# DEPARTMENT OF CONCRETE STRUCTURES AND BRIDGES

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## I. STAFF

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# II. EQUIPMENT

## II.1 Teaching and Research Laboratories

The Department has a separate laboratory facility located in the Trnávka - UNI research complex. We are able to test specimens made from

- concrete (reinforced, prestressed), mortar
- steel
- wood
- brick

The laboratory is accredited for testing basic concrete mechanical properties. The maximum size of the samples or structures for testing is up to 12 m in length and 4 m in height.

## II.2 Special Measuring Instruments and Computers

The Department has a computer centre equipped with personal computers, a scanner and a LAN INTERNET connection. The teaching process is supported by state-of-the-art CAD-FEM systems.

The laboratory facility has:

- compression - testing machines with a loading capacity from 1.0 N to 6,000 kN,
- tension - testing machines with a loading capacity from 1.0 N to 500 kN,
- a reinforced testing slab with anchorage holes (one hole has a 500 kN loading capacity, and the distance between the holes is 750 mm),
- a hydraulic loading system with hydraulic jacks (250 kN – 2,000 kN; the working pressure is 20 MPa),
- a stress gauge measuring PC centre with 64 channels with 4 wire connections,
- a universal measuring PC centre with 100 channels for stress gauges and 20 channels for displacement sensors.

# III. TEACHING

## III.1 Graduate Study

Obligatory subjects

| Subject | Semester | Hours Per Week Lectures | Seminars | Lecturer |
|---|---|---|---|---|
| Concrete and Masonry Members | 4 | 2 | 2 | Ľ. Fillo |
| Reinforced and Prestressed Concrete Members | 5 | 3 | 2 | Ľ. Fillo |
| Reinforced Concrete Structural Members | 5 | 3 | 3 | J. Halvoník, Š.Gramblička |
| Reinforced Concrete Structural Systems | 6 | 3 | 3 | I. Harvan, M. Čabrák |
| Concrete Structures I | 6 | 3 | 2 | I. Hudoba |
| Concrete Structures | 6 | 3 | 2 | J. Bilčík |
| Concrete Structures II | 7 | 2 | 2 | I. Hudoba |
| Prestressed Concrete | 7 | 2 | 2 | I. Harvan |
| Concrete Bridges | 8 | 4 | 1 | Ľ. Bolha |

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| High-Rise and Long-Span Concrete Structures | 9 | 2 - 2 | I. Abrahoim |
| Lifespan and Repair of Concrete Structures | 10 | 2 - 2 | J. Bilčík |
| High-Rise Concrete Structures | 10 | 2 - 2 | Š. Gramblička |
| Execution of Concrete Structures | 10 | 2 - 2 | I. Hudoba, M. Chandoga |
| Special Problems in Concrete Structures II | 10 | 2 - 1 | I. Harvan |
| World Language – English: CAD–FEM Computer – Aided Design of Concrete and Steel Structures | 7 | 2 | J. Šoltész |
| Reinforced Concrete Structures | 8 | 1 - 1 | J. Šoltész |

Optional Subjects

| Subject | Semester | Hours Per Week | | Lecturer |
|---|---|---|---|---|
| | | Lectures | Seminars | |
| Structural Analysis of Reconstructed/Retrofitted Structures | 10 | 2 | 1 | J. Šoltész |
| Precast Concrete Structures | 7 | 2 | 1 | M. Čabrák |
| Masonry Structures | 10 | 2 | 2 | M. Čabrák |
| Time-Dependent (Rheological) Effects of Concrete Structures | 9 | 2 | 2 | Ľ. Bolha |
| Concrete Bridges II | 9 | 2 | 2 | Ľ. Bolha |
| PC Structural Analysis – FEM Models | 1 | 4 | | A. Bartók |
| Special Concrete Structures | 9 | 2 | 2 | F. Hájek, M. Chandoga |
| Flat Plate Slabs | 9 | 2 | 2 | F. Hájek |
| Experimental Testing of Concrete Structures | 10 | 2 | 2 | V. Priechodský |
| Composite Structures | 8 | 2 | 2 | Š. Gramblička J. Halvoník |

Recommended subjects

| Subject | Semester | Hours Per Week | | Lecturer |
|---|---|---|---|---|
| | | Lectures | Seminars | |
| Composite Structures | 9 | 2 | 2 | Š. Gramblička |
| CAD–FEM Computer – Aided Design of Concrete and Steel Structures | 9 | 1 | 2 | J. Šoltész |

# IV. RESEARCH TARGETS

The research activities of the Department are focused on new design methods for reinforced, prestressed and composite structures, methods of repair and strengthening of building structures and bridges and utilisation of high-performance and fibre concrete for concrete structures and precast elements.

# V. RESEARCH PROJECTS

1. Non-Linear Behaviour of Structures Made from Reinforced and Prestressed Concrete and Composite Steel and Concrete Structures (2005-2007). Head of the Project: Ľ. Fillo

2. Analysis of Design Models and Effect of Stochastic Phenomena for Setting of Nationally Determined Parameters (2005-2007). Head of the Project: Ľ. Fillo
3. Enhancement of Effectiveness and Reliability of Prefabricated Concrete Members (2005-2007). Head of the Project: J. Bilčík
4. Revitalisation of Prefabricated Residential Buildings (2005-2007). Head of the Project: Ľ. Fillo
5. An Enhancement of the Competitiveness of Labour in the Construction Industry in the European Labour Market (2005-2006). Head of the Project: J. Bilčík
6. Design of Concrete Structures for Durability (2006-2008). VEGA Project, Head of the Project: J.Bilčík
7. Reconstruction of Precast Concrete Buildings (2005-2007). Head of the Project: Ľ. Fillo
8. Structural and Transportational Engineering in English. Common University Study Program. Curriculum (2006-2008). Head of the Project: Ľ. Fillo (in English)

# VI. COOPERATION

## VI.1 Cooperation in Slovakia

1. Bohunice Cooling Towers
2. VUIS - Bridges
3. ZIPP Bratislava
4. SSC Bratislava
5. Slovak Chamber of Civil Engineers
6. Doprastav Bratislava
7. Slovak Academy of Science
8. Dopravoprojekt Bratislava
9. VUJE Trnava
10. VUEZ Levice
11. Nuclear Regulatory Authority of the Slovak Republic
12. Slovak Electric Power Company
13. Holcim Slovakia
14. Slovak National Committee *fib*

## VI.2 International Cooperation

1. CEN TC 250 – SC2 Eurocodes – Design of Concrete Structures – Representative of Slovakia – Ľ. Fillo
2. *fib* – TG1.1 Design Applications – Task group member – Ľ. Fillo
3. Technical Counsil *fib* in Lausanne, Switzerland – member – M. Chandoga
4. Technical Committee *fib* – Task group 9: Reinforcing Materials and Systems – member – M. Chandoga
5. CEN TC 250-SC2 Concrete Structures – Ľ. Fillo, representing SK
6. Klokner Institute ČVUT Prague, Czech Republic
7. Faculty of Civil Engineering, VUT Brno, Czech Republic
8. ETH - Laboratory for Building Materials, ETH Zürich, Switzerland
9. Institut für Baustatik und Konstruktion, ETH Zürich, Switzerland
10. Baustoffinstitut, TU Munich, Germany
11. Institut für Massivbau und Baustofftechnologie, University of Leipzig, Germany

12. Katedra Budowy Mostow Politechniki Slaskiej, Gliwice, Poland
13. Department of Civil and Materials Engineering, University of Illinois at Chicago, USA
14. RIB Bausoftware, Stuttgart, Germany
15. Betosan, s.r.o., Prague, Czech Republic
16. Seidl & Partners, G.m.b.H., Regensburg, Germany
17. European Commission, DG Research, Brussels, Belgium
18. Imperial College for Science, Technology and Medicine, London, U.K.
19. St. Paul University, Brussels, Belgium
20. Fachhochschule Braunschweig – Wolfenbütel, Germany
21. Institut für Massivbau, TU Darmstadt, Germany
22. Fachhochschule Coburg, Germany

### VI.2.1 Visitors to the Department

### VI.2.2 Visits of Staff Members and Postgraduate Students to Foreign Institutions

1. ŠOLTÉSZ, J.: Berufsakademie Sachsen Staatliche Studienakademie Glauchau, Kopernikusstraße 51, D-08371 Glauchau, Visiting the new Experimental Laboratories of the Institution, Software installation, 10.8. 2006 – 14.8. 2006
2. FILLO, Ľ.: Meeting *fib* /TG1.1 – Naples 4.6.2006.
3. FILLO, Ľ.: 23. Meeting of CEN/TC 250/SC2 – Brussels, 6.11. 2006.
4. FILLO, Ľ.: 2. *fib* Congress – Naples, 5.-8.6.2006.

## VII. THESES

### VII.1 Graduate Theses

| No. | Student's name | Title | Supervisor |
|---|---|---|---|
| 1. | Brliť M. | Bridge Constructed by Cantilever Balanced Method with EDK-Tendons in Považská Bystrica | J. Halvoník |
| 2. | Hriň Š. | Monolithic Bridge Made from High Performance Concrete | Ľ. Bolha |
| 3. | Chlebana D. | Design of a Footbridge for Pedestrians and Bicyclists | Ľ. Fillo |
| 4. | Karaba V. | Považská Bystrica Extradosed Viaduct | M. Chandoga |
| 5. | Moravčík M. | Bridge Constructed by Launching Technology in Považská Bystrica | J. Halvoník |
| 6. | Paulík P. | Bridge Constructed by Launching Technology over Railway Track on the I/51 Road Trnava | J. Halvoník |
| 7. | Porubčan P. | Static Analysis of Connection of a Ventilation Tunnel with a Tunnel Tube | Ľ. Rojko |
| 8. | Prítula A. | Bridge Superstructure Made from Prestressed Precast Beam Coupled with RC Slab | Ľ. Bolha |
| 9. | Bc. Sedlák J. | Design of the 2T Section Bridge without Cross Girders over Intermediate Piers | J. Šoltész |
| 10. | Al-Heraki Hidayat | Design of a Garden Swimming Pool | F. Hájek |
| 11. | Krajčík M. | Design of a Precast Multi-Storey Garage Structure from RC | J. Bilčík |

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| 12. | Mittelman P. | Design of a Mass Tank for Liquid Natural Gas | Ľ. Fillo |
| 13. | Polakovič P. | Underground Parking Place Floor in the Production Process, Design of Roof Slab and Vertical Elements | F. Hájek |
| 14. | Remenár A. | Underground Parking Place Floor in Service Process, Design of a Roof Slab and Vertical Elements | F. Hájek |
| 15. | Sysák M. | Design of a Monolithic Multi-Storey Garage Structure from RC | J. Bilčík |
| 16. | Szöcz Š. | High-Rise Office Building | Š. Gramblička |
| 17. | Tomeček M. | Strengthening the Brick Arch of a Church | F. Hájek |
| 18. | Bedaj M. | Car Showroom – Monolithic Reinforced Structure with Bracing Cores | I. Abrahoim |
| 19. | Buček M. | Hotel Tula. Monolithic Reinforced Structure with Stiffening Core | I. Harvan |
| 20. | Cupáková L. | Bratislava City Business Center. Monolithic Reinforced Structure with Stiffening Core | I. Harvan |
| 21. | Číž M. | DIGITAL PARK Office Building | D. Ďuriš |
| 22. | Halászová K. | RC Structure of Slovak Savings Bank in Poprad | I. Harvan |
| 23. | Hlinka R. | High-Rise Apartment Building | A. Bartók |
| 24. | Kumpanová S. | Multifunctional Sectional Residential Building | M. Čabrák |
| 25. | Löricz A. | Multifunctional House EUROPA – Monolithic Reinforced Concrete Structure with Beamless Slabs and Bracing Cores | I. Abrahoim |
| 26. | Lužák M. | Office Building | A. Bartók |
| 27. | Bc. Pivarč Ján | OFFICE CAMPUS GASOMETER Building in Vienna | D. Ďuriš |
| 28. | Prokopčáková H. | "Gold Stag" Multifunctional Building | D. Ďuriš |
| 29. | Szakszon V. | Reinforced Concrete Structure of a Block of Flats | M. Čabrák |
| 30. | Žalman P. | Gallery in Čunovo | A. Bartók |

## VIII.1 Special Lectures

## VIII.2 Commercial Activities for Firms and Institutions

1. BILČÍK, J.: Static Verification and Repair of Load-Bearing Members of the Cooling Towers at ENO. October 2006
2. BILČÍK, J.: Damage to the Underground Garage of the Slovak National Bank. December 2006
3. ČABRÁK, M.: Translation of EN 1996-1-1 Design of Masonry Structures. Part 1-1: General Rules for Reinforced and Unreinforced Masonry Structures. March 2006
4. ČABRÁK, M.: Translation of EN 1996-3 Design of Masonry Structures. Part 3: Simplified Calculation Methods for Unreinforced Masonry Structures. October 2006
5. ČABRÁK, M. – SZABAD, Z.: Testing Study for Development of National Annex to European Common Standard EN 1996-1-1 Design of Masonry Structures. Part 1-1: General Rules for Reinforced and Unreinforced Masonry Structures. December 2006
6. FILLO, Ľ. et al.: Translation of EN 1992-1-2 Structural Fire Design. SUTN 2006. 91 pp.
7. FILLO, Ľ. et al.: Translation of EN 1992-3 Liquid Retaining and Containment Structures. SUTN 2006. 26 pp.
8. FILLO, Ľ. et al.: Translation of EN1996-1-2 Structural Fire Design. SUTN 2006. 89 pp.
9. HÁJEK, F. – BORZOVIČ, V.: Expert Assessment of a Destroyed Underground Parking Floor. July 2006

10. HUDOBA, I: Accelerated Durability Test of the MASTERFLOW-648-CP+ Used for Joint Compaction of Fibre - Reinforced Concrete Containers at Slovak Electricity Company. Faculty of Civil Eng., November 2006
11. ROJKO, Ľ. – BILČÍK, J.: Main Inspection of the Branisko Tunnel's Inner Lining and Concrete Pavement. Expert Report. May 2006
12. ROJKO, Ľ.: Inspection and Evaluation of Cracks in the Branisko Tunnel's Concrete Pavement. Expert Report. September 2006

# IX. PUBLICATIONS

## IX.1 Journals

[1] BELLOVÁ, M.: The Effect of Using Thin Layer Mortar Masonry. Stavba, Vol. IX, 2006, No. 9, pp. 50 - 53 (in Slovak)

[2] BILČÍK, J. – OLIVOVÁ, K.: News in the Strengthening of Concrete. Stavba, 10/2006, pp. 48 - 51 (in Slovak) .

[3] BILČÍK, J.: Bridges and Tunnels without Membrane Seals. Beton, Czech Republic /2006, pp. 54 - 57 (in Slovak)

[4] BILČÍK, J.: Watertight and High-Performance Concrete in Tunnels and Bridges. Stavebnícka ročenka 2007, pp. 73 - 76 (in Slovak)

[5] BORZOVIČ, V. – HALVONÍK, J. – FILLO, Ľ .: Experimental Research on Continuous Composite Girders. Inžinierske stavby, Vol. 54, 2006, No.1, pp. 4 - 7 (in Slovak)

[6] GRAMBLIČKA, Š. – VALACH, P.: Short-Term Tests of Composite Steel Concrete Columns with Steel HEA Members. Stavba, Czech Republic, 4/2006, pp. II - V (in Slovak)

[7] GRAMBLIČKA, Š.: Structures of High-Rise Buildings. ASB, Vol. XIII, 2006, No.10, pp. 118 - 120 (in Slovak)

[8] GRAMBLIČKA, Š. – VALACH, P.: Experimental Verification of Resistance of Composite Steel Concrete Columns. Beton TKS, Czech Republic, 5/2006, pp. 44 - 49 (in Slovak)

[9] GRAMBLIČKA, Š.: Failures of Reinforced Concrete Structures of Industrial Buildings. Stavba, Vol. IX, 2006, No.10, pp. 32 - 36 (in Slovak)

[10] HÁJEK. F.: Static Failures of Panel Buildings. Stavba 2006/10, pp. 40 - 43 (in Slovak)

[11] HARVAN, I.: Serviceability Limit States of Deflection Control According to EN 1992-1-1 with Normal Force Effect in Reinforced Concrete Members. Beton, Czech Republic, 5/2006, pp. 50 - 55 (in Slovak)

[12] HARVAN, I.: Serviceability Limit States of Crack Control According to EN 1992-1-1 with Normal Force Effect in Reinforced Concrete Members. Beton, Czech Republic, 4/2006. pp. 52 - 57 (in Slovak)

[13] HARVAN, I.: Calculation of Deflection of Reinforced Concrete Members Due to Concrete Shrinkage According to EN 1992-1-1. Projekt - Stavba, 5/2006, pp. 21-26 (in Slovak)

## IX.2 Books and Textbooks

[1] BENKO, V. – HALVONÍK, J. – HOLICKÝ, J. – MARKOVÁ, J.: Guidelines for STN EN 1990 and STN 1990/NA Standard, Slovak Standards Institute, June 2006, ISBN 80-88971-28-4 (in Slovak), Guidelines to Standard STN EN 1990 and STN 1990/NA

[2] BILČÍK, J. – FILLO, Ľ. – HALVONÍK, J.: Design According to EN 1992-1-1 Structures. Bratislava: SKSI, 2006, 179 pp. (in Slovak)

[3] FILLO, Ľ. et al.: Common European Codes for Design of Structures. Bratislava: STU, 2006, 154 pp. (in Slovak)

[4] HARVAN, I.: Reinforced Concrete Structural System Designs According to European Codes. Bratislava: STU Bratislava, 2006, 291 pp. (in Slovak)

[5] HARVAN, I.: Serviceability Limit States of Prestressed Structure Designs According to European Codes. Bratislava: STU Bratislava, 2006, 44 pp. (in Slovak)

## IX.3 Conferences

[1] ABRAHOIM, I.: Calculating the Variation of Stress Due to Creep, Shrinkage and Relaxation According to EN 1992-1-1. In: Proceedings of Concrete Days 2006 Conference, Bratislava, November 2006, pp. 251 - 258 (in Slovak)

[2] BENKO, V. – FILLO, Ľ – HALVONÍK, J.: Reliability Format of Non-Linear Analysis According to Eurocodes, Proceedings of Concrete days 2006 Conference, Hradec Králové, November 2006, pp. 275 - 281 (in Slovak)

[3] BELLOVÁ, M.: The Reduction of the Load-Bearing Capacity of Masonry Members Due to Weakening of Their Cross Sections – According to Eurocodes. In: Proceedings of the 11th Conference on Statics of Structures, Piešťany, March 2006, pp. 73 - 78 (in Slovak)

[4] BELLOVÁ, M. – FILLO, Ľ. – PORUBSKÝ, T.: Resistance Analysis of Masonry Walls. In: Proceedings of the 4th International Conference on Masonry and Composite Structures, Brno, October 2006, pp. 91 - 96 (in Slovak)

[5] BELLOVÁ, M.: Analysis of the Utilization of Masonry with Thin Layer Mortar. In: Proceedings of the 4th International Conference on Masonry and Composite Structures, Brno, October 2006, pp. 134 - 139 (in Slovak)

[6] BELLOVÁ, M.: Consideration of Reductions in Cross Sections of Masonry Members According to European Standards. In: Proceedings of the 4th International Conference on Masonry and Composite Structures, Brno, October 2006, pp. 145 - 150 (in Slovak)

[7] BELLOVÁ, M.: Analysis of the Parameters Affecting the Ultimate Bearing Capacity of Load-Carrying Masonry Walls. In: Proceedings of the 6th International Conference: Concrete Days 2006, Bratislava, November 2006, pp. 411 - 416 (in Slovak)

[8] BILČÍK, J. – ROJKO. Ľ.: Analysis and Repair of Cracks in Tunnels. In: Proceedings of the *fib* Conference on Concrete in Slovakia 2002-2006, Žilina, April 2006, pp. 357 - 362 (in Slovak)

[9] BILČÍK, J. – OLIVOVÁ, K.: Modern Methods of Strengthening Concrete. In: Proceedings of the *fib* Conference on Concrete in Slovakia 2002-2006, Žilina, April 2006, pp. 363 - 368 (in Slovak)

[10] BILČÍK, J.: Causes and Consequences of Cracks in Concrete Structures . In: Proceedings of Concrete Days 2006 Conference, Bratislava, November 2006, pp. 319 - 324 (in Slovak)

[11] BILČÍK, J.: Watertight and High-Performance Concrete in Concrete Structures. In: Proceedings of Concrete Days 2006 Conference, Bratislava, November 2006, pp. 41 - 45 (in Slovak)

[12] ČABRÁK, M.: Design of Masonry Wall Ties. In: Proceedings of Conference on Statics of Structures 2006. Piešťany, March 2006, pp. 65-72 (in Slovak)

[13] ČABRÁK, M. – SZABAD, Z.: Contribution to Design of External Masonry Load-Bearing Walls of a Building in Terms of Statics. In: Proceedings of International Conference on Masonry and Composite Structures 2006. Czech Republic, Brno, October 2006, pp. 103 - 108 (in Slovak)

[14] ČABRÁK, M.: Current Problems in the Design of Masonry Structures in the Slovak Republic. In: Proceedings of Concrete Days 2006 Conference. Bratislava, November 2006, pp. 405 - 410 (in Slovak)

[15] FILLO, Ľ. – BARTÓK, A. – HALVONÍK, J. – ROJKO, Ľ. : Punching of Prestressed and Fibre-Reinforced Concrete Slabs – Comparison of Mechanical Models and Test Results. In: Proceedings of the 2nd *fib* Congress, Naples – Italy, June 2006, pp. 262 - 263 (in English)

[16] FILLO, Ľ.: Buildings with Bracing Cores. In: Design of Concrete Structures According to EN 1992-1-1. Brno, Czech Republic, May 2006, pp. 83 - 88 (in Slovak)

[17] FILLO, Ľ. – HALVONÍK, J.: Eurocodes – Introduction – Validity. In: FIB forum. Žilina, March 2006, pp. 297 - 302 (in Slovak)

[18] FILLO, Ľ. – REPKA, B.: Resistance of Columns made from HPC. In: Proceedings of Concrete Days 2006 Conference, Bratislava, November 2006, pp. 259 - 264 (in Slovak)

[19] FILLO, Ľ – BELLOVÁ, M. – PORUBSKÝ, T.: Resistance of Masonry Walls. In: Proceedings of Concrete Days 2006 Conference, Bratislava, November 2006, pp. 265 - 270 (in Slovak)

[20] FILLO, Ľ.: Fixed Column and Inside Column of Joist Ceiling. In: Design of Concrete Structures According to EN 1992-1-1. Prague, Czech Republic, November 2006, pp. 77 - 82 (in Slovak)

[21] GRAMBLIČKA, Š. – VALACH, P.: Design of Composite Steel – Reinforced Concrete Columns. In: Proceedings of the *fib* Conference on Concrete in Slovakia 2002-2006. Žilina, April 2006, pp. 173 - 178 (in Slovak)

[22] GRAMBLIČKA, Š. – VALACH, P.: Theoretical and Experimental Analyses of the Design of Composite Steel – Reinforced Concrete Columns. In: Steel Structures and Bridges 2006, Bratislava, September 2006, pp. 151 – 156 (in Slovak)

[23] GRAMBLIČKA, Š.: Design of Composite Steel and Concrete Structures of Buildings According to EN 1994-1-1. In: Proceedings of the 11th Conference on Statics of Structures, Piešťany, March 2006, pp. 145 - 152 (in Slovak)

[24] GRAMBLIČKA, Š.: Design of Concrete Floor Slabs. In: Proceedings of the 11th Conference on Statics of Structures, Piešťany, March 2006, pp. 137 - 144 (in Slovak)

[25] GRAMBLIČKA, Š.: Concrete Structures of Buildings. In: Structures of Buildings, Žilina, June 2006, pp. 25 - 47 (in Slovak)

[26] GRAMBLIČKA, Š. – VALACH, P.: Tests of Composite Steel-Reinforced Concrete Columns. In: Proceedings of Concrete Days 2006 Conference, Bratislava, November 2006, pp. 129 - 134 (in Slovak)

[27] GRAMBLIČKA, Š. – JAROSZEWICZ, M.: Composite Slabs with Profiled Steel Sheeting, In: Concrete Days 2006, Bratislava, November 2006, pp. 139 – 144 (in Slovak)

[28] HALVONÍK, J. – BORZOVIČ, V. – FILLO, Ľ.: An Experimental Investigation of Composite Continuous Girders. In: Proceedings of the 2nd *fib* Congress, Naples – Italy, June 2006, pp. 354 - 355 (in English)

[29] HALVONÍK, J. – NAGY, L. – BORZOVIČ, V. – ŠEFČÍK, T.: Updating of Precast Beams I-96 with a Length of 24, 27, 30 and 42 m. In: Proceedings of the *fib* Conference on Concrete in Slovakia 2002-2006. Žilina, April 2006, pp. 303 - 308 (in Slovak)

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