



DISPUUT TRANSPORTKUNDE PANDORA

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PHD research
Hamid Gilvari

An experience with TU Delft
Sawan Prakash

Delft Hyperloop





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PHD research

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Germany trip

Our annual trip to Germany

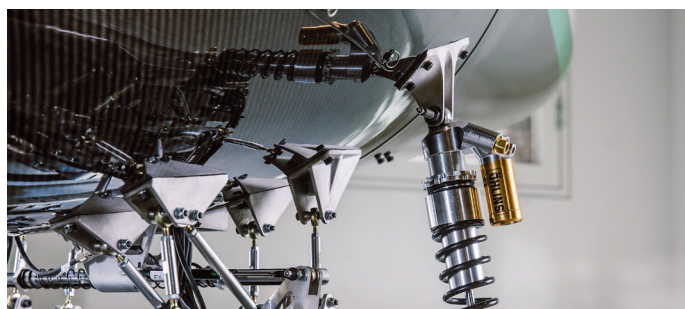
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FROM THE BOARD

By: The board

Voorzitter:

Frans de Groot

voorzitter@transportkunde.nl

I finished my BSc Mechanical Engineering last study year and decided to continue this discipline. Why the track Transport Engineering & Logistics? At the moment I work at AH Online (grocery delivery service) in the weekends and I come from a family of craft bakers where I have delivered various products to restaurants, hotels, etc. I have seen the advantages and disadvantages of delivery services. It sometimes causes traffic congestions, especially in urban regions, but it could also be a huge improvement to the environment. Lowering emissions by finding the most efficient route and decrease the amount of traffic on the road are just a couple of examples. I also believe transport & logistics will change in shape and size with time, but it will never disappear. It is a necessity. Besides my study and work, I also love to ride my motorcycle (only when the sun is shining). One of my most recent hobbies is blockchain technology. I am interested by its potential and how it will change the internet.



Secretaris:

Alex Steenkamp

secretaris@transportkunde.nl

Hi!

My name is Alex Steenkamp, I am 23 years old and moved from Tilburg to Delft at the start of the 2013/2014 academic year for my studies in mechanical engineering at faculty 3ME. Now little over four years later I am working on my MSc Transport Engineering and Logistics. One of the reasons this master appealed to me is my interest in an ever increasingly globalizing world and its transportation challenges which can be improved using process optimization. I have greatly enjoyed my first semester because of the many interesting courses, assignments and activities with my fellow students! At the board of Dispuut Transportkunde Pandora I hold the position of commissioner of internal affairs, which means that if you have any sort of question you can always mail me!



Did you know:

The Netherlands has the highest motorway density in Europe, 57.5 km motorway / 1000 km² (according to wegenwiki.nl)

Penningmeester:**Duco Schaefer**

penningmeester@transportkunde.nl

Hello!

I am Duco Schaefer! I was born and raised in The Hague. After high school I started studying mechanical engineering at TU Delft. During my bachelor, I started working for Ivy Global. Here I had to work in the harbor of Rotterdam. Because of this work, I developed an interest for logistics. After my bachelor, I started the master transport engineering and logistics (TEL). I'm really enjoying this master because of all the exciting projects and interesting subjects. Besides this, the other students at this master are really great and I can always have a good time with them!



For the board of Pandora, I am the commissioner of treasure!

Cheers!

Commissaris Extern:**Pieter Bouwstra**

extern@transportkunde.nl

Hi everyone,
Mechanical Engineers are educated to solve complicated technical problems by application of a structured and analytical approach. After my undergraduate, I sought to apply those skills of critical thinking to solving challenging everyday problems and in my opinion immersion in the field of Transport Engineering and Logistics serves this purpose well. I joined the board of Transportkunde Pandora as the Commissioner of External Affairs because I want to get a good insight in the industry related to our Master's track and



their approach to solving TEL problems. As the dispute of the section TEL we try to organize exciting and interesting excursions and lunch lectures together with relevant companies in the industry allowing students to get familiar with the industry and discover their personal interests within the TEL industry.

I have greatly enjoyed organizing the events of the past semester and experiencing those events together with my fellow-students. There is yet another semester filled with fun activities ahead which I hope to enjoy together with a group of TEL students as numerous and enthusiastic as we are used to!

Commissaris Onderwijs:**Marion Tuijp**

onderwijs@transportkunde.nl

Hello all!

My name is Marion Tuijp. I am born and raised in Volendam. On my 18th I decided to move to Delft to study Civil Engineering. During my bachelor my interests shifted more and more in the direction of mechanical engineering and that is why I switched from civil to mechanical engineering to start the master Transport Engineering and Logistics (TEL) in 2017. I am enjoying the study very much and also my fellow students are very nice, so it promises to be a very nice two years!



In the board of dispuut Transportkunde Pandora I am fulfilling the position of commissioner of education. If you have anything to share with me with regards to education (or just have a talk), feel free to come to me!

Cheers!

From all of us

If you would like to know more about us, don't hesitate and ask us anything! You are welcome to contact us through our e-mails, but we prefer to chat face to face!



By: Dr. Ir. Henk Polinder

My name is Henk Polinder. I am born and raised on a farm at the end of a dead-end road outside of Nunspeet. On my 18th I went to study electrical engineering in Delft. There I ended up in the electrical drives, a border area between electrical engineering and mechanical engineering. During my internship and graduation I noticed that I found it enthralling to do research. That is why I asked the professor if it was possible to continue with a PhD research, and that happened. When my contract as researcher ended, my doctoral research had not finished yet. I could then stay as a teacher and in this way finish my doctoral research – then this was still possible. After I got my PhD degree I again asked myself if I wanted to keep working at the university or wanted to go work in the industry. After I worked on the design of generators for wind turbines two days a week at Lagerweij for a year, I decided to stay at the university. Together with graduates and PhD students I have mainly done research to generator systems for sustainable energy generation (wind, waves) and for electrification of transport (flywheels for energy storage, a starter-generator for a helicopter). After 25 years EWI it was time for a change. I switched to the department of Maritime and Transport Technology at 3mE. I expect that I can contribute to the education and the research in the field of sustainable maritime energy and of electrical drives in ships and other transportation systems. In the maritime sector the energy transition is also an important theme. Ships and other transportation systems are becoming more electrically or hybrid driven. In a moderate scenario around 25,000 wind turbines with a total

capacity in the order of 250 GW will be installed in the North Sea in the coming 30 years. We will no longer only get oil and gas from the seabed, but also try to sustainably harvest energy from the sea like wave energy, tidal energy and thermal energy. The department of Maritime and Transport Technology seems like a nice department to contribute to this.



Smoelenboek



Ajith
Sankar Subramanian



Alex
Steenkamp



Bart
Boogmans



Bart
de Krom



Benno
Rooijackers



Piet
Zeegers



Thijs
van Berkel



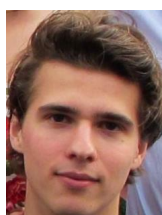
Brian
Reinders



Charlotte
Girardin



Coen
van Battum



Daan
Edens



Duco
Schaefer



Pieter
Bouwstra



Thyco
van Engelshoven



Frans
de Groot



Hendrik
Wesseling



Jorben
Sprong



Jorrit
de Jong



Léon
van der Plas



Pieter
van de Ven



Sawan
Prakash



Luke
Boers



Marion
Tuijp



Maurits
van Pampus



Nout
Neijmeijer



Olof
Olberts



Raimbard
Merkies



Wierenga, Ezra



Kulathur, Dheeraj



Stamoulis,
Thomas



Weerheim, Ruben

From february:



Ewout
Ruijs



Hank
van Toor



Mathijs
Franken



Pim
Crombag



Sander
Koot



By: D. de Boer, Mieloo & Alexander 2018

The retail sector is an extremely diverse market with a broad consumer group and a lot of competition, on-line as well as offline. To survive in this market retailers should have a high variety of products always available for the customers. Due to the advance of the webstores the supply chains and transport systems are becoming more and more complex.

Department	Accessories	1090
	Coats	51
	Jackets	162
	Knitwear	283
	Shirts	1601
	Shoes	258
	Suits	892
	Suits Jackets	1
	Suits Trousers	1
	Ties	1354
	Tops	1
	Trousers	417
	Vests	53
	otherY	1
	Total	6165

One of the key elements to control these processes is information. Mieloo & Alexander (M&A) is specialized in technology-enabled supply chain improvements in various sectors including the retail sector. M&A can implement all kind of automated identification solutions, from barcodes scanners to RFID readers, to obtain the necessary information.

One of the industries where the absence of information is a problem is the apparel industry. Especially in the last part of the supply chain, the stores. For apparel store owners, it is critical that the products are always available in the stores. Retail stores use automated replenishment systems, based on the recorded inventory, to aid on item availability. The problem that they experience is that the inventory record is often inaccurate, due to various process errors,

mainly internal and external theft. Inaccurate records result in Out of Stocks (OoSs). These OoSs lead to lost sales in the short term and a declining brand reputation in the long run.

To correct the inaccurate inventory records, stores do an inventory count twice a year. They only perform this twice a year because of it is labour intensive and expensive process to count the complete inventory with barcode scanners. Radio Frequency IDentification (RFID) deployments enable inventory counts to be more frequent.



I performed my research at M&A around the following research question: To what extent does more information, obtained by different RFID-deployments, result in less Out of Stocks for various apparel store configurations? After defining the problem and the research question, I analysed the store as an inven-

tory system, the origins of inaccurate inventory records and what RFID can do to solve the problem.

Several RFID deployments can be used in apparel stores, namely handheld readers, a robot reader, a combination of multiple readers. I linked the deployments to several inventory count frequencies. The second step was defining the various apparel stores. Since every apparel store is unique, I decided to vary only one parameter at the time. To compare the deployments for all the store types, I made a discrete event simulation model.



My research gave several insights into the benefits of RFID for various store types. For example, my model showed that there were almost no differences between the different RFID deployments and that each deployment could significantly reduce the number of OoSs for each store type. The best results were obtained for stores that had higher quantities per product and that were replenished more frequent. In reality, other factors as the dependency on employees and the decrease in theft should also be considered to get a complete overview of each deployment. Furthermore, more sophisticated RFID deployments as overhead readers can have extra benefits as locating items, direct confirmation of the inventory, precise data about item movements and fit to sales ratios. To get a complete picture of all the benefits and drawbacks, it is recommended to run a pilot store project in a store type.

The use of RFID in the store does not only benefit the store owner but the customer as well. With the use of magic mirrors, automatic check out systems and pattern recognition the customer will receive a better service and experience.

During my research, I learned about the importance of information in logistical processes, the growing market for AutoID and the retail sector itself. M&A is a growing company that understands the client's wishes and offers all kinds of specific solutions for different problems in different industries, which can become standard in the near future.

Did you know:

According to Centraal Bureau voor de Statistiek, the total value of the export products & services is equal to 83% of the Gross Domestic Product (Dutch: bruto binnenlands product)"



GERMANY TRIP

By: Frans De Groot

Day 1

ESI Eurosilos

There was a cold and strong wind in the morning of the 7th of December, nevertheless everyone was excited for the two days to come! The bus left just after nine o'clock to Lünen, Germany where we would visit a coal plant. During the construction of this plant (which started in 2008 and finished in 2013) ESI Eurosilos had the task to place their special storage system. Under the supervision of Richard (one of the owners of ESI Eurosilos) and an employee of the coal plant, we were allowed to walk around the facility.

We started off at the port where the coal comes in. There we followed the continuous belt conveyor to the storage silos. Some of us were brave enough to climb the 40 meter high stairs to the top entrance, the others took the elevator (wussies). The coal that comes in at the port is transported to the top of the two silos, each having a volume of 100,000 m³. We entered one of them to see how the system works and to experience how much 100,000 m³ really is.

Everyone was astonished by the size of the silo and the amount of coal that was stored there. We were allowed to walk freely over the storage system and make pictures of everything we found interesting. Any questions regarding the system, no matter how difficult, Richard could answer them all. After a last few looks around the silo, we continued the tour to other parts of the coal plant. We have visited the boilers, the steam turbine and much more.

Even though coal plants are not the most eco friendly way of generating electricity, for now we cannot do without them. There is not enough renewable energy (yet) to provide every household and the lack of a good working storing system for electricity forces us to keep using fossil fuel based plants for the coming years.





Dortmund

After the very insightful tour, we went to Dortmund. The first stop was our hostel which is located in the centre of the city where we dropped off our stuff. We continued to an Italian restaurant for dinner and drinks. We all talked about what we have seen and learned and had a good laugh with each other. The initial plan was to go to the Christmas market, but due to the bad weather we decided to go to a bar instead. With the complete group we ordered multiple 3L beer towers! Some of us left after a couple of hours for a good night sleep, while others went to the next party...

Day 2

KROHNE Altometer

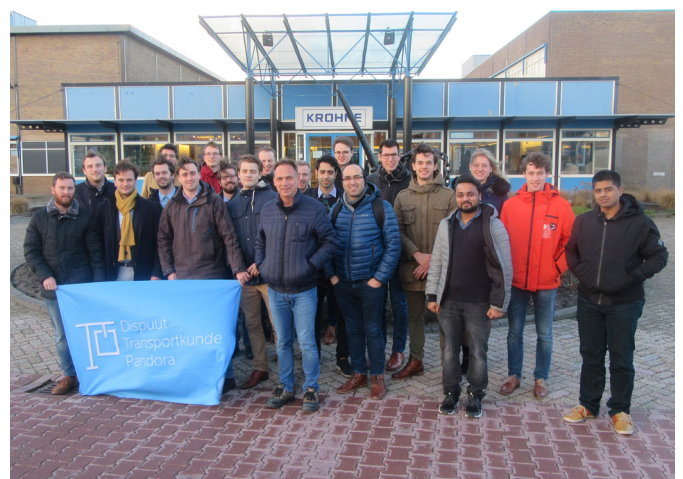
Some may have had a short night sleep, but after a bowl of yoghurt, a boiled egg and glass of orange juice everybody was ready to go to KROHNE Altometer. Underway we stopped for an exquisite lunch at the one and only McDonalds before visiting the company.

Arriving at KROHNE, we were welcomed by Pim Stam. We first went to the conference room for a presentation about the company's history & products and their lean principles. Pim told us that the magnetic flowmeter was invented by a Dutch person and that the focus of the company is more on quality than quantity. The company mainly produces two types of flowmeters, the first type works with electromagnetic fields and the second type ultrasonic sounds. These flowmeters can reach an accuracy of up to 99.97%. In total 95% of the flowmeters is sold outside of the Netherlands. The focus of lean principles is to provide perfect value to the custom-

er through a perfect value creation process that has zero waste. KROHNE tries to achieve this by rearranging the workplace, creating a system, deadlines and much more. More of this will be discussed in the course: "Advanced Operations and Production Management" given by Wouter Beelaerts van Blokland.

After the presentation, the excursion continued with a tour through the different departments of KROHNE Altometer. The production of these flowmeters are separated by technology and size. One of the first things we noticed is that the assembly of these flowmeters is labour-intensively, this is due to mainly low batches in a high variety of sizes. KROHNE also tries to make the complete product inhouse. Only in special cases the flowmeters have to be outsourced, for example if the flowmeter is too big for the spray booth. We visited the assembly of the small electromagnetic flowmeters, the big electromagnetic flowmeters, the ultrasonic flowmeters and a special department for the assembly of flowmeters for the nuclear industry which have to comply with a lot of regulations. The testing facility for the bigger flowmeters is also really impressive. The company uses two towers filled with water to calibrate the flowmeters. Pim told us that the ground trembles when these tests are performed, unfortunately there were no tests during our visit.

It is hard to put on paper what we all have seen and heard, it is something to experience. It was impressive to see how much is done by hand and to learn that only 5% of these flowmeters is produced for the Netherlands. We finished the excursion with a picture of the group and Pim in front of KROHNE Altometer.



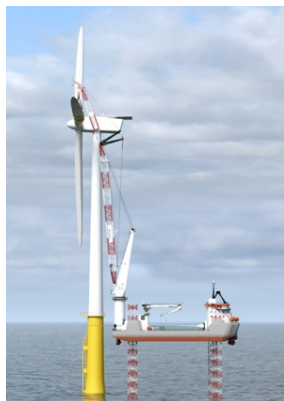


Wind Installation – The Future Unfolding with the Foldable Offshore Crane

By: Wouter Slob

The development of current and future offshore wind farms is picking up with wind installation contractors further optimizing their toolboxes for efficient installation of offshore wind turbines. Up to now the jack-up vessel has been the platform of choice for installation of wind turbines; providing a stable platform, which when jacked up, uses a crane which reaches high enough to install the nacelle of the wind turbines.

Building larger size jack-ups is a costly affair; the Foldable Offshore Crane offers a crane solution, which can increase the installation capabilities of such an asset, offering the same effective lift height with a shorter crane, compared to conventional fixed boom cranes while increasing the payload capacity.



With the ever increasing size of wind turbines and the need to make efficient use of the stable platform provided by jack-up vessels, it is invaluable to be able to increase the lifting envelope of the crane, both in height, width and load.

This can result in a vessel layout on which a crane boom extends far beyond the main vessel dimensions. In this setup the boom is largely unsupported during transit conditions, resulting in unwanted fatigue wear. The large overhang also makes it more difficult to manoeuvre the vessel in port or restricted areas and results in the need for a larger mooring length, increasing docking costs in port. The unwanted

fatigue wear can be resolved by adding more steel to the boom. The added steel will result in a weight increase, negatively affecting the crane's capacity and also decreases the vessel payload; all unwanted effects resulting in a weight increase, which are only needed for ensuring the crane's integrity in transit mode.



With these design constraints and effects in mind a new crane concept was born: the Foldable Offshore Crane, or FOC. It features a long boom, to which a foldable boom is attached.

The foldable boom results in two important benefits: The design can stay light, since the foldable boom is fully folded in transit mode, omitting the need for fatigue strengthening of the boom;

An additional benefit comes from the more efficient use of the lifting height, resulting in a shorter crane boom, since the crane makes better use of its installation height and (boom) clearance. The shorter compound boom length of the FOC further helps to limit the weight of the crane design.

The FOC makes more efficient use of the hoisting height, using the foldable boom to rotate the tip to the lifting point, while maintaining boom clearance with the lifted object.

This functionality is provided by incorporating a backstay beam, which can be adjusted by an adjustable backstay.

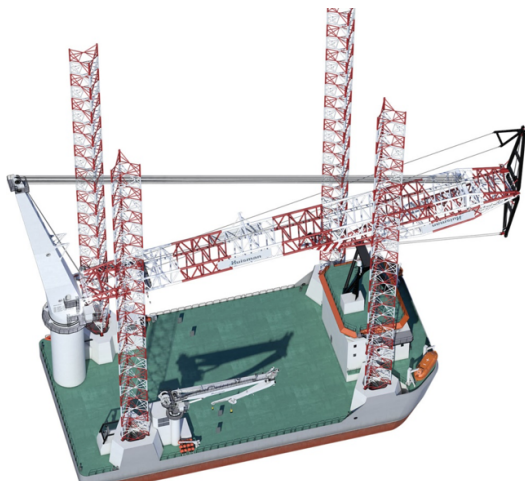
By incorporating a second backstay beam, full folding functionality can be achieved. By fixing the position of the first backstay and the second backstay, with respect to the booms they are attached to, minimal reeving is needed to erect the foldable boom.

With the fully folding boom, a jack-up vessel with a limited length can be equipped with a crane which does not have an overhanging boom, extending far beyond the vessels bow.

This new crane type is as light as possible, while providing a large lifting capacity and featuring a large lifting height with enough boom clearance to lift large items like the nacelle of a wind turbine.

In order to keep weight of the FOC as low as possible, high tensile steel is used and the folding mechanism is created making smart use of backstay beams and wires. This limits the extra weight on the boom, compared to a solution where hydraulic cylinders or a telescopic mechanism would have been used.

In addition to the low weight, the use of the wire folding mechanism has the added benefit of needing less maintenance than cylinder or telescopic solutions.



By introducing the folding boom, the main boom can be made shorter; with the boom hoist attached to the end of the main boom an extra weight reduction on the main boom construction can be achieved, since the buckling length of the main boom is reduced. With the boom hoist connected to the lifting end of the main boom, instead of to a full length boom, the lifting arm of the boom hoist is more effective, resulting in a lighter boom hoist package.

In order to fully use a crane's available lifting height

integrated hoisting tools, which connect directly to the hoisting block, provide additional opportunities to limit the needed rigging height. In general an abundance of rigging is used to control the load to be lifted, or pick up other intermediate tools, which sit on top of for instance a pile. By connecting tools directly to the lifting block with integrated interface points, the rigging height is kept to a minimum, resulting in a large effective lifting height.

With a hoisting block featuring a clamping mechanism, to interface with for instance flange grippers, an integrated spreader or a piling hammer, extra effective height remains below the lifting hook, which can be used for installing equipment at higher heights.

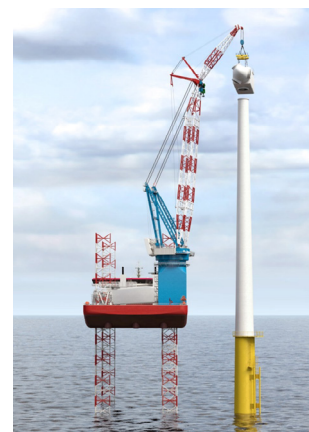
The FOC can be featured as a Pedestal Mounted Crane (PMC), whose position is free to be selected. To make the most effective use of space on a jack-up vessel the FOC can also be featured as a leg encircling (LEC) variant, which frees up more deck space to be used for storage of payload or other equipment.

In our standard range we provide a lifting solution for creating a lifting height of up to 160m from deck, with a large boom clearance, in lifting capacities ranging from 90mt to 2500mt.

The Folding Offshore Crane provides a crane solution, which can open up or unfold the capabilities of jack-up platforms which are critical in size and limited in payload, by optimizing the lifting point and boom clearance, resulting in the same lift with a smaller crane.

The adjustability of the folding boom makes the FOC ideal for handling of different voluminous structures, each with their specific dimensions.

Since the FOC is essentially a boom with accompanying rigging, existing Huisman cranes can be retrofitted to fully benefit from the advantages of adjustability of the foldable boom.





COULD HYPERLOOP BE THE FUTURE OF FREIGHT?

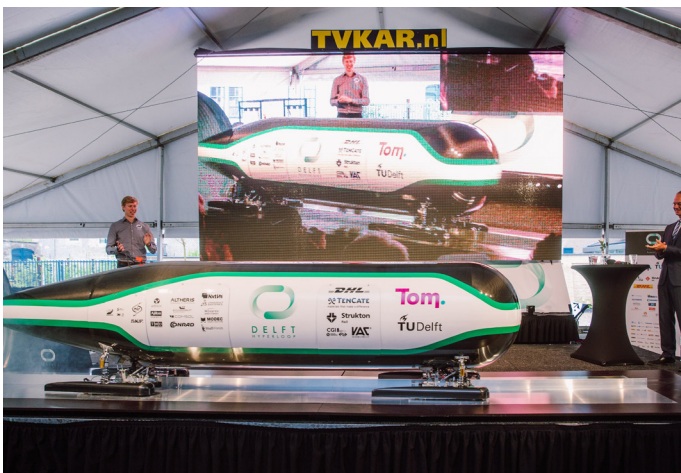
By: Charlotte Meerstadt

As TEL'ers, it is part of your future to seek innovation in the transport industry. However, can we truly say that the transport industry has seen any major, game-changing new technology being implemented over the past few decades? The modes of transport we use to move humans and goods have been unchanged for a long time: automotive, rail, air and shipping. Cars and lorries are a more advanced version of the wagon and have been around since the oldest civilisations, railway transport has existed for more than 200 years, the transition from hot air balloons to winged aircrafts was around 1900 and the concept of ships for trade and travel is pre-viking. So: time for innovation!

Of course, big steps have been made to make the aforementioned modes of transport faster, more efficient, more comfortable and safer. Developments such as electric driving, artificial intelligence and solar propulsion may greatly influence transport of the future. However, in order to develop a thoroughly modern new mode of transport, two physical

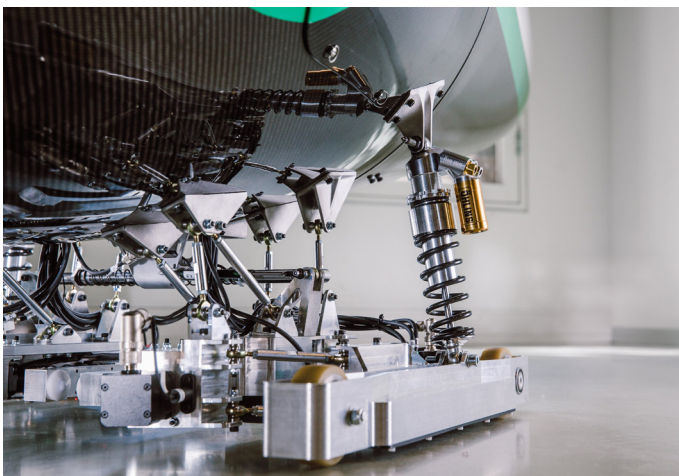
problems must be overcome. Firstly, friction with the rails, road or water also causes energy to be wasted. Secondly, in all of the existing modes of transport, an air column needs to be pushed in front of the vehicle, which causes a significant amount of propulsion energy to be wasted. Aiming to overcome these two forms of resistance, Elon Musk developed his idea for the hyperloop, which he presented in the form of a White Paper in 2013. By magnetically levitating a pod, friction with any surface is overcome and by moving the pod through an almost completely vacuum tube (0,1% air) the problem of the air column is solved. In a hyperloop tube, speeds of 1000 km/h should be realistic and as a hyperloop system is closed off from external influences, delays due to autumn leaves or meteorological mishaps would be history. In order to prove this concept, SpaceX has built a test track in Hawthorne, L.A. and opened a series of hyperloop pod competitions for teams from all over the world, such as Delft Hyperloop (winners of the January 2017 competition). Elon might have made this idea big through his white paper and his pod competition, but a lesser known piece of trivia is that an English mechanic named George Medhurst already developed a hyperloop-esque vacuum transport system in the early 1800s.

Now, most of you are probably familiar with the idea of hyperloop for passenger transport, which is also what the SpaceX pod competition focuses on. In this article, I would like to inspire you to think about the application of hyperloop for freight transport. The current freight industry –on which you are much more of an expert than I am- is complex and, in most cases, rather slow for transporting your goods from A



to B. It is also extremely taxing for the environment, especially the shipping industry due to the large amount of NOx, SOx and CO2 being released into the atmosphere. (Corbett, 2016)

Hyperloop has the potential to eliminate some key problems of the current shipping industry: speed, expenses, carbon footprint, effect on air quality and public health, delays due to external factors, safety issues due to accidents and delays due to human error and strain on infrastructure such as roads, railroads and airports. According to an international group of researchers, the yearly added value of all these advantages would be over \$900 million, returning a %2.7 investment in three years. (Werner, 2016) Furthermore, it would be safe and practical to test hyperloop by transporting freight before using it to transport people as well. All of the safety and security measures can be tested without putting lives at stake and people can get used to the idea of hyperloop, via transport of goods.



A strategically placed hyperloop freight tube could be an enormous asset to the Dutch economy and transport sector. The Port of Rotterdam, for example, is a major component in the Dutch economy. However, it competes with the ports of Antwerp and Hamburg, for parties wishing to ship to and from the Netherlands. In the situation that there would be hyperloop connections from the port of Rotterdam to Berlin, Amsterdam and London, this would be a major competitive asset to the Port of Rotterdam and the economy of the Netherlands. The same could be done for airports. Schiphol has expressed interest in Hyperloop transport as well, which would

be especially useful once their new Lelystad terminal is finished. Linking important cities and transport hotspots through hyperloop is a practice which the American firm Hyperloop One (soon to be Virgin Hyperloop One after a merger with transport multi-talent Virgin) calls “creating super-regions”. Via the link at the end of this article/the QR code, you can watch a video where Alan James from Hyperloop One explains how these super-regions would function and the role they could play for the Netherlands.



Of course, we won't all be sending around freight in hyperloops next week. There are many challenges to be overcome, and intelligent people must come up with technological and logistic solutions to these before this will come anywhere close to reality. A first issue is predicting the costs and impact on people and the environment that digging tunnels or building elevated tunnels above ground will cause. Another issue is loading and offloading freight, which is currently often rather bulkily packed in containers or large boxes, into something as compact as a hyperloop pod. In this aspect, designing a station for passengers is more simple. Also, there are some concerns on whether a magnetically levitating pod could handle the mass of some types of freight. Furthermore, a considerable investment is needed, which may be more likely to come from a private party with a business interest, than from the government. There are many more minor and major obstacles that must be considered, but this is also part of the excitement of working on something completely new. The Dutch government seems to be optimistic about the prospects of hyperloop; in their recently

issued report the Ministry of Infrastructure and the Environment advises to construct a test track in the Netherlands. (Arup, 2017)

Has this article made you enthusiastic to research any aspect of the hyperloop system, for a thesis or just for fun? We would love to share your work via our Innovation Hub. As the Delft Hyperloop Student team, we have a dual goal: proving the hyperloop concept by winning the SpaceX competition and accelerating the development of a scalable hyperloop system. We believe that in order to achieve the second goal, universities, companies and governments must work together and share their knowledge and experience. To this end, we are setting up an innovation hub, where we aspire to connect these parties by setting up partnerships and facilitating access to information on hyperloop. The innovation hub will also have a website, on which we aspire to share well written articles on all things hyperloop with a wide international audience. This website shall be launched in december, so check out our social media to stay in the loop!

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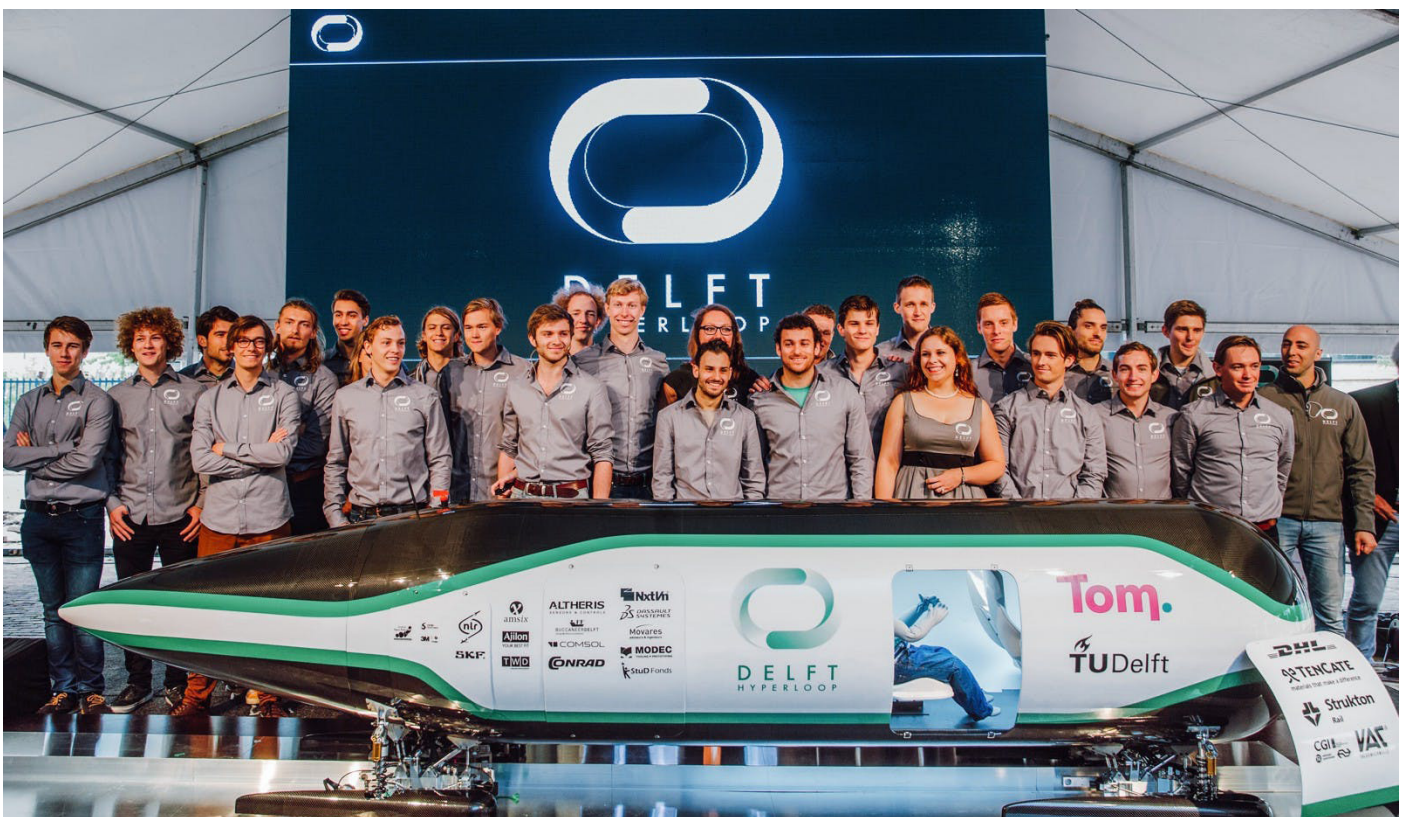
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Hyperloop One: A Hyperloop Network can create a Netherlands Super-Region: <https://hyperloop-one.com/blog/hyperloop-one-network-can-create-netherlands-super-region>

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Did you know:

The longest conveyer belt in the world is located in Morocco. It has a length of just under 100 km.





March

5 Lunch lecture



Simplifying your operation

7 Excursion



20 Guest lecture



▶ *achieve more*

28 Inhouseday



29 Lunch lecture

MIELOO & ALEXANDER
Business Integrators

April

26 Excursion

MIELOO & ALEXANDER
Business Integrators

July

17 Business Tour



Blockchain

You (a “node”) have a file of transactions on your computer (a “ledger”). Two government accountants (let’s call them “miners”) have the same file on theirs (so it’s “distributed”). As you make a transaction, your computer sends an e-mail to each accountant to inform them. Each accountant rushes to be the first to check whether you can afford it (and be paid their salary “ Bitcoins”). The first to check and validate hits “REPLY ALL”, attaching their logic for verifying the transaction (“Proof of Work”). If the other accountant agrees, everyone updates their file...

This concept is enabled by “Blockchain” technology.







TORREFIED BIOMASS: PRODUCT OF THE FUTURE, LOGISTICS OF TODAY?

By: Hamid Gilvari

This article is about my doctoral thesis in which I aim to accelerate the use of renewable energies in industries by investigating the handling, transportation and storage characteristics of densified torrefied biomass. My research is carried out under supervision of dr. Dingena Schott from the section of Transport Engineering and Logistics and prof. Wiebren de Jong from the section of Large Scale Energy Storage. The project is conducted within the larger scope of project ‘Bioforce’ with the support of KIC Innoenergy.

Going back to many years ago, coal has been widely used in industries to produce energy because of its availability, high energy content and of course the low price. As you can see in the figure below, coal still plays a key role in energy production all over the world where it has the biggest share of energy production among the other solid sources of energy. However, the environmental impact of fossil fuel consumption stresses the importance of the transition to clean, more environmentally friendly energy sources which simultaneously can meet the market quality requirements and demands.

A well-known alternative for energy production is biomass. Biomass is a renewable source of fuel, which can be used interchangeably with coal to reduce the amount of emissions. However, due to low mass and energy densities and high amount of moisture content, use of biomass in its raw form may cause problems during transportation, storage and burning. Thus, biomass pre-treatments followed by densification processes are crucial. Torrefaction is an emerging pre-treatment process which increases the energy density of biomass by eliminating the moisture content and volatiles. Torrefaction is mostly followed by a densification process to increase the mass density as well.

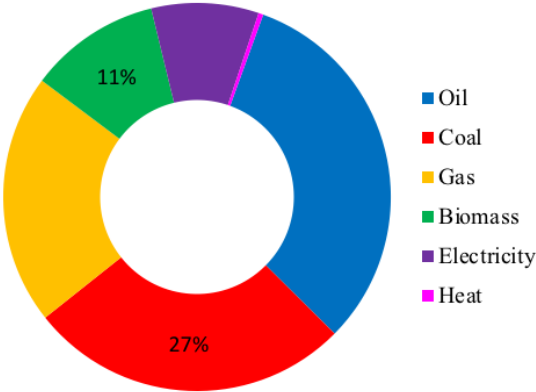


Figure 1. Share of coal and biomass in energy production worldwide (2016)

Solid forms of energy are mostly shipped intercontinental over oceans, followed by loading in terminals for further storage and transportation. Since most of the terminals are designed for transportation and storage of coal, there is a concern in using them for storage and transportation of densified torrefied biomass. Currently, torrefied biomass is not yet commercially produced, however, a few pilot scale plants are currently in operation. Consequently, the material characteristics for logistics, handling, and storage are mostly not

taken into consideration and make it difficult to assess the suitability of current coal handling and storage infrastructure to use for densified torrefied biomass. Therefore, the key research question in my study is: to what extent densified torrefied biomass can be used interchangeably with coal, using the existing (handling, transportation, and storage) infrastructure?

Densified biomass materials are prone to breaking during handling and transportation resulting in production of fines and dust. The existence of dust may lead to drastic problems such as fire and explosions. Studying the breakage behaviour of material helps to optimize handling equipment in such a way that the material degradation remains at its lowest amount. This will be the core of my

research in the next three years of studying. The next step of my research is to obtain the values of different parameters experimentally, and then to model the breakage behaviour using the computer modelling tools such as DEM. DEM is a numerical method to investigate bulk material behaviour by modelling the individual particles. I will present the initial experimental results in European Biomass Conference and Exhibition (EUBCE) in Copenhagen, Denmark in May 2018, and initial modelling results in Conveying and Handling of Particulate Solids (CHoPS) conference in London in September 2018. These will be great opportunities for me to meet other people studying and working on biomass and to share our knowledge.



Did you know:

The world's largest transportation company is United Parcel Service according to Forbes. The company's annual revenue in 2016 was equal to \$61 billion.



By: Business Tour Committee 2017

In August 2017, the student association Transportkunde Pandora organized a two-week study tour to Malaysia and Singapore. An initiative, supported by the Delft University of Technology for master students to experience their field of study within an unknown culture. By company visits, students were confronted with different aspects of transport technology and the logistic control in practical applications.

Transport technology in combination with logistic engineering is a very broad field. This is reflected in the diversity of the companies that were visited during the tour. In some, the focus was on building transport equipment (cranes) or essential parts for that equipment (spreaders, electrical drives) and in other companies, the focus was more on the logistic challenge of storing and distributing their products over a large area, or providing that service for others. During travelling we had many impressions about life in Malaysia and Singapore. Temperatures are high, the food is good and the people are friendly. Many different cultural and religious groups are living in this part of Asia and that results in a wide range of temples, mosques, churches and other buildings.

The first week, we stayed in Kuala Lumpur. After some sightseeing and company visits, we went more inland on Wednesday, to Jerantut. Here, we went on a jungle tour, which was an experience in itself and travelling to a native village by boat brought out the child in every one of us. The day after the bus full touristic Dutchies went to an elephant sanctuary to cuddle and swim with elephants, because that's what you do when you are in Malaysia.

Friday brought another company visit in Kuala Lumpur, which was followed by a large travel in southern direction, towards Singapore but with a few stops. In the city of Melaka, the former presence of the Dutch was still visible, for instance in the name of the restaurant that we visited, the Heeren House.

A small but cozy visit of one night, because the next stop was Johor. This city lies on the border of Malaysia – Singapore and here we visited two companies as well, before entering our final destination.

Singapore brought a lot, our final two companies, our final days with each other and relaxing in the pool of Dutch expats. Organizing a study tour like this is in itself a logistic challenge where opportunities to visit companies must be combined in a feasible travelling schedule. The organizing committee spent a lot of time and effort into this tour and we would like to thank all the participants that attributed to the positive vibe during this whole trip!





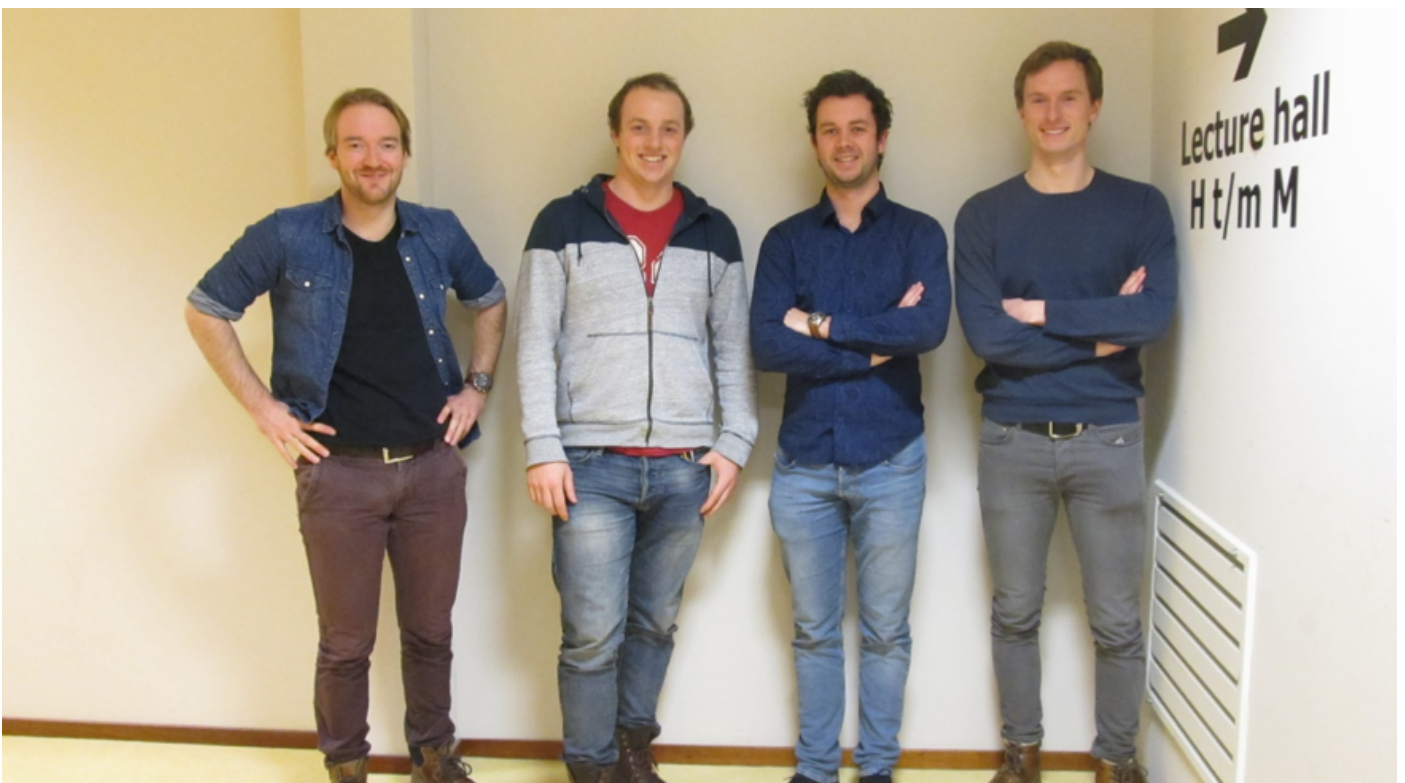
INTRODUCTION BUSINESS TOUR COMMITTEE 2018

By: Business Tour Committee 2018

Every year new students from Transport Engineering and Logistics go on a business tour to acquaint themselves with companies abroad. The Business Tour Committee is group organizing the trip this year going to the East Coast of China, the challenge to organize the trip has been taken up by Brian Reinders, Jorben Sprong, Thijs van Berkel, and Thyco van Engelshoven. This year the tour will take place from the 17th of July to the 1st of August. On the business tour, innovation in scaling automation to meet national goals and worldwide demand will be explored in multiple companies abroad as the overhanging theme. Next to company visits the tour will also consist of different activities so that the students can experience the culture there as well as explore the large cities on the Chinese East Coast.

Did you know:

In 2015, the amount of bicycles in the Netherlands were estimated at 22.7 million according to BOVAG. This equals about 1.3 bicycle per resident.





LUNCH LECTURES

ESI Eurosilos

It was the first presentation of the year organised by the new board of Dispuut Transportkunde Pandora. Richard (one of the owners) came over from Purmerend to give a presentation about one of their installed storage systems in Lünen, Germany, which we will visit in about a week for the Germany trip!

Richard explained in the presentation how the storage system works and what the benefits are. He showed how easy and quick it could be installed. The storage system is pre-assembled before shipping it to the silo. There, the installation is done within a couple of days rather than weeks. He also showed how much safer it is to use a closed system for the storage of coal and how to solve 'hotspots', which are caused by the high pressure. At the end of the presentation Richard told that everyone visiting Lünen will get a chance to get inside the silo! With 100,000 cubic meter and a height of around 40 meter it is an impressive site.

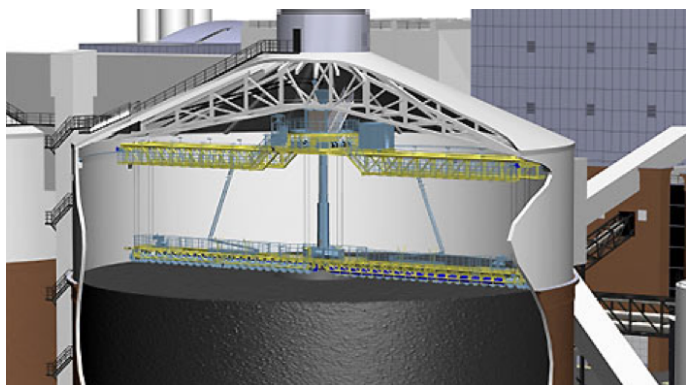
An informative and fun presentation in combination with a sandwich from butcher Leo van Vliet created a perfect first lunch presentation. We hope that everybody is excited for the Germany trip, we know we are!



Huisman Equipment BV

It was the first lunch lecture of the year. Wouter Rijkee, Technical Project Manager at Huisman, gave a presentation about the Huisdrill Floating Factory. What is it exactly? Well, it is a drill on a floating factory, who would have thought!

The Huisdrill Floating Factory is designed to drill for oil and gas at deep depths in seas and oceans. Huisman commissions the complete drill, from design to maintenance, with the exception of the construction of the ship. Some of their drills are placed on existing ships, while other ships are built around it! What makes the drill so special that ships are built around it? The biggest pipes have a diameter of at most a few 100 mm diameter, this may not sound really small, but imagine a pipe that is more than 1 km long and has to drill into the ocean bed. The ratio between length and diameter is huge and causes all kinds of stresses in the pipe. Another difficulty in drilling in the ocean bed is the constant movement of the water and the ship. The Huisdrill is designed to function under, normally considered difficult weather circumstances. Enough of the underwater world, let's get some



fresh air. What makes this drill different from that of other companies? Huisman took the conventional (onshore) design and stripped it down to only the functional components. One of the problems of the conventional design is the amount of space a drill tower uses. The amount of space on a ship is limited and was a key factor in the design. Huisman decided to construct a drill tower which only consisted of one big tower with all the functional components inside it. This design drastically increased the available space. The tower has three functions: drilling, storing pipes and connecting pipes. The drill of the tower faces the bridge, the other side of the tower is used to weld the smaller pipes together, which increases the drilling speed. The sides of the tower are used to store the welded pipes. The pipes can be welded together when the ship is sailing to its destination, all of this together makes the Huisdrill a very efficient drilling tower.

The presentation went into much more detail, but it is almost impossible to explain the mechanics of the drill without any animations. The best thing to do is go to their site and have a look around. If you would like to do your graduation project at Huisman, but do not know how to contact them please reach out to us. We will help you out!

Dispuut Transportkunde Pandora hopes to see you all next time at all the upcoming events!

PostNL

On the 30th of November Iris from PostNL visited the faculty of 3mE at the TU Delft to give a presentation to a group of interested TEL students about the company PostNL and her role within the company.



After getting to know Iris a little she enthusiastically spoke about her graduation project at PostNL. It was very interesting to hear how a graduation project at PostNL is executed. Also the fact that her assignment gave her the opportunity to cooperate closely with the execution area appealed to the students as well.

At the end of the presentation projects from other graduates were discussed as well. The discussion of different subjects gave the students a good insight in what kind of company PostNL is and what kind of problems they encounter. All in all it was a very informative and interesting presentation which all students enjoyed!

> accenture

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Accenture

On the 1st of December Rogier Toetenel and Jogchum Alberda visited the faculty of 3mE to give a lunch lecture for interested TEL students. As representatives of the multinational firm Accenture they explained the five main fields in which the company provides service: Strategy, consultancy, digital, technology and operations. Some time was also spent on discussion of the company's structure and philosophy. After this general introduction to the company Mr. Toetenel and Mr. Alberda elaborated on some of the projects they have worked on. The lecture was finished with a more detailed discussion of blockchain. Alberda explained that the blockchain structure will not only find its application in the financial world but also creates new opportunities in other fields.





SAWAN PRAKASH: AN EXPERIENCE WITH TU DELFT

By: Sawan Prakash

There are two reasons to rejoice the month of March in the Indian sub-continent. Firstly, the onset of the spring season when everything seems happy and beautiful and secondly, the Hindu festival of colors, known as Holi. However, on the 9th day of March in the year 2017, somewhere during the evening, my phone chimed. Seeing an e-mail notification, I proceeded to check it and suddenly I had a completely different reason to celebrate. I was accepted in one of the most prestigious technical universities of Europe—TU Delft. The beautiful spring weather had just got infinitely times better.

However, coming from a middle class family, celebration was limited. With no scholarship, the grants and no financial help, I had to consequently take an education loan of a significant amount. Such an amount made me contemplate my decision. Fortunately, my parents were very supportive about it and they agreed to apply for the loan on my behalf. With part-guilt and part-glad feeling I began to put everything in motion which included a ton of paperwork, referrals, and running around like a headless chicken.

Cut to 19th of August 2017, and there I was, sitting on a window seat of the airplane which would take me 7000 kilometers away to one of the happiest countries of the world—the Netherlands. Looking through the window, there was nothing but empty darkness as far as the horizon; not my mind, of course. I was going to start the next phase of my life, in a new country, university, was going to face a completely different way of living. Other than that it was scary, and overwhelming. Shivers ran down my spine thinking about so many ways this risky move of my life could go wrong. My own mind was questioning myself. I was not visiting the Netherlands for a vacation; it was a Masters' degree course, which, according to

the previous graduates that I got in touch with, was no joke. There were scary stories, and there were successful stories and although I wanted to be the part of the latter, my mind refused to let go of the possibility of the former happening. However, as the airplane descended and finally touched the Dutch runway, I took a deep breath and murmured, "Let's do this".



The following ten days were filled with plethora of activities. I realized how much effort TU Delft put into welcoming its international students. Be it the film screening on the beautiful slope of TU Delft library, beer cantus, pub crawl or introduction to student associations, there was something for everybody.

It was quite overwhelming to witness such a vast number of prospective students from all around the world. They were more than happy to share their culture and I was more than proud and glad to share my own among them. Other than that, the freedom of life was something unique for me. As someone from a relatively conservative culture, a society free of cultural and religious restrictions and judgmental eyes was welcoming.

However, so much of freedom had its downside as well. At least for me it was. My main motive of being here was put on the back side while I was keener to roam around and enjoy my free life in this country.

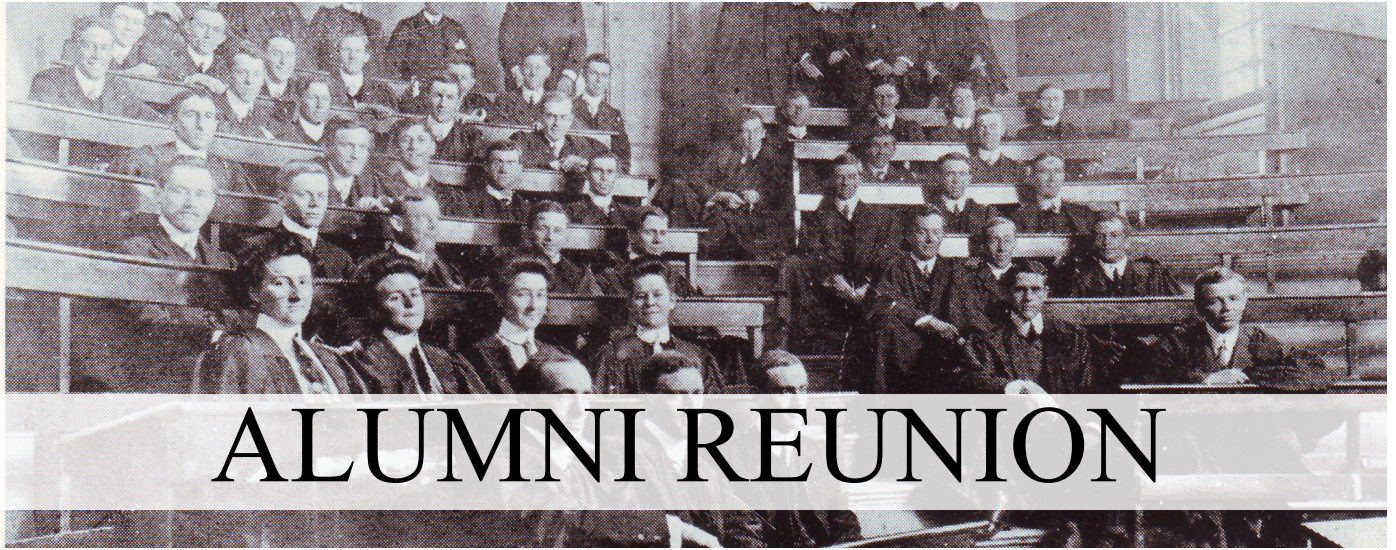
Consequently the repercussions arrived pretty soon. Deadlines, assignments and an intense pace of courses soon started to take a toll on my mind. Sooner than I could say the word, the examinations of the course arrived. The entire exam period was extremely stressful and it made me realize that life at this university is not a cup of tea.

Fortunately as the first semester has ended, I feel as if I slowly started to adjust to the technical requirements of such an advanced university. I aim to make full use of this opportunity I have got to make a better life for me and my loved ones.



Did you know:

The five most transported goods in the world are: 1. Coal, 2. Fuel, 3. Food/ Agriculture, 4. Pharmaceutical products, 5. Vehicles (according to sewellmotor-express.com)



ALUMNI REUNION

By: Laurien van Capelle

On Thursday 28 September, the alumni reunion of Dispuut Transportkunde Pandora was held at Ortec, one of the largest providers of optimization software and analysis solutions in the world, in Zoetermeer. The day started off well when the bus, with which the TEL students left Delft, turned out to be the official ADO players bus. Once we arrived at Ortec we were warmly welcomed with a word of welcome from Dispuut Pandora by Marcel Ceelen and Jan Marijnen. In this word the content of the day and the results of the previous alumni reunion survey were discussed. Hereafter Ortec started with an introduction about the company.

Ortec was founded in 1981 by four innovative econometrics students at Erasmus University Rotterdam. They believed that companies' problems could be solved with mathematical theories and algorithms that they had studied in their university years. Theodoor Toorn started with a presentation about a project he was currently working on. He was succeeded by CFO Gerrit Timmer, one of the four founders, who immediately stirred the enthusiasm of the TEL'ers with an interesting introduction. Hereafter Frank van Os from Smartmile gave a presentation. Smartmile's mission is to ensure package delivery is efficient, sustainable and smooth. Due to the increasing growth of parcel delivery, the inner cities are silting up. Shippers can not reach homes, often it is difficult to stop and when a delivery person finally arrives at their destination, no one is at home. By means of a distribution center on the outskirts of the city in combination with pick-up points, SmartMile wants to make the frustration of both the deliverer and the recipient disappear. SmartMile is still in its infancy and has recently started the first pilot in a German city.

After these introducing presentations, the group was divided into six to increase the participation rate and start a group discussion. Six subjects were briefly pitched by different group leaders and after that you could choose which presentation appealed to you the most.

Warehousing

During the group session on warehousing, the robotization of department stores was discussed. A given example were the AGVs at Amazon, which were very progressive in this. The discussion focused on the technical aspect of robots, with the question whether they are flexible enough to be used in smaller department stores where they have multiple functions. The expectation was that the implementation would still take at least 10 years. In addition, the public debate, whether the robotization would not lead to great unemployment, also got under way. It was thought that through robotization people would lose work and therefore purchasing power, which would cause the economy to deteriorate.

Smartmile

Entrepreneur Frank van Os took the participants into the world of Smartmile. The enthusiasm of Frank was contagious and the participants were asked to think about potential new future plans for Smartmile. Here participants had to imagine themselves as a shareholder of Smartmile. First of all, all ins and outs became clear, such as the revenue model. Smartmile currently operates in public and accessible places. It was difficult to sketch ideas in a short time that were new to Frank, which resulted in more out-of-the-box ideas that gave thought to Smartmile. In short, an inspiring session about the world of Smartmile.

Routing

Routing was presented by Theodoor Torn, Ortec employee. In this session about routing, we discussed how Ortec is involved in optimizing route planning software, in order to reduce costs and save time so that a company can function more efficiently. The route planning software takes into account many different factors, including: current traffic, current stock in department stores, optimal loading / unloading of means of transport and different routes. Furthermore, it became clear that the software is in most cases more efficient than when the route planning is done manually by a planner. A striking difference between Europe and the US is that a planner in the US must follow the software with as little personal contribution as possible while in Europe a planner can ultimately take the decision.

Load building

In the Load Building group a case was discussed of a logistics manager who had to realize millions of savings in transport costs by loading pallets with boxes in a more optimal way. For this well-known 'packing problem', Ortec has an excellent tool available that, based on a scenario, calculates the optimal structure of a pallet. The challenge lies mainly in realizing a theoretical solution in practice. Thinking 'out-of-the-box' is the key to successfully complete such an assignment!

Site Logistics

TDuring the site logistics session, a case was presented which is currently a project that Ortec is working on. The case was about the central distribution center of DPD in Poland where all parcels are sent to and from smaller distribution centers in the country. The biggest problem at the moment was that a new Vanderlande system had been installed for the collection and further distribution of the packages. However, this system has limited capacity and until now there was little registration of inbound and outbound traffic, which made it difficult to determine how best to use the capacity of the system. During the session there was discussion about what information is essential to optimize this process. In the end, we talked about the solution Ortec came up with, which basically comes down to the fact that incoming and outgoing trucks were monitored more closely and the data was forwarded to the scheduler of the distribution center, in order to gain more insight into the package flows. to create. Afterwards, the alumni suggested more ideas for further development of this solution.

Analyses

By means of a diagram, a random company could be analyzed on the degree of development in the field of data usage. If a company is very inefficient with its data resources then this company was placed on the left side in the diagram. Once the company was further developed in the use of data resources, it moved to the right side of the diagram. Once a company was on the far right of the diagram, it was not necessary to improve the data resources. On the basis of this table we were able to ask questions, and discuss which company is placed where in this diagram.

After half an hour, that many feel had flown by, the group came together again to share experiences gained during the group sessions. One person was chosen from each group to give a short presentation about what they had discussed and what the conclusion was. After a word of thanks from Marcel to Ortec and Smartmile we left for the top floor of the building. Here, everyone was able to evaluate the day while enjoying a bite and a drink and to retrieve memories of the most beautiful master track at TU Delft. After a pleasant drink everyone left home full of experiences.

On behalf of the board of Transportkunde Pandora, we would like to thank Ortec and Smartmile for organizing this wonderful reunion, we had a great time! We would also like to thank all alumni members for the great attendance and great enthusiasm during the day. We hope to see you again, hopefully then as alumni members, in two years time.



Question:

You have won a quiz and you see three doors. Behind one of them is an expensive car, behind the two others are a goat. You choose a door, and then the quizmaster opens one of the other two doors (he knows that the car is not there). There is indeed a goat behind this door. He then asks you: “Do you want to change your choice?”. Is that a good tactic or not? Or does it make no difference?

Answer:

Initially the chance was 1/3 in that we had the right door. Because the quizmaster always opens an 'empty' door, it says nothing, and the chance that we were right is still 1/3. But then the chance on the other door is 2/3.

Question:

At a high school (classes 1 to 6) a sports day is organized. There are 4 sports (football, hockey, basketball, korfbal). From each class there is one participant for each sport, so there are exactly 24 participants. So, the set-up looks like this:



There are two captains (teachers) who will choose teams. In turn they may choose a student, but they must meet the condition that everything is “completely fair”. This means that they have to choose exactly 3 students for each sport and exactly 2 pupils from each class.

I am treasurer of the student association and I would like to give the teams an amount of money for lunch during the break. I have a total of € 300 available so each student can get € 12, 50. On the day I am not present, and because I am a suspicious type I do not trust anyone else with the money. However, I know a way to distribute the money in advance among the participants, so that after each team there will be exactly € 150, -!!!

Do you see how I can do that?

Answer:

In the row above, give the first person €1, the second person €2, the third person €3 and so on. The last person (the korfbal player from class 6) will receive €24. Now I know for sure that tomorrow every team will have the same amount of money!!!!

Word search

I E O J X K Z A N H O P S Z T S P K B B
 N L J T X I H K Y Z K H F V K U E K T S
 S U O U N I T N O C S I D L W O I H F M
 F G I G P E D M F F I S U N Q U L E I W
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AGV
 AOR
 BREAKBULK
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Sudoku

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Did you know:

Residents of Hong Kong are the
 ecommerce champions of the world.
 The average consumer spends \$2,868
 per year online shopping in Hong Kong
 (according to entrepreneur.com).

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	6	1		5		2		4
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		9			8	4	3	
2		3		9		8		



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