Current work on social sustainability in the built environment

Sustainability is based on the United Nation's (UN) Brundtland Report, which defines economic, social and environmental factors that can ensure long-term economic viability while maintaining an environmental balance and showing commitment to socially desirable practices. Great focus has been on integrating environmental and economic factors into the project processes of construction. There is substantial potential in developing a strategic process to ensure that social sustainability is systematically incorporated into a project equally with economic and environmental factors. Research in the field is scarce and suggests that social sustainability is a secondary parameter even though it is integrated in building projects today. There is a tendency that decisions made regarding which social sustainability aspects is to be integrated in a project is based on experience from previous projects. There is a need of a strategic approach on how to handle and work with social sustainability that is based on more than experience. Can decisions be informed by quantifiable information about social sustainability as is the case with economic and environmental sustainability?

Informing sustainable building design: The importance of visualizing technical information and quantifying architectural decisions

Purpose - In recent decades there has been a focus on reducing the overall emissions from the built environment, which increases the complexity of the building design process. More specialized knowledge, a greater common understanding and more cooperation between the stakeholders are required. Interdisciplinary design teams need simple and intuitive means of communication. Architects and engineers are starting to increase their focus on improving interdisciplinary communication, but it is often unclear how to do so. The purpose of this paper is to define the impact of visually communicating engineering knowledge to architects in an interdisciplinary design team and to define how quantifying architectural design decisions have an impact during the early phases of sustainable building design.

Design/methodology/approach - This work is based on a study of extensive project materials consisting of presentations, reports, simulation results and case studies. The material is made available by one of the largest European Engineering Consultancies and by a large architectural office in the field of sustainable architecture in Denmark. The project material is used for mapping communication concepts from practice.

Findings - It is demonstrated that visual communication by engineers increases the level of technical knowledge in the design decisions made by architects. This is essential in order to reach the goal of designing buildings with low environmental impact. Conversely, quantification of architectural quality improved the engineer's acceptance of the architects' proposals. Originality/value - This paper produces new knowledge through the case study processes performed. The main points are presented as clearly as possible; however, it should be stressed that it is only the top of the iceberg. In all, 17 extensive case studies design processes were performed with various design teams by the 3 authors of the paper Mathilde, Birthe and Signe. The companies that provided the framework for the cases are leading in Europe within sustainability in the built environment, and in the case of Sweco also in regards to size (number of employees). Data are thus first hand and developed by the researchers and authors of this paper, with explicit consent from the industry partners involved as well as assoc. Professor Lotte B. Jensen Technical University of Denmark (DTU). This material is in the DTU servers and is in the PhD dissertation by Mathilde Landgren (successful defence was in
January 2019). The observations and reflection is presented in selected significant case examples. The methods are described in detail, and if further information on method is required a more in depth description is found in Mathilde Landgrens PhD Dissertation. There is a lack in existing literature of the effect of visualisation in interdisciplinary design teams and though the literature (e.g. guidelines) of integrated design is extensive, there is not much published on this essential part of an integrated design process.

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Integrated design processes – a mapping of guidelines with Danish conventional 'silo' design practice as the reference point
This research maps various Integrated Design Processes (IDPs) with Danish conventional silo Design Practice as the reference point. The intention was to identify generic elements that are common among IDPs. The mapping was based on a literature study of a number of IDP guidelines. Eight IDP guides from the last two decades were selected for mapping. The Danish Description of Services functions as a typical representation of a conventional silo Design Practice (CSDP) and as a 'scale' against which to map the selected IDP guides. The results indicate a limited consensus on what constitutes an IDP but a possible consensus core that is shared by them all. One commonality is that technical knowledge must inform design decisions, and not simply be used to validate them, but on the other hand, it should not drive them. Another main trait is the interdisciplinary character of these processes, where several professions must be a part of the process from the beginning. The study also found that all IDP guides have a 'black box problem', where the desired inputs and outputs of the process are known but no explanation is given regarding the mechanisms of how the integrated design decisions are to be made or how to facilitate this decision-making in an interdisciplinary design team. These findings can explain the slow adoption of IDPs in the building industry and they can be used to improve IDPs and increase their implementation in integrated building design.

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The importance of visuals in communicating engineering knowledge to architects

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A review of current work with social sustainability in the built environment

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How does sustainability certification affect the design process? Mapping final design projects at an architectural office

The context of the study is the very strict regulation of energy consumption for operating buildings in Denmark. It is difficult to meet the requirements by system optimisation in the final design phase, so recent research has focused on ways of meeting the target by adapting the whole design process and informing the industry of them. This has led to optimised design processes such as Integrated Energy Design, in which many decisions related to energy consumption and indoor climate are made in the early design stages. The current tendency is to use an expanded notion of sustainability, derived from the sustainability certification system itself, and to apply it even in the early design process. This perspective emphasises all phases of the life cycle of a building. The goal of the present study was to map how a Danish architectural office approached sustainability in the projects they undertook in the course of a year. All the projects concerned were intended to conform to the German Sustainability Certification System DGNB. We developed a mapping tool to document these case projects and found that different sets of certification criteria were used in each project. This demonstrates the complexity of using them as design parameters in practice, but also that it was successfully achieved.
Informing Sustainable Architecture

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Informing sustainable architecture: Introduction

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Introduction

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LCA in early design phases

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LCA in the early design phases

Social Sustainability: If it doesn't have a number it doesn't exist

Tools for social sustainability into structural engineering
How to foster a High-Tech entrepreneurial mind-set – A multidisciplinary engineering course for Bachelor students

Integrated Energy Design and Life Cycle Assessment in Design Processes for Refurbishment

Integrated Energy Design and Life Cycle Assessment in Design Processes for Refurbishment
This paper investigates the state-of-art for using the DGNB Sustainability Rating System, Life Cycle Assessment, and Life Cycle Costing in the Danish building industry, and how well this use is aligned with the Integrated Energy Design process in refurbishment projects. An optimal method for including all aspects of sustainability in the design process is developed based on a literature review, interviews of professionals, and a mapping of design processes at a Danish architecture firm that specializes in sustainable architecture. Finally, the paper reflects upon the final design process presented in this work, considers what is needed to implement this design process, and envisages the impact of this practice on the building industry.
Process optimization on ambitious sustainability goals through the framework of DGNB

The need for designing buildings with a sustainable approach is higher than ever before, but using building sustainability assessment tools, such as DGNB, is a comprehensive and complex activity. This has led to attempts to optimize the tangibility for usage of sustainability assessment tools in the design process. A holistic qualitative approach is used in this paper with the aim of mapping the structure of DGNB Office Building finding and prioritizing topics to address during a design process. Four experts from the Danish building sector were interviewed and their responses analyzed through the use of Grounded Theory. The findings expose that the project brief must define a healthy framework for both collaboration and project management, and a specific two-step approach to obtain the certification goal should be performed. The size of the criteria determined how it should be addressed in the project. DGNB was also found to have an impact on the architectural quality leading to certain architectural traits. An important finding was that it is paramount that all stakeholders take an integrated holistic approach when applying DGNB.

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Sustainability Gains from combining LCA and Parametric Design in Early Design Phases of Structural Design

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Beskrivelse af borepladsen

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Expansion in Number of Parameters - Simulation of Energy and Indoor Climate in Combination with LCA

The Technical University of Denmark has been carrying out research in the energy balance of buildings in relation to indoor climate for decades. The last two decades have seen a major role played by research in the field of Integrated Energy Design (IED) focusing on the earliest design phases. The research has showed that the greatest effect in relation to achieving net-zero-energy buildings is achieved when indoor climate and energy simulation tools are applied from the very first architectural sketches, where geometry, façade design, orientation, etc. are determined. Large architectural offices and engineering consultancies in Scandinavia have invested in software and interdisciplinary design teams to carry out Integrated Energy Design (IED). Legislation has been altered and simulations of indoor climate and energy balance are now required to obtain building permits. IED has been rolled out extensively in the building industry. Having reduced the energy needed to operate the indoor environment to almost zero by designing with knowledge and optimizing systems, the energy needed to construct the building and its systems is now prominent in importance. The CO2 impact of buildings has become an important parameter because sustainability certification systems like the Deutsche Gesellschaft für Nachhaltiges Bauen (DGNB) have taken the lead in Europe. The DGNB system includes Life Cycle Assessment (LCA), and the Danish government has stated that Denmark must be CO2 neutral by 2050. The focus in design is shifting from energy and indoor climate to CO2 impact. The experience from the decades of IED shows that the largest gains in reduction come from the early design phases. LCA in relation to buildings has to include the energy needed to operate the building’s indoor climate as well as the CO2 embodied in the building. This makes the simulations far more complex. LCA thus tends to be placed in the last phases of design and used for certification, so that only a single iteration is needed. However, real-time LCA simulation tools are required if designers are to base design decisions not only on knowledge about indoor climate and energy balance but also on LCA. This paper presents the efforts at DTU’s Department of Civil Engineering to develop a real-time LCA simulation tool, including indoor climate and energy balance simulation (based on Energy +) and the first round of implementing the tool at well-esteemed architectural offices in Scandinavia. The development of the real-time LCA-indoor climate- energy balance tool was funded by Nordic Built.
Mapping one year's design processes at an architecture firm specialized in sustainable architecture - How do sustainability certification systems affect design processes?

The current study mapped how a Danish architecture firm integrated sustainability in their projects over a year. All the projects concerned were aimed at being sustainable within the framework of the DGNB certification system. The focus of DGNB is equally divided between environmental, economic and social aspects. During the mapping process, a picture was drawn of the state of the art for integrating DGNB in design processes and of the challenges involved. Case studies formed the basis of the study and helped substantiate the complexity of integrating DGNB's criteria as design parameters in practice.

The framework for the study is the increased focus in recent decades on minimizing the energy consumption used for operating buildings, because the building industry accounts for 40% of the total energy consumption in the EU. This focus has led to more optimized design processes within the framework of the Integrated Energy Design (IED) method, in which many decisions related to indoor climate and energy consumption are made in the early stages of the design process and have therefore become an important design factor for both architects and engineers. The tendency is now to widen the perspective to design decisions in all phases of the entire lifecycle of a building. Life Cycle Assessment (LCA) moves to
the fore in the design process to make it possible to meet the overall purpose of reducing CO₂ emissions and the general environmental impact of the entire building industry.

Mapping one year’s design processes at an architecture firm specialized in sustainable architecture - How do sustainability certification systems affect design processes?

Sustainability certification systems as guidelines for early-phase urban design processes

The German Sustainable Building Council (Deutsche Gesellschaft für Nachhaltiges Bauen or DGNB) has one of the most comprehensive sustainability certification systems for urban districts (UD). Their explicit aim is that the system should impact the very earliest design decisions. The Technical University of Denmark has tested the DGNB-UD system in two experimental design projects for similar locations to find out how it can be used in the early-phase design process. This paper describes these two independent design processes, compares them and discusses their general features.

We found that DGNB-UD addresses a broad sustainable focus and can be used as a tool for setting sustainability goals from the very first design steps. The system tends to promote multifunctional compromise solutions that meet several criteria at the same time. Using the DGNB-UD certification system in the early design phases therefore does have some effect on the urban design in terms of a bias towards certain design traits.
Videnskabelig udredning af international viden om skifergas relateret til en dansk kontekst: DTU, GEUS, DCE

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Learning from the Masters: Architectural History and history of technology and architectural engineering in relation to structural design education

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Quantifying Sustainability in Architecture

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Students as agents – connecting faculty with industry and creating collaborative projects

Collaborative projects between partners in the building industry and students constitute important means for addressing more advanced parts of the CDIO Syllabus 4. In this paper an existing internship program is revised in order to enhance collaboration between industry and faculty/students and perform as vehicle for addressing challenging parts of the CDIO syllabus.

Sustainability through hands-on experience: Solar Decathlon

Creating an information quantum leap in early design phases

The poster will outline the dynamic simulations tools developed in the building industry during the last two decades for integrating knowledge of indoor climate and energy in early phases of a building design and give a brief up date of the present quest to include and integrate information from urban environment climatic conditions, broad multi-criteria sustainability certification in early design phases aiming a.o. at meeting the obligations defined by smart cities challenges. Civil and Environmental Engineering has special challenges concerning design processes. These design projects are always influenced by their location and the topography (be it natural or manmade), climate, etc. This means that each project is unique and must be viewed in its own right. This reduces the benefits of mass production and standardization.
that are so heavily emphasized in mechanical design and manufacturing. This also means that design theories, tools, and techniques cannot be adopted directly from other design disciplines such as product design where different solutions can be developed for each individual or group. The natural environment has dynamic, unpredictable, and sometimes chaotic properties and behavior. This is more true than ever when considering the challenge of climate change. The requirements and behavior of the human users also vary in time. To meet these challenges, Civil and Environmental Engineering projects must be designed to be flexible so they can adjust for temporary changes in natural or human conditions. They must also be adaptable so they can evolve with technology, society, and the environment. The recent years, increasing application of renewable energy sources put extreme pressure onto the energy grids and need for demands side management, where buildings play a decisive role in stabilizing the energy demand through e.g. thermal storage in building components. Design in Civil and Environmental Engineering also defines the reality in which we live, work, and play. Thus, it borders other fields such as architecture, landscape design, and urban planning --- influencing them and being influenced in exchange. The design of sustainable and climate adaptive systems and structures requires a very high level of information in all of the design phases. Addressing the challenges will require even more information with a better level of integration than is currently available today in either industry or education. Interdisciplinary design methods building on the know-how created during the past 2 decades is at the fore. How can we better integrate the knowledge at hand in Civil and Environmental Engineering in interdisciplinary design processes?
Quantitative and creative design tools for urban design in cold and windy climates

In cold and windy climates, the quality of the urban spaces is severely challenged. A design process with a very high level of information regarding wind, sun, daylight and water from the earliest of the design process will help create the most optimized design. For the last couple of years, the Technical University of Denmark has had an initiative to combine the University’s existing knowledge, relevant for large scale physical planning, in new ways. Technical-scientific knowledge about traffic and transportation, water-management, snow drift, wind engineering, sun and daylight have prospered in academic ‘silos’ where little attention has been made in regards to architectural design processes. Simulation tools were developed that can render a larger amount of information available in a short time and thus can keep pace with an ongoing design process in an architectural studio. Bridging the gap between the design processes and the academic knowledge available is a focus area. The effects of climate change and a general higher demand for quantitative assessment of urban planning proposals in hard climatic locations have created a demand for research based design advice. The paper will present these ‘design tools’ and how they can inform an ongoing design process from the earliest of design phases and afterwards.
The Potential of the Technical University of Denmark in the Light of Sustainable Livable Cities

The Technical University of Denmark (DTU) has a long tradition for research and education in urban planning and sustainable urban development. An increasing societal focus on sustainability and urbanization in society supports this continuous focus on sustainable urban planning in technical educations. The focus on sustainable urban development includes understanding the role of civil engineering, water engineering, sustainable mobility and energy, and communities in developing future desirable solutions. However, beyond the challenges faced in each of the specific technical fields, there is a growing demand for integrated solutions. A proposal has been developed in the last couple of years to further develop DTU's education in urban development and livable cities with an emphasis on integration and interdependencies in urban engineering. This paper describes core professional design niches which by themselves have an impact on urban development, including water in cities, climate adaptation, mobility planning, building, energy, and community designs. A number of challenges in developing an integrated approach in the technical education are discussed in the paper. The increasing focus on sustainability but also on global urbanization, compact cities, and smart cities supports new thinking in urban planning and design in technical education. The paper suggests a new initiative to further develop the sustainable urban planning research and education at DTU.

Reflections on How DGNB(UD) Certification Standards Effect Design Methods

DGNB is an abbreviation of Deutsche Gesellschaft für Nachhaltiges Bauen, a German sustainability standard and certification system that has operated for a decade and that was appointed as the official Danish system by Green Building Council (GBC) Denmark in 2009. In 2012 GBC Denmark launched a second DGNB standard, now focusing on urban districts. This certification standard is currently still in the process of being adjusted to Danish standards. DGNB Urban Districts (DGNB(UD)) pleads for using their system as design ‘tool’ or guideline for the very early design stages. This process has not been investigated or described well. In this paper, the effects of DGNB(UD) on design is investigated in a case study using DGNB(UD) as a ‘design tool’. The effects on the design process is observed and compared to well established methodologies of integrated energy design (IED) and traditional beaux- arts architectural design. The case study addresses the design of an abandoned harbor area to be re-inhabited and to provide new functions.
Report for Working Group 2: Design Education in Civil and Environmental Engineering
The theme for the second working group was design education in civil and environmental engineering. Issues discussed during this meeting included the current state of the art of civil design education, the importance of civil design education, tools and techniques that can be used to build design competencies, the importance of balancing hard and soft skills, and the role that culture and context play and will continue to play in civil design in the future.

Investigation of Architectural Strategies in Relation to Daylight and Integrated Design: A Case Study of Three Libraries in Denmark
This paper investigates the use of daylight in three architecturally successful buildings. The aim is to discuss the challenges and opportunities of architectural daylight strategies in relation to integrated design. All these buildings were designed with the focus on a strategy of using daylight to create well-lit, exciting spaces and spatial sequences. The original ideas, thoughts, and decisions behind the designs and daylight strategy are compared with answers in questionnaires from test subjects who have experienced the space and lighting conditions created. The results indicate that the architectural daylight strategies formulated by the architects and engineers at the beginning of the design process are actually experienced by the “users” in the existing buildings. The architectural daylight strategy was different in each of the three libraries, and analysis of the results shows that daylight strategies that include spatial considerations received more positive evaluations. Furthermore, the study showed that designs aimed at achieving an even distribution of daylight with an illuminance target of 200 lx did not result in higher evaluation of the daylight design.

Investigation of Architectural Strategies in Relation to Daylight and Integrated Design: A Case Study of Three Libraries in Denmark
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Bridgescaping - Contextual Structural Design

Large-scale infrastructural projects such as bridges used to be the monopoly of engineers. They were designed as – often very beautiful – expressions of how forces work in a structure, guided by the nature of materials and a rational construction process. However, in recent decades politicians and investors have discovered ways of getting more from their investments by using such projects to give identity and coherence to an area. This has led to a European tendency for engineers to surrender their design opportunities and let architects take over but it does not have to be so. These projects can also encourage engineers to focus more on the aesthetic aspects of their design and the way their structures will work in the context of the surroundings. This paper will present a series of contemporary bridge structures to provide a short history of the tendency described above and discuss design at the boundary between civil and architectural engineering.

Energy renovation of listed buildings

Integrated Structural Design Education

In Environmental Impact Assessment (EIA), the environment is broadly defined and includes not only quantifiable aspects, but also social conditions, scenic beauty, traffic, cultural heritage, and commercial development. A successful bridge design must comply with all of these demands according to EU legislation. And a successful engineering student must be prepared to work in the open-ended, multidisciplinary environment necessary to produce structures which comply with EIA demands. This paper describes an innovative course developed at the Technical University of Denmark which integrates landscaping and structural design. The integrated courses create a setting for learning about the design of large-scale structures and involve geometry, statics, computer simulation, graphical design and landscape architecture. Together, they educate engineers who can take part in the early design phases of a project, function well in design teams, and comply with EU EIA demands.
Mutual Workshops enhancing Curriculum Integration
The BSc Eng programme in architectural engineering at DTU Civil Engineering is organized in accordance with CDIO principles. We have been working with CDIO principles for 2-3 years now, and in the following we present the process and adjustments that were made, with the third semester as a case. Every semester has a teaching team consisting of all the teachers for courses in that semester. Each semester also has its own theme and a multidisciplinary, joint project. So the most active members of the teaching team, of course, are those responsible for courses that address the theme and contribute to the joint project. The theme of the third semester is 'structural design'. Structural design is defined as an integration of material science, statics and geometry in relation to an architectural project. Anticipating the implementation of CDIO and this theme, major changes were made to the curriculum. A course in material science was moved from the fourth to the first semester so that the project could be informed by material science. A new course in geometry was prepared and software that could facilitate an integrated design project was introduced (STAAD Pro). The ‘full package’ of the new third-semester project in structural design was realized for the first time in autumn 2009. This paper presents the lessons learned from this first round along with the changes they inspired. Amongst the biggest changes made was the introduction of a successful joint workshop between the geometry course and the design course. This realized the full potential of structural design and firmly highlighted the creative potential in geometry for hesitant students. The joint workshop also showed potential as a general tool that can enhance curriculum integration.

Obstacles and New Opportunities for Integrated design
Recent developments in integrated design in Civil Engineering are outlined by describing how projects can now be informed with engineering knowledge at a conceptual level. The well-defined methods of integrated design are challenged by young engineers and architects. The development of simulation programs has been massive and engineering educational programmes can no longer teach just one design method with its related programs, but must instead give room for a continuous experimental design laboratory.
Quantifying the potential of automated dynamic solar shading in office buildings through integrated simulations of energy and daylight

The façade design is and should be considered a central issue in the design of energy-efficient buildings. That is why dynamic façade components are increasingly used to adapt to both internal and external impacts, and to cope with a reduction in energy consumption and an increase in occupant comfort. To gain a complete picture of any façade’s performance and subsequently carry out a reasonable benchmarking of various façade alternatives, the total energy consumption and indoor environment need to be considered simultaneously. We quantified the potential of dynamic solar shading façade components by using integrated simulations that took energy demand, the indoor air quality, the amount of daylight available, and visual comfort into consideration. Three types of façades were investigated (without solar shading, with fixed solar shading, and with dynamic solar shading), and we simulated them with various window heights and orientations. Their performance was evaluated on the basis of the building’s total energy demand, its energy demand for heating, cooling and artificial lighting, and also its daylight factors. Simulation results comparing the three façade alternatives show potential for significant energy reduction, but greater differences and conflicting tendencies were revealed when the energy needed for heating, cooling and artificial lighting were considered separately. Moreover, the use of dynamic solar shading dramatically improved the amount of daylight available compared to fixed solar shading, which emphasises the need for dynamic and integrated simulations early in the design process to facilitate informed design decisions about the façade.

COMPARISON AND CLASSIFICATION OF DESIGN BUILD PROJECTS IN DIFFERENT ENGINEERING BACHELOR PROGRAMS

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10.1016/j.solener.2011.01.010
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Green cottages of tomorrow

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Contributors: Villumsen, A., Bjerregaard Jensen, L.
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The problem of scale in design-implement experiences in civil engineering

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Contributors: Bjerregaard Jensen, L., Almegaard, H.
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B 150 civil engineering futures: The 150th anniversary celebrations of the study of civil engineering in Denmark

Foreword B150 –Civil Engineering Futures consists of interviews made, articles written, and projects presented in connection with the 150th anniversary celebrations of the study of civil engineering in Denmark. Instead of a historical retrospect, it was decided to look into the future. What challenges will the next 150 years bring civil engineers? Researchers and lecturers at DTU’s Department of Civil Engineering (known as DTU Byg) suggested possible events, and we also consulted civil engineers and their business partners in the building industry. In this way, a programme was put together consisting of free, public lectures by international experts, and workshops and master classes on this question open to everyone in the building industry. The use of glass as a construction material would have been considered impossible a few years ago. But work on achieving complete transparency was a major theme in twentieth century architecture. Together, civil engineer Peter Rice and architect Ian Ritchie created a paradigm shift with their revolutionary ideas for glass facades supported by cables. Glued and bolted constructions made entirely of glass are now a reality in small-scale projects, yet the story of transparency and dematerialisation is far from complete. New construction materials
have also come from new knowledge at the nano-scale. Design at the molecular level opens the way for materials with completely new properties and options, e.g. active materials, designed to cope with some specific climatic challenge or clean the air. With nanotechnology, the artificial and the natural move closer together; this is the perspective for civil engineer Chris McCarthy's work all over the world. And what is new is not just the way the construction materials are put together; they also require a huge investment in new production equipment and working processes for the craftsmen who use them. Completely new thinking is needed when an electrical impulse is used to improve the penetration of a chemical. The same applies when classical materials like concrete are given new properties or when a previously passive insulation material is altered to play an active role in a building. The Design Master Class was for architects, civil engineers and students. It was led by Richard Horden, who is not only the head of a design department at Munich Technical University, but also works on design in his own company in London. The theme for the design project was 'Touch the earth lightly' – ultra-lightweight constructions interposed between the human body and the climate. Ultra-lightweight constructions are also the basis for the work of civil engineer Werner Sobek in his capacity as head of the legendary ILEG (Institute for Lightweight Structures). But as time has gone on, he has both collaborated on major architectural projects and, in other cases, gone his own way. His comprehensive knowledge of science and architecture, and especially of construction and materials, has enabled Werner Sobek to develop a technically advanced form of aesthetics. The Master Class in low energy buildings was led by civil engineer, Svend Svendsen, a Professor at DTU Byg. Together with colleagues and students, he has achieved an extensive knowledge of Integrated Design. In fact, the situation is that our knowledge of the energy performance of buildings is so complete now that the bottleneck in the creation of low-energy buildings is no longer in the technology, but in the way the industry works. Integrated Design is a concept that ranges over all the various work processes necessary from the earliest beginnings of a project to its completion in the low-energy building. The master class practised using 'ID Build', a free-ware program developed by DTY Byg, which facilitates integrated design. The architect Thomas Herzog is one of the pioneers of Integrated Design and, together with the Fraunhofer Institute in Germany, has helped create a new standard for sustainable building. One day of the master class was devoted to lectures by civil engineers and architects from Denmark and abroad who talked about their own experience with Integrated Design. The anniversary event was rounded off with another important topic related to sustainability – a Workshop on Traffic. The workshop discussed traffic prognoses and the way they are used in the preparation of urban transport and traffic strategies. Civil engineer Jonas Eliasson spoke about the experience in Sweden of developing a database for traffic prognoses. The main Anniversary Conference on 16 November offered a number of seminars organised by the professional associations and lectures by civil engineers Stephen Selkowich and Cecil Balmond. In collaboration with the architect Renzo Piano, Stephen Selkowich has developed and tested low-energy façade systems; and Cecil Balmond's visionary use of his extensive knowledge of architecture, science, construction and building opened our eyes for totally new possibilities in civil engineering.
Chris McCarty: Active, high-performance materials inspired by nature

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Contributors: Bjerregaard Jensen, L.
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Futures of civil engineering

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Ian Ritchie: Structural glazing and beyond

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konstruktionsfornuft tilsat magi
Richard Horden: Touch the earth lightly

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Thomas Herzog: Interdisciplinarity and low-energy buildings

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Werner Sobek: Advanced aesthetics and research into terra incognita

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Contributors: Bagger, A., Bjerregaard Jensen, L.
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CDIO projects at BYG DTU Architectural Engineering: Two traditions and one evolving

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Contributors: Bjerregaard Jensen, L.
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Recent developments in Structural Engineering, Mechanics and Computation: BLOBS AND IDEAL SPATIAL STRUCTURES - The context of ideal spatial structures

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Contributors: Bjerregaard Jensen, L.
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Ideal Structures & Urban Context: Strategy for integration of ideal spatial structures and place: Virum Sports Hall designed by Finn Monies and Jørgen Nielsen

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Contributors: Bjerregaard Jensen, L.
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Historiografi

Abstract

The article examines the apparent silence concerning history and theory of modern architecture in Denmark during the after war period. By making inquiries into the general agenda of mainstream C.I.A.M. modernism a strong Danish line of oppositional architecture appears. Sigfried Giedions influential book ‘Space Time and Architecture’ promotes science and works of engineering as keys to overcoming the rift between structure and architecture that appeared during the 19th century – in Giedions point of view because architects failed to catch up with technological progress. ‘Space Time and Architecture’ is a linear history in an almost Hegelian sense describing the parallel development of still more dematerialized built structures (+exposed glass cladding) and natural science, implicitly evoking a relation between the two. Arne Jacobsen’s Redovre City hall is a case study of architecture that manifest Giedions and C.I.A.M.s programme. Glass Curtain wall cladding and exposed engineering structures characterize this building. What is not so well known outside Denmark is that at stock of Danish Architects opposed to Arne Jacobsen’s ideas of architecture and in reality also to the C.I.A.M. programme. Their silence in terms of explicit architectural theories may be due to the fact that ‘Den Klintske Skole’ line of architects where rooted in architectural theories from the Arts & Crafts movement and further back from the English pioneers of ‘The Picturesque’ (Kay Fiskers clearly demonstrated this link between eg. PV Jensen Klint and William Morris. David Watkin and Christopher Hussey the link between romanticism and Arts & Crafts).

The essence of these architectural strategies is to meet science and industry manifest in tectonic strategies. Danish architecture of the after war period is devoted to Ruskins stock of tectonic strategies. Bo & Wohlert’s Louisiana Museum is a case study in this aspect, wonderfully reinterpreting follies of the romantic garden: the ruin and the Chinese pavilion coupled with vernacular motives using glass only as a non exposed necessity. But since ‘Space Time and Architecture’ aggressively ridiculed what could be termed a romantic architectural programme (explicitly Arts & Crafts architecture eg. By Maybeck and Greene and Greene, so praised by Kay Fiskers), the above mentioned silence appeared. Finally the article in detail examines how the term ‘romantic’ is used as a negative expression in ‘Space Time and Architecture’ and how Giedion uses the term ‘organic’ in a sense suited for C.I.A.M.’s mission of promoting science as architectural meaning.
Forselg og symbiose: Naturvidenskab og naturromantik - en dialog i moderne arkitektur

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The Dilemma of the Door in the Glass House

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Suburbia and Social Democracy: The golden age of Danish 'Modernism'
An inquiry into the implicit values behind construction practice in Denmark - 1950-1970.

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Dansk Arkitektur - årgang 2000: Musholm Bugt Ferie- og fritidscenter

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