



September 11th – 13th, 2019



University of Padova, Padova, Italy



ISAP 2019 APE Symposium

5th International Symposium on Asphalt Pavements & Environment (APE)

Final Program

September 11th – 13th, 2019, Padova, Italy



UNDER THE AUSPICES OF



UNIVERSITÀ
DEGLI STUDI
DI PADOVA

DEPARTMENT OF
CIVIL, ENVIRONMENTAL AND
ARCHITECTURAL ENGINEERING **ICEA**



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ASSOCIAZIONE ITALIANA
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European Asphalt Technology
Association

September 11th – 13th, 2019, Padova, Italy



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WELCOME

Preface

International Society for Asphalt Pavements (ISAP) is a volunteer organization of practitioners and experts, academics and industry, set up to share the latest in leading edge asphalt pavement technology worldwide. The Society's distinctly global and inclusive approach is reflected by its international membership, representing all stakeholders in the asphalt industry—users, producers, professionals as well as individuals and organizations. ISAP is one of the most prestigious international associations established to promote asphalt pavement technologies.

The Society developed from a series of widely recognized international technical conferences, starting at the University of Michigan, Ann Arbor, in 1962; since then, the conferences, periodically organized by ISAP, cover a wide spectrum of the current practical topics and research activities on asphalt pavements. ISAP focuses on improving and presenting engineering concepts in pavement design, construction, maintenance under the aspect of key issues, such as environmental protection, socio-economic impacts and political concerns. In order to support some of these interests, in 2008 ISAP took the initiative to organize a Symposium on Asphalt Pavements and Environment—APE (Zurich, Switzerland). This initiative has been repeated, due to the success of the conference. So, the APE Symposium was organized again in Fortaleza, Brazil (2012); Sun City, South Africa (2015); Tokyo, Japan (2017).

The fifth symposium is held for the first time in Italy, in Padova, from 11 to 13 September 2019, hosted by ISAP and *Università degli Studi di Padova* (University of Padova).

The 2019 Symposium provides an excellent chance to share and disseminate research concerning materials and technologies for asphalt pavements, conceived with the purposes of sustainability and environmental compatibility. The main topics addressed are:

- Sustainable pavement materials
- Marginal materials for asphalt pavements
- Pavement structures
- Test methods and performance
- Hot, warm or cold recycling
- Maintenance and management methods
- Environmentally friendly technologies
- Urban heat island mitigation
- Energy harvesting
- Lifecycle assessment

Some of these topics have become increasingly essential in recent years (e.g. energy harvesting, UHI mitigation, LCA, CO₂ reduction); ISAP has a leading role in enhancing the diffusion of research activities and application techniques suitable for their awareness.

The 5th International ISAP-APE Conference has an important function for this purpose. Forty-eight papers with more than 150 authors, from 20 countries on four continents, have been accepted for publication, after rigorous peer review. They are assigned to the following chapters:

1. Sustainable pavements and environmentally friendly technologies
2. Future trends in asphalt pavements
3. Marginal materials for asphalt pavements
4. Hot, warm and cold recycling
5. Test methods and performance
6. Pavement structures, maintenance and management

This book aims at presenting the most original and innovative ideas concerning the environment-related achievements in asphalt pavements study and development, in the hope of giving industry, academia and practitioners valid stimuli for better growth of research and sustainable application of asphalt pavements all over the world. The editors would like to thank all the authors and reviewers from the international scientific committee, for their valuable efforts in producing the highest quality papers for this conference. Many thanks to lecturers and chairmen for their contribution during the symposium. A sincere grateful acknowledgement of the unstinting cooperation of Emiliano Pasquini, Giovanni Giacomello and Andrea Baliello in the organization of the event. Finally, heartfelt thanks to all the supporters who have contributed to the success of the conference.

Prof. Marco Pasetto



Prof. Manfred N. Partl



Prof. Gabriele Tebaldi



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2019 Padova ITALY

September 11th – 13th, 2019, Padova, Italy



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Department of Civil, Environmental and Architectural Engineering (ICEA)
via Marzolo 9, 35131, Padova, Italy
isap2019@dicea.unipd.it

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2019 Padova ITALY

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5TH APE SYMPOSIUM



2019 Padova ITALY

KEYNOTE LECTURE



John T. Harvey

Professor of Civil and Environmental Engineering

University of California (UC), Davis

Davis, CA, USA

Keynote title: "Assessment of asphalt rubber and other strategies for improved sustainability of asphalt pavement"

Short bio

John Harvey is Professor of Civil and Environmental Engineering at the University of California, Davis (UC Davis), Director of the UC Pavement Research Center (UCPRC, UC Davis and Berkeley), and Director of the newly created City and County Pavement Improvement Center (CCPIC, a consortium of cities, counties, UC and California State University). He is Principal Investigator for projects for research, development and implementation for a wide range of pavement technology, pavement management, cost and environmental topics for the California Department of Transportation (Caltrans), FHWA, FAA, CalRecycle, the California Air Resources Board, the Transportation Research Board, other state DOTs and industry. He is a professional civil engineer in California.

KEYNOTE LECTURE



Athanasios Nikolaidis

**Professor of Civil Engineering and
Pavement Engineering**

Aristotle University of Thessaloniki

Thessaloniki, Greece

Keynote title: "**Sustainable flexible pavements**"

Short bio

Prof. Dr. Civil Engineer, teaching the subjects of Pavement engineering, Materials testing, and Airport engineering; Consultant, specialized in: Highway-Pavement engineering, Pavement materials and testing, International specifications (American, European and Australian), and Airport engineering. He worked in Europe and Asia as Project manager, Technical advisor, Pavement and material Specialist, and as Consultant, Pavement Expert; Member of International Institutions; Published 81 papers in Scientific Journals and International Conferences; Presented papers/lectures in 36 seminars in various countries; Carried out more than 100 Consultancy works and studies in Highway-pavement engineering and Airports; Participated in 13 research projects, in 9 of which was the Team leader; Supervised eleven (11) PhD students; External examiner in five (5)

KEYNOTE LECTURE

PhD abroad and in nine (9) PhD in Greece; Supervised more than 90 final year projects; Founder and President of the International Conference 'Bituminous Mixtures and Pavements' (ICONFBMP) in 1992, 1996, 2002, 2007, 2011, 2015 and 2019; Member of Scientific/Technical Committees of International Conferences and Editorial Advisory Panel of ICE (UK) Journal 'Construction Materials'; Author of four books: a) "Highway Engineering: Pavements, Materials and Control of Quality, 2015 (in English), b) Highway Engineering: Pavements, Materials, Control of Quality and Evaluation, 4th edition, 2019 (in Greek), c) Flexible pavements: Pavement design methodology, Bituminous mixtures, Wearing courses, 2nd edition 2018 (in Greek) and d) 'Airports: Design and Construction', 2nd edition, 2017 (in Greek).

KEYNOTE LECTURE



Hervé Di Benedetto

Professor

President of the Steering Group of EATA

University of Lyon, ENTPE

Lyon, France

Keynote title: “Thermo-mechanical properties of Multi-recycled bituminous mixtures”

Short bio

Professor Hervé Di Benedetto received his Diploma of Civil Engineer from the “Ecole Nationale des TPE” (ENTPE, University of Lyon) and his PhD from the University of Grenoble, France.

Currently he is Professor at ENTPE, University of Lyon. He is also, since 2011, visiting Professor at the University of Quebec (ETS). He is member of “Laboratoire de Tribologie & Dynamique des Systèmes” (LTDS, UMR CNRS 5513) where he is leading the team “Geomaterials and Sustainable Constructions”.

Prof. Di Benedetto’s research activities focus on the study of mechanical, thermo-mechanical and structural behaviour of geomaterials, including experimental and modelling aspects. He is working in the fields of soil mechanics and road engineering.

KEYNOTE LECTURE

He has been the supervisor of more than 50 PhD students and of many research projects. He is the author of more than 200 publications. He is Editor-in-Chief of the International Journal “Road Materials and Pavement Design” (<http://www.tandfonline.com/loi/trmp20>).

Professor Di Benedetto is a well know expert, which is frequently invited or keynote speaker for international conferences. Among others, he delivered the 3rd Bishop Lecture of the Int. Soc. of Soil Mech. and Geotech. Eng. (ISSMGE).

He Chaired Technical Committee 101 of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) from 2009 to 2013. He was President from 2013 to 2015 of the International Society of Asphalt Pavement (ISAP) and is co-founder and present President of the Steering Group of the European Asphalt Technology Association (EATA). He was from 2009 to 2014 international representative of the Board of the Association of Asphalt Pavement Technologists (AAPT). He is a Fellow and officer member of the Technical Advisory Committee of “International union of laboratories and experts in construction materials, systems and structures” (RILEM), Convener in charge of cluster F “Bituminous Materials and Polymers”, since 2014.

KEYNOTE LECTURE



Manfred N. Partl

Professor

**Director of the Road Engineering
Sealing Components Laboratory**

KTH; Carleton University; EMPA

Dübendorf, Switzerland

Keynote title: **"Challenges in developing sustainable asphalt pavements"**

Short bio

Prof. Dr. Manfred N. Partl, born 19.11.1953, in Vienna (AT), is civil engineer with doctoral degree 1983 from ETHZ Swiss Federal Inst. of Technology in Zurich. He is Director of the Road Engineering/Sealing Components Laboratory at EMPA Swiss Federal Laboratories for Materials Science and Technology (Switzerland) since 1990 and affiliated with KTH Royal Institute of Technology in Stockholm and with Carleton University, Ottawa. He is also at ETHZ Swiss Federal Institute of Technology in Zurich since many years. During his professional career in private industry and academia, he has worked on wood, polymers, fiber cement and bituminous materials. His special interest focuses on mechanical and physical properties of bituminous materials and systems with respect to innovative sustainable development and multi-functionality of road pavements.



KEYNOTE LECTURE

He is former president of ISAP (International Society for Asphalt Pavements) and chair of ISAP TC APE on Asphalt Pavements and Environment. He has served RILEM (International Union of Materials and Experts in Construction Materials, Systems and Structures) for many years as TC chair and has been awarded RILEM Fellow and 2017 honorary member. From the Association of Asphalt Technologists AAPT he received award of recognition and is honorary member of SIIV (Società Italiana Infrastrutture Viarie). On the national level, he is member of the board of VSS (Swiss Association of Road and Traffic Experts) and chair of its international Science Council. He is associate editor of the Journal Materials and Structures and the International Journal of Road Materials & Pavement Design RMPD as well as member of the editorial board of International Journal of Pavement Research and Technology IJPRT.

5TH APE SYMPOSIUM



2019 Padova ITALY

VENUE



The city of Padova

Symposium will be held in Padova, beautiful historical city in Northern Italy. Padua is one of the most charming and dynamic towns in Italy. The historical center boasts a wealth of medieval, renaissance and modern architecture; here a fascinating mix of historic and new, of centuries-old traditions and metropolitan rhythms creates a unique atmosphere. The medieval palaces, churches and cobbled streets emanate a sense of history and culture, the shops, markets and locals, a sparkling vitality and vibrant modern life. Welcome to Padova, a town of vast cultural and artistic heritage.

Over three thousand years of history have left a wealth of historical buildings and places. Beautiful artifacts of the past but also contemporary creations are the results of the works of extraordinary artists of past centuries and the great passion of the Paduans for art and culture.

Attractions

The **Basilica of Sant'Antonio** is one of the main attractions in Padova. It reflects a strong Byzantine influence and is dedicated to St. Anthony, whose tomb is located in the church. Anthony was a Franciscan monk who moved through southern France and northern Italy and inspired the people with his eloquent speeches. In 1231 he died in Padua and was canonized a year later. By keeping his relics in the Basilica, the church fast became a destination for pilgrims from all over Europe, and even today tens of thousands of pilgrims come every year to Padova to the Basilica of Sant'Antonio to pray and pay homage to the Saint.

Prato della Valle is one of the biggest square in Europe (90.000 mq). The Prato della Valle was transformed into a place for markets, performances and meetings in 1775. Statues of famous persons, among which the mythical founder of Padova Antenore, are still present and perfectly conserved.





The **Palazzo della Ragione** was built in 1218 and enlarged in 1306. Until 1797 it was used as city council's assembly hall and palace of justice (hence the appellation “della Ragione”, meaning of reason). The upper floor, called il Salone, is a vast hall, one of the largest medieval halls of the world (mt. 81x27x27). It has a beautiful wooden ceiling and is decorated by an astounding cycle of frescoes depicting the astrological theories of Pietro d'Abano, a professor at La Sorbonne in Paris and later at University of Padova in the 13th century. The frescoes represent the influxes of stars on men's activities and life. The gigantic wooden horse on the western side of the hall was built in 1466 and is modelled on Donatello's Gattamelata standing on Piazza del Santo. On the eastern side there is a contemporary version of the Foucault's Pendulum.

The world's first **Botanical Garden** was created in 1545. It still preserves its original layout – a circular central plot, symbolizing the world, surrounded by a ring of water. Other elements were added later, some architectural (ornamental entrances and balustrades) and some practical (pumping installations and greenhouses). It continues to serve its original purpose as a center for scientific research.

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SYMPOSIUM LOCATIONS

Palazzo Bo

Via 8 Febbraio, n.2 - 35122, Padova - Conference room: **Aula Magna**

Palazzo Bo is the main building of the old university. The palace was built in the 15th century and has been home to the University of Padova since 1493. **Aula Magna** was in ancient times assigned to Galileo Galilei for his teaching.



Pedrocchi Café

Via 8 Febbraio, n.15 - 35122, Padova - Conference room: **Sala Rossini**

Pedrocchi Café was founded in 18th century. Its architectural prominence is due to its rooms, arranged in an eclectic ensemble by the architect Giuseppe Jappelli.

Sala Rossini is a sort of theater adorned with elements from the early 19th century.



Symposium locations

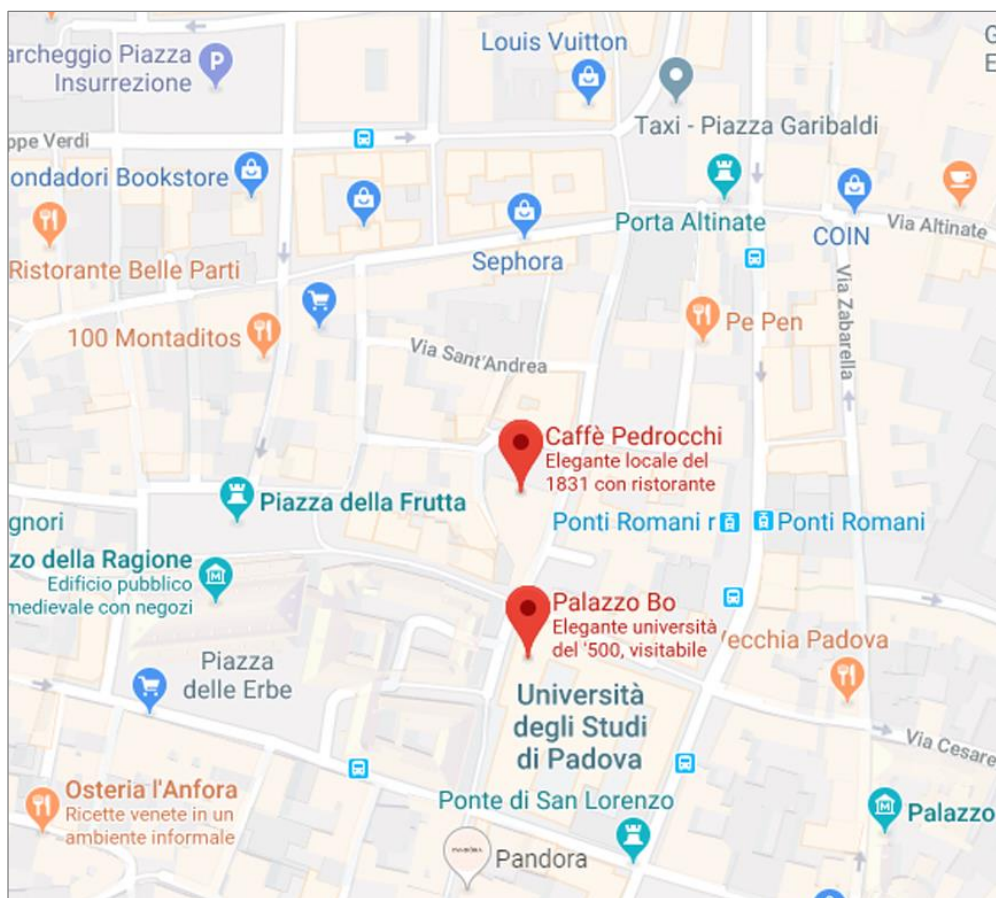
Via 8 Febbraio, 35122, Padova

nr. 2 – Palazzo Bo

<https://goo.gl/maps/dKp6bXupC7ZBGqUt6>

nr. 15 – Pedrocchi Café

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September 11th – 13th, 2019, Padova, Italy



PROGRAM

5th International Symposium on Asphalt Pavements & Environment (APE)

Wednesday - 11th September 2019

Via 8 Febbraio, n. 2 - 35122, Padova

Palazzo Bo - Aula Magna and Sala delle Colonne

12:00 – 18:00

Time	Wednesday – 11 th September	
Room	Aula Magna	Sala delle Colonne
12:00 - 12:30	Welcome and Registration	
12:30 - 13:00		
13:00 - 13:30		
13:30 - 14:00		
14:00 - 14:20	Opening session	
14:20 – 14:40		
14:40 - 15:00	Keynote lecture 1 Prof. John T. Harvey	
15:00 - 15:20		
15:20 - 15:40	Keynote lecture 2 Prof. Athanasios Nikolaidis	
15:40 – 16:00		
16:00 – 16:20		Coffee break
16:20 – 16:40		
16:40 – 17:00	Keynote lecture 3 Prof. Hervé Di Benedetto	
17:00 – 17:20		
17:20 – 17:40	Keynote lecture 4 Prof. Manfred N. Partl	
17:40 – 18:00		

Thursday - 12th September 2019

Via 8 Febbraio, n. 15 - 35122, Padova

Pedrocchi Café - Sala Rossini

8:00 – 18:30

Time	Thursday – 12 th September	
8:00 - 8:30	Welcome & Registration	
8:30 - 9:00	Opening session	
9:00 - 9:30	Oral session 1 Chair: Emmanuel Chailleux	
9:30 - 10:00		
10:00 - 10:30		
10:30 - 11:00		
11:00 - 11:30	Coffee break	Poster Session
11:30 - 12:00	Oral session 2 Chair: Alan Carter	
12:00 - 12:30		
12:30 - 13:00		
13:00 - 13:30	Lunch	
13:30 - 14:00		
14:00 - 14:30	Oral session 3 Chair: Joëlle De Visscher	
14:30 - 15:00		
15:00 - 15:30		
15:30 - 16:00		
16:00 - 16:30	Coffee break	Poster Session
16:30 - 17:00	Poster presentation Chair: Marco Pasetto	
17:00 - 17:30	Oral session 4 Chair: Hervé Di Benedetto	
17:30 - 18:00		
18:00 – 18:30		
20:00 - 0:00	Gala dinner	

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Friday - 13th September 2019

Via 8 Febbraio, n.15 - 35122, Padova

Pedrocchi Café - Sala Rossini

8:30 – 13:00

Time	Friday – 13 th September	
8:00 – 8:30	Welcome & Registration	
8:30 - 9:00	Opening session	
9:00 - 9:30	Oral session 5 Chair: Christiane Raab	
9:30 - 10:00		
10:00 - 10:30		
10:30 - 11:00		
11:00 - 11:30	Coffee break	Poster session
11:30 - 12:00	Oral session 6 Chair: Gabriele Tebaldi	
12:00 - 12:30		
12:30 - 13:00		
13:00 - 13:30		
13:30 - 14:00	Closing session	
14:00 – 15:30	Lunch	

Wednesday – 11th September

First day – Palazzo Bo

Welcome and Registration (12:00 – 14:00)

Registration will take place from 12:00 to 14:00 in the 1st floor of Palazzo Bo building just in front of the Aula Magna entrance. Symposium material will be distributed during the registration.

Opening session (14:00 – 14:40)

Prof. Marco Pasetto

University of Padova, Italy

Prof. Manfred N. Partl

EMPA, Switzerland

Institutional welcome

Keynote lecture 1 (14:40 – 15:20)

Prof. John T. Harvey

UC Davis, California, USA

"Assessment of asphalt rubber and other strategies for improved sustainability of asphalt pavement"

Keynote lecture 2 (15:20 – 16:00)

Prof. Athanasios Nikolaidis

Aristotle University of Thessaloniki, Greece

"Sustainable flexible pavements"

Coffee break (16:00 – 16:40)

Coffee break will take place in the Sala delle Colonne room, adjacent the Aula magna

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Keynote lecture 3 (16:40 – 17:20)

Prof. Hervé Di Benedetto

University of Lyon, ENTPE, France

"Thermo-mechanical properties of Multi-recycled bituminous mixtures"

Keynote lecture 4 (17:20 – 18:00)

Prof. Manfred N. Partl

EMPA, Switzerland

"Challenges in developing sustainable asphalt pavements"

Thursday – 12th September
Second day – Pedrocchi Café

Welcome and Registration (8:00 – 8:30)

Opening session (8:30 – 9:00)

Marco Pasetto

University of Padova, Italy

Oral presentations: Session 1 (9:00 – 11:00)

Sustainable Pavements and Environmentally Friendly Technologies

Session chair: **Emmanuel Chailleux**

Micromechanical surface investigation of bio-modified RAP binder

Maria Chiara Cavalli and Lily D. Poulidakos

New fluxing agent for the road industry – an overview of technical performances and HSE Benefits

Thomas Lebarbé, Frédéric Delfosse, Hélène Martin and Arnaud Bourdette

Towards a better assessment of recycling agents effects on bitumen during hot recycling

Fayçal Lahjiri, Sabine Gazeau, Frédéric Delfosse, Anne Dony, Layella Ziyani, Virginie Mouillet and François Henn

Graphene-enhanced recycled asphalt pavements

Loretta Venturini and Fabrizio Monti

Properties of asphalt binders with increasing SBS polymer modification

Mike Aurilio, Peter Mikhailenko, Hassan Baaj and Lily D. Poulikakos

Non-petroleum-based binders for paving applications: rheological and chemical investigation on ageing effects

Davide Dalmazzo, Ana Jiménez Del Barco Carrión, Lucia Tsantilis, Davide Lo Presti and Ezio Santagata

Effectiveness of rejuvenators for asphalt mixtures with high Reclaimed Asphalt Pavement content in cold climates

Marco Pasetto, Giovanni Giacomello and Emiliano Pasquini

Coffee break (11:00 – 11:30)

Poster session (11:00 – 11:30)

During the coffee break, posters will be available in the session room

Oral presentations: Session 2 (11:30 – 13:00)

Future Trends in Asphalt Pavements

Session chair: **Alan Carter**

Electric energy harvesting systems from urban road pavements: analysis and preliminary simulation

Sandro Colagrande and Gino D'Ovidio

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Environmental sustainability and energy assessment of bituminous pavements made with unconventional materials

Marinella Giunta, Marina Mistretta, Filippo Giammaria Praticò and Maria Teresa Gulotta

Reflectivity and durability assessment of solar heat-blocking pavement

Masahiko Iwama, Tamotsu Yoshinaka, Shunsuke Nishioka and Hiroshi Murakami

Supply curves using LCA and LCCA for conceptual evaluation of proposed policies to improve the environment

John T. Harvey, Alissa Kendall, Ali Butt, Arash Saboori, Mark Lozano and Maryam Ostovar

Preliminary study of an energy harvesting system for road pavements made with marginal aggregate

Marco Pasetto, Andrea Baliello, Antonio Galgaro, Elisa Mogentale and Anna Sandalo

Lunch (13:00 – 14:00)

Lunch will take place in the “Sala Egizia”, near the session room

Oral presentations: Session 3 (14:00 – 16:00)

Marginal Materials for Asphalt Pavements

Session chair: **Joëlle De Visscher**

Experimental investigation of performance properties of asphalt mixture designed with the re-recycled RAP and EAFSS

Di Wang, Augusto Cannone Falchetto, Ki Hoon Moon, Chiara Riccardi and Michael P. Wistuba

Influence of crumb rubber added by dry process on linear viscoelastic properties and tensile strength of bituminous mixtures

Yasmina Mahmoudi, Salvatore Mangiafico, Cédric Sauzéat, Hervé Di Benedetto, Simon Pouget and Jean-Philippe Faure

A preliminary investigation into the use of alkali-activated blast furnace slag mortars for high-performance pervious concrete pavements

Marco Bassani, Luca Tefa and Paola Palmero

Experimental study on use of recycled polymer as modifier in mastic and asphalt mixture

Francesco Mazzotta, Andrea Simone, Valeria Vignali, Claudio Lantieri and Giulio Dondi

Preliminary study on the mechanical properties of an asphalt mixture containing RAR modifiers

Christina Plati, Brad Cliatt and Andreas Loizos

Influence of the production temperature on the optimization process of asphalt mixes prepared with steel slag aggregates only

Emiliano Pasquini, Giovanni Giacomello, Marta Skaf, Vanesa Ortega-Lopez, Juan Manuel Manso and Marco Pasetto

Cold recycling with bitumen emulsion of marginal aggregates for road pavements

Marco Pasetto and Nicola Baldo

Coffee break (16:00 – 16:30)

Poster session (16:00 – 16:30)

During the coffee break, posters will be available in the session room

Poster presentations (16:30 – 17:00)

Short oral presentations of posters

Session chair: **Marco Pasetto**

Long-term aging behaviour of asphalt mixtures modified with crumb rubber using the dry process

Israel Rodríguez-Fernández, Maria Chiara Cavalli, Lily D. Poulidakos and Moises Bueno

Sustainable warm in-plant SMA mixtures with 80% recycling and produced at 115°C

Jian Qiu, Rien Huurman, Ernst Demmink and Mark Frunt

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Rheological and mechanical properties of HMA containing fly ashes as alternative filler

Rosa Veropalumbo, Nunzio Viscione and Francesca Russo

Reclaimed asphalt usage: handling, processing, management and future trends in Lithuania

Mindaugas Martišius

The BIM (Building Information Modeling)-based approach for road pavement maintenance

Gaetano Bosurgi, Clara Celauro, Orazio Pellegrino, Nicola Rustica and Giuseppe Sollazzo

Oxidative aging effects on damage-healing performance of unmodified and polymer modified asphalt binders

Yifang Chen and Chao Wang

Cold in-place recycling for a base layer of an Italian high-traffic highway

Edoardo Bocci, Andrea Graziani and Maurizio Bocci

A new design methodology for improving porous concrete properties to achieve multifunctional and sustainable pavements

Eduardo Javier Elizondo-Martinez, Valerio Carlos Andrés-Valeri, Jorge Rodriguez-Hernandez and Daniel Castro-Fresno

Investigation into the use of reclaimed asphalt pavement in asphalt concrete

Olumide Moses Ogundipe

Experimental study to re-refine aged binder using water

Kengo Akatsu, Yousuke Kanou and Shouichi Akiba

Evaluation of two laboratory-based design methods for CIR mixtures

Pablo Orosa Iglesias, Ana Maria Rodriguez Pasandin, Ignacio Perez Perez

Oral presentations: Session 4 (17:00 – 18:30)

Hot, Warm and Cold Recycling

Session chair: **Hervé Di Benedetto**

Impacts of recycling agent on Superpave mixture containing RAP

Sujit Kumar Pradhan and Umesh Chandra Sahoo

Evaluation of reliability of RILEM fragmentation test

Francesco Preti, Stefano Noto, Beatriz Chagas Silva Gouveia and Gabriele Tebaldi

Development of a soybean-based rejuvenator for asphalt mixtures containing high reclaimed asphalt pavement content

Reza Mohammad Pouranian, Reyhaneh Rahbar-Rastegar and John E. Haddock

Effect of water and cement content on the mechanical properties of Cold Recycled Mixtures (CRM) with bitumen emulsion

Simone Raschia, Tushar Chauhan, Shalu Panwar, Alan Carter, Andrea Graziani and Daniel Perraton

100% Recycling of low-temp asphalt for minor roads – lab compaction and traffic simulation

Christiane Raab, Manfred N. Partl and Cédric Bensa

Gala dinner (20:00 – 0:00)

Sala Rossini of Pedrocchi Café will be arranged for Gala dinner

Friday – 13th September

Third day – Pedrocchi Café

Welcome and Registration (8:00 – 8:30)

Opening session (8:30 – 9:00)

Marco Pasetto

University of Padova, Italy

Oral presentations: Session 5 (9:00 – 11:00)

Test Methods and Performance

Session chair: **Christiane Raab**

Impregnation of lightweight aggregate particles with phase change material for its use in asphalt mixtures

Muhammad Rafiq Kakar, Zakariaa Refaa, Jörg Worlitschek, Anastasia Stamatiou, Manfred N. Partl and Moises Bueno

The use of a polyethylene-based modifier to produce modified asphalt binders on site

Antonio Roberto, Antonio Montepara, Elena Romeo and Saša Tatalović

Effect of moisture on fatigue characteristics of asphalt concrete mixtures

Mohit Chauhan and Atul Narayan

A new approach to determine absorption water of Reclaimed Asphalt Pavement aggregate (RAP) for the production of Cold Recycled Mixtures (CRM)

Simone Raschia, Shalu Panwar, Tushar Chauhan, Alan Carter, Andrea Graziani and Daniel Perraton

Effect of air void topology on the hydraulic conductivity and clogging properties of pervious asphalt roads

Alvaro Garcia, Mustafa Aboufoul, Kassra Gerami and Frank Asamoah

Fatigue performance of bituminous binders tested by linear amplitude sweep test

Krzysztof Błażejowski, Marta Wójcik-Wiśniewska, Wiktoria Baranowska, Przemysław Ostrowski, Radek Černý and Petr Jisa

Effect of nano SiO₂, TiO₂ and ZnO modification to rheological properties of neat and polymer modified bitumen

Rita Kleizienė, Miglė Paliukaitė and Audrius Vaitkus

Coffee break (11:00 – 11:30)

Poster session (11:00 – 11:30)

During the coffee break, posters will be available in the session room

Oral presentations: Session 6 (11:30 – 13:30)

Pavements Structures, Maintenance and Management

Session chair: **Gabriele Tebaldi**

Fast falling weight accelerated pavement testing and laboratory analysis of asphalt pavements reinforced with geocomposites

Davide Ragni, Tony Montillo, Alessandro Marradi and Francesco Canestrari

Automatic crack detection results using a novel device for survey and analysis of road pavement condition

Gaetano Bosurgi, Giuseppe Sollazzo, Nicola Bongiorno and Orazio Pellegrino

Airport Pavement Management Systems: an open BIM approach

Sara Guerra de Oliveira, Andrej Tibaut and Gianluca Dell'Acqua

Mixture design for recycled porous asphalt pavement and results of follow-up survey for ten years

Atsushi Kawakami, Iwao Sasaki, Hiroyuki Nitta and Masayuki Yabu

Performance Related Quality Assurance in Pavement Construction

Salvatore Cafiso, Brunella Capace and Alessandro Di Graziano

Performance evaluation of innovative and sustainable pavement solutions for road tunnels

Pier Paolo Riviera, Eldho Chooracka and Ezio Santagata

Experimental evaluation of improving effects of thermal environment of water retaining pavement on wheelchair users

Masashige Aoki, Yasuhiro Shimazaki and Kenji Karaki

September 11th – 13th, 2019, Padova, Italy



Closing session (13:30 – 14:00)

Prof. Marco Pasetto

University of Padova, Italy

Prof. Manfred N. Partl

EMPA, Switzerland

Lunch (14:00 – 15:30)

Lunch will take place in the “Sala Egizia”, near the session room

5TH APE SYMPOSIUM



2019 Padova ITALY

POSTERS LIST

Long-term aging behaviour of asphalt mixtures modified with crumb rubber using the dry process

Israel Rodríguez-Fernández, Maria Chiara Cavalli, Lily D. Poulidakos and Moises Bueno

Sustainable warm in-plant SMA mixtures with 80% recycling and produced at 115°C

Jian Qiu, Rien Huurman, Ernst Demmink and Mark Frunt

Rheological and mechanical properties of HMA containing fly ashes as alternative filler

Rosa Veropalumbo, Nunzio Viscione and Francesca Russo

Reclaimed asphalt usage: handling, processing, management and future trends in Lithuania

Mindaugas Martišius

The BIM (Building Information Modeling)-based approach for road pavement maintenance

Gaetano Bosurgi, Clara Celauro, Orazio Pellegrino, Nicola Rustica and Giuseppe Sollazzo

Oxidative aging effects on damage-healing performance of unmodified and polymer modified asphalt binders

Yifang Chen and Chao Wang

Cold in-place recycling for a base layer of an Italian high-traffic highway

Edoardo Bocci, Andrea Graziani and Maurizio Bocci

A new design methodology for improving porous concrete properties to achieve multifunctional and sustainable pavements

Eduardo Javier Elizondo-Martinez, Valerio Carlos Andrés-Valeri, Jorge Rodriguez-Hernandez and Daniel Castro-Fresno

Investigation into the use of reclaimed asphalt pavement in asphalt concrete

Olumide Moses Ogundipe

Experimental study to re-refine aged binder using water

Kengo Akatsu, Yousuke Kanou and Shouichi Akiba

Evaluation of two laboratory-based design methods for CIR mixtures

Pablo Orosa Iglesias, Ana Maria Rodríguez Pasandin, Ignacio Perez Perez

PRE-SYMPOSIUM SCIENTIFIC EVENTS



1st EAPA Workshop

Use of rejuvenators in asphalt mixtures

10th - 11th September 2019, Padova, Italy



RILEM Meetings

Technical Committee: **TC 264-RAP**

Task Group: **TG1**

10th September 2019, Padova, Italy

Technical Committee: **TC 280-CBE**

Task Group: **TG1 & TG2**

11th September 2019, Padova, Italy



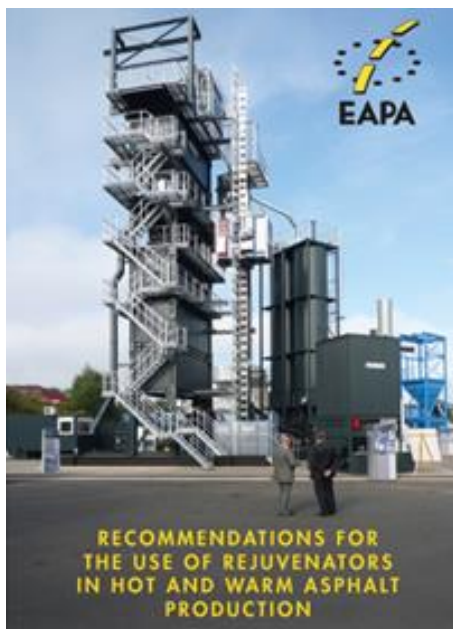
1st EAPA Workshop

Use of rejuvenators in asphalt mixtures

10th - 11th September 2019

Via 8 Febbraio, n. 15 - 35122, Padova
Pedrocchi Café - Sala Rossini

In December 2015, the EU Commission adopted a Circular Economy Action Plan with the aim to set the European Union "on the course of the transition towards a more sustainable model for economic development". The action plan looks at the whole lifecycle of products and adopts a systemic approach that promotes partnerships along the entire value chain and across five priority sectors, among which is "Construction and Demolition" sector.



In March 2019 the Commission published a Staff Working Document on the implementation of the Circular Economy Action Plan with 54 actions, with several actions affecting the way we will build and maintain the roads in the coming years. Among others, it can be highlighted the proposal for "New/revised EU green public procurement criteria integrating new circular economy requirements for road design, construction and maintenance".

In this context, Asphalt is one of the best tools for our Administrations to meet such requirements, as at the end of its service life, it can be re-used 100% to build a new road. At the same time, current technologies allow the construction of new roads with a content of Reclaimed Asphalt up to 90% in hot and warm mixes and 100% in cold recycling.

September 11th – 13th, 2019, Padova, Italy



One of the greatest technological milestones to achieve this is the use of rejuvenators, which, by restoring the flexibility, cracking resistance and rheological properties of the mix, without reducing other important properties, allows the addition of high quantities of reclaimed asphalt in new pavements.

There is nowadays an increasing demand to classify various products on the market as "rejuvenators" and a great deal of research projects on this topic. However, there is not any harmonised method for the assessment and classification of these products. In 2018, EAPA, the European Asphalt Pavement Association, published a Guidance Document where the best knowledge of each country was included, covering different levels, from plant to unit control.

Due to the great feedback received from the industrial community and with the aim of maximising the dissemination and outreach of EAPA's work, the Association organised the **1st EAPA Workshop on the use of rejuvenators in asphalt mixtures**.

Contacts



EUROPEAN ASPHALT PAVEMENT ASSOCIATION

Dr. Breixo Gomez Meijide

EAPA - European Asphalt Pavement Association

Rue du Commerce 77, 1040 Brussels, Belgium

Mobile: [+32 \(0\)497 17 97 54](tel:+322497179754)

E-mail: breixo@eapa.org

Twitter: [@B_GomezMeijide](https://twitter.com/B_GomezMeijide)

LinkedIn: [@breixogomezmeijide](https://www.linkedin.com/company/breixogomezmeijide)

www.eapa.org

Agenda

Tuesday 10 th September – Day 1	
16:00	Registration and networking opportunity
16:30	<p>Opening</p> <p>François Chaignon, EAPA President</p> <p>Gabriele Tebaldi, ISAP</p>
16:45	Laurent Porot , Presentation of EAPA Position Paper on Rejuvenators
17:15	Coffee break
17:30	<p>Session 1</p> <p>Research innovations on the use of rejuvenators in asphalt</p> <p>Tine Tanghe, BRRC (Belgium) The use of Rejuvenators: a pragmatic approach from Belgium</p> <p>Tomas Koudelka, Brno University (Czech Republic) Benchmark on rejuvenators, all rejuvenators are not equal</p> <p>Martins Zaumanis, EMPA (Switzerland) Towards 100% RA mixes - Mix evaluation and need of balanced mix design</p> <p>Emmanuel Chailleux, IFSTTAR (France) HSE evaluation for the use of rejuvenators - BioRePavation case study</p> <p>Martin Hugener, RILEM TC RAP (International) RILEM TC-264 RAP Asphalt Pavement Recycling - Update on Rejuvenators</p>
19:30	Networking reception and closure of Day 1

Wednesday 11th September – Day 2

<p>9:00</p>	<p style="text-align: center;">Session 2 Industrial experience on using rejuvenators</p> <p>Edvards Pavloskis, Binders (Latvia) Benefits of the use of rejuvenators at mix plant and specification - Case study from Latvia</p> <p>Xavier Carbonneau, Routes de France (France) Experience and barriers for the use of rejuvenators - Case study from France</p> <p>José Luis Peña, ASEFMA (Spain) Binder interaction in asphalt pavement recycling. Some experiences in Spain</p> <p>Henrik Arnerdal, Trafikverket (Sweden) Opening specification to 100% RA in asphalt mix – Case study from Sweden</p> <p>Rob Hofman, Rijkswaterstaat (The Netherlands) and CEDR Use of rejuvenators from the point of view of Road Authorities – Case study from The Netherlands</p>
<p>11:00</p>	<p style="text-align: center;">Coffee break</p>
<p>11:30</p>	<p style="text-align: center;">Session 3 – Workshop</p>
<p>12:30</p>	<p style="text-align: center;">Closure of EAPA Workshop Breixo Gomez-Meijide, EAPA Technical Director</p>

5TH APE SYMPOSIUM



2019 Padova ITALY

September 11th – 13th, 2019, Padova, Italy



RILEM Meetings

10th September 2019 - 11th September 2019

Via Marzolo, n.9 - 35131, Padova

Department of Civil, Environmental and Architectural Engineering (ICEA)

Aula Polivalente

University of Padova

RILEM TC 264-RAP, TG1

Technical Committee: **TC 264-RAP, Asphalt Pavement Recycling**

Task Group: **TG1, Cold Recycling**

Date: **10th September 2019**

Time: **14:30 - 17:30**

Place: **Aula Polivalente - Department ICEA, via Marzolo 9, 35131**

RILEM TC 280-CBE

Technical Committee: **TC 280-CBE, Multiphase Characterisation of Cold Bitumen Emulsion Materials**

Task Groups: **TG1, Emulsions and emulsion-based composites**

TG2, Cold bitumen emulsion mixtures

Date: **11th September 2019**

Time: **9:00 - 12:00**

Place: **Aula Polivalente - Department ICEA, via Marzolo 9, 35131**

Meetings' Location



Department of Civil, Environmental and Architectural Engineering (ICEA)

The Department follows traditional methods for training technicians for expertise in the fields of transport systems, hydraulics and civil architecture, each with their related cultural heritage. The Department was created in the early 17th century and developed throughout the 19th and 20th centuries until the present day. It covers all the disciplinary sectors of the Civil Engineering fields: hydraulics, maritime constructions, environmental engineering, roads, railways and airports, transportation, topography, geotechnics, construction science and techniques, architecture, urban composition, landscape architecture, history of architecture, restoration, town planning techniques, town planning, surveying.

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DEPARTMENT OF
CIVIL, ENVIRONMENTAL AND
ARCHITECTURAL ENGINEERING



Address

University of Padova,
Via Marzolo, 9, 35131
Padova, Italy

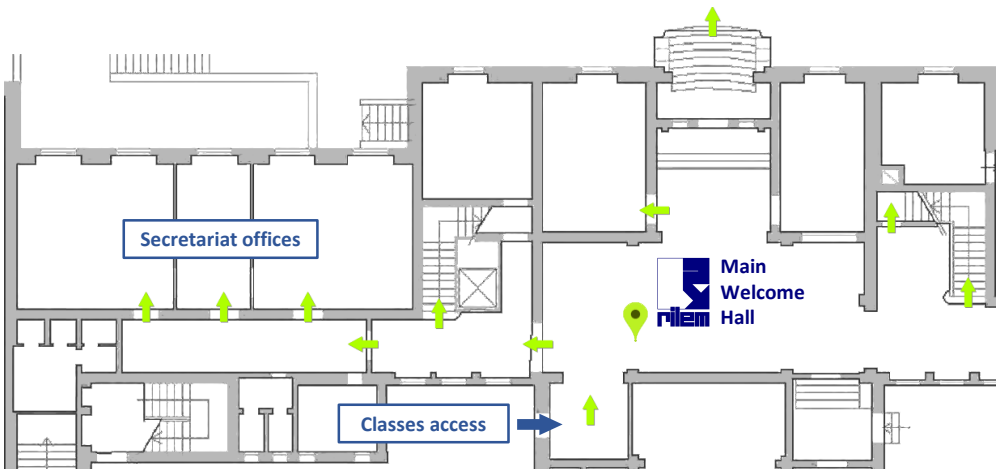
Contacts

isap2019@dicea.unipd.it






September 11th – 13th, 2019, Padova, Italy

Location

How to reach ICEA Department and the RILEM Meetings





Event's Program

Tuesday 10 th September 2019		Wednesday 11 th September 2019		
Pedrocchi Café	Dep.t ICEA	Pedrocchi Café	Dep.t ICEA	Palazzo Bo
8 h				
9 h				
10 h		Workshop Session 2	RILEM Activities TC 280-CBE	
11 h		Coffee		
12 h		Interactive Session		
13 h		Closure		Welcome & Registration
14 h				Opening Session
15 h				Keynote Lecture 1
16 h		RILEM Activity TC 264-RAP TG1		Keynote Lecture 2
17 h	Welcome & Registration			Coffee
18 h	Workshop Opening			Keynote Lecture 3
19 h	Workshop Session 1			Keynote Lecture 4
20 h	Day 1 Closure			

September 11th – 13th, 2019, Padova, Italy



	Thursday 12 th September 2019	Friday 13 th September 2019
	Pedrocchi Cafè	Pedrocchi Cafè
8 h		
	Welcome & Registration	Welcome & Registration
9 h	Opening Session	Opening Session
10 h	Session 1 "SUSTAINABLE PAVEMENTS AND ENVIRONMENTALLY FRIENDLY TECHNOLOGIES"	Session 5 "TEST METHODS AND PERFORMANCE"
11 h	Coffee + Posters	Coffee + Posters
12 h	Session 2 "FUTURE TRENDS IN ASPHALT PAVEMENTS"	Session 6 "PAVEMENT STRUCTURES, MAINTENANCE AND MANAGEMENT"
13 h	Lunch	Closing Session
14 h	Session 3 "MARGINAL MATERIALS FOR ASPHALT PAVEMENTS"	Lunch
15 h	Coffee + Posters	
16 h	Poster Session	
17 h	Session 4 "HOT, WARM AND COLD RECYCLING"	
18 h		
19 h		
20 h	Gala dinner	

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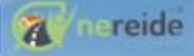
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September 11th – 13th, 2019, Padova, Italy



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2019 Padova ITALY