



EUROSTRUCT

EUROPEAN ASSOCIATION ON
QUALITY CONTROL OF BRIDGES AND STRUCTURES

TRAINING SCHOOL
University of Twente, the Netherlands

27 June – 30 June, 2022

TRAINING SCHOOL TWENTE

EUROSTRUCT

EUROPEAN ASSOCIATION ON
QUALITY CONTROL OF BRIDGES AND STRUCTURES

DATE OF EVENT
27 – 30 June 2022

University of Twente
Enschede, The Netherlands

ACTION CONTACTS

EuroStruct

Local organizer
Action websites

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1. INTRODUCTION

1.1. ABOUT

The objective of the EUROSTRUCT Training School at the University of Twente is the exchange of knowledge and experience in quality control, to encourage awareness and responsibility of structural engineers towards the needs of society, and to encourage actions necessary for the progress of quality control in bridges and structures.

The school aims at teaching the most recent developments on performance indicators and performance goals, focusing on the training on some contemporary topics around this field.

In this training school, trainees will be familiarized with emerging digital technologies for inspection, structural health monitoring and decision making, such as Unmanned Aerial Vehicles (UAVs), digital twin models, computer vision-based monitoring, machine learning models, and their integration into bridge management decision making processes. The EuroStruct training school provides targeted training for young researchers, professionals and decision makers, who will closely collaborate during hands-on problem-solving sessions. Trainees will be able to use the gained knowledge for their daily practice and research projects, and are expected in the future to influence and contribute to the bridge management aspects.

The event is organized by the EuroStruct organization and the University of Twente, Faculty of Engineering Technology, Construction Management and Engineering Department.

Venue: University of Twente, Enschede, the Netherlands

Time: 27 – 30 June 2022

Capacity: 10-25 trainees

Fee: 350 € per person

Local Organizer	Co-Organizer
Irina Stipanovic <i>University of Twente, Faculty of Engineering Technology, Enschede, Netherlands</i>	José Matos <i>University of Minho, School of Engineering, Civil Engineering Department, Guimarães, Portugal</i>
Rolands Kromanis <i>University of Twente, Faculty of Engineering Technology, Enschede, Netherlands</i>	Amir Kedar <i>Kedmor Engineers Ltd. Ramat Gan, Israel</i>

Trainers list of experts:

- Prof. José Matos, Department of Civil Engineering, School of Engineering, University of Minho, Portugal
- Dr. Irina Stipanović, Faculty of Engineering Technology, University of Twente, Netherlands
- Mr. Amir Kedar, Kedmor Engineers, Israel
- Dr. Rolands Kromanis, Faculty of Engineering Technology, University of Twente, Netherlands
- Ms. Maria Xofi, Faculty of Engineering Technology, University of Twente, Netherlands
- Dr. Zaharah Bukhsh, Industrial Engineering and Innovation Sciences, Eindhoven University of Technology, Netherlands.
- Dr. Mário Coelho, Department of Civil Engineering, School of Engineering, University of Minho, Portugal

This workshop tries to harmonize a common decision-making framework through practical examples acknowledging the differences that may exist for practical implementation. The hands-on approach of the case studies and methodologies are expected to create an in-depth understanding around decision-making approaches for bridges and promote a healthy discussion around the needs, approaches and interpretation of information obtained from individual bridges and bridge networks. Rationalizing the process of arriving at safe and efficient management of bridge assets will also be focused on in this training school.

The training school attempts to:

- Provide practical and modern tools and impart them on the trainees
- Act as a formal platform for dialogue, discussion and consensus-development of bridge networks for trainees with diverse technical and experiential backgrounds
- Increasing the impact of research on policy makers, regulatory bodies and national decision makers as well as the private sector.

The training school addresses the core value of EUROSTRUCT by promoting tangible and meaningful interaction among engineers, owners, inspectors and researchers to arrive at an EU-wide approach for managing the performance and safety of its bridges and the connection of such approaches to how such maintenance and management is carried out at a global level.

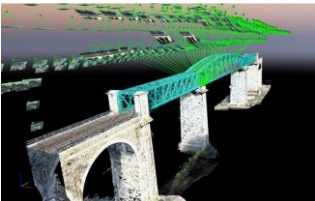
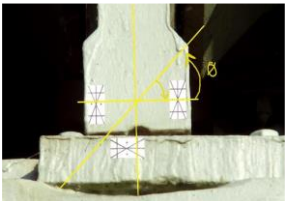
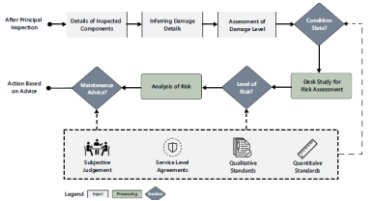
The school will be led by leading experts in the field of bridge assessment, structural health monitoring and decision making for infrastructure management. Within the school following specific topics will be covered:

- Performance-based assessment of existing bridges, using UAVs and digital platform
- Computer vision-based bridge monitoring
- Network level decision making using performance indicators

Trainees will work in groups of max. 5, and will have access to real case studies. Each group will work with a mentor and develop solution for the given assignment. Finally, on the last day trainees will present the results to each other and receive feedback from trainers and relevant experts.

During the training school infrastructure owners and consultants will also give the insights into the practice in the Netherlands and vision for the future needs for bridge management practice.

Topics covered in the Training school:

Performance-based assessment of existing bridges, using UAVs and digital environment ¹	Computer vision-based bridge monitoring ¹	Decision making for efficient bridge life cycle management ¹
<p>i. Definition and characterization and of performance indicators PIs and key performance indicators KPIs</p> <p>ii. Characterization of PIs for the structural assessment and maintenance planning;</p> <p>iii. Case study: bridge inspection using UAV and digital platform</p> 	<p>i. Introduction to the concept of computer vision-based bridge monitoring.</p> <p>ii. Visit to the bridge and collection of the measurements.</p> <p>iii. Modeling of the bridge and analysis of data.</p> <p>iv. Interpretation of results.</p> 	<p>i. Introduction to the concept of network level decision making and prioritization.</p> <p>ii. Decision making (DM) models with different conceptual solutions.</p> <p>iii. Application of machine learning models</p> <p>iv. Case study: application of DM model on selected number of bridges</p> 

¹ Trainees must have Excel and Matlab with corresponding toolboxes.

2. PROGRAMME

NOTE: All times are as per CET Time.

2.1. DAY #1

Monday, June 27th, 2022	
09:00 – 09:30	<i>Registration</i>
09:30 – 09:45	Introduction and welcoming <i>by Jose Matos and Irina Stipanovic</i>
09:45 – 10:30	Introduction to performance-based assessment of bridges <i>by Jose Matos</i> Detailed program, Learning Outcomes <i>by Irina Stipanovic</i>
10:15 – 11:00	Quality Control for Bridges <i>by Amir Kedar</i>
11:00 – 11:15	Coffee break
11:15 – 12:00	Structural Health Monitoring <i>by Rolands Kromanis</i>
12:00 – 13:00	Lunch break
13:00 – 13:45	Presentation of the Bridge Case study – worked out example <i>Amir Kedar</i>
13:45 – 15:45	Introduction to the Digital Platform for the inspection of bridges <i>by Amir Kedar and Gilad Shlush</i>
15:45 – 16:00	<i>Coffee Break</i>
16:00 – 17:00	Dividing into groups, introduction to the Bridge Case Studies for each group <i>by Trainees + Trainers</i>

2.2. DAY #2

Tuesday, June 28th, 2022	
09:00 – 10:00	Local expert lecture on Bridge Management Practice in the Netherlands
10:00 – 10:15	<i>Coffee Break</i>
10:15 – 12:30	Implementation of Bridge Case Studies for each group Visit to the site <i>by Trainees + Trainers</i>
12:30 – 13:30	<i>Lunch</i>
13:30 – 16:00	Implementation of Bridge Case Studies for each group Visit to the site <i>by Trainees + Trainers</i>
16:00 – 16:15	<i>Coffee Break</i>
16:15 – 17:00	Analyses of case studies Implementation: Interpretation of Results <i>by Trainees + Trainers</i>

2.3. DAY #3

Wednesday, June 29th, 2022

09:00 – 10:30	Implementation of Bridge Case Studies for each group <i>by Trainees + Trainers</i>
10:30 – 10:45	Coffee break
10:45 – 12:30	Implementation of Bridge Case Studies for each group <i>by Trainees + Trainers</i>
12:30 – 13:30	<i>Lunch</i>
13:30 – 14:00	Local expert lecture on Bridge Management Practice in the Netherlands
14:00 – 16:00	Implementation of Bridge Case Studies for each group <i>by Trainees + Trainers</i>
16:00 – 16:15	<i>Coffee Break</i>
16:15 – 17:00	Analyses of case studies Implementation: Interpretation of Results <i>by Trainees + Trainers</i>

2.4. DAY #4

Thursday, June 30th, 2022

08:30 – 9:45	Preparation of workgroup report & discussion <i>by Trainees + Trainers</i>
09:45 – 10:00	<i>Coffee Break</i>
10:00 – 12:30	Workgroup presentations & discussions <i>by Trainees + Trainers</i>
12:30 – 13:00	<i>Snack Break</i>
13:00 – 14:00	Summary and conclusions. Submittal of workgroup reports

Trainees will be requested to provide their reports at the end of the entire session or mail them over the next day.



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