

10th International Conference

TUNNEL SAFETY & VENTILATION

Graz, Austria

New Developments in Tunnel Safety



April 21-22, 2020

Conference

ROAD TUNNELS

RAILWAY TUNNELS

METRO TUNNELS

ALTERNATIVE PROPULSION SYSTEMS

April 20, 2020

Technical Visit

www.tunnel-graz.at

About us

Graz University of Technology *Technische Universität Graz*



As the name suggests, Graz University of Technology is located in the center of Graz, the second biggest city in Austria. With eight institutions of higher education, Graz is a real student city and is regarded as one of the cities of Europe with the highest quality of life. "Science - Passion - Technology" is the guiding principle for research and teaching in all technological and scientific disciplines at TU Graz. The internationally recognized scientific strengths are covered by five Fields of Expertise. TU Graz is dedicated to work closely with well-known scientific institutions and businesses in Austria and abroad. Successful teams of students, talented up-and-coming scientists, ambitious researchers and a lively start-up scene enjoy an inspirational environment as well as access to top-quality equipment.

Institute of Internal Combustion Engines and Thermodynamics *Institut für Verbrennungskraftmaschinen und Thermodynamik*



The Institute of Internal Combustion Engines and Thermodynamics at Graz University of Technology is dedicated to providing innovative and internationally recognized teaching and research in the interconnected system energy, engines, traffic and environment and to contributing to the solution of problems that affect the environment.

Research Area Traffic and Environment *Forschungsbereich Verkehr & Umwelt*



Focus of the Research Area Traffic and Environment is placed on ventilation, fire safety and environmental issues concerning road and rail tunnels. Activities here entail undertaking theoretical investigation, system design, onsite testing of ventilation and safety systems, and performance of fire and systems tests. An additional focus is placed on urban air quality, pollution dispersion and environmental measurement, which includes an accredited measurement laboratory for measuring particulates of the fractions PM10 and PM2.5 as well as the pollutants NO_x, NO and O₃.



Monday, April 20, 2020

09.00 Technical Visits to **Semmering Base Tunnel** or **ZaB (Zentrum am Berg)** – see page 09 for more informations

19.00
– **Get Together**

21.00 **Kunsthhaus Graz**, Lendkai 1, 8020 Graz, Austria



Tuesday, April 21, 2020

08.00 **Registration**

Hall 1 Chairman **Peter Sturm** | TU Graz, IVT, AT

09.00 **Welcome and Opening**

H. Eichlseder | TU Graz, Head of IVT, AT

H. Kainz | TU Graz, Rector, AT

F. Zotter | PIARC Austria, AT

09.30 **On the contribution to tunnel safety of 9 TUG conferences – the journey so far**

P. Sturm | TU Graz, IVT, AT

09.55 **Road tunnel safety - challenges for a highway operator**

A. Fromm | ASFINAG Bau Management GmbH, AT

10.20 **Railways for future**

R. Heissenberger | ÖBB Infrastruktur AG, AT

10.45 **Coffee Break at Trade Show**

Hall 1 Chairman **Rune Brandt** | HBI HAERTER AG, CH

11.30 **PIARC's road tunnel committee: Past and future activities**

I. Kaudinya | Federal Highway Research Institute (BAST),
Chairman of PIARC TC 4.4 Tunnels, DE

11.50 **The renaissance of truth in risk based decision making**

A. Dix | Barrister & Scientist Life Property Environment, AU

12.10 **Tunnel performance test**

G. Rattei | ASFINAG Service GmbH, AT

12.30 **Lunch**

Tuesday, April 21, 2020

Parallel

Hall 1 Chairman **Bernhard Kohl** | ILF Consulting Engineers Austria GmbH, AT

14.00 Assessment of the effectiveness of different safety measures at tunnel lay-bys and tunnel-portals to protect passenger car occupants in collisions
 E. Tomasch, S. Heindl, G. Gstrein, H. Steffan | TU Graz, Vehicle Safety Institute, AT

14.20 Fire and dangerous goods accidents characteristics of road tunnels in China
 H. Ding, F. Ma, Y. Xia, H. Liao | China Merchants Chongqing Transportation Research and Design Institute Co., Ltd., CN

14.40 Evacuation locus in a full-scale tunnel experiment
 M. Seike | Toyama Prefectural University, JP
 N. Kawabata | Komatsu University, JP
 M. Hasegawa | Kanazawa University, JP

15.00 Permissibility of dangerous goods traffic through an urban train tunnel in Belgrade – A risk Study
 S. Rosić | JSC Serbian Railways, RS
 B. Bošković | University of Belgrade, RS
 F. Diernhofer, O. Heger, R. Schmidt | ILF Consulting Engineers Austria GmbH, AT

15.20 Coffee Break at Trade Show

Hall 1 Chairman **Conrad Stacey** | Stacey&Agnew, AU

16.00 Development of a coupled risk model for the assessment of the life safety level of road tunnels in Belgium
 M. Pachera, K. Kamalisesht, X. Deckers |
 Fire Engineered Solutions Ghent bvba (FESG), BE

16.20 Evaluation of the performances of a new model for tunnel risk analysis
 F. Borghetti, M. Derudi | Politecnico di Milano, IT

16.40 TRUCK Platooning – A quantitative assessment of the potential consequences on tunnel safety
 O. Heger, R. Schmidt | ILF Consulting Engineers Austria GmbH, AT
 G. Rattei, B. Hintermayer | ASFINAG Service GmbH, AT

17.00 Behavior-Based Safety (BBS) as a novel aspect of the safety risk assessment at a tunnel construction site
 R. Hojo, S. Shimizu | National Institute of Occupational Safety and Health, JP

17.20 Application of in-house risk assessment tool on the analysis of a tunnel in the new Gronda di Genova highway
 M. Fronterre, R. Scozzari | CANTENE s.r.l., IT

19.30 Conference Dinner Sponsored by the Governor of Styria, Hermann Schützenhöfer

Hall 2 Chairman **Frederic Waymel** | Egis Tunnels, FR

14.00 On the air-flow resistance of tunnel fires in longitudinal ventilation – the “throttling effect”

I. Riess | Riess Ingenieur-GmbH, CH

D. Weber, M. Steck | Amstein + Walthert Progress AG, CH

14.20 Multi-parameter study of interactions and uncertainties within CFD-based consequence analysis using the elementary effects analysis

H. Wahl, G. Vollmann, M. Thewes | Ruhr-University Bochum, DE

14.40 Avoiding micro-pressure waves without building tunnel hoods

F. Liu | Taiyuan University of Technology, CN

D. Pokrajac | University of Aberdeen, UK

A.E Vardy | University of Dundee and Dundee Tunnel Research, UK

15.00 Aspects of longitudinal air flow control in road tunnels

S. Frey, M. Lempp, C. Zimmermann | HBI Haerter AG, CH

15.20 Coffee Break at Trade Show

Hall 2 Chairman **Alan Vardy** | University of Dundee and Dundee Tunnel Research, UK

16.00 Feasibility study to the implementation of zero flow tunnel ventilation in the Schiphol Kaagbaan tunnel

H. Beljaars | Royal Haskoning DHV, NL

16.20 Variable blade fans evolution-proofing the underground works

F. Duet, E. Beraud | Eiffage Énergie Systèmes, FR

L.J. Diaz Valdes | Zitron S.A., NL

16.40 Justification of rational ventilation diagram of railway submarine tunnel in the rigorous climate

S.G. Gendler | Saint-Petersburg Mining University, RU

V.G. Lozin | Ltd. responsibility society design and exploration institute

„Bamtunnelproject“, RU

YE.A Savenkov | Open joint – stock company „LenMetroGiproTrans“, RU

17.00 Dust-loads in ÖBB railway tunnels – results from in-situ measurements and consequences for tunnel facilities and railway operation

H. Steiner | ÖBB Infrastruktur AG, AT

P. Sturm, D. Fruhwirt | TU Graz, IVT, AT

17.20 Examining tunnel ventilation in a point extract-supply tunnel

N. Harvey, K. Zhang, K. Khattab, C. Malinowski | Mott MacDonald, New York City, US

and the Mayor of Graz, Mag. Siegfried Nagl

Wednesday, April 22, 2020

Parallel

Hall 1 Chairman **Sonja Wiesholzer** | Austrian Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology (BMK), AT

09.00 A self-sufficient cyber physical mobility concept for road tunnels
A.G. Stein | Ponts et Chaussées Luxembourg (National Road Administration), LU

09.20 Safety and security strategies for subsurface structures
P. Hofer | Austrian Joint Forces Command / Graz, AT
R. Laabmayr | IL-Ingenieurbüro Laabmayr&Partner ZT GmbH, AT

09.40 Improving the resilience of road tunnels under the perspective of tunnel safety
S. Nisancioglu | Federal Highway Research Institute, DE
H. Kammerer | ILF Consulting Engineers Austria GmbH, AT

10.00 The path to highly available, sustainable and efficient operation of road tunnels
R. List | ASFINAG, AT

10.20 Coffee Break at Trade Show

Hall 1 Chairman **Ignacia del Rey** | TYPESA, ES

11.05 Electric vehicle fires and contaminations in underground infrastructures – preliminary findings
L. D. Mellert, U. Welte | Amstein + Walthert Progress AG, CH
M. Hermann, M. Kompatscher | Versuchsstollen Hagerbach AG, CH
M. Tuchschnid, M. Held |
Eidgenössische Materialprüfungs- und Forschungsanstalt, CH
L. Nacheff | Centre d'études des tunnels, FR

11.25 Learning from 10 years of Li-Ion battery fire tests
B. Truchot, G. Marlair, A. Lecocq | INERIS, FR

11.45 Safety aspects related to Fuel Cell BEVs
A. Trattner | TU Graz, HyCentA, AT
Full scale fire tests of Battery Electric Vehicles - first results
P. Fößleitner *et.al.* | TU Graz, IVT, AT
Challenges in handling incidents with Battery Electric Vehicles
S. Krausbar | Österreichischer Bundesfeuerwehrverband, AT

12.25 Lunch

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session

Wednesday, April 22, 2020

Hall 2 Chairman **Günter Rattei** | ASFINAG, AT

09.00 Life cycle management for tunnel equipment – the boring part of engineering?
 A. Wierer | crypta.sec engineering e.U., AT
 M. Außerlechner | Amt der Tiroler Landesregierung, AT

09.20 Road tunnel temperature monitoring system using a simulation model
 T. Sakaguchi, T. Matsumoto, K. Yamamoto, M. Takegaki |
 Sohatsu Systems Laboratory Inc., JP

09.40 Detecting incidents within traffic flow in tunnels by vehicle and infrastructural based data
 P. Böhnke | ave Verkehrs- und Informationstechnik GmbH, DE

10.00 Condition monitoring in road tunnels
 C. Kuhn | SICK AG, DE

10.20 Coffee Break at Trade Show

Hall 2 Chairman **H. Steiner** | ÖBB Infrastruktur AG, AT

11.05 Tunnel sensors 4.0: networked tunnel sensors fit for the future
 R. Jung | JES Elektrotechnik GmbH, AT

11.25 Measurement of road tunnel air quality - prEN 50545-2
 F. Tarada, B. Vidal, C. Edge, C. Seewald, T. Halbach, R. Hallam | Mosen Ltd., UK

11.45 Utilising barometric pressure differences to optimise tunnel ventilation system design
 J. Shim, D. Feest, R. Jones, M. Gilbey | WSP UK Ltd, UK

12.05 Preventing disasters: On-site frequency analysis of jet fans
 V. Carstens | Consultant Aerodynamics, Thermodynamics, DE
 P. Pospisil | IP Engineering GmbH, CH

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Wednesday, April 22, 2020

Hall 1 Chairman **Norris Harvey** | Mott MacDonald, US

13.35 Refurbishment of the emergency ventilation system including Saccardo nozzles in the North-South Railway junction of Brussels

F. Waymel, L. Rabeh | Egis Tunnels, FR

E. Beraud, L. Rathat | Eiffage Energie Systèmes, FR

13.55 The value of BIM in MEP systems coordination. Designing the TVS in Doha Metro Project

C. Andrés Sierra, C. López Fanjúl | ZITRON, S.A., ES

14.15 The complexity to design the ventilation system in long railway tunnels where large height variations occur

J. M. Sanz-Sacristán, G. Peris-Sayol, C. Gago-Fernández |

SENER Ingeniería y Construcción, ES

14.35 Coffee Break at Trade Show

Hall 1 Chairman **Arnold Dix** | Barrister-at-Law, AU

15.15 Smoke propagation in tunnels – Comparison of in-situ measurements, simulations and literature

D. Fruhwirt, P. Sturm | TU Graz, IVT, AT

15.40 Critical of critical velocity – an industry practitioner's perspective

C. Stacey, M. Beyer | Stacey&Agnew, AU

16.05 Fire life safety in road tunnels – Problem solved?

G. Hofer, M. Eisenlohr | Swiss Federal Roads Office (FEDRO), CH

F. Zumsteg, U. Steinemann | US+FZ Consulting Engineers, CH

16.30 Closing remarks

P. Sturm | TU Graz, IVT, AT

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Poster presentations

CFD analysis on fire properties of expressway longitudinal slope V-shaped tunnels

T. Nakayama, M. Yokota, K. Yamazaki, T. Ota |
Central Nippon Highway Engineering Tokyo Company Limited
N. Kawabata | Komatsu University, JP

The topic shall be jet fan simulation and advances in CFD simulation

N. Nayan | Parsons, US

Increase of extraction flow rate using CFD to optimize ventilation system design – verified using flow measurements

R. Gertl, M. Schöll, A. Fankhauser | ILF Consulting Engineers Austria GmbH, AT

System safety for road tunnel operations on resilience new concept

H. Ding, J. Chen, K. Li, S. Liu | National Engineering Laboratory for Highway Tunnel Construction Technology, CN + China Merchants Chongqing Communications Technology Research & Design Institute Co., Ltd, CN
Y. Xia | China Merchants Chongqing Communications Technology Research & Design Institute Co., Ltd, CN

Analysis of ventilation systems for road tunnels in Poland

M. Borowski, K. Zwolińska | AGH University of Science and Technology, PL

Risk analysis for road tunnel in Polish conditions

M. Różycki | m/d/r/k Trusted Advisers Group sp z o.o., PL
M. Borowski | AGH University of Science and Technology, PL

Some consideration of numerical modeling of airflow in road tunnels

A. Król, M. Król | Silesian University of Technology, PL

The jet-flow fan: a hybrid system for tunnel ventilation

B. Houseaux, E. Beraud | Eiffage Énergie Systèmes, FR
E. Casalé | FluidAlp, FR

Enhancements of tunnel ventilation system using semi-transverse strategy in road tunnels

L.L. Chan, Kelvin KW Cheung | AECOM Asia Company Ltd., HK

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Monday, April 20, 2020

Technical

This year you have the possibility to **choose between two different Technical Visits**.

Costs for participation in the Technical Visit: **€150,-** (fee includes bus transfer and snacks).

Note: Because these two locations are construction sites, visitors are asked to bring along - if available - their PPE (personal protection equipment) with them. A limited amount of PPE will be available.

Attention: Restricted participation!

Schedule

09.00 Departure at Messecongress Graz

17.30 – 18.00 expected arrival at Graz

Visit of Semmering Base Tunnel

The Semmering Base Tunnel is one of the most important infrastructure projects in the heart of Europe. As part of the new Southern Line, the 27 km long Semmering Base Tunnel creates a fast and safe connection between Vienna and Graz. The technical visit allows a very close look to a huge underground construction site with various parts of underground construction facilities like tunnel boring machine, explosive propulsion, ventilation etc. We will reach these facilities via a 400m deep ventilation shaft at Fröschnitzgraben. Construction started in 2014 at this access shaft south of Steinhaus am Semmering. The tunnel driving is taking place there in two directions.



Visit

Monday, April 20, 2020

Visit of research centre ZaB (Zentrum am Berg)

The ZaB (Zentrum am Berg) is an Austrian centre for research, development and testing, with special focus on tunnel safety during excavation and operation. The technical visit starts with a presentation of the tunnel-system and current research activities. Since ZaB now is in its commissioning phase, visitors have the possibility to see the full ventilation installation, which includes jet-fans, axial fans, smoke extraction dampers and cross-passage ventilation. After lunch, visitors are welcome to be an active part at a training-session of the fire brigade Linz and at an evacuation drill/simulation under limited visibility conditions. The final showdown will be a fire-test of the fire brigade Linz.



General Information

Venue

Messecongress Graz, Messeplatz 1, 8010 Graz, Austria, www.mcg.at/de/messecongress

Date

April 21 – 22, 2020 / Conference
April 20, 2020 / Technical Visit

Conference Language

English + German simultaneous translation

Conference Proceedings

Volume of papers + USB storage device (English)

Scientific Director

Ao.Univ.-Prof. Dr. Peter STURM

TU Graz, Institute of Internal Combustion Engines and Thermodynamics

Organizing Committee

Dr. Michael BACHER

TU Graz, Institute of Internal Combustion Engines and Thermodynamics

Dr. Johannes RODLER

Forschungsgesellschaft für Verbrennungskraftmaschinen und Thermodynamik

Scientific Committee

Rune Brandt | HBI HAERTER AG, CH

Ignacio Del Rey | TYPESA, ES

Arnold Dix | Barrister-at-Law, AU

Norris Harvey | Mott MacDonald, US

Günter Hofer | Swiss Federal Roads Office (FEDRO), CH

Haukur Ingason | RISE and Lund University, SE

Bernhard Kohl | ILF Consulting Engineers Austria GmbH, AT

Günter Rattei | ASFINAG, AT

Conrad Stacey | Stacey&Agnew, AU

Alan Vardy | University of Dundee and Dundee Tunnel Research, UK

Sonja Wiesholzer | Austrian Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology (BMK), AT

Friedrich Zotter | PIARC Austria

Franz Zumsteg | US+FZ Consulting Engineers, CH

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Costs & Payment

Conference Fee

Value Added Tax VAT will not be charged. The presenting author of a paper will get a reduction of 25%. The fee includes proceedings, coffee and lunches during the conference, reception and conference dinner. For registration **after 1st April, 2020** an extra fee of € 50,- will be charged.

€ 960,-

Costs for the Participation in the Technical Visit

fee includes bus transfer and snacks

€ 150,-

Payment

Bank: "Bank Austria" in Graz

IBAN: AT35 1200 0516 5610 1832

SWIFT: BKAUATWW

Account name: "Tunnel Safety and Ventilation 2020"

Please note that bank transfers must be made net of bank charges and commission.

To avoid any confusion, participants are requested to indicate their names and addresses clearly on transfer orders.

Online-Registration

www.tunnel-graz.at

Credit card

Master-, Euro- and Visa card are accepted.

Cancellation

For cancellation (in written form!) before April 10, 2020 a handling fee of **€ 50,-** will be charged. No refunds will be made after this date.

Organisation

Mrs. Sabine MINARIK

Graz University of Technology,

Institute of Internal Combustion Engines and Thermodynamics

Inffeldgasse 25C / IV

8010 Graz

Austria

Fax.: +43 316 873 10 30231

Tel.: +43 316 873 30231

Mail: Minarik@ivt.tugraz.at

Accommodation

A limited number of rooms have been reserved for the "Tunnel Safety and Ventilation" conference. Indicate the conference to get the reduced prices when reserving your hotel accommodation.

- Best Western Plus Plaza Hotel Graz www.plazahotels.de
- RoomZ Graz www.roomz-hotels.com
- Star Inn Hotel Graz www.starinnhotels.com
- Hotel Wiesler www.hotelwiesler.com
- Hotel Weitzer www.hotelweitzer.com
- Hotel Daniel www.hoteldaniel.com

Exhibition

The conference exhibition offers a chance to meet experts and to learn about projects, new products and innovations on a very high level. With more than 1000 m² of exhibition space, located door to door to the conference rooms, an optimal forum for business contacts can be guaranteed.

Exhibition space is already fully booked!



Exhibition



This was 2018 ...

status: 2020-02-12



This event is
organized by:



Institute of Internal Combustion
Engines and Thermodynamics



Graz University of Technology

In cooperation
with:



Austrian National Committee of
the World Road Association



Österreichische
Forschungsgesellschaft
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