The International Academy for Production Engineering

66th GENERAL ASSEMBLY

CIRP 2016

21st to 27th August 2016, Guimarães, Portugal

PROGRAMME
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Welcome

Dear Colleagues and Friends,

On behalf of the CIRP Portuguese delegation, this is our great honour and pleasure to welcome you to the 66th General Assembly of the International Academy for Production Engineering (CIRP).

University of Minho is very proud to host this event. University of Minho (UMinho) is one of the so-called “New Universities” that changed the HE landscape in Portugal. Located in the Minho region, in the cities of Guimarães and Braga, UMinho is renowned for the quality of its teaching, the quality of its students, the public recognition given to its Alumni, and for its intervention and strong links with the local community and the surrounding region.

Guimarães is the city with a glorious historical past, whose history is linked to the founding of Portugal’s national identity and to the Portuguese language in the 12th century. The historical centre is classified a World Heritage site. Along centuries the region of Guimarães and Braga developed to nowadays one of the most industrialised regions of Portugal, which has special importance in the history of industrialization of Portugal since XIX century. Today, Guimaraes continues to be one of the most industrialized municipalities in Portugal with primary industries from so-called “traditional” industrial sectors.

The scientific and technical meetings of the 66th CIRP GA will take place at the Campus of Azurem of the University of Minho in Guimarães. During the week a great number of excellent keynote and regular papers will be presented, as well as a number of meetings of the members, corporate and affiliate colleagues will be realized. In parallel, the accompanying persons will have a rich programme of visiting the cities of Guimarães and Braga as well as the North of Portugal including the city of Porto.

On behalf of the Portuguese Organising Committee, we wish you a fruitful and enjoyable stay in Guimarães and Braga and an unforgettable 66th General Assembly of the International Academy of Production Engineering.

Goran D. Putnik, Chairman of the Organising Committee

Hildebrando Vasconcelos, Co-Chairman of the Organising Committee
Acknowledgements

The Organising Committee wishes to thank the CIRP President and the administration for their contributions to preparing the 66th CIRP General Assembly:

**CIRP President**  
Professor Ekkard Brinksmeier

**CIRP Office**  
Professor Didier Dumur – Secretary General  
Treasurer  
Mrs. Chantal Timar-Schubert – Assistant Secretary General  
Ms. Agnes Chelet – CIRP Accountant

Our gratitude to all Portuguese Delegation members for their advices and support during the preparation of this event.

Our sincere thanks to all organisation committee members and volunteers for their support and advices during the preparation of the 66th CIRP General Assembly.

Our thanks for preparing the 66th CIRP General Assembly also go to our partner ParallelPlanes Lda.
Our thanks for the support of our partners:
CIRP Council 2016

President
Prof. E. Brinksmeier

Vice President
Prof. Y. Altintas

Secretary General Treasurer
Prof. Didier Dumur

Technical Secretary
Prof. B. Lauwers

Council Members
Prof. A. Bernard
Prof. F. Fang
Prof. H. Hansen
Prof. B. Karpuschewski
Prof. M. Mitsuishi
Prof. K. Rajurkar

STC Officers

<table>
<thead>
<tr>
<th>STC</th>
<th>Chairman</th>
<th>Vice Chairman</th>
<th>Secretary</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>S. Kara</td>
<td>J. Sutherland</td>
<td>J. Krueger</td>
</tr>
<tr>
<td>C</td>
<td>R. M’Saoubi</td>
<td>D. Biermann</td>
<td>S. Melkote</td>
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<td>Dn</td>
<td>E. Lutters</td>
<td>R. Stark</td>
<td>T. Tomiyama</td>
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<td>E</td>
<td>A. Malshe</td>
<td>P. Bartolo</td>
<td>M. Schmidt</td>
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<td>F</td>
<td>J. Allwood</td>
<td>J. Cao</td>
<td>G. Hirt</td>
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<td>G</td>
<td>J. Aurich</td>
<td>K. Wegener</td>
<td>H. Yamaguchi</td>
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<td>M</td>
<td>C. Brecher</td>
<td>E. Budak</td>
<td>A. Matsubara</td>
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<tr>
<td>O</td>
<td>R. Teti</td>
<td>J. Vancza</td>
<td>G. Lanza</td>
</tr>
<tr>
<td>P</td>
<td>W. Gao</td>
<td>A. Donmez</td>
<td>A. Archenti</td>
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<tr>
<td>S</td>
<td>H. Haitjema</td>
<td>E. Savio</td>
<td>B. Mullany</td>
</tr>
</tbody>
</table>

Editorial Committee
Organising Committee

Chairman of the Organising Committee
Professor Goran Putnik

Co-Chairman
Eng. Hildebrando Vasconcelos

Accompanying Persons Committee
Chair, Mrs Zlata Putnik

CEO
Helio Castro (ParallelPlanes Lda)
Luís Rocha (CATIM, Porto)
Paulo Avila, Professor (ISEP, Porto)
Cátia Alves (UMinho, Guimaraes)

Members of the CIRP Delegation from Portugal
Professor Paulo Bártolo (1), IPL, Portugal, University of Manchester, UK
Professor Pedro Cunha (2), IPS, Portugal
Professor Paulo Martins (2), IST, Portugal
Professor José Outeiro (2), Arts et Metiers ParisTech, France

Members of the Portuguese Institutions
Professor Valério de Carvalho, UMinho (Head of Department DPS)
Professor Senhorinha Teixeira, UMinho (Former Head of Department DPS)
Professor Madalena Araújo, UMinho (Research Centre ALGORITMI)
Eng. Manuel Martins, President, Commercial and Industrial Association of Guimarães
Dr. António Marques, President, Industrial Association of Minho (AIMinho)

Members
Acácio Costa, UMinho
Carla Rocha, UMinho
Luís Coutinho, UMinho
Amélia Aguiar, UMinho
Ana Rita Rodrigues, UMinho
Conceição Marques, UMinho
Dr. Vaibhav Shah, UMinho
Cláudia Fernandes, CATIM
Nuno Araújo, CATIM
### Practical Information

**Venue**

Universidade do Minho  
Campus de Azurém  
Alameda da Universidade  
4804-533 Guimarães – Portugal

**GPS:**  
Latitude: 41° 27’ 6.85” N  
Longitude: 8° 17’ 33.19” W

**Date**  
21st to 27th of August 2016

### CIRP Secretariat

The CIRP Headquarters will be located in Room A2 ("Sala dos Actos") at the Ground Floor.

### Help Desk

The help desk will be located at the Reception (Ground Floor), near the Entrance to the building.

**Emergency Contacts:**

- **Name:** Dr. Paulo Ávila  
  **Telf:** +351 914 729 712

- **Name:** Eng. Hélio Castro  
  **Telf:** +351 919 498 287
Parking for the CIRP GA 2016 participants at the Campus of Azurém – University do Minho

Parking place is available at the CIRP GA 2016 meetings venue, at the Campus of Azurém – University of Minho, for the participants of the CIRP GA 2016. Entrance to the campus is shown in the picture below. The users should go the middle parking barrier – see the picture below.
For entrance you have to show your badge to the security.
## Registration at Hotels

The registration may be done at the following locations:

<table>
<thead>
<tr>
<th>Day, Time</th>
<th>Registration Location</th>
<th>For the guests from the following hotels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guimarães</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturday, 20th August 14:00 – 19:00</td>
<td>Hotel Guimarães</td>
<td>Hotel Guimarães Hotel Fundador</td>
</tr>
<tr>
<td>Sunday, 21st August 10:00 – 13:00</td>
<td>Hotel Guimarães</td>
<td>Hotel Guimarães Hotel Fundador</td>
</tr>
<tr>
<td></td>
<td>Hotel Villa Guimarães</td>
<td>Hotel Villa Guimarães</td>
</tr>
<tr>
<td></td>
<td>Ibis GMR</td>
<td>Ibis GMR Hotel Mestre de Avis</td>
</tr>
<tr>
<td></td>
<td>Hotel EMAJ</td>
<td>Hotel Toural Santa Luzia ArtHotel Hotel EMAJ Casa Juncal Hotel Oliveira Pensão Residencial das Trinas</td>
</tr>
<tr>
<td></td>
<td>Open Village Sports Hotel &amp; SPA Club</td>
<td>Open Village Sports Hotel &amp; SPA Club</td>
</tr>
<tr>
<td></td>
<td>Pousada Mosteiro de Guimarães</td>
<td>Pousada Mosteiro de Guimarães</td>
</tr>
<tr>
<td><strong>Braga</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday, 21st August 17:30 – 18:15</td>
<td>Hotel Meliã Braga</td>
<td>Hotel Meliã Braga</td>
</tr>
<tr>
<td></td>
<td>Hotel Mercure Braga</td>
<td>Hotel Mercure Braga Ibis budget Braga</td>
</tr>
</tbody>
</table>

**IMPORTANT:**

If you cannot make your registration at the hotels, you can pick up your badge ONLY at the entrance of the “Welcome Reception” location (in this case you can pick up your bag from Monday at the Venue – Campus of Azurém, University of Minho).

**THERE WILL BE NOT GRANTED ACCESS TO THE WELCOME RECEPTION AND TO THE OPENING SESSION TO ANYONE WHO IS NOT HOLDING A VALID BADGE.**
Registration/Hospitality Desk at the GA Venue – Campus of Azurém

The Hospitality Desk will be located on the Ground Floor at the Reception near to the Entrance.

Opening Hours during the Conference:

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, 22nd August</td>
<td>13:00 – 18:00</td>
</tr>
<tr>
<td>Tuesday, 23rd August</td>
<td>08:30 – 18:00</td>
</tr>
<tr>
<td>Wednesday, 24th August</td>
<td>08:30 – 18:00</td>
</tr>
<tr>
<td>Thursday, 25th August</td>
<td>08:30 – 18:00</td>
</tr>
<tr>
<td>Friday, 26th August</td>
<td>08:30 – 18:00</td>
</tr>
<tr>
<td>Saturday, 27th August</td>
<td>10:30 – 17:15</td>
</tr>
</tbody>
</table>

Onsite Registration Fees

The access to all the General Assembly activities is subject to registration. All invoices will be processed in Euro (€).

<table>
<thead>
<tr>
<th></th>
<th>Part I &amp; II</th>
<th>Part I only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delegates</td>
<td>995,00€</td>
<td>845,00€</td>
</tr>
<tr>
<td>Accompanying person</td>
<td>685,00€</td>
<td>570,00€</td>
</tr>
</tbody>
</table>

Payments onsite ONLY in cash.

Items Included in the Fees

Delegates Part I & II
Attendance at all sessions from August 22nd to 26th programme, conference bag, programme booklet and list of participants. Lunches, refreshment during the “coffee-breaks”, during conference days and on Saturday, August 27th. Welcome Reception on Sunday, August 21st. Assembly Dinner on Wednesday, August, 24th. Farewell dinner on Saturday, August, 27th. Transportation between selected hotels and the
conference venue, between the selected hotels and the social events venues, in accordance with schedule plan.

**Delegates Part I only**

Attendance at all sessions from August 22\textsuperscript{nd} to 24\textsuperscript{th} programme, conference bag, programme booklet and list of participants. Lunches, refreshment during the “coffee-breaks”, during conference days from August 22\textsuperscript{nd} to 24\textsuperscript{th}. Welcome Reception on Sunday, August 21\textsuperscript{st}. Assembly Dinner on Wednesday, August, 24\textsuperscript{th}. Transportation between selected hotels and the conference venue, between the selected hotels and the social events venues, in accordance with schedule plan.

**Accompanying Person Part I & II**

Attendance at the Opening Session, conference bag, programme booklet and list of participants, participation in the touristic tours, with lunches included, from Monday to Friday, August 22\textsuperscript{nd} to 26\textsuperscript{th}, and lunch on Saturday, August 27\textsuperscript{th}. Welcome Reception on Sunday, August 21\textsuperscript{st}. Assembly Dinner on Wednesday, August, 24\textsuperscript{th}. Farewell dinner on Saturday, August, 27\textsuperscript{th}. Transportation between selected hotels and the social events venues, in accordance with schedule plan.

**Accompanying Person Part I only**

Attendance at the Opening Session, conference bag, programme booklet and list of participants, participation in the touristic tours, with lunches included, from Monday to Wednesday, August 22\textsuperscript{nd} to 24\textsuperscript{th}. Welcome Reception on Sunday, August 21\textsuperscript{st}. Assembly Dinner on Wednesday, August, 24\textsuperscript{th}. Transportation between selected hotels and the social events venues, in accordance with schedule plan.

Registration fees do not include: Flights, transfers from/to the airport, or accommodation.

Changes between Delegate and Accompanying Person’s programmes are not permitted. For participation in Accompanying Person’s programme by the delegates one day “tickets” will be charged.
Badges

Name badge colours indicate the attendee type and programme chosen.

<table>
<thead>
<tr>
<th>Attendee type</th>
<th>Badge Colour Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delegate for Part I &amp; II</td>
<td>Blue</td>
</tr>
<tr>
<td>Delegate for Part I only</td>
<td>Half Blue, Half White</td>
</tr>
<tr>
<td>Accompanying Person for Part I &amp; II</td>
<td>Green</td>
</tr>
<tr>
<td>Accompanying Person for Part I only</td>
<td>Half Green, Half White</td>
</tr>
<tr>
<td>Organisation Committee and Staff</td>
<td>Bordeaux</td>
</tr>
</tbody>
</table>

A name badge is provided with your registration documents upon your registration in the corresponding hotels.

For security and regulations purposes, the wearing of the badge is compulsory at all times inside Opening Session location and inside the University of Minho.

Only persons wearing a CIRP GA 2016 badge are entitled to attend the meetings, lunches, refreshments, social events or Accompanying Persons’ programmes. Badges also serve as tickets for the social and Accompanying Persons’ programmes. Extra tickets will be issued in case of extra purchase.

Lunches
Lunches for the conference delegates will be served in the canteen (Cantina) of the University of Minho in the Campus of Azurém.

Coffee Breaks
Coffee and refreshments for the conference delegates will be served in the Coffee Break Area, between the Central Hall and the AN room.

Computer Room
Computers are available for all participants in the room CA-CR, on the 1st Floor. In this room a printer is available.
Preparation Room
The “preparation room” is located in R2 (B1.12) on the Ground Floor. In this room the speakers may check their presentations.

Speakers’ Presentation
Each meeting room, R1, R4, R5, R6, R7 and AN, all on the Ground Floor, is equipped with a projector and a laptop. Personal laptops may also be used. In the case of personal laptops use, the speakers are requested to check compatibility with the installed equipment (software, connectors and format). The laptops provided are equipped with Microsoft Windows 10, Office 2013 (PowerPoint, Word, and Excel), Adobe Reader, Windows Media Player and VCL Video Player.

IMPORTANT: Projector’s connector is of VGA type. If you would use your own personal laptop with different connector, you should bring your own adapter.

Speakers are requested to upload their presentations to the room’s laptop in due time before their session starts. In any case, a copy of the presentation is requested by the CIRP secretariat.

Technical assistance is provided in the meeting rooms.

Internet Access
University of Minho has free WI-FI.

WI-FI name: eduroam
Username: cirp2016@guest
Password: cirp2016
The preparation room is located in R2 (B1.12) on the Ground Floor. In this room, the speakers can check their presentations.

Each meeting room, R1, R4, R5, R6, R7, and AN, all on the Ground Floor, is equipped with a projector and a laptop. Personal laptops may also be used. In the case of personal laptops, use, the speakers are requested to check compatibility with the installed equipment (software, connectors, and format). The laptops provided are equipped with Microsoft Windows 10, Office 2013 (PowerPoint, Word, and Excel), Adobe Reader, Windows Media Player, and VCL Video Player.

IMPORTANT: The projector’s connector is of VGA type. If you would use your own personal laptop with a different connector, you should bring your own adapter.

Speakers are requested to upload their presentations to the room’s laptop in due time before their session starts. In any case, a copy of the presentation is requested by the CIRP secretariat.

Technical assistance is provided in the meeting rooms. The University of Minho has free WI-FI. WI-FI name: eduroam. Username: cirp2016@guest. Password: cirp2016.
CIRP GA 2016 Venue – University of Minho - Campus of Azurém
Map
General Information

Emergency, Police, Fire Brigade and Ambulance
In case of emergency while you are in Guimarães or Braga, always dial 112. It is a free call which will connect you to National Emergency Service (SOS) in case of accident. A technician will forward your call to the service that can best serve, either the police, fire brigade or hospital. Speak slowly and distinctly, and state your telephone number and address. If you need a pharmacy, there are few open 24 hours.

Bank, Currency, Exchange Rate, Credit Cards and Debit Card
Banks are open to the public between 8:30 am and 3:00 pm, Monday to Friday. The currency in Portugal is the Euro. Exchange Rates: For your orientation only, visit e.g. http://www.oanda.com/currency/converter/.

Credit Cards and Debit Cards:
Visa and MasterCard credit cards are widely accepted. Other cards are also accepted, but there could be exceptions. Debit cards associated with Maestro and Visa Electron multi-national debit card services are widely accepted.

Electricity, Power Supply
220 volts AC, 50Hz. Continental two-pin plugs CEE7/4 Schuko are in use. Depending on your country, you may need an adapter.

Smoking
Smoking – cigarettes, cigars and pipes – is banned in indoor public places in Portugal (as of 1 January 2008). The ban prohibits smoking in all government buildings as well as work places, public transport, schools and sports facilities, hospitals, museums, food and beverage establishments, covered car parks, theatres, libraries, and bars and restaurants where smoking is only allowed in designated smoking areas or venues.
VAT
There are different rates of VAT (Value Added Tax, in Portugal: Imposto sobre o Valor Acrescentado – IVA) due for different goods and services. These rates are: IVA geral (general VAT): 23%; IVA intermedio (intermediate VAT): 13%; IVA reduzido (reduced VAT): 6%. Prices in shops and restaurants are inclusive IVA (VAT).

Units of Measurement
Metric (kg, g, l, m, km, ...)

Liability
The Organising Committees and/or Conference Organisers shall not be held liable for personal accidents or losses or damage to private property of registered delegates of the Conference. Delegates should make their own arrangements in respect of personal insurance.
There are different rates of VAT (Value Added Tax, in Portugal: Imposto sobre o Valor Acrescentado – IVA) due for different goods and services. These rates are:

- **IVA geral** (general VAT): 23%
- **IVA intermedio** (intermediate VAT): 13%
- **IVA reduzido** (reduced VAT): 6%

Prices in shops and restaurants are inclusive IVA (VAT).
<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Session</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, Aug. 22, 2016</td>
<td>09:00-10:30</td>
<td>Opening Session</td>
<td>Lunch</td>
</tr>
<tr>
<td></td>
<td>10:30-12:30</td>
<td>Cross STC &quot;Process Chains,...&quot;</td>
<td>Lunch</td>
</tr>
<tr>
<td></td>
<td>12:30-14:00</td>
<td>Keynote O &quot;Cyber Physical Systems...&quot;</td>
<td>Lunch</td>
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<tr>
<td></td>
<td>14:30-15:30</td>
<td>Keynote F &quot;Closed Loop Control...&quot;</td>
<td>Lunch</td>
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<tr>
<td></td>
<td>15:00-16:30</td>
<td>Keynote G &quot;Abrasive Fine Finishing...&quot;</td>
<td>Lunch</td>
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<td></td>
<td>16:00-18:00</td>
<td>Cross STC &quot;Continuous Maintenance...&quot;</td>
<td>Lunch</td>
</tr>
<tr>
<td>Sunday, Aug. 21, 2016</td>
<td>09:00-09:30</td>
<td>Board meeting</td>
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<td></td>
<td>09:30-10:00</td>
<td>Research Affiliates Meeting</td>
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<td>10:00-10:30</td>
<td>Nominating Ctte Meeting</td>
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<td></td>
<td>10:30-11:00</td>
<td>Credent. Ctte</td>
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<td></td>
<td>11:00-11:30</td>
<td>Senate meeting</td>
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<tr>
<td></td>
<td>11:30-12:00</td>
<td>(Lunch)</td>
<td></td>
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<tr>
<td></td>
<td>12:00-12:30</td>
<td>Coffee break</td>
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<td></td>
<td>12:30-14:30</td>
<td>(Lunch)</td>
<td></td>
</tr>
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<td></td>
<td>14:30-14:30</td>
<td>(Lunch)</td>
<td></td>
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<tr>
<td></td>
<td>14:30-15:00</td>
<td>Corporate Members</td>
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<td>15:00-15:30</td>
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<td>15:30-16:00</td>
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<td>16:00-16:30</td>
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<td>16:30-18:00</td>
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<td>17:30-18:30</td>
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<td>18:00-19:00</td>
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<td></td>
<td>19:00-19:30</td>
<td>Corporate Members</td>
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*ITP: CMAG Industrial Technical Papers*
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>STC</th>
<th>Title</th>
<th>Location</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday, Aug. 21</td>
<td>09:00-10:00</td>
<td>STC G</td>
<td>Keynote A</td>
<td>Guimarães, Portugal</td>
<td>Opening Session</td>
</tr>
<tr>
<td></td>
<td>10:00-11:00</td>
<td>STC C</td>
<td>Keynote B</td>
<td></td>
<td>Keynote C</td>
</tr>
<tr>
<td></td>
<td>11:00-12:00</td>
<td>STC F</td>
<td>Keynote C</td>
<td></td>
<td>Keynote D</td>
</tr>
<tr>
<td></td>
<td>12:00-12:30</td>
<td>STC E</td>
<td>Keynote D</td>
<td></td>
<td>Keynote E</td>
</tr>
<tr>
<td></td>
<td>12:30-14:00</td>
<td>STC D</td>
<td>Keynote E</td>
<td></td>
<td>Keynote F</td>
</tr>
<tr>
<td></td>
<td>14:00-15:00</td>
<td>STC B</td>
<td>Keynote F</td>
<td></td>
<td>Keynote G</td>
</tr>
<tr>
<td></td>
<td>15:00-16:00</td>
<td>STC A</td>
<td>Keynote G</td>
<td></td>
<td>Keynote H</td>
</tr>
<tr>
<td></td>
<td>16:00-17:00</td>
<td>STC H</td>
<td>Keynote H</td>
<td></td>
<td>Keynote I</td>
</tr>
<tr>
<td></td>
<td>17:00-18:00</td>
<td>STC I</td>
<td>Keynote I</td>
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* ITP: CMAG Industrial Technical Papers

**STC:** Strategic Technical Committees

**Committees:**
- STC A: Advancing Materials
- STC B: Bio-inspired Systems
- STC C: Composite Systems
- STC D: DGNW Meetings
- STC E: Drawing Systems
- STC F: Electrical Systems
- STC G: Manufacturing Systems
- STC H: NC Systems
- STC I: Parts & Manuf. Systems
- STC J: Processes
- STC K: Self-Optimizing Machining Systems
- STC L: Smart Factories
- STC M: Software Systems
- STC N: Technical Meetings
- STC O: Technical Meetings
- STC P: Technical Meetings
- STC Q: Technical Meetings
- STC R: Technical Meetings
- STC S: Technical Meetings
- STC T: Technical Meetings
- STC U: Technical Meetings
- STC V: Technical Meetings
- STC W: Technical Meetings
- STC X: Technical Meetings
- STC Y: Technical Meetings
- STC Z: Technical Meetings

**CWG:** Cross Working Group

**CWGs:**
- CWG A: Advances in Large Scale F & M
- CWG B: Advances in Large Scale F & M
- CWG C: Advances in Large Scale F & M
- CWG D: Advances in Large Scale F & M
- CWG E: Advances in Large Scale F & M
- CWG F: Advances in Large Scale F & M
- CWG G: Advances in Large Scale F & M
- CWG H: Advances in Large Scale F & M
- CWG I: Advances in Large Scale F & M
- CWG J: Advances in Large Scale F & M
- CWG K: Advances in Large Scale F & M
- CWG L: Advances in Large Scale F & M
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- CWG V: Advances in Large Scale F & M
- CWG W: Advances in Large Scale F & M
- CWG X: Advances in Large Scale F & M
- CWG Y: Advances in Large Scale F & M
- CWG Z: Advances in Large Scale F & M
Opening Session Programme

Monday, August 22, 2016, 09:00-10:30

GRANDE AUDITORIUM, Cultural Centre Vila Flor (CCVF)

09:00  Chamber Orchestra of the University of Minho

09:15  Welcome Address by the Chairman and Co-Chairman of the Organizing Committee
       Professor Goran D. Putnik
       Eng. Hildebrando Vasconcelos

       Welcome Address by the Rector of the University of Minho
       Professor Antonio M. Cunha

09:20  Opening Address by the CIRP President
       Professor Ekkard Brinksmeier

09:40  Special lecture 1: Research in the School of Engineering of the University of Minho
       Professor António Gomes Correia
       Vice-President of the School of Engineering, University of Minho, Portugal

09:55  Special lecture 2: What can Industry 4.0 learn from software engineering?
       Professor José Nuno Oliveira
       Informatics Department, University of Minho, Portugal

10:10  Special lecture 3: Driving change with Universities
       Gerardo A. Saraiva de Menezes
       BOSCH Car Multimedia, Braga, Portugal

10:25  Presentation of the Taylor Medal Award
       CIRP President Professor Ekkard Brinksmeier

10:30  General Announcements
**Special lecture 1:**

**Research in the School of Engineering of the University of Minho**

**António Gomes Correia**  
*Professor, ice-President of the School of Engineering, University of Minho, Portugal*

**Abstract:** Founded in 1975, the School of Engineering of the University of Minho (EEUM) is currently among the most prestigious institutions of higher education in the country, and it has also gain a remarkable international reputation. It has contributed significantly to the top world leading rankings of University of Minho for higher education. Furthermore, in 2015, the School of Engineering developed more than 2010 research projects which represented a total funding sum of more than 53 million euros. The School of Engineering through their 9 research centres devotes its efforts to innovative ground-breaking scientific areas, the so called “new engineering”, involving new manufacturing technologies, more efficient processes, advanced design, energy and sustainability. The main goal is to promote knowledge and innovation working towards the reinvention of our future and providing effective solutions to the societal challenges of our days: environment, energy, reindustrialisation, sustainability, bioengineering, etc. This is materialised addressing real life problems in close cooperation with industry and society. R&D activities foster the creation of new knowledge, which is in turn applied and taught, constantly renewing the cycle of practice-based learning. The recognition of these achievements has been awarded in the report "Diagnosis of the Research and Innovation System – Challenges, strengths and weaknesses towards 2020", recently published by the Portuguese Foundation for Science and Technology (FCT), referring the University of Minho as a top institution with regards to the number and quality of collaboration relationships with the national industry network.

**Biography:** António Gomes Correia received in 1987 the Doctor degree in Civil Engineering by the Technical University of Lisbon – IST and also in 1998 the “Habilitation in Civil Engineering. In 1987 he gained the specialist degree at the National Laboratory of Civil Engineering (LNEC), distinguished with Manuel Rocha Award. He is since 2003 Full Professor at the University of Minho and from 2010 to 2013 Director of the Research Centre of Territory, Environment and Construction. He is
also from 2010 chair of the Doctoral programme in Civil Engineering and from 2013 Vice-Dean of School of Engineering of the University of Minho. He participated in over 35 national and international research projects. He is since 2013 expert (external member) of "Agência de Avaliação e Acreditação do Ensino Superior" (Agency for Assessment and Accreditation of Higher Education - A3ES) for the scientific area of Civil Engineering. He is from September 2013 Editor-in-Chief of the International Journal on Transportation Geotechnics published in Elsevier’s Engineering Journals (SCI and Web of Science).

Special lecture 2:

What can Industry 4.0 learn from software engineering?

José Nuno Oliveira
Professor, Informatics Department, University of Minho, Portugal

Abstract: Post-war industrialization found a new resource in the possibility of controlling industrial systems using software running on electronic computers. This raised a so-called "software crisis", as programmers were unable to cope with the complexity of problems never tried before on (more and more powerful) computers. The terms "software crisis" and "software engineering" (SE) were coined at a NATO Conference in Garmicsh, Germany, 1968, the latter "deliberately chosen as being provocative, in implying the need for software manufacture to be based on the types of theoretical foundations (...) that are traditional in the established branches of engineering."

Half a century old, the evolution of SE is a story of frustrations but also of scientific advances, learning above all how to handle complexity by using abstractions to solve concrete problems. Can theoretical foundations such as abstract interpretation, parametric polymorphism, modularity, object and contract-oriented programming, as well as the development of proof systems ensuring quality in (safety critical) software production be mapped back to the industrial systems which originated SE as a discipline? Can these impact positively on Industry 4.0?
Special lecture 3:

Driving change with Universities

Gerardo A. Saraiva de Menezes
BOSCH Car Multimedia, Braga, Portugal

Abstract: After several years of internal CIP (Continuous Improvement Process) activities, it is realized that for several knowledge fields, innovation is more effective inside partnerships. From this point in time, the first Innovation Programme has been launched in 2013, with a partnership between Bosch Car Multimedia Portugal in Braga and the University of Minho, one of the most important Portuguese universities, supported by the Portuguese Government. Actually, the second Programme is in course, with two main fields, iFactory and Innovative Car HMI, in a total of more than 30 development projects. The presentation focuses on the iFactory through the presentation of some of these research projects, where the aim to manage new scientific and technological developments, systems and tools to increase flexibility and quality, as well as integration of communication and information systems to optimize the quality of information to support plant management.

Biography: Gerardo A. Saraiva de Menezes is responsible, at Bosch Car Multimedia in Braga, for Manufacturing Engineering in continuous connection with several
worldwide Product Development Centers mainly focused on Simultaneous Engineering. Designing new production lines and concepts, with new technologic processes searching optimized Production flow concepts and aiming for the best utilization of resources, in collaboration with Industrial Engineering team. He is graduated by the Faculty of Engineering of the University of Porto, has now worked at Bosch for almost 25 years. He has started to work on the introduction of a Production Control System in the early 90’s. He then spent almost two years in Germany working on production planning and material flow in the plant, returning to Braga to coordinate the Internal Logistics. After leading the SAP introduction in the plant in 2003, he started his activities of management of the Industrial Engineering team, later adding the lead off the Production Engineering team and the coordination of Launch Managers in the plant to his functions.
Opening Session Keynote Papers

Monday, August 22, 2016 11:00-12:30
GRANDE AUDITORIUM, Cultural Centre Vila Flor (CCVF)

11:00  KEYNOTE PAPER CROSS STC
Process Chains for High-Precision Components with Micro-Scale Features
Eckart Uhlmann (1), Brigid Mullany (2), Dirk Biermann (2), Kamlakar P. Rajurkar (1), Tino Hausotte, Ekkard Brinksmeier (1)

11:30  KEYNOTE PAPER F
Closed loop Control of Product Properties in Metal Forming

12:00  KEYNOTE PAPER G
Abrasive Fine-Finishing Technology
Fukuo Hashimoto (1), Hitomi Yamaguchi (2), Peter Krajnik (2), Konrad Wegener (2), Rahul Chaudhari, Hans-Werner Hoffmeister, Fredy Kuster (3)
Monday, August 22, 2016     14:30-16:00
Room: AN (Ground Floor)

14:30  KEYNOTE PAPER O
Cyber-Physical Systems in Manufacturing
L. Monostori (1) B. Kádár (2), T. Bauernhansl, S. Kondoh (2), S. Kumara (1), G. Reinhart (1), O. Sauer (3), G. Schuh (1), W. Sihn (1), K. Ueda (1)†

15:00  KEYNOTE PAPER P
Advances in Large-Scale Metrology - Review and Future Trends

15:30  KEYNOTE PAPER CROSS STC
Continuous Maintenance and the future – Foundations and Technological Challenges
R. Roy (1), R. Stark (2), K. Tracht (2), S. Takata (1), M. Mori (1)
Session Programme

Session on Life-Cycle Engineering and Assembly – STC A

Tuesday, August 23, 2016 16:00-19:00

Room: R1 (Ground Floor)

**Keynote “A”**

The Role of Manufacturing in Affecting the Social Dimension of Sustainability
John W. Sutherland (1), Justin S. Richter, Margot J. Hutchins, Michael Z. Hauschild (1), Alexandra Bonou, Paul Schönsleben (2), Felix Friemann, David Dornfeld (1), Jennifer Mangold, Rachel Dzombak, Stefanie Robinson

A1 The Sustainability Cone - A holistic framework to integrate sustainability thinking into manufacturing
Jan-Markus Rödger, Niki Bey, Leo Alting (1)

A2 Sustainability Cockpit: an integrated tool for continuous assessment and improvement of sustainability in manufacturing
Wen Li, Samira, Alvandi, Sami Kara (1), Sebastian Thiede, Christoph Herrmann (2)

A3 A hybrid group leader algorithm for green material selection with energy consideration in product design
F. Tao, L.N. Bi, Y. Zuo, A.Y.C. Nee (1)

A4 Natural fibre selection for composite Eco-design
Andrea Corona, Bo Madsen, Michael Zwicky Hauschild (1), Morten Birkved

A5 Batch scheduling for minimal energy consumption and tardiness under uncertainties: a heat treatment application
Junkai Wang, Fei Qiao, Fu Zhao, John W. Sutherland (1)
A6 A Decision Support System for Waste Heat Recovery in Manufacturing  
Alessandro Simeone, Yang Luo, Elliot Woolley, Shahin Rahimifard (2), Claudio Boër (1)

A7 Modelling of specific energy requirements in machining as a function of tool and lubricoolant usage  
Paolo C. Priarone, Matteo Robiglio, Luca Settineri (1), Vincenzo Tebaldo

A8 Comparative environmental impacts of additive and subtractive manufacturing technologies  
Henri Paris (2), Hossein Mokhtarian, Eric Coatané, Matthieu Museau, Inigo Flores Ituarte

A9 Impact reduction potential by usage anticipation under comfort trade-off conditions  
Joost R. Duflou (1), Andres Auquilla, Yannick De Bock, Ann Nowé, Karel Kellens

A10 Condition based renewal and maintenance integrated planning  
Hiroki Iijima, Shozo Takata (1)

A11 A Decision Support System to Manage the Quality of End-of-Life Products in Disassembly Systems  
Marcello Colledani (2), Olga Battaïa
Wednesday, August 24, 2016 14:00-15:30

Room: R5 (Ground Floor)

A12 High voltage fragmentation and mechanical recycling of glass fibre thermoset composite
Norshah A. Shuaib, Paul T. Mativenga (2), Jack Howarth, Fadri Pestalozzi, Jörg Woidasky

A13 A new method for combining handling systems with passive orientation devices
Gunnar Borchert, Annika Raatz / Hans Kurt Tönshoff (1)

A14 Model based Design of process-specific Handling Tools for Workpieces with many variants in Shape and Material
Klaus Dröder, Franz Dietrich, Christian Löchte, Jürgen Hesselbach (2)

Wednesday, August 24, 2016 16:00-17:30

Room: R5 (Ground Floor)

A15 A Probabilistic Approach to Workspace Sharing for Human-Robot Cooperation in Assembly Tasks
Stefania Pellegrinelli, Federico Lorenzo Moro, Nicola Pedrocchi, Lorenzo Molinari Tosatti, Tullio Tolio (1)

A16 Augmented Reality system for operator support in human-robot collaborative assembly
Sotiris Makris (2), Panagiotis Karagiannis, Spyridon Koukas, Aleksandros-Stereos Matthaiakis

A17 Coil Winding Process Modelling with Deformation based Wire Tension Analysis
F. Sell-Le Blanc, J. Hofmann, R. Simmler, J. Fleischer (1)
Session on Cutting – STC C

Tuesday, August 23, 2016, 2016  14:00-15:30
Room: AN (Ground Floor)

C1  A mechanics-based predictive model for chip breaking in metal machining and its validation
    S. Buchkremer, J. Schoop / I.S. Jawahir (1)

C2  Mechanism of Cutting Elastomers with Cryogenic Cooling
    Matthias Putz (2), Martin Dix, Mike Neubert, Torsten Schmidt

C3  Analytical temperature prediction for cutting steel
    Mustapha Abouridouane, Fritz Klocke (1), Benjamin Döbbeler

Tuesday, August 23, 2016, 2016  16:00-19:00
Room: AN (Ground Floor)

C4  Prediction of surface integrity using Flamant-Boussinesq analytical model
    Thomas Baizeau, Frédéric Rossi, Gérard Poulachon (2), José Outeiro (2)

C5  Atomic Migration of Carbon in Hard Turned Layers of Carburized Bearing Steel
    Vikram Bedekar, Jonathan D. Poplawsky, Wei Guo, Rajiv Shivpuri (1),
    R. Scott Hyde

C6  High speed turning of Inconel 718 using PVD-coated PCBN tools
    Sein Leung Soo (2), Sarmad A. Khan, David K. Aspinwall (1), Peter Harden,
    Andrew L. Mantle (3), Gregor Kappmeyer (3), David Pearson,
    Rachid M’Saoubi (1)
C7 The influence of built-up layer formation on cutting performance of GG25 grey cast iron
Paolo Fiorini, Gerry Byrne (1)

C8 Reduction of built-up edge formation in machining Al- and cast iron hybrid components by internal cooling of cutting inserts
Friedrich Bleicher (3), Christoph Pollak, Jens Brier, Anton Siller / G. Byrne (1)

C9 Effect of structure and residual stresses of diamond coated cemented carbide tools on the film adhesion and developed wear mechanisms in milling
G. Skordaris (2), K.-D. Bouzakis (1), P. Charalampous, T. Kotsanis, E. Bouzakis, O. Lemmer

Wednesday, August 24, 2016 09:00-10:30
Room: AN (Ground Floor)

C10 The influences of pulsed-laser-ablation and electro-discharge-grinding processes on the cutting performances of polycrystalline diamond micro-drills
Paul Butler-Smith, Maximilian Warhanek, Dragos Axinte (1), Michael Fay, Jean-Francois Bucourt, Raphael Raguenau, Konrad Wegener (2)

C11 The mechanics of milling of germanium for IR applications
J.D. Owen, J.R. Troutman, T.A. Harriman, A. Zare, Y.Q. Wang, D.A. Lucca (1), M.A. Davies (1)

C12 Critical depth of cut and asymptotic spindle speed for chatter in micro milling with process damping
J.-J. Junz Wang, E. Uhlmann (1), D. Oberschmidt, C.F Sung, I.Perfilov
Wednesday, August 24, 2016

Room: AN (Ground Floor)

Keynote “C”

Cryogenic Manufacturing Processes

C13 Deformation of Thin Parts in Micro Milling
Ismail Lazoglu (2), Ali Mamedov

C14 Thermo-mechanical Modeling of the Third Deformation Zone in Machining for Prediction of Cutting Forces
Erhan Budak (1), Emre Ozlu, Hayri Bakioglu, Zahra Barzegar

Wednesday, August 24, 2016

Room: AN (Ground Floor)

C15 Prediction of effect of helix angle on cutting force coefficients for design of new tools
E. Özturk, O. Ozkirimli, T. Gibbons, M. Saibi, S. Turner (3) / R. M’Saoubi (1)

C16 Design of irregular pitch end mills to attain robust suppression of regenerative chatter
N. Suzuki, R. Ishiguro, T. Kojima / I. Inasaki (1)

C17 Chip geometry and cutting forces in gear shaping
Kaan Erkorkmaz (1), Andrew Katz, Yasin Hosseinkhani, Denys Plakhotnik, Marc Stautner (3), Fathy Ismail
Wednesday, August 24, 2016

Room: AN (Ground Floor)

C18  Comparison of conventional drilling and orbital drilling in machining carbon fibre reinforced plastics (CFRP)
     Robert Voss, Marcel Henerichs, Friedrich Kuster / Jean-Pierre van Griethuysen (1)

C19  A new hybrid oscillatory orbital process for drilling of composites using superabrasive diamond tools
     I. Sultana, Z. Shi, H. Attia (1), V. Thomson

C20  New abrasive deburring method by suction for the micro burrs at intersecting holes
     B.C. Kwon, K.H. Kim, K.H. Kim, S.L. Ko (2)
Session on Design – STC Dn

Monday, August 22, 2016  16:30-18:30
Room: R1 (Ground Floor)

Dn1  Optimization and Lifecycle engineering for Design and Manufacture of Recycled Aluminium Parts
Julien Le Duigou, Sverre Gulbrandsen-Dahl, Flore Vallet, Rikard Söderberg (2), Benoît Eynard, Nicolas Perry (2)

Dn2  A Novel Engineering Process for Spatial Opto-Mechatronic Applications
Jörg Franke (2), Jochen Zeitler, Thomas Reitberger

Dn3  New methodology to define roller geometry on power bearings
Emmanuel Mermoz (3), Douchane Fages, Laurent Zamponi, Jean-Marc Linares (1), Jean-Michel Sprauel

Dn4  Online-simulation of fluidic processes in early design of plant development using SPH
Stefan Krotil, Christoph Richter, Gunther Reinhart (1)

Wednesday, August 24, 2016  09:00-10:30
Room: R1 (Ground Floor)

Keynote “Dn”  Design for Additive Manufacturing: Trends, Opportunities, Considerations and Constraints
Mary Kathryn Thompson, Giovanni Moroni (2), Tom Vaneker (2), Georges Fadel, R. Ian Campbell, Ian Gibson, Alain Bernard (1), Joachim Schulz (3), Patricia Graf, Bhrigu Ahuja, Filomeno Martina

Dn5  From reverse engineering to shape engineering in mechanical design
Nabil Anwer, Luc Mathieu (1)
Wednesday, August 24, 2016

Room: R1 (Ground Floor)

Dn6  Management of product design complexity due to epistemic uncertainty via energy flow modelling based on CPM
Roozbeh Babaeizadeh Malmiry, Jérôme Pailhès, Ahmed Jawad Qureshi, Jean-François Antoine, Jean-Yves Dantan (2)

Wednesday, August 24, 2016

Room: R1 (Ground Floor)

Dn7  Modeling the transition to a provider Customer relationship in servitization for expansion of customer activity cycles
Tatsunori Hara, Keita Sato, Tamio Arai (1)

Dn8  A Crowdsourcing Design Framework for Concept Generation
Ang Liu, Stephen C.-Y. Lu (1)

Dn9  Stakeholder Integration for the successful Product Process Co-Design for Next-Generation Manufacturing Technologies
Martina Flatscher, Andreas Riel (2)

Wednesday, August 24, 2016

Room: R1 (Ground Floor)

Dn10  Semantic Data Management for the Development and Continuous Reconfiguration of Smart Products and Systems
Michael Abramovici (2), Jens Christian Göbel, Hoang Bao Dang

Dn11  Accessing enterprise knowledge: a context-based approach
Florent Laroche, Mohamed Anis Dhuieb, Farouk Belkadi, Alain Bernard (1)
Dn12  Engineering design memory for design rationale and change management toward innovation
Lionel Roucoules, Esma Yahia, Widad Es Soufi, Serge Tichkiewitch (1)

Wednesday, August 24, 2016        16:00-16:30
Room: R1 (Ground Floor)

Dn13  Recording the design thought process as time variation in parameter network
Shinsuke Kondoh (2), Yusuke Kishita
Session on Electro-Physical and Chemical Processes - STC E

Monday, August 22, 2016
Room: R7 (Ground Floor)

E1 Porosity testing methods for the quality assessment of selective laser melted parts
Wessel W. Wits, Simone Carmignato (2), Filippo Zanini, Tom H.J. Vaneker (2)

E2 Nonlinear Using X-ray Computed Tomography to improve the porosity level of polyamide-12 laser sintered parts
Wim Dewulf (2), Michele Pavan, Tom Craeghs, Jean-Pierre Kruth (1)

E3 Influence of metal powder characteristics on product quality with directed energy deposition of Inconel 625
Yasuhiro Kakinuma (2), Masahiko Mori (1), Yohei Oda, Takanori Mori, Makoto Kashihara, Adam Hansel (3), Makoto Fujishima (3)

E4 Microstructure and mechanical properties of as-processed Scandium-modified aluminium using Selective Laser Melting
Adriaan B. Spierings, Karl Dawson, Mark Voegtlin, Frank Palm, Peter J. Uggowitzer / G. Levy (1)

Tuesday, August 23, 2016
Room: R5 (Ground Floor)

Keynote "E" Shaping of Engineering Ceramics by Electro, Chemical and Physical Processes
E. Ferraris, J. Vleugels, Y. Guo (2), D. Bourell (2), J.P. Kruth (1), B. Lauwers (1)
E5  Fabrication of silicon-based porous nanocomposite films by focused infrared light sintering  
Jiwang Yan (2), Kouga Okada

E6  Development of peeling tools with sub-50 μm cores by zinc electroplating and their application to micro-EDM  
Rie Tanabe, Yoshiro Ito, Naotake Mohri (1), Takahisa Masuzawa (1)

Tuesday, August 23, 2016  
Room: R5 (Ground Floor)

E7  Study on Influences of Bubbles on ECM Gap Phenomena using Transparent Electrode  
Tomoyuki Shimasakia, Masanori Kunieda (1)

E8  Acoustic emission signatures of electrical discharge machining  
Andreas Klink, Maximilian Holsten, Sebastian Schneider, Philip Koshy (1)

E9  Investigation of hydrodynamic arc breaking mechanism in Blasting Erosion Arc Machining  
Lin Gu, Fawang Zhang, Wansheng Zhao, K.P. Rajurkar (1), A.P. Malshe (1)

Tuesday, August 23, 2016  
Room: R5 (Ground Floor)

E10  Generation of Bio-compatible Titanium Alloy Surfaces by Laser-Induced Wet Treatment  
Kazutoshi Katahira (2), Atsushi Ezura, Koki Ohkawa, Jun Komotori, Hitoshi Ohmori (1)
| E11  | A strength-model for laser joined hybrid aluminium - titanium transition structures  
|      | *Peer Woizeschke, Frank Vollertsen (1)* |
| E12  | A Study on machining of binder-less polycrystalline diamond by femtosecond pulsed laser for fabrication of micro milling tools  
|      | *Yoshinori Ogawa, Kazuo Nakamoto, Michiharu Ota, Tomohiro Fukaya, Marc Russell, Tarek I. Zohdi, Kazuo Yamazaki (1), Hideki Aoyama* |
Session on Forming – STC F

Tuesday, August 23, 2016       16:00-19:00

Room: R4 (Ground Floor)

F1 Tribological effects of punch with micro-dimples in blanking under high hydrostatic pressure
K. Kitamura, T. Makino, M. Nawa, S. Miyata / A. Azushima (1)

F2 Lubricant free deep drawing process by macro structured tools
A. Brosius, A. Mousavi / M. Kleiner (1)

F3 Improvement of the wear resistance of hot forging dies using a locally selective deposition technology with transition layers
Dong-Gyu Ahn, Ho-Jin Lee, Jong-Rae Cho, Dae-Seon Guk / D.Y. Yang (1)

F4 Modelling of real area of contact between tool and workpiece in metal forming processes including the influence of subsurface deformation
Chris V. Nielsen, Paulo A.F. Martins (2), Niels Bay (1)

F5 Effective forming strategy for double-sided incremental forming considering in-plane curvature and tool direction
Newell Moser, Zixuan Zhang, Huaqing Ren, Huan Zhang, Yi Shi, Ebot Ndip-Agbor, Bin Lu, Jun Chen, Kornel F. Ehmann, Jian Cao (1)

F6 Influence of Die Geometry on Performance in Gradation Extrusion Using Numerical Simulation and Analytical Calculation
Dirk Landgrebe (3), Andreas Sterzing, Nadine Schubert, Markus Bergmann / R. Wertheim (1)
Wednesday, August 24, 2016

Room: R4 (Ground Floor)

F7  Enhanced granular medium-based tube and hollow profile press hardening
Hui Chen, Sigrid Hess, Jan Haeberle, Sebastian Pitikaris, Philip Born, Alper Güner, Matthias Sperl, A. Erman Tekkaya (1)

F8  A rotary reduction of fine wires/tubes of a wide range of diameters using a pair of concave rolls
Takashi Kuboki, Shohei Kajikawa / M. Kiuchi (1)

F9  Ring rolling with variable wall thickness
Christopher J. Cleaver, Matthew R. Arthington, Sharareh Mortazavi, Julian M. Allwood (1)

Wednesday, August 24, 2016

Room: R4 (Ground Floor)

F10  New method for the manufacturing of curved workpieces by open-die forging
Martin Wolfgarten, Gerhard Hirt (1)

F11  Design and optimization of stamping process of ultra-thin stainless sheet into bidirectionally corrugated shape for finless high-efficiency heat exchanger
Jun Yanagimoto (1), Yasuhiro Wake, Pascal Zeise, Hung Mao, Naoki Shikazono

F12  Forming of light-weight gear wheel by plate forging
Z.G. Wang, K. Hirasawa, Y. Yoshikawa, K. Osakada (1)
Wednesday, August 24, 2016  
14:00-15:30

Room: R4 (Ground Floor)

**F13**  Die Motion Control for Die-Quench Forging Process of A6061 Aluminum Alloy  
*Hiroshi Utsunomiya (2), Koki Tada, Ryo Matsumoto*

**F14**  Metastable material conditions for forming of sheet metal parts combined with thermomechanical treatment  
*Verena Kräusel, Peter Birnbaum, Andreas Kunke, Rafael Wertheim (1)*

**F15**  Material flow control in tailor welded blanks by a combination of heat treatment and warm forming  
*Tobias Gniibl, Marion Merklein (1)*

Wednesday, August 24, 2016  
16:00-16:30

Room: R4 (Ground Floor)

**F16**  A hybrid mixed double-sided incremental forming method for forming Ti6Al4V alloy  
*Beatrice Valoppi, Antonio J. Sánchez Egea, Zixuan Zhang, Hernán A. González Rojas, Andrea Ghiotti, Stefania Bruschi (2), Jian Cao (1)*
Session on Abrasive Process – STC G

Tuesday, August 23, 2016, 2016

14:00-15:30

Room: R7 (Ground Floor)

G1 Influence of metalworking fluid additives on the thermal conditions in grinding
Daniel Meyer, André Wagner / E. Brinksmeier (1)

G2 Drastic reduction of grinding fluid flow in cylindrical plunge grinding by means of contact-type flexible brush-nozzle
Akira Hosokawa, Keita Tokunaga, Takashi Ueda (1), Takahiro Kiwata, Tomohiro Koyano

G3 Modelling and simulation of thermal effects in internal traverse grinding of hardened bearing steel
D. Biermann (2), R. Holtermann, A. Menzel, S. Schumann

Tuesday, August 23, 2016, 2016

16:00-19:00

Room: R7 (Ground Floor)

G4 Modeling of material removal mechanism in vibratory finishing process
Fukuo Hashimoto (1), Stephen P. Johnson, Rahul G. Chaudhari

G5 Cutting edge preparation with elastic bonded superabrasive grinding wheels
Jan C. Aurich (1), Christian Effgen, Benjamin Kirsch

G6 Design of bronze bonded grinding wheel properties
Berend Denkena (1), Thilo Grove, Imke Bremer, Leif Behrens
G7  Grinding process for profiled texturing
Eraldo Jannone da Silva, Alex Camilli Bottene, João Fernando Gomes de Oliveira (1), Almir Atoatte, Alex de Souza Rodrigues

G8  Grinding with controlled kinematics and chip removal
D. Barrenetxea (2), J. Alvarez, J.I. Marquinez, J.A. Sanchez

G9  Grinding wheel motion, force, temperature, and material removal in rotational atherectomy of calcified plaque
Albert J. Shih (1), Yao Liu, Yihao Zheng
Sessions on Machines – STC M

Monday, August 22, 2016 16:30-18:30
Room: R4 (Ground Floor)

M1  Trajectory Generation and Control of a 9 axis CNC Micromachining Center
A. Yuen, Y. Altintas (1)

M2  Sliding Bearing with adjustable Friction Properties
T. Engel, A. Lechler, A. Verl (2)

M3  Enhancement of feed drive dynamics using additional table speed feedback
Zheng Sun, Günter Pritschow (1), Armin Lechler

M4  Polymeric Carbon Nanotube Nanocomposite-based Force Sensors
S.S. Park (2), K. Parmar, S. Shajari, M. Sanati

Tuesday, August 23, 2016 09:00-10:30
Room: R1 (Ground Floor)

M5  Analytic tuning of robust multi-mass dampers
Christian Brecher (1), Simo Schmidt, Marcel Fey

M6  Mechanism and suppression of frictional chatter in high-efficiency elliptical vibration cutting
Hongjin Jung, Takehiro Hayasaka, Eiji Shamoto (1)

M7  A trajectory optimization method for improved tracking of motion commands using CNC machines that experience unwanted vibration
C. Okwudire, K. Ramani, M. Duan / T. Hoshi (1)
Tuesday, August 23, 2016

Room: R1 (Ground Floor)

**M8**  
Diagnostics for geometric performance of machine tool linear axes  
*Gregory W. Vogl, M. Alkan Donmez (2), Andreas Archenti*

**M9**  
Process simulation integrated tool axis selection for 5-axis toolpath generation  
*Lutfi Taner Tunc, Erhan Budak (1), Samet Bilgen, Mikel Zatarain (1)*

**M10**  
A sensorless approach for tool fracture detection in milling by integrating multi-axial servo information  
*Ryo Koike, Kouhei Ohnishi, Tojiro Aoyama (1)*

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Tuesday, August 23, 2016

Room: R1 (Ground Floor)

**Keynote**  
“M”  
Chatter Suppression Techniques in Metal Cutting  
*J. Munoa (2), E. Budak (1), Y. Altintas (1), C. Brecher (1), X. Beudaert (3), G. Stepan (2)*

**M11**  
Design of self-tuneable mass damper for modular fixturing systems  
*Jokin Munoa (2), Alex Iglesias, Aitor Olarra, Zoltan Dombovari, Mikel Zatarain (1), Gabor Stepan (2)*

**M12**  
Adaptronic approach for modular long projecting boring tools  
*E. Abele (1), M. Haydn, T. Grosch*
Session on Production Systems and Organizations – STC O

Tuesday, August 23, 2016 09:00-10:30

Room: AN (Ground Floor)

O1  Enhancing products and services using smart appliance networks
    Takeshi Takenaka, Yoshinobu Yamamoto, Ken Fukuda, Ayaka Kimura, Kanji Ueda (1)

O2  Opportunistic maintenance based on multi-dependent components of manufacturing system
    Benoit Iung (2), Phuc Do, Eric Levrat, Alexandre Voisin

O3  Assessment of Mathematical Programming and Agent-Based Modelling for Off-line Scheduling: application to Energy Aware Manufacturing
    F. Tonelli, A.G. Bruzzone (1), M. Paolucci, E. Carpanzano (2), G. Nicolò, A. Giret, M.A. Salido, D. Trentesaux

Tuesday, August 23, 2016 11:00-12:30

Room: AN (Ground Floor)

O4  Design for Energy Sustainability in Manufacturing Systems
    Tarek AlGeddawy, Hoda ElMaraghy (1)

O5  The Impact of Corporate Culture on Manufacturing System Design
    Yoram Koren (1), Xi Gu, Theodor Freiheit

O6  Design of deep convolutional neural network architectures for automated feature extraction in industrial inspection
    Daniel Weimer, Bernd Scholz-Reiter (1), Moshe Shpitalni (1)
Wednesday, August 24, 2016

Room: R6 (Ground Floor)

O7  Performance modelling and simulation of metal powder bed fusion production system
    Simon Mounsey, Bernard Hon (1), Chris Sutcliffe

O8  Performance Measurement in Flow Lines – Key to Performance Improvement
    Nicole Stricker, András Pfeiffer, Emanuel Moser, Botond Kádár (2), Gisela Lanza (2)

O9  Multi-objective allocation of customized orders to production-line networks
    Robert H. Schmitt (2), Max Ellerich, Sean Humphrey

Wednesday, August 24, 2016

Room: R6 (Ground Floor)

O10 Automatic design of scheduling rules for complex manufacturing systems by multi-objective simulation-based optimization
    Michael Freitag, Torsten Hildebrandt / Bernd Scholz-Reiter (1)

O11 Lead time planning instability and its mitigation in production work systems
    Neil Duffie (1), Julia Bendul, Katja Windt, Mathias Knollmann

O12 Design and Management of Reconfigurable Assembly lines in the Automotive Industry.
    Marcello Colledani (2), Dávid Gyulai, László Monostori (1), Marcello Urgo, Johannes Unglert, Fred Van Houten (1)
Wednesday, August 24, 2016

Room: R6 (Ground Floor)

O13 Exploring Optimal Timing for Remanufacturing Based on Replacement Theory
Zhichao Liu, Feri Afrinaldi, Hong-Chao Zhang (1), Qiuhong Jiang

O14 Optimized Joint Motion Planning for Redundant Industrial Robots
Gábor Erdős, András Kovács, József Vánca (1)

O15 A novel manufacturing architecture for sustainable value creation
Pinar Bilge, Fazleena Badurdeen, Günther Seliger (1), I.S. Jawahir (1)

Wednesday, August 24, 2016

Room: R6 (Ground Floor)

O16 An Approach for Process Control of Responsive Service Processes
Andy Bruntsch, Mitchell M. Tseng (1)

O17 Multimodal speech and gesture control of AGVs, including EEG-based measurements of cognitive workload
Ludger Overmeyer (2), Florian Podszus, Lars Dohrmann
Session on Precision Engineering and Metrology – STC P

Monday, August 22, 2016 16:30-18:00
Room: R5 (Ground Floor)

P1 Measurement of a tool wear profile using confocal fluorescence microscopy of the cutting fluid layer
Yasuhiro Takaya (1), Kenji Maruno, Masaki Michihata, Yasuhiro Mizutani

P2 An imaging system with a large depth of field based on an overlapped micro-lens array
Kuo Pang, Le Song, Fengzhou Fang (1), Yue Zhang, Haoyang Zhang

P3 Virtual spindle based tool servo diamond turning of discontinuously structured microoptics arrays
Suet To (3), Zhiwei Zhu, Haitao Wang / B. Hon (1)

Tuesday, August 23, 2016 09:30-10:30
Room: R4 (Ground Floor)

P4 Automated thermal main spindle & B-axis error compensation of 5-axis machine tools
Josef Mayr, Michael Müller, Sascha Weikert / W. Knapp (1)

P5 Measurement of thermal influence on a two-dimensional motion trajectory using a tracking interferometer
S. Ibaraki, P. Blaser, M. Shimoike, N. Takayama, M. Nakaminami, Y. Ido / S. Shimada (1)
Tuesday, August 23, 2016
11:00-12:30
Room: R4 (Ground Floor)

P6 Gaussian Process Based Multi-scale Modelling for Precision Measurement of Complex Surfaces
Yuehong Yin (2), MingJun Ren, Lijian Sun, Lingbao Kong

P7 Uncertainty evaluation of distributed Large-Scale-Metrology systems by a Monte Carlo approach
Maurizio Galetto, Luca Mastrogiacomo, Domenico Maisano, Fiorenzo Franceschini / R. Levi (1)

P8 Economic benefits of metrology in manufacturing
E. Savio (2), L. De Chiffre (1), S. Carmignato (2), J. Meinertz

Tuesday, August 23, 2016
14:00-15:30
Room: R4 (Ground Floor)

P9 3D artefact for concurrent scale calibration in Computed Tomography
A. Stolfi, L. De Chiffre (1)

P10 Self-Calibration Method for a Ball Plate Artefact on a CMM
Anke Guenther, Dirk Stöbener, Gert Goch (1)

P11 Implementation of straightness measurements at the Nanometer Comparator
Christoph Weichert, Harald Bosse (3), Jens Flügge, Rainer Köning, Paul Köchert, Axel Wiegmann, Horst Kunzmann (1)
Session on Surfaces – STC S

Monday, August 22, 2016  
16:30-18:30  
Room: R6 (Ground Floor)

Keynote “S”  
Surface Modification by Hammer Peening and Burnishing  
V. Schulze (2), F. Bleicher (3), P. Groche (1), Y.B. Guo (2), Y. Pyun

S1  
Nano/micro-composite surface fabricated by chemical treatment/microembossing for control of bubbles in boiling heat transfer  
Keisuke Nagato, Shumpei Miyazaki, Shuhei Yamada, Masayuki Nakao (1)

S2  
Effects of Carbon Contaminations on Y2O3-stabilized ZrO2 Thin Film Electrolyte prepared by Atomic Layer Deposition for Thin Film Solid Oxide Fuel Cells  
Suk Won Cha, Gu Young Cho, Yeageun Lee, Taehyun Park, Yusung Kim, Jang-moo Lee (1)

S3  
Fast fabrication of superhydrophobic metallic surface using nanosecond laser texturing and low-temperature annealing  
Doo-Man Chun (2), Chi-Vinh Ngo, Kyong-Min Lee

Tuesday, August 23, 2016  
16:00-19:00  
Room: R6 (Ground Floor)

S4  
The effect of surface and subsurface condition on the fatigue life of Ti-25V-15Cr-2Al-0.2C %wt alloy  
Donka Novovic, David K. Aspinwall (1), Richard C. Dewes, Paul Bowen, Brian Griffiths
An international comparison of surface texture parameters quantification on polymer artefacts using optical instruments
G. Tosello (2), H. Haitjema (2), R.K. Leach, D. Quagliotti, S. Gasparin (3), H.N. Hansen (1)

Assessment of uncertainty in structured surfaces using metrological characteristics
Gavin D. MacAulay, Claudiu L. Giusca (3) / X. Jiang (1)

Effects of different mould coatings on polymer filling flow in thin-wall injection moulding.
G. Lucchetta (2), D. Masato, M. Sorgato, L. Crema, E. Savio (2)

Surface topography and dielectric properties of polished PMN-PT single crystals
Hideaki Takahashi, Hirofumi Suzuki (2), Yoshiharu Namba

Antifouling coatings made with Cold Spray onto polymers: process characterization
R. Lupoi, C. Stenson, K.A. McDonnell, D.P. Dowling, E. Ahearne (2)
CMAG – Corporate Members Advisory Group

Tuesday, August 23, 2016
09:00-12:30

1. **Welcome, formalities**
   *Dr. J. Schulz*

2. **First session on “CIRP Industrial Technical Papers”:**
   - Study of sensing technologies for machine tools
     *Dr. Fujishima*
   - Three dimensional topographic studies on worn surfaces of coated cemented carbide tools with different workpiece materials
     *Dr. Bejjani*
   - Conditioning of copper material surfaces increasing the efficiency of continuous wave laser microwelding
     *Dr. Kaierle*

3. **Corporate member presentation:**
   - TIZ Implements, Poland
     Sergiusz Sobieski
   - PLUGandWORK for existing machines and devices
     *Dr. Olaf Sauer – Fraunhofer Institut für Optronik, Systemtechnik und Bildauswertung*
   - Current research and innovations for simulation on the CNC
     *Dr. Marc Stautner - ModuleWorks*
   - iCBM - Integrative Condition-Based Maintenance: Continental Mabor – Indústria de Pneus, S. A, Portugal
     *Eng. Rui Nunes, Eng. Francisco Ferreira*

4. **Appointment of new chairman to follow Dr. Schulz**
   *Dr. J. Schulz*

5. **Various issues and closing**
   *Dr. J. Schulz*
Social Programme

Sunday, 21st August, Welcome reception, Guimarães 19:30 – 21:30

Venue: Instituto do Design de Guimarães (IDEGUI)
Rua da Ramada 52, 4810-445 S. Sebastião Guimarães
Date: Sunday, 21st August 2016
Time: 19:30 – 21:30
Dress code: Informal

Light snack will be served. Local wine, beers and soft drinks.
Special of the event: “Vinho Verde” – Alvarinho - and Port Wine in honor of CIRP GA 2016 participants.

Note: Please follow the instructions how to come to the event venue, which will be available in your hotel and on the webpage.

Wednesday, 24th August, Assembly Dinner, Porto 19:45 - 23:30

Venue: Alfândega Velha do Porto
R. Nova da Alfândega, 4400 Porto
Date: Wednesday, 24th August 2016
Time: 19:45 – 23:30
Dress code: Formal

Note: Please follow the instructions how to come to the event venue, which will be available in your hotel and on the webpage. Please pay attention that the dinner venue is in Porto, approximately 60km from Guimarães, and that buses will depart approximately at 18:30. For the precise time of bus departure follow the instructions.
Saturday, 27th August, Farewell Dinner, Guimarães

**Venue:** MitPenha  
Rua da Montanha- Mesão Frio,  
4800 Guimarães  

**Date:** Saturday, 27th August 2016  
**Time:** 19:30 – 00:00  
**Dress code:** Semi-formal

**Note:** Please follow the instructions how to come to the event venue, which will be available in your hotel and on the webpage. Buses will depart approximately at 19:00. For the precise time of bus departure follow the instructions.
Accompanying Persons Programme

**Note:** Comfortable walking shoes are recommended for the whole week. It might be necessary to bring a light coat.

**Important:** it is recommend not to be exposed to the sun for a longer time, to avoid sun stroke. For this purpose the organising committee will provide you a cap/hat and a sun protection umbrella.

Please consult the bus schedule provided for each tour. Further useful information will be distributed in the busses at the beginning of each tour.

**Monday, 22nd August**

**Guimarães: Cradle of Portugal**

Tour starts at 11:00.

Buses will depart from CCVF at 11:00. The tour starts with visiting Santa Marinha Monastery and Gardens from XII century Augustin Convent. In the space formerly occupied by the cellars and barns of the Monastery, now stands the Restaurant of the Pousada of Guimarães: an imposing room with gentle stone arches where your lunch will be served.

After the lunch the tour will continue visiting Ducal Palace of Bragança (Paço dos Duques de Bragança) that was ordered built in the XV century. After visiting Ducal Palace of Bragança you will walk towards the historic centre of Guimarães within the town walls – the UNESCO World Heritage. Refreshment will be served at the ACIG (Commercial and Industrial Association of Guimarães).

Buses will transfer you to the University of Minho at 18:00 for the presentation of the 67th CIRP General Assembly in Switzerland.

Tour ends approximately at 19:30 after the presentation of the 67th CIRP General Assembly in Switzerland.
Tuesday, 23rd of August

Braga: The Capital of Baroque in Portugal

Tour starts at 09:30.

The tour starts with visiting museum the Casa dos Biscaínhos. Following with the visit of historic centre comprising sightseeing of the Braga appreciating different architectural styles of which the Baroque style is dominant. The itinerary passes through the University of Minho Rectorate (XIV-XVIII century) (including visit to Medieval Hall) and Cathedral of Braga (beginning of construction XI century).

Subsequently, you will be driven to the Bom Jesus Sanctuary and Park where you will have lunch in the Tea House of Bom Jesus Hotels. After lunch you can enjoy the monuments of Bom Jesus Sanctuary, which is one of the landmarks of Portugal and the surrounding garden with belvedere over Braga.

The tour will continue with visit to the Palace of Raio. The Palace of Raio is an example of the late Baroque, with early Rococo style of decoration by Portuguese architect André Soares, notable for his influence in the northern Baroque movement.

Tour ends approximately at 17:00

Wednesday, 24th August

Guimarães: From to Antiquity to Modernity

Tour starts at 09:30.

Note: We strongly recommend not to wear shoes with high heels.

The tour starts with visiting the museum “Museu da Cultura Castreja” after which the archaeological ruins of Citânia de Briteiros, on top of a small hill with spectacular views over the Ave River valley will be visted.

After visiting Citânia de Briteiros, the lunch will be served in the Hotel Guimarães restaurant. After the lunch the tour will take you to visit one of the largest textile
factories to discover how some of the fine products used in many homes and by many persons worldwide are produced. You will see how the raw material is transformed, step-by-step, into the finest pieces appreciated by customers worldwide, including leading world brands such as Ralph Lauren, Purification Garcia, and others, as well as products manufactured for the worldwide famous stores such as Macy’s.

Tour ends approximately at 17:00

Thursday, 25th August

North of Portugal: “Minho Verde”, Harmony of History, Vinho Verde, and Beaches

Tour starts at 09:00

On this tour, after leaving the hotels by bus, the first stop will be the town Ponte de Lima, about 45km to north from Braga. You can discover Ponte de Lima, the most ancient charted villa in Portugal, and its historic centre, including sightseeing of Ponte Velha – the historical bridge with original roman construction.

After the historic centre the visit will continue by visiting the most important winery of Ponte de Lima region: Adega de Ponte de Lima. Here you will discover how the famous type of wine Vinho Verde is produced and you will taste different types of Vinho Verde wines, widely appreciated. Lunch will be served in a selected restaurant.

The tour will continue to the town of Viana do Castelo, the jewel of the coast of Minho. The itinerary will start at the belvedere Santa Luzia from which you can appreciate a wonderful view over Viana do Castelo, mouth of river Lima to the Atlantic Ocean, long sand beaches along the Atlantic coast, and spotting the bridge constructed by Gustave Eiffel’s office. Then, you will visit historic centre of Viana do Castelo.

Finally, going back to Guimarães and Braga, you will pass by bus though the towns of Póvoa de Varzim and Vila do Conde sightseeing the crowded beaches and to appreciate the beauty of Atlantic Ocean.

Tour ends approximately at 18:00
Friday, 26th of August

Porto: “Old, Very Noble, Always Loyal and Undefeated” and Home of Porto Wine

Tour starts at 09:00.

This tour will start by sightseeing the centre of Porto. After the centre of Porto follows the visit to the Music Hall (Casa da Música) that is an example of the (beginning of) XXI century architecture and which represents an icon of the city.
After that the lunch will be served in a selected restaurant. After the lunch the itinerary continues by bus along the Avenida de Boavista, Castelo do Queijo, Anémona, and along the Atlantic Ocean coast, turning along river Douro coast to Ribeira. Ribeira is the old port within the historic centre of Porto, also classified as the UNESCO world heritage. Here you will walk along the Ribeira, pass the bridge D. Luís I, an icon in the city, over Douro River, to the Port wine caves, in Vila Nova de Gaia, on the opposite bank of the Douro River. There you will visit one of the Port wine caves with Port wine tasting. The tour will continue to the “Serra do Pilar” monetary with belvedere with wonderful view over the Porto and Douro river, after which you will go back to hotels in Guimarães and Braga.

Tour ends approximately at 18:00
Porto: “Old, Very Noble, Always Loyal and Undefeated” and Home of Porto Wine

Tour starts at 09:00. This tour will start by sightseeing the centre of Porto. After the centre of Porto follows the visit to the Music Hall (Casa da Música) that is an example of the (beginning of) XXI century architecture and which represents an icon of the city.

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Tour ends approximately at 18:00.
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