



journal

Architectural Engineering journal 2015/2016

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graduation project in Bandung by Nadia Remmerswaal
Social Digital Engineering
page GS5

Nadia Remmerswaal
(aE graduate)

**best student
of the
faculty 2015**

news aE in action

Column

by **Thijs Asselbergs**



WHO MAKES THE BUILDING OF THE FUTURE?

What influence does the architect have in the future? Who is the master builder of the future and is the profession definitely going towards being an architectural stylist employed by the creative or construction industry?

And if the architect no longer has a dominant position, is he therefore sliding into 'the middle of the road': making buildings and environments with a dull, mediocre quality, mostly only obliging the feeble wishes of consumers, and where experimentation and progress can no longer be found as recognizable design themes.

Is the architect still the most suitable person to firstly bear the responsibility? There is a tendency to see the architectural component as a part that you can manage. The position of the Dutch architect has been eroded in recent decades and has suffered even more serious blows as a result of the recent crisis.

That brings me to the question: Who makes the building of the future? The architect, the real estate owner or the society by means of participation? Who has final responsibility?

There is hope. Nowadays, you see young, mostly newly graduated architects designing and producing their own buildings or building components through trial and error as their own boss. A very interesting trend in which the architect appropriates his or her traditional core task in essence and experiments with new methods and technologies.

At the same time, the engineering firms seem to be experiencing better times again and there is an opportunity for architects as seasoned designers to enclose themselves in an environment of strong engineers. And that is what we need to arrive at, a good architecture: integral design and engineering.

Well-educated and professionally experienced architects must be the pioneers of good buildings and urban structures, which also have an added value from a cultural perspective. This must be stimulated. The complexity of the assignments is enormous. Large architectural questions relating to urban and landscape environments are waiting for us, in which it is important that these can be taken on by the right talents with the right attitude.

These are new times, and they are about new content and search for innovation. Let's create new value to make progress!

Please take a look at our intecture goals in this journal and join us in renewing the assignment.

Green Transformable Buildings aE studio at the Kick-off Symposium at IBA Parkstad



text **Nina Kuipers**

From the 22nd until 24th of April a group of 15 representatives of the aE graduation studio went to IBA Parkstad Limburg in order to get inspired and learn about the region. The excursion led the students past the Kick-off Symposium on Green Transformable Buildings, the church of Chevremont which functions as a temporary working house, several IBA 'candidate' projects and the Glaspaleis in Heerlen, followed by a visit to the Emscher Park in Germany, a former mining place that is transformed in an inspiring way. After all we could speak of a successful journey!

Last summer, Laura Vester and Georges Taminau were the first two students of the IBA studio to finish their design successfully (see page GS5). The students of studio 14 have

just started their designs, based on their own researches. The aE for IBA Parkstad group will be enriched with the concepts of a few more students from studio 15. Together they will visit the IBA Parkstad region again at the start of this years' November, where an exchange of ideas and feedback will take place, most likely in the new working house which is the water tower of the town Schimmert. Also the C-mine in Genk, Belgium, will be visited to get inspired by all the possibilities of such an interesting project and location.

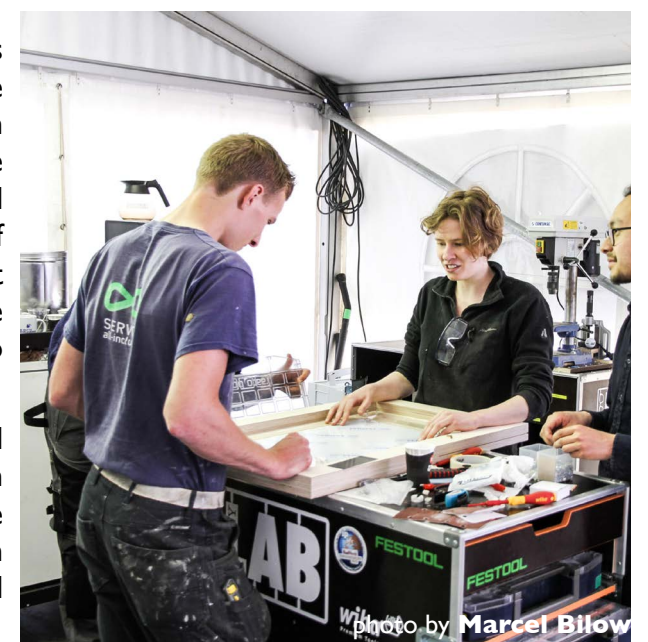
Students who have a finished graduation project or a finished concept have the possibility of submitting their designs or ideas in the second open call, which will be in March 2016. Who knows what interesting consequences that might have for the designs of the aE for IBA

Bucky Lab - Building Weeks

text **Marcel Bilow**

One of the highlights of the Bucky Lab seminars are for sure the building weeks. In the winter we are off campus in an industrial warehouse, but in the summer we set up camp in a tent. This time we weren't able to use our normal space behind the maquettehal due to renovation activities of our building. We found a new spot on the west terrain and placed the tent over there. The location was nice, and the students started to claim their space immediately.

This time we build 6 sun shade concepts but build also a big cardboard shelter in cooperation with Jerzy Latka our polish cardboard expert. The weather was mixed, but we managed to finish most of the projects in time and the cardboard was even visible for a couple of more days.



aE in action news

Stuiflab @ Oerol Festival 2015

a collaboration between Architectural Engineering and Rijkswaterstaat

text **Annebregje Snijders**

Walking from beach bar 'De Branding' on Terschelling to the temporary pavilion it becomes immediately visible where the 'Stuiflab' is about. The 12 different beach houses of scaffolding tubes and curtains all react differently to the wind and the sand. Some of these 'beach houses' cause big holes in the dunes, before others arise huge sand piles. And they are only standing there for one week.

In the pavilion a couple of students from the graduation studio of Architectural Engineering and MScI Bucky Lab give explanations about their research to alternative ways to build at the coast line. These researches were conducted in different themes: smart ways of using materials, easy to transport and demountable homes, self-sufficiency, integration and connection to the characteristics of the dunescape and of course aerodynamics.

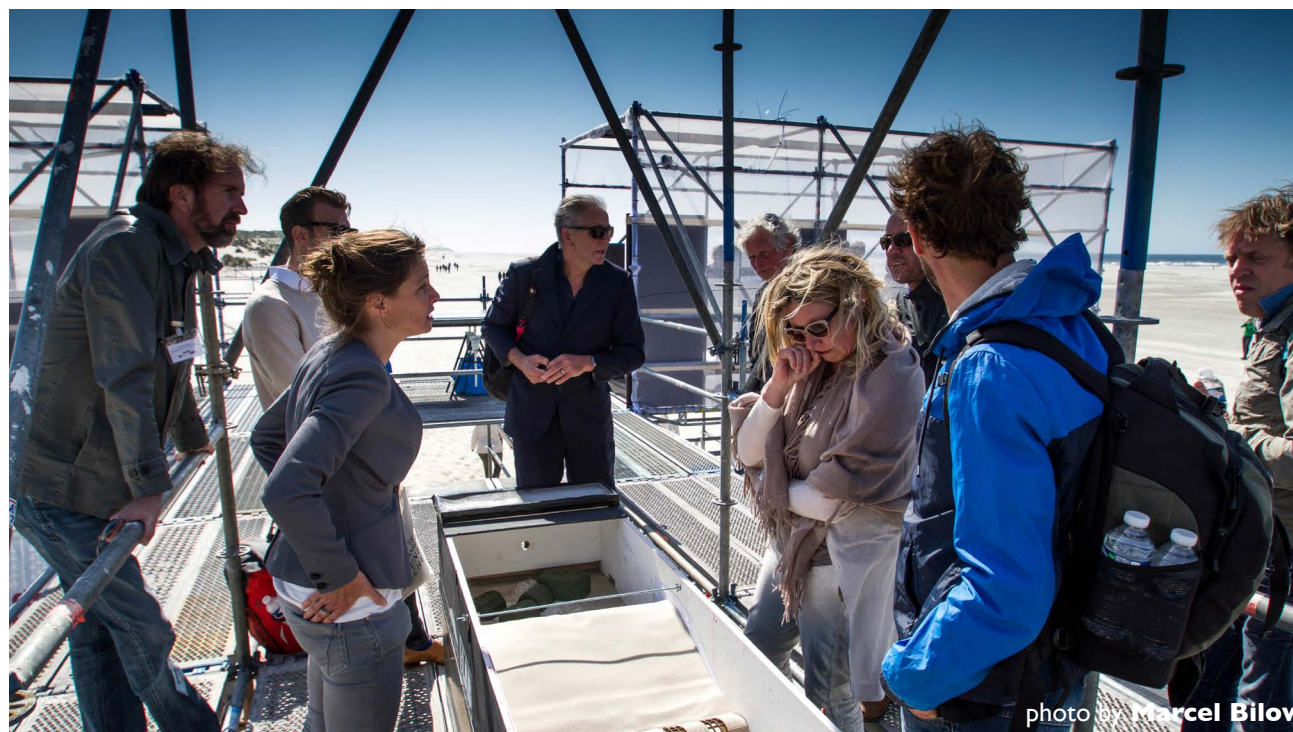


photo by Marcel Bilow



photo by Marcel Bilow

aE Day 2015 : MAKE!

text **Heleen van Russen Groen**

On the 19th of March Architectural Engineering organised the anual aE-day. This year make-experts, aE-alumni and aE-graduates discussed the making of architecture. Their short presentations led to a vivid discussion, moderated by Thijs Asselbergs and make-expert Mick Eekhout, with the public that filled the orange tribune of the Oostserre of our faculty.

aE Day 2016 : 15 March 2016

Bandung

working with students from Institut Teknologi Bandung

text **Mo Smit**

Two Home at Work excursions have been organised to Bandung Indonesia with the Intecture AE Studio. The first group visited Bandung in November 2014 and the second group followed in May 2015. During the excursion, students have conducted field research for their technical research paper within industrial kampungs surrounding the textile and garment factories in Cigondewah, a heavily polluted industrial district at the southern periphery of Bandung. In addition AE students have also investigated the spatial, socio-economic and ecological character of this context. They exchanged knowledge and ideas with Indonesian students of the Built Environment Analysis Class of Institut Teknologi Bandung. This research group also contributed to the Home at Work assignment with a typological study of workers' housing and research into the metabolism of the industrial live-work environment and the potential circularity of resources, like water, energy and waste materials.



photo by Mo Smit

Learning from Lowlands

a collaboartion with nederlandwordtanders

text **Tjalling Homans**

Last August AE Studio organized, in cooperation with Nederlandwordtanders, the expedition 'Learning from Lowlands'. Following the analogy of the book 'Learning from Las Vegas', a group of 10 students and 10 professionals with diverse professional backgrounds tried to frame the spatial lessons one could learn from the temporary city of Lowlands. During the field research at the festival, the mechanisms shown on Lowlands were recorded and afterwards they were translated into different prototypes for the (temporary) city. The outcome will be discussed in a public 'Live meeting' with Rijksbouwmeester Floris Alkemade and Lowlands-director Eric van Eerdenburgin in our faculty.



photo by Lowlands

education bachelor

Design and Engineering

the BSc2 ON2-assignment

text **Nellie Schut**

For project ON2 first year students design a rowing clubhouse at the location of an existing slot of 'de Omval'. As a final project of the first year, it focuses both on sustainability with the ultimate goal to design a passive climate and engineer a functioning construction, materialization and a comfortable climate of the spaces needed for the function of a clubhouse.

'De Omval' is located along the Amstel River, at a very inspiring location. Across the water there

is Berlage's plan-Zuid, along the water you have the Amstel quarter with its offices and behind the location there is a new development and the Bijlmer Neighborhood.

During the project students get to work with experts on climate design, construction engineers and building construction engineers. These teachers indicate the special technical issues, which gives the student the task to make choices reckoning with these issues and incorporate them into their design.

From the very first week scale models get great attention. From 1:1000 for connection to the urban context until 1:100 and even 1:20 for spatial, structural and material design, especially in the façade area.

Everything has to be presented in both these models and 2D manual and digital drawings.



Design **digital chairs** in 10 days



This designs by **Luc Sebec** (right) and **Ted de Vries** (left) were exposed at the Dutch Design Week 2015



photo by **Marcel Bilow**

Archineering

Minor

text **Roel van de Pas**

The minor Archineering focuses on two main issues: technology as an essential part of any design product and making explicit the design process. Just like an athlete can train to become a master, a designer can train the design process as well. By training designing, engineering and prototyping in a number of short exercises (like the design of a digital fabricated chair) and explicitly studying and reflecting on the design process, more insight in the personal design process will be acquired.

Some of the Archineering design projects focus on architectural design & engineering, involving construction, climate and materialization, other assignments are focussing on industrial design, digital manufacturing and aerospace. This very mixed program results in a new and flexible

personal toolbox and will be an inspiring basis for all future design projects! Archineering will learn you to

- foster design results, in which the relationship between design and technology is a key theme;
- do research and learn about the material aspects in the design of construction, climate design and detailing;
- translate a project very quickly and concisely in a physical and functional design, integrated into the urban and socio-cultural context by doing many experiments;
- formulate a guiding theme and to enrich and strengthen this (idea or concept) through technical engineering;
- increase your "frame of reference" and design language by using sketches, diagrams, drawings and (sketch-)models.

Do you want to delve more into the materialization and engineering of your plans while improving your design process? Then this minor is for you!

Junior TU

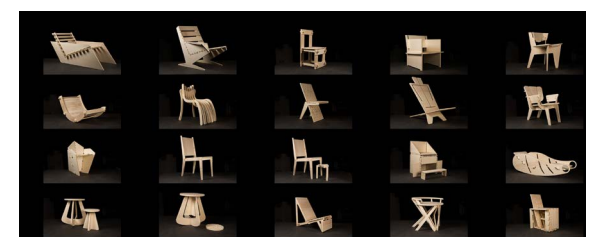
Young Architectural Engineers

text **Bob van Vliet**

In januari 2016, BK city will host a group of high school students for the Digitally Designed Chairs program (DiDe Chairs). The course is part of the Junior TU Delft program, which offers a range of courses for ambitious, technologically minded students, who take 5 days off from their regular school activities to experience what it might be like to come and study in Delft.

The high school students will be designing chairs for production in CNC milled plywood. The exercise is based on an assignment developed for the Archineering minor in cooperation with prof. Thijs Asselbergs and Pieter Stoutjesdijk. The students will learn the basics of design, construction, ergonomics and CAD modelling, and they will produce lasercut scale models of their designs.

The goal of the DiDe Chairs project is not just to offer a group of high schoolers interested in design and technology a first look at Achitectural Engineering, but also to further explore the possibilities of digital fabrication technologies.





GS

Graduation Studio

MSc3 & MSc4 Intecture **aE Studio**

Eric Geboers

Salt city (page GS03)

Emilie van Wijnbergen

Earthquake architecture (page GS11)

Thom Schreuder

Ruin prothesis (page GS05)

Laura Vester

Life-span greenhouse (page GS05)

Jan Portheine

Disposable housing (page GS07)

Twana Gul

Refugee city (page GS02)

Muhammed Ulusoy

Design with nature (page GS06)

Daan Meeder

DIY flexible infills (page GS03)

Frederick Ulijn

Self-supporting dunehouse (page GS06)

Nadia Remmerswaal

Social digital engineering (page GS09)

Column

by **Annebregje Snijders**



THE ARCHITECTURAL ENGINEERING ASSIGNMENT

A better future begins with asking a different question

aE / Intecture integrates design and technical innovation through all scales. If technology is the answer, then what's the question? In our architectural engineering program we seek for innovative and inspiring architectural solutions for societal issues. Driven by the need to think differently about resources, energy, power generation, the choice for materials, effectiveness, user involvement, bottom-up and top down, we see the built environment in a new perspective: there's a vast amount of vacancy, a large percentage of the existing housing stock does not meet our comfort needs. Moreover, new buildings have to deal with changing requirements. Do we assume we are able to solve the challenges we are facing today by optimizing the status quo? Or do we really want to go down the rabbit hole and come up with radical solutions for our current challenge?

Understanding the existing, insight in knowing the possibilities of renewal, and discovering how to design and make the change are central themes in our studio.

Within the working field of the urban existing, the decentral shrinking area's and the changing landscape, such as coastal area or temporary cities, we re-examine construction and production, utility, choice of materials and design. Themes that we seek to profoundly understand are the role of digitalization, temporary and permanent transformations, energy landscapes, fluxes and new production techniques. How do they influence the design task, how does this affect utility and will this lead to new forms in architecture?

Social engineering as architectural assignment!

Column

by **Tjalling Homans**



In our graduation studio 'Intecture' we seek for innovative and inspiring architectural solutions for societal issues. As coördinator of our studio I'd like to think of the ideal process for our students to get there. A process in which we think personal ownership, specific tutoring, sharing knowledge and connecting with the 'outside world' are key aspects.

Therefore every student in our studio has great responsibility in formulating his/her own graduation project and defining a specific thematic focus within.

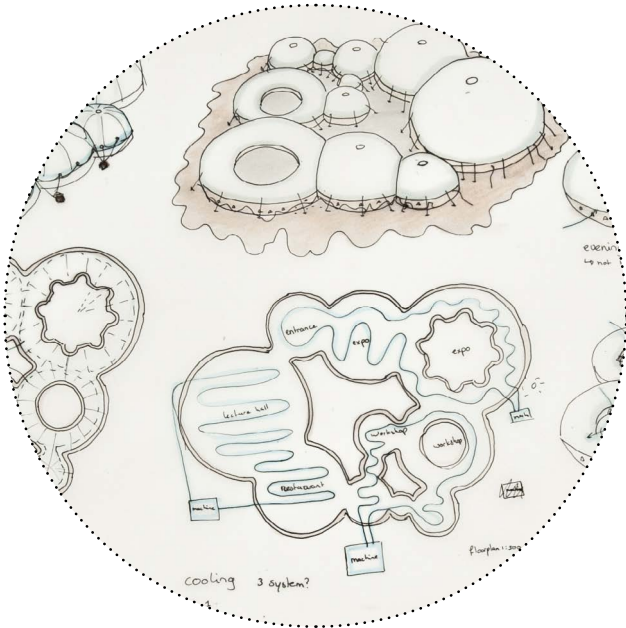
The student is guided through the graduation year by an architecture tutor, a building technology teacher and the specific focus of each graduation project is enriched by the knowledge and support of a specific research tutor.

This modus operandi of the studio leads to a growing amount of inspiring and innovative architectural solutions for the future. By sharing this knowledge - within the studio, but also outside the faculty-, our student projects get an extra boost and more value. Collaborations as with Rijkswaterstaat, Lowlands, Nederlandwordtanders and Bandung University (see page 2&3) are good examples of this knowledge sharing. This way we aim to provide our students with the best perspective for their 'after-TU-career'. (see also page GS12)

SAND BUILDING IN THE ARABIAN DESERT

by **Anne Schakel**

Surviving in the hot-arid climate of Saudi-Arabia requires a special attitude towards your surroundings. Over decades, Bedouin people were able to live in these hard circumstances in a sustainable and effective way. Their vernacular architecture teaches us to use local materials, passive climate solutions and shows the rich heritage of the Arabian culture. Unfortunately nowadays, these beautiful principles are not used anymore and replaced by less sustainable solutions.



DIY FLEXIBLE INFILLS

by **Daan Meeder**

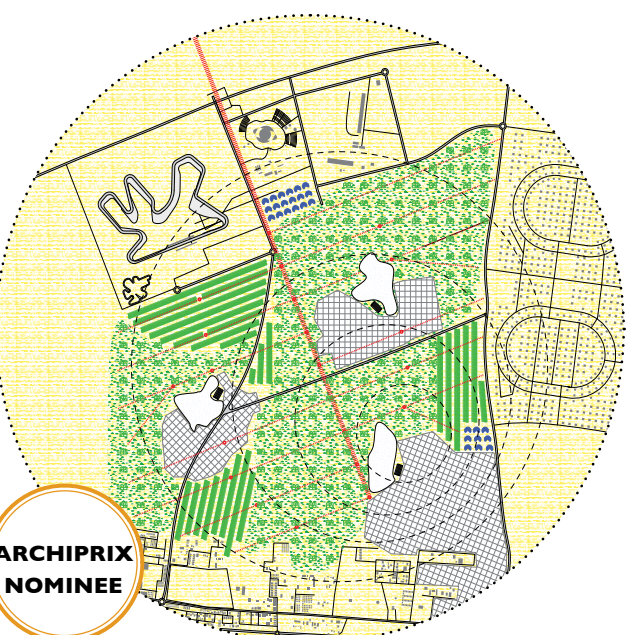
There are often vacant old industrial buildings to be found near city centers within the Netherlands. Artists regularly use these buildings, because of a shortage of affordable and suitable atelier space. These buildings offer a grand and affordable space, which they can make their own. This system support this concept of making ones own space within these buildings and is able to grow and shrink in the x, y and z axes on a grid of 1200 x 1200 x 1200 mm. CNC-routing is used so the artists can cut out all external parties by being able to buy the materials, make the parts and assemble the structure by them selves.



SALT CITY

by **Eric Geboers**

This project is a biomimetic attempt to utilize locally available resources in order to create a scalable solution to combat desertification that is able to grow organically whilst providing a valuable addition to the existing ecosystem. The premise is to pump up seawater to arid areas and use the sun's energy to distill the valuable fresh water in greenhouses. The resulting salt is then turned into a building material and used for construction, creating a 'closed ecosystem' with no waste.



ARCHIPRIX
NOMINEE

locations IBA Parkstad 2020

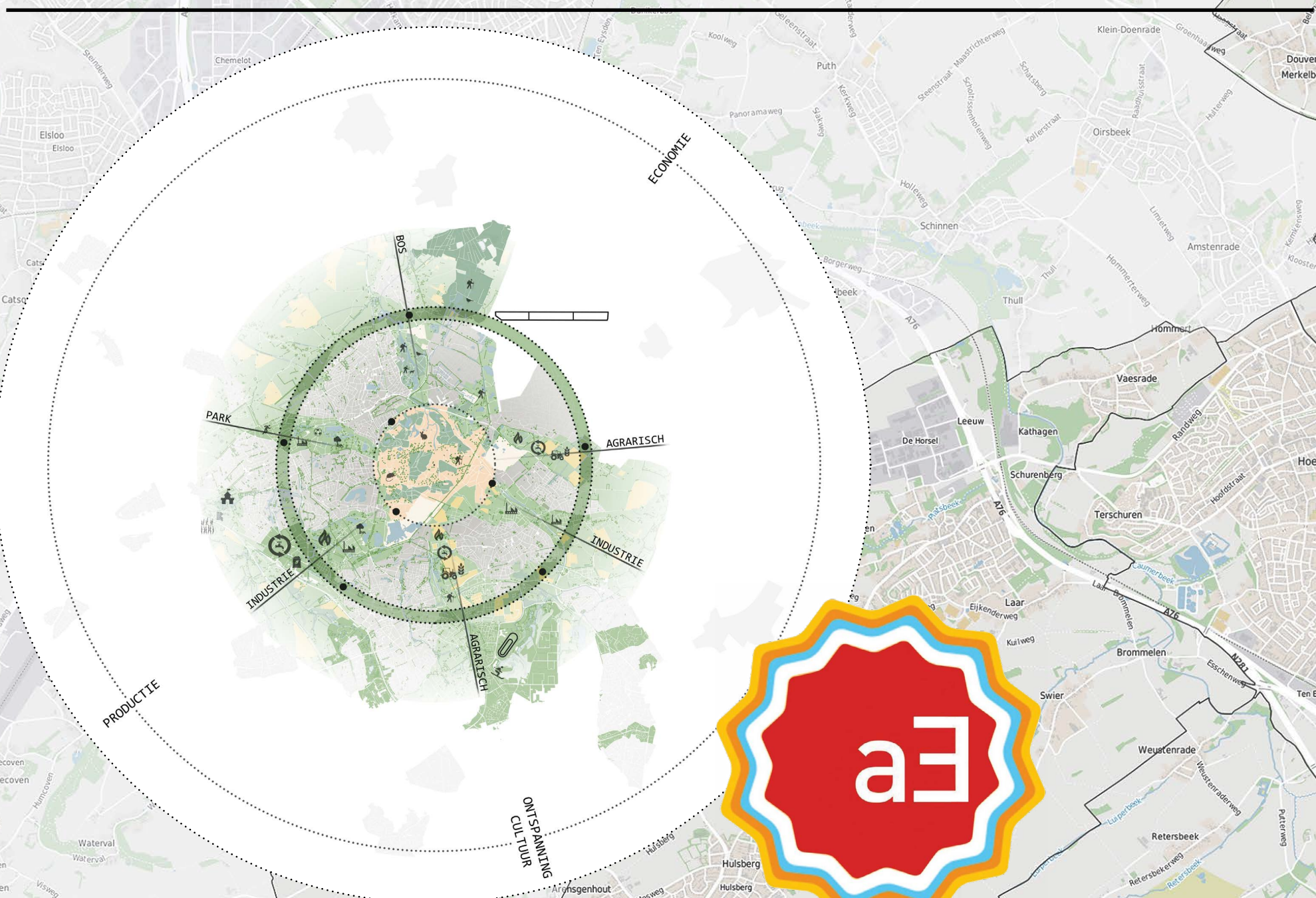


image by AnnA // Parkland - "Framework for Parkstad 2.0"

TOWARDS IBA PARKSTAD 2020

text **Annebregje Snijders**

Until 2020, IBA Parkstad will function as a laboratory: An engine for groundbreaking building projects, remarkable exhibitions and innovative plans. They will put Parkstad on the world map and will help to shape Parkstad's future. aE/intecture sees opportunities and joins!

What is IBA?

IBA is an abbreviation for: Internationale Bau Ausstellung. It's a German phenomenon which contributes to the improvement of a city or region. It is a creative approach with a proven economic boost. And a physical change in the area as a tangible. And moreover: a cultural shift in thinking and working and appreciation for the area. A renewed pride that invites to invest. In 2020, the IBA period ends with an exhibition of the completed projects. Traditionally, innovation in design and ways of construction play a major role here.

Parkstad Limburg

Parkstad is an administrative partnership between the eight municipalities Brunssum, Heerlen,

Kerkrade, Landgraaf, Nuth, Onderbanken, Simpelveld and Voerendaal. An area covering 210 km² in the formerly eastern mining area in the southeast of Limburg. It has therefore the size of Amsterdam, but only has 255 000 inhabitants. Through its hilly structure, the area has a wide range of views. A varied landscape with different cores, alternated by green valleys. With many places for relaxation and recreation.

But it is also an area with high vacancy rates. Where changing demographics and shrinkage are serious assignments. Where the question of identity manifests itself by the smeared layer of the mining history. Where little reminds to the times of economic prosperity. It is therefore also a quest for a new economic engine.

Shrinkage as opportunity

The arrival of the construction exhibition in the region offers the potential, next to the administrative cooperation, to make a stand for the physical spatial. And can therefore bring coherence to area. Can shrinkage also be used as an opportunity? And how can the need to reform energy production and energy consumption contribute to this? What is the role of material usage? And will this lead to new forms in

architecture?

Led by Annebregje Snijders, aE/intecture is working on innovative interventions for "Parkland", a framework for modeling Parkstad that depicts how - based on the uniqueness of the place, in relation to current necessities and desires - Parkstad can transform into coherent and renewed landscape. Themes that will be discussed are the urban metabolism, creating a positive business climate and renewed identity by making old and new artifacts, mutual connections and new ways of usage.

aE/intecture meets IBA academy

The student projects' results are shared with the IBA organisation. Twice a year aE/intecture organises an excursion to IBA Parkstad where in workhouses the floor will be given to students where they present and where they can reflect with other professionals. Besides TU Delft, RWTH Aachen, TU Hasselt, UTwente and TU Eindhoven are connected.

- 1 www.iba-parkstad.nl
- 2 www.parkstad-limburg.nl



RUIN PROSTHESIS

by **Thom Schreuder**

Combining digital fabrication with ruined structures is a perfect match. Fabricating by computer driven machines makes irregular and complex forms possible and easy to produce. The ruin provides the highly complex and delicate context that should be treated with care and precision. By using 3d scanning it is possible to relate the digital and the existing directly to one another.

In my graduation project these techniques will be put to the test on the case of the ruin of castle Schaesberg. Inspiration drawn from both the castle's history and its present eroded form, is combined to design a 'prosthetic' extension to the castle ruin to house a restaurant, exposition floor and atelier. The projects aim is to show how thin the line that separates history from the present can be.



LIFE-SPAN GREENHOUSE

by **Laura Vester**

The Dutch population is aging. These elderly people are often lonely, many of them even hire others to keep them company. Research also shows how elderly spent up 95% of their time indoors, mainly because of the weather. My graduation design offers a solution that brings active elderly together and lowers the threshold for them to go outside. Besides having their private apartment, cohousing offers them communal rooms for their hobbies and get-togethers. The greenhouse that is placed over a large part of the building creates a sustainable microclimate that makes the communal garden, with all its different types of spaces, useable throughout the entire year.

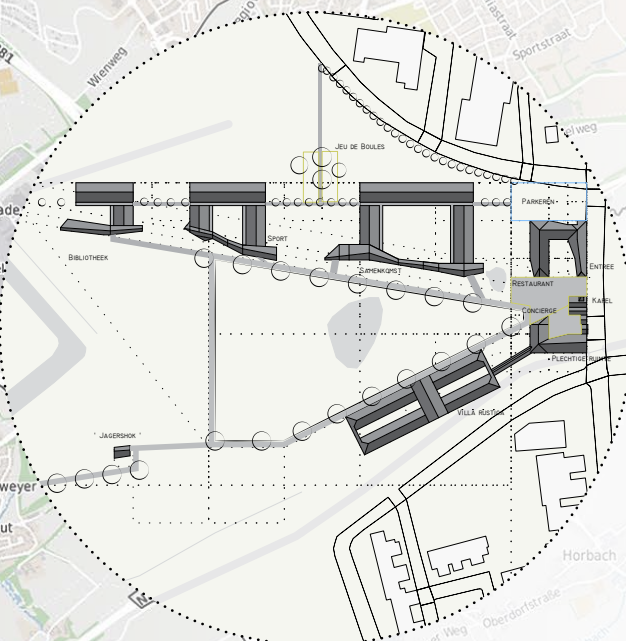


VILLA RUSTICA SUBMERSIO

by **Georges Taminiau**

Building in a shrinking area at the start of the grey wave asks for a different approach. New dwellings will cause future vacancy. So, what if architecture is made to disappear? The project designed gives answers to the question, a fully biodegradable building. From foundation to ridge, all to become what was once was, nothing or everything.

How to design with transience of life? Villa rustica submersio, the sinking of a rural village, intertwining architecture and time.



Locations Coastal Living

text **Annebregje Snijders**

Our coast inspires. It is a constantly changing landscape. Not a single day is the same. Dominated by wind, sand and salt. It is a public landscape where the demand for recreational facilities is increasing rapidly.

Rijkswaterstaat

This increase in demand faces Rijkswaterstaat and the Water Boards with a challenge. For example, the beach structures and buildings hinder the drifting of sand which is extremely important for keeping the dunes strong. Therefore Rijkswaterstaat has asked the aE/intecture studio students to develop new ideas and designs of dune-friendly building.

Oerol festival 2015, a collaboration between aE/intecture studio and Buckylab

During the Oerol festival on Terschelling, the student's designs were displayed in a pavilion, specifically designed by the TU Delft for this occasion. At this exhibition, four inspirational examples of beach houses designed by graduates of aE / intecture were shown. Students from Bucky Lab have displayed new innovative building component solutions of different characters.

Drift design

Moreover, TU Delft in cooperation with Rijkswaterstaat developed the "Stuiflab", a 300 meter long test setup I: I to measure the drifting sand. The long ranges and volumes show that

appearance within the landscape is an important theme as well. Can this go hand in hand with the natural habitat and can coastal pollution be avoided?

Coastal Living

We are used to build on the coast like we build in the city. But what happens when we begin to think in terms of dynamics. Impermanence. Adaptability. Self-sufficiency. Can product development lead to a breakthrough in new typologies of beach development? Are we going to work with new materials, or maybe choose for a high degree of flexibility and temporality? To be continued...



T SELF-SUPPORTING DUNE HOUSE

by **Frederick Ulijn**

How to design a new temporary, recreational beach house typology in the coastal area of the Netherlands? The dune area is a protected area in the Netherlands because of its fauna and flora, natural water treatment and most important to protect the land from the sea. This raises the research question "How can I design a new typology for a beach houses located in the dunes area of the Netherlands?"



S DESIGN WITH NATURE

by **Muhammed Ulusoy**

The sandy dunes at the Dutch coastal areas are characterized as an aeolian landscape and are essential for the complex water safety systems of the Dutch lowlands. The naturally formed dunes act as a soft barrier with a cyclical process of formation and deformation. Building in the sandy dunes and beaches poses a threat as this may imbalance the naturally occurring cyclical healing process of the dunes. Building at these fragile locations demands meticulous planning and programming of the built environment, with some level of temporality at the core of the assignment.

background photo by **Marcel Bilow**

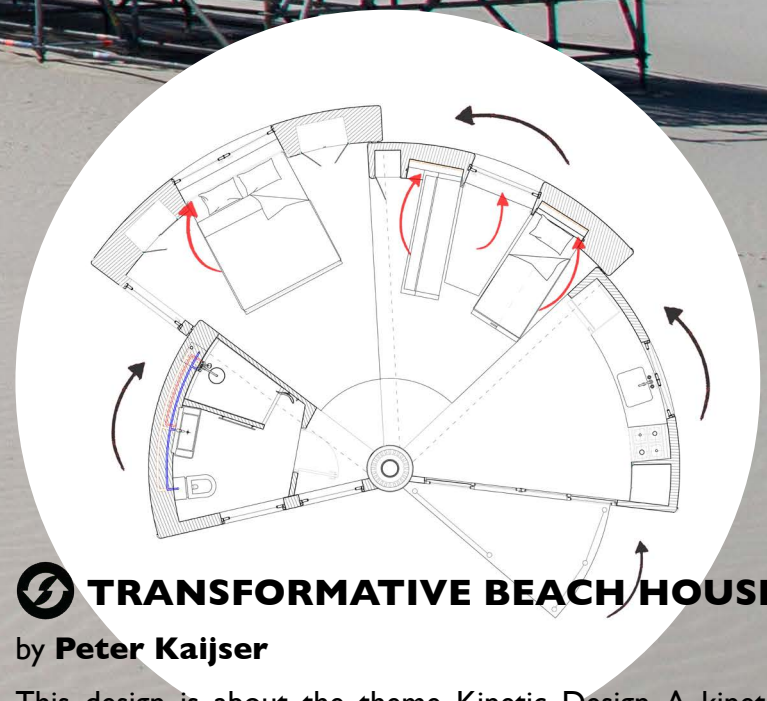
This year Architectural Engineering did a project in collaboration with Rijkswaterstaat. Building at the coast requires a public debate. To give this debate a new impulse a pavilion was built at the Oerol Festival 2015. At this exhibition different graduation projects of AE Studio were shown together with projects of students of the MSc I Bucky Lab.



DISPOSABLE HOUSING

by **Jan Portheine**

The cardboard beach house consists of different types of cardboard supported by a wooden construction. The house can be built up quickly by users, rented by users and deconstructed by users. Why is this a good idea? Because the house is made of cardboard it is easy to transport, lightweight and cheap. Parts can be replaced after a season and recycled. All parts are easy to lift by two persons and no big tools are needed.



TRANSFORMATIVE BEACH HOUSE

by **Peter Kaijser**

This design is about the theme Kinetic Design. A kinetic design can adapt to the changing needs, what makes it more durable. A kinetic design can have 4 different purposes: spatial optimisation; multifunctional design; contextual adaptability and mobility. This could be achieved by making a design with 3 different types: embedded kinetic structure, dynamic kinetic structure and deployable kinetic structure.

locations Bandung Indonesia

INVIGORATE INDUSTRIAL KAMPUNG LIFE

text **Mo Smit**

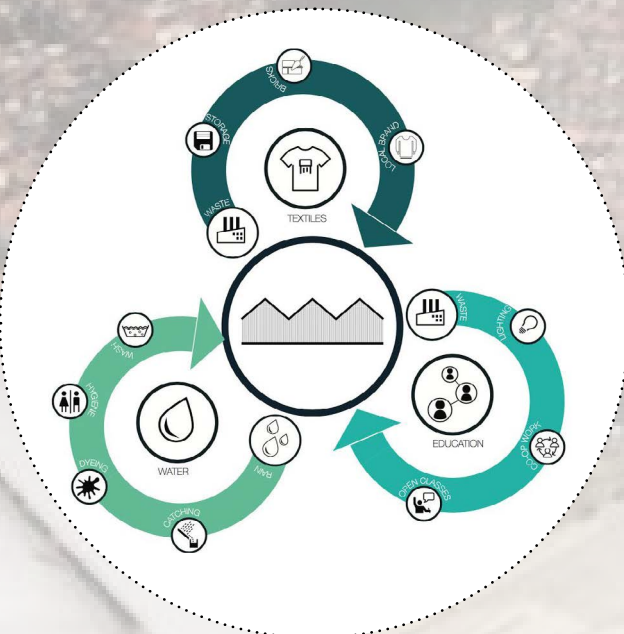
The metropolitan area of Bandung is known as Indonesia's textile and fashion hub. This extensive urban region, with over 7 million inhabitants, is known for its creative urban communities and a thriving textile and garment manufacturing culture. Next to fashionista's and weekend shoppers Bandung also welcomes masses of factory workers, flocking the city on the tides of the local and global textile market.

Factory workers mostly live in peri-urban industrial kampungs. Under influence of global mass production and the corresponding arrival of large scale factories these originally rural villages have rapidly transformed into unplanned and heavily polluted factory towns.

Because of its rural past and agricultural remnants, its entrepreneurial local community and its intrinsic connection with the global economy, the industrial kampung nevertheless has a great potential to be a healthy and self-sufficient live-work environment for future generations.

To make the regeneration of the industrial live-work environment come true, the textile and garment producing region of Bandung will be launched as the Home at Work Living Lab. Partnerships between communities, governments, global fashion brands, local businesses, knowledge institutes and consultants & designers are enabled to cooperatively develop and implement new products, projects, services and value models in a realistic context.

The Intecture AE Studio will take part in the Home at Work Living Lab. Within this context students can define their own graduation assignment and technical fascination related to the bigger ambition to put Bandung on the map as most sustainable and creative fashion producing region in the world. Dealing with topics such as self-sufficient worker housing, building with local materials, industrial metabolism, and waste up-cycling using circular economy principles, the studio aims to deliver cohesive strategies that invigorate industrial kampung life through innovative interventions.



SUSTAINABLE PRIMARY SCHOOL

by **Elmar van Cleynenbreugel**

The design for a primary school and a multi-functional community center support the change within the Kampung. The school forms a backbone for the new perspective on sustainability. The kampung community needs this knowledge distribution for the project to succeed. Through an educational landscape experience, integrated support for urban agriculture and gardening, and economic opportunities for the bamboo plantation I try to involve the community in the project so they can maintain the system and the school.

THE SECOND LIFE HUB

by **Gabriela Peña**

The need for a strategy in the inclusion of the textile waste stream became apparent once on site, the kampung community of Cigondewah, Indonesia, makes a living out of creating the waste (i.e. working for the factory) or dealing with the waste at home (i.e. independent seamstresses and tailors using non-conforming parts). To find a solution to the given problem I began researching ways in which a big bulk of this waste could become part of the building structures of the kampung as a building block. In dealing with the abundant resource that is the textile waste, I submerged myself in creating a technique suitable for the kampung in which the waste stream could be retrofitted to build space, other than block it.

BAMBOO HOUSING

by **Coen Kampinga**

Bamboo, 'the building material of the future', has a lot of potential as a constructive building material. Nevertheless it is being refused by kampung residents due to a lack of knowledge and distrust about the material. The goal of this project is to reintroduce bamboo within the kampung in a way that it becomes a valuable building material. Besides, local craftsmanship should be stimulated in order to allow safe, low-cost and self-built housing.



T SOCIAL DIGITAL ENGINEERING

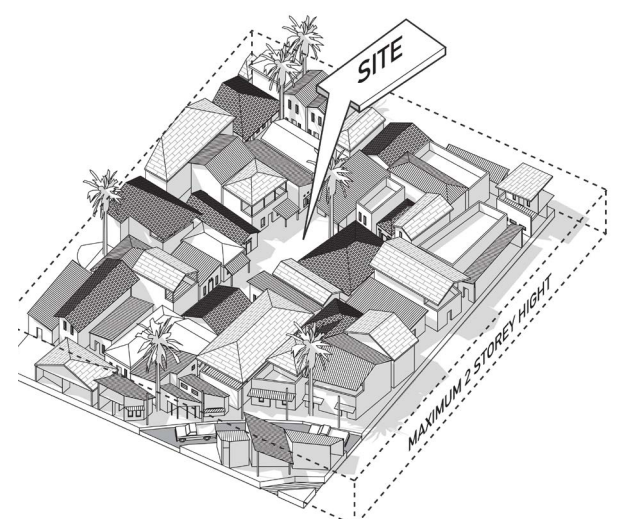
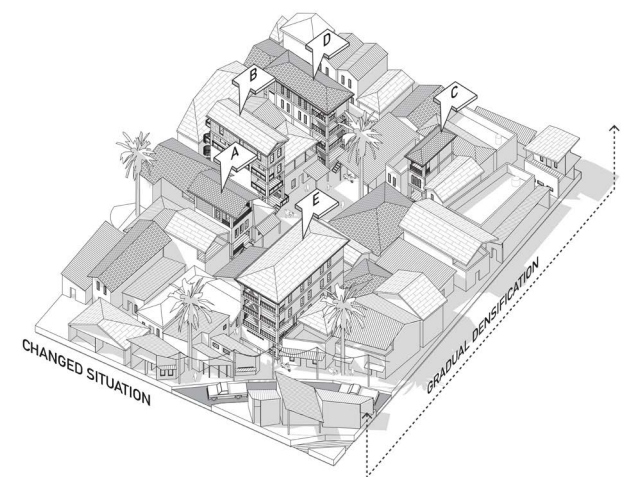
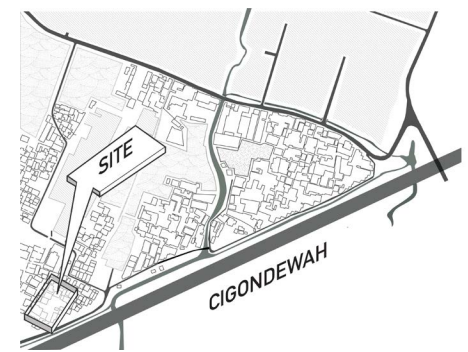
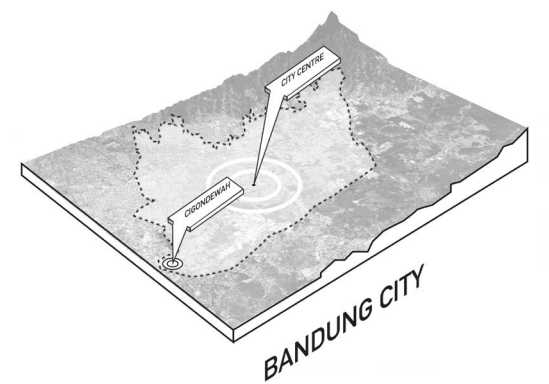
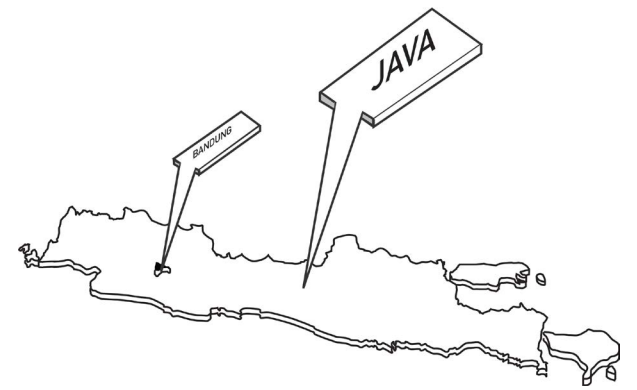
by **Nadia Remmerswaal**

The Global Health Organization estimates that in 2050 almost 75% of the world population will be living in cities. The biggest urban growth will take place in 'informally build' parts of the city, often known as slums. Municipalities can no longer govern this enormous growth so city inhabitants start constructing their own living quarters. Sufficient building knowledge is often lacking and dangerous situations occur in densely populated areas caused by earthquakes and yearly flooding.

Tra-Digital Hybrids (TDH) is a concrete formwork-system based on CNC-milling technology. It enables self-construction in informal areas to build up safe, incremental housing up to four stories high. Ordinary formwork systems are complex in use, too expensive for the low- to mid-low income group and only suited to one shape of building plot. The TDH-system is not only cheaper and easier in use, it can be customized to all shapes of building-plots and enables safe construction up to four stories high.



best student of the faculty 2015



locations Beyond the Current

increasing the energy efficiency of the existing housing stock

text **Tjalling Homans**

From 2020 on, all newly built buildings in the Netherlands have to be energy neutral. However, every year, about 1% of the building stock in the Netherlands is refreshed. Therefore Beyond the current focuses on a bigger challenge: the existing housing stock.

Most deep renovation designs of dwellings however, focus on the relatively easy part of the

housing stock: (early) post-war row housing. While a major challenge remains to generate designs for more complicated housing estates such as pre-war housing and apartment blocks, particularly concentrated in the larger cities.

In our graduation studio we aim to generate design solutions for deep renovation of representative parts of the more complicated housing stock to increase its energy efficiency as well as architectural quality.



The chosen context for Beyond the Current is Amsterdam-West with a specific focus on two Modern housing complexes. One is the monumental complex of 'Koningsvrouwen van Landlust, designed by Merkelbach. The other project is a series of post-war housing blocks built in the industrial Airey system that is just saved from the wrecking ball.



AE Studio's 'Beyond the current' is a joint venture with Heritage & Architecture Studio. All students work on individual projects but share knowledge in diverse group meetings.

Seismic locations

text **Job Schroën**

The Seismic Studio the changing environment in Groningen, where earthquakes caused by the extraction of natural gas are a new reality. The main problem of the studio is to return confidence in the build environment to the inhabitants using architectural tools.

Architectural innovation is a result of new materials and tools, new requirements and new environments, combined with the insights of a good architect. In Groningen the environment has changed, the existing architecture is no longer an answer to present day circumstances. The studio is thus looking for a new architecture for Groningen.

This can be done in many ways, maybe traditional materials can be used in a new way which deals

with earthquakes, or maybe we need to build in a different material. A different possibility is to make temporary structures as it is expected the earthquakes will not last for more than 50 years.

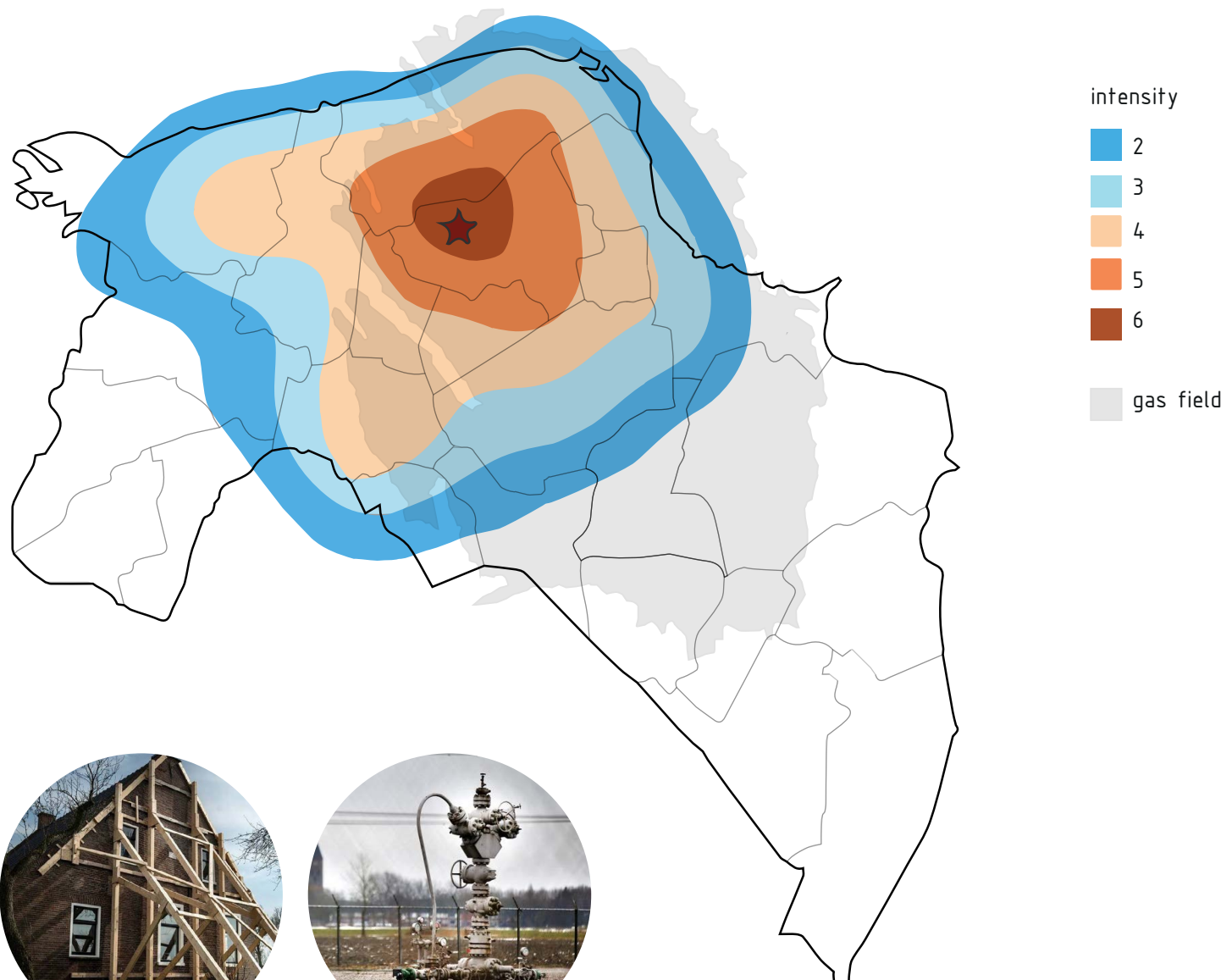


image by **Emilie van Wijnbergen**



EARTHQUAKE ARCHITECTURE BALANCING CONFLICTING OBJECTIVES

by **Emilie van Wijnbergen**

The recent earthquakes in Groningen have shocked the community: earthquakes, a serious threat in the Netherlands? A predominant part of the building stock is built with unreinforced masonry, which performs poorly during earthquakes. The building community is challenged to develop a shock-proof approach and architectural language for new buildings. Earthquake engineering might seem to be a very technical subject; however these seismic events will strongly influence the architecture of the region.

Research showed that building objectives and design strategies (such as irregular plans) are often conflicting with structural earthquake design

principles. In order to prevent subordinating aspects such as aesthetics and function, I have set up a design strategy (objective-conflict-solution) to make reasonable tradeoffs during design decisions. The research was used to make a design for the public interface for the Governmental Department for earthquakes. The design has resulted in an exciting building, made shockproof by all kinds of innovative earthquake principles.



**ARCHIPRIX
NOMINEE**

the architect in practice

AWARDS FOR AE GRADUATES



Sol van Kempen, Nadia Remmerswaal and Jan Porthene are nominated for the **ASN Bank Wereldprijs** - for the world of tomorrow.



Joël Klerks won the second price for the **studentenSTAALprijs**.



Eric Geboers is one of the distinguished award winners of the **Singapore Challenge** - the science of future cities.



Cederick Ingen-Housz is nominated for the **NRP masterprijs** - new ideas for transformation and renovation.



Eric Geboers is one of the finalists of the **Challenge Stad van de Toekomst**

AE ALUMNI



ERIC GEBOERS, founder of the Salt Project, is currently participating in the 'Urban Accelerator' as one of the winners of the Challenge de Stad competition. Eric is now looking to change the world through sustainable innovation, starting with the development of his first 1:1 salt project in the urban accelerator. Eric also won the distinguished award at the Singapore Science of Future Cities competition (see photo above), and is nominated for the Archiprix. The Salt Project is a biomimetic attempt to create architecture using seawater in the desert.



SOL VAN KEMPEN, founder of Sustainer Homes, just realized his first prototype home. The Sustainer Home uses solar panels, wind mills, and rainwater collection to produce all its own energy and water. The resulting design is completely off the grid.



ANNE SCHAKEL works as a junior architect at cepezed. She is currently working on an urban development in Aalst, Belgium, containing a parking, residential building and cinema.

photo by Leon van Woerikom



text **Thijs Asselbergs**

De Nieuwe Architect (The New Architect, DNA) is an investigation of the position of the architect in this transformative time.

What is the role of the architect within society and the building process? What is his position? To whom belongs the authorship? What expertise

does he (still) require today? Are you a generalist or a specialist? These are all examples of challenges that DNA questions.

DNA is a platform supervised by Thijs Asselbergs and Alijd van Doorn, with committed students and fellows from the Faculty of Architecture at TU Delft. DNA promotes associations with organizations that want to serve and strengthen the general interest of the architect.

master education

Bucky Lab

MSc 1

text **Marcel Bilow**

We started the new Bucky Lab MscI course a couple of years ago in its new set up. Marcel Bilow, assistant professor and formally known as Dr. Bucky Lab developed the idea of a mobile workshop to solve the problems that occurred after the demolition of the old building by putting a set of tools in boxes and open the workshop in a tent on the campus.

The idea was well accepted and the ongoing trend having more than 70 students in the course is quite a fact that the Bucky Lab is more prominent and liked from a wide group of students.

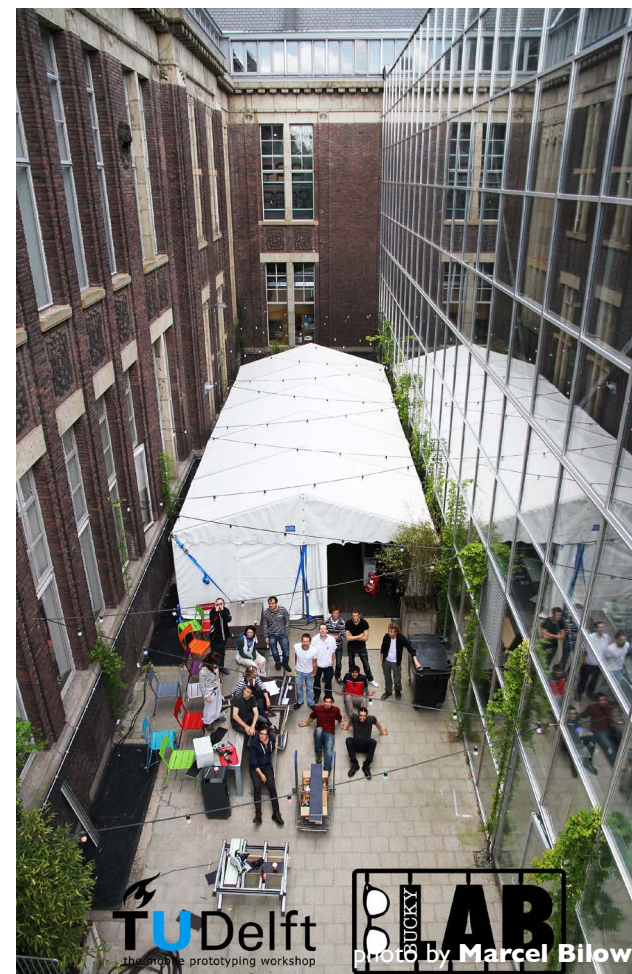
Its is no wonder that our Dr. Bucky Lab also got this years title as “docent of the year” which not only underlines his passion to teach how to develop and build innovative prototypes but also brings the whole course on the top of the best courses within our faculty. According to

Stylos who asked for the best docent this year, it seems that the whole course and alumnis of the course voted for Marcel and indirectly also for the course itself.

The course collaborated with several associations and research partners like RWS to develop new technologies how to build on the dutch coast. Next to this the students won several prices within the last years on national and international competitions.

This winter semester we will work on the topic of acoustics in cooperation with the chair of Arjan van Timmeren. We will try to find a way to improve his shared office space with new and appealing solutions to reduce the noise level and increase the acoustic comfort. Due to the fact that some elements will be placed in the middle of the room but also within the window openings, daylight will be a topic also.

If you like to know more about the course, its mobile workshop or the projects from former semesters follow www.buckylab.nl or join the Bucky Lab facebook group.



EXTREME

MSc 2



image by **J.J. van Maastrigt**

text **Job Schroën**

Last year Extreme addressed building at high altitude. The group was joined by a team of lecturers and teachers like Marcel Baumgartner, the architect of the Neue Monte Rosa-Hütte, prof. Holger Techen and prof. Stefan Behnish.

The students made presentations of their concepts on architecture, climate, structure, but also their concepts on detailing.

The next Extreme, which starts in November, will be dealing with earthquakes on Iceland. Students will be dealing with a spectacular landscape on a coastal location with some of the most extreme earthquakes on our planet. Of course the architectural quality can only be guaranteed in an integral design.

Delft Seminars on Building Technology

text **Bas Gremmen**

Imagine you have a beautiful façade in mind you want to make. Or you are fascinated by materials. Or you are convinced that we should build at least energy neutral -or even better- buildings that produce energy.

But now you have to design it. You have to have the knowledge and the skills to make your idea concrete. In the way you want it to be. In fact, better than that; better than the first –often vague – idea and not only the idea, but a concrete, buildable design. We want you to experience what a design needs to make you co-producers enthusiastic about the feasibility of your project. This is what the course ‘Delft Seminars on Building Technology’ is about.

Design task

Architecture is for an important part designing technical aspects. ‘Delft seminars on building technology’ is about architecture from the perspective of technical building design.

The design task at hand is a new (technical) design proposal for an existing building. It is about integration of structural elements, facade construction and climate design in one design. This design must be “2030 proof”. This means designing in a different socio-cultural context with new technical possibilities, reducing the ecological footprint of the building. We practise this task in six different studios. Five of them have a specific theme and the last one is based on the personal fascinations of the student self.

research featured

PD Lab Product Development Lab



image by **Pieter Stoutjesdijk**

text **Pieter Stoutjesdijk**

During the last century the world has seen impressive innovations. Strange to see that the way our buildings are built did not change that much. While most of the goods around us are made with highly advanced fully automated production technologies, the results on the building site are still determined by the sharpness of the pencil.

Of course, also the building industry has its pioneers; we read about 3D printed houses, constructions made with robots and architects proudly telling that not a single piece of the entire facade is made out of the same shaped part. But these are expensive prototypes, experiments, often challenging and demanding projects only feasible if millions of visitors come and look and bring the economy in full swing.

In the end, we don't buy cars or furniture because they are built by robots, but we know we are able to afford them due to this fact. Therefore, in this research project expensive digital production technologies are not used to make even more expensive architecture, but to provide an economic and ecological advantage for the building sector.

With this lighthouse project a platform for Product Development – the PD Lab – will be realized to explore the boundaries and potential of CNC milling technologies in building construction.

In fact a platform will be built literally step-by-step: to investigate and test digital production technologies like CNC milled wood connections on 1:1 scale, but also a platform in its wider meaning to investigate the effects and influences of file to factory production, to explore the potential in the field of sustainability, material use, logistics and the interaction of stakeholders within the chain of the building process.

The method of using CNC milled plywood sheets with integrated connections for full scale building construction was invented by Larry Sass's (MIT) in Cambridge ten years ago. Pieter Stoutjesdijk (TU Delft) developed this principle further; developing disassemblable integrated building components and making optimal use of the third axis on a CNC router to create 2,5D connections.

CNC milling technologies deliver accurate precision which allows airtight construction details, an essential key factor to create low energy consuming buildings with a high comfort. This accuracy combined with integrated connections makes easy and fast (pre)assembly possible. CNC milling technologies can handle a variety of sheet good, the PD lab will be produced out of environmental friendly plywood and natural fiber based sheets which comes from waste cycles. The use of these materials will reduce the embodied energy. While the use of standardized building components accepts the reuse of the components like Lego blocks, the building itself allows a high

amount of flexibility over time. Combined with specific custom building components where necessary allows mass-customization; supported through the direct file-to-factory process.

The digital process offers the advantages of modularity, predictability and precision which will be key features on the building site. The digital engineering phase allows a constant overview of material flows, energy consumption, production time and embodied energy. Former problem solving on site will be reduced by the control of the digital design beforehand in close collaboration within the design team, which has great potential to reduce failure costs.

The goals of the team are clear but also demanding. It's not about following a trend, or the fulfillment of an architect's dream. The current situation on the market asks for smart use of technology and material, which adds up together higher than the sum of its parts. Through the PD lab we try to investigate if digitally fabricated building systems can contribute to provide affordable, flexible, low energy consumption buildings that respond to our demanding challenge towards an energy neutral future

Team: Tillmann Klein; Thijs Asselbergs; Marcel Bilow; Pieter Stoutjesdijk (TU Delft), Jos Lichtenberg (TU Eindhoven)

featured research

MaCuBs Mass Customized Building Systems

text **Pieter Stoutjesdijk**

The 20th century knows many examples of failed experiments to integrate the mass-production potential of the First Industrial Revolution into architecture. Experiments that were all based on rigid product solutions; with a lack of flexibility in political, programmatic and technical sense. The "one size fits all" worked for a car, but not for a building. Architecture is highly context-specific product, rooted in local culture, local climate and local urban context.

At the start of the 21st century we are at the beginning of a New Industrial Revolution. One in which digital fabrication technologies create a direct connection between the digital and the physical world. Atoms are the new bits. This new industrial revolution offers 'mass-customization' with the benefits of 'mass-production'

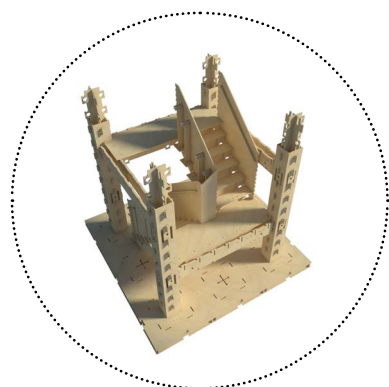
"Right now there is a bit of hype in the media about 3D printers, but it is silly because the articles are written by journalists who don't even actually use them. There is a revolution today, which is digital fabrication, which means turning data into things and things into data, and the 3D printer is a small corner of that big space. (...) There are bigger machines that involve much more complex processes." (Neil Gershenfeld in Barcelona Metropolis, sept. 2014)

It is those big digital fabrication machines - often using far developed subtractive techniques like CNC milling - that already have significant applicability in the realization of buildings today. The same unique digital model that is used during

design and engineering can be sent directly to digital fabrication machines to be physicalized on full scale. In the field of architecture the New Industrial Revolution provides the opportunity to fully re-integrate currently fragmented disciplines of design, engineering and production.

MaCuBs – part of graduation studio Architectural Engineering – is developing and applying building systems created through digital fabrication techniques. Through research, design, prototypes and pilot projects MaCuBs explores the potential of digital fabrication in building industry to solve real world problems in innovative and realistic ways. Challenges MaCuB students are currently working on include the development of safe and affordable construction systems for slums, the transformation of vacant offices through mass-customized interiors, and the use of the speed and flexibility of digital production to house asylum seekers. The Product Development Lab investigates how digital fabrication techniques could provide an economic and ecological advantage for the building sector.

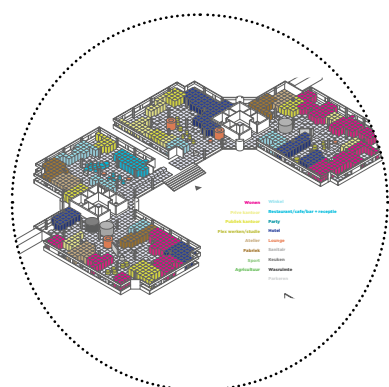
Many aspects of the New Industrial Revolution are involved in the design projects and the research: open source knowledge, fab-labs, mass-customization, local production, file-to-factory, new business models, new collaborations between architect and client and new kinds of ornamentation.



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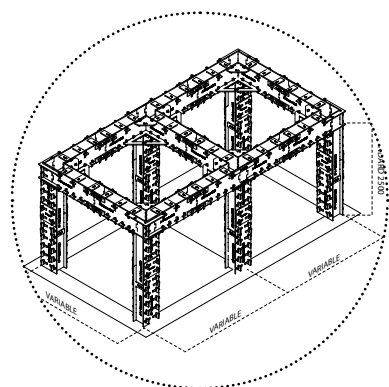
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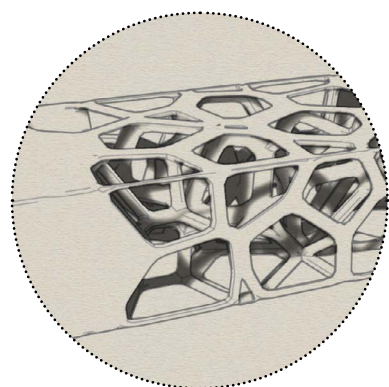
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Images on the left: Graduation Projects by students of Architectural Engineering:

1. A cnc milled building system for flexible DIY transformation by *Daan Meeder*
2. An optimization of force flows in cnc milled friction-fit connections by *Leonard Vischer*
3. A system to transform vacant offices into flexible cities by *Leon Zondervan*
4. New roles in the design process through digital technologies by *Freek van Zeist*
5. A cnc milled formwork to create safe structures in slums by *Nadia Remmerswaal*
6. A 3D printed element for varying integrated green facades by *Jasper Manders*



photo by **Marcel Bilow**

Education

Junior TU | Bob van Vliet | bob@sjokola.nl

BSc2 ON2 | Nellie Schut | P.A.Schut-Baak@tudelft.nl

Minor Archineering | Roel van de Pas - R.R.J.vandePas@tudelft.nl

MSc 1 Bucky lab | Marcel Bilow | M.bilow@tudelft.nl

MSc 1 Delft Seminars on Building Technology | Bas Gremmen | B.gremmen@tudelft.nl

MSc 2 Extreme | Job Schroën | jschroen@septemberarchitectuur.nl

MSc 2 van Gezel tot Meester | Elise van Doorn | E.J.G.C.vanDooren@tudelft.nl

MSc 3 + 4 Graduation Studio | Tjalling Homans | T.C.Homans@tudelft.nl

Topics

Beyond the Current | Tjalling Homans | T.C.Homans@tudelft.nl

Coastal Living | Annebregje Snijders | anne@annebregjesnijders.nl

De Nieuwe Architect | Thijs Asselbergs | M.F.Asselbergs@tudelft.nl

Home @ Work in Bandung | Mo Smit | M.J.smit@tudelft.nl

IBA Parkstad 2020 | Annebregje Snijders | anne@annebregjesnijders.nl

Learning from Lowlands | Tjalling Homans | T.C.Homans@tudelft.nl

MaCuBs | Pieter Stoutjesdijk | P.M.M.Stoutjesdijk@tudelft.nl

PD Lab | Marcel Bilow | M.bilow@tudelft.nl

Seismic | Job Schroën | jschroen@septemberarchitectuur.nl

Shelterlands | Annebregje Snijders | anne@annebregjesnijders.nl

Design Education | Elise van Doorn | E.J.G.C.vanDooren@tudelft.nl

more info: intecture.blogspot.nl



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Annebregje Snijders

Tjalling Homans

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