

DIANA Users Association

Annual report 2014

02-06-2015



Dr.ir. A. de Boer
Chairman DIANA User's Association

Annual Report 2014

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1 Aim of the Association

The members of the Association are all users of the DIANA software package of TNO-DIANA BV.

In this capacity, they have a considerable interest in gaining knowledge in the Finite Element Method and (numerical) mechanics, as well as in the further development and extension of DIANA.

To achieve this, the Association fulfils a coordinating role by taking stock of the members' needs in terms of research and development, and initiating new projects.

The Association is also a meeting place for the exchange of experiences with the software package.

Furthermore, TNO-DIANA BV utilizes the Association to inform the Users on the DIANA package development progress.

2 Executive Committee 2014

During this reporting year, the Executive Committee consisted of:

Chairman: dr.ir. A. de Boer, Centre for Infrastructures, Ministry of
Infrastructures and the Environment, Utrecht
Secretary/ Treasurer: ir. C. van der Vliet, Arcadis Nederland BV
Committee member: ir. H.G. Burggraaf, TNO Structural Reliability

The Executive Committee has mainly dealt with the following:

1. Discussion on continuing new research projects on the basis of a national and international user's wish list.
2. Organizing of the 8th International DIANA Users Meeting in Gothenburg, Sweden.
3. Continuing contributing to the set-up a database with publications related to DIANA or FEA.
4. Extending the existing e-mail database with foreign users in the fields of concrete, concrete mechanics, bridges and tunnels.
5. Preparation of general and technical meetings.
6. Association finance.
7. Progress in an international response/discussion forum around developments now and in the future related to Users Wishes.

3 Activities

3.1 General

The Association holds a general meeting of members twice a year, followed if possible by a technical meeting (lectures). In 2014 there have been held two technical meetings, lecture evenings.

3.2 Technical lectures June 10th, 2014

Modelling of dowel details connecting concrete slabs

Coen van der Vliet, Arcadis

When slabs are expanded, dowels are sometimes used to connect the old and new slabs into one slab. This dowel is usually placed on top of the bridge deck, which causes it to be eccentric situated as to the neutral level from the slab. This requires a special approach that will be discussed in this presentation later on.

Modelling of Vlijmen East related to proofloading

Johan de Boon, TU-Delft

On the 3rd of April, a study day was held surrounding the proofloading of the object Vlijmen East. In the preparations of the proofloading a slab model was set up to test different loadcases concerning the reliability of the object and to support the capability of the proofloading with the Belfa vehicle. In this presentation both aspects will be explained further.

International contest prefab girders

Cor van de Veen, TU-Delft

After 15 Augustus 2014, at the Stevin lab, four prefab girders scaled 1:2 will be tested on the possibility of collapsing. Preceding, software suppliers and consultants can execute a prediction to determine the failure load and related aspects of these girders. Because the DIANA Users Association celebrates its anniversary, the winner can win a total amount of 500 euros. A workshop with contributions of these predictions will be held on the 7th of November in Parma, Italy.

Interim evaluation results DOV study cell:

Probalistic material characteristics

Ostar Joostenz, ABT

Effort random fields probalistic input

Coen van der Vliet, Arcadis

Both lectures will discuss the progress of the DOV study cell, which aims to effectuate the variability of the material characteristics of load cases in a FE model.

3.3 International DIANA Users Meeting, 4th November 2014, Parma, Italy

Lectures

On the nonlinear behaviour of joint connection between precast members realized using steel dowels

Beatrice Belletti, Cecilia Damoni, Matteo Scolari and Alessandro Stocchi, University of Parma, Italy

A Comparative Study of Two Solution Strategies for NLFEA of Concrete Structures

Morten Engen^{1 2}, Max Hendriks^{1 3}, Jan Øverli¹, Erik Åldstedt², ¹NTNU, Norway,

²Multiconsult AS, Norway, ³Delft University of Technology, The Netherlands

A multi-level structural assessment proposal for reinforced concrete bridge deck slabs

Mario Plos, Jiangpeng Shu, Karin Lundgren, Kamyab Zandi, Chalmers University, Sweden

Comparison between safety formats in nonlinear analysis of a reinforced concrete element

G. Mancini, D.L. Allaix, Gabriele Bertagnoli, Politecnico di Torino, Italy

FEM calculations with SFRC in relation to the ModelCode2010

Ab van den Bos, TNO DIANA Engineering bv The Netherlands

CONSHEAR model from UPC: A shear-sensitive fibre beam formulation for nonlinear, time dependent and phased analysis of RC structures

Denise Ferreira, Jesús Bairán and Antonio Mari, Universitat Politècnica de Catalunya (UPC), Spain

Fire analysis of reinforced concrete precast tunnel lining considering the spalling effect

N. Bettine¹, R. Felicetti², G. Lilliu³, A. Meda and P. Riva¹, ¹University of Bergamo,

²Politecnico di Milano, ³Formerly TNO DIANA, University of Rome Tor Vergata, Italy

Modelling the bond behaviour of naturally corroded reinforced concrete

Mohammad Tahershamsi, Ignasi Perez, Kamyab Zandi, Karin Lundgren and Mario Plos, Chalmers University, Sweden

3-D analyses of CMA in prestressed concrete bridge decks

Cor van der Veen¹, Sana Amir¹, Ane de Boer², ¹Delft University of Technology, The Netherlands, ²Ministry of Infrastructure and the Environment, The Netherlands

Response of RC slab strips subjected to axial tension and transverse load

Beatrice Belletti¹, Cecilia Damoni¹, Max Hendriks^{2 3}

¹University of Parma, Italy, ²Delft University of Technology, The Netherlands, ³NTNU, Norway

DIANA Release 9.5

Gerd-Jan Schreppers, TNO DIANA BV, The Netherlands

DIANA wishes from the Users, Ane de Boer

International Shear Force Workshop, 5th November 2014, Parma, Italy

Design of the T-girders; test setup

Cor van der Veen, Delft University of Technology

10 minutes presentations participants contest

- Cecilia Damoni, University of Parma, Italy
- Shen Ma, ABT bv, the Netherlands
- Jaime Mata Falcón, Universitat Politècnica de València, Spain
- Coen van der Vliet, Arcadis, the Netherlands
- Mario Pimentel, University of Porto, Portugal
- Björn Schütte, Hamburg University of Technology, Germany
- Sebastiaan Ensink, Delft University of Technology, the Netherlands
- Vladimir Cervenka, Cervenka Consulting, Czech Republic
- Ab van den Bos, TNODIANA Engineering bv, the Netherlands
- Denise Ferreira, Universitat Politècnica de Catalunya, Spain
- Joop den Uyl, Delft University of Technology, the Netherlands
- Morten Engen, NTNU / Multiconsult, Norway
- Matteo Scolari, University of Parma, Italy

Experiments T-girder, Stevin lab, Delft University of Technology

Sebastiaan Ensink, Delft University of Technology

Discussion

Winner Contest

3.4 Technical lectures December 10th, 2014

Recalculation reinforced concrete notch

Gerko-Kees Bloemsma, Arcadis

Due to increase of the loads on the one hand, and a reduction of the recommendation strength on the other hand, it is not always clear if a work of art meets the requirements of safety. That is why for a notch-detail of a viaduct at Rijksweg 4, a recalculation has been done to determine if, and to what extent the work of art meets the requirements of the current regulations. This presentation will discuss this recalculation and its surprising results.

Research cause of collapse temporary support structure B-tower Rotterdam

Henco Burggraaf, TNO-Bouw

In October 2010, concrete was poured on the third floor of the 70 meter high planned B-tower in Rotterdam. When this was almost done, a 300 square meter floor came crushing down. Five construction workers were severely injured. The Public Prosecutor's Office and the Dutch Safety Board assigned TNO to research the cause of this accident. The results of this extensive research and knowledge of the characteristics of constructions are combined to define a series of collapse scenarios. The collapse scenario that most likely happened was validated with calculations in the FE-code DIANA. The results of the calculations in DIANA fit well with the observations of the inspections on site. In this presentation, the effort of DIANA in forensic engineering will be discussed.

Recalculation bar roster viaduct

Ostar Joostensz, ABT

The Ministry of Infrastructure and the Environment assigned ABT to recalculate the existing viaduct in the A4, which connects the Lissersweg at junction Burgerveen. The calculation's goal was to determine whether the work of art has enough remaining capacity to take up the traffic load from the current Eurocode. The construction concerns a continuous deck over four support, existing of a bridgedeck with bar roster. To get a realistic image of the remaining capacity of the construction, it is determined to set up a calculation model existing of volume elements. To determine the forces and moments, composed scale elements were used. These elements replaced the system lines or planes from traditional shell and frame models. For the DOV lecture evenings, a nonlinear analysis was executed on the existing calculation model conforming the NLFEA Guideline. With a nonlinear calculation, it is possible to determine the redistribution within the construction.

A new proposal for slabs with a low reinforcement ratio

Yuguang Yang, TU-Delft

In the present study, the concept of v_{min} proposed in Eurocode is re-examined. After checking the derivation of v_{min} , it is suggested that the original formula EC 6.2.b, in this report Eq. (2), is a conservative simplification. The formula cannot provide sufficient accuracy anymore when it is used in occasions such as the evaluation of the residual capacities of existing concrete slab bridges. In order to have a more reliable evaluation procedure on this problem, the concept of v_{min} is discussed at a more fundamental level from three different approaches, namely the Eurocode method, the shear model based on critical shear displacement proposed by Yang in [1]. Based on comparing the two different approaches, several major differences are found between the models. They are related to the understanding on the physical background of shear failure. To obtain additional proof, a framework of searching v_{min} both numerically and experimentally is established. Following that framework, a systematic numerical study is carried out with large amount of numerical models. The results from the numerical studies are compared with the two theoretical approaches.

4. Financial aspects 2014



DIANA Ontwikkelingsvereniging

Balans behorend bij financieel jaarverslag 2014			
	31 december 2014		31 december 2013
ACTIVA			
VASTE ACTIVA	€ 0	€ 0	€ 0
			€ 0
VLOTTENDE ACTIVA			
Vorderingen (debiteuren)	€ 3 850		€ 550
Liquide middelen	€ 27 720		€ 34 962
Transitoria	€ 0		€ 0
	€ 31 570		€ 35 512
TOTAAL ACTIVA	€ 31 570		€ 35 512
PASSIVA			
EIGEN VERMOGEN	€ 30 694	€ 30 694	€ 34 288
			€ 34 288
KORTLOPENDE SCHULDEN			
Transitoria (crediteuren)	€ 876	€ 876	€ 1 224
			€ 1 224
TOTAAL PASSIVA	€ 31 570		€ 35 512

Winst- en verliesrekening behorend bij financieel jaarverslag 2014		
	2014	
Netto omzet	€ 9 036 +	
Kostprijs van de omzet	€ 8 829 -	
BRUTO OMZETRESULTAAT	€ 207	
Personeelskosten	€ 4 476 -	
Algemene beheerskosten	€ 617 -	
Financiële baten	€ 1 293 +	
Financiële lasten	€ 0 -	
RESULTAAT UIT GEWONE BEDRIJFSVOERING	-€ 3 593	
Buitengewone baten en lasten	€ 0 +	
RESULTAAT	-€ 3 593	

Penningmeester DOV:	Accordering kascommissie:	
	handtekening:	handtekening:
(8 mei 2017)		
Coen van der Vliet opgemaakt 31 maart 2014	naam: Sander Meijers	naam: Ostar Joostensz
	datum: 20 apr. 2017	datum: 01-01-2017

5. Publication list

ABT

Joostensz, O., Kuijer H.J. (2014). Waar wringt de petligger?. Bouwen met Staal 239(06/14)

ARCADIS

Heijmans, R.W.M.G., C. van der Vliet and F. Deurinck, The 2nd Coentunnel – Design requirements from construction and service life risks, Tunnels for a better life - Proceedings of the World Tunnel Congress 2014 - Negro, Cecilio and Bilfinger (editors), ISBN 978-85-67950-00-6, CBT/ABMS, São Paulo, May 9th-15th 2014.

TNO Geo-energy, Utrecht

Orlic, B., Buijze, L. (2014). Numerical modeling of wellbore closure by the creep of rock salt caprocks. Proc. of the 48th US Rock Mechanics / Geomechanics Symposium (ARMA), Minneapolis. Paper no ARMA 14-7499.

Orlic, B., Buijze, L., Schreppers, G.-J. (2014). Final site-relevant evaluation report on system integrity / stability. CATO-2 deliverable no CATO2-WP3.03-D24b.

Peters, E., Pizzocolo, F., Loeve, D. (2014). Consequences of thermal fracture development due to injection of cold CO₂ into depleted gas fields. CATO-2 deliverable no CATO-2-WP3.2-D16.

Wassing, B., Orlic, B., Geel, C., Leeuwenburgh, L., Buijze, F., Pizzocolo, F. (2014). 3D Geomechanical Modelling of Fault Stability in the Lacq Field. TNO-report no TNO2014 R10378 (confidential).

Ministry of Infrastructure & Delft University of Technology

Lantsoght, de Boer, van der Veen and Walraven ‘Effective Width in Shear of Reinforced Concrete Solid Slab Bridges under Wheel Loads’, TRB 2014 Annual Meeting, Washington DC, USA

Ministry of Infrastructure & TNO DIANA BV

Gerd-jan Schreppers, Ane de Boer David Begg, Assessing the capacity of existing concrete structures using stiffness adaptation, AMCM, Wroclaw Polen

Ministry of Infrastructure

Ane de Boer, Re-examination of RC and PRC structures by a guided nonlinear analysis, 20e CTE, Milaan, Italie

Ane de Boer, Niveau’s van beoordeling constructieve veiligheid van bestaande constructies’, Proefbelasting bijeenkomst, TU Delft, Delft

Ane de Boer, Beoordeling constructieve veiligheid van bestaande constructies
Algemeen en Hoge Brug & Lissersweg, WOW, Haarlem

Ane de Boer, De voordelen van een te slopen viaduct – Bijeenkomst Proefbelasting
Ruytenschildbrug Friesland, Betonvereniging Noord, Heerenveen

TNO DIANA BV

Sangers, Alex. (2014), .(TNO DIANA BV)
Enhancing iterative solution methods for general FEM computations using rigid body
modes. Published: Thesis (TU Delft)

Schreppers, G-J. (2014), Veel bindmiddel, geen scheuren
Published: Betoniek 2014 (copyright: Betoniek)

Helder Sousa (Univ. Porto), Joao Bento (Efacec Capital SA), Joaquim Figueiras
(Univ. Porto) (2014). Assessment and Management of Concrete Bridges Supported by
Monitoring Data-Based Finite-Element Modeling
Published: ACSE (copyright: ACSE)

Schreppers, G-J. (2014), EEM in de praktijk
Published: CEMENT (copyright: CEMENT)

Kikstra, W.P., Sirumbal, F. Schreppers, G. and Partovi, M.(TNO DIANA BV)
Finite Element Analysis of Dynamic Behavior of Large Dams
Published: USSD 2014 (copyright: USSD)

Labib, D., Jonna Manie, J. Schreppers, G-J., (TNO DIANA)
Nonlinear dynamic analysis of a RC structure using DIANA
Published: SMART Benchmark 2014 (copyright: SMART)

6. Memberslist

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