

International Conference on Machine Tools, Automation, Robotics and Technology

September 12-14 | 2012

Prague, Czech Republic



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Welcome

Welcome to the 9^{th} International Conference MATAR 2012 - Machine Tools, Automation, Robotics and Technology in Prague! The MATAR conference is run every four years and its aim is to cover all important topics in the field of manufacturing technology.

The tradition started in the early 1980s. The MATAR conference, organized by the Institute of Production Machines and Equipment, Czech Technical University in Prague, has always served to bring together experts from academia and professionals from the industry to provide vital bidirectional feedback. The long history is related to the traditionally strong position of machine tool production in Czechoslovakia and in the Czech Republic. Some companies date back as far as the 19th century. Many of them were founded in the in the first half of the 20th century. Since the 1950s, there has been a common R&D base led by VUOSO (Research Institute of Machine Tools and Machining) and its main researchers, including worldfamous scientists such as Jiri Tlusty and Milos Polacek, whose main focus was on chatter vibrations, or Jaromir Zeleny, the founder of modern flexible manufacturing systems. Currently. the Czech Republic is placed 7th in the world in terms of turnover per capita and 12th in terms of total machine tool production volume.

Manufacturing technology research is facing constant demands: industry is asking for productive manufacturing of complex and accurate workpieces at a low price. Lately, there have also been social and legislative forces affecting the industry.

There are several main research topic groups responding to industry priorities. MATAR 2012 pays attention to all of them:

Mathematical modeling of machines - the virtual machining concept enables us to do accurate simulations of machine tool properties and resultant workpiece quality at the design stage, without the need for expensive and time demanding experimental testing.

Working accuracy of machine tools - influenced mainly by thermal deformations caused by machine internal heat sources and ambient conditions. Minimization of thermal errors by design modification or smart compensation algorithms is a challenging task of high importance.

Intelligent machine tools – the topic covers all kinds of advanced approaches, aiming generally at improving the quality, precision and time of machining. This includes both new algorithms for machine tool feed drive control and tool path generation, as well as various mechatronic solutions employing additional sensors, measurement systems and diagnostics enabling adaptive machine tool behavior.

Manufacturing process enhancement – there is often significant improvement potential in tool and cutting parameters selection or other media assistance for enhancement of machining performance. Similarly, new machining strategies or unconventional means of manufacturing belong to the topic.

Energy efficiency and life cycle assessment - not only quality and quantity of manufacturing, but also energy demands and efficiency of the whole manufacturing chain defines another aspect for the machine and process optimization.

We believe that the presented 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 program and proceedings. We would also like to express our gratitude to members of the international scientific committee for their time, effort and constructive feedback, which have helped a great deal in preparing the MATAR 2012 conference

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

Petr Kolar

CHAIRMAN OF THE 9^{TH} INTERNATIONAL CONFERENCE MATAR 2012 MACHINE TOOLS, AUTOMATION, ROBOTICS AND TECHNOLOGY

Acknowledgements

The Conference Chairman wishes to thank

Ing. Jan Smolik, Ph.D.

Head of Research Center of Manufacturing Technology | RCMT Head of Czech Machine Tool Society | CMTS

Univ.Prof. Dipl.-Ing. Dr.techn. Friedrich Bleicher

Head of Institute for Production Engineering and Laser Technology | IFT







Our sincere thanks also go to our media partners for supporting the 9th MATAR 2012 International Conference:





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INSTITUTE FOR PRODUCTION ENGINEERING AND LASER TECHNOLOGY, VIENNA UNIVERSITY OF TECHNOLOGY

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Prof. Jürgen Leopold

Dr. Lukas Novotny

Dr. Matei Sulitka

Dr. Jiri Sveda

Dr Luis Uriarte

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LOCAL TECHNICAL SUPPORT

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Jaroslav Cervenka

liri Drobilek

Josef Kekula

Lukas Rapek

Tomas Zavazal





KEYNOTE SPEAKERS

Prof. Friedrich Bleicher, Austria

is Head of the Institute of Production Engineering and Laser Technology at the Vienna University of Technology. After finishing his master's degree in Mechanical Engineering, he worked as a research assistant at the Institute of Production Engineering and Laser Technology. In 1996 he obtained his doctorate in Mechanical Engineering and in 2001 he became an associate professor at the Institute for Production Engineering and Laser Technology. In 2009 he received a professorship in Production Engineering and Chipping Technology at the Vienna University of Technology. His main topics of research cover machining processes with geometrically defined and undefined cutting edges, process automation, development and optimization of machine tools, parallel kinematics, EDM-technologies, and rapid manufacturing.



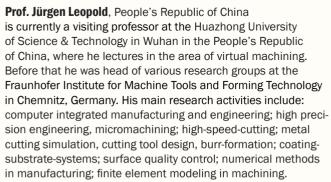
Prof. Erhan Budak, Turkey

obtained his B.Sc. and M.Sc. in Mechanical Engineering at the Middle East Technical University (METU) in 1987 and 1989 respectively. He earned his Ph.D. in Mechanical Engineering at the University of British Columbia in Vancouver, Canada in 1994. From 1994-2000 he worked for Pratt & Whitney Canada in Montreal as a manufacturing development engineer. He is now a professor at Sabanci University in Istanbul, Turkey, and the director of Manufacturing Research Lab. In 2003, he won the CIRP Taylor Medal and in 2011 he became a CIRP Fellow Member. His areas of interest include manufacturing processes and equipment, process modeling, monitoring and control, machine dynamics, and mechanical vibrations.

Prof. Berend Denkena. Germany

is Head of the Institute of Production Engineering and Machine Tools at the University of Hannover. After obtaining doctorate at the Faculty of Mechanical Engineering at the University of Hannover in 1992, he worked as a design engineer and head of various research groups for Thyssen Production Systems both in Germany and the United States. From 1996 to 2001 he was Head of Engineering and Turning Machine Development at Gildemeister Drehmaschinen in Bielefeld. Since 2001 he has been a full professor of Production Engineering and Machine Tools and Director of the Institute of Production Engineering and Machine Tools at the University of Hannover. He is a CIRP Fellow Member. His primary areas of research are geometry and functionalizing manufacturing processes, machine tools for cutting and grinding, production planning and control, and simulation of manufacturing processes.



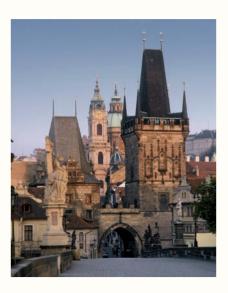






Prof. Michael Valasek, Czech Republic

is the Head of the Department of Mechanics. Biomechanics and Mechatronics at the Faculty of Mechanical Engineering at the Czech Technical University (CTU) in Prague. He earned his PhD in Automatic Control in 1984, and DrSc in Production Machine Design in 1991. He worked at CTU's Department of Automatic Control between 1980 and 1990 as well as in the National Research Institute for Machine Design between 1984 and 1988. He performed research during his Alexander von Humboldt Scholarship at the University of Stuttgart in 1989 to 1990 and during his Fulbright Scholarship at the University of Connecticut in 1991 to 1992. Since 1990, he has been working for the Department of Mechanics, Biomechanics and Mechatronics at CTU, where he was appointed Associate Professor in 1992 and full professor in 1997. Between 1992 and 1997. Prof. Valasek was leading a Tempus EU grant, which helped to establish mechatronics study program at four Czech technical universities. He participated in founding the Josef Bozek Research Center of Combustion Engine and Automotive Engineering in 1999 and has led its Laboratory of Dynamics and Mechatronics since 2000, Prof. Valasek and Mr. Petru were awarded the prestigious prize Czech Mind Invention in 2003 for the TriJoint machine tool and the corresponding theory of parallel kinematic machines. Prof. Valasek's expertise covers three main areas: computational mechanics of multibody systems; control of nonlinear mechanical systems, mechatronics, machine tools, robotics; and knowledge-based systems for engineering design.



Prague

Prague is the capital city of the Czech Republic, home to a number of famous cultural monuments. The structure of the old part of the city has remained almost intact in its historical appearance, which makes the atmosphere of the city unique. The main attractions include: the Prague Castle, Charles Bridge, Old Town Square, Jewish Quarter, Lennon Wall, and Petřín Hill. Since 1992, the historic centre of Prague has been inscribed on the UNESCO list of World Heritage Sites. In 2011, Prague was the sixth most visited city in Europe.

Conference Venue

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

CONFERENCE OFFICE

The MATAR conference office can be found on the $1^{\rm st}$ floor (Conference Level) of the Hotel Grand Majestic Plaza Prague. Phone: +420 605 205 912

REGISTRATION DESK

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

Opening time

 Wednesday, 12th September
 08:00 - 17:00

 Thursday, 13th September
 08:30 - 16:30

 Friday, 14th September
 08:30 - 13:30

Phone: +420 605 205 912

On-site payments can be settled in cash € only. ATM for Czech crowns (Kč) is a 5-minute walk from the conference venue in the PALLADIUM shopping center.



Internet Access / Computer Room

Free wireless Internet access is available on the Conference Level and in hotel rooms. Password is not necessary, please, choose the GM1 internet interface. Computers with printing facilities in a separate computer 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 7, Office 2010 (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.

POSTER SESSION

The poster must be put up during the registration period (September 12th between 8:00 until 9:00). All tools necessary for fastening the poster to the presentation frame will be prepared at the registration desk. The official presentation of the posters is on September 13th between 13:30 and 14:00. We would like to ask poster presenters to be present near their poster in order to answer the conference participants' questions.

BADGES AND TICKETS

The colors of name badges indicate the program options chosen.

Participants Blue
Visitors Green
Organizers Red

Only persons wearing the "M A T A R 2012 Blue" badges are entitled to attend the meetings, lunches and social event. Persons wearing the "M A T A R 2012 Green" can only attend meetings.

INSURANCE

The Organizers of the M A T A R 2012 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.

USEFUL PHONE NUMBERS

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

Ambulance: 155

Municipal Police: 156 Fire Brigade: 150 Overall Emergency: 112

Tourinform Hotline: +420 221 714 444

(9:00-12:00, 13:00-16:00)

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.

CURRENCY. CREDIT CARDS

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

International credit cards (EC/MC, Visa/Visa Electron) are accepted at most hotels, restaurants and shops. ATMs are available at the airport and all over the city.

ARRIVAL BY CAR

The Grand Majestic Plaza Prague Hotel is located in the very center of Prague (Truhlářská 16, Praha 1). The hotel offers onsite car parking (€ 25 per day).

TRAVEL INFO

ARRIVAL BY PLANE

By public transport

Take bus No. 100 from the Prague Airport to the terminal metro stop Zličín on line B (Yellow), where you change to metro. Go from Zličín to náměstí Republiky (12 stops).

Taxi

We would like to offer you a taxi for a fixed price of € 18. If you are interested in using this service, please send us your time arrival and flight number to **conference@matar.cz.**You can also take an AAA Taxi. One-way trip to the city center is about € 26.

ARRIVAL BY TRAIN

From Hlavní Nádraží train station or Nádraží Holešovice train station take the metro line C (Red) to Florenc station, where you change the line from C (Red) to B (Yellow), then travel to náměstí Republiky (1 stop).

PUBLIC TRANSPORTATION

Tickets should be purchased in advance (e.g. at metro stations, hotels, newsstands, 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 line B (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/.

	Public transport tickets and passes						
	TICKET / PASS TYPE	Adult # #	Child *	Junior	Student	Senior	
Tickets	Basic 90 min.	32 CZK	16 CZK	32 CZK	32 CZK	16 CZK	
	Short-term 30 min.	24 CZK	12 CZK	24 CZK	24 CZK	12 CZK	
	1 day 24 hrs.	110 сzк	55 CZK	110 czk	110 czk	55 CZK	
	3 days 72 hrs.	310 сzк		310 czk	310 czk	•	



MSV 2012

Pre-conference tour

Tuesday, 11th September 2012

Before the conference you can visit the International Machine Tool (IMT) fair in Brno, Czech Republic, the most important machine tool fair in Central and Eastern Europe. The IMT fair is held every even-numbered year (in between EMO exhibitions). The tour includes transport by minibus from Prague to Brno, a guided tour of the booths of Czech machine tool builders (including comments about specific research and development cooperation activities with RCMT), lunch and transport by minibus back to Prague. Participants will be back in Prague before the welcome reception of the conference starts. The price of the pre-conference tour is € 40.





Conference Program

Tuesday, 11th September 2012

Welcome reception - Foyer

Wednesday, 12th September 2012

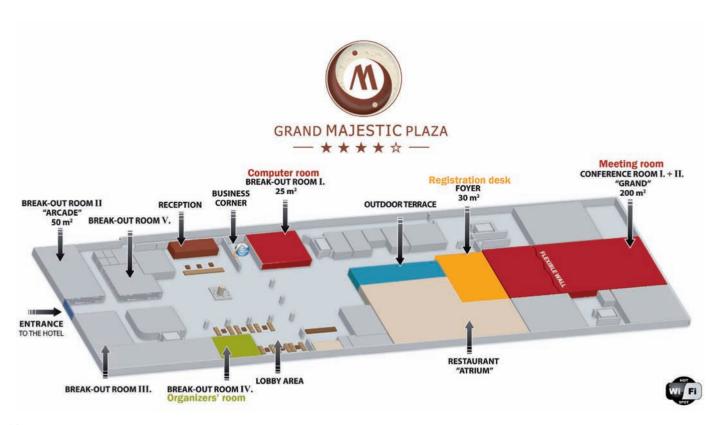
Invitation, Keynotes, Presentations in Sessions - Meeting Room

Thursday, 13th September 2012

Keynotes, Presentations in Sessions - Meeting Room Social Event - U Medvídků Restaurant

Friday, 14th September 2012

Presentations in Sessions - Meeting Room



Wednesday, September 12th

8:00 - 9:00	Registration. Poster hanging out.
9:00 - 9:30	Conference opening / Dr. Kolar, Prof. Housa, Dr. Smolik
9:30 - 10:00	Keynote speech: Improving 5-axis milling operations using process models / Prof. Budak
10:00 - 10:30	Keynote speech: Machine and process interaction by mechatronics / Prof. Bleicher
10:30 - 11:00	Coffee break
11:00 - 11:30	Keynote speech: Advancing Machine Tools and Technology / Prof. Denkena
11:30 - 12:00	Keynote speech: Energy optimized machining processes with advanced models and simulation tools / Prof. Leopold
12:00 - 12:30	Keynote speech: New concepts of structures and control of machine tools / Prof. Valasek
12:30 - 13:40	Lunch
Session 1:	Machine tool simulation and modeling / chairman: Dr. Sulitka
13:40 - 14:00	12013: Model updating of machine tools
14:00 - 14:20	12024: Real time simulation approach for the machine tool design and error compensation
14:20 - 14:40	12024: Real time simulation approach for the machine tool design and error compensation 12049: Analysis of the unconventional application of rotating systems of machine tools
14:20 - 14:40	12049: Analysis of the unconventional application of rotating systems of machine tools
14:20 - 14:40 14:40 - 15:00	12049: Analysis of the unconventional application of rotating systems of machine tools 12082: An integrated approach to the development of machine tool structural parts
14:20 - 14:40 14:40 - 15:00 15:00 - 15:30	12049: Analysis of the unconventional application of rotating systems of machine tools 12082: An integrated approach to the development of machine tool structural parts Coffee break
14:20 - 14:40 14:40 - 15:00 15:00 - 15:30 15:30 - 15:50	12049: Analysis of the unconventional application of rotating systems of machine tools 12082: An integrated approach to the development of machine tool structural parts Coffee break 12076: Synergetic development of machine tools
14:20 - 14:40 14:40 - 15:00 15:00 - 15:30 15:30 - 15:50 Session 2:	12049: Analysis of the unconventional application of rotating systems of machine tools 12082: An integrated approach to the development of machine tool structural parts Coffee break 12076: Synergetic development of machine tools Energy efficiency / chairman: Dr. Holkup

Thursday, September 13th parallel session A

Action 13 Parallel 3e33ion A
Thermal behavior of machine tool structures / chairman: Assoc. Prof. Bach
12072: Advanced compensation of thermally induced displacements of machine tools based on transfer functions
12033: Machine integrated, robust direct measuring devices for the compensation of thermal deformation
12053: Inherent thermal error compensation of machine tool structures with graded mineral casting
12086: Issue concerning identification of machine tools thermal behavior according to ISO 230-3 standard
Coffee break
12073: Machine tool heat transfer FEA and experimental identification of convective heat transfer
Thermal behavior of machine tool spindles and spindle design / chairman: Prof. Jedrzejewski
12031: Dynamic thermal error modeling of a built-in permanent magnet motor high-speed spindle
12060: Spindle and cooling circuit thermal integrated model
12032: Development of magnetically levitated high speed spindles and possibilities they give for the interaction with the milling process
Lunch
Poster program
Machine tool spindles / chairman: Dr. Kolar
12017: Analysis and re-design of structure dynamics and tolerances for the ram of a double-column machine tool
12021: A study on the influence of the spindle characteristic to the cutting stability of machine tool
12027: Damping behavior of spindle bearings
12090: Final inspection procedure for machine tool spindles
Coffee break
Inspection and diagnostics of machines and workpieces / chairman: Dr. Uriarte
12059: A machine vision approach for automated raw part alignment in machine tools
12029: Study of AE signals for ball screw pretension on feed drive table
12014: Revealing the 5-axes machine tool contouring performance with the R-test

Thursday, September 13th parallel session **B**

mursuay, se	pteriliber 13 paraller session b
Session 4:	Machine tool development, tool path planning and tool management / chairman: Prof. Bleicher
9:00 - 9:20	12088: Analysis of finishing NC programs from two different CAM systems
9:20 - 9:40	12056: Three-axis tool-path B-spline fitting based on preprocessing, least square approximation and energy minimization and its quality evaluation
9:40 - 10:00	12034: Information system for tool management in manufacturing systems
10:00 - 10:20	12089: High speed pneumatic spindle online vibration control for resonance avoidance in non-loaded state
10:20 - 10:50	Coffee break
Session 6:	Cutting process monitoring / chairman: Dr. Zatarain
10:50 - 11:10	12023: Cutting force monitoring in ball screw driven stage by inner sensor fusion
11:10 - 11:30	12028: Development of spindle vibration based tool breakage monitoring system for micro milling
11:30 - 11:50	12040: Development of the tool contact stiffness monitoring method in buffing with the intelligent polishing machine
11:50 - 12:10	12083: The method for online monitoring of stability during milling
12:10 - 13:30	Lunch
13:30 - 14:00	Poster program
Session 8:	Cutting technology / chairman: Prof. Budak
14:00 - 14:20	12037: Innovative calculation method for ultrasonic systems and its application for an ultrasonic device to machine optical freeform-surfaces with diamond
14:20 - 14:40	12044: Investigation of machining related impact to the generated surface of work pieces due to high-speed hard milling
14:40 - 15:00	12052: Fundamental investigations on conventional milling in the overall context of a laser-assisted process
15:00 - 15:20	12022: Air jet assisted machining of difficult-to-machine materials
15:20 - 15:50	Coffee break
Session 10:	Cutting technology / chairman: Prof. Leopold
15:50 - 16:10	12057: Milling and quality monitoring of sheet metal edges in continuous flow production
16:10 - 16:30	12019: Machining performance improvement based on chatter identification
16:30 - 16:50	12075: Technology optimization of PPS/C composite milling using Taguchi method
	Social event
19:00 - 23:00	Social event

Friday, September 14th

Triday, September 14				
Session 11:	Machine tool accuracy / chairman: Dr. Sveda			
9:00 - 9:20	12065: Integrated modelling of axial motion error sources for 5-axis precision machining centre with direct drives			
9:20 - 9:40	12041: High precision, fast and flexible calibration of robots and large multi-axis machine tools			
9:40 - 10:00	12042: Efficient calibration of five-axis machine tools based on a systematic error budget analysis			
10:00 - 10:20	12012: Improving accuracy of cooperating robots by prediction of the iGPS-signal-stability			
10:20 - 10:50	Coffee break			
Session 12:	Feed drives / chairman: Dr. Lukas Novotny			
10:50 - 11:10	12077: Minimization of cogging effect in machine tool rotational feed drive axes			
11:10 - 11:30	12035: Integrated machine control strategy for fast tool ultra precision machining			
11:30 - 11:50	12036: Controller commissioning based on a new identification method of parametric models for cascaded servo drive systems			
11:50 - 12:10	12087: Coupled model of the machine tool motion axis with a multi-stage tooth gear system			
12:10 - 12:20	Conference closing			
12:20 - 13:20	Lunch			

Social Program

Tuesday, 11th September

19:00 HOTEL GRAND MAJESTIC PLAZA PRAGUE

Truhlarska 16, Prague 1

WELCOME RECEPTION

The participants will have an excellent opportunity to network and socialize in a pleasant atmosphere of the hotel foyer.

Attire: Formal





Thursday, 13th September 19:00 U MEDVÍDKŮ RESTAURANT

Na Perstyne 7, Prague 1

SOCIAL EVENT

Attire: Casual

18:00 Before the social event you can join a guided tour of the Old Town. The tour will start at **18:00** at the Hotel Grand Majestic Plaza Prague and end at the U Medvídků Restaurant. You will get a chance to see places like the Powder Tower and the Old Town Square.

How to get to the restaurant on your own:

By metro line B (Yellow) from the station náměstí Republiky to the station Karlovo náměstí and then by tram No. 22 to the station Národní třída

OR

By tram No. 24 from the station náměstí Republiky to the station Lazarská, then change to tram No. 9 to the station Národní třída

U Medvídků Restaurant

The U Medvídků Brewery Hotel is situated in the Prague centre between the Old Town Square and the National Theatre. The U Medvídků Brewery Hotel is the only hotel with a brewery

in Prague. A former medieval brewery was converted into a three-star hotel with 33 unique rooms.

The restaurant comprises a traditional Prague pub with typical Czech cuisine, a beer bar with a wide selection of Czech beer, shop offering beer and brewery souvenirs.

The mini-brewery is the biggest attraction for guests. It makes the strongest beer in the world, XBEER-33, using historical technology.

A short guided tour through the brewery will be organized for you during the evening.

Accommodation

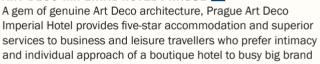
We recommend accommodation in hotels located close to the conference venue:

HOTEL GRAND MAJESTIC PLAZA PRAGUE

The new design hotel Grand Majestic Plaza, a member of Worldhotels chain is located in one of the most desirable locations, in the heart of historical and business centre of Prague. The hotel is within walking distance from all major tourist attractions, just a few steps from the famous Municipal House, Gothic Powder Gate, Republic Square and most attractive PALLADIUM shopping centre.



ART DECO IMPERIAL HOTEL PRAGUE 1



The hotel is located within a 5-minute walk from the conference place at the Hotel Grand Majestic Plaza Prague.

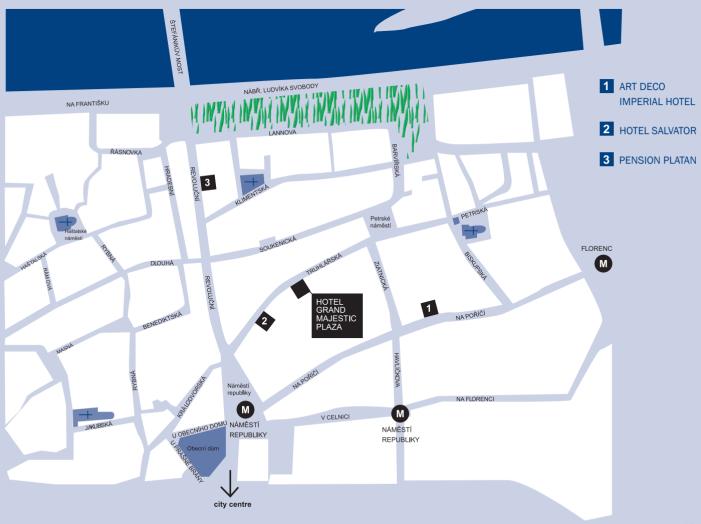


HOTEL SALVATOR 2

The Salvator hotel is listed historical building. Czech architects have preserved the characteristics of Old Town buildings. The hotel is located within a 3-minute walk from the conference place at Hotel Grand Majestic Plaza Prague.

PENSION PLATAN 3

The Platan Pension is situated in the historic centre of Prague, just a few hundred meters from the Old Town Square, medieval Josefov Jewish Quarter, Charles Bridge, National Theatre and Prague State Opera, and 10 minutes from the Wenceslas Square.



Contact

CHAIRMAN

Dr. Petr Kolar

RESEARCH CENTER OF MANUFACTURING TECHNOLOGY, CZECH TECHNICAL UNIVERSITY IN PRAGUE.

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Zuzana Cejkova

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Organizers and Partners

CZECH TECHNICAL UNIVERSITY IN PRAGUE | FACULTY OF MECHANICAL ENGINEERING | RESEARCH CENTER OF MANUFACTURING TECHNOLOGY | RCMT

The Research Center of Manufacturing Technology was established in 2000 as an institute of the Faculty of Mechanical Engineering of the Czech Technical University in Prague (CTU). The RCMT is highly professional and well equipped both research and educational institution, providing its service for the Czech machine tool industry. Cooperation with the industry stands in the foreground of RCMT activities.

The RCMT team comprises almost 100 professionals specializing in design, engineering analyses and research. In the frame of intensive cooperation with the machine tool producers all over the Czech Republic all the knowledge gained in the research is applied. RCMT represents the Czech Republic in technical fields in CECIMO.

VIENNA UNIVERSITY OF TECHNOLOGY | INSTITUTE FOR PRODUCTION ENGINEERING AND LASER TECHNOLOGY | IFT

Institute for Production Engineering And Laser Technology covers a wide field of manufacturing technology and machine tool research. The IFT is the most important institution in

process development and machine tool research in Austria. Knowledge and technology transfer is made possible by close cooperation with the Austrian industry. Research results are immediately used in the learning process, to reach the highest level of technical education.

CZECH MACHINE TOOL SOCIETY I CMTS

The Czech Machine Tool Society is an association of companies and specialists in the field of machine tools. The Society supports research, development, production and application of machine tools in the Czech Republic by organizing scientific conferences, lectures, workshops and specialized tours. The Society helps create links between the industry and technical universities, supports scientific and technical publication activities and makes prognoses and concept studies.

MAIN MEDIA PARTNER

MM Science Journal

Currently, MM Science is the leading scientific journal in Central Europe. The main focus of this journal is engineering design theory, methodology and creativity, innovations in engineering design of production machines, esp. machine tools, including their parts and mechanisms. The conference paper fulltexts are available on the journal's website. Paper abstracts are distributed in printed version as a scientific supplement of Modern Machinery (MM) journal.

MEDIA PARTNERS

Manufacturing Technology

The Manufacturing Technology is a periodical scientific journal published in the Czech Republic. The journal focuses on these topics: Advanced Technology (Precision Machining, Hard Machining, High Speed Machining, MicroMilling), Material Engineering, Surface Quality, Non-destructive Materials Testing, Casting, Forming, Metallography. All articles are peer-reviewed by 2 reviewers. The journal is published twice per year and disseminated to top universities and colleges in Europe and the USA.

List of participants

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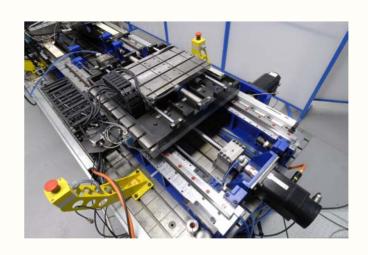
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