

Delft Outlook

MAGAZINE OF DELFT UNIVERSITY OF TECHNOLOGY 2012 • 5

A man in a dark jacket and glasses stands on a white metal platform high above a green landscape. The platform has a railing and a long horizontal arm extending outwards. Below, a wide river flows through a valley with green fields and some buildings. The sky is clear and blue.

In the clouds

Research at a height of 213 metres

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'We have to look further'

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Looking back

The Second World War claimed 180 victims at TU Delft. In 1940, this number of students were quartered in Delft as TH Company and assigned the task of obtaining their Bachelor's degree as soon as possible. Quite how these turbulent times affected our university is explained in the recently published book *Loyaleit in verdrukking* ('Loyalty under Oppression') by Onno Sinke, compiled at the initiative of former rector Prof. Jacob Fokkema. In this edition we delve even further into the past. "Wow, look at that!" PhD candidate Robert van Langh scans centuries-old bronze sculptures using neutron beams. This enables art historians to see how a sculpture is made, not just what its external features are. The 213 metre KNMI mast in Cabauw has been collecting meteorological data with increasingly sophisticated equipment for the last forty years. In the mid-nineties TU Delft got involved with the objective of producing street-level weather forecasts and more accurate climate scenarios. Advanced technology also involves certain risks. "In some fields it would perhaps be better if we decided to pull the plug on the internet." In the 'View' ICT expert Jan van den Berg wonders which risks to our cyber safety we consider acceptable. Don't hesitate to pull the plug during the Christmas break so you can recharge for the new year.

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Colophon

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Sustainable fibres

Incorporating aramid fibres into conveyor belts could reduce energy consumption by between 40 and 60 percent, says Prof. Gabriel Lodewijks (3mE). The aramid fibres make the conveyor belts lighter and reduce friction. This discovery could be significant to the mining industry and ports. In Rotterdam, 70 percent of the emissions can be traced to conveyor belts. Making them more energy efficient could enable the port to achieve its growth ambition without coming into conflict with the city's climate objectives.

delta.tudelft.nl/25757



Photo: Gabriel Lodewijks

Playing in the lab

Something other laboratories might, at best, turn a blind eye to is actually encouraged in the new Field-lab Delft: playing. The Yalp Sona offers children games and instructions, prompting them to be active. As part of the European ProFit programme, Delft City Council and the TU have installed a special playground on Beukenlaan. The playground aims to prompt young and old to play together. The level of activity is recorded using sensors and cameras. "The idea is for manufacturers of outdoor play equipment to come and test their prototypes here", says Mathieu Gielen, assistant professor of 'Designing for Children' at the faculty of Industrial Design and Engineering.



Photo: Sam Rentmeester

Supercoils

Unique film shot through a microscope shows supercoils moving about in a DNA molecule. In collaboration with Prof. Cees Dekker, Marijn van Loenhout published an article on this in Science. For their research they used the recently improved magnetic tweezers made by the Kavli Institute at the faculty of Applied Sciences.

delta.tudelft.nl/25647



Image: ceesdekkerlab

Scooter

It's impossible to do a wheelie on it, let alone a stoppie. But then the RooT electric scooter isn't intended for daredevils. IDE student Gideon de Mooij developed this special scooter, on which you don't fall back when accelerating or shoot forwards if you stop abruptly. This scooter does the exact opposite: you lean forwards to move forwards. "It's like being on a flying carpet", de Mooij writes in his final/year research report. De Mooij is now looking for investors to develop his scooter further. He is doing this together with Bram van der Grinten (IDE), who built a prototype in 2010, though it wasn't yet possible to steer that one.

delta.tudelft.nl/25884

Flight control computer

By 2020 there are expected to be twice as many small aircraft in the skies as there are now. Because 72 percent of the accidents involving small aircraft are caused by poor flight control, Wouter Falkena (AE) calls for the introduction of flight control computers, like those already in use in large and military aircraft. Flight control computers would need to get much cheaper, however.

delta.tudelft.nl/25711



Photo: Diamond Aircraft Industries

Thunder and Lightning

In October TU researchers, together with three hundred colleagues, waited in the mountains of France, Spain and Italy for thunderstorms. It was the largest climate research project ever into the Mediterranean's unique meteorology. This region is known for its heavy thunderstorms and flooding in autumn. These are presumed to be the result of the collision between the warm, moist air from the sea and the cold wind from the north. "The details of these complex interactions are not understood at present, which makes it difficult to forecast precipitation", researcher Yann Dufournet (CEG) explains. delta.tudelft.nl/25802

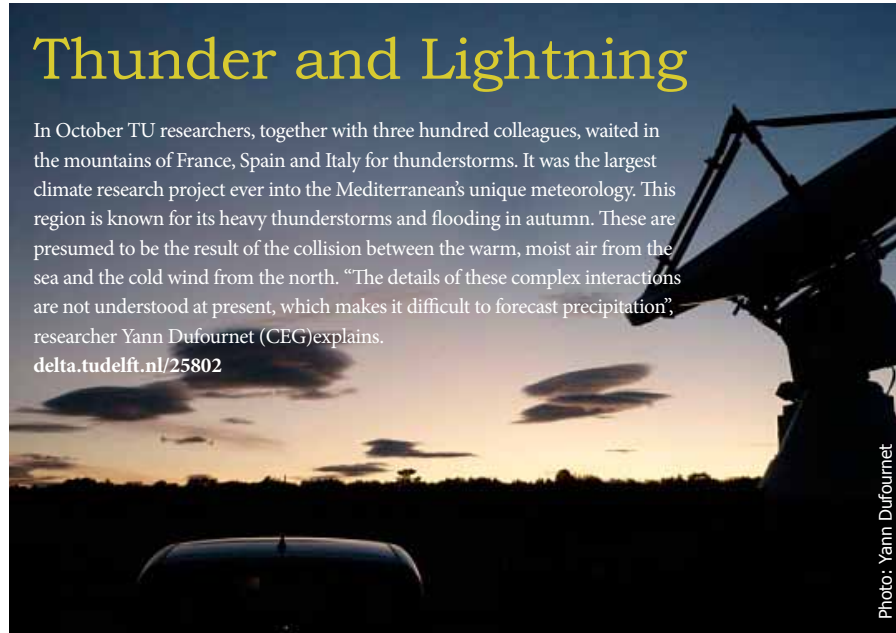


Photo: Yann Dufournet

Little tension in Limburg

Thanks to improved techniques for analysing satellite images – so-called radar interferometry – Prof. Ramon Hanssen of the Geoscience and Remote Sensing department (CEG) and his PhD candidate Dr Miguel Caro Cuenca (who obtained his PhD for his research into this subject in November) were able to measure the movements of the Earth's crust along the geological faults in Brabant and Limburg in minute detail.

Can we expect another earthquake like the one in Roermond in 1992, which had a magnitude of 5.8 on the Richter scale? "I don't make predictions", Hanssen says. "Least of all after the recent conviction of seismological scientists in Italy. But we have no indications of any build-up of tensions along the fault lines in the Dutch substratum."

The researchers established that the Earth has moved an average of one millimetre a year over the past twenty years. However, they attribute this movement to groundwater level variations.



Photo: Connie van Uffelen

Braindrops

Emeritus Professor and former Knowledge Director of Deltares Professor Huib de Vriend believes hydraulic engineers need to show more of their softer side. Where possible, he prefers sprayed sand to hard dykes. In Braindrops, the video supplement to Delft Outlook, de Vriend tells us about 'Building with Nature' as the new and more sustainable trend in hydraulic engineering. This includes the best known example: the sand engine.

lustrum.tudelft.nl



In November, TU students put their university up for sale in protest against the intended cutbacks on basic grants. Campaigners from the Delft student union VSSD drew particular attention to science students. They believe that the cutbacks on student grants and travel cards will hit them harder than other students. Their degree programme lasts a year longer than other programmes and is also more demanding. "At this rate there won't be any engineers left", says VSSD chairman Bas Vollebregt. "The cabinet can't build bridges without engineers." delta.tudelft.nl/25873

The lift

The lift system in the EEMCS building could be much more efficient, concludes Dr Jeroen de Jong, who defended his thesis 'Heuristics in dynamic scheduling' at the end of November. De Jong simulated various methods of controlling lift systems that consist of multiple lifts. If users indicate which floor they wish to go to before entering the lift (using a push button control panel outside the lift), the lifts can group together those wanting to travel a similar distance. This would reduce the average waiting time by 5 to 10 percent, says one of De Jong's conclusions. "It would be even more efficient if people in the office were to carry RFID chips with them, which would enable the lift to see them coming", de Jong says. "It would know which people usually travel to which floor. Via a message to their smartphone it could tell them at the last moment which lift they should enter."

Dr. Jeroen de Jong, 'Heuristics in dynamic scheduling. A practical framework with a case study in elevator dispatching', verdedigend 28 november.



Photo: Shutterstock

Super small

It couldn't get any smaller. Dr Jan Mol (Applied Sciences and University of South Wales, Australia) has reached the limits of Moore's law with his adding machine, which uses separate arsenic atoms as transistors. Not only are these single-atom transistors (SATs) minimal in size, the number of elements required for an adder drops from 28 to 4. There is one disadvantage: they only work at extremely low temperatures.

delta.tudelft.nl/25611

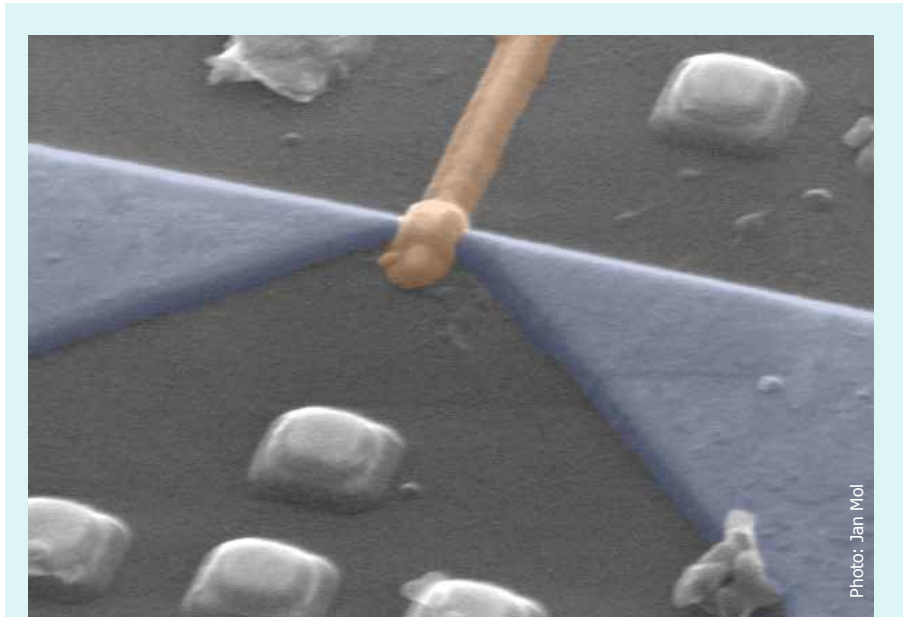


Photo: Jan Mol

Poisonous frogs

Frogs produce proteins which look promising for the pharmaceutical industry. At least, that is the conviction of PhD student Geisa Evaristo (Applied Sciences). She used mass spectrometry to identify the proteins frogs use to protect themselves against bacterial infections.

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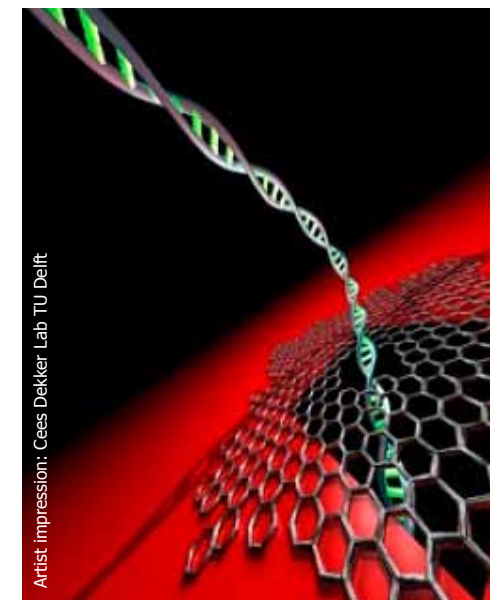


Photo: Geisa Evaristo

50,9 million euros

Nano-research in Delft and Leiden to receive over fifty million euros over the next ten years. The Ministry of Education, Culture and Science has followed recommendations of the Netherlands Organisation for Scientific Research (NWO) and granted the Frontiers of Nanoscience research programme led by Prof. Cees Dekker and five colleagues 35.9 million euros of research funding. A further 15 million euros have been allocated by the Executive Boards of TU Delft and Leiden University. "We aim to research and build on the smallest scale of the tangible material", Dekker says, quoting Richard Feynman: "What you cannot create, you don't understand."

delta.tudelft.nl/25916



Artist impression: Cees Dekker Lab TU Delft

In the clouds

Clouds always used to be the least understood element of the weather system, but that is rapidly changing. Computer clouds increasingly correspond with those in the sky, which promises weather forecasts at street level and more accurate climate scenarios.

Jos Wassink

It's known locally as the 'sniffing post'. Indeed, the 213 metre mast in the village of Cabauw, in the Dutch province of Utrecht, was once used to monitor air pollution. Even after forty years, the tower stands out strangely in the flat landscape: 47 steel cylinders, each 5 metres high and 2 metres wide, are stacked to heights of 50, 100, 170 and 210 metres and anchored to the ground with wire stays. That mast put Cabauw on the world meteorological map as one of the top locations for atmospheric research: studying the complex system of clouds, dust particles, radiation, precipitation and turbulence in relation to the Earth's surface. In the mid-nineties TU Delft became involved in the atmospheric research, with organisations like the Royal Dutch Meteorological Institute (KNMI), the Netherlands Organisation for Applied Scientific Research (TNO), the Dutch National Institute for Public Health and the Environment (RIVM), the Institute for Marine and Atmospheric research Utrecht (IMAU) and Eindhoven University of Technology (TU/e). Professor Herman Russchenberg (Geoscience and Remote Sensing) recalls how

all the equipment was initially brought to Delft to enable the radar to be used on the EEMCS building. "That campaign proved to be the start of Cesar (Cabauw Experimental Site for Atmospheric Research, ed.) because we had noticed how valuable it is to install all instruments together for long periods. It provides extra information." Cabauw was a better research site than Delft due to its more inland location. TU Delft operates two radar systems at Cabauw: a mobile trailer-mounted system for analysing rain clouds (Tara) and a 360 degree scanning radar with a higher working frequency (10 GHz), which also registers fog and drizzle (the Idra drizzle radar). At the symposium held on 26 October to mark forty years of Cabauw, Russchenberg said that understanding the water cycle (evaporation, clouds, precipitation) is the key issue for the coming time. "What's happening now and how will an increase in CO₂ change that? That is the main question."

www.cesar-observatory.nl

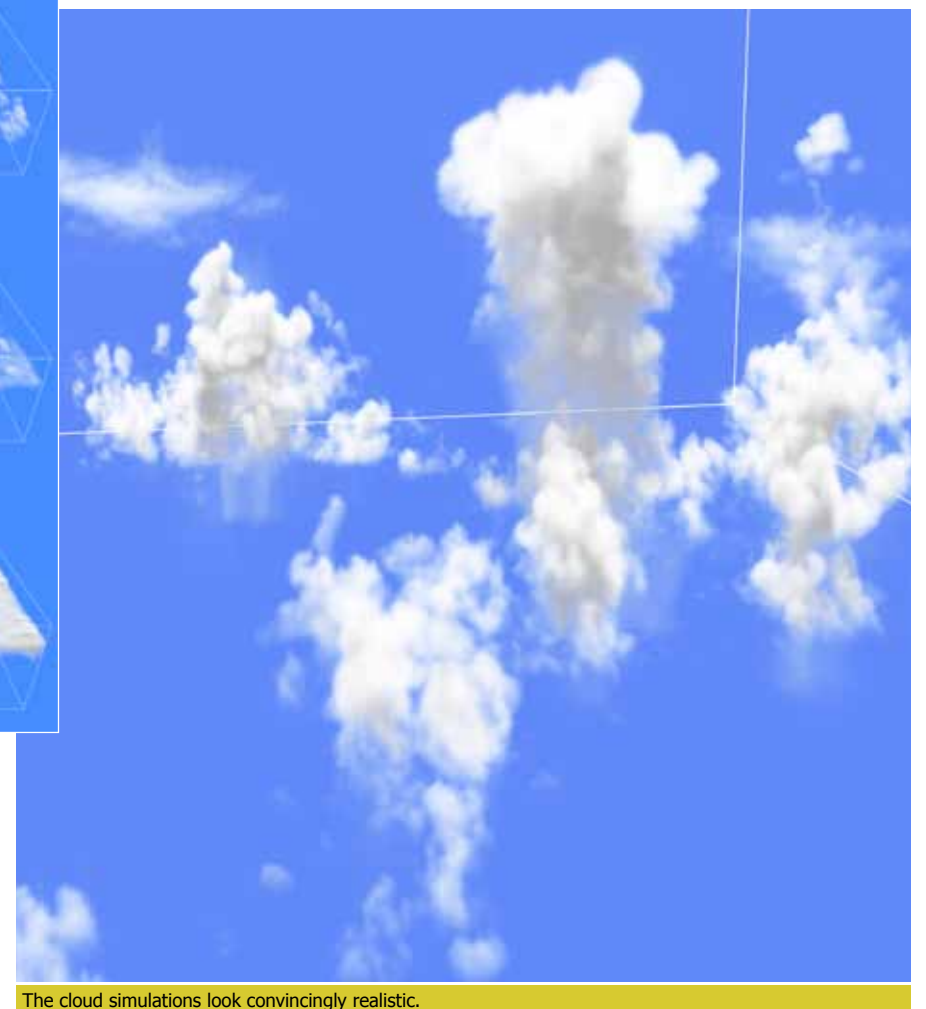
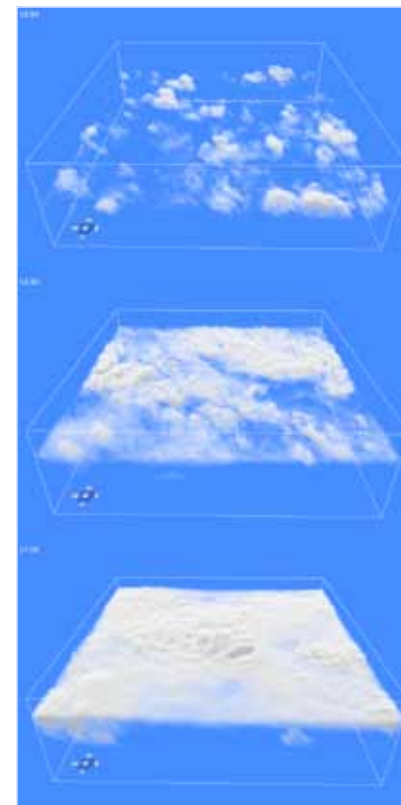
"We've actually thrown in the towel," Professor Harmen Jonker (Geoscience and Remote Sensing) explains about the LES cloud programme. This Large Eddy Simulation programme is a detailed simulation of cloud formation. "In relation to LES researchers said: predicting cloud formation with clever models doesn't work. You just have to do the hard calculations using fluid mechanics equations." One of the pioneers of the programme in 1992 was Professor Pier Siebesma, who currently also works at KNMI. The programme calculates clouds in a box of 10 by 10 kilometres and several kilometres high. The spatial resolution is 10 to 20 metres and smallest unit of time is the second. It works well, but calculating the development of millions of cells requires a lot of computing power. Over the last two years, the technology has become more accessible thanks to the use of graphics cards. One graphics card (developed for game computers and on sale at 200 dollars) proves to be able to calculate as fast as 64 supercomputer processors. Frits Post (Computer Graphics) and PhD candidate Eric Griffith have converted the Fortran

code to Cuda, a language that controls GPUs (graphic processing units). Together with them, PhD candidate Jérôme Schalkwijk developed a modified version of the cloud programme: Gales (GPU-resident Atmospheric Large Eddy Simulation).

For a year now, this programme has been calculating the clouds around Cabauw based on temperature and humidity distribution, while special cameras continuously register the cloud cover. This results in split-screen films with the actual cloud on the left and the computer cloud on the right. Jonker: "The result is surprisingly good. Sometimes we do get it wrong and the cloud appears later than in reality. But apart from that, there's real 'weather' in the programme. You're starting to see the same turmoil on the monitor that you do outside."

Jérôme Schalkwijk, Eric Griffith, Frits Post and Harm Jonker: 'High-Performance Simulations of Turbulent Clouds on a Desktop PC', Bulletin of the American Meteorological Society (BAMS), March 2012.

"You just have to do the hard calculations using fluid mechanics equations"

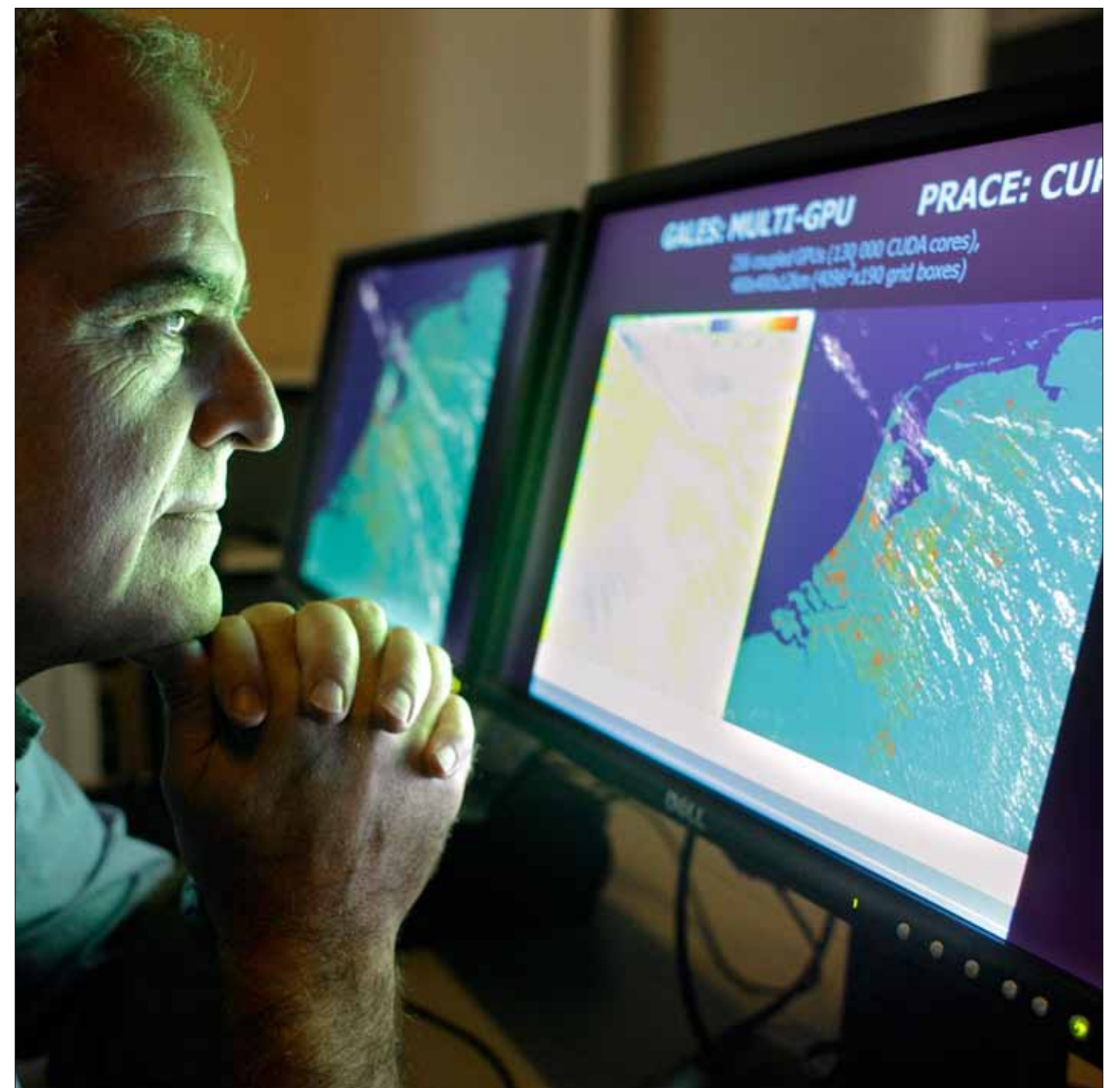


The cloud simulations look convincingly realistic.

In the early days, research at Cabauw focused on the heat and moisture exchange between the air and the soil. The data that were collected in the seventies and eighties have now been processed in weather and climate models. The focus then shifted to clouds, the most poorly understood elements of weather and climate. Siebesma summarises these developments as follows: “Even with the first generation of climate models in the seventies, scientists recognised that clouds are the most uncertain factor in climate models. Based on the same rise in atmospheric CO₂, different climate models consequently generated different global warming predictions, varying from plus 2 to plus 6 degrees. It was not then known which type of cloud caused this uncertainty. We now know it to be the low-hanging stratocumulus clouds. One model expects an increase of these clouds, another expects a reduction. Over the next five years we hope to discover which cloud processes are responsible for the differences between the various climate models.”

Siebesma says he is ‘in the middle of it all’. At KNMI he is a climate researcher and at TU Delft, together with Dr Stephan de Roode, he seeks to translate the results of the LES cloud simulation programme to a larger scale because, whereas LES works on a grid scale of 50 metres at most, the resolution of the weather and climate models is 50 to 100 kilometres. Based on the cloud simulation programme, which uses the average temperature and humidity in its calculations, the researchers seek to enable the large-scale model to show the extent of cloud cover, how much radiation it will block and how much rain will fall from it. This should reduce the differences between the various climate models and the uncertainty in climate predictions. In the next IPCC report there will be just as much uncertainty as there was five years ago, Siebesma says. However, he predicts a significant improvement in another five years’ time.

*‘We now know the **low-hanging stratocumulus clouds** are responsible for the differences between the **various climate models**’*



The cloud simulations around Cabauw might be successful, but then the area concerned is of course only small. However, now that computing power in the GPUs is so cheap, Jonker and his colleagues have come up with the idea of using 256 graphic processors at once to run Gales in an area of 400 x 400 kilometres. The result is breathtaking. On a beautiful spring day you can watch a line of delicate cloud forming in the course of the morning. The IJsselmeer remains largely cloudless. Compared with the actual weather, the patterns and movements are practically identical, although often not in exactly the same place. Jonker thinks this could be improved if the Gales calculations were based on information from a cloud radar. That would enable a unique forecasting method. Russchenberg can see such a system in the city of Rotterdam. A rain radar will be installed there next spring on top of the Nationale Nederlanden building. The

objective is to be able to produce precipitation forecasts at street level to limit the inconvenience in the city. Russchenberg: “If you know what’s coming, you can take appropriate measures. Flooded streets and emergency response by the police and fire service cost several million euros a year. If you can cut that by half, the system will soon pay for itself.” Enabling such fine scale forecasts throughout Europe requires hundreds of automated radar systems with a rain radar, a lidar (measuring cloud height) and a radiometer (measuring the radiation and hence the temperature of the clouds). This might seem science fiction, but a German firm is already working on a cheaper radar for mass production. “We’ll soon have a network of little Cabauws throughout Europe”, Russchenberg predicts.

Watch the clips on cloud formation at www.ablresearch.org

'We have to look further'

At his farewell event Emeritus Professor Prabhu Kandachar displayed more enthusiasm, idealism and optimism than many a politician. The more complex the world becomes, the more work there will be for designers.

Jos Wassink

Everyone's complaining about the crisis. You say: these are great times for designers.

"Because designers have the potential to develop many things that meet global requirements. The crisis you refer to is a European crisis. My story isn't about the European crisis, it's about future global crises."

What kinds of crisis do you mean?

"There are three developments at once really. Population growth is the basis. There are now 7 billion of us. By the end of the century it'll be somewhere between 11 and 15 billion. In other words, the world population will double this century. Much of the population growth will be in emerging economies. This combination will result in a huge rise in consumption. This can in turn lead to food crises, water crises, fuel crises, etc."

Other people say the same, yet you remain optimistic.

"Wait a minute, I hadn't finished. Consumption was my second point. The growth in consumption results in a tremendous growth in waste production and pollution. Our use of raw materials and natural resources for consumption purposes has an impact on our planet. We already use 1.4 times more than the Earth can produce. If everyone lived as the Americans do, we would even need five times the Earth. More consumption leads to a rising demand for raw materials. That can lead to conflicts between nations. These are challenges that designers can respond to. Rich countries pollute the environment much more than poorer countries. Rich countries should therefore reduce their consumption and, at least, reduce their carbon footprint (CO₂ emission per capita, ed.). What's more, people in developing countries can forget about ever reaching the western standard of living

should they adopt the development model of in the western world."

That's not a message people will like there.

"Nor here. Not anyone. There is a little room for an increase in prosperity in poor countries, provided rich countries reduce their consumption. Because we only have the one planet between us. Unless we change our ways, in thirty, forty years' time we will need four times the Earth. Designers play an important part in that change."

How?

"By reducing consumption with more efficient products. Electric or lightweight cars, for instance. Behavioural change is another example. It is still in its infancy, but designers are thinking about how their products could influence behaviour."

Can you give an example?

"Examples include travelling by bike rather than taking the car, designing energy-saving resources and, of course, improving consumer awareness. Designers used to design products and services, but now they also design infrastructures and much more. Above all, designers need to understand the problem. Then you'll be much better able to devise a solution."

Does the future call for a different kind of designer?

"Yes, I think it does. They will need to have had a much broader training than they have now. They'll have to learn to think more systemically."

Does that mean not just thinking about the product but also how it's made, which raw materials are used, its life cycle, etc.?

"Yes, a more holistic approach. Take the United Nations Millennium Objectives for

example. One of those objectives concerns maternal health, another is about children's health. There are more than half a million pregnancy-related deaths a year. And there are still more than seven million child deaths a year. The reduction of these numbers was set as two separate objectives. Only after ten years did they realise that maternal and child mortality are so closely connected that a combined approach would be more likely to succeed. Plus, it's not only about the health of mother and child, it's about the health of an entire community. So you need to take a more holistic approach before you can zoom in. That's what designers need."

Aren't you afraid that the current crisis will threaten the realisation of the Millennium Objectives?

"It is certainly threatened. Last June, in Rio de Janeiro, the UN looked back on the millennium conference held twenty years earlier. They were unable to make a strong statement. The US and Europe have different priorities right now."

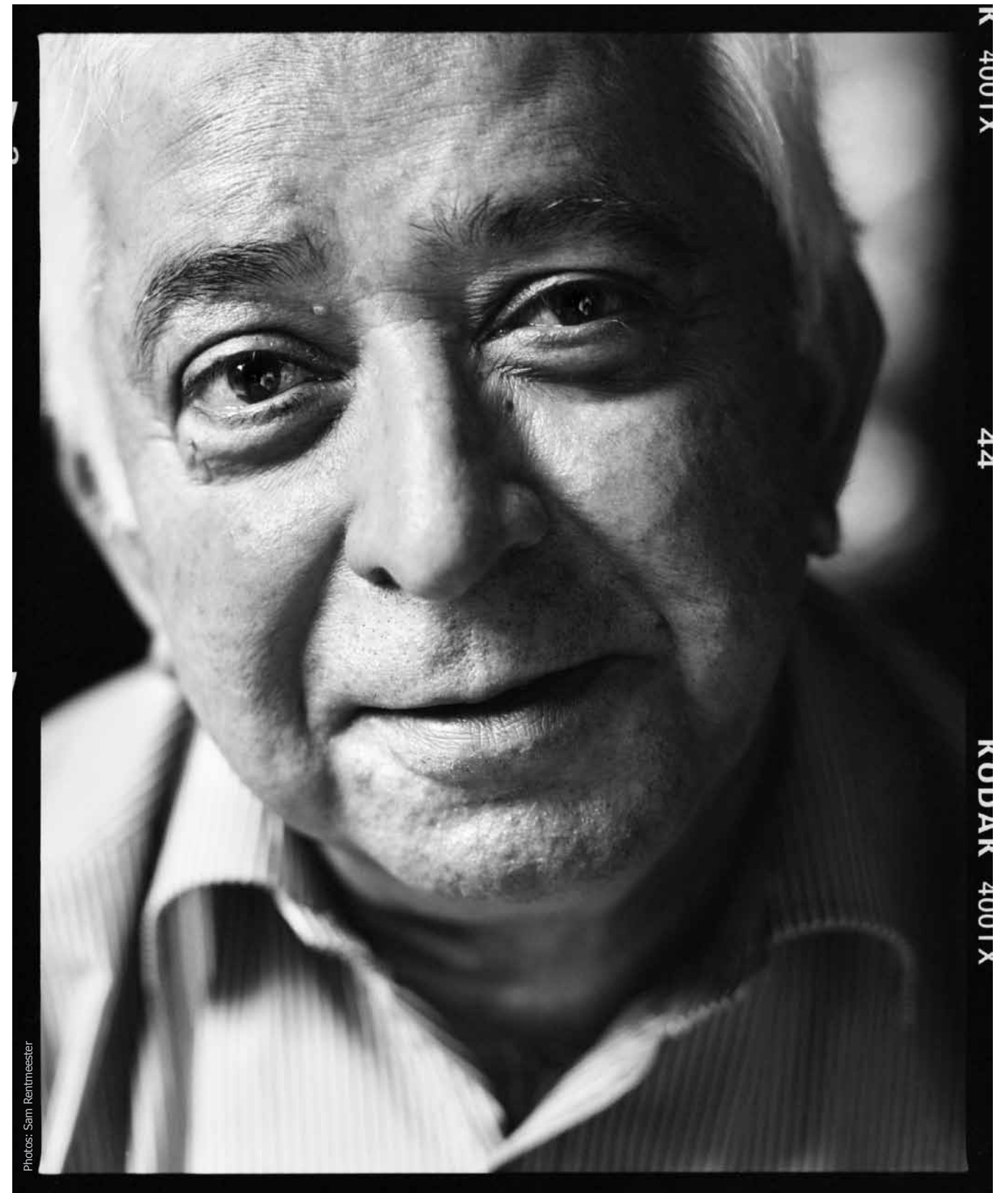
Yet you remain optimistic?

"I am an optimist. Being a pessimist is pointless, so I have to be an optimist. Whether I like it or not. We people always figure it out. But I'm not sure whether or not that's always thanks to technology. There is so much more than technology. Behavioural change, for instance, something social scientists understand more about. I would like to see the universities of Leiden, Delft and Rotterdam approach these kinds of global issue collectively. It would be a golden opportunity."

How? Just start somewhere?

"Yes. With social innovation in poor and rich countries, for instance."

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'Unless we change our ways, in thirty, forty years' time we will need four times the Earth'

Innovation has become such a hollow concept. Does that bother you?

"It doesn't bother me. Innovation might be a hollow concept in the Netherlands. But I also work with Aalto University in Finland. It's a small country with a population of 5 million and one large company: Nokia. And Nokia is not doing well. So the Finnish government told Helsinki University of Technology, Helsinki University of Design and Helsinki University of Business Economics: you'll have to cooperate and merge. In 2010 they merged into one university, Aalto University. They were given 500 million euros and one task: innovate."

Does that work?

"There's no proof of that yet, after just two years. Nor can you expect it."

So what's happening there?

"Hopeful processes. They recognise that innovation doesn't always have to occur in Finland. They also look abroad. They have set up innovation centres in China, India and elsewhere. There's plenty going on there that the Finns want to help with and share in the benefits of. Does that happen here?"

I don't think so.

"That's the reason for your negative feelings; it

doesn't happen here. The innovation platform is here..."

The Dutch innovation platform primarily stimulates the existing key sectors of industry.

"And why is that? The Finnish insight to look abroad and translate what you see to what it could mean for your own country and industry is lacking in the Netherlands. And it is of little interest to today's political parties. Their only concern is whether the speed limit should be 120 or 130. Those aren't issues. Very much of what occurs outside the Netherlands affects the Netherlands so you must also look outside."

Do you sometimes look outside?

"I look outside and inside."

You have made a case for the development of products for the 4 billion poorest in the world, the 'base of the pyramid'. How can that work as a business model?

"Nokia does just that. It can make money by producing a product that is suitable for the population there."

Nokia is successful in poor countries thanks to a telephone with different address books.

"For example: People there often share a telephone, so it's very handy if it has more

than one address book. That innovation was devised after they had seen how people live and use their product. They also saw that people used the display light as a torch and then thought: we'll incorporate LED lights. It's not that hard. You just have to live there for a while and observe. You have to design a product for them. And at a price that is acceptable to them, then you'll succeed."

Is it ethical to profit from people who are poor?

"I don't think it is unethical. They are not forced to buy, are they? But there are other issues. I was involved in the development of a small and inexpensive ultrasound machine that would only cost 1,000 euros as opposed to 20,000. It had to be suitable for an illiterate village doctor to use. The doctor produces the image and transmits it to the hospital where a specialist responds with three lights: green, yellow or red. If the light is yellow or red the woman has to go to the hospital. There is one 'but'. The screen shows whether the baby is a boy or girl. And in some countries, female foetuses are aborted. What am I to do as a design lecturer? If I design it I could save women's lives but endanger the lives of unborn baby girls. These are ethical issues I cannot answer."

A very difficult issue indeed. Do you want designers to produce more sustainable cradle to cradle work?

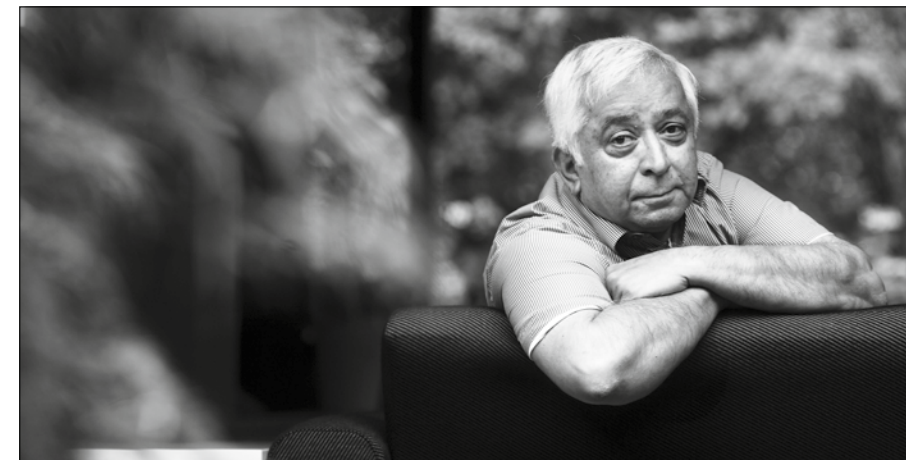
"Any worthwhile developments in that direction must certainly continue."

You are saying goodbye to TU Delft - except to your 5 PhD students. What would you like to say to future designers?

"That they should continue as they are. I am also in the process of convincing my departmental director Frans Gortemaker that a successor should be appointed in my discipline. Dean Ena Voûte also thinks it's a good idea. Fantastic challenges for designers also lie ahead in the cooperation with Leiden and Rotterdam."

Finally: you are the epitome of someone with holistic vision. Is that due to your Indian roots?

"You have a point there, but that attitude isn't just Indian, it's oriental. Consider Chinese acupuncture, that's also a holistic approach. In the western model, you treat a headache with a headache pill. But you might have had a row with your partner, and a pill won't help then."



Who is Prabhu Kandachar

Until 1 January 2012 P.V. (Prabhu) Kandachar was Professor of Industrial Design Engineering with special emphasis on sustainable materials and production technology. Born in India, he obtained his PhD at the Indian Institute of Science in Bangalore and in 1975 came to Delft, where he worked on environmentally friendly technologies until 1980. Between 1980 and 1995 he worked at Fokker Aerospace near Amsterdam. From 1995 he worked at the Faculty of Industrial Design Engineering. In this capacity, he was passionately involved in designing for the very poorest in such countries as India, Indonesia, Honduras and Madagascar. This base-of-the-pyramid approach prompted him to contemplate the world of today and the near future with its numerous challenges. His speech 'Beyond Design' on 7 September 2012 focused on the role of designers in this context.

More women please

Not enough women. That, to me, was the only major disadvantage of studying in Delft. Besides desperate quests for prom dates, the shortage of women was also evident in the lack of diversity in project groups. On my course, Aerospace Engineering, the ratio of men to women was then about twenty to one.

Numerous studies reveal that creativity and innovation benefit from a diverse staffing base. At least as many studies also demonstrate that boys and girls have an equal talent for sciences. In short, a disproportionate ratio of men to women in the faculty is about as undesirable as an all-bass choir.

Photo: Sam Rentmeester



Tonie Mudde is an author and science journalist for the newspaper de Volkskrant. He studied Aerospace Engineering at TU Delft from 1996 to 2002.

The technical universities have clearly realised this. In Delft, Eindhoven and Twente the number of women professors rose from 2.8 percent to 8.3 percent over an eight year period. Chapeau, keep up the good work. I read in the university newspaper Delta that TU Delft is investing over ten million euros on a development programme for female scientists. Some men are very much against this; indeed the first has already complained to the Equal Opportunities Committee. The complainant, a Delft alumnus, feels that he now has less chance of being appointed. He has a point, strictly speaking. I nevertheless hope that the priority ruling remains in place. The average woman seeking to carve a scientific career is already disadvantaged enough as it is. It starts around the first birthday, when boys are a little more likely to be given Duplo, cars and rockets as a present than girls. Next are the maths and physics teachers, usually men and therefore, logically, more of a role model for boys than for girls.

Girls who nevertheless choose a science career can find themselves hitting the glass ceiling. I recently spoke with Marieke van

den Brink of Radboud University Nijmegen, who specialises in male/female issues relating to staff recruitment. She said: 'If the next professor is announced at a congress, I automatically look at the man in the audience with the beard rather than the young woman beside him.' Thinking patterns are that tenacious: even a female glass-ceiling expert thinks of a man first on hearing the word professor.

Is the man complaining to the Equal Opportunities Committee aware of all the preferential treatment he and his fellow men have secretly enjoyed for decades? Just think of recruitment via the Old Boys Network, the wording of vacancies, which appeal to men more because they are written by men, interview committees with a disproportionate number of men. If it were up to me the judgement of the Equal Opportunities Committee would be: 'True, this one measure is disadvantageous to you. But so many more measures work in your favour. Complaint unfounded.'

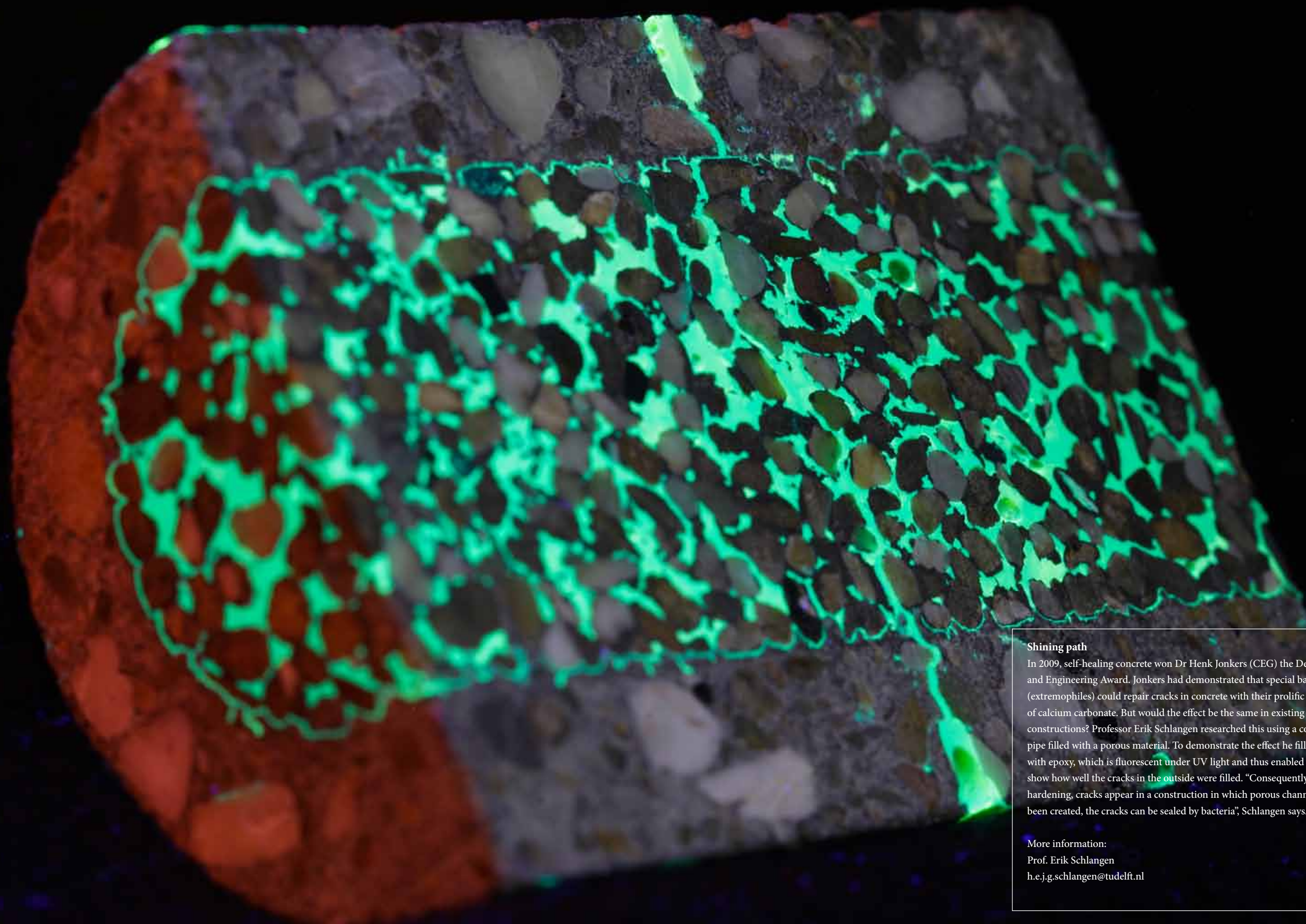


Under construction



Photo: Sam Rentmeester

At the end of October, the first two floating foundations, on top of which sustainable floating homes will be completed over the next few months, were anchored in the Tuindersvaart in the Delft Harnaschpolder. The project is a collaboration between the City of Delft, the former TU Delft high-tech start-up Deltasync and the future residents building their dream home here.

**Shining path**

In 2009, self-healing concrete won Dr Henk Jonkers (CEG) the Delft Design and Engineering Award. Jonkers had demonstrated that special bacteria (extremophiles) could repair cracks in concrete with their prolific deposits of calcium carbonate. But would the effect be the same in existing concrete constructions? Professor Erik Schlangen researched this using a concrete pipe filled with a porous material. To demonstrate the effect he filled the pipe with epoxy, which is fluorescent under UV light and thus enabled him to show how well the cracks in the outside were filled. "Consequently, if, during hardening, cracks appear in a construction in which porous channels have been created, the cracks can be sealed by bacteria", Schlangen says.

More information:

Prof. Erik Schlangen

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Propositions

The only way to reduce healthcare costs is to take better care of each other

Frank van der Pijl
Transport engineer

The extent to which a university values its employees and students can be read by the quality of its toilet paper.

Matthijs Dicke-Ogenia
Electrical engineer

Those with a higher education who are against raising the pension age out of expediency have made wrong career choices.

Gijsbertus de Lange
Physics engineer

The use of apps stimulates intellectual laziness.

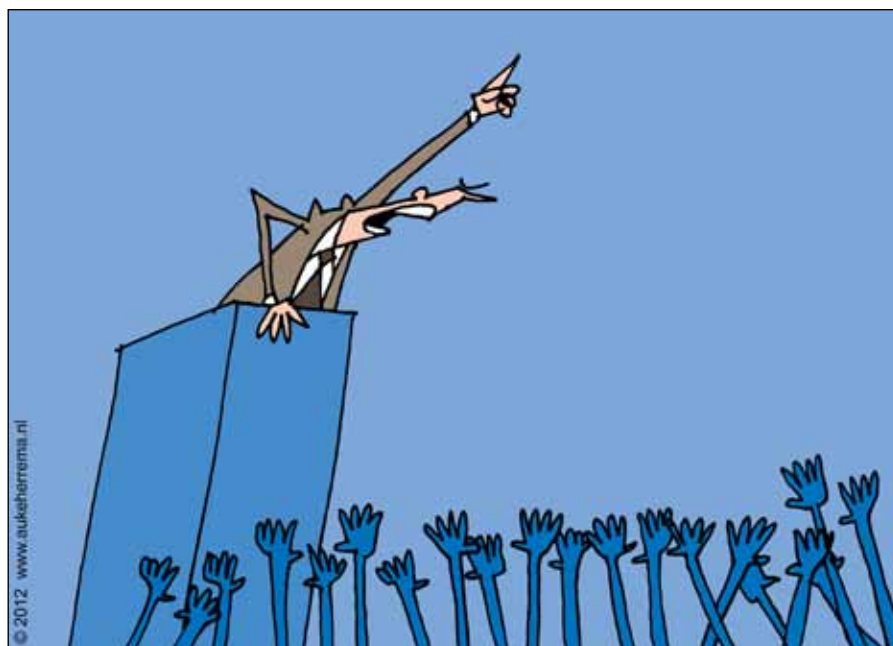
Marinus van Loenhout
Physics engineer

Creative technical solution can only arise in complete artistic freedom, while innovation is only possible when it is carefully constrained.

C.J.H. Keijzers
Physics engineer

Computer simulation is a sharp scalpel to dissect experimental data, but the truth only can be found when you know where to cut.

Yunan Gao
Physics engineer



Proposition

A bit of discontent with oneself leads to self-development. Too much of it leads to selfdestruction.

Alina Hriscu, physics engineer

Defence

"In scientific research, it is a professional 'requirement' to keep a critical perspective on things. As it applies to the topic of research, so it applies to the researcher him(her) self. Facing the challenge brings us many insights and I suppose much progress comes in this way, both professional and personal. But how much self criticism is too much? Sometimes we fail to solve a problem, or we meet our own limitations. We think: "oh, am I good enough to solve this?"; or "I should have known that already!"

Too much dissatisfaction with oneself, can lead to a vicious circle of demotivation and lowering of self respect. We have to strike the right amount to keep the self-criticism on the constructive side. To keep such a subtle balance, I believe, is part of the skills of an experienced researcher."

Soundbites

"In terms of politics, the fact that mortgage interest relief is to be adjusted for existing mortgages is, of course, a major breakthrough. But the coalition agreement deviates embarrassingly from the reform plans scientists and interest groups presented before the elections. The politicians' prime focus is clearly on cutbacks and not on injecting life back into the housing market."

Professor Hugo Priemus in de Volkskrant

"It is causing few people sleepless nights. After all, who is involved with American investigation services? But it goes much further than that. This is a recipe for too much state power. The checks and balances are missing."

Professor of Internet Security Michel van Eeten in NRC Handelsblad on working in the cloud and being watched by the government, in particular by the CIA.

"The technique of saving yourself with a parachute is also applied in aerospace. This is a fine act of daredevilry but has very little to do with science."

Aerospace Engineering Professor Boudewijn Ambrosius in Algemeen Dagblad on the record-breaking jump from a height of 39 kilometres by Austrian stuntman Felix Baumgartner in mid-October.

People who make statements without being bothered by any knowledge, can end up in positions where lacking of knowledge no longer hinders them.

M.R. Tajari Mofrad,
Electrotechnical engineer

Pull the plug

Society is increasingly dependent on ICT technology. ICT expert Dr Jan van den Berg (TPM) believes things have been carried too far in some fields.

"In some fields it would perhaps be better if we decided to pull the plug on the internet, even though that will not always be an economically pleasant option. Take the connectivity of our waterworks: whether or not floodgates should be opened or closed is partly determined by online data exchange. If a hostile nation wants to hit the Netherlands it can attempt to remotely flood vital areas with a sophisticated cyber attack. We have created a world in which this is actually possible. Another example is the electronic patient record. If the ICT system were to fail, due to any ICT incident whatsoever, could patients still be treated? Was that risk explicitly considered when deciding upon implementation? Besides needing to provide better detection and surveillance systems, so we know what is wrong and are aware of new trends in cyber attacks ('situational awareness'), we must especially consider the risks that are inherent to the use of ICT and how we deal with them. With regard to the dykes, politicians have indicated what the acceptable risks are. Certain dykes are allowed to collapse once every 10,000 years. In traffic, 600 hundred deaths a year in the Netherlands is considered more or less 'acceptable'. Establishing an acceptable level of internet safety is probably more complex, but it is something we must address.

Yet politicians don't look very far ahead and usually only respond to incidents. Look at last year's DigiNotar affair, for instance. Politicians were wondering how on Earth this could have happened.

Another phenomenon Van den Berg considers is cyber warfare. "A transformation is actually ongoing in terms of the way ICT

'Establishing an acceptable level of internet safety is probably more complex'

technology is used in warfare. In the United States they already refer to the Obama doctrine. Here in the Netherlands there is no real public debate about it. The Dutch government recently purchased a number of drones. How they are to be used is clouded in uncertainty. And how are soldiers to be trained to deal with these unmanned, remotely controlled aircraft that cause loss of life? It's high time there was more openness and a public political debate was started." (SB)



Photo: Sam Rentmeester

Siemens leaves Desertec

The German group Siemens has withdrawn from the Desertec project, the ambitious programme seeking to provide Europe and Northern Africa with solar power from the Sahara.

Siemens liked the idea; gigantic solar thermal stations which use solar power in the Sahara to generate electricity. Thermal solar power involves a network of mirrors reflecting the sun's rays on a tube of special oil or a collector in a centrally located tower. The concentrated heat is used to generate steam to drive the turbines, thus generating electricity. Siemens has quite some expertise in this area. The company therefore decided, several years ago, to take part in the Desertec Industrial Initiative (Dii) which seeks to supply Europe and Northern Africa with solar energy, and in particular thermal solar power from the Sahara. This month however, the company announced its withdrawal from the project.

Will this endanger the Desertec project? Rogier Rouwet, chair of the Delft Energy Club, thinks not. While Siemens is the front runner, it is not the only company developing solar thermal technology, he says. He points out that Siemens is

'I think the efficiency is quite limited'

not involved in the Desertec first solar power plant in the Moroccan Ouarzazate. Is thermal solar energy an outdated concept and is that the reason from Siemens' withdrawal from the project?

Rouwet doubts that. "It might have something to do with the crisis. Now doesn't seem to be the time for large-scale technologies such as solar thermal systems."

According to Dr Kas Hemmes of the Technology Dynamics & Sustainable Development research group (TPM) the efficiency of the solar thermal systems leaves much to be desired. "I think the efficiency is quite limited and that you need an awful lot of mirrors. They are certainly quite secretive about it all. I have looked, but they are reluctant to release any figures."

Hemmes believes there is another, economically more interesting way in which companies working on the Desertec project could make use of the sun. They should concentrate on fuel production.

"Solar energy can be used to split natural gas into hydrogen and pure carbon", explains Hemmes, who has researched this and last year published an article in the International Journal of Hydrogen Energy. "Besides the hydrogen, you can also use the carbon as the fuel in a fuel cell. A recent development in this respect is the direct carbon fuel cell."

But how sustainable is that? The combustion of carbon does produce carbon dioxide emissions. "True, but this form of energy is cleaner than the direct use of natural gas. You are mixing fuels: solar and fossil!" (TvD/JW)

Hercules' head

Neutron beams are much more suitable than X-rays for scanning bronze statues.
Good news for our art collections?

Jos Wassink



Renaissance bronzes (from the fifteenth and sixteenth centuries) are an important collection within the Rijksmuseum. Until recently, art historians only ever studied the style features. Exactly how the sculptures were made was of little importance to them however, partly because this was barely visible. Now, new techniques based on neutron tomography reveal every detail of the hidden inside. Not only does this enable one to learn more about the artist, it also facilitates the distinction between an original and a copy. That could be a matter of millions. Robert van Langh (44) is no average PhD candidate. He considers himself a late developer. Upon leaving secondary school he went to a retail school in Breda, after which he trained as a goldsmith in Antwerp. He learned to restore fine art at the Antwerp Institute for Fine Arts. His interest in the scientific aspects of the various works of art led him to research institutes in New York and Florence. In 2006 head of conservation & restoration Van Langh, encouraged by art

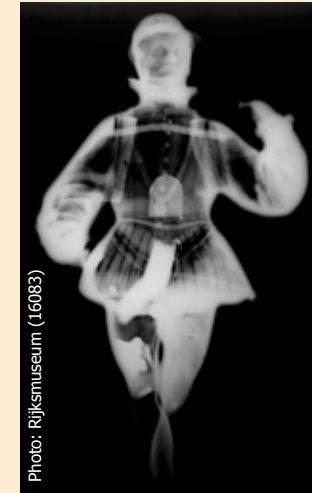


Photo: Rijksmuseum (16083)

Strange man

"The sculpture was initially considered a full-length portrait of William of Orange and attributed to sculptor Hendrick de Keyser (who also sculpted his memorial stone in Delft). The walking pose and strange posture later suggested a walking musician (a player of the violone, an early form of viola da gamba and cello). The X-radiograph revealed a strange 'hatch' (a flap with a rounded top) in the back of the sculpture, for which there was no apparent explanation.

With the aid of neutron radiography and tomography it could be established that the arms and lower legs had been cast on separately (and not cast in one run). This led us to believe that the sculpture was originally intended to be a moveable man, like a clockwork doll or an automaton (wind-up toy). This also explains the walking position. In this case the 'hatch' on the back would have been an opening for the winding handle to start the walking mechanism. These sculptures were especially made in Southern Germany in the sixteenth and seventeenth centuries.

The conclusion, therefore, was that the sculpture had originally been intended as an automaton but that it was later decided to fixate it as a standing figure and to seal the hatch in its back. Consequently, the sculpture is no longer attributed to De Keyser but is now listed as an automaton figure of a walking nobleman, made in Southern Germany (Neurenberg or Augsburg), c. 1580-1600. This case illustrates beautifully how collaboration between art historians and scientists can lead to new insights." (Frits Scholten)

historian and Rijksmuseum curator Prof. Frits Scholten, began his doctoral research with Prof. Joris van Dik's research group at the Faculty of Mechanical, Maritime and Materials Engineering. Van Langh's point of departure for any research is often a hunch that something about a sculpture is not quite right. This was also the case with the 35 centimetre sculpture of the Greek demigod Hercules, attributed to the sixteenth century sculptor Willem

later, the 3D dataset was complete.

"Wow, look at that!" Van Langh calls out as, on his monitor, he navigates through the inside of the sculpture up towards the Hercules' head. Nothing remains hidden here. It is decidedly strange that no iron core pins are visible on the inside of the Hercules sculpture, but that core material can be seen in the arms and legs. The absence of core pins means that the sculpture is not a direct cast but a copy.



Robert van Langh: "Neutron tomography is a powerful technique."

'Neutrons are sensitive to hydrogenous materials such as resin and wax'

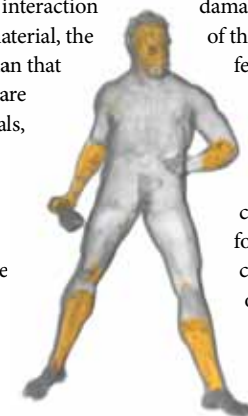
van Tetrode. X-rays had been made of the sculpture before, but they had not shown sufficient contrast due to the thickness of the material.

So Hercules went to the Neutra facility at the Paul Scherrer Institute in Switzerland. The neutron beam used here comes from a spallation setup: a lead plate that is bombarded with protons delivering 600 MeV of power. The resulting neutron beam is first slowed down and then conducted to 'the object'. As there is very little interaction between the neutrons and the material, the penetrating capacity is higher than that of X-rays. In addition, neutrons are sensitive to hydrogenous materials, such as resin and wax, thus also revealing information about soft materials. To make it even better, the neutron images from Switzerland are tomographic: the sculpture was rotated 1 degree before each following image. Three hours and 180 degrees

Something else is strange about this sculpture: the torso is hollow but the arms and legs have core material. As if someone had scraped out the top of the sculpture. But how is that possible if the sculpture is closed? The X-rays had revealed cracks in the hair. Did this suggest that the crown had been cast on separately?

Close examination of the neutron images revealed a thick lump of bronze behind the nose. Van Langh thinks the inner mould was damaged during the casting process. Pieces of the inner mould material consequently fell into the gap, blocking the flow of bronze to the head area, which resulted in a sculpture without a crown. The makers then filled the head (as the neutron images clearly show) and made a new mould for the missing part. A good piece of craftsmanship, as nothing can be seen on the outside.

'Neutron tomography is a powerful technique because it provides



genuine 'insight' into these objects,' Van Langh writes. He believes that when studying works of art one should also note how they were made - something which is not done often enough. Van Langh would love to put the entire oeuvre of a well-known sculptor through the neutron scanner. That could reveal more about a person's typical way of working and how it develops. It could also result in the sculpture being attributed to someone other than would otherwise be the case on the basis of style features alone. 'We should look at these works differently,' the PhD candidate says in summary. Although he also knows that in saying that, he will kindle the wrath of the more conservative curators.

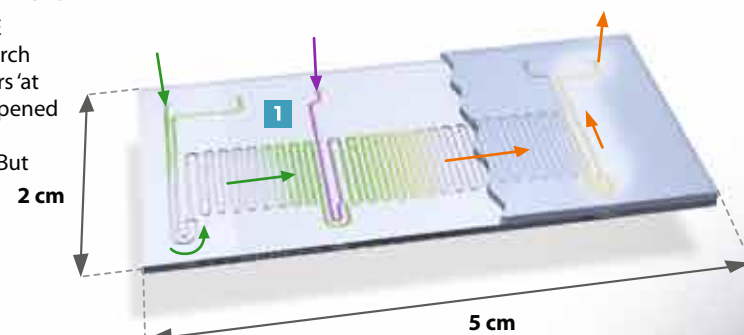
Robert van Langh: 'Technical Studies of Renaissance Bronzes,' PhD supervisors: Prof. Joris Dik (TU) and Prof. Frits Scholten (UvA).

Snooker, not pinball

In 2011, Andrzej Stankiewicz, professor of process intensification (3mE faculty), received a grant of 2.3 million euros from the European Research Council to conduct research into the improvement of chemical reactors 'at molecular level'. Last September, Stankiewicz's 'Perfect Reactors Lab' opened its doors. One type of microreactor **1** is already known: a glass plate through which molecules can flow through micro- or nano-channels. But how can one perfect a microreactor and how does it work? For more information see: www.pe.tudelft.nl/Chairs/IRS

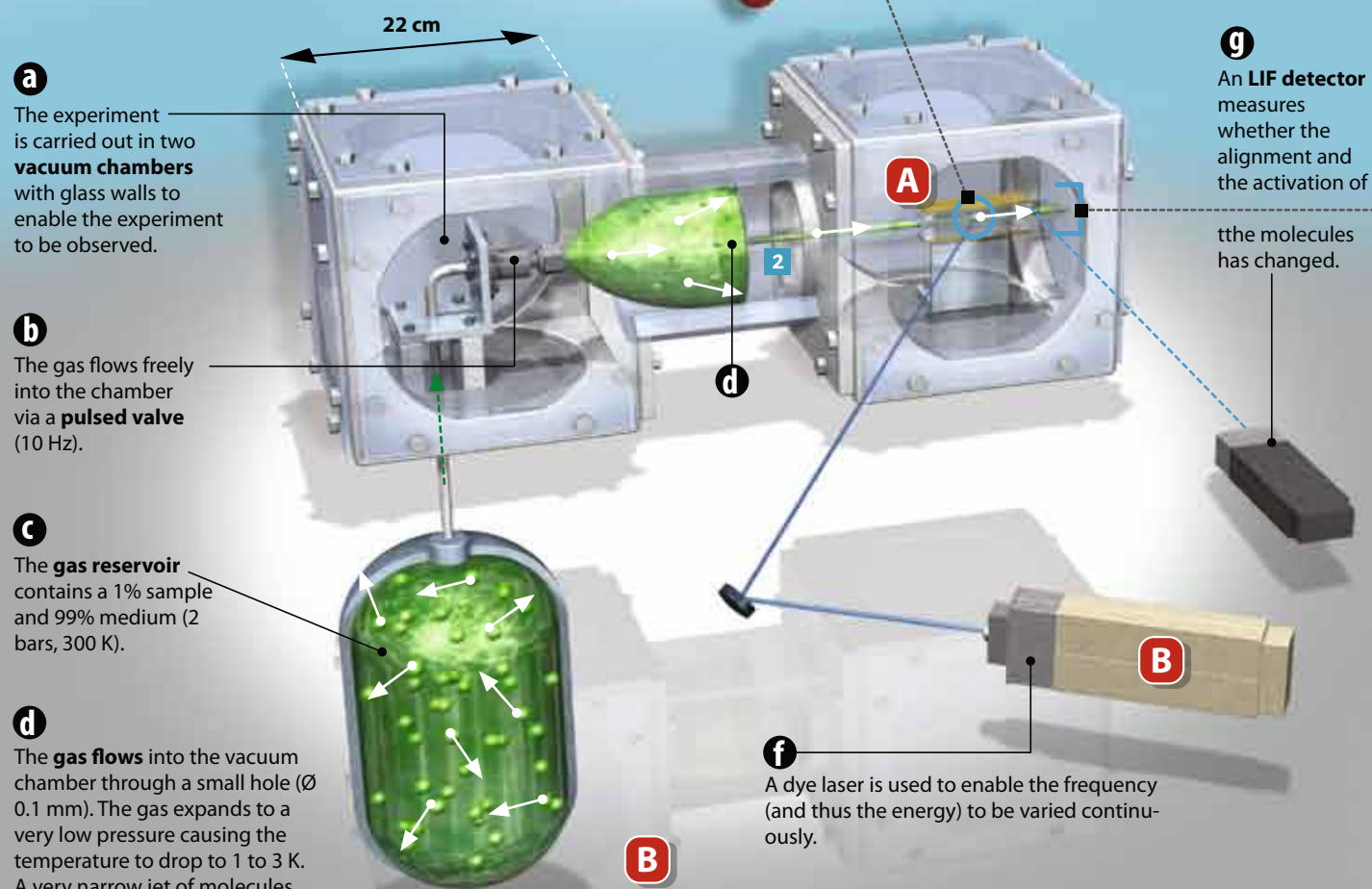
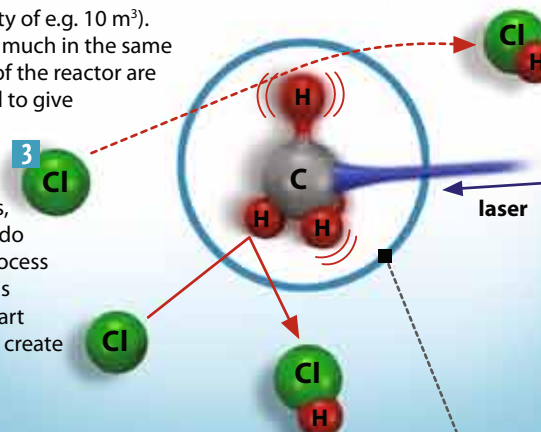
A pinball machine with efficient collisions

The current practice in the chemical industry is to mix substances together in a large reactor vessel (with a capacity of e.g. 10 m³). During mixing, the molecules collide randomly much in the same way as balls do in a pinball machine. The walls of the reactor are heated to increase the number of collisions and to give the molecules the required activation energy. A disadvantage of this method is that large temperature gradients arise. Some molecules become too hot and form undesirable products, while other molecules are not hot enough and do not react. The macroscopic regulation of the process means that only a small number of the collisions actually lead to the desired reaction and only part of the substances being mixed actually react to create the final product.



Spectacular improvement of reactor yield

Collisions between chlorine atoms and methane molecules can result in the production of hydrogen chloride. A laser beam can be used to add energy to the H atoms in the methane molecules. This stretches the bonds in the methane molecule and increases the "target area" so that even non-frontal collisions **3** become effective. Experiments in the United States have shown that using a laser can increase the reaction rate by a factor of 100.



Activating molecules using laser light

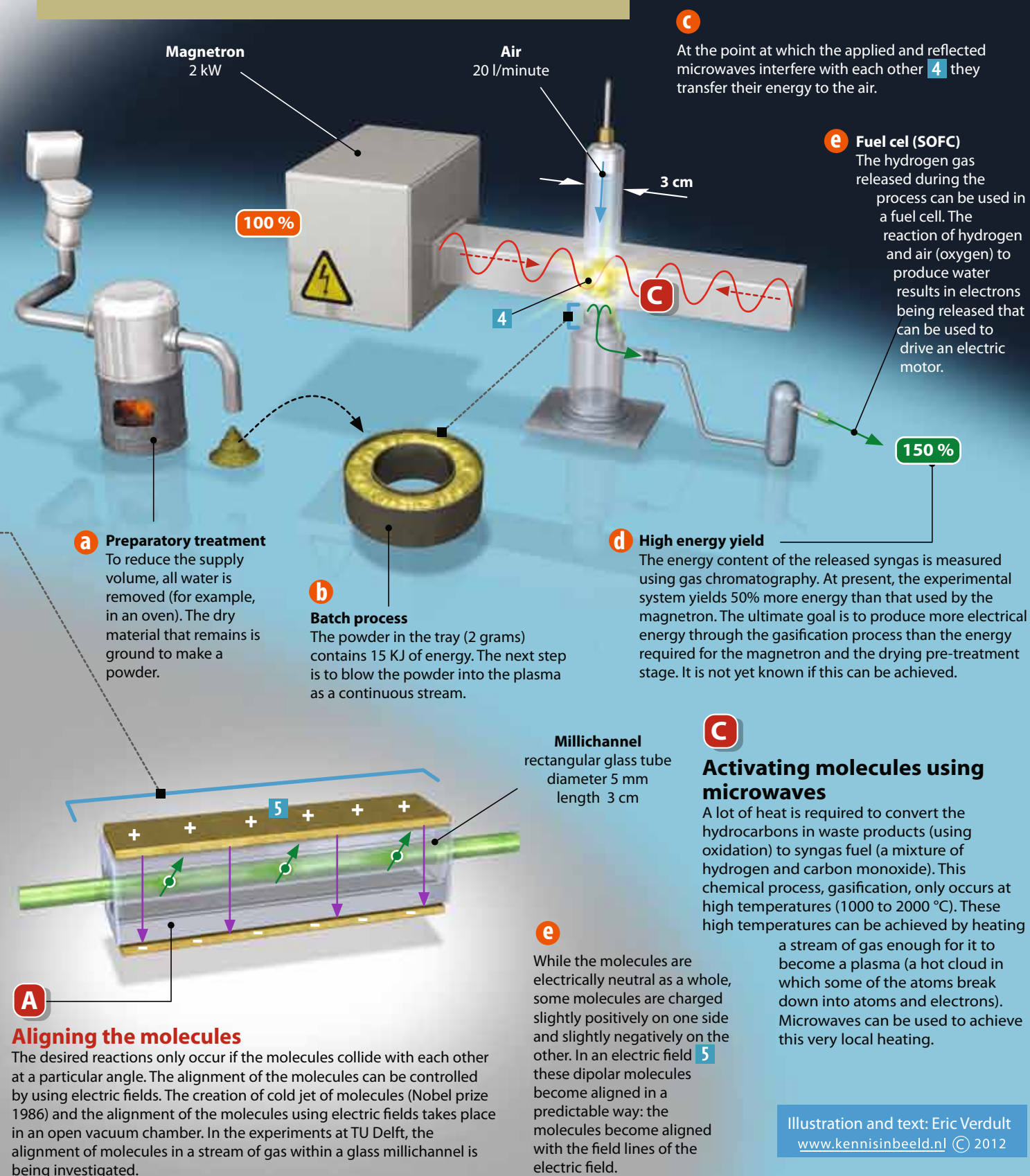
The desired reaction only occurs if molecules have a particular energy when they collide. Laser light can be used to add a specific amount of energy to the molecules to achieve the required activation energy. The additional energy causes the atoms to become excited more quickly, weakening the bonds between them and enabling reactions to occur more frequently. The Perfect Reactors Team is going to investigate the effects of laser light on reactions.

Playing snooker with molecules

A chemical reaction consists of collisions between molecules that result in their existing molecular bonds being broken and new bonds being formed (this requires energy). Molecules collide with each other at different angles, but the desired reaction only occurs if they collide at a particular angle. The energy involved in the collision must also be a particular precise value. If the energy is less than this activation energy, no reaction will occur, while too high an energy will result in a different reaction and the production of undesirable by-products. Rather than random collisions, Stankiewicz wants to control the alignment and activation of all the molecules when they collide. This is a bit like playing snooker with the molecules at a nano scale. This leads to more intensive reactions that produce more of the desired end product while using less energy and raw materials. This is made possible by drastically cooling the molecules (to a temperature of 2 K) so that they no longer move in a random way.

Electrical power from waist

A very practical application of research into the activation of molecules is the development of a simple process for converting human excrement into fuels. A working prototype is expected to be ready within a year. In developing countries, the new toilet system will provide energy to people and improve hygiene at the same time. The project is being funded by the Bill and Melinda Gates Foundation. The envisaged system will fit into a standard shipping container.



Loyalty under oppression

The Second World War cost the lives of 180 students and staff of the Technische Hogeschool (TU) Delft. Historian Onno Sinke has written a book about those tumultuous years.

Extract from 'Loyaliteit in verdrukking'

"The war threat changed life in Delft. During the mobilisation (August 1939, ed.) several of the college's buildings were requisitioned for military purposes. The servicemen left most of them again within a few weeks so that the timetables did not have to be altered. Only the enrolments for the new academic year and first-year degree audits had to postponed by one week. The mobilisation of 46 members of staff, including six lecturers, and no fewer than 800 of the 1776 students enrolled did

cause major problems.

Professor of Microbiology A.J. Kluyver observed 'a not insignificant stagnation' of the activities in his laboratory. Two of his staff and several students were called up and all foreign researchers had returned home. Luckily, the research could be continued, in part at least, because Kluyver's small scientific team was still intact. Much of his own time was spent solving all the practical problems resulting from the mobilisation. The mobilisation of students also hit the

various student associations. Sanctus Virgilius lost thirty seniors to the army, just when the new students were due to arrive for their introduction period. It was only with great difficulty, therefore, that the first-year students could be properly initiated into the Roman Catholic student associations. The student associations avoided any outward show. Much to the disliking of many Delftsch Studenten Corps (DSC) members, the candidate members' heads were not shaven and the traditional torchlight procession and rowing races were abandoned. Moreover, the committee of the DSC, the Senate, did not travel in the usual carriages.

Many of the students who had been mobilised ended up outside Delft. Some of them initially enjoyed soldier life. Twenty-year old Mining student Ruud von Nordheim was assigned to the 4th Company of the 16th Depot Battalion in Alkmaar. There were ten of them quartered in a classroom on Vondelstraat. Most of this fellow soldiers were 'simple' lads. 'That makes for a pleasant change,' he wrote in his diary on 19 September 1939, 'because in time, mixing with fellows from one's own environment who are not your friends becomes a bore. I have been sleeping with them for three weeks or so now and it [is] a riot practically every evening' [...]

Despite enjoying soldier life, Von Nordheim still wanted to work on his studies. He sent a letter to the department of Mining, asking if he might sit some examinations. Most of the professors obliged him in this. Von Nordheim's case was no exception. At the Technische Hogeschool there was wide concern for the progress delays suffered by students who had been mobilised. [...]

Contrary to some other degree programmes, future engineers were often required to conduct work in the drawing office or laboratory. In October 1939 therefore, on the initiative of Colonel P.W. Scharroo, Garrison Commander of Rotterdam, 180 Delft students training to become reserve officers with the Engineering Corps and who had not yet obtained their Bachelor's degree were brought to Delft. This TH company was quartered in a building of the Road and Water Engineering department in Oostplantsoen and was under the command of Reserve Major U. van der Zee, a police commissioner in everyday life. Several other police officers were also appointed leading positions as reservists in the TH company.

Despite being under military discipline, the students' military training was no great shakes. When the Germans invaded the Netherlands in May 1940, TH company fired live ammunition only twice. The students were exercised in full military kit for half an hour every morning, took lessons in the afternoon and studied in the evenings. Indeed, their most important task was to obtain their Bachelor's degrees as soon as possible. There was literally a gun behind every door: any student who did not study hard enough ran the risk of being sent to join the field army.

Exceptions to this regime were sometimes made, however. The rowers of Laga, a sub-association of the Corps, were soon allowed to train for one hour a day. The fact that training time had been shortened was not reflected in the results: In the 1939-1940 season Laga won the Head of the River as well as the Varsity and the Telegraaf Cup."

Lest we forget

The Second World War was a dark period in the history of our university. Delft students went on strike. More than a hundred students and staff of the Institute of Technology ultimately died in the resistance. Others either signed statements of loyalty or were openly pro-German. What were their motives, their experiences? A lot is known, but much is yet unknown. This is why TU Delft and the association of former members of the Delftsch Studenten Corps took the initiative to research the history of wartime Delft and the role of students and staff during this period. Besides using the usual sources for this thorough historical research, Dr Onno Sinke also collected new material. Thanks in part to these interviews, diary extracts and letters from survivors and surviving relatives, the book has an authentic Delft feel about it. Lest we forget. Because even today, both as people and scientists, we too can be confronted with fundamental questions of conscience.

Karel Luyben, rector magnificus



Photo: Archief Paardekooper

The TH company marches, 1939 or 1940.

The Technische Hogeschool Delft (TH) during the Second World War

German hostility in Europe led to the mobilisation of Dutch students in August 1939. They came into action when Germany attacked the Netherlands on 10 May 1940. After the capitulation everyday life resumed and the management of the TH sought to avoid all provocation by the occupier. In October 1940 the Germans suspended six Jewish lecturers. This sparked a large outcry among the students. A spontaneous strike was a huge success but led to the closure of the TH and of various student associations. Student life continued underground.

There was immediate unrest again after the reopening of the TH in March 1941. Professors J.A.A. Mekel and R.L.A. Schoemaker as well as several students were arrested for resistance activities and executed. The Germans took various measures to Nazify the college. Members of the TH Board belonging to the Dutch National Socialist Movement NSB were given extensive powers. Their plan nevertheless failed due to a lack of allies.

In February 1943, in retaliation for an attack on a member of the NSB, the Germans raided several student cities. In Delft, 223 students were arrested and transported to camp Vught. In exchange for their release, all students had to sign a statement of loyalty and refrain from any anti-German activities. Those who signed could continue their studies. In the end, 25 percent of the Delft students signed – more than the national average. The others were called up for compulsory work in Germany.

In 1944 the professors, prompted by Rector Magnificus J. Muysken, said that they regretted their advice to sign the statement of loyalty. They also proposed suspending higher education. Muysken was subsequently arrested. But during the 'Hunger Winter' there was no place for higher education anyway, as survival was more important. After the liberation it emerged that the war had cost the lives of 180 Delft students and lecturers. The TH set up commissions to evaluate the conduct of staff and students during the war. In September 1945, despite everything, the first post-war academic year began.

'Loyaliteit in verdrukking' (Loyalty under oppression. The Technische Hogeschool Delft during the occupation), by Onno Sinke, is for sale at the information desk in the Aula (€ 24,95). Only in Dutch. An exhibition held in the library until 2 January focuses on the personal dilemmas Delft students faced during the Second World War.



Dr **Edward Valstar** (3mE) has been appointed Antoni van Leeuwenhoek professor. He develops prostheses that will last for the rest of the patient's life. Valstar studied Mechanical Engineering at TU Delft and worked in the Orthopaedics department of Leiden University Medical Centre. He has also held a position at TU Delft for the last ten years. In 2007 he received a Vidi grant for research into the early treatment of loose prostheses.



At the end of November, Prof. **Hennes de Ridder** (CEG), of Integral Design Methodology, bade farewell to TU Delft. In his farewell speech he recounted his twenty year quest for the reorganisation and development of a more sustainable building sector. He was involved in such projects as HSL Zuid, Zuiderzeelijn, Rondje Randstad, Volgermeer, Noord-Zuidlijn and Maasvlakte2.



Theoretical physicist Dr **Yaroslav Blanter** has also been appointed Antoni van Leeuwenhoek professor. He is associated with the Kavli Institute of Nanoscience (Applied Sciences) and is an expert in the field of quantum transport. His research is important to the development of the quantum computer. Blanter studied Physics in Moscow and came to Delft in 2000.



In Korea, Professor of Drinking Water Engineering (CEG) **Jan Peter van der Hoek** received the IWA Sustainability Award 2012 for his article on the Amsterdam water cycle company Waternet. He described how Waternet seeks to develop a sustainable cycle by utilising energy from water to thus enable climate-neutral operations by 2020.



Last but not least, Dr **Geert Leus** has been appointed Antoni van Leeuwenhoek professor (EEMCS). His specialism is the theory and mathematics of communication signal processing. In 2008 he received a Vici grant for research into more autonomous wireless sensors. Leus studied Electrical Engineering in Leuven and is editor-in-chief of the Eurasip Journal on Applied Signal Processing.



Dr **Elisa Giaccardi**, one of the recipients of the TU Delft Technology Fellowship for top female scientists, has been appointed Professor of Interactive Media Design at the Faculty of Industrial Design Engineering. Before her appointment at TU Delft, she was associate professor UC3M in Madrid and senior research scientist at CU Boulder in the United States.



Prof. **Sybrand van der Zwaag** (AE) and Prof. **Luuk van der Wielen** (Applied Sciences) may call themselves 'distinguished professor' in the fields of Material Science and Biobased Economy respectively. They both distinguish themselves by the successful valorisation of scientific and technological knowledge for industry and society. This position will enable them to concentrate on knowledge valorisation beyond the boundaries of their own chair.



Prof. **Ben Ale** has left TU Delft. In December 2002 he joined the TU as part-time Professor of Safety Science and Disaster Abatement, the first in the Netherlands. The chair was founded together with the Netherlands Institute for Fire and Disaster Abatement (Nibra) with which he was affiliated until 2006.

Eight TU academics have been awarded a European Research Council Starting Grant. This prize is awarded for a five-year period to academics leading an independent team or programme who have the potential to become world-class researchers. The grant is worth up to EUR 2 million. Prof. **Nynke Dekker** plans to use her ERC Starting Grant to further research into the dynamics of data handling processes during DNA transcription and DNA reproduction (copying DNA). Dr **Ronald Hanson** is researching the possibilities of controlling the quantum properties of spins. Dr **Val Zwiller** is working on quantum optics. He intends to use his grant to

develop a 'nano device toolbox' for quantum optics based on individual photons. Dr **Chirlmin Joo** is an RNA specialist; RNA is a molecule which is crucial to the copying of DNA. Joo aims to study MicroRNA and the protein complex RISC with the aid of single molecule fluorescence microscopy. Dr **Marnix Wagemaker** focuses on one of the major technological issues of this century: energy storage. He seeks to improve the fundamental knowledge of electrodes in Li batteries with a new experimental and computational approach. Dr **Robert Bogdan Staszewski** pioneered 'Digital RF', a technology that enables digital processing of radio signals in microelectronics. Digital RF is particularly

applicable to the field of mobile communications. Staszewski is seeking solutions for the new growth markets high data rate smart phones and ultra low-power wireless sensor network devices. Dr **Maria Santofimia** (1977) will concentrate on developing fundamental knowledge of the nucleation and growth of unbalanced phases in steel and the interaction between these phases. The influence of these phases on the mechanical behaviour of the material will also be researched. Dr **Francesco Pedaci** (BN/Nynke Dekker Lab) will use his grant to set up a research group at the Centre National de la Recherche Scientifique (CNRS) in Montpellier, France.

Fashion designer

Within a year, Industrial Design Engineering student **Marin Licina** (26) managed to obtain a firm footing in the fashion industry. This success is partly due to striking media campaigns.



The first of three steps in the Cravatta Pellianno business plan was as simple as it was complex: enter the fashion industry as soon as possible. With a modest starting capital of 55 thousand euros, four students managed to accomplish what other companies spend millions on. They have good relations with manufacturers and the media, realised a turnover of half a million euros within a year and sell their products in 130 shops in seven countries. How did they do it? Licina describes his company's marketing as 'different and striking'. "Take the prestigious menswear trade show Pitti Uomo in Florence, for example. We designed suits for the staff of the chic and expensive Savoy Hotel. We were given a hotel suite in exchange. We then had an opera diva hand out keys to that suite to fashion people and journalists." Good relationships are essential, but so are quality and beauty. Of the four partners who started Cravatta Pellianno, Licina is the creative one. He designs ties, pocket squares, bow ties and suits. As an IDE student he has a lot of experience in drawing, design and general aesthetics. In addition, he also took good note of how the intangible value of products is created. "In terms of function, Rolex and Casio watches are the same, but people are prepared to pay three thousand euros for a Rolex. Why? All kinds of things enter into this: identity, brand experience, emotional value. Once you get that, you can apply it everywhere." Licina describes his style as classical with a playful modern twist. "We make quality clothing for the modern man who wants to dress more elegantly. They are surprisingly many in number but they don't like shopping. That is mainly because shops don't match the male mindset. We try to develop a new branch of fashion that does." Quite what that will be is not yet certain. In the first half of 2012, Licina attended lectures for enterprising students at Harvard, MIT and Stanford on a prestigious Kauffman Scholarship. He plans to work from his own business on his graduation project, 'a hybrid shop, combining the best aspects of online and offline shopping'. For that, he rejected offers from BMW, Audi and Apple. Licina will not be discouraged by risks. He thinks it has something to do with his roots. He was ten years old when he and his parents fled to the Netherlands from former Yugoslavia. "My family lost everything, so I know what it's like to have nothing. I am very grateful to my parents that they have never been overly dramatic about it. My mother cleaned houses and cut asparagus despite being a psychologist. That shaped me." (SB)

www.cravattapellianno.com

Architect on the inside

Edmond Lam's company has little more to do with architecture but everything to do with his goal in life: doing nice things.

Some people seem to sail through life effortlessly. Edmond Lam shrugs his shoulders and smiles: he was just lucky. The reality is different. Usually, you have to force luck a little bit. He just needed a gentle push. "I had already been studying for a while when my girlfriend Yuhua and I started living together", he says. A year of Civil Engineering and Management in Twente, to be precise, and a few years of Architecture in Delft. To put it mildly, she was not very impressed with my uninterested attitude to studying. "She called me a moron", Lam grins. Within two years he had graduated in Real Estate and Housing. His vision on integral area development made such an impression that he was invited to participate in the ING Bank round table discussions about city centre facilities in Rotterdam. "Integral area development basically amounts to coordinating the various facilities within an area. In Rotterdam, for instance, the Pathé cinema relocated to the city centre, because people like to go for a meal after they've been shopping and then may decide to catch a film. My graduation project revealed that the more facilities there are in a particular area, the more consumers spend." The local Chamber of Commerce asked him to conduct an additional practical survey from the entrepreneurs' point of view. The findings: there could be more catering facilities near the Laurens Church and there was a serious lack of catering amenities near the busiest central walking route from Blaak station to the shopping district. "I've recently noticed some changes there, would you believe", Lam laughs. He is already working on other things. He ended up working for a project management agency, when a client told him: "It's not really the company I'm interested in, I'm more interested in you." "I said: if that's true, I'll give up my job here and come to work for you freelance", he

'It's not really the company I'm interested in, I'm more interested in you'

grins. That was the start of his own business, Provem. Three years on, our project manager moves from one regular client to the next. "I invest a lot of time and effort in that", he adds, putting it in perspective. "And no, of course this isn't what I dreamt of when I studied architecture. It's quite a change, from architecture to facility management, and from process management to organisational management. But it is still building related." Thinking back to his time in Delft, he says he benefited most from the 'soft' subjects. "They helped me to distinguish and express myself." After all, he is still a people person, who prefers to work among the bricks rather than on top of them. (JB)



'Disasters are an everyday occurrence here'

Developing guts, setting to it, and asking critical questions.

Alumnus of the year 2012 Rinske Geerlings learned it all during her programme in Industrial Design Engineering. "I still reap the benefit of those six years of training in Delft every day."

About six years ago, Rinske Geerlings set up her own company specialising in continuity planning and disaster management. She lives in Australia and travels all round the world. "Right now I'm in Papua New Guinea for three days, for a training programme with the tax service", she tells us via Skype. "Disasters are an everyday occurrence here. Sometimes there'll be no water for three weeks. Yesterday, we had no electricity or internet." Geerlings advises on how to deal with the consequences of such problems, natural disasters, epidemics or terrorism. She also teaches companies to take creative precautions to enable them to continue their operations.

Proud

The title of Alumnus of the Year is not the first award Geerlings has received. Business &

Professional Women (BPW) elected her Woman of the Year 2010-2011, for the way in which she has encouraged young women worldwide to develop their talents and to run their own business. Her own business currently operates worldwide and is based in Australia. She intends to use the personal prize of 2,500 euros awarded to the Alumnus of the Year to expand her company in Europe. The 7,500 euros she can spend on research at TU Delft, will go to research in the overlapping field of continuity and chain flow. "I still feel involved with TU Delft and occasionally deliver lectures in my field. I will add the title to my CV and my biography. I am proud that this will enable me to draw my clients' attention to my academic background." On awarding the title of 'Alumnus of the Year' to Geerlings, the jury praised the way in which she is able to apply technology in practice. She



already had a practical flair as a student. She was one of the first students to follow lectures online and she set up a society that encouraged TU students to market their innovations. She graduated cum laude in 1996. (PW)

Sponsor wanted

The Delft University Fund (UfD) is looking for a new sponsor (20 thousand euros a year) for the UfD Teamwork Award. Any company sponsoring this award would link its name to the most outstanding teams of TU Delft. For the duration of the sponsorship, the award will of course be named after the sponsoring company. This will improve the company's name

awareness among technical students, and offer direct access to these enterprising student teams. For more information: K.M. van der Laan, telephone 015 - 2785555 or e-mail k.m.vanderlaan@tudelft.nl.



Nuna, Velox, DUT, Solarboat, Formula Zero and all the other dreamteams are able to work in a renovated space. The monumental Stevinhall behind the Faculty of Civil Engineering and Geosciences was re-opened in November. Although all the projects were initiated by students, from 2009 on dreamteam members can participate in the minor D:ream.

Alumni Circles

There are Delft alumni all over the world, who regularly meet up. In Spain, Germany or Indonesia, for example, but also in Amsterdam, The Hague and Utrecht. Such an engineers network is always fruitful. In terms of business, but also socially. TU Delft is a strong supporter of these alumni circles. Each alumni circle has a contact person who acts as host at its meetings. TU Delft naturally supports the organisation of these meetings. If you would like to set up an alumni circle in your region, send an e-mail to alumnibureau@tudelft.nl

Alumni Event

This year's Alumni Event took place on 12 October. Theme of the inspiring event was 'Celebrating the past, connecting to the future'.



Photo's: Roy Borghouts en Ernst de Groot



Publication information:

Alumni portal

www.alumniportal.tudelft.nl

Changes of address

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<http://universiteitsfonds.tudelft.nl>

Questions or suggestions?

Alumnibureau@tudelft.nl

(015) 2789111

Register with the Delft University of Technology Alumni group

who & where

Delft University of Technology has eight faculties, each of which is engaged in education and research in one or more disciplines. The University was founded in 1842 by King William II. With 13,000 students, 2,800 scientific staff members and 2,000 technical and administrative employees, it is the largest university of technology in The Netherlands.

Disciplines

Aerospace Engineering

Kluyverweg 1
nl-2629 HS Delft
Telephone +31 15 278 2058

Applied Earth Sciences

Mijnbouwstraat 120
nl-2628 RX Delft
Telephone +31 15 278 1423

Applied Physics

Lorentzweg 1
nl-2628 CJ Delft
Telephone +31 15 278 7774

Architecture

Berlageweg 1
nl-2628 CR Delft
Telephone +31 15 278 4184

Chemical Technology & Bioprocess Technology

Julianalaan 136
nl-2628 BL Delft
Telephone +31 15 278 2667

Civil Engineering

Stevinweg 1
nl-2628 CN Delft
Telephone +31 15 278 5440

electrical engineering

Mekelweg 4
nl-2628 CD Delft
Telephone +31 15 278 4568

Geodetic Engineering

Kluyverweg 1
nl-2629 HS Delft
Telephone +31 15 278 3289

Industrial Design Engineering

Landbergstraat 15
nl-2628 CE Delft
Telephone +31 15 278 4750

Life Science & Technology

Julianalaan 67
2628 BC Delft
Telephone +31 15 278 8271

Marine Technology

Mekelweg 2
nl-2628 CD Delft
Telephone +31 15 278 6666

Materials Science

Mekelweg 2
nl-2628 CD Delft
Telephone +31 15 278 6666

Mechanical Engineering

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Telephone +31 15 278 6666

Computer Science

Mekelweg 4
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Telephone +31 15 278 4568

Applied Mathematics

Mekelweg 4
nl-2628 CD Delft
Telephone +31 15 278 4568

Technology, Policy & Management

Jaffalaan 5
nl-2628 BX Delft
Telephone +31 15 278 7100

Multidisciplinary Centres

Adhesion Institute
Kluyverweg 1
nl-2629 HS Delft
Telephone +31 15 278 5353

Biotechnological Sciences Delft Leiden (bsdl)

Julianalaan 67
nl-2628 BC Delft
Telephone +31 15 278 5140/2342

Centre for International Co-operation and Appropriate Technology (cicat)

Mekelweg 2
nl-2628 CD Delft
Telephone +31 15 278 3612

Centre for Transportation Engineering

Stevinweg 1
nl-2628 CN Delft
Telephone +31 15 278 6634

Dutch Institute of Systems & Control (DISC)

Mekelweg 2
nl-2628 CD Delft
Telephone +31 15 278 7884

Koiter Institute Delft (Institute for Engineering Mechanics)

Kluyverweg 1
nl-2629 HS Delft
Telephone +31 15 278 5460

Netherlands Institute for Metals Research (NIMR)

Mekelweg 2
nl-2628 CD Delft
Telephone +31 15 278 2535
Fax +31 15 278 2591

Wind Energy Research Group

Kluyverweg 1
nl-2629 HS Delft
Telephone +31 15 278 5170

Reactor Institute Delft

Mekelweg 15
nl-2629 JB Delft
Telephone +31 15 278 5052

OTB Research Institute for Housing, Urban and Mobility Studies

Jaffalaan 9
nl-2628 BX Delft
Telephone +31 15 278 3005

Open Building Working group (obom)

Berlageweg 1
nl-2628 CR Delft
Telephone +31 15 278 5400

Delft Institute for Microelectronics and Submicron-technology (dimes)

Feldmannweg 17
nl-2628 CT Delft
Telephone +31 15 278 3868

Interduct Delft University Clean Technology Institute

Rotterdamseweg 145
nl-2628 AL Delft
Telephone +31 15 278 7233

J.M. Burgerscentrum Centre for Fluid Mechanics

Mekelweg 2
nl-2628 CD Delft
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Telephone +31 15 278 8032

Trail Research School

Kluyverweg 4
p.o. box 5017
nl-2629 HT Delft
Telephone +31 15 278 6046

Central Library

Delft University of Technology Library (dutl) supplies information and provides services, particularly in the area of the technical sciences.

It comprises a central library and twelve sub-faculty libraries housed at the respective sub-faculties and institutes. The dutl is intended for students and staff at the Delft University of Technology. However, as the task of the library is to provide scientific and technical information at a national level, its facilities are also available to the general public. As well as all areas of technology and natural sciences, the library also contains a general collection in the social sciences, economics etc. This relates not only to books or periodicals, but also to standards, reports, reference works and congress proceedings.

Literature not in the collection or not on hand can be obtained through Delft University's Central Library from other libraries in the Netherlands or abroad.

For further information:

Delft University Central Library

Prometheusplein 1
p.o. box 98
nl-2600 MG Delft
Telephone +31 15 278 5678

Delft University Press

IOS Press
Nieuwe Hemweg 6B
nl-1013 bg Amsterdam
www.iospress.nl
Telephone +31 20 688 33 55
Fax +31 20 620 34 19
E-mail order@iospress.nl

Information

General information:

Information office

p.o. box 5
nl-2600 AA Delft
Telephone +31 15 278 5404

Information on facilities for foreign students:

Student Advisory Office

Jaffalaan 9a
nl-2628 BX Delft
Telephone +31 15 278 4670

Liaison between business and research:

Liaison Office

Mekelweg 2
nl-2628 BX Delft
Telephone +31 15 278 1500

Information on research fellowships:

Mrs. M.Y.M. Spiekerman-Middelplaats
Stevinweg 1
nl-2628 CN Delft
Telephone +31 15 278 3773

General information on university education in the Netherlands:

Min. of Education, Science & Culture Central Information Dpt.

p.o. box 16375
nl-2500 BJ Den Haag
Telephone +31 70 412 3456

(Post Graduate) Courses

Delft TopTech

(vocational courses)

Mekelweg 2
p.o. box 612
nl-2600 AP Delft
Telephone +31 15 278 8019
Fax +31 15 278 1009
www.delft-toptech.nl

Institute for Biotechnology Studies Delft Leiden (bsdl)

Julianalaan 67
nl-2628 BC Delft
Telephone +31 15 278 2355

For information on courses in the Dutch language:

Language Laboratory

Jaffalaan 5
nl-2628 BZ Delft
Telephone +31 15 278 4124