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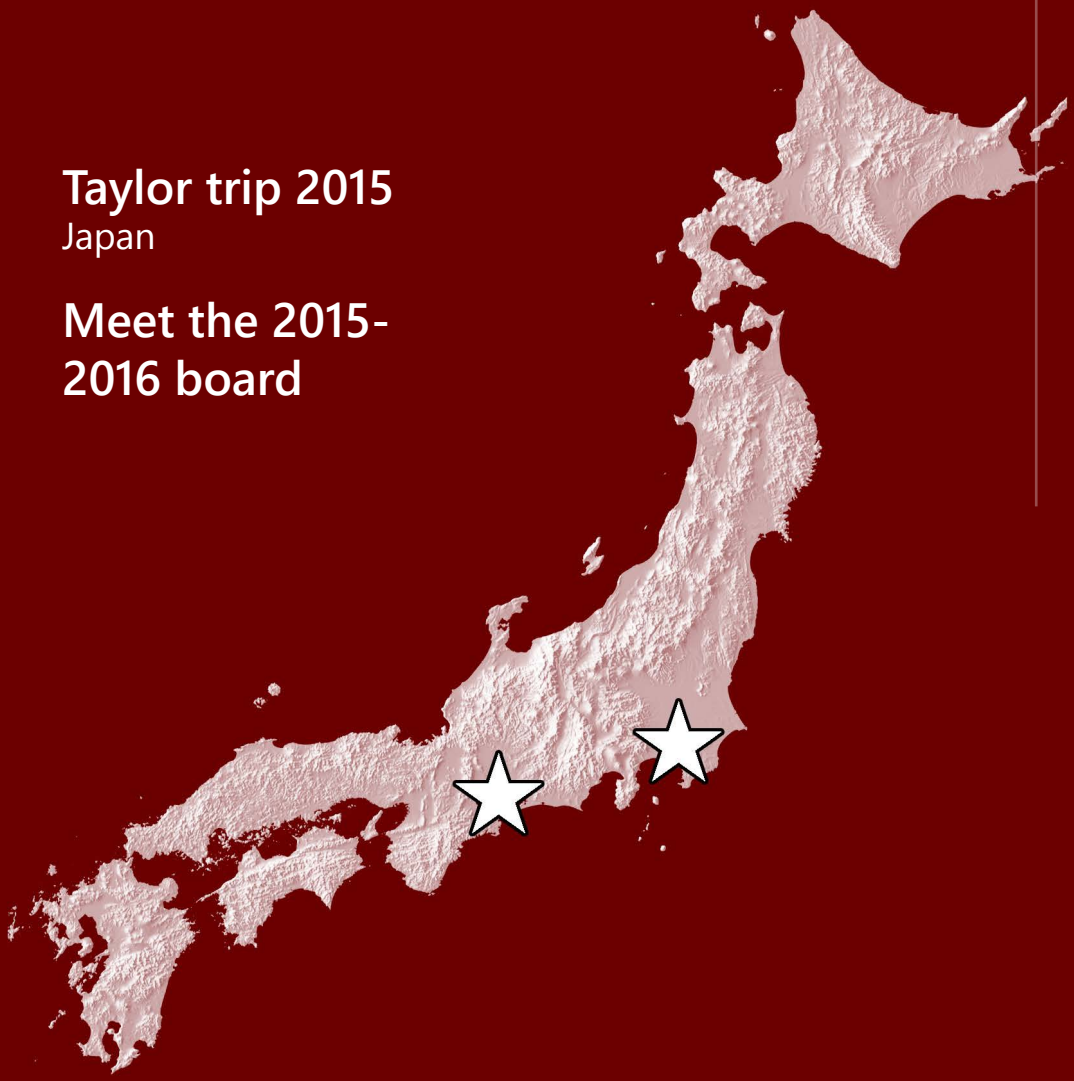
Taylor Vision

Edition December 2015



Taylor trip 2015
Japan

Meet the 2015-2016 board

TU Delft

Colofon

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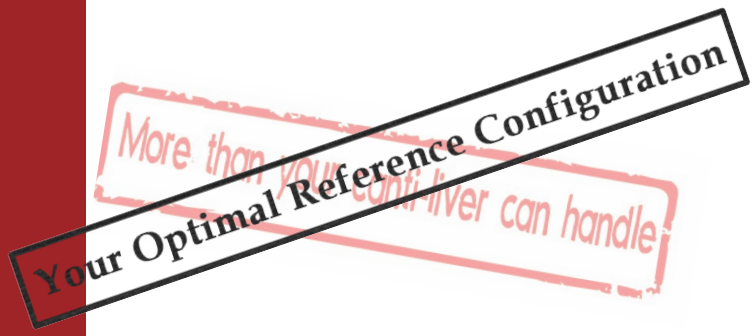

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From the board

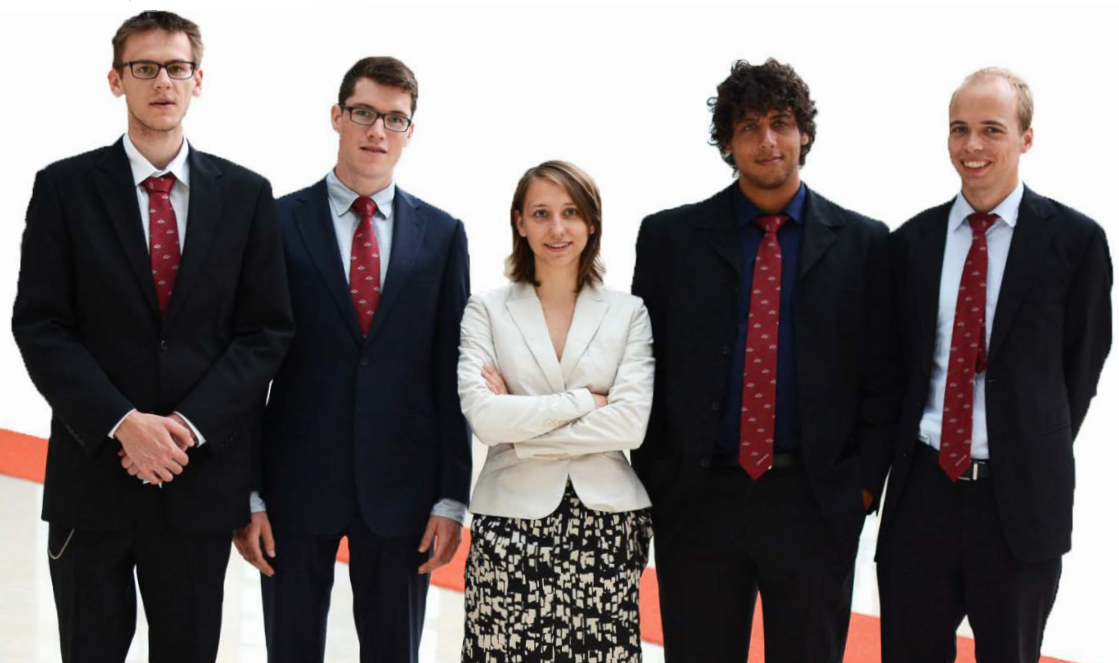
Dear reader,

Since the last edition of the Vision a lot has happened. First of all, at the time of writing we are no longer part of the Taylor board. Five new people have assumed this role for the coming year, you can read all about them on the next page. So far they are doing a great job, and we have no doubt they will succeed in organizing another great year for Taylor.

Now that we have all resumed our studies, I would like to reflect on last year. We have had a fantastic time! With over 25 activities it was busy but rewarding. The culmination of this was the Taylor trip to Japan last July, you can read all about this ten-day excursion in this magazine.

Finally I want to thank Sarah, Anton, Stefan and Rolf for all the time and effort they invested this year. You guys really made this an unforgettable experience for me. We wish our successors all the best, and hope to see you all at the next Taylor reception!

Thomas, Sarah, Anton, Stefan & Rolf
Taylor 2014/15



Taylor 2015-2016

Thej has made his way all the way from India to test his skills on mechanical engineering and the Dutch language. This man knows how to have a fresh and stylish beard with every changing season. With much pride he has become the first international student to become chairman of Taylor. The best time to approach this energetic yet chaotic person is after a few beers during one of our fine receptions.

Stijn is a true 3ME veteran, this man has had the privilege of gathering lots of experience during his many years at this faculty. During the past Taylor trip he has shown to be an unbreakable spirit, Being able to be ever vigilant no matter the lack of sleep. As the most vigilant member of the group he will take on the role of secretary, making sure everybody is always up to date.

Just like the great Jay Z once said, **Bram** is the jabroni beating, pie eating, trailblazing, eyebrow raising, mountain of man. He kills on bass, loves his pink ladies, enjoys his Jupiler and makes money his business. He is meticulous in his work and already working on improving the ways the finance is handled.
Always the curious guy who takes the time to help out his friends, our treasurer, Bram.

If there is one person you can trust to represent the Taylor board to the outside world it would be **Olivier**. As many if you may know Olivier will rattle round the best presentation possible, even if it is not his own part. Olivier proved time and time again that he is a great planner and he we will make sure that we get our things done! During his time in the Taylor board he will be in charge of the external affairs.

You'd better burn this face into your retina, because **Joep** will concern himself with all the educational affairs.
Always striving for good results, he is the embodiment perseverance. While keeping his vitamin D level in check, this study association veteran will be strengthening the team with his vast network of connections and his talent for organization rivalling Jan Neve himself.

Recent Graduates

As always, the first months of the academic year have seen many students graduate, including the first six from the 2013 cohort. Congratulations to you all!

Micro & Nano Engineering

R.P.H. Wielandts
Balancing and Calibration of an Ultra Precision Indexing Tool for SPDT Lathes

R.M. Wanders
Near Field Thermal Radiation Distance Sensing

I.D. Stam
Transport of Ultra-Thin Chips Using a Micro-Conveyor

J. Buter
Synthesis of a Long Vertically Aligned Carbon Nanotube Array by Chemical Vapour Deposition

R.B.T. de Gruiter
Dosing of Femtoliter Volumes using Hollow Atomic Force Microscope Cantilever

Mechatronic System Design

P.J.P. Ouwehand
Nanometer Precision Positioning Stage using Pre-sliding Friction

T. Nijveldt
Pneumatic Manifold Design

R. Berkhof
Vertical Vibration Isolation using Permanent Magnets

B.M. ter Mors
Optimal Non-linear Motion in Piezoelectric Energy Harvesting

R.T. van der Niet
Frequency Shifting using Rotating Wave-plates and its Application in Displacement Interferometry

P. Sebek
Dynamically Balancing a Scan Stage inside a Scanning Electron Microscope

Engineering Mechanics

A.S. Singh
Model Order Reduction of Nonlinear Magnetic Field Problems

S.J. Jain
Model Order Reduction for Nonlinear Structural Dynamics

P. Papazoglou
Topology Optimization of Heat Exchangers

Trip 2015: First excursions

-By Bas Heming

For the kick-off of the trip we were welcomed at the Dutch Embassy in Tokyo. Some employees of the embassy presented a brief introduction about the past, present and future situation in Japan and especially the metropolis Tokyo. Moreover they explained their effort in catalyzing Dutch collaboration in Japan. At the end some do's and don'ts were discussed, these could be summarized in four words: Be polite and open-minded. With this advice in mind we continued our journey to the University of Tokyo. Professor Umeda, full professor of the department of Precision Engineering, received us at their Faculty of Engineering, which is located at the characteristic campus. After a bento (Japanese lunch box) he tried to show as many slides as possible, with as much statistics as possible, in the shortest possible time! At the point that even he himself got lost in the figures a lot of interesting projects were shown during a lab tour along several departments of the faculty. The first lab showed a digital air-hockey game with force-feedback at the pods. Then some projects related to the clean up of the nuclear disaster at Fukushima were shown, to which all the engineering groups of the country have been contributing over the past years. After another try to show as many slides as possible in the shortest possible time at a lab that is comparable to our Systems & Control-lab we ended up at a group explaining some incomprehensible medical cases that were introduced at temperatures approaching 40 degrees, which resulted some of us succumbing for their 'jetlag'. After all it was a very nice experience to get a look in their faculty!

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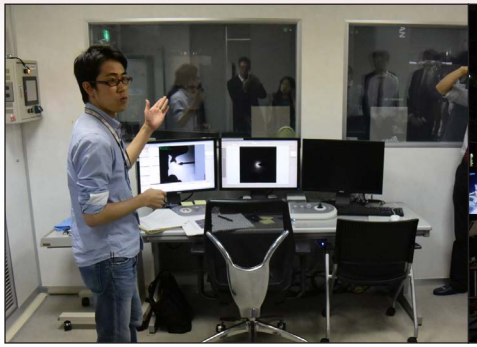
NIMS

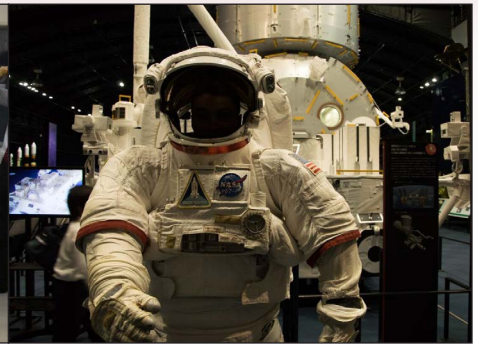
By Kaz Vermeer-

At our second full day in Japan, we travelled to Tsukuba, just north of Tokyo. Tsukuba is home to the Tsukuba Science City: a science park in which many high-tech companies are located. Among them the National Institute for Materials Science, NIMS, which had invited us to come visit their facilities. After arriving at NIMS we were welcomed by the institutes managing director. After his welcoming words, a NIMS employee showed us a presentation on the institute's history, location and current activities. NIMS has divided its research in four divisions: Energy and Environment, Advanced Key Technologies, Nano-scale Materials and the Research Centre for Strategic Materials. Within these divisions, they employ many well-educated researchers, resulting in many publications and patents. NIMS is currently the 12th most cited instance in the world, which is exceptional given they are no university and they hold an average of 0.4 patent per researcher. Their researchers are mainly Japanese, but they are trying hard to diversify their staff. Therefore, NIMS is offering PhD programs for international students.

Fun fact: the presenter knew Professor van Keulen, because of his involvement in NanoNextNL, a consortium aimed at micro and nano technology research. It is a small world… After lunch, we were split into groups and participated in several lab tours, leading to huge STMs, killer lasers and super-conducting wire.

After the tours, we paid a short visit to the JAXA Space Centre, which was just across the street from NIMS. We ended the day at JAXA and returned home after a long, but interesting day.





DENSO

-By Martijn Krijnen

Thursday evening a bullet train full of sleeping PME students arrives at Nagoya, the third biggest and most unknown city of Japan. The reason for our two-day trip to Nagoya from Tokyo, is the Japanese company DENSO. DENSO is a global automotive company which produces, researches and develops advanced technology, systems and components for cars. The company supplies to allmost all car manufacturers. Therefore, as for Nagoya, it is surprising nobody has ever heard of it. This might be related to the fact that their main workforce remains in Asia. Nevertheless they are solidly established in the US and, a bit closer to home, in Aachen Germany (internship possibilities!).

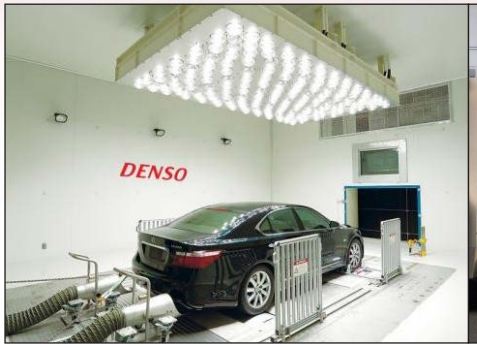
After arrival at the DENSO headquarters we are welcomed by a camera team and then sent back to have another take on our arrival. In neat suited-up columns we walk through the dense heat while the cameras are rolling. The reason is that DENSO wants to make a promotional video on our visit to their company. Therefore everything we say and do throughout the day is caught on camera. Once inside and settled we get an introduction to the company, while being supplied with some life-saving coffee and candy. The sales-talk more or less goes as follows: The DENSO strategy is built on two main pillars, which are safety and environment. The goal throughout every design process is to make customers feel as safe as possible while affecting the environment as least as possible. To achieve this, 9 % of consolidated net sales is reinvested into R&D (For comparison: Google and Microsoft spend 13 % and Volkswagen 5 %).

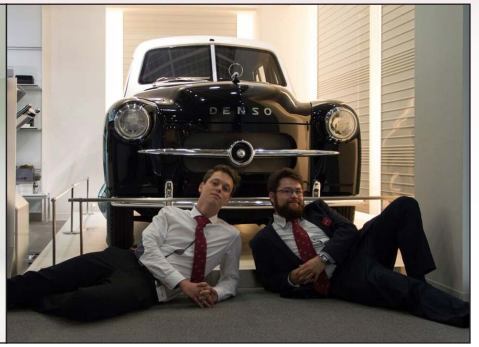
After this introduction we are led into the gallery where the achievements of DENSO are displayed. After an excellent lunch we also get a tour of the

DENSO (continued)

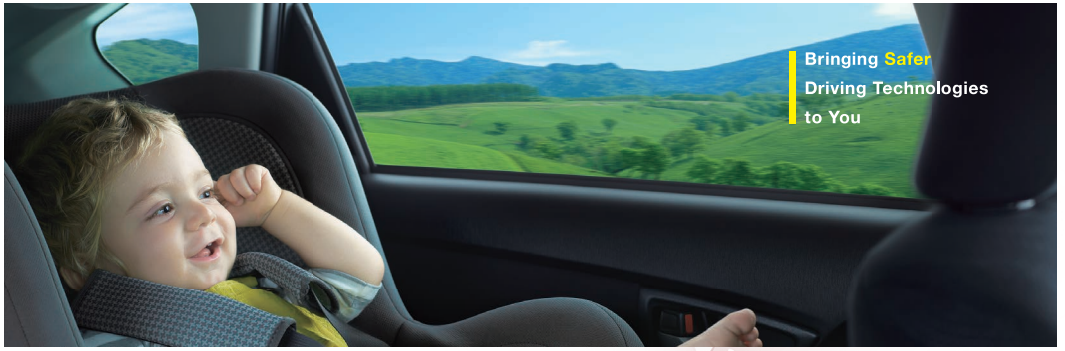
local research facilities, where we are silenced in awe by the silence room for noise measurements and blown away by the wind-tunnel which shoots at us at 130 km/h. Next thing on the agenda is a visit to the Takatana factory, where about 3000 workers manufacture and assemble a range of components. It ranges from injection molding processes for car instruments (e.g. speedometers) to circuitboards being assembled, soldered ánd tested within a single machine. Throughout the factory line following robots carry components to and from, following the coded white lines on the ground. When any of the machines runs into a problem a showtune, for example 'Rocky', is played to alarm supervisors. Every machine has a different song so that workers immediately know where to go.
After all this we are in for the final point on the agenda, which is 'applying the DENSO thinking method to think about the future'. For half an hour we put our thinking caps on and brainstorm and turn our ideas into a poster which we present to each other and the DENSO employees. After a long day and then half an hour of vague brainstorming and colouring posters this does not necessarily result in giant breakthroughs, but it's fun anyway.

In the end DENSO takes us out for dinner following our favorite concept, food and unlimited drinks. The employees fed us various types of sake, and after three hours of getting to know them, they release us into the Nagoya nightlife. Overall my impression of DENSO is extremely positive. Their location might be less ideal, but their employees are all extremely welcoming, friendly and equal. Thank you for a great day!





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

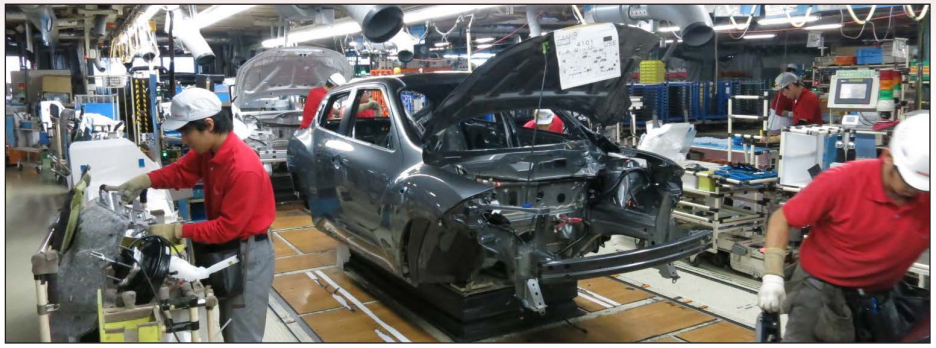
QR Code originated as a production control innovation at DENSO

Nissan

By Robin de Greeuw-

One of the final companies we visited was the car assembly Oppama Plant of Nissan in the vicinity of Tokyo. It's was another scorching hot day with tropical humidity, but this was nothing new under the sun. We were welcomed by an cool air conditioner and a Dutch speaking Nissan representative. The presentation was very business orientated, with a lot of data about revenues and growth predictions et cetera. The story about the collaboration with Renault and how the unequal relationship changed (first Renault 'saved' Nissan, now money is going the other way) was quite interesting. What definitively stood out the most during the presentation, was the close to divine worship of their CEO Carlos Ghosn. Although this is a common phenomenon which we already encountered in other companies, the admiration for this man was unprecedented, even the Dutch spokesman was truly impressed by this man. During this presentation we got a nice Japanese lunchbox and some student used the quite lengthy part about the revenues of Nissan to get some shuteye, which was quite embarrassing.

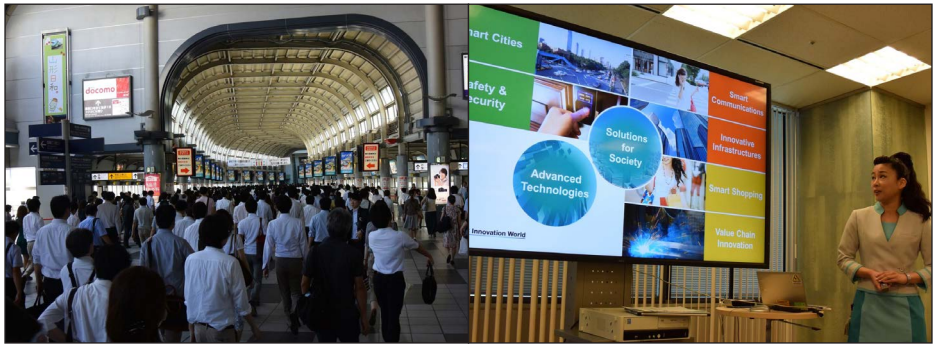
After all the talks, it was time to see the magic happen, we were after all at a manufacturing plant. It's was a huge assembly line were multiple cars were produced simultaneously, they took allot of pride from the fact that the all electric Nissan Leaf was also produced here. All in all, the plant was quite impressive, and it remains a wonderful thing to see such complex machines as cars being produced right in front of your eyes.



NEC

-By Thomas Scholten

On the second to last day of the Taylor trip two company visits were planned and of the those was a visit to NEC. NEC is in their own words a world leading provider in broadband mobile network and enterprise solutions. The location of NEC was just a short train ride away from our hostel and is located at Minato, which is one of the many districts of Tokyo. We arrived in a very nice looking building and were escorted to one of the higher floors where a big meeting room was reserved. First we got a general presentation of what NEC did and their sales and number of employees. NEC has around 100k employees and about 3,071 billion Yen sales (about 25 billion Dollar). After the presentation the group was split in half and a small excursion was given. There were several rooms with different products NEC made. In room one a woman gave a presentation about a surveillance system that can keep track of almost everything on city level. Like energy consumption, water level, weather and can also access cameras. It can also contact the maintenance staff of buildings directly. Also a solution for the dropout of energy after an earthquake was given. The second room contained a rather big 4k television screen made by NEC, a military water purification system and a water leakage monitoring service. Room three showed a demonstration of security by fingerprints and face recognition. The final room showed a mobile phone application that can recognize objects by camera and give a link where to buy them. After the small tour a final presentation was given about the costumers of NEC and a Q&A was held. At the end of the tour the group was given some nice souvenirs.



Toshiba

By Sanidhya Naikwad-

14th of July was quite an eventful day with two company visits lined up and also personally since I lost my jacket on the train on the way to Yokohama. Visiting Toshiba was the second event of the day after visiting Japanese telecom giant NEC.

A 15 minute bus ride from Yokohama station lead us to Toshiba Keihin Product Operations where we were received by their representatives. Toshiba Keihin Product operations is a part of Toshiba Power Systems company which manufactures steam turbines for thermal power plants. We expected it to quite unrelated to Precision and Microsystems Engineering, however we were proven wrong soon enough. After a quick introduction of the factory and its operations, we were lead to a guided tour of the production facility. It was amazing to see these gigantic turbines and how they are manufactured from start to finish. It was quite astonishing to learn that these gigantic turbines were machined with micrometer precision. It felt like the visit to TU Delft machining workshop, just the size was 100 times bigger.

Quality control is a key aspect of any Japanese company and we witnessed that too at Toshiba with a very high focus on inspection and lean manufacturing. Visiting the facility while wearing a cool helmet, goggles was pleasing to the mechanical engineer in us. We could see a strong sense of pride in the workers and also the engineers. Japanese people are very dedicated to their company and Toshiba was one of them. I believe that is what sets the Japanese apart in delivering high quality products.

In conclusion, it was an educational visit and unique in its own way. All in all, it was quite a productive day.

Hitachi

-By Luca Marinangelli

For the last day of the Taylor Trip the departure for the final excursion was planned at 10:30 (Finally!), and although some people decided to have some real sleep the night before, we took the chance and went partying in Shinjuku! Neverthless, everyone was really movitated (especially Stjin!) to suit up again for the last visit at “HITACHI High-Tech Group”. The visit was planned in the afternoon, and it started off as usual with a brief introduction from the company, followed by a factory tour. The building itself and the facilities were very impressive: everything looked so new and fancy! The tour was organized in four parts: we first visited the “Machining shop”, where they explained their commitment in making very precise mechanical components. Some parts were even made by hand like electrostatic lens that need high accuracy. After we went to the ”Electron microscope assembly and adjustment shop” and to the “Machinery shop for medical devices”. Finally a demonstration was given where we could use and touch some of their machines.

Once the tour was finished, we first had a presentation about the technology they use for the Scanning Electron Microscope (SEM), and then two students of our mechatronic group, Pjotr and Ruijun, gave a short presentation about their research at TU Delft.

At the end of the day we had a dinner party in the cafeteria together with the people from Hitachi, where the new Taylor board took the chance to thank their predecessors with a bottle of “Taylor Sake”!

Before leaving for our hostel and getting ready for the Karaoke night, Martjin and Raoul of course couldn’t miss the opportunity to take again their typical picture in the company Hall!