



Program for Japan-DK-Seminar, Copenhagen, September 13, 2019
- Theme 1: Challenges and visions for construction
- Theme 2: Construction Kaizen and incremental improvements

Japan has a growing population of old people and a shrinking construction workforce. Globally there is also an intensive top-down-push on construction from the 17 UN sustainable goals as well as from new technology, materials, systems and client. The construction industry in Japan and Denmark/EU therefore fight for better productivity, new technology, and qualified workers and technicians to fulfil the growing demands. However, we have not yet seen essential improvements on building projects in general.

In two themes, we will discuss different challenges and vision in Japan and Denmark (Theme 1) and Construction Kaizen as a bottom-up-pull solution (Theme 2). The two themes is held in an closed session September 13, 2019, 8:00-12:30 at BLOXHUB, Bryghuspladsen 8, Entrance C, third floor, 1473 Copenhagen K.

In the afternoon, it will be follow up by a site visit in theme 3 and a discussion about i-Construction, ICT, VDC, robots and 3D-construction-print in theme 4 in another program.

Program for theme 1 & 2 at BLOXHUB, 8:00 - 12:30

08:00 Check-in, breakfast and networking

Theme 1: Challenges and visions for construction

08:30 Welcome and introduction to BLOXHUB by HUB director Torben Klitgaard

08:40 Introduction to theme 1 by N. H. Bertelsen, SBI/AAU

08:50 Challenges and visions in Denmark

09:10 Challenges and visions in Japan

09:30 Reflections and break

Theme 2: Construction Kaizen as a bottom-up-pull

09:50 Introduction to theme 2 by N. H. Bertelsen, SBI/AAU

09:55 Kaizen in Toyota as a join practical exercise

10:10 Examples from a construction company in DK

10:30 Utilization of video data on construction sites in Japan

10:50 Reflections and break

11:05 Continuous improvements training by organizations

11:25 Education in motivation and inter professionalism

11:45 Refection and conclusion

12:00 Networking and walk and talk to the construction site 'Postgrunden'.



Background, objectives and discussion room

In January 2019 Professor Kazuyoshi Tateyama, Ritsumeikan University, Japan presented '*i-Construction as a new stage of construction in Japan*' at a seminar in the Consulate-General of Japan in New York. In a related meeting, he and Senior Researcher N. H. Bertelsen, SBI/Aalborg University discuss how to meet these challenges. In September, K. Tateyama and a small Japanese delegation visit Europa, and we get the opportunity to continue our search for solutions at this Japan-DK-Seminar September 13 in Copenhagen. The objective of the seminar is to exchange knowledge, learn from our

different cultural, and seek for solutions to improve productivity, quality, worker environment and sustainability.

We have divided the seminar in four themes. Theme 1 about challenges and vision forms a horizontal discussion room together with theme 3 about building projects, where we can test improvements in practice. Theme 2 about Construction Kaizen as an example of a bottom-up-pull forms a vertical discussion room together with theme 4 about i-Construction as an example of a top-down-push from new technology. We hope, that this discussion room will be applied actively in the presentations and inspire the common discussions in each theme.

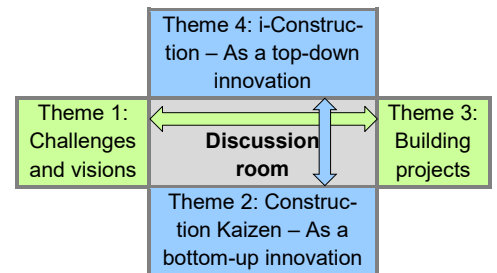


Figure 1. The discussion room at the seminar.

Introduction to theme 1 Challenges and visions for construction

To have a common and targeted development in the construction sector it is important that challenges and visions are simple, visible and applicable for the individual participants and locations in the value chain. In theme 1 we will have a status for Japan and Denmark covering the viewpoints of authorities, construction organizations and innovative clients and companies. It could e.g. refer to the different elements in construction theory (Figure 2) and to different parts in the process matrix including e.g. five steps in the value chain and the three levels in the management hierarchy (Figure 3). We hope Figure 1, 2 and 3 will inspire the participants.

a. External requirements from authorities a. m.
b. Values, costumer requirements and quality
c. Building, property and area as physic 'product'
d. Activities,, operations, processes and time
e. Actors, cooperation, leadership and work environ.
f. Information, digitalization and communication
g. Materials, components, systems and waste
h. Equipment, machines, scaffolding and site sheds
i. Economy, cost in different parts and productivity
j. Learning, improvements and benchmarking
k. Knowledge, research, education and theories

Figure 2. Construction theory from TPS, Lean, Last Planner, TDABC, TFV-theory a.m., where a&k are the framework, b&c areas value and 'products', d&e are the project control and f&g&h are the flows.

A. Program					
B. Design					
C. Construction					
Process matrix	i. Production	ii. Delivery	iii. Construction site	iv. Construction	v. Final building

Figure 3. Value chain for construction (i.-v.) and management levels (A.-C.), where i&ii is the supply part, iii&iv is the construction part and v is the building.

Introduction to theme 2 Construction Kaizen as a bottom-up-pull

In material supply after Just-in-Time (JIT) and in the planning concept Last Planner System pull from the workers is a central principle; nevertheless, practice shows focus is still on a top-down-push. It is clear from a Danish study on construction supply chain, it is difficult to implement the pull principle, and we have to train it instantly in practice, if it should work. The same challenge can we also see in relation to information technology, improvement, documentation and in other part of the construction theory (Figure 2). In the seminar, we will therefor put focus on this challenge by discussing Construction Kaizen as feasible solution to get a better pull-push-balance. We can of course use the principle at all levels in the construction project; nevertheless, we have chosen to put our main effort on how we can improve the pull-competence of the construction worker ('worker' in Figure 3). We hop theme 2 will highlight essential activities in Construction Kaizen for workers in Japan and Denmark, and how managers and others can support implementation in relation to Figure 4.

Worker activities
a. Know customer and value requirements
b. See and experience the activity
c. Reduce waste and increase throughput
d. Lean flow and use the 5 why's
e. Communicate visible with data
f.. ?
Manager support
g. Motivate and give space for innovation
h. Support collaboration and team activity
i. ?

Figure 4. Kaizen activities and supports.

A brief profile of our guests from Japan

Professor Kazuyoshi Tateyama tateyama@se.ritsumei.ac.jp

Professor at College of Science and Engineering and an executive trustee of Ritsumeikan University, Japan.

He graduated from Kyoto University with Bachelor in Civil Engineering and took the Doctoral Degree in Kyoto University in 1988. He has taken on the research and development on the rationalization of construction for many years and engaged in a lot of committees of governments and academic societies. He is now the chairperson of the committee for construction robotics in Japan Society of Civil Engineers and Council for Construction Robot Research.

Article: *A New Stage of Construction in Japan – i-Construction – Special Contribution.*

Dr. Kazuyoshi Tateyama, College of Science and Engineering, Ritsumeikan University, Japan. IPA News Letter, Volume 2, Issue 2 June 2017.

Dr. Eng. Takaaki Yokoyama t-yoko@fc.ritsumei.ac.jp

Lecturer at College of Science and Engineering, Department of Environmental Systems Engineering, Ritsumeikan University, Japan.

Expert of Precision construction, Soil mechanics, Tera-mechanics, Space Engineering.

Dr. Hiroshi Furuya furuya.hiroshi@obayashi.co.jp

Senior Chief Engineer at Technical Research Institute, Obayashi Corporation, Japan.

Expert of Utilization of ICT and system development in the construction field

Construction robot development and Construction of data model utilization system.

Theme 1: Challenges and visions for construction

08:50-09:10 Challenges and visions in Denmark

CEO Lene Espersen, Danish Association of Architectural Firms (Danish: Danske Arkitekt Virksomheder) <https://www.danskeark.dk/content/danish-association-architectural-firms>.

Lene was from 2001-11 Minister of Foreign affairs, Legal affairs and Business; Minister of Finance, Industry and Business affairs; and Minister of Justice.

L. Espersen will introduce Danish Association of Architectural Firms, and how architects today acts in construction projects. She will then give an assessment on how authorities, organizations and innovative companies, as well as research and education collaborate in development of the Danish construction industry. She will tell about the development and changes in recent years in the design and construction process in the various life cycle parts and management levels e.g. in relation to Figure 3. She will illustrate how competitive the Danish construction industry is in relation to productivity, quality, architecture, work environment and sustainability or other aspects related to Figure 2. . Espersen will eventually pointing out important key points in the discussion room between theme 1-4.

09:10-09:30 Challenges and visions in Japan

Professor Kazuyoshi Tateyama, Ritsumeikan University, Japan.

Handouts: Kazuyoshi Tateyama (2019). *A New Stage of Construction in Japan i-Construction*. Japan-DK-Seminar, Copenhagen, September 13, 2019: Theme 1. Challenges and visions for construction. 13 pages.

K. Tateyama will explain the challenges facing Japanese society with increasing share of older people and the declining workforce, and how it influence the construction industry. It led to the Ministry of Land, Infrastructure and Transport started a new policy of i-Construction, where high wage levels, sufficient holidays and a safe labor environment is planned to be realized through remarkable improvements in productivity. The ministry established three major steps for such improvements, namely:

- An aggressive use of ICT in construction.
- Standardization of the specifications used in construction to avoid the inefficiency caused by single-item production.
- Balancing of orders throughout the year regardless of the season.

Among these steps advanced construction technology utilizing ICT expected to play the most important role in realizing the final goal. K. Tateyama will eventually pointing out important key points in the discussion room between themes 1-4.

Theme 2: Construction Kaizen as a bottom-up-pull

09:55-10:10 Kaizen in Toyota as a join practical exercise

Production Support Manager Jan Buur Frederiksen and Production Manager East Søren Christensen, Construction Company Enemærke & Petersen a/s, <https://eogp.dk/>

A Danish Lean Construction delegation visit Toyota and different constructions sits in Japan in 2017. In Toyota an old worker showed a practical exercise, where the Danish delegation tried how the principles of Kaizen in practice. J. B. Frederiksen and S. Christensen will go through the same exercise together with the theme 2 participants so we can see and feel the spirit of Kaizen. The exercise is a practical introduction to Kaizen we can use in the following discussions on Construction Kaizen in Japan and Denmark.

10:10-10:30 Examples from a construction company in DK

Production Support Manager Jan Buur Frederiksen and Production Manager East Søren Christensen, Construction Company Enemærke & Petersen a/s, <https://eogp.dk/>

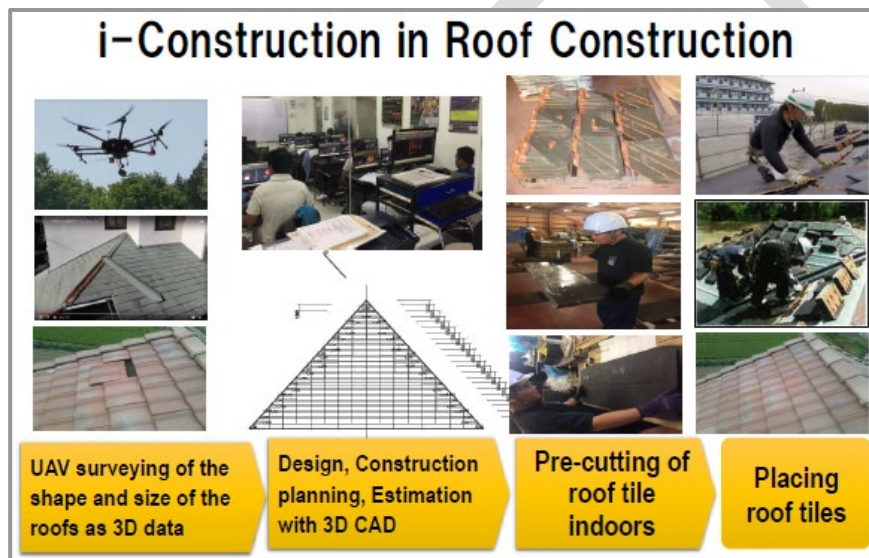
Enemærke & Petersen a/s (EogP) is an innovative construction company with around 700 employees working with decentralized management, where construction teams can take great responsibility for the execution and development of the individual construction projects. For many years, they have been a driving force in Lean Construction DK, and their workers and construction managers are leaders in the application of Location Based Planning and other digitally supported concepts in site management. J. B. Frederiksen and S. Christensen will talk about how EogP is carrying out step-by-step-

renovation of residential buildings like an assembly line production, where workstations move in steps from building entrance to building entrance with a fixed beat. They will also talk about how they continuously train their project managers and workers in the various concepts including Construction Kaizen as small incremental improvements with learning from one project to the next. They will also talk about the challenges and difficulties of extending Construction Kaizen to all corners of the company. Jan and Søren will finally giving their proposal to future development of Kaizen activities and support.

10:30-10:50 Utilization of video data on sites to improve of the construction covers

Professor Kazuyoshi Tateyama, Ritsumeikan University, Japan
 Dr. Takaaki Yokoyama, Ritsumeikan University, Japan.

Handouts: Kazuyoshi Tateyama (2019). *A Notable Technology in Construction: 1. Visual Construction, 2. Work-style reformation.* Japan-DK-Seminar, Copenhagen, September 13, 2019: Theme 2: Construction Kaizen as a bottom-up-pull. 29 pages.



Presentation page 26: i-Construction in Roof Construction.

K. Tateyama and T. Yokoyama will talk about how Matsuzawa Pantile Co. Ltd. use drones for measuring roof construction in 3D as a basis for industrializing the dangerous roof work. This moves the cutting of roof tiles to a factory, so they can streamline the roof work with less workers. They will also describe the backgrounds and challenges for the development and the individual steps in surveying, designing, planning, cutting and installing roof tiles on the construction site as well as:

- Recording function of video data.
- Visual education of employees.
- Communication between the client and contractor.
- Prevention of occupational accidents.
- Others.

They will eventually outline how the development disseminate to other contracting companies and the evaluation of productivity, and may be they will give the Japanese proposal to future development of Kaizen activities and support.

11:05-11:25 Continuous improvements training by organizations

Development Consultant Mads Okking, Danish Craft Association (Danish: Dansk Håndværk) <https://dhv.dk/> and Consultant Michael Dalsgaard, United Federation of Danish Workers, Construction Group (Danish: 3F) <https://www.3f.dk/english>

The Danish Construction Association (Danish: Dansk Byggeri) <https://www.dansk-byggeri.dk/english/> has together with the United Federation of Danish Workers from 2011-18 offered development courses to contractor companies for employees and managers in what they call the Better Bottom Line (Danish: Bedre Bundlinje). From 2018, the Danish Craft Association together with the United Federation of Danish Workers has offered similar courses and training in what they call the SMART project. M. Okking will talk about the content of the SMART project, and how the employer and employee associations cooperate. SMART is a Lean based offer including different full-day meetings with Kaizen, where the participants identify obstacles and suggestions for improvements, and where they training in board meetings in relation to Last Planner. M. Okking will tell about the challenges in 'selling' the Kaizen principals as well as the various challenges companies and employees face. He will also explain how they plan to develop additional concepts in project control and improvement, and how they will evaluate the effect of the processes development. M. Okking and M. Dalsgaard will finally giving their proposal to future development of Kaizen activities and support.

11:25-11:45 Education in motivation and inter professionalism

General Manager of International and Political Affairs Jette Leth Fejerskov Djælund, Association for Architectural Technologists and Construction Managers (Danish: Konstruktørforeningen) <https://www.kf.dk/english/>

J. L. F. Djælund will give a brief presentation of the association and the education to Bachelor of Architectural Technology and Construction Management (Danish: Bygningskonstruktører) and the various background the students have from the primary school e.g. on projects and collaboration. She will explain their education in ICT and BIM and project management as well as the competences they acquire in relation to the need in the entire construction industry. She will then focus on how they will be able to support Construction Kaizen both in the design and construction phases as manager and coworker. J. L. F. Djælund will finally giving their proposal to future development of Kaizen activities and support.