

Meeting Minutes

IABMAS Technical Committee on Bridge Load Testing

Zoom Meeting ID: 880 257 05271 <https://usfq.zoom.us/j/88025705271?from=addon>

Wednesday December 10th 2025 9:00 – 11:00 CDT, 16:00 – 18:00 CEDT

***Mission:** Bridge Load Testing is a field testing technique that can be used to obtain more information about the performance of bridges. In particular, diagnostic load tests can be used to quantify elements of structural performance such as transverse distribution, unintended composite action, repair effectiveness, etc. and the information of a diagnostic load test can serve to develop field-validated models of existing bridges that can be used to develop a more accurate assessment of the bridge's performance. Proof load testing can be used to demonstrate directly that a bridge can carry a load that is representative of the live load, provided that the bridge does not show signs of distress. Other types of load testing include testing for dynamic properties, and parameter-specific tests. Load test data as well as the analytical assessment of the data can be used to make more informed decisions and manage the life-cycle performance and maintenance of bridges.*

Aspects of bridge load testing that are of particular interest to bridge owners are having an overview of the typical uses for bridge load tests, the decision on when to load test or not, which information to obtain from the load test, and how this information can be used to reduce the uncertainties regarding the tested bridge. This committee is eager to learn about and disseminate the potential for applying new technologies for bridge load testing through learning from technologies used in other industries.

Associated with bridge load testing, the following topics are also of importance to this committee: instrumentation used during load testing and the interpretation of the obtained measurements during the load test, determination of required load, method of load application, methods of updating assessments using collected field data, the link between load testing and structural health monitoring, the uncertainties (probabilistic aspects as well as risks during test execution) associated with load testing, the interpretation of load test results, laboratory testing of bridge components to improve assessment methods in the field, and optimization of related costs keeping adequate reliability to spread their use worldwide.

The IABMAS Bridge Load Testing Committee aims to be an international committee of participants from academia, industry, and bridge owners, which provides a forum for the exchange of ideas on bridge load testing. Best practices as well as the insights from the development of national codes and guidelines will

be exchanged among participants from countries that use load testing for the assessment of their existing bridges, those who are exploring the possibilities of this method, and those who are in the process of standardizing the procedures or developing guidelines.

Goals:

- Organize dedicated sessions to the topic of load testing at IABMAS conferences.
- Develop national IABMAS group events on the topic of load testing.
- Exchange information on the use of load testing in different countries.
- Exchange lessons learned and best practices.
- Inform about case studies of bridge load testing.
- Communicate load testing guides or standards that have been developed.
- Provide a forum for new ideas and applications of technology.
- Identify potential research topics.
- Establish international collaborations.
- Liaise with relevant committees internationally outside of IABMAS and liaise with the national IABMAS groups.

Committee Members

Eva Lantsoght	David Kosnik (TRB AKB40 liaison)
Jesse Grimson	Daniele Losanno
Mitsuyoshi Akiyama	Marcelo Marquez
Sreenivas Alampalli	Johannio Marulanda
Numa Bertola	Armin Mehrabi
Fabio Biondini	Piotr Olaszek
Tulio Bittencourt	Pavel Ryjacek
Alok Bhowmick	Marek Salamak
Matteo Breveglieri	Gabriel Sas
Anders Carolin	Gregor Schacht
Hermes Carvalho	Jacob Schmidt
Joan Ramon Casas	Tomoki Shiotani
Rolando Chacon	Hisatada Suganuma
Dave Cousins	Matias Valenzuela
Ivan Duvnjak	Michal Venglar
Dan Frangopol	Esteban Villalobos Vega
Monique Head	David Yang
Robert Heywood	Yuguang Yang (fib TG 3.2 liaison)
Boulent Imam	Gloria Zhang
Ho-Kyung Kim	Ales Znidaric

Guests: Grzegorz Poprawa, Oliver Mosig

Regrets: Ales Znidaric, Fabio Biondini

1. Administrative

1.1. Welcome and introduction

Eva opened the meeting, welcomed all participants, and outlined the agenda. A round of introductions followed.

1.2 Review and approval of agenda

The meeting agenda was reviewed without comments.

2. Strategic Planning and Discussion

2.1. Membership and committee leadership

- Gregor Schacht has rejoined the committee.
- Grzegorz Poprawa has joined as a new member.
- Committee membership records and website information have been updated accordingly.

2.2. Website

The IABMAS website has been updated to reflect the current committee composition.

Old business

2.3. Development of joint bulletin of proof load testing of concrete structures with fib TG 3.2

Progress update:

- Chapters 3 and 4: finalized and internally reviewed.
- Chapter 5: currently under review.
- Chapter 6 (structural liability): aligned with ongoing research; completion planned for spring 2026.
- Chapters 7–9:
 - Chapter 7 (preparation): ongoing.
 - Chapter 8 (execution): draft stage.
 - Chapter 9 (analysis): recently initiated and requiring coordination.

Publication strategy:

- The bulletin will be a **joint IABMAS–fib publication**, likely disseminated through fib channels to maximize reach.
- Case studies will **not** be included in the bulletin.
- Instead, a **call for papers** has been issued for *Structure and Infrastructure Engineering*, with a submission deadline of **15 April 2026**.

Discussion:

- Challenges were noted regarding the definition of representative use cases and coordination among volunteer contributors.
- Eva acknowledged and thanked contributors for their voluntary efforts.
- Yuguang confirmed an upcoming coordination call with fib TG 3.2.
- Ivan is considering submitting a paper aligned with recent experimental work.

2.4. Special Session on Bridge Load Testing – IABMAS 2026

Eva introduced the topic and invited Jacob to report.

Key points:

- All submitted abstracts have been accepted.
- Late abstracts may still be accommodated, subject to compliance with strict Taylor & Francis deadlines.
- Based on the successful three-session format at IABMAS 2024 (Denmark), the committee aims to replicate a similar structure in 2026.
- Broad participation was encouraged.

2.5. Collaboration with Other IABMAS Technical Committees and Digital Twin Activities

Updates included:

- An ongoing survey of bridge owners regarding digital twin needs, with strong response rates.
- Preparation of a paper for *ASNT Materials*.
- Proposals for sessions at IABSE 2026 in Incheon.

Rolando reported:

- Workshop planning is progressing slowly due to overlapping IABMAS deadlines.
- Cross-committee interest in digital twins continues to grow.

The survey results will support a forthcoming journal paper coordinated by Eva.

3. New Business

3.1. Technical presentations

Oliver Mosig presented a detailed overview of a recent load-test campaign on the Elbe/Edel Bridge, designed by the same team as the Carola Bridge.

Background and inspection

- Bridge closure (Nov 2022/2024, depending on bridge) due to concerns related to stress corrosion cracking (SCC).

- Part of a group of 19 similar bridges raising regional safety concerns.
- Visual inspection identified one broken wire; magnetic testing confirmed cracking in two samples.
- Tendons were in better condition than those of the Carola Bridge.
- Cracks identified in underslung components.

Load-test methodology

- Objective: enable partial reopening (pedestrians, cyclists, 7.5-ton vehicles, and controlled 30-ton crossings).
- Five load positions using SPMTs loaded up to 330 tons.
- Instrumentation included:
 - LVDTs and deformation sensors
 - Inclinometers
 - Acoustic Emission sensors
 - Distributed fiber-optic strain sensors
- Emphasis on achieving equivalent bending moments representative of service conditions.

Results

- No exceedance of limit criteria.
- No permanent deformation; full elastic recovery observed.
- Crack-width variations < 20 µm, largely temperature-driven.
- Temperature effects proved more significant than traffic loading.
- Structural analysis provided insight into pre-stress loss thresholds.

The bridge was reopened under controlled conditions in April 2023/2025 (depending on bridge).

Discussion

- Questions addressed political sensitivity, AE interpretation, prestressing levels, residual deflections, modelling approaches, SCC references, and post-reopening traffic restrictions.
- No plastic deformation was observed.
- Oliver thanked the committee and indicated plans for future publication.

Grzegorz Poprawa presented Poland's large-scale, industrialized approach to commissioning load testing.

Context

- ~95% of tests concern new bridges.
- National plan to expand highways to ~8,000 km by 2040.
- Seven accredited laboratories operate competitively.
- Laboratories are paid by contractors, incentivizing efficiency.
- Accreditation required except for tests commissioned by regional administrators.

Operations

- ~60 bridges tested per month.
- Core team of 13 civil engineers with overlapping competencies.
- Instrumentation includes:
 - Settlements
 - Elastomeric bearing behaviour
 - Bearing compression
 - Displacements (manual digital sensors preferred)
 - Wireless systems and dynamics
- Equipment from Siemens, NI, and HBM.
- Loads typically set at ~50% of LM1, calibrated to achieve correct equivalent bending moments.

Digital workflow

- Cloud-based data management (OneDrive), OpenVPN, centralised repositories.
- Benefits: real-time access, transparency, quality control, rapid reporting.

Research and Digital Twins

- Testing data supports at least eight PhD theses.
- Variability of concrete elastic modulus is a key modelling challenge.
- BIM adoption remains limited nationally, but digital twin initiatives are advancing.

Discussion

- Extensive datasets are collected and shared under national documentation standards.
- Failures are rare, though repairs are not unusual.
- Concrete mix design often governs acceptance criteria.
- Jesse congratulated Grzegorz on the scale and efficiency of operations.

3.2. Liaison updates

TRB AKB40: No update (Dave Kosnik absent).

fib TG 3.2: Update already covered previously .

3.3. Updates of ongoing research projects

Members briefly shared updates on current research activities, including:

- PhD projects on proof loading and structural liability.
- Emerging collaboration opportunities in monitoring, assessment, and digital twin research.

3.4. Upcoming conferences and events

- **IABMAS 2026:** Special sessions under preparation; deadlines noted: <https://www.iabmas2026.org/>

- **SMAR 2026 (Dresden):** Session co-organized by Eva and Grzegorz Poprawa. No additional events were formally proposed: <https://smar-2026.org/>

4. Adjournment

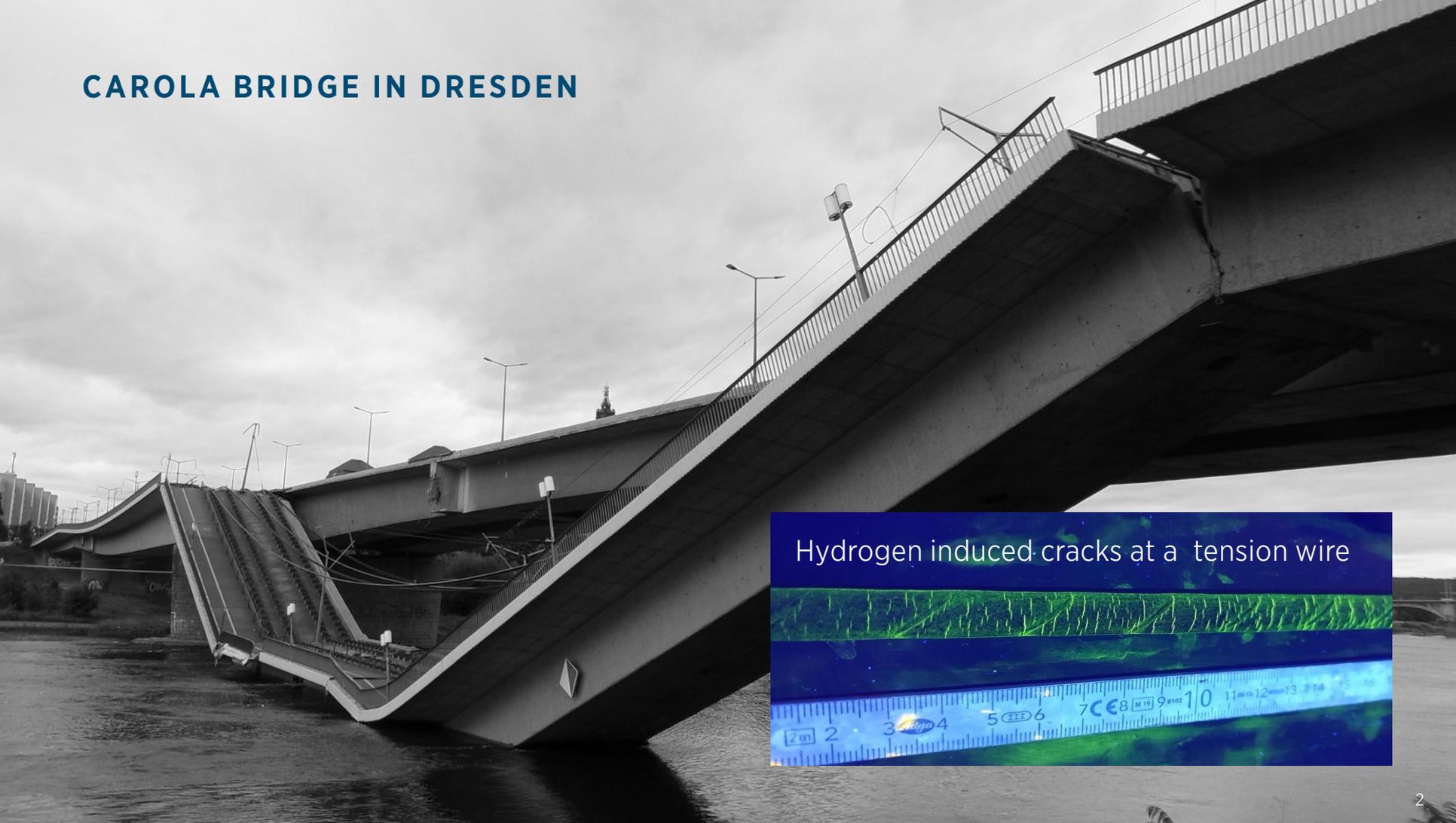
Eva thanked all participants for their active engagement and valuable contributions. With no further business, the meeting was adjourned.

LOAD TEST ON THE ELBE BRIDGE BAD SCHANDAU TO ASSESS THE RISK OF STRESS CORROSION CRACKING

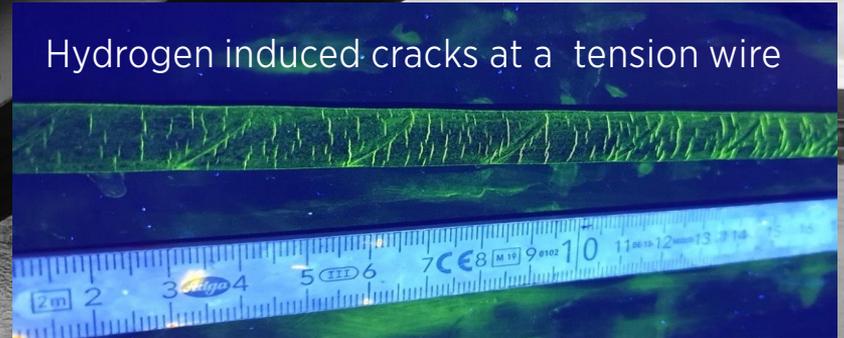
10.12.2025

Dr.-Ing. Oliver Mosig

CAROLA BRIDGE IN DRESDEN



Hydrogen induced cracks at a tension wire



(AT LEAST) 19 MORE SIMILAR BRIDGES IN SAXONY

Exklusive Liste

+ Nach Einsturz in Dresden und Sperrung in Bad Schandau: Diese 19 Brücken in Sachsen stehen jetzt im Fokus der Prüfer



Nach dem Kollaps der Carolabrücke in Dresden müssen sachsenweit 19 weitere Spannbetonbrücken geprüft werden. Ein Blick in die der Redaktion exklusiv vorliegende Liste verrät, welche Bauwerke betroffen sind.

+ 19 Spannbeton-Brücken in Sachsen auf dem Prüfstand – darunter fünf bei Leipzig

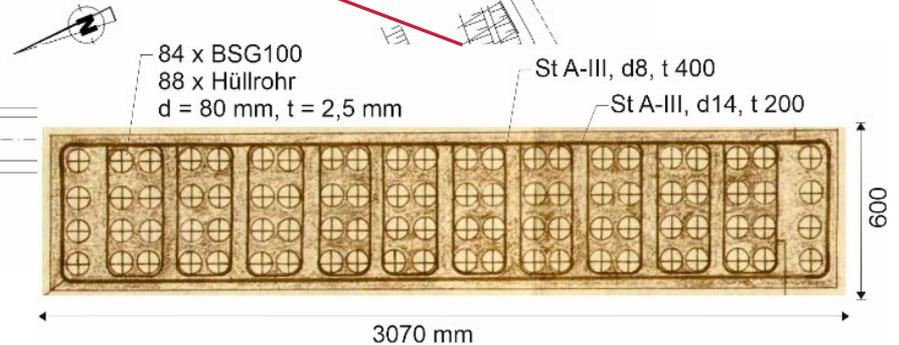
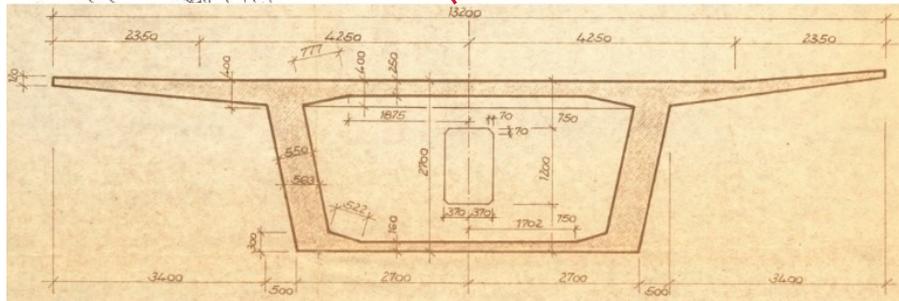
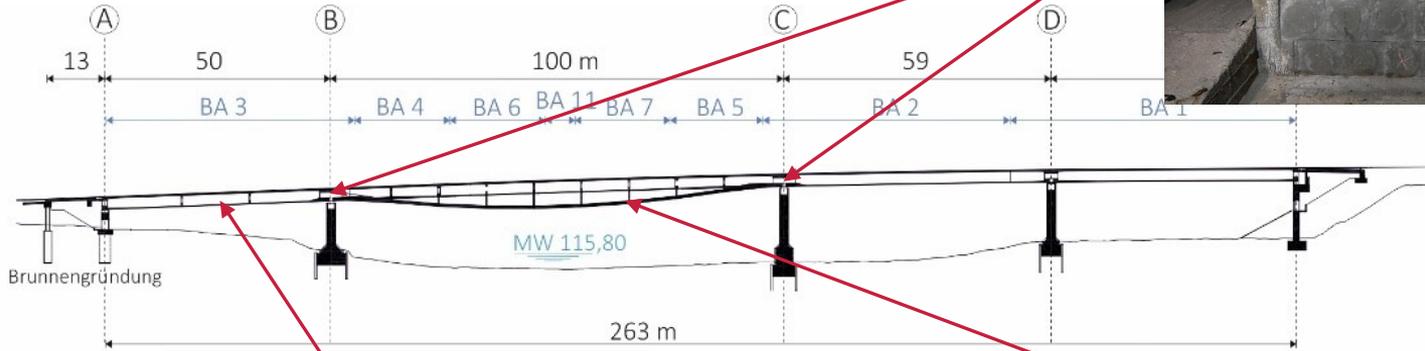


 Anhören

ELBE BRIDGE BAD SCHANDAU



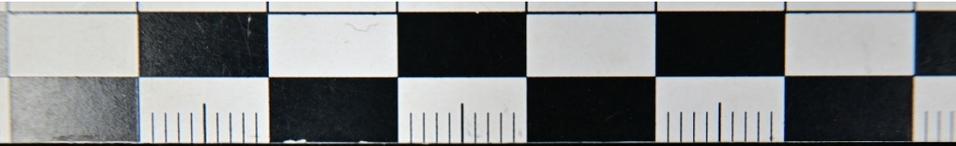
OVERVIEW



SPECIAL INSPECTION



DIAGNOSTICS



CRACKS UNDERSLUNG

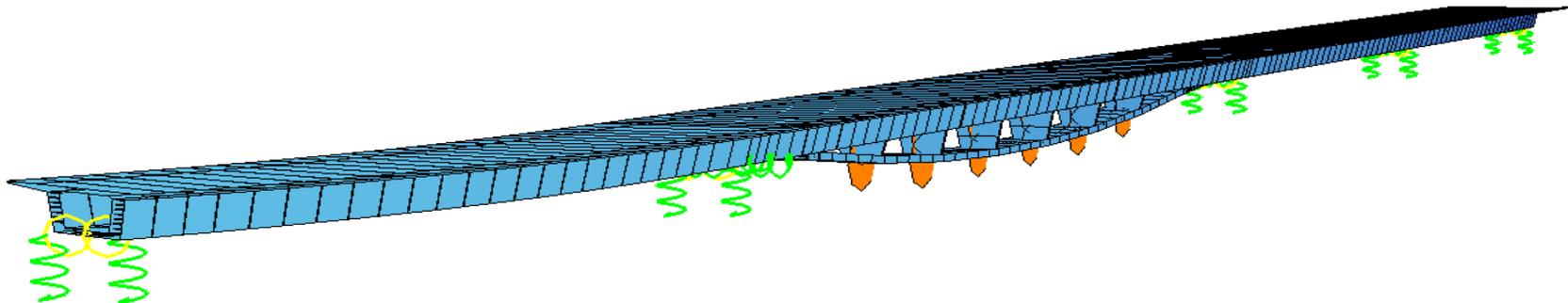
- ➔ Renovation in 2001: Coating of the bridge with a surface protection system
- ➔ Cracks less critical, as they ran in the coating and not extend into the structural concrete



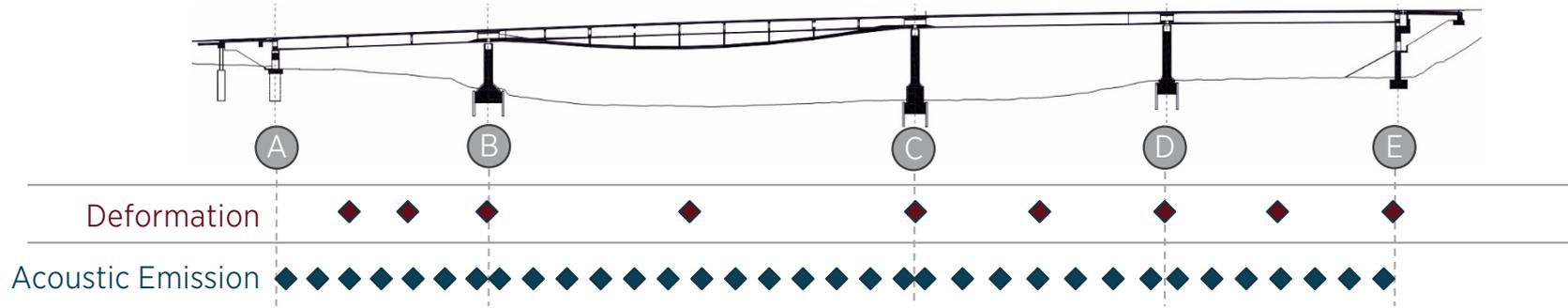
RECALCULATION

ASSUMING SUFFICIENT PRE-TENSION (AS PLANNED):

- ➔ ULS checks satisfied; additional reserves due to higher material strengths
- ➔ Almost all SLS checks satisfied – deficit in the decompression check due to limited prestressing of the edge spans
- ➔ Sufficient indication through crack formation is present, or the probability of a sudden failure without prior indication is sufficiently low



ACOUSTIC-EMISSION AND DEFORMATION MONITORING



- ➔ No abnormalities in deformation monitoring
- ➔ Operation of AEM at the end of March 2025: wire break events now detectable
- ➔ **But:** What is the extent of damage that has already occurred in the past?
 - ➔ Option I: Evaluation of the AEM over a longer period (at least 3 months)
 - ➔ **Option II: Load Test**

OBJECTIVES OF THE LOAD TEST

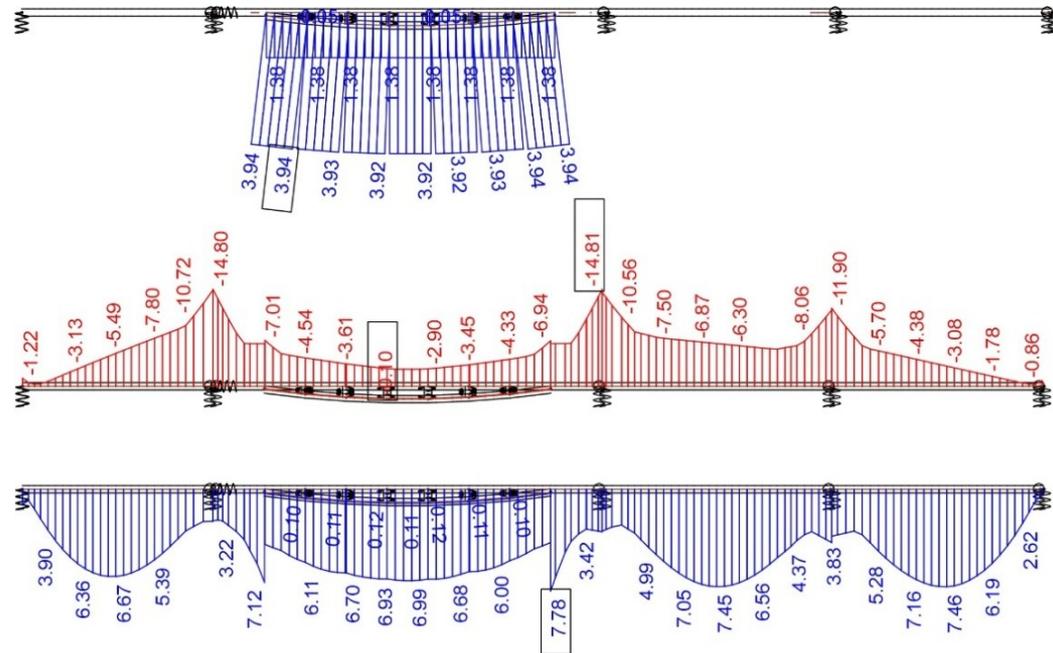
- ➔ Traffic related:
 - Release for pedestrians and cyclists
 - Release for light traffic (up to 7.5 tons) – two lanes
 - Release for vehicles up to 30 t (special permit – one lane, traffic light controlled)

- ➔ Structural / Measurement-related
 - Experimental Assessment of the load-bearing capacity for the traffic loads (see above)
 - System identification, verification of calculation assumptions (pre-tension)
 - Definition of limits for future operation (allowable wire breaks, deformation limits)

TARGET LOADS / TARGET INTERNAL FORCES

$$F_{Ziel} = \gamma_{\ddot{u}R} \cdot \left[(\gamma_{G,1} - 1,0) \cdot G_1 + \sum_{j>1} \gamma_{G,j} \cdot G_{k,j} + \gamma_{Q,1} \cdot Q_{k,1} + \sum_{i>1} \gamma_{Q,i} \cdot \Psi_{0,i} \cdot Q_{k,i} \right]$$

- ➔ Pedestrians / Cyclists
- ➔ 7,5 t - traffic
- ➔ 30 t Single Crossings
- ➔ Temperature



Target internal Forces in the underslung [MN] / Bending Moment [MNm]

LOAD GENERATION



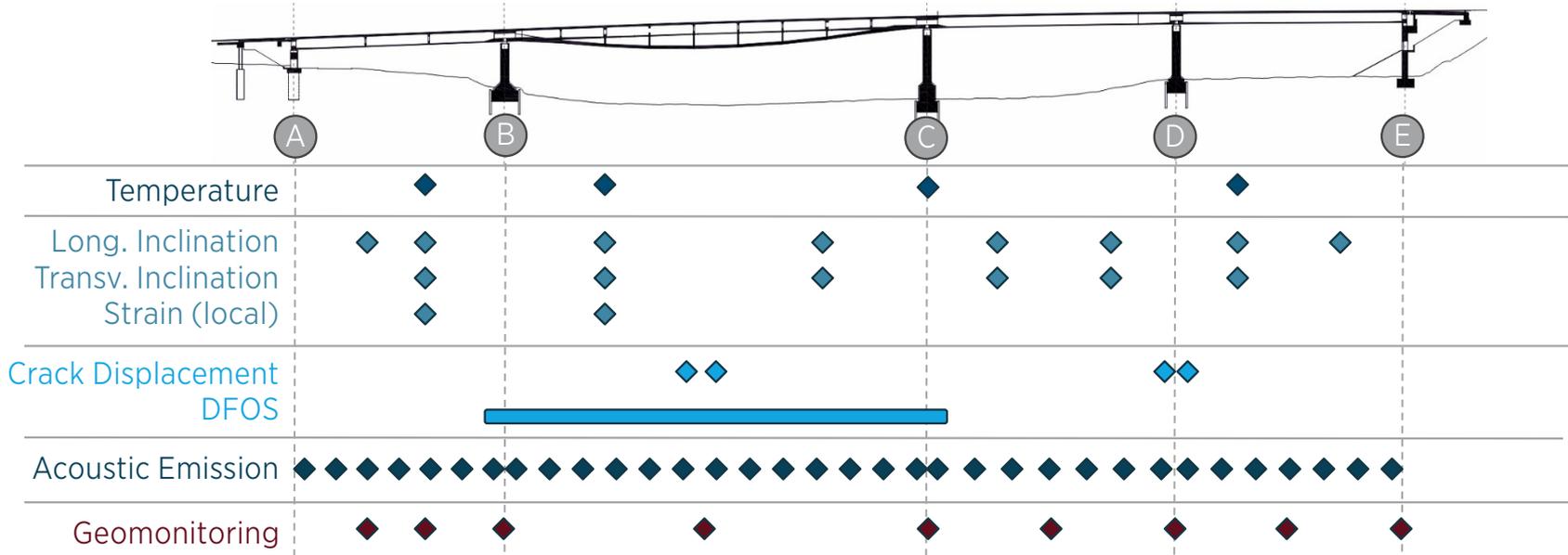
SPMT 29 t



10 t Weights

21 t Forklifter

ADDITIONAL MONITORING



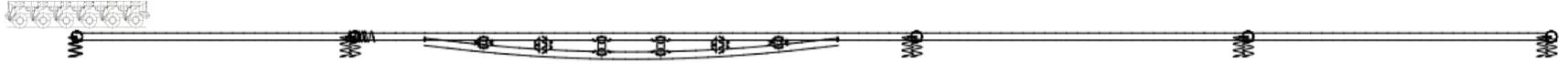
- ➔ Limits for Deformations, crack widths, and changes in crack widths
- ➔ Limits for wire breaks

LOAD POSITIONS



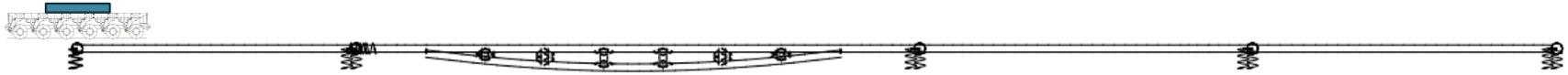
- ➔ 5 Load cases (positions) with stepwise load increase to represent the target internal forced in specific areas
- ➔ Total weight up to 330 tons

LOAD POSITION 1a

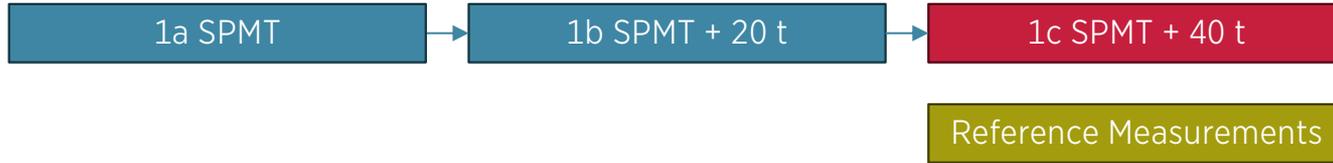
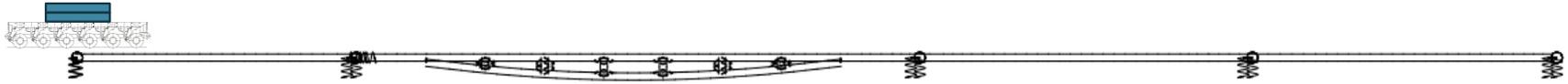


1a SPMT

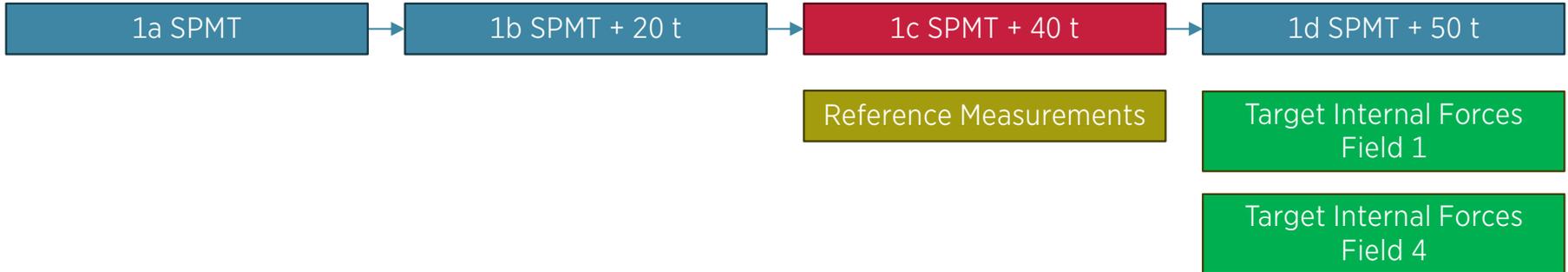
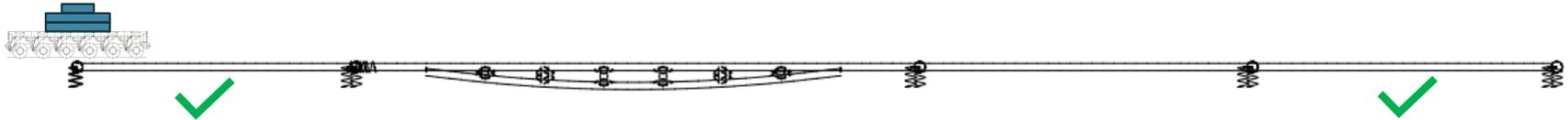
LOAD POSITION 1b



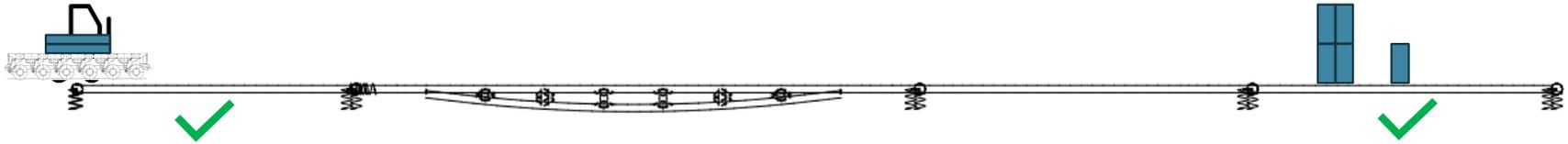
LOAD POSITION 1c



LOAD POSITION 1d



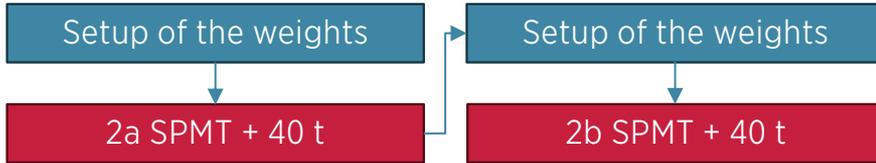
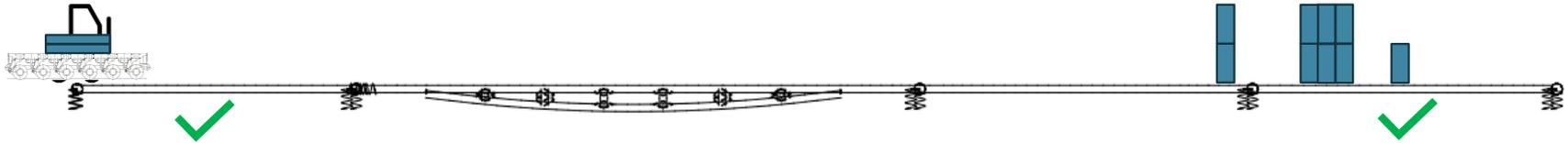
LOAD POSITION 2a



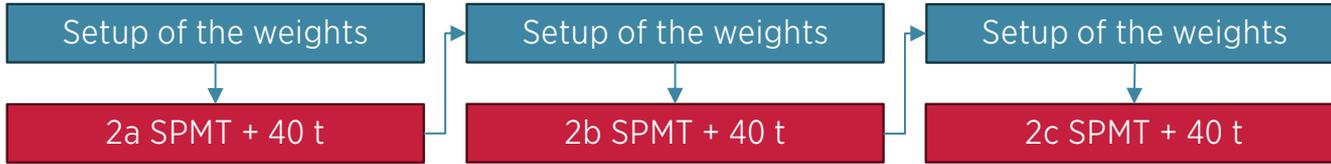
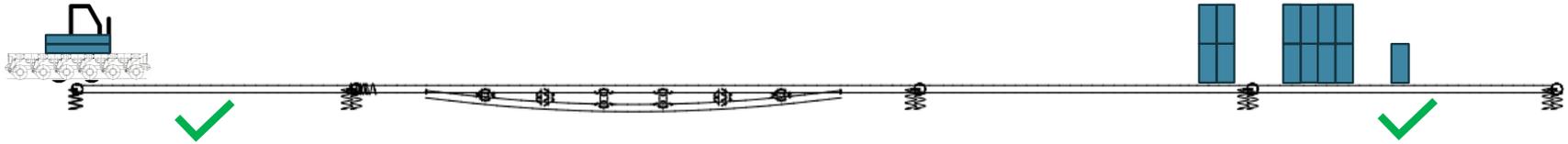
Setup of the weights

2a SPMT + 40 t

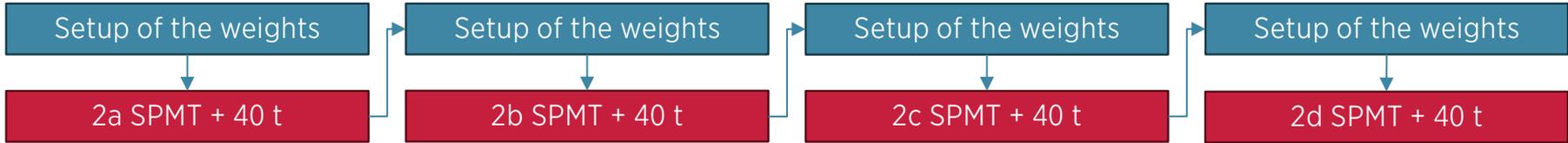
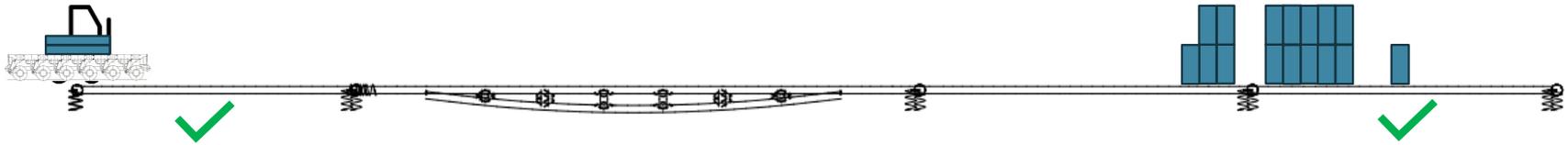
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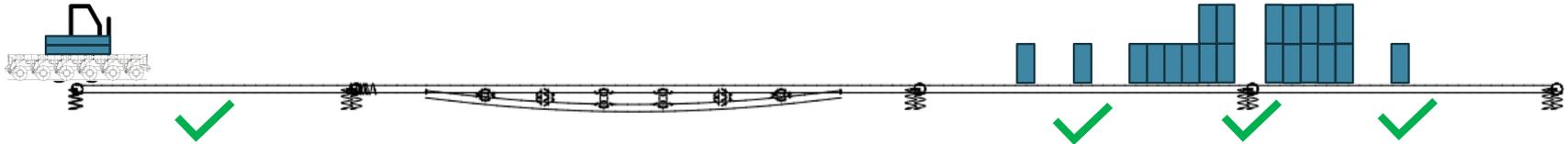
LOAD POSITION 2c



LOAD POSITION 2d



LOAD POSITION 2e

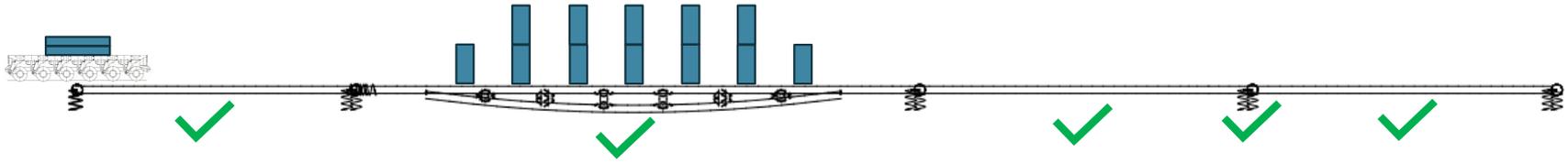


Setup of the weights

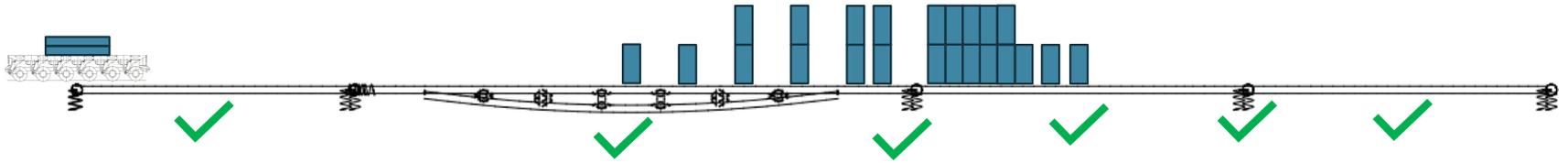
2e SPMT + 40 t

Target Internal Forces
Axis D & Field 3

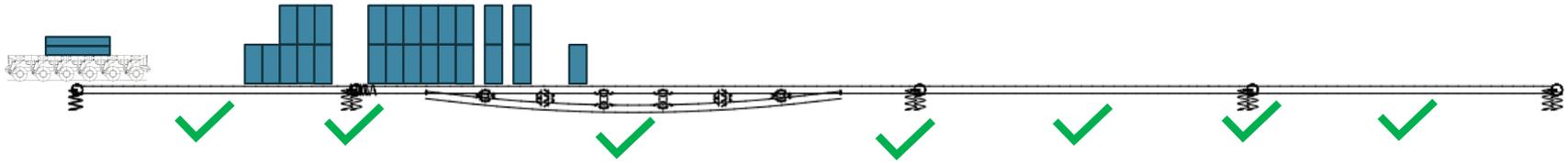
LOAD POSITION 3



LOAD POSITION 4



LOAD POSITION 5





holz

27

fahrenholz

139

fahrenholz



145



140

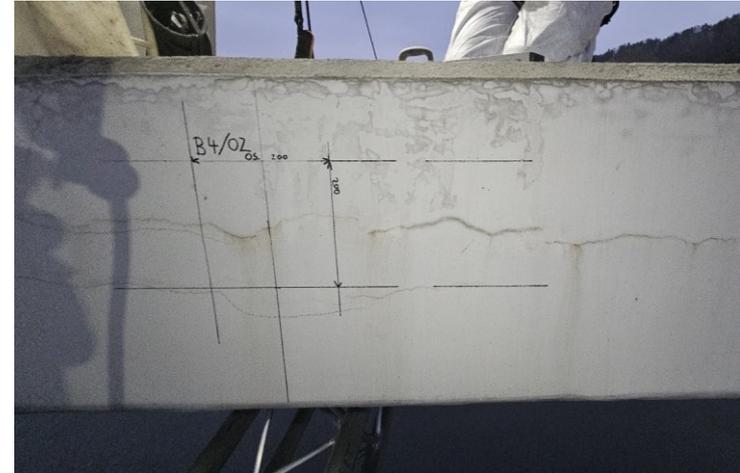
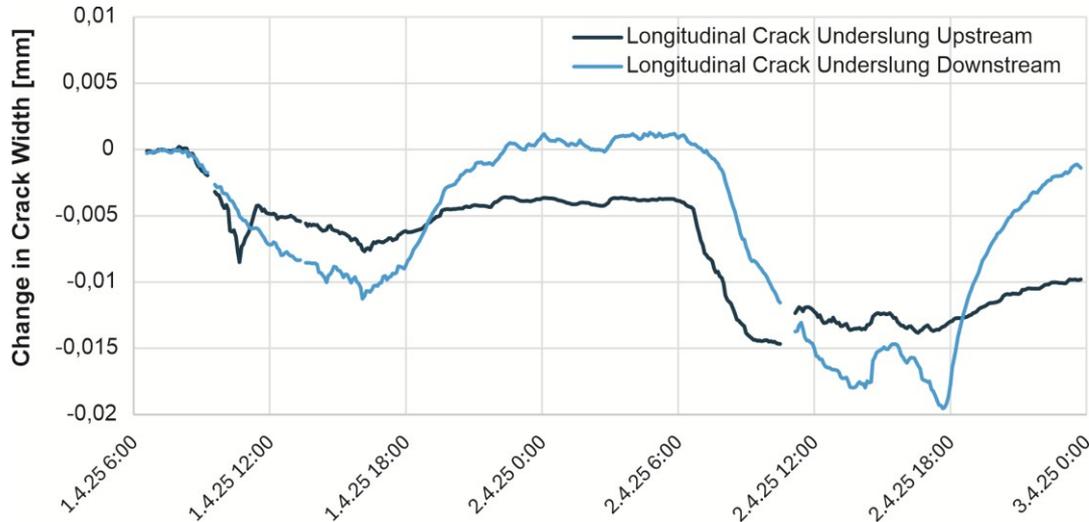


Ein
G

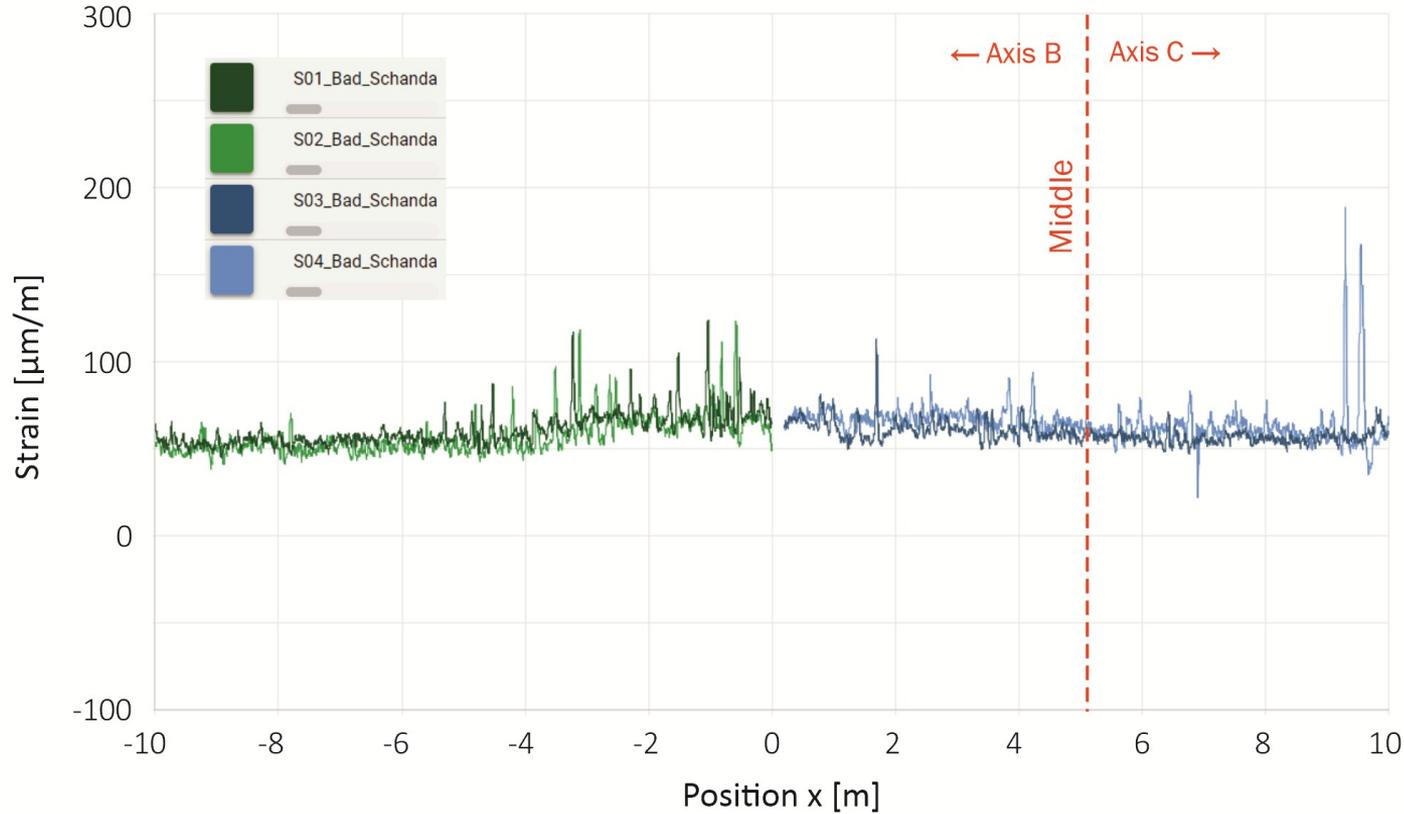
LIEBHERR

TEST RESULTS

- ➔ None of the limit criteria were reached
- ➔ Deformations / tilts below the calculated expected range
- ➔ No permanent deformations
- ➔ change in crack width in the underslung < 20 μm

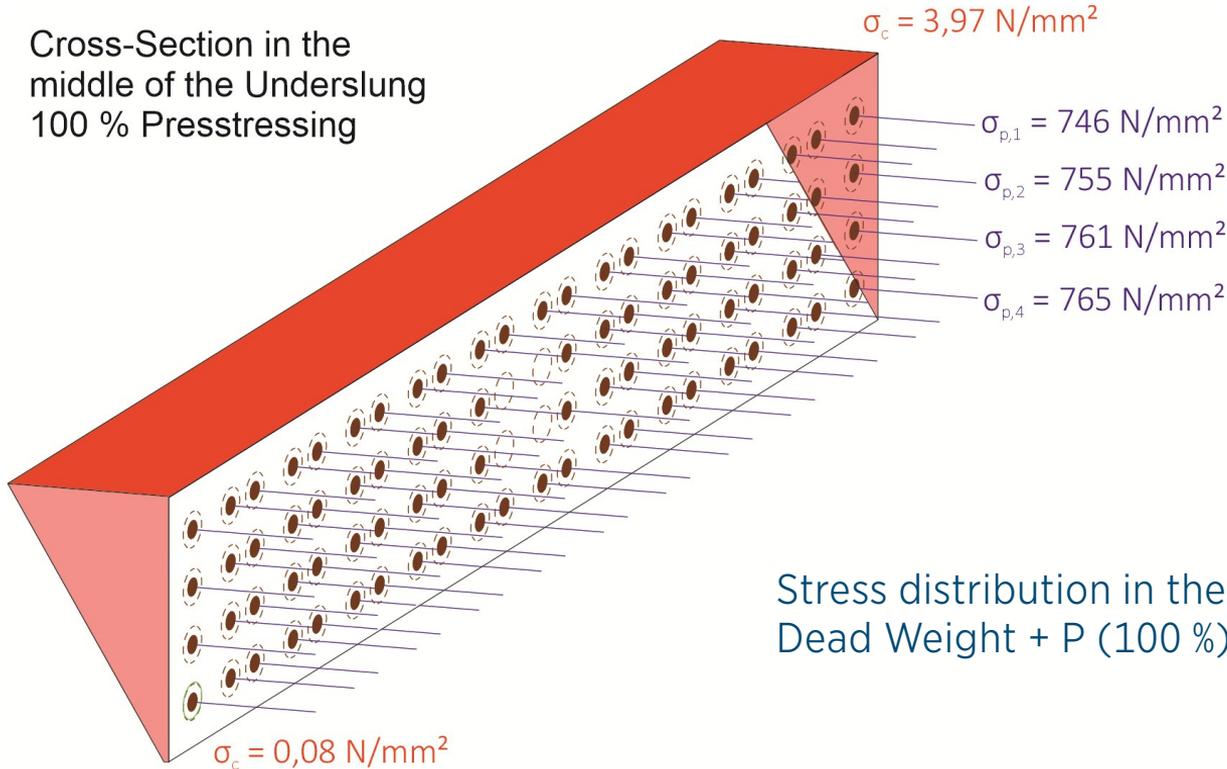


DFOS - UNTERSUNG



STRESS DISTRIBUTION IN THE UNDERSLUNG

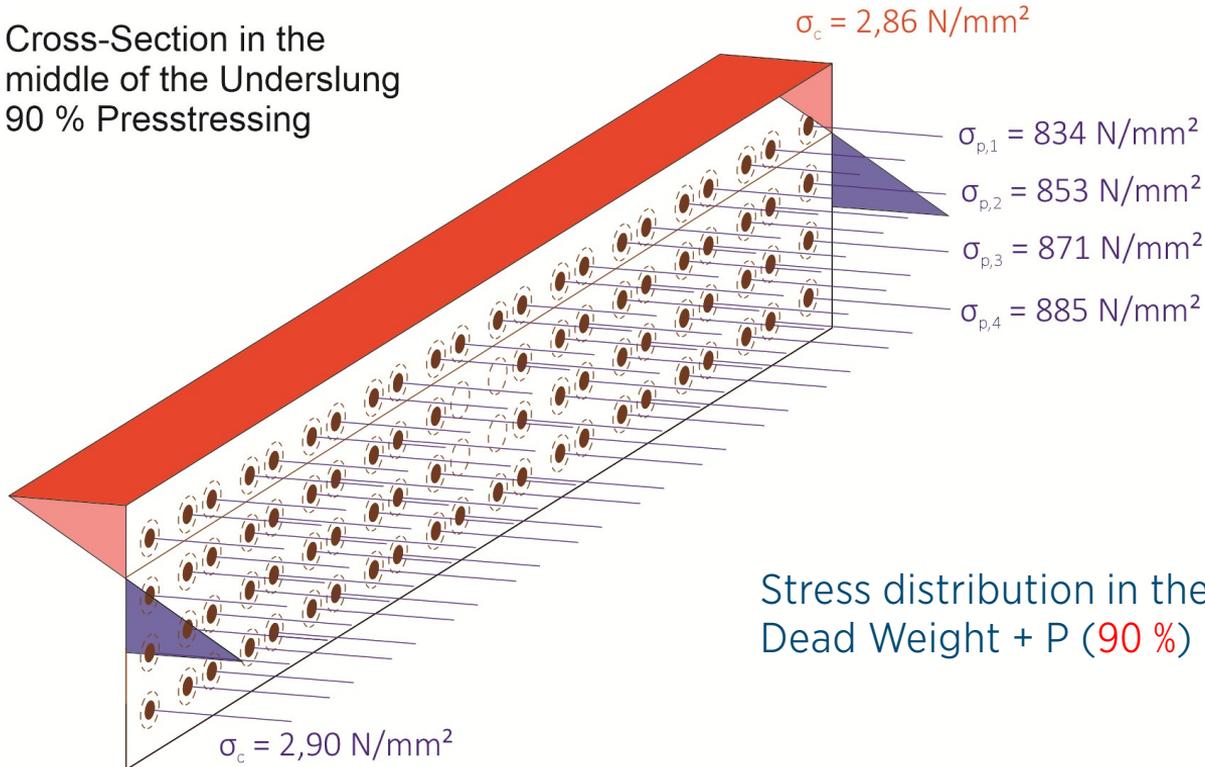
Cross-Section in the middle of the Underslung
100 % Prestressing



Stress distribution in the middle of the underslung:
Dead Weight + P (100 %) + Load test + $\Delta T(2K)$

STRESS DISTRIBUTION IN THE UNDERSLUNG

Cross-Section in the middle of the Underslung
90 % Prestressing



Stress distribution in the middle of the underslung:
Dead Weight + P (90 %) + Load test + $\Delta T(2K)$

REOPENING

Sachsen

Elbbrücke in Bad Schandau wird wieder für Verkehr geöffnet

10.04.2025, 03:33 Uhr





Thank You For Your Attention!

Streamlined Commissioning Load Testing of Multiple New Bridges in Poland

Grzegorz POPRAWA, dr inż. – CADmost / UIGP

Marek SALAMAK, prof. dr hab. inż. – Politechnika Śląska

IABMAS Technical Committee on Bridge Load Testing
Zoom meeting, 10 December 2025 r.

Grzegorz POPRAWA, dr inż.

- PhD. (dr inż.) from Silesian University of Technology
- Technical director in ISO 17025 accredited laboratory
 - Field Testing Laboratory of Silesian University of Technology
 - Since 2018
- 2014 – first load test of a bridge
- ~ 1000 load tests until now
 - Our team >2500?
- Key interests
 - Structural dynamics
 - Operational Modal Analysis
 - Load Testing of bridges
 - Structural Health Monitoring



Background

Load testing

- Load testing is in general mandatory
 - For new bridges
- When I say load test I usually mean
 - Static load test and dynamic test

Static load testing



Dynamic testing



Approximately 95% of all conducted load tests are commissioning load tests



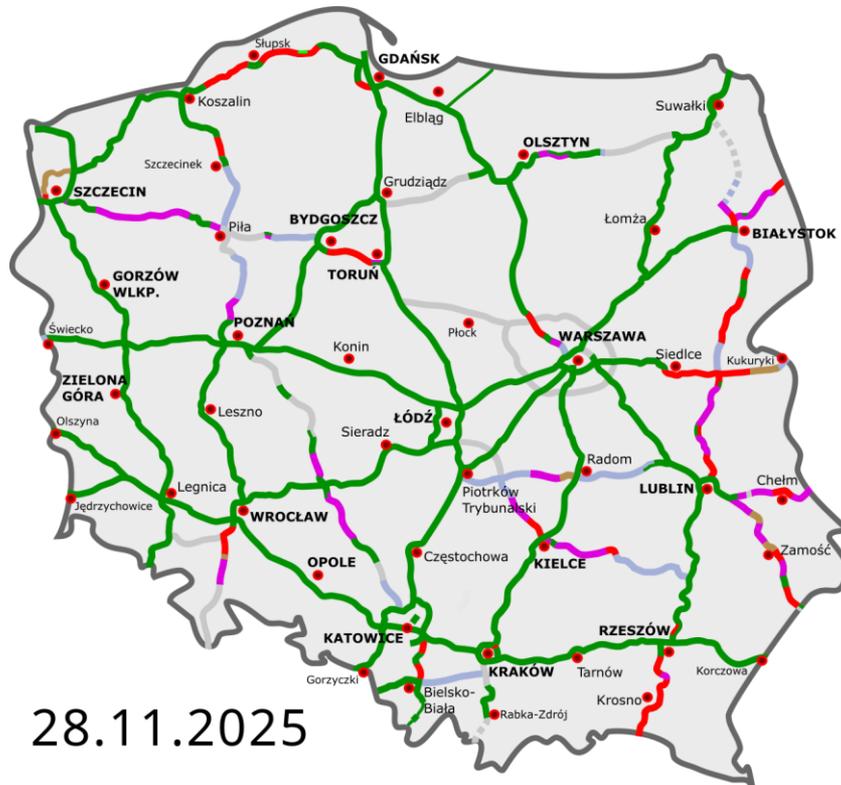
Generalna Dyrekcja
Dróg Krajowych i Autostrad

* Polish National Highway Authority

Controlled-access highways in Poland

-  existing
-  under construction
-  design stage
-  tender stage
-  environmental decision issued
-  planned

8177 km – final layout
5320 km – in operation
1290 km – under construction
(various stages)



28.11.2025

2025, 24th November – 19th December

- One month*
 - ~60 load tests
 - *Outlier rather than rule
- Road and railway bridges



2538 S7-Widoma-Igolomska_OBC_Gulermak						
1	KP1-JL	bełkowy sprężony	stalwka	04.11.2025	3	0 0 0
2	M1-L02	bełkowy sprężony	stalwka	04.11.2025	3	0 0 11,91
3	MD-202	prefabryk. T	stalwka	04.11.2025	3	4 4 6 9 9,81
2437 LK202_OBC_INTERCOR						
1	MWK1-86_406 (Tor2)	rama żelbetowa	stalwka	06.11.2025	1	1 lokom 1
2	P1-87-075 (Tor1,2)	rama żelbetowa	stalwka	06.11.2025	2	1 lokom 2
3	T1-87-702 (Tor2)	rama żelbetowa	stalwka	06.11.2025	1	1 lokom 1
4	MWK 2-83_020 (Tor1)	obrotowiana żbwig	stalwka	06.11.2025	1	1 lokom 1
5	MWK 3-90_024 (Tor1)	rama żelbetowa	stalwka	06.11.2025	1	1 lokom 1
6	P1-80-050 (Tor1)	rama żelbetowa	stalwka	06.11.2025	1	1 lokom 1
7	MWK 4-90-978 (Tor1)	obrotowiana żbwig	stalwka	06.11.2025	1	1 lokom 1
2406 Stacja Ostróda_OBC_Torpoi						
1	PP-258_103 (segment 12,13-tor2)	rama żelbetowa	stalwka	07.11.2025	3	0 0 0
2426 S6-Koszalin-Stupsk_OBC_Kobyłomia						
1	MD-1A	prefabryk. T	stalwka	08.11.2025	2	4 4 5 0,7
2	WD-12	prefabryk. T	stalwka	08.11.2025	2	4 4 4 0,42
3	WD-15	prefabryk. T	stalwka	08.11.2025	2	4 4 4 0,36
2505 A2-Odcinek-VI_OBC_INTERCOR						
1	PZD-53A L	bełkowy sprężony	dynamika	01.12.2025		
2	PZD-53A P	bełkowy sprężony	dynamika	01.12.2025		
3	WD-56	bełkowy sprężony	dynamika	01.12.2025		
4	PZD-56A L	bełkowy sprężony	dynamika	01.12.2025		
5	PZD-56A P	bełkowy sprężony	dynamika	01.12.2025		
6	WD-57	bełkowy sprężony	dynamika	02.12.2025		
7	MA+PZD-59 L	prefabryk. T	dynamika	02.12.2025		
8	MA+PZD-59 P	prefabryk. T	dynamika	02.12.2025		
9	WD-60	bełkowy sprężony	dynamika	02.12.2025		
10	WD-53L	bełkowy sprężony	stalwka	03.12.2025	2	4 4 2 13,81
11	WD-53P	bełkowy sprężony	stalwka	03.12.2025	2	4 4 2 13,81
12	WD-54	bełkowy sprężony	stalwka	03.12.2025	2	5 2 12 40
2506 A2-Odcinek-VII_OBC_INTERCOR						
1	WD-58	bełkowy sprężony	dynamika	02.12.2025		
2	MA+PZD-69L	prefabryk. T	dynamika	02.12.2025		
3	MA+PZD-69P	prefabryk. T	dynamika	02.12.2025		
4	WD-59A	bełkowy sprężony	dynamika	02.12.2025		
5	MA+PZD-73L	prefabryk. T	stat_dyn	04.12.2025	3	5 2 3 9,16
6	MA+PZD-73P	prefabryk. T	stat_dyn	04.12.2025	3	5 2 3 9,11
7	PZD-73A L	bełkowy sprężony	stat_dyn	04.12.2025	2	5 3 21 12
8	PZD-73A P	bełkowy sprężony	stat_dyn	04.12.2025	2	5 3 21 12
9	PZD-73B L	bełkowy sprężony	stat_dyn	03.12.2025	1	5 3 19,20
10	PZD-73B P	bełkowy sprężony	stat_dyn	03.12.2025	1	5 3 19,19
11	WA-74L	prefabryk. T	stat_dyn	05.12.2025	1	6 2 8 30
12	WA-74P	prefabryk. T	stat_dyn	05.12.2025	1	6 2 8 30
13	PPM-13L L	bełkowy sprężony	stat_dyn	05.12.2025	1	5 3 14,00
14	PPM-13L P	bełkowy sprężony	stat_dyn	05.12.2025	1	5 3 14,00
2538 S7-Widoma-Igolomska_OBC_Gulermak						
1	KP1-JL	bełkowy sprężony	dynamika	04.12.2025		
2	M1-L02	bełkowy sprężony	dynamika	04.12.2025		
3	MD-202	prefabryk. T	dynamika	04.12.2025		
2543 LK354-Oborniki_OBC_PORR						
1	PPT-26_322 (Tor2)	rama żelbetowa	stalwka	06.12.2025	1	1 lokom 1 0,28
2437 LK202_OBC_INTERCOR						
1	MWK 1-100_320 (Tor1)	sklepienie pref żeb	stalwka	09.12.2025	1	1 lokom 1
2	MWK 1-113_436 (Tor1)	obrotowiana żbwig	stalwka	09.12.2025	1	1 lokom 1
3	MWK 1-115_451 (Tor1)	obrotowiana żbwig	stalwka	09.12.2025	1	1 lokom 1
4	PA-120_255 (Tor1)	rama żelbetowa	stalwka	09.12.2025	1	1 lokom 1
5	MWK 1-122_099 (Tor1)	rama żelbetowa	stalwka	09.12.2025	1	1 lokom 1
2424 LK104-Chabówka_OBC_in top W-wa						
1	MD-62 611	zespólny	stat_dyn	10-11-12.2025	1	4 3 33 36
2	MK-62 690	obrotowiana żbwig	stat_dyn	10-11-12.2025	2	1 lokom 4 11 22
3	MK-71 150 (Estakada)	obrotowiana żbwig	stat_dyn	10-11-12.2025	4	2 lokom 8 19 31
4	MK-71 150 (E-uk)	kolcowy	stat_dyn	10-11-12.2025	3	2 lokom 6 17 49
2534 S1-Bierun-Oświecim_OBC_Strabag						
1	WD-14	zespólny	stat_dyn	11.12.2025	2	8 6 20 25
2	M3-17L	bełkowy sprężony	stat_dyn	11.12.2025	3	6 6 30 39
2536 LK274-Walbrzych-Marciszów_OBC_PORR						
1	WK-78_658 (Tor 1)	bełkowy	stat_dyn	12.12.2025	1	1 lokom 2 13 21
2	MK-901_094 (Tor 1)	szalownica	dynamika	12.12.2025		
3	MK-904_244 (Tor 1)	szalownica	dynamika	12.12.2025		
2541 DW886-Domaradz_OBC_Strabag						
1	Most	prefabryk. T	stat_dyn	15-19.12.2025	1	4 2 6 46
2542 G dańsk-Most Popielny_OBC_MTM						
1	Most Popielny	bełkowy żelbetowy	stalwka	15-19.12.2025	1	1 2 0 47

Our customers

- **National Highway Authority**

- ISO 17025 accreditation mandatory
- Scientific unit mandatory



- **National Railway Authority**

- ISO 17025 accreditation mandatory
- Scientific unit mandatory



- **Regional road administrators**

- Any lab

- **Private entities**

- Any lab

Load test is contracted and paid for by construction contractor on behalf of road/railway authority



Required
result of lobby

Our approach to Load Testing of bridges

“We do a lot of tests, and we do them very efficiently”

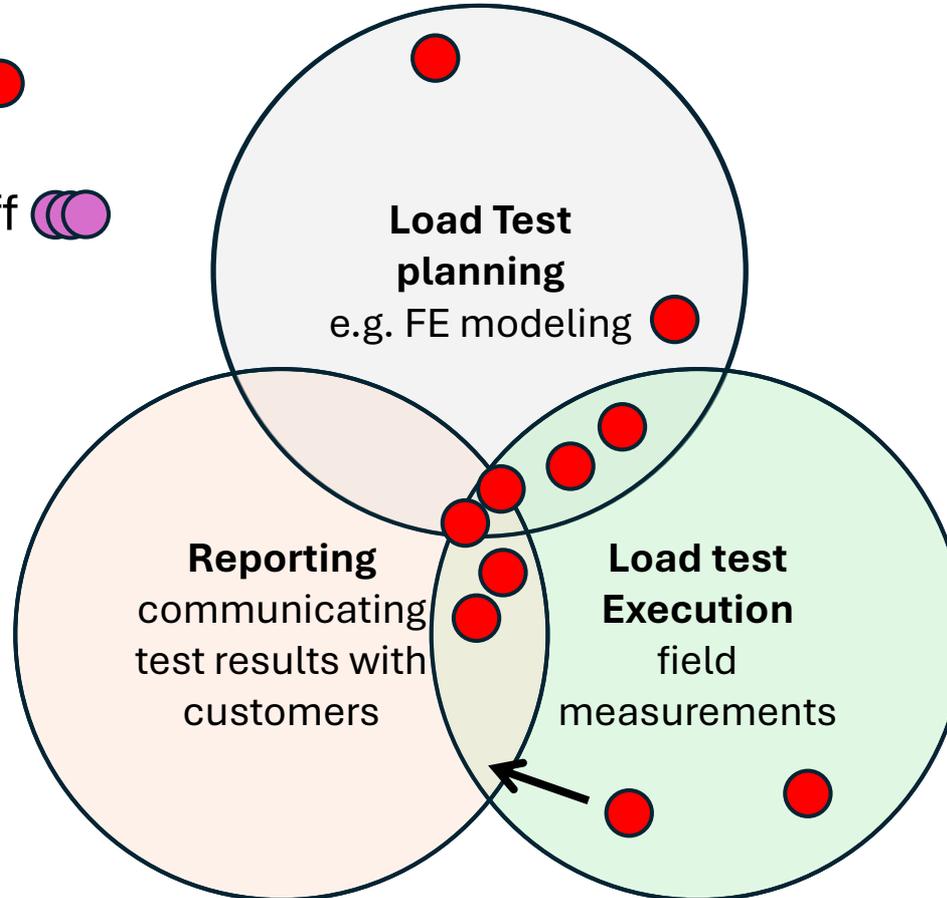
Lab personnel

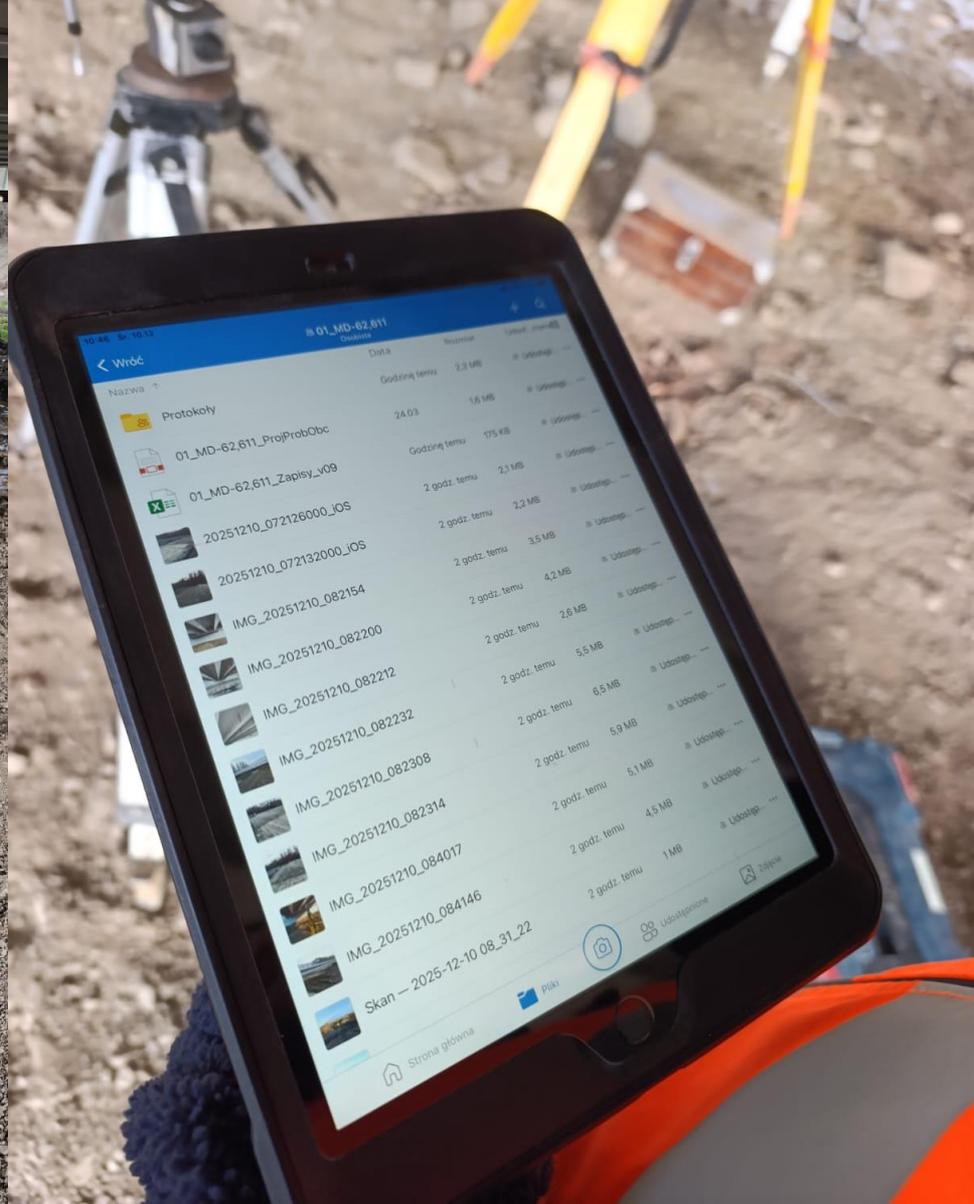


Summer 2017

Lab personnel

- Core team: 
 - 10 people
- Supporting staff 
 - 3 people
- New contracts
 - 3 people
- Civil engineers
 - 10/13 people





Cloud based communication and data sharing

- **OpenVPN**

- Office level data sharing
- Remote work is common

- **OneDrive**

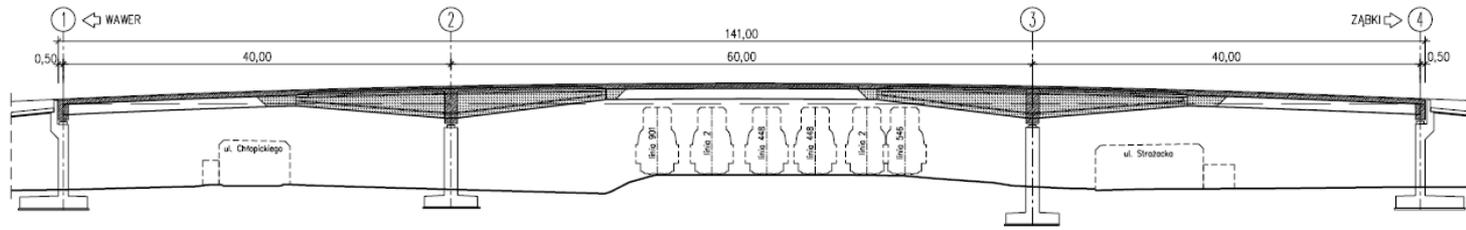
- Field level data sharing

- **iPad**

- OneDrive
 - Data storage and sharing
- PDF viewer
 - Test plan
- Camera
 - Inspection
 - Test documentation
- Excel
 - Static load test results



Example

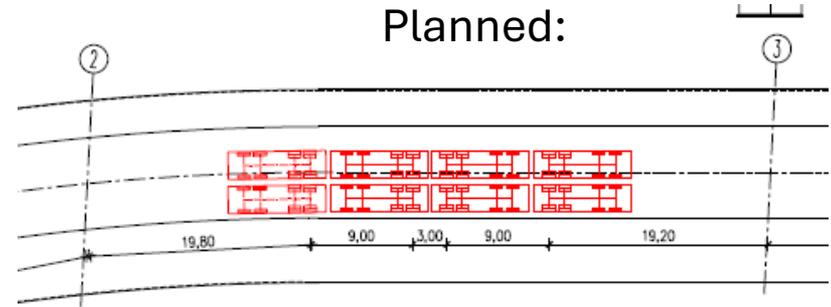


- Fast decision making
 - Construction site ordered wrong vehicles
 - Ordered 8 x **5 axis** 32 ton
 - Should be 8 x **4 axis** 32 ton
 - Call to office, FEM recalculation
 - In 20 min we had new load layout



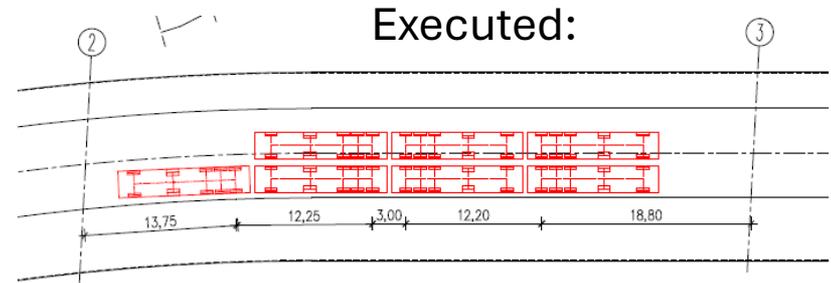
Min load 50% of EC LM1

Planned:



Min load 50% of EC LM1

Executed:



Scientific benefits

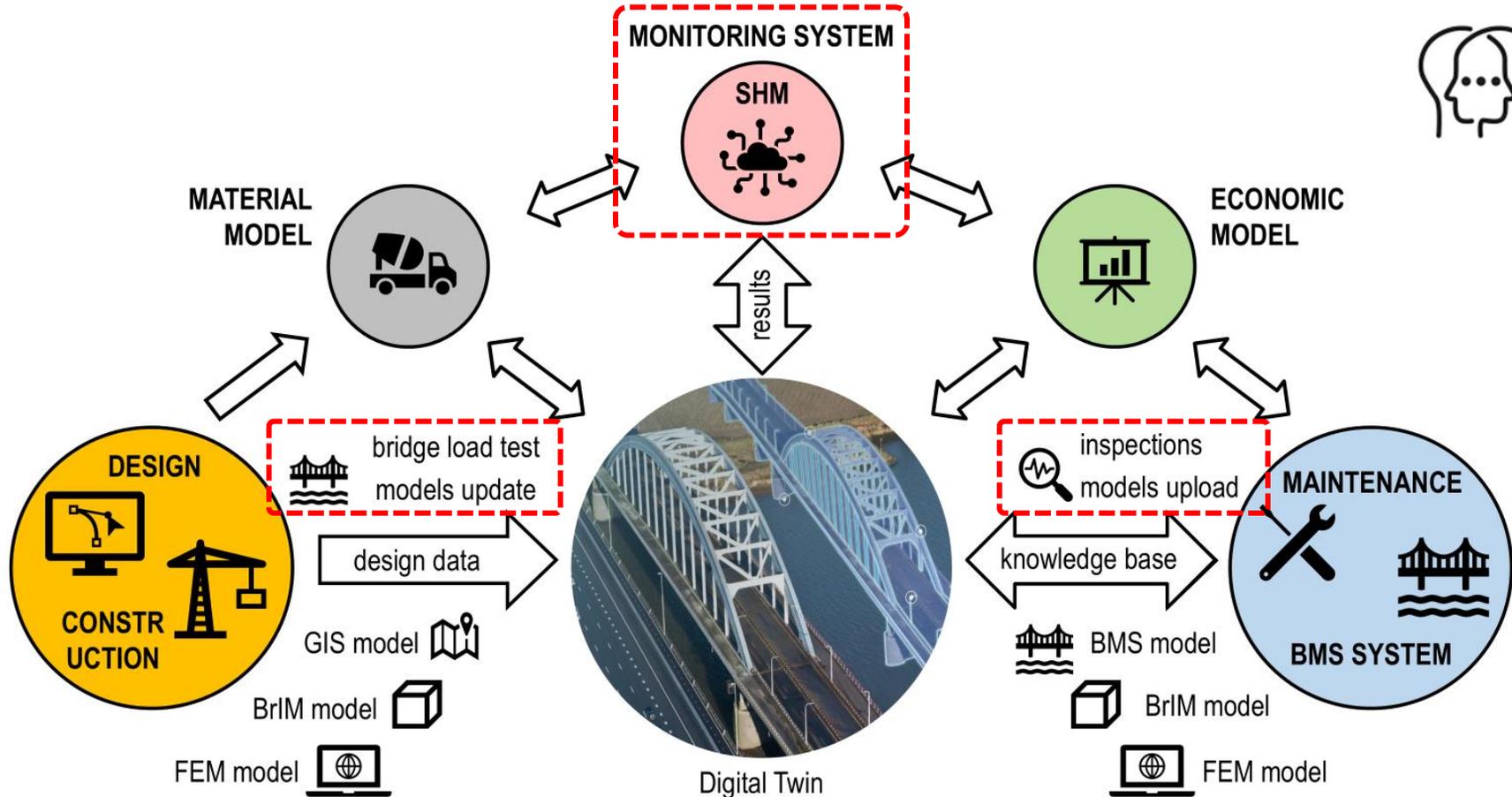
- Industry cooperation
 - The whole bridge team at the SUT have strong ties with industry partners
 - Recognition gained through at least three decades of bridge testing
- Source of data for publications
 - A large part of our research is based on results from load tests
 - Usually, we can shape test programs to fit our scientific needs
- At least 8 PhD theses benefited from the load test data availability
 - Most PhD students get involved in load testing in some way
 - Recently, the team has shifted towards Digital Twins (DT) of bridges
 - Load test is the birth of a DT
- All that is due to the commercial activity of the SUT lab



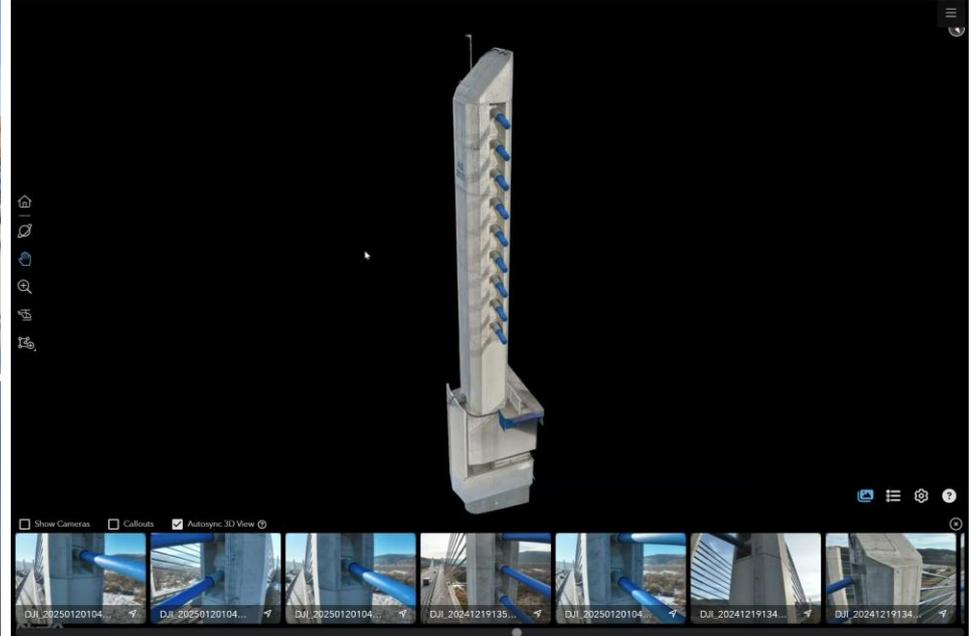
Other activities related to load testing



Digital Twins of bridges

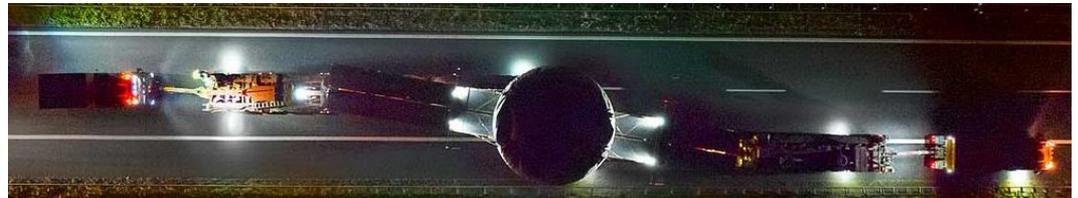
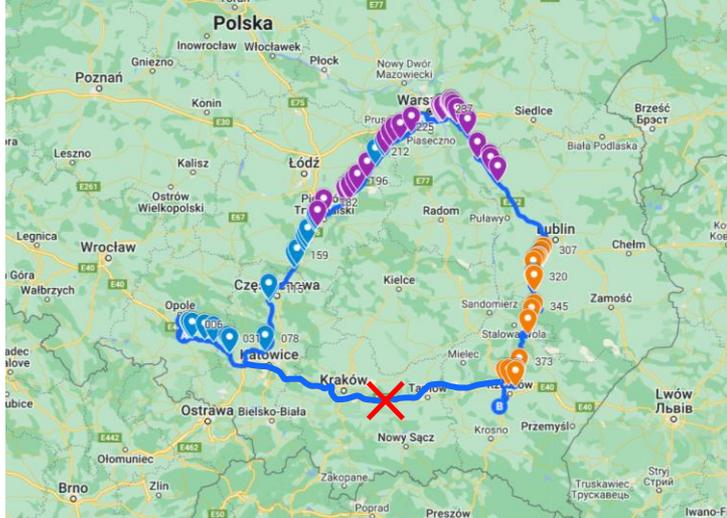


Virtualization of bridge inspection processes



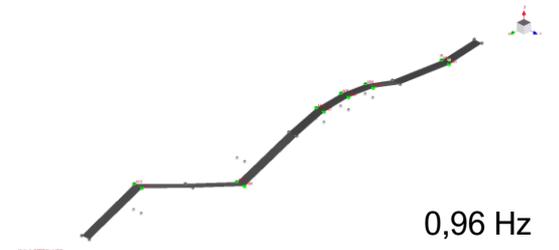
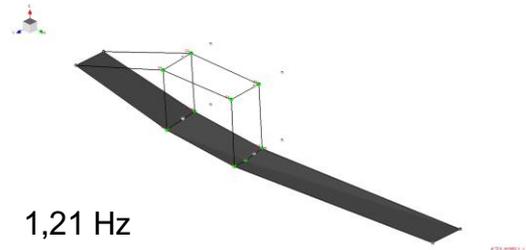
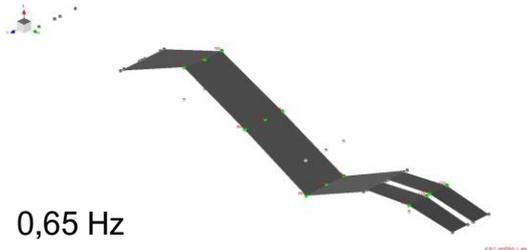
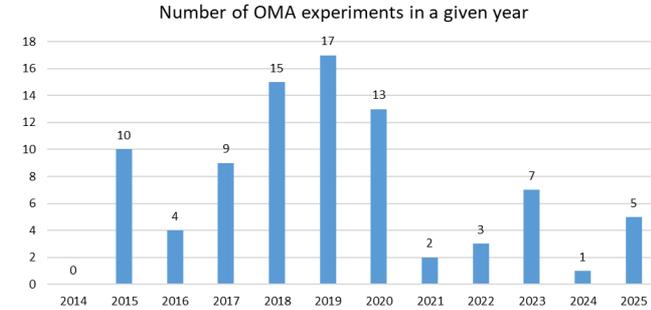
Virtualization of bridge inspection processes

- The heaviest vehicle **~500 tons**
- Biggest vehicle **73 x 9 x 4 m**
- **740 km** of the route
- Over **400** bridge structures



Operational Modal Analysis (OMA)

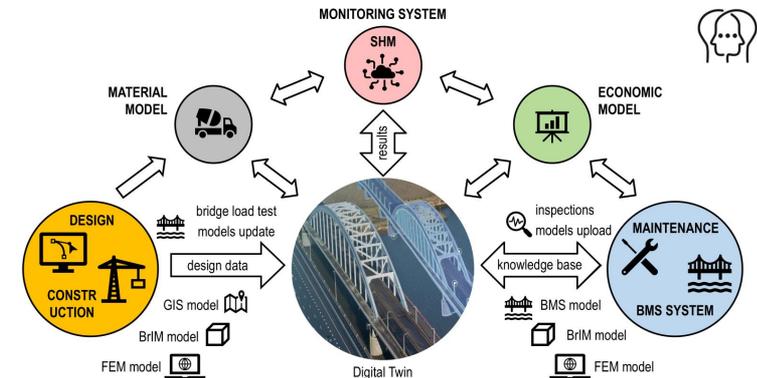
- As a valid toll in bridge testing processes
- Great supplement to expert work
 - Customers doesn't see the difference (yet)



Goals and plans for future

Goals and plans for future

- Further automation of load test results processing
 - Simplified load test report
 - Similar to an equipment calibration report
 - Load test report as a “Birth certificate” for new bridges
 - **Load test as the birth of a Digital Twin**
- Transition into virtualized asset inspections
 - Transition into maintenance support
 - Proof load testing
- Pursuing vision of Digital Twins of Bridges
 - Most of our work goes in this direction now
 - Recent PhD topics are in the field of DT and BrIM
- Stay on load testing market
 - Benefiting from generational memory
- Support abroad partners with our competences



Thank You