Solution

Driving DENSO's cutting-edge commitment to environmental and safety technologies is a sense of urgency. By 2025, global output of carbon dioxide will exceed the amount that the Earth can absorb by more than threefold. And traffic accidents are increasing at an alarming pace as vehicle ownership increases worldwide.

DENSO's engineers want cars to be part of the solution to environmental and safety issues. They are working around the clock to put the

brakes on global warming—helping improve combustion efficiency in conventional engines, for example, while pursuing advances in hybrid power and exploring possibilities in alternative energies. They are also achieving improvements in safety—active safety features for preventing accidents and passive safety features for protecting driver, passengers, and pedestrians when accidents occur. DENSO is bringing greener and safer technologies to you.

DENSO is a leading global supplier of advanced automotive systems and components for thermal management, powertrain control, electronics, information and safety



www.denso-europe.com

QR Code originated as a production control innovation at DENSO



Taylor Trip 2015: Japan



As always, we are organizing a study trip during which we will visit companies abroad. This year we will go to Japan in the first ten days of the summer holiday. Our base of operations there will be Tokyo. Afterwards, most participants will continue travelling and see more of Japan.

Why do we want to go to Japan? First of all, we want our students to experience what it is like to work for a company abroad. Many of us might be considering this, by organizing this trip we hope to gain more insight into what this involves. Japan is a great country for this, because of the amount of high-tech industry based there. Also, Japan is very different from our country/the Netherlands, but we expect many western influences as well. Experiencing this first-hand will be very interesting.

Finally, the Taylor Trip should of course be a lot of fun, and Tokyo is great for this!

During the trip, we will visit five companies in Tokyo and Nagoya, including Denso and NIMS. Also, we will visit a university and the Dutch Embassy, plus of course many cultural sites.

Our group consists of twenty five MSc and PhD students, including five international students. The number of applications was very high, so we had to make a selection, which we based on their motivation combined with a lottery. The level of enthusiasm is high: people are already making detailed travel plans, organizing a Japanese movie night, etc.

As Taylor board, we are currently working on the final details. It has been a great ride so far, and we are really looking forward to this Trip!



puzzle grappen

Phd Story

upcomming

Rolfs Riddle

Rolf's Riddle

Puzzles about princesses or mathematics, or in fact brain teasers in general, are of course way too easy for people at PME. So this time, our puzzle champion Rolf has thought of something different. Below are four pictures of locations in our faculty:

1.... Plaatje discobal / taylor serie in hok

2.... ?

3.... ?

4.... ?

Do you know where these pictures were taken? Send the answer to taylor-3me@tudelft.nl to win the movie tickets!



Get involved!

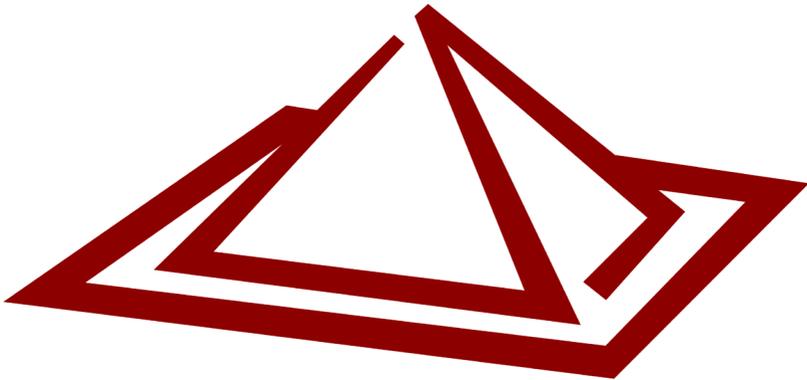
If you have any comments ideas or questions about Taylor and its activities, feel free to contact us.

Also we would be very happy to receive any comments or new content for the next issue of the Taylor Vision. For example: Articles on PhD work or on your graduation thesis, internship experiences, or quotes from your favourite teacher.

You can contact us at:
taylor-3me@tudelft.nl

Check out the website!

Lots of information can be found at
www.dispuuttaylor.nl



**To make smaller chips...
...we are looking for the biggest brains.**



ASML ontwikkelt de snelste en nauwkeurigste ic-productiesystemen ter wereld. Door continu innovatieve technologie toe te passen, kunnen we onze klanten – de grote chipfabrikanten – voorzien van systemen waarmee zij de Wet van Moore kunnen blijven volgen. Om de technologie van morgen waar te maken, is ASML op zoek naar de beste en vooral de meest gedreven technici, die in staat zijn om technologische grenzen te verleggen.

Bezit jij (bijna) een bachelor-, master- of PhD-grad in **natuurkunde, wiskunde, werktuigbouwkunde, software-technologie, elektrotechniek, mechatronica** of **technische bedrijfskunde**? En wil je jouw en onze grenzen verleggen? Stuur ons vandaag je cv.

www.careers.asml.com