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Cursor

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Helix unrest

Walking into the Department of Chemical Engineering and Chemistry one might not realize the major changes it has undergone over the past six months. The doorman's still seated at the entrance drinking his cup of Joe, and in the cafeteria students are still going about their business as usual. Behind closed doors however, small horror stories are being acted out. The research structure is being axed drastically and if I am to believe some of the people involved, all this was

communicated in a way that did not show a whole lot of empathy earlier this year. Labels like 'language was close to legal', 'left no room for changes', and 'completely out of the blue' seem to indicate the board was a rather blunt messenger. There will be forced redundancies, something that hasn't happened at TU/e in a long time.

The fact that those affected haven't been informed about anything for three months now doesn't help matters. The atmosphere is said to be icy and faculty is scared and waiting for it all to blow over. Departmental kingpins Bert Meijer and René Janssen currently don't want to comment on the plans and how these will be dealt with either.

What happens at ST stays at ST. It doesn't sit right with me. After all, wouldn't both department and TU/e benefit from openness and proper deliberation when plans include trying to recover what is healthy?

Brain gain

Students who have travelled halfway across the globe for a solid education in Eindhoven are getting nervous. If the media are to be believed, they can forget about their dream job in the Netherlands, due the recession. Yet at the same time, businesses insist there's still a major shortage of engineers that cannot be solved by native geniuses alone. I would therefore like to take this opportunity to reassure the brave: if you've made it all the way to Brabant for a degree in science, I'm sure there's a beautiful career ahead of you. Good luck!



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◀ Rewwwind www.tue.nl/cursor

Our Rewwwind feature provides you with snippets of last week's news. What happened online after the previous Cursor magazine was published?

Atmosphere at reorganizing Department of ST "icy"

4 April 2012 - As a result of Chemical Engineering and Chemistry's (ST) reorganization, the number of capacity groups will be cut from eleven to eight, and sixteen positions will disappear. The Departmental Board considers the changes a reorientation as well as an

economic measure, and has two focal points: Molecular Systems and Materials Chemistry, and Chemical and Process Technology. There's a lot of confusion and unrest within the affected groups.

Final design Project 2 needs changes

28 March 2012 - Coordination of Campus 2020 has decided to cancel the presentation of the new construction for the Departments of Applied Physics and Electrical Engineering

(also known as Project 2) at the last minute. The official presentation was scheduled for Wednesday, March 28, but both design and financing need to be altered.

Cum laude PhD research into singing ribbed tubes

27 March 2012 - On Monday, March 26 Güneş Nakiboğlu received a cum laude distinction for his dissertation at TU/e. His research focused on the sounds that occur due to airflows in ribbed tubes ('corrugated pipes'). He has managed to develop techniques that

can predict what kind of sound the tubes will make. His research is very important for tube systems such as flexible gas tubes where sound vibrations might damage the tubes. The results can also be used for musical implementations.

≡ Clmn



What is it that makes good teachers good?

What indeed? Based on my experience at TU/e I would like to highlight the following features.

Straightforward explanations. A good example would be prof. M. Heemels who refers to formulas as 'guys'. During his lectures I hear him say things like "Take this guy, subtract him from that other guy and compute the eigenvalues. If they're negative, you're in trouble". This simple instruction covers ten pages of exhaustive proof, but such an informal approach is easier to remember and therefore preferable.

A passion for the subject. An exemplary enthusiast is prof. S. Weiland who is famous for exclamations like "Look at that formula! Isn't it beautiful?". Only during his lectures do I hear juicy adjectives like 'awesome', 'fantastic', 'amazing'. Sometimes it seems he's describing some masterpiece by Rembrandt or Renoir. His enthusiasm has infected my brain like a disease thanks to which I now get aesthetic pleasure from science.

Respect for students. When I first opened dr. N. van de Wouw's lecture notes I saw it said 'Dedicated to my students' on the second page. It touched me because usually authors dedicate their textbooks to the people closest in their lives. My first impression was strengthened later when during a guided self-study session he told us: "Always ask. I am here for you". Such a sign of respect encouraged us to study harder because we felt morally obligated to our teacher.

Recognizing similar virtues in other good teachers is important for all of us. In our careers, we will have to share gained knowledge with other, less experienced colleagues. In our families, we will have our own children who will be educated by us. In both cases we accept the role of the teacher and assume responsibility for our 'students' bright future.

Sultan Imangaliyev, from Kazakhstan, is a student of Systems & Control, Department of Mechanical Engineering

◀ Flashback

Dommel November 2010 versus April 2012

It seems it won't be long before we cross the Dommel without having to use the bridge. Currently, the watermark is extremely low. And it's not because of a lack of rain this spring; the cause is of a more technical nature. In light of the work that needs to be done for the Dommel to regain its meandering flow, the district water board has changed the position of the city's southern weir so water now flows into the Wilhelmina Canal instead of the Dommel. In a few months' time, the banks will be reshaped, at which time the water board will 'return' the water.

And just to remind you how beautiful that can be: the second picture on the left was taken in the fall of 2010. Another extreme situation. A watermark this high only occurs after heavy rainfall or continuous precipitation north of the weir. (NS)



Photo | Bart van Overbeeke

Dr.ir. Bas de Hon, assistant professor of Electromagnetism,
Department of Electrical Engineering

How invisible does an antimagnet make things?

Whilst theories about the subject have been advanced for many years, researchers have now actually succeeded in making a magnetic invisibility cloak. Last week a group of international researchers published a new method in Science for building this so-called 'antimagnet'. The materials are cheap and easily available. Good news for patients with pacemakers who need to undergo an MRI scan and can thus be shielded from magnetic radiation. Still, there are also risks attached to the magnetic shield, for what about security systems based on magnetic signals?

"This antimagnet works very well on paper, and no deformations can be observed of the magnetic field around it and what is inside the cloak is indeed entirely invisible", says Bas de Hon, assistant professor of Electromagnetism with the Department of Electrical Engineering. "And in practice, too, the cloak works very well, which is a novelty. Until now a great deal was possible in

theory in the area of invisibility cloaks, but in reality things were rather disappointing. The good thing about this cloak is its simplicity. You need to think of it like several layers of tape stuck onto each other, although these are superconductive layers and one magnetic layer. Together they form a kind of metamaterial, which is a material that does not occur by nature and has been made through a combination of properties. Thus, you can even design material properties that are totally new. In the case of the magnetic cloak they have used a high-temperature superconductor that has no magnetic field permeability, in combination with a ferromagnet coating - known from the household magnets. One side repels and the other attracts and together this ensures that magnetic field lines do not permeate the cloak, although it looks as if they are going right through it. And that is called invisibility."

"However, this magnetic shield only works in a uniformly static magnetic field. For a medical application such

as MRI it could still work, though. For while several magnetic fields are used in case of an MRI, the main field is uniformly static. And you do need to remember that the field in the cloak does not disappear entirely anymore then, but for medical applications a strong reduction may already be enough. Still, the present cloak does have a lot of snags. For example, the antimagnet cannot really be said to be practical. The high-temperature superconductors need to be cooled with liquid nitrogen, some -196 degrees Celsius. Beside the cloak, which is now 12.5 millimeters, an enormous thermos flask is suspended. Imagine how huge it must be with a cloak big enough to fit a human being inside... And it also remains to be seen whether the superconductor will still work in a magnetic field of some 10 Tesla - probably you would have to use a type II superconductor for this. Security officials don't really need to lose any sleep over this invention, for that matter. Security gates work in a totally different



Bas de Hon. Photo | Bart van Overbeeke

manner, with a pulse-induced magnetic field. Not uniformly static, so the cloak definitely does not work there."

"Thanks to the Harry Potter-like films a great deal of attention has been generated for invisibility cloaks. And a considerable amount of research is being conducted, for each conference in our field of expertise features a number of presentations about this

subject. Still, my feeling is that this is a bit of a craze, a fad. In this case, too, people start to make suggestions about MRIs and security gates, although such things are really far removed from this research. Researchers like to surf along on a subject that is 'in the picture'. For although people in films like nothing better than being invisible, the thing that really counts in the world of science is to be highly visible indeed." (NT)

Dommel Run

Thursday, March 29 saw the **16th** Dommel Run.

A new course was plotted for this edition, a **2.5-kilometer** run across campus. Runners were free to run either **5** or **10 kilometers**.

The number of participants was the highest ever at **203**, which is more than double that of last year.

The **10 kilometer** for men was won by Harm Sengers, who finished at **33 minutes** and **22 seconds**.

Sengers, a TU/e graduate, is Mister Eindhoven Marathon: last year he was the fastest Dutch runner at the Eindhoven Marathon. Running the marathon here his number is always **040**.

The first female to finish was Angelie van den Bosch at **39.58**. (HR)



Photo | Bart van Overbeeke

Does the Netherlands still need foreign brains?

Text | Norbine Schali
 Photos | Bart van Overbeeke
 Illustration | iStockphoto

Do international students need to worry about their prospects in the Netherlands, seeing that their host country is officially in the midst of a recession? Cursor has noticed they do and wonders whether this is for a good reason.

“Hi, is Cursor planning to write anything on the recent slowdown in the Dutch economy and how it affects the highly skilled jobs in the Netherlands? Maybe Cursor can help us international students understand if we have the same opportunities we had a year ago. We are very concerned about the news being published in the Dutch papers. It would be very useful if we get views from our very own Cursor.”

It is hard to ignore Siddharth Chunduri's request. And it is understandable too: the contradictory reports heard by those international students every day are hardly reassuring. What are the prospects for international students? In order to find out whether they ended up in the right place until now, we turn to the Alumni Office. In March the first Alumni monitor was organized; the results are not known just yet.

Drs. Herman van Hoeven, Director of the Alumni Office, thinks that TU/e Masters do not need to worry. “The demand for engineers from abroad is still strong. This is also evident from the TU/e policy: we are still recruiting students from abroad who want to stay here and make themselves available for the labor market.”

“The crisis seems to pass by the R&D departments”

According to Van Hoeven this contrasts with Maastricht University, which attracts many German students, but sees them return to their home country

again once they have graduated. “Politicians may claim that all foreign students depart again, but they don't. Some of them continue to live and work here. It's not easy to say what proportion that is. They disappear from sight.”

Which is the very reason why the Alumni monitor was set up, as Van Hoeven emphasizes. People are followed during the three to ten years after their graduation; the first two years are covered by the WO monitor of the Association of Universities in the Netherlands VSNU. “One thing we try to watch is how soon they find jobs and whether those jobs are in line with the study program they've completed and we follow their careers.” Van Hoeven is certain that the three Dutch universities of technology still appeal to international students and that there is plenty of work for them. He does assume that building

engineers and architects may be going through a more difficult patch, but engineers from other disciplines are still sought after.”

Mr. drs. Ben Donders, policy official at TU/e and coordinator of the Stan Ackermans Institute for design engineer programs, does not take a gloomy view of the prospects for international students. In 2011 the two-year design engineer's programs presented some one hundred PDEng trainees with their diplomas. A minority is of Dutch descent, 85 diploma holders are from abroad. Of those, 63 have gone to work for companies in the region. “It seems as if the crisis is passing by the research and development departments of companies like ASML, DAF and the chemical industry. Foreign students have no trouble finding jobs with major companies and three-quarters of them

“It's like now or never”

Bhargava Puvvula and Siddharth Chunduri both joined a Master's course Embedded Systems in 2010 immediately after completing their Bachelor's degrees in India. Both are worried about their career opportunities in the Netherlands.

Puvvula (on the left in the picture) never had any experience working in a company, so he chose the Netherlands and Eindhoven in particular due to the strong industrial presence in this region and hopes to gain this experience. “I had other options like TU Munich, where the tuition fee is way lower than here, but I chose TU/e for only this reason. I don't have a scholarship. I am happy that my hopes are being partially realized, thanks to the graduation assignment at Philips, which I am currently working on.” The Master student wishes to find a job in the Netherlands after his graduation by September 2012.

Chunduri is concerned if the Netherlands still has work for them. “Almost every day we hear news in the media

about increasing unemployment and firms going bankrupt. According to the newspapers fewer people are being given long-term contracts and companies prefer to hire people on a temporary basis. A paper even went so far as to say that there were more people losing jobs and fewer new jobs were being created.” Chunduri picks his news from websites such as dutchnews.nl, nu.nl, rnw.nl/english and in addition he regularly peeks at the statistics given by CBS (Statistics Netherlands). He wonders if companies that are loss-making according to the media, will be hiring at all under such circumstances. And what are the consequences of funding cuts by the government for PhD positions? “I hear from professors and my Dutch colleagues that the Netherlands needs more engineers. Does this statement hold water anymore? Does the Netherlands really need us in such a recession?”, says Chunduri.

His friend Puvvula: “I have been reading articles on the Internet about the EU crisis and how unemployment rates



are increasing. A few of my friends who graduated last year and are currently working, tell me that their companies are on a hiring freeze. Even if they want to recruit someone, they prefer people with experience over a fresher like me. Also, there's a lot of talk on funding cuts at the university and restructuring at companies, which for me translates to: ‘Sorry we are not hiring newbies and we are going to fire the current ones’”.

His parents don't ask him about it, but other friends back home do. “If I go back to India after my Master's program without working here, I would end up having a job that I could have got after a Bachelor's degree. So it will be like spending two years' time and over 30,000 euros for nothing.” Puvvula adds: “But of course the experience I gained here is priceless”. Chunduri is a TU/e loan student and

will be expected to pay back a debt of 18,000 euros over a period of three years in installments after his graduation. It is not an option for international, non-EU students to go back to their country now, because there is less hiring due to the economic slowdown, and return later when there is an upturn in the economy. Puvvula: “It's like now or never”.

get jobs within the Netherlands.” One exception is the construction industry, Donders thinks. “In construction companies the language of communication is Dutch after all; sometimes that forms a stumbling block.”

“Politicians claim that all foreign students depart again”

External Relations Officer and secretary of the TU/e Recruitment Days Gertjan van Drunen is able to illustrate the need for international students perfectly. “Of the 102 companies that attended the latest Enterprises Day (Bedrijvendag) there were 63 that indicated they were

interested in both Dutch and international students - which is almost two-thirds. The other 39 enterprises said they were only interested in Dutch or Dutch-speaking students. Enterprises that take part tell us that Eindhoven has a greater percentage of international students on the market than Delft. ASML, BP, NXP, Océ and KEMA do not consider that to be a problem. Imtech and KPN indicate that they only want to talk to Dutch students.” He can be brief about the labor prospects for engineers: “We have more trouble attracting students to the recruitment activities than enterprises - they are still queuing up. In excess of one hundred companies we run out of space and have to say no.”



“I might go back to China earlier than planned”

Sissi Zeng is Chinese and came to the Netherlands two years ago. April 5th she will get her PDEng diploma and she has got a job at AkzoNobel in Deventer.

“When I was about to finish my Master’s program in China, I started to think about what should be my next step. It was very clear that I prefer the industry to the academic world. So I decided to look for opportunities related with the industry. I was eager to have some international experience which fits my background as well. Therefore, a perfect job for me at the same time would be an international non-research process engineering job.”

Zeng found PPD (process and product design) programs at TU/e via the Internet. It is a two-year post-Master program. During the first year, courses are given by lecturers who nearly all come from the industry. The technological design projects are carried out in the second year of the program. Participants are paid a monthly salary of approximately 1,650 euros (before taxes) and are entitled to bear the title of ‘Professional

Doctorate in Engineering’ (PDEng) after two years. This program is totally in Zeng’s field and sounds like a perfect link between the academic world and the industry. That is why she applied for the program and moved to the Netherlands.

“During the PPD I gained valuable experience, increased my knowledge and broadened my vision. And I must say the PPD program is indeed a link between the academic world and the industry: I got a job offer from Akzo Nobel RD&I at which I was carrying out my second-year design project. I would like to stay in the Netherlands several years more to gain more experience and then go back to China.”

Zeng knows from different media that Europe has been under a financial crisis. Moreover, she could sense it when she was carrying out her second-year project in the company, because the company launched a series of actions to cut costs, and announced hiring freezes. “Luckily, I was not affected by the hiring freeze because I got the offer last year. Nowadays, companies are more

cautious about hiring new employees and prefer people with working experience. At this moment, my situation is safe and comfortable. However, I’m a little worried about the future of Europe and the euro. I hope the euro zone doesn’t fall apart and the euro can stay strong. Two years ago, the exchange ratio between the euro and the renminbi (Chinese currency) was around 1: 9.5. These days, the ratio is around 1: 8. I hope the euro can regain value over time. Then I will have more money when I go back China.”

“In terms of a Dutch crisis, actually I’m not that worried because the Netherlands has a strong and solid industry basis. I think everything is going to be fine in the end. On the other hand, if the situation becomes too bad, I might go back to China earlier than I planned. China is really growing now and has a lot of opportunities. I believe it would be more exciting to work in China because of the dynamic environment.”



Science around the clock

Bell foundry Koninklijke Eijsbouts in Asten is going to cast a new bell for Notre-Dame Cathedral in Paris next year. For the determination of the right timbre of the new 'Maria', software will be used that has been designed by mathematician Stef van Eijndhoven and students from the Mathematics for Industry program. For a longer period now Van Eijndhoven has been working with craftsmen bell founders to unravel the secret of the perfect seventeenth-century bells.

"The bell founder's craft is a very fine craft indeed and should definitely be preserved if it were up to me. Also, bell founding allows craft and science to merge beautifully. If anything, we try to support the craftsman's work, rather than to take it over", is the resolute opinion of Stef van Eijndhoven, Study Program Manager for Mathematics for Industry.

The Netherlands has a long tradition in the field of bell founding: of the four carillon bell foundries in existence worldwide today, two are located in our country. So it is not really strange that representatives of the Parisian Notre-Dame should knock on the doors of Koninklijke Eijsbouts for the new bell in the north tower. At the same time, bell founding is a trade shrouded by experience and intuition. Even now some bells are still cast in molds faced with loam and horse manure, as this is supposed to result in bells with purer tones. For so much is at stake with respect to the purity and timbre of bells. As a bell has no harmonic keynotes,

its timbre depends on the thickness of the wall, the shape in which the bell is cast and the amount of material that is ground from the bronze inner wall after it has cooled. In short: the manufacture of a perfect bell is a specialist trade.

"The need for scientific knowledge about the bell founding process has increased continuously"

Van Eijndhoven: "Since the Second World War the need for scientific knowledge about the bell founding process has increased continuously. Many of the bells that went missing in the war had to be replaced and the demand for high-quality bells was huge.

The introduction of the computer provided more possibilities for optimizing the bell design and the tuning process. For one, we have a program that shows the relation between shape and sound. You can allocate a graded score to the bell's inner and outer walls. Often the design of the clock first takes place intuitively, after which you can play around with the points allocated and it becomes clear: what does a change in the shape do to its sound? Starting from the eventual design, the bell founder subsequently makes aluminum profiles, which he tests once again before casting the bell in a mold of a malleable material. The casting is a process that is extremely difficult to control, which is why the interior profile of the bell is always made a bit thicker, so that there is enough room for correction of the interior contour of the bell. Tuning is a skill that comes with experience, a lot of feeling and careful listening. However, the problem encountered by today's bell founders is that in case of an accurate tune the interior of the bell is not nice and smooth. So in fact they cannot make perfect bells anymore".

In days of old this was quite different. In the period 1600-1700 the finest specimens of carillons and (carillon) bells were cast. The majority of these bells were founded by the Hemony brothers. They understood and mastered the craft of designing and tuning bells perfectly. It is known that they were connected with the prominent mathematician Christiaan Huygens. He praised them for their craftsmanship, but also because they were open to scientific input in the traditional process. Unfortunately history has left us no data at all about the manner in which François and Pieter Hemony manufactured their bells. When they died, so did the secret of the perfect bells. Still, with the adoption of a new approach Van Eijndhoven hopes to find out about this again.

"Several years ago we were approached by Koninklijke Eijsbouts, which asked us whether we wanted to think along about a way in which bell founding could be optimized and whether we could perhaps assist them in this pursuit by designing new software. Together with a couple of international students from the design engineer's program Mathematics for Industry I have taken up this challenge. A fine example of applied mathematics. A very clear application that entails some splendid modeling and where you are also working in close harmony with the company. The fact that bell founding is a typically Dutch craft and that there is a historic awareness connected with it makes the project very special for me." After a thorough study of literature it became clear to Van Eijndhoven that it was necessary to change the design process altogether. "Instead of the points, we have now developed a



Photos | Stef van Eijndhoven

program whereby the bell is designed by means of arcs. And here, too, we can hear beforehand how a certain bell design will sound. We use the same program during the tuning process. After the founded bell has cooled, the tuner knocks it with a sizeable hammer. Via a microphone attached to the bell we can register the frequency and determine where material needs to be ground off. In some six steps we can work our way towards the final target. In consultation with the foundry this takes place step by step, because they are still too anxious that we are going to screw up a bell. For occasionally it takes a lot of persuasive power to convince a tuner to refrain from intervening - then your experiment goes down the drain and you have to wait for the next bell. While facing your computer you can think up many very nice ideas, but things do work differently on the shop floor. Work is done with intuition, whereas a scientist likes to look at something objectively. And yet it is magnificent when you see a member of the 'Asten foundry' trying to explain in poor English to an Indian student why he should do things some other way. I am fortunate enough to be a native from Brabant and to be able to say in thick Brabant patois, while slapping him on the shoulder: "Lad, tha'll be jist foine". We have already completed a few successful experiments and people on the shop floor are also gradually warming up to the idea that our software really helps to improve the bells."

Meanwhile Van Eijndhoven and his students have accomplished a unique piece of software. Nowhere else in the world are bells founded in such a scientific manner. Which is also true now for the Maria bell of Notre-Dame.

"Tuning is a skill that comes with experience, a lot of feeling and careful listening"

"Especially in comparison with the Hemony bells it is definitely not a complex bell, but nonetheless it's a great honor for us to be allowed to cooperate in this. And it generates some extra attention for the science connected with bell founding. And there's more than the founding, for that matter, because new questions crop up continuously. For once the bell is hanging, how should the clapper move so as to produce a synchronous sound? How will the sound change over time and how can that be repaired optimally, if at all? We have so many things that still need to be sorted out."

The recipe for the perfect bell has not yet been found, then, but the software of the Mathematics for Industry students has in fact brought them a big step closer. (NT)

