

FINAL PROGRAM



13th International **DIANA Users Meeting**

22-23 May 2019

Hosted by

Norwegian University of Science and Technology (NTNU)
Trondheim
Norway



Trondheim

Trondheim is a thriving city and centre of knowledge with a highly respected university, many popular colleges and a research community ranking amount the best in Europe. You will find a wide variety of cultural and recreational activities here, while work and education options abound. Here, you can experience both of the charm and intimacy of the small town and the plethora of choices of big-city life. Founded by the Viking King Olav Trygvason in 997, Trondheim holds a special place in Norwegian history and culture. It was the first capital of Norway and is still the city where new kings receive their ceremonial blessing.



Accessibility to Trondheim

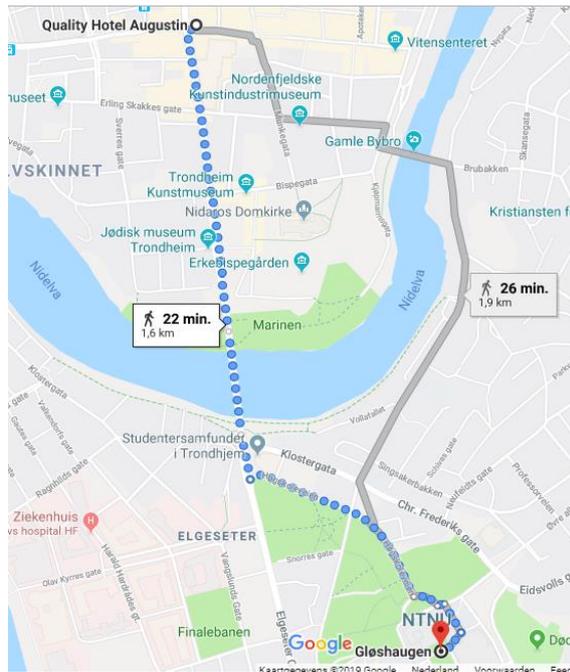
Trondheim is well accessible from European airports: a frequently running shuttle bus will bring the participants to the inner city of Trondheim.

Venue

The Department of Structural Engineering at the Norwegian University of Science and Technology (NTNU) in Trondheim will host the meeting during both days.

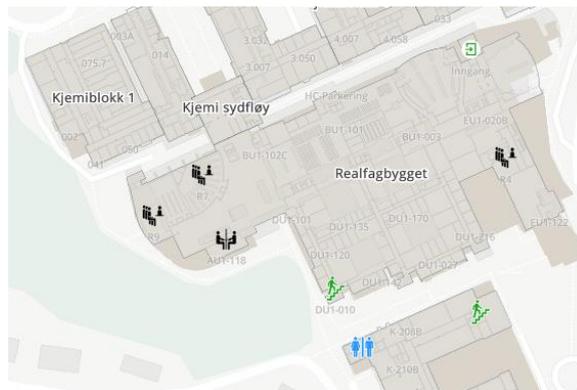
Maps Trondheim

Kongens gate 26 (top; Maxibus) &
Campus: Gløshaugen(bottom)

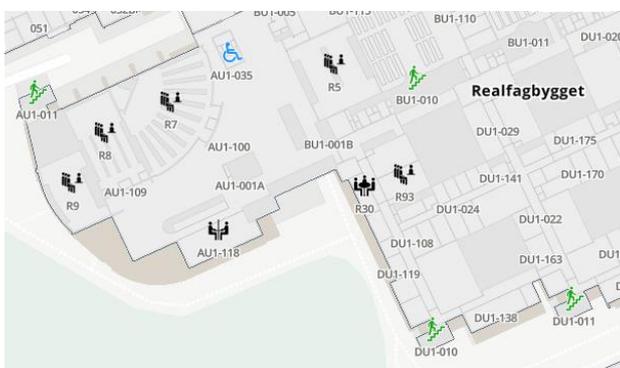


Campus Gløshaugen &

Realfagbygget (South)



Realfagbygget; Floor: U1; Room: R9(left)



Program International DIANA Users Meeting



NTNU

Building: Realfagbygget; Floor: U1; Room: R9; NTNU Campus: Gløshaugen, Trondheim; <http://bit.ly/2VcwZSa>

Wednesday 22th May 2019

09.00 Registration

09.15 Opening by Ane de Boer, chairman DIANA Users Association & Karl Vincent Høiseth, NTNU

Workshop 'Parametric Modelling'

09.30 *Ab van den Bos, DIANA FEA, The Netherlands*

Introduction and possibilities of parametric modelling with the FE code DIANA.

10.00 The participants can use these possibilities on their own PC by exercising some predefined or own examples.

10.45 Break

11.15 Continuing Examples

12.00 Discussion Examples

12:30 Lunch

Lustrum Contest session

13.45 *Yuguang Yang, Delft University of Technology, The Netherlands*
Overview of the lab experiments.

14.15 Pitch presentations of the received contributions

15.00 Break

15.30 Continuing Pitch presentations of the received contributions

16.00 Discussion

16.10 Yuguang Yang, Results of the Lab Experiments

16.25 Winner Contest

16.30 Closing Workshop

Social Event

17.45 MaxiBus drive from the Augustin Quality Hotel, Kongens Gate 26, Trondheim to the Trøndelag Folkmuseum Sverresborg/Byåsen, about 5 km/10 min by car from NTNU/inner city

18.00 Folkmuseum – Guided tour

19.00 Dinner at the Trøndelag Folkmuseum

21.30 Closing, Maxibus drive back to Augustin Quality Hotel

Program International DIANA Users Meeting



Thursday, 23th May 2019

NTNU

Building: Realfagbygget; Floor: U1; Room: R9; NTNU Campus: Gløshaugen, Trondheim; <http://bit.ly/2VcwZSa>

08.45 Registration

09.00 Opening by Ane de Boer, chairman DIANA Users Association

09.05 **Heated reinforced concrete slabs subjected to static load: Experimental results and numerical simulations**

Assis Arano Barenys, NTNU, Norway

09.30 **Punching shear failure due to impact loading**

Wouter Meijers, Royal HaskoningDHV, The Netherlands

09.55 **Finite elements modelling of UHPFRC flexural-reinforced elements**

Eduardo J. Mezauida-Alcaraz, ICITECH, Universitat Politècnica de València, Spain

10.20 – 10.55 Break + Proud Pitches

10.55 **Collision protection Oosterweel link tunnels**

Zhekang Huang and Willem Nobel, Witteveen+Bos, The Netherlands

11.20 **Finite element analysis of an arch dam, emphasizing on the modeling of boundary conditions and connections**

Mathias Berg Rønning and Lorents Flygansvær, NTNU, Norway

11.45 **Follow-up on Bubbledeck floor investigation with DIANA**

Kris Riemens, ABT, The Netherlands

12.10 **Cracking of restrained RC elements: validation of constitutive models and applications**

Carlos de Sousa, University of Porto, Portugal

12.35 **Strength assessment of a concrete bridge: From 3D linear to 2D non-linear**

Niels Kostense, Arcadis B.V., The Netherlands

13.00 – 14.00 Lunch

Theme: Norway's Coastal highway E39

14.00 **Norway's coastal highway, a ferry-free E39**

Arianna Minoretti, The Norwegian Public Roads Administration

14.30 **NTNU research on a ferry-free E39**

Ole Øiseth, Dept. of Structural Engineering, NTNU

15.00 **Crack width calculation methods for large concrete structures**

Assis Arano Barenys, Dept. of Structural Engineering, NTNU

15.30 – 15.45 Break + Proud Pitches Award

15.45– 16.30 **DIANA Users Wishes**

16.30 – 16.45 **Closure event, Refreshment and Farewell**

Introduction to Python and Parametric Modelling

DIANA GUI is very powerful for setting up all kinds of models in different ways. There are a lot of easy ways of making parts of geometry in the GUI, modify them and so on. Importing from CAD files is another powerful method.

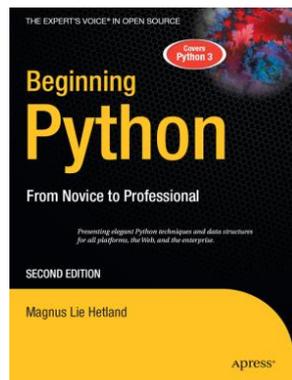
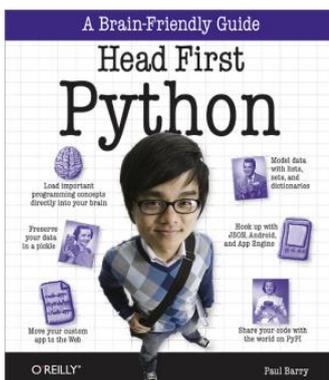
But what to do, if a certain geometry comes back again in several projects ?

Would it not be easy to be able to repeat a certain part of your model and automate the process of making the model ?

And if so, would it not be possible to also automate the analysis and output report process ?

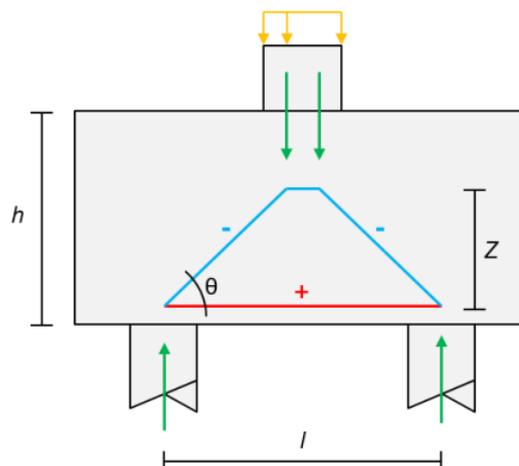
In DIANA it is made possible via an interface language Python. Python is an easy to understand, plug and play, discover on the internet language, that everybody can learn.

In the parametric modelling session we will give a quick overview of some basic commands and background outline of Python.



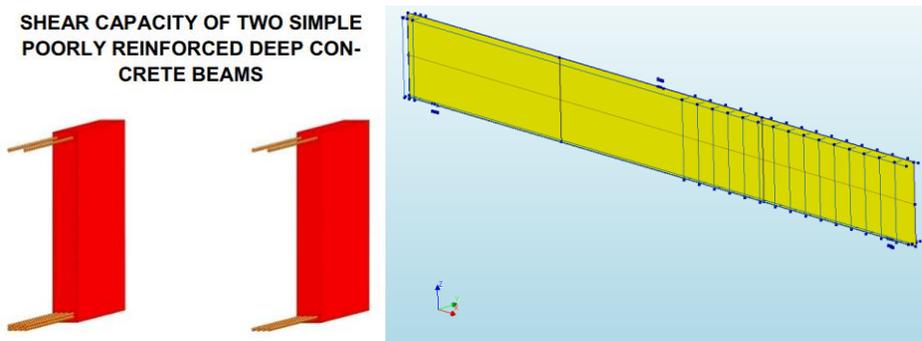
Example 1: Foundation

Next thing is to show a practical example of a project, where DIANA is at its best because of having a structure that is not in pure bending. Variation in dimensions will give together with the belonging reinforcement layout a optimized solution.



Example 2: Contest 2019

Another example project could be the beam of the contest. We will show how to make a parametric model for that. Information of the Contest beam is given in the flyer of the Users Meeting.



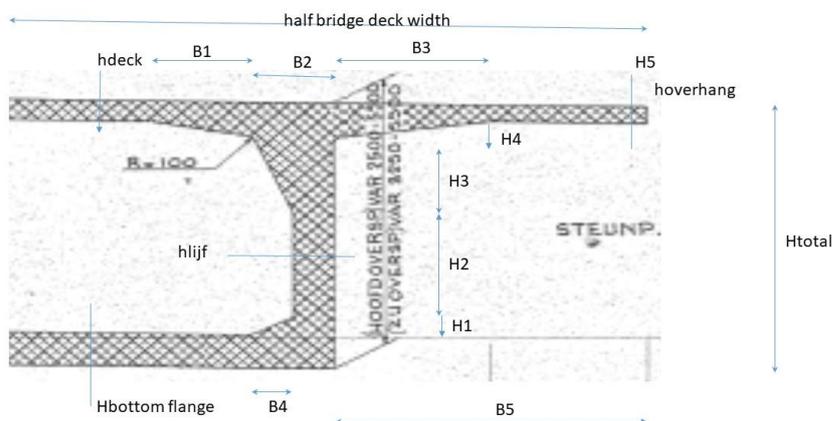
After that you can discover yourself some ways of parametric modelling in DIANA.

Example 3: Varying Geometry Structure

A nice practical example is a box-girder bridge and get acquainted with choosing the correct parameters for your structure. Variability in parameters about the width of a bridge deck is mostly fixed but can be also a variable one.

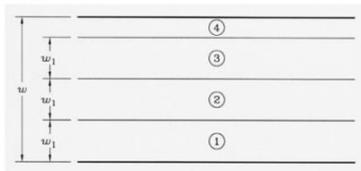
In longitudinal direction the H_{total} is varying parabolic over the length of the main and side spans. Also the thickness of the bottom flange is a varying parameter in the design process.

H_{dek} is fixed, but the h_{overhang} is again an variable parameter. All other B_i and H_i are variabel so parametric.



Example 4: Varying Mobile Loads

It is also possible to add the mobile loads and other combinations for a normative loading check on this kind of bridges. Variation in number of lanes, lane width and locations of the Eurocode axle load configuration for side span and main span can be variable parameters.



Key
 w Carriageway width
 w_1 Notional lane width
 1 Notional Lane Nr. 1
 2 Notional Lane Nr. 2
 3 Notional Lane Nr. 3
 4 Remaining area

Figure 6: All lanes positioned all to the right side of the bridge

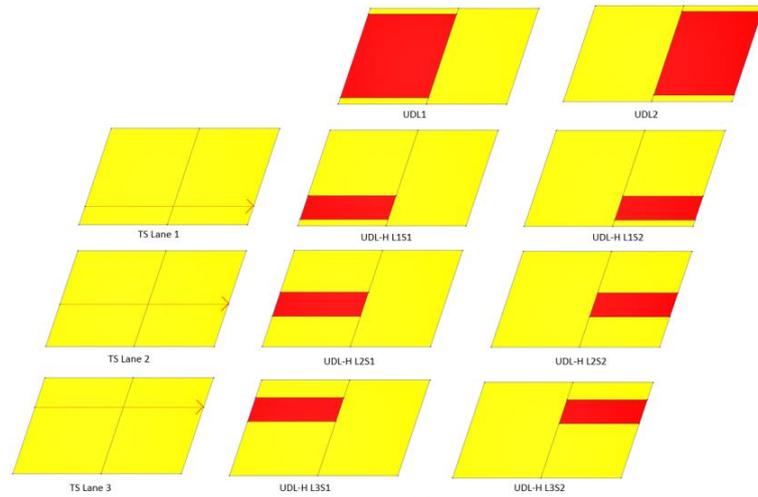


Figure 7: Traffic load, to define in Diana

Example 5: Your Own Example