

15th INTERNATIONAL
CONFERENCE



HIGH SPEED MACHINING

PROGRESS IN HIGH SPEED MACHINING TECHNOLOGY

8—9/10 2019

PRAGUE | CZECH REPUBLIC



PROGRAMME



FACULTY
OF MECHANICAL
ENGINEERING
CTU IN PRAGUE

Czech Technical University in Prague
Faculty of Mechanical Engineering



Czech Technical University in Prague
Research Center of Manufacturing Technology



Czech Machine Tool Society



IK4 TEKNIKER a IK4 IDEKO



Technical University of Darmstadt
Institute of Production Management
Technology and Machine Tools



Ecole Nationale Supérieure d'Arts et Métiers



Nanjing University of Aeronautics
and Astronautics



Sponsored by the International Academy
for Production Engineering CIRP

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WELCOME

Welcome to the 15th International Conference on High Speed Machining HSM 2019 in Prague! The HSM conference has established a tradition of taking place in a different country every year. The conference is organized by a consortium of five partners: PTW Darmstadt (Germany), IK4 Tekniker & IDEKO (Spain), ENSAM Metz (France), RCMT – Research Center of Manufacturing Technology (Czech Republic) and NUAA – Nanjing University of Aeronautics and Astronautics (China). This year, the conference is proudly organized in the Czech Republic by RCMT, part of the Czech Technical University in Prague, and the Czech Machine Tool Society. The conference is sponsored by the International Academy for Production Engineering CIRP.

The advantages of high speed machining technology were discovered by Professor Solomon in the early 1930s. Significant advances in cutting tool materials and tool coatings greatly accelerated progress in high speed machining technology in the 1990s. High speed machining changed the world of cutting processes as well as machine tools. Today, high speed machining remains a successful strategy. Concurrently, it is incorporated into solutions for advanced machining systems, which is also this year's conference subtitle. The HSM 2019 conference will focus on the following key topics: machine tool design, characterization and accuracy; tool path planning and feed drive control; dynamic behaviour and process-machine interaction; smart devices and digital twins; cutting



Dr. Petr Kolář

Chairman of the HSM 2019 conference

Editor of the conference proceedings

process fundamentals; machining of non-ferrous materials; machining of difficult-to-cut materials; micromachining; abrasive processes; drilling processes; and cryogenic machining.

We believe that the conference papers will serve as a valuable source of information and also boost research networking in the future. We would like to thank all the authors for their contributions to the conference programme and proceedings. We would also like to express our gratitude to the members of the international scientific committee for their time, effort and constructive feedback, which have been a great help in our preparation of the HSM 2019 Conference.

Thank you again for your support. I wish you a fruitful and enjoyable conference!

It is my great pleasure to welcome you to the 15th International Conference on High Speed Machining 2019 in Prague. Department of Production Machines and Equipment and Research Centre for Manufacturing Technology (RCMT) at Czech Technical University in Prague, Faculty of Mechanical Engineering is the main research base for manufacturing technology in the Czech Republic. RCMT was founded in July 2000 with direct financial support from the Ministry of Education, Youth and Sport and Association of Engineering Technology. Since January 2012, RCMT has been part of the Department of Production Machines and Equipment, Faculty of Mechanical Engineering, Czech Technical University in Prague. RCMT Strategic Agenda includes:

- **Education** of young experts
- **Research and development** in the field of production machines and manufacturing technology
- **Support to companies** in the field of production machines and technology

RCMT focuses on basic and applied research in the field of manufacturing technology. Key research topics are defined and developed in cooperation with the industry. Research programme is divided into three main streams:

- Research of design and properties of **productive, reliable and precise machine tools**
- Research of **automation and robotic applications in manufacturing processes**
- Research in productive **manufacturing processes**



Dr. Matěj Sulitka

Chairman of the HSM 2019 conference

Head of the Department of Production Machines and Equipment and Research Centre for Manufacturing Technology

Cooperation with the industry is among RCMT core activities. RCMT investigates number of projects of applied R&D with public funding and on commercial base as well. RCMT intensively develops international collaboration with a number of leading foreign research institutes and companies in the frame of EU projects or other funding frameworks. All this contributes to RCMT being a professional and reliable partner for R&D.

I am honoured that RCMT can host the 15th HSM 2019 Conference in Prague.

I am grateful to the members of the international scientific committee, to the participants and to the organizing team for their support of the conference. I believe that excellent scientific and research contributions will make the conference a great event.

I wish you to enjoy fruitful exchange and transfer of scientific knowledge and information.

Welcome to Prague! Continuing education is a key aspect of every successful society during this era with its exploding volume of new knowledge in many technical as well as non-technical fields. The Czech Machine Tools Society (CMTS) was founded in 1994 as a platform for meeting and exchange of experience between experts from Czech technical universities and Czech companies producing machine tools. CMTS holds regular workshops where information on various specific machine tool design and operation topics are shared by lecturers from universities and selected companies. CMTS also organizes a special workshop about new development trends every two years, which is presented at the EMO fair.

I am delighted that CMTS is able to support the High Speed Machining Conference in Prague. The conference makes CMTS' educational portfolio complete by sharing and transferring new scientific



Dr. Jan Smolík

Chairman of the HSM 2019 conference

Head of the Czech Machine Tool Society

information to the wide spectra of conference participants.

The excellent contributions reviewed by the respected members of the scientific committee are an essential component of this great event.

COMMITTEE AND ORGANIZERS

Conference Chairmen

Dr. Petr Kolář | Czech Republic
Dr. Matěj Sulitka | Czech Republic
Dr. Jan Smolík | Czech Republic

Board of Organizers

Prof. Eberhard Abele | Germany
Prof. Alain D'Acunto | France
Dr. Luis Uriarte | Spain
Dr. Petr Kolář | Czech Republic
Prof. Ning He | China

Scientific Committee

Prof. Eberhard Abele | Germany
Prof. Yusuf Altintas | Canada
Dr. Mikel Armendia | Spain
Dr. Ana Aranzabe | Spain
Prof. Pedro José Arrazola | Spain
Prof. Bahman Azarhoushang | Germany
Prof. Daniel Bachrathy | Hungary
Dr. David Barrenetxea | Spain
Dr. Xavier Beudaert | Spain
Prof. Dirk Biermann | Germany
Assoc. Prof. Petr Blecha | Czech Republic
Prof. Friedrich Bleicher | Austria
Prof. Christian Brecher | Germany
Prof. Erhan Budak | Turkey
Prof. Gianni Campatelli | Italy
Prof. Alain D'Acunto | France

Prof. Matthew A. Davies | USA
Prof. Berend Denkena | Germany
Prof. Zoltán Dombóvári | Hungary
Dr. Fernando De Egaña | Spain
Prof. Kaan Erkorkmaz | Canada
Dr. Marcel Fey | Germany
Prof. Benoit Furet | France
Prof. Niccolo Grossi | Italy
Prof. Ning He | China
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Dr. Michal Holub | Czech Republic
Prof. Steffen Ihlenfeld | Germany
Prof. Jerzy Jedrzejewski | Poland
Dr. Petr Kolář | Czech Republic
Prof. Peter Krajnik | Sweden
Prof. Ismail Lazoglu | Turkey
Prof. Christophe Lescallier | France
Prof. Liang Li | China
Prof. Luis Norberto López De Lacalle | Spain
Prof. Atsushi Matsubara | Japan
Dr. Rachid M'Saoubi | Sweden
Prof. Hans Christian Möhring | Germany
Prof. Brigit Mullany | USA
Dr. Jokim Munoa | Spain
Prof. José C. Outeiro | France
Prof. Tuğrul Özel | USA
Prof. Erdem Öztürk | Great Britain
Prof. Simon S. Park | Canada
Dr. Lars Pentter | Germany
Dr. Gaetano Massimo Pittalà | Italy
Prof. Gerard Poulachon | France
Prof. Franci Pušavec | Slovenia

Prof. Matthias Putz | Germany
Prof. Mohammad Rabiey | Switzerland
Dr. Mathieu Ritou | France
Prof. Tony Schmitz | USA
Dr. Scott S. Smith | USA
Dr. Jan Smolík | Czech Republic
Prof. Gábor Stépán | Hungary
Dr. Matěj Sulitka | Czech Republic
Dr. Jiří Švéda | Czech Republic
Prof. Giovanni Totis | Italy
Prof. Lütfi Taner Tunç | Turkey
Dr. Luis Uriarte | Spain
Dr. Petr Vavruška | Czech Republic
Prof. Konrad Wegener | Switzerland
Prof. Matthias Weigold | Germany
Prof. Petra Wiederkehr | Germany
Prof. Michael Zäh | Germany
Dr. Pavel Zeman | Czech Republic

Keynote Speakers

Prof. Matthias Weigold | Germany
Dr. Ondřej Uher | Czech Republic
Prof. Pedro José Arrazola | Spain
Prof. Gábor Stépán | Hungary

Conference Officer

Tereza Frelich

Local Organizing Team

Zuzana Čejková
Tereza Frelich
Ester Kopecká
Hana Pelikánová
Martina Slancová

KEYNOTE SPEAKERS



Prof. Matthias Weigold | Technical University of Darmstadt, Germany

Prof. Weigold studied mechanical engineering at Darmstadt University of Technology, Germany. He received the Dr.-Ing. degree in Mechanical Engineering at Darmstadt University of Technology, Germany in 2008. His thesis „Compensation of the tool deformation during machining with industrial robots“ was about a new machine tool concept for milling, drilling and deburring applications based on an industrial robot platform.

From 2007 to 2015 he worked at Heidelberger Druckmaschinen AG within the manufacturing division in different functions. As Head of Tool Technology he was responsible for the company-wide development of processes and tool technology and the tool management reorganization. As Head of Engineering he was responsible for the manufacturing innovation management, investment projects and the development and construction of jigs, automation

technology and special purpose machines for assembly and manufacturing. He left in 2015 as Head of Engineering and Production Planning for prototype production as well as serial production.

From 2015 to 2018 he worked at SAP SE within the division of Products & Innovation in the field Industry 4.0. As a product owner “SAP Machine Manufacturing Analytics” he was responsible for a new and disruptive product approach of “Internet based Big Data Analytics for Manufacturing Applications”. The interdisciplinary topic of real time data recording, cloud-computing and big data analytics as well as the overall end-to-end integration engineering connects the shop-floor to the global enterprise network. In the last two years, applications for CNC machine tools as well as for industrial robots where developed.

Since January 2019 he is leading the Institute for Production Management Technology and Machine Tools.



Dr. Ondřej Uher | Compo Tech PLUS, Czech Republic

Dr. Uher born in 1972 in Sušice, Czech Republic, studied Mechanical Engineering at the Czech Technical University in Prague (CTU) and obtained his degree in 1995. He found company Compo Tech Plus spol. s r.o. with his friend, and also CTU student Vít Šprdlík in 1994. Since that he is responsible for all research and development activities relating the main Compo Tech objective to develop and produce composite solution for industrial applications and especially the application in general machine building industry. He received his doctore degree under program of prof. Milan Růžička at CTU in 2003. The close collaboration between Ondřej Uher, CompoTech and CTU is not only the participation on many research projects, which resulted in number of successful composite applications in machine tool and machine building industries, but also in his active role in student education in the field of mechanics of composite materials.



Prof. Pedro José Arrazola | Mondragon University, Spain

Prof. Arrazola is a Senior Lecturer of Mechanical Engineering and the Head of the Machining Laboratory at Mondragon University. He received his Master degree in Mechanical Engineering at INSA Lyon – France in 1988, and his PhD in 2003 at Nantes University.

He has been active in metal machining during the last 2 decades, publishing 59 papers in international refereed journals (23 papers Q1), 3 book chapters and more than 100 papers in conferences. His H index is 18. He has been awarded with 2 patents (Temperature Measurement in Drilling, On-line Measuring of Component Distortions) and one I.P.R. (Finite Element Model of Chip Formation Process). He has directed the research of 15 PhD and 104 Master thesis and has participated in more than 90 scientific

and industrial projects (EU, National and Regional) for several sectors (automotive, aeronautical, railways, medical).

He has been involved as well in continuous training activities related to metal cutting. His current research interests are the following: cutting fundamentals (modeling and advanced experimental techniques), machinability, process monitoring and machining optimization. In recent years, he has focused his research on the machining of aeronautical applications, where analysis of surface integrity condition key aspect.

Prof. Pedro José Arrazola is a Fellow Member of CIRP (The International Academy for Production Engineering) since 2018 (he was Associate Member since 2009). He is as well the secretary of the Scientific Technical Committee of Cutting of CIRP.



Prof. Gábor Stépán | Budapest University of Technology and Economics, Hungary

Prof. Stépán is professor in Applied Mechanics at Budapest University of Technology and Economics (BME), a position that he has since 1995. His research interests include vibrations and time-delay systems with applications in mechanical engineering, like machine tool vibrations, hardware-in-the-loop experiments, vibrations and stability of robots. He is member of the Hungarian Academy of Sciences (2001) and the Academy of Europe (2013). He was elected as associate member of the International Academy for Production Engineering (CIRP, 2012) and fellow of the Society for Industrial and Applied Mathematics (SIAM, 2017). He is ERC Advanced Grant holder (2014–2019) with a topic on machine tool vibrations, and the recipient of the Thomas K. Caughey Dynamics Award of ASME (2015). He organized an international advanced course on Dynamics of Machining (2019).

CONFERENCE VENUE

The conference is held in the Hotel Grand Majestic Plaza Prague (Truhlářská 16, Prague 1). The hotel is situated in the center of the city and provides full-service and comfortable accommodation.

Registration Desk

The registration desk is located on the Conference Level of the Hotel Grand Majestic Plaza Prague.

Opening time

Tuesday, 8th October

08:00–18:00

Wednesday, 9th October

08:30–16:00

On-site payments can be settled in cash € only. ATM for Czech crowns (CZK) is a 5-minute walk from the conference venue in the PALLADIUM shopping center, please see the map on p. 18.

Internet Access / Chill-out Room

Free wireless Internet access is available on the Conference Level and in hotel rooms. Name: **GRAND**, Password: **grand2018**. Computers with printing facilities in a separate Chill-out room are available to all participants.

GENERAL INFORMATION

INSTRUCTIONS FOR SPEAKERS

Each meeting room is equipped with a projector and a laptop. Speakers are requested to upload their presentations to the laptop in the room in due time before the start of their session. Own laptop may also be used. Laptops are equipped with Microsoft Windows 10, Office 2013 (Powerpoint, Word, Excel), Adobe Acrobat Reader, Windows Media Player and VLC Video Player. Technical support is provided in the meeting rooms. The length of the presentation is limited to 20 minutes. We expect 15 minutes for the presentation itself and 5 minutes for a discussion.

BADGES AND TICKETS

The colors of name badges indicate the program options chosen.

Participants – **Blue**

Visitors – **Green**

Organizers – **Red**

Only persons wearing the “**HSM 2019 Blue**” badges are entitled to attend the meetings, lunches and social event. Persons wearing the “**HSM 2019 Green**” can only attend meetings.

INSURANCE

The Organizers of the HSM 2019 do not provide insurance and do not take responsibility

for any loss, accident or illness that might occur during the Conference or in the course of travel to and/or from the meeting site. It is, therefore, the responsibility of the participants to check their coverage with their insurance provider.

LUNCHES

Lunch for the conference delegates is served in the ATRIUM restaurant on the Conference Level, the Hotel Grand Majestic Plaza Prague.

COFFEE BREAKS

Coffee and refreshments are served in the Foyer on the Conference Level, the Hotel Grand Majestic Plaza Prague.

CONFERENCE PROGRAM

Tuesday, 8th October 2019

Invitation, Keynotes, Presentations in Sessions – Meeting Room

Social Event – The Municipal House

Wednesday, 9th October 2019

Presentations in Sessions – Meeting Room

Thursday, 10th October 2019

Visit RCMT laboratory – optionally – Czech Technical University in Prague, Faculty of Mechanical Engineering, Research Center of Manufacturing Technology



PROGRAMME OF 15TH INTERNATIONAL CONFERENCE HIGH SPEED MACHINING, 8–9 OCTOBER 2019, PRAGUE, CZECH REPUBLIC

Tuesday, 8th October

MAIN ROOM		
9:00–9:30	Welcome and conference opening	P. Kolář, M. Sulitka, J. Smolík
9:30–10:00	Keynote speech: Hybrid manufacturing – The best of both worlds	M. Weigold
10:00–10:30	Keynote speech: Composite structural parts for high speed machine tools	O. Uher
10:30–10:50	Coffee break 1	
10:50–11:20	Keynote speech: Predictive modelling of machining processes	P. J. Arrazola
11:20–11:50	Keynote speech: Exploring the limits of chatter-free high speed milling operations	G. Stépán
11:50–13:00	Lunch	

	ROOM 1	ROOM 2	ROOM 3
	Session on micromachining and drilling processes	Session on machine tool design, characterization and accuracy	Session on machining of non-ferrous materials and micromachining
13:00–13:20	094 Surface integrity in turning of Fe17Cr2Ni0.2C iron based thermally sprayed coatings with special respect to the influence of the feed	064 The impact of size reduction on the energy efficiency, dynamics and machining performances in milling	047 Numerical study on stress wave induced dislocation density evolution during high speed machining
13:20–13:40	045 Affection of chip formation in single-lip deep hole drilling at small diameters by application of low-frequency vibration support	066 Mobile machines for the machining of large dimension parts	065 Surface roughness and its prediction in high speed milling of aluminum alloys with PCD and cemented carbide tools
13:40–14:00	050 Investigations on material removal mechanism in drilling 2D C _f /SiC composites using PCD tools	111 Resource consumption classes of machine tools	022 Material removal mode in 3D micro USM
14:00–14:20	063 In process monitoring and analysis of whirling motions in boring and trepanning association (BTA) deep drilling	074 Strategy of milling center thermal error compensation using a transfer function model and its validation outside of calibration range	130 Design of a micro tool for high-efficiency micro slotting

	ROOM 1	ROOM 2	ROOM 3
14:20–14:40	076 Analysis of contour accuracy and process forces using a chamber-boring-system	077 Long-term thermal compensation of 5-axis machine tools due to thermal adaptive learning control	108 High speed machining of brass rod alloys (no presentation, proceedings only)
14:40–15:00	Coffee break 2		
	Session on tool path planning and feed drive control	Session on machine tool design, characterization and accuracy	Session on abrasive processes
15:00–15:20	012 Design and simulation-based analysis of a test bed for two-dimensional kinematically coupled force compensation	015 A study of the application of volumetric compensation by direct and indirect measurement methods	038 Free-form tools design and fabrication for Flank Super Abrasive Machining (FSAM) non developable surfaces
15:20–15:40	028 A novel evaluation method for setpoint data based on time-frequency analysis	039 A study on the dynamic behaviour of machine tool spindle-tool-holder by using joint stiffness	061 Spherical fixed abrasive head lapping of titanium alloy plane
15:40–16:00	082 Productivity increase of high precision micro-milling by trajectory optimization	083 Modeling and simulation technology of the spindle characteristics for manufacturing industry	089 Sensors as an enabler for self-optimizing grinding machines
16:00–16:20	095 Control of hybrid electric-hydraulic drive for vertical feed axis of machine tools	116 High speed synchronous reluctance drives for motor spindles	090 Molecular dynamics investigation of the efficiency of vibration-assisted nano-grinding
16:20–16:40	Coffee break 3		
	Session on tool path planning and feed drive control	Session on dynamic behaviour and process-machine interaction	Session on abrasive processes
16:40–17:00	102 S-curve algorithm of acceleration/deceleration with smoothly-limited jerk in high speed equipment control tasks	013 Chatter avoidance in milling by using advanced cutting tools with structured functional surfaces	097 A novel method for the characterization of diamond wire topography and abrasive grain geometries
17:00–17:20	109 Modal-space control of a linear motor-driven gantry system	020 Investigation of process damping in robotic milling	107 Investigation of the coolant fluid flow distribution in the grinding gap

	ROOM 1	ROOM 2	ROOM 3
17:20–17:40	119 Machining of thin blade using vibration prediction and continuous spindle speed control	030 Investigation of the dynamic behavior of machine tools during cutting by operational modal analysis	121 Experimental investigation on tool path patterns in controlled depth abrasive water jet machining
17:40–18:00	131 Adaptive toolpath for 3-axis milling of thin walled parts	032 Vibration attenuation of boring bars with nonlinear control force	123 Active abrasive number in fixed abrasive lapping process
19:30	Social event (see page 16)		

Wednesday, 9th October

	ROOM 1	ROOM 2
	Session on machining of difficult-to-cut materials	Session on dynamic behaviour and process-machine interaction
9:00–9:20	017 Surface hardening and wear correlations studies when turning Inconel 718	044 Frequency response prediction for robot assisted machining
9:20–9:40	040 A preliminary investigation on ice-assisted milling of zirconium-based bulk metallic glass	084 Improving cutting performance of two spindle machine tool applying tuned mass damper
9:40–10:00	041 An investigation on the feasibility of dry high speed machining of additive manufactured Ti-6Al-4V alloy with solid ceramic end mill	099 Operational method for identification of specific cutting force during milling
10:00–10:20	042 Pulsating high-pressure cutting fluid supply for chip control in finish turning of Inconel 718	124 Machinability the AISI 316 stainless steel after processing by various methods of 3D printing
10:20–10:40	046 Influence of both rake and flank faces metal working fluid (MWF) strategies on machinability of Ti-6Al-4V alloy	125 Stability analysis for peripheral milling of hardened mold steel considering helix angle effect
10:40–11:10	Coffee break 1	

	Session on machining of difficult-to-cut materials	Session on fundamentals of cutting process
11:10–11:30	055 Experimental investigations on residual stress in hard turning of AISI 52100 using PCBN and coated carbide tools	014 A generalized force and chip flow model for oblique cutting and varying undeformed chip crosssections
11:30–11:50	087 Investigations on the influence of isotropy improving alloy additives when machining 38MnSiV56	037 A two-step discrete element method by elastic-viscoplastic constitutive model in high speed cutting
11:50–12:10	092 Methodology for a model-based control of the boundary zone properties during milling of Ti-6Al-4V	080 Inverse material model parameter identification for metal cutting simulations by optimization strategies
12:10–12:30	101 Finish milling study of Ti-6Al-4V produced by Laser Metal Deposition	098 Numerical and experimental analysis of chip formation at ultrahigh cutting speed
12:30–12:50	110 Nickel-based alloy dry milling force and temperature by using monolithic ceramic end mill tool	
12:50–14:00	Lunch	

ROOM 1		ROOM 2
	Session on machining of difficult-to-cut materials	Session on smart devices and digital twins
14:00–14:20	115 Cutting condition selection for high-speed milling of titanium alloy	023 Adaptive scheduling through machine learning-based process parameter prediction
14:20–14:40	122 Machining induced hardening aspects in eco-friendly HSM of Inconel 718	026 Quality control of a milling process using process data management in the aerospace industry
14:40–15:00	127 Analysis of surface post-processing techniques for improvement of additive manufactured parts in aerospace	035 Concept of smart tool holder monitor for tool management
15:00–15:20	128 Modelling and optimization of the cutting forces during Ti-6Al-4V milling process using the response surface methodology and dynamometer	057 High-resolution geometry measurement with a collaborative robot
15:20–15:40	129 Surface roughness investigations in minimum quantity lubrication assisted high speed turning of two aerospace materials	048 A new power-based online tool state monitoring method in cyber-physical system (no presentation, proceedings only)
15:40–16:10	Coffee break 2	
	Session on tool wear and cryogenic machining	Session on smart devices and digital twins
16:10–16:30	018 Effect of temperature and oxidation in cutting zone on wear of cutting tools with multilayer composite nano-structured coatings at high speed turning	070 Development of a method to determine cutting forces based on planning and process data as contribution for the creation of digital process twins
16:30–16:50	054 Tribological performance of textured robust lyophobic tool surface	091 Feed drive condition monitoring using modal parameters
16:50–17:10	019 Clean manufacturing of Ti-6Al-4V under cryogenic CO ₂ and hybrid nanofluids	093 Simulation-based fast identification method of cutting process
17:10–17:30	021 Investigation on the productivity of milling Ti-6Al-4V with cryogenic minimum quantity lubrication	103 Investigation of processes in high speed equipment using CNC capabilities
17:30–17:50	027 The influence of cutting conditions on surface integrity in high feed milling of Ti-6Al-4V with supercritical CO ₂ cooling	112 Estimation of engagement conditions using an ANN pattern recognition system on the base of a sensory tool holder
17:50–18:00	Closing remarks	

Thursday, 10th October

RCMT	
9:00	Visit RCMT laboratory – optionally Address: CTU – FME, RCMT, Horská 3. You can get there by tram No. 14, 18 and 24 (Albertov station) from Karlovo náměstí underground station (B-line). How to get from the tram station to RCMT please see the map p. 18.

SOCIAL PROGRAM



SOCIAL EVENT

Tuesday, 8th October

Dress code: Business casual

19:30 | Social event in the Municipal House, náměstí Republiky 1090/5, Prague 1

The Municipal House is 10 minutes walk from the Conference venue. Please see the map on page 18.

Cultural Program | Camerata 2018

23:00 | Closing social event

The Municipal House

The Municipal House has been one of the most significant public buildings in Prague for over a hundred years. After the city administration had purchased the plots where the Royal Court, the medieval seat of the Bohemian kings, used to be located, they announced an architectural competition for the Municipal House in 1903. Unsatisfied with the results of the competition, the city administration awarded this project to architects Antonín Balšánek and Osvald Polívka. They designed the Municipal House, following instructions from the city council, as a multifunctional building, which included areas for ceremonial purposes, exhibitions, concerts as well as restaurants and shops.

The Municipal House facade is eye-catching not only due to its monumental architectural composition but also because of the unique profile created by its collection of the sculptural art of the time. Monumental allegorical figures, displayed all over the facade of the building, which were created by the greatest artists represent particular historical and classical cultural symbols (allegories of the nation, Prague, legendary characters and events, personification of art, philosophy, science, etc.), but they are also inspired by modern day symbols (allegories of industry, trade, transport).

CULTURAL PROGRAM

Bohuslav Martinů:
[1890–1959]

**Three Madrigals (Duo no. 1) for violin
and viola H. 313 – First movement**

Poco allegro

**Mazurka-Nocturne for oboe, two violins
and cello**

Antonín Dvořák:
[1841 – 1904]

**Miniatures Op. 75 and for two violins and
viola**

Cavatina – Moderato
Capriccio – Poco allegro
Romance – Allegro
Elegy – Larghetto

Anton Reicha:
[1770 – 1836]

**Quintet F Major for oboe, two violins,
viola and cello – Second and fourth
movements**

Andante siciliano
Finale – Vivace

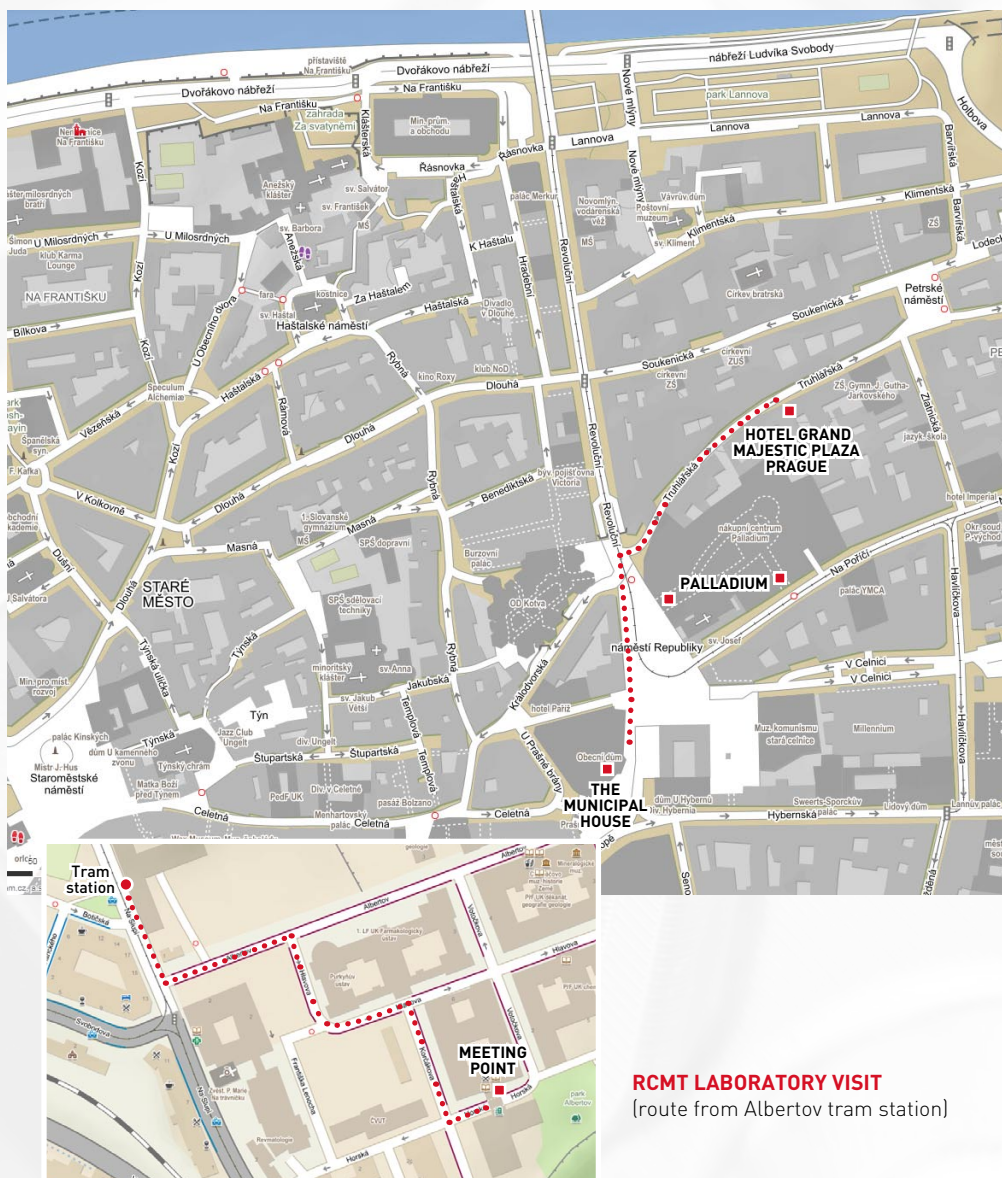
Camerata 2018

Vojtěch Jouza – oboe
Anna Sommerová – violin
Chikako Tomita – violin
Anežka Ferencová – viola
Petr Malíšek – cello

The musical ensemble **Camerata 2018** was founded by oboist and conductor Vojtěch Jouza, who also acts as the group's artistic director. The ensemble primarily performs chamber music in various instrumental combinations with an emphasis on 20th century composers. The group members include musicians from the Czech Philharmonic as well as renowned soloists and chamber instrumentalists.



CONFERENCE LOCATIONS



RCMT LABORATORY VISIT
(route from Albertov tram station)

PRAGUE

Situated in the northwest of the country on the Vltava River, Prague is the capital and the largest city of the Czech Republic. This magical city of bridges, cathedrals, gold-tipped towers and church spires is also the fourteenth largest city in the European Union. Since the Middle Ages Prague has cherished the reputation of one of the most beautiful cities in the world.

Prague has been a political, cultural, and economic centre of central Europe with waxing and waning fortunes during its 1,100-year existence. Founded during the Romanesque and flourishing by the Gothic and Renaissance eras, Prague was not only the capital of the Czech state, but also the seat of two Holy Roman Emperors and thus then also the capital of the Holy Roman Empire. It was an important city to the Habsburg Monarchy and

its Austro-Hungarian Empire and after World War I became the capital of Czechoslovakia. The city played major roles in the Protestant Reformation, the Thirty Years' War, and in 20th-century history, during both World Wars and the post-war Communist era.

Prague is home to a number of famous cultural attractions, many of which survived the violence and destruction of twentieth century Europe. Main attractions include the Prague Castle, the Charles Bridge, the Old Town Square, the Jewish Quarter, the Lennon Wall, and the Petřín hill. Since 1992, the extensive historic centre of Prague has been included in the UNESCO list of World Heritage Sites. Prague is classified as a Beta+ global city according to GaWC studies, comparable to Berlin, Rome, or Houston.





Public transport tickets and passes

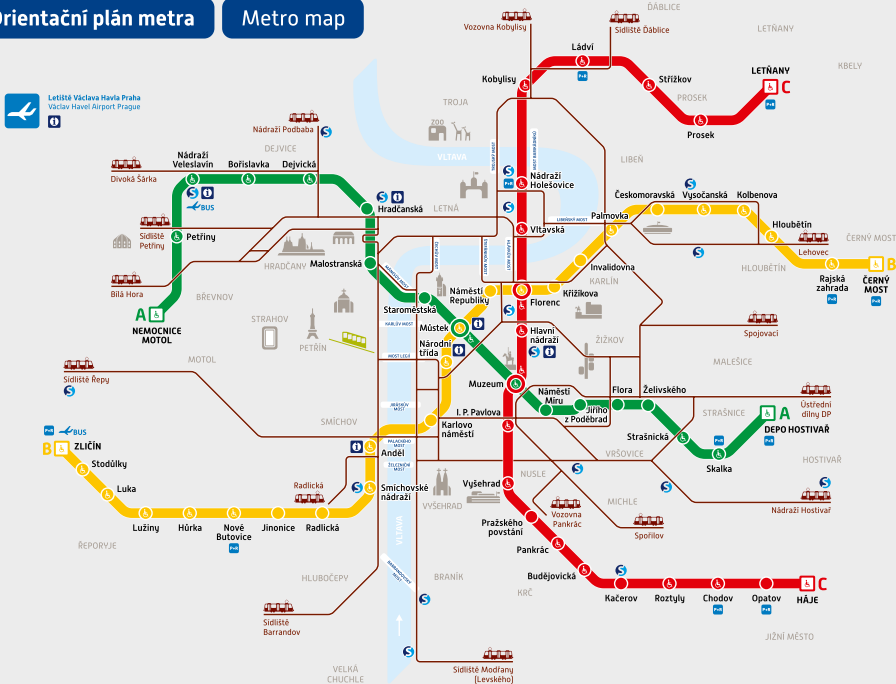
TICKET / PASS TYPE	ADULT	CHILD	SENIOR
Basic 90 min.	32 CZK	16 CZK	16 CZK
Short-term 30 min.	24 CZK	12 CZK	12 CZK
1day 24 hrs.	110 CZK	55 CZK	55 CZK
3 days 72 hrs.	310 CZK	-	-



PRAHA PRAGUE

Orientační plán metra

Metro map



© Dopravní podnik hl. m. Prahy, akciová společnost



Linky a stanice metra
Metro lines and stations



Bezbariérový přístup
Barrier-free access



Bus MHD na Letišti Václava Havla Praha
Public transport buses to Václav
Havel Airport Prague



Parkoviště P+R
Park and ride



Konečná stanice metra
Metro terminus station



Tramvajová trať
Tram line



Přestup na linky S a další vlakové spoje
Transfer to lines S and other railway lines



Infocentrum DP
Public transport information



Stanice přestupní
Transfer station



Lanová dráha
Funicular



296 19 18 17
www.dpp.cz



Dopravní podnik hl. m. Prahy
PRAGUE
PRAŽSKÁ INTEGROVANÁ DOPRAVA



TRAVEL INFO

CURRENCY, CREDIT CARDS

The currency unit is the Czech crown (CZK), denoted as “Kč” by Czechs.

International credit cards are accepted at most of hotels, restaurants and shops. ATMs are available at the airport and all over the city. ATM for Czech crowns (CZK) is a 5-minute walk from the conference venue in the PALLADIUM shopping center, please see the map on p. 18.

Public Transportation

Tickets should be purchased in advance (e.g. at metro stations, tobacco shops). The tickets should be validated (on board or at the entrance gates), and kept, since one must provide them if requested by inspectors on board or at the exit gates.

The metro station “Náměstí Republiky” on B line (Yellow) is a 5 minute walk from the conference venue.

You can find public city transport routes, ticket prices and timetables on www.dpp.cz/en/.

USEFUL PHONE NUMBERS

Emergency numbers can be dialed without a coin or a card:

Ambulance: 155

Police: 158

Municipal Police: 156

Fire Brigade: 150

Overall Emergency: 112

Tourinform Hotline: +420 221 714 444
(8:00–19:00 h)



PARTNERS

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BRAY
CNC MACHINING CENTRES

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Data as of 20 September 2019.

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