The International Academy for Production Engineering

NEWSLETTER

N° 52 – May 2016

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From the President

Dear CIRP colleagues,

It is not easy for me to begin this CIRP newsletter again with sad news. On Easter Sunday we have lost our dear colleague, friend and CIRP Vice President Professor David Dornfeld. He died after a massive heart attack at his house in Georgetown/Ca. This news has shocked the whole scientific community. Our thoughts are with his wife Barbara and his family. We all will miss Dave as an excellent scientist, great friend and smart man with an unforgettable sense of humor. Personally, I am also so sad that the wonderful collaboration with Dave as CIRP Vice President cannot be continued.

With David Dornfeld and Kanji Ueda CIRP has lost two Board members within half a year. Despite this tragedy CIRP as an academy has to move forward and being the current President I initiated the necessary measures to appoint a new Vice President.

Today, I am happy to inform you that our Vice President Elect, Professor Yusuf Altintas, has accepted to take over immediately as new CIRP Vice President. We all are very grateful to him and his commitment for CIRP in this exceptional situation. At the end of our General Assembly in Portugal, Professor Altintas will become our new President. Also in Portugal, Senate and Council will appoint a new Vice President and Vice President Elect.

As to our 66th CIRP General Assembly in Guimarães, Portugal, preparations are well underway. Professor Putnik, his wife Zlata, and the organizing committee are doing a great job and everything is moving forward according to schedule. As you will have noticed, so called “communications” are sent out to membership, which are reminding us on our necessary planning steps for attending the GA. I have visited Guimarães and the conference site already last year and I can assure you that Guimarães being UNESCO world heritage and Braga being one of the top cultural and historic centers of Portugal are both worth visiting. Most of the meetings will be held at Minho University which offers a very good meeting environment on a beautiful campus.

Let me also take the chance to highlight some achievements regarding our business:

1. Based on my proposal I am happy to announce a CIRP premiere i.e. the first CMAG paper session to be held in Guimarães. We have received several Industrial Technical Papers which have gone through a reviewing process of the EC and will be published in the CIRP Journal. The oral presentations will be given by Corporate Members within an extension of the CMAG meeting on Tuesday 23rd August.
2. After our meetings in Paris this year, our responsible committees have been busy working on some further modifications to bring to the internal regulations. The modifications will address membership issues, the Nicolau Award, and rules to host a GA. It is planned that the Fellows shall vote on the suggested modifications at the General Assembly meetings in Portugal. Therefore, I would like to remind all CIRP members to plan attendance at the GA-meetings on Saturday afternoon, 27th of August.
3. Since CIRP claims to be the leading academy for production engineering we must be able to face ongoing and future developments of new technologies and production environment. In my last newsletter I have therefore asked our STC boards to give some room for

discussion on how we could accommodate new emerging fields within our STC structure. More than this, Council has decided on its meeting in Paris to install a task force group on CIRP structural issues. This group is headed by Professor Karpuschewski who will be grateful for any input you would wish to give.

There are only a few months left to our 66th General Assembly to be held in Guimarães, Portugal. If not done yet, plan your attendance and travels now. I am very much looking forward to this exciting event and being your current President, I would be pleased to meeting all of you there.

See you in Guimarães!

Ekkard Brinksmeier
President of CIRP 2015-2016

News about Members

Professor Hoda ElMaraghy is invested into the Order of Ontario

Professor Hoda ElMaraghy, Senior Canada Research Chair in Manufacturing Systems at the University of Windsor, was invested into the "Order of Ontario" – the highest official honor that Ontario can bestow on its citizens.

The investiture ceremony took place on Wednesday 20 January 2016 in the Ontario Legislature at Queen's Park in Toronto where the Honorable Elizabeth Dowdeswell, Lieutenant Governor of Ontario and representative of the Queen, presented her with the official insignia. She is the only engineer among an impressive list of 25 accomplished Ontarians who received this great honor in the 30th anniversary of the Order of Ontario.

Her citation read: "Distinguished scholar and professor, Dr. ElMaraghy is changing the way the industrial world operates. Her work in mechanical engineering has helped influence public policy, positioning Canada at the forefront of emerging transformative technologies and global trends in manufacturing.

Director of the Intelligent Manufacturing Systems Center at the University of Windsor, her catalytic research on flexible manufacturing has revolutionized the way manufacturers around the world adapt and respond to market changes by enabling companies to be adaptive and agile and enhancing the economic sustainability of the modern factory.

The first woman Dean of Engineering in Canada and also the first Canadian woman to earn a PhD in mechanical engineering, Dr. ElMaraghy has been a trail-blazer, inspiration and mentor to aspiring young men and women engineers in this province and beyond".

Professor Lásló Monostori receives the highest Hungarian state award for scientist

Professor Lásló Monostori received the most prestigious state award in the field of sciences. It was handed over by János Áder, President of Hungary in the presence of Prime Minister Viktor Orbán on 15 March 2016, in the Cupola Hall of the Parliament Building.

According to the laudation, László Monostori, electrical engineer, corresponding member of the Hungarian Academy of Sciences, director of the Institute for Computer Science and Automation, Hungarian Academy of Sciences, professor at the Department of Manufacturing Science and Technology, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, has been awarded as a recognition for his school-founding scientific results based on his basic and applied research activity's unique interdisciplinary embeddedness and for his fundamental achievements in the field of production informatics, which have contributed to the establishment of today's modern manufacturing science, as well as for his work to foster R&D cooperation across the different industrial sectors and to translate the theoretical results into industrial practice and, at the same time, for his outstanding and successful science organisational and educational accomplishments aiming at bringing up new generations of scientists.

Professor Gisela Lanza receives Cross of the Order of Merit

Photo: Markus Breig, KIT

Professor Gisela Lanza of Karlsruhe Institute of Technology (KIT) is awarded the Cross of the Order of Merit of the Federal Republic of Germany by President Joachim Gauck on March 7. 2016. On the eve of International Women's Day, the President honors 24 women for their outstanding achievements in culture and science. Gisela Lanza receives the distinction for her research in the field of production engineering and her commitment to the promotion of young scientists.

Planning and designing production systems in global production networks is the focus of Professor Gisela Lanza's research. At KIT, the engineer is Head of the "Production Systems" Group of the Institute of Production Science (wbk). Here, she develops methods and models that enable high-quality and yet cost-effective production. "This involves, among other things, how companies can shape and implement the transition to an automated and intelligent production in the sense of 'Industry 4.0'", Lanza says. In doing so, she puts particular emphasis on production in global production networks: "Today, the production of complex products is distributed over various locations throughout the world." Thus, a basic understanding of important markets such as China is vital, she says. Therefore, Lanza, who is also KIT's representative for China, founded a branch office of her institute in Suzhou: The Global Advanced Manufacturing Institute (GAMI). At GAMI, the theoretical understanding of global production structures is used to create concrete, robust, and locally adapted networks for industrial enterprises. Since 2014, the GAMI has also been acting as KIT's official representative office in China. As Germany's first shared professor, Lanza, who studied industrial engineering and has a PhD in mechanical engineering, combined her teaching and research activities at KIT with management tasks in the automotive industry for four years.

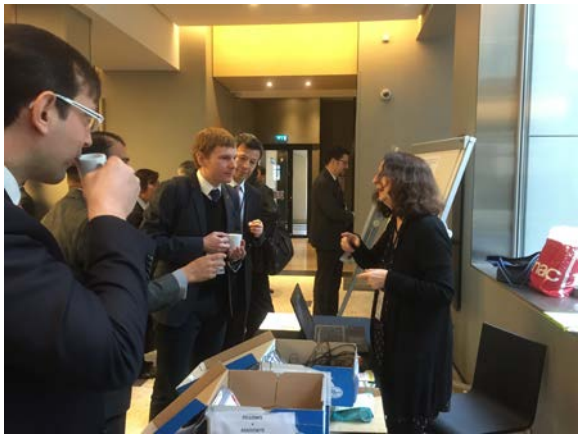
Not least, the award also recognizes Gisela Lanza's commitment to young scientists: She addresses students and young researchers from around the world not only with her lectures at KIT's Department of Mechanical Engineering and the HECTOR School of Engineering and Management of the International Department of KIT, but also with strongly involving the GAMI in research and teaching at KIT.

Professor Lin Li, President Laser Institute of America

Professor Lin Li has been elected to the President of Laser Institute of America at the LIA AGM in October 2015 in Atlanta, USA. I will serve as the President from 1 January 2016 to 31 December 2016. The Laser Institute of America (https://www.lia.org) was established in 1968 to promote the advancement of science, technology and applications of lasers and the safe use of lasers.

Successful Winter Meeting

The annual Winter Meeting at "La Mutualité" meeting-centre in Paris has been very successful. We had a total of 440 registrations: 110 Associate members, 105 Fellows (including 15 Honorary and Emeritus), 50 Corporate members, 55 RAs, and 120 guests. The Minutes from all the scientific meetings are available online



Papers & Conferences

Our Conferences

For the **most recent overview** of our coming conferences go to:

CIRP Conferences:
http://www.cirp.net/meetings-conferences/conferences/cat.listevents/2016/05/09/-.html

CIRP Sponsored Conferences:
http://www.cirp.net/meetings-conferences/sponsored-conferences/cat.listevents/2016/05/09/-.html?start=10

Future Keynotes Papers

Our keynote papers are the result of an intensive collaboration between specialists working together during several years within an STC. They are important state of the art papers on important (new) technological areas. CIRP members who are willing to contribute are invited to contact the coordinator of each keynote paper.

2016 Keynotes

STC A
The Role of Manufacturing on the Social Dimensions of Sustainability - *J. Sutherland (1) et al.* - Contact: jwsuther@purdue.edu

STC C
Cryogenic Manufacturing Processes - *I.S. Jawahir (1) et al.* - Contact : jawahir@engr.uky.edu

STC Dn
Design for Additive Manufacturing: Trends, Opportunities, Considerations and Constraints - *Mary Kathryn Thompson et al.* - Contact: mkath@mek.dtu.dk

STC E
Shaping of Engineering Ceramics by Electro, Chemical and Physical Processes – *E. Ferraris et al.* - Contact: Eleonora.ferraris@kuleuven.be

STC F
Closed loop Control of Product Properties in Metal Forming - *J. Allwood (1) et al.* - Contact: jma42@cam.ac.uk

STC G
Abrasive Fine-Finishing Technology – *F. Hashimoto (1) et al.* – Contact: fukuo.hashimoto@timken.com

STC M
Chatter Suppression Techniques in Metal Cutting– *J. Munoa (2) et al.* - Contact: jmunoa@ideko.es

STC O
Cyber-Physical Systems in Manufacturing – *L. Monostori (1) et al.* – Contact: monostor@sztaki.hu

STC P
Advances in Large-Scale Metrology - Review and Future Trends - *R. Schmitt (2) et al.* – Contact: r.schmitt@wzl.rwth-aachen.de

STC S
Surface Modification by Hammer Peening and Burnishing – *V. Schulze (2) et al.* – Contact: volker.schulze@kit.edu

Cross-STCs
Process Chains for High-Precision Components with Micro-Scale Features – Eckart Uhlmann (1) et al. - Contact: eckart.uhlmann@ipk.fhg.de

Cross-STCs
Continuous Maintenance and the future - Foundations and Technological Challenges - *R. Roy (1) et al.* - Contact: r.roy@cranfield.ac.uk

2017 Keynote proposals

STC A
Innovative Control of Assembly Systems and Lines - *Jörg Krüger (2) et al.* - Contact: joerg.krueger@tu-berlin.de

STC C
Advances in Material and Friction data for Modeling of Metal Machining - *S. Melkote* (2) *et al.* - Contact: shreyes.melkote@me.gatech.edu

STC Dn
Design for Reduced Resource Consumption during the Use Phase of Products - *L. Shu (1) et al.* - Contact: shu@mie.utoronto.ca

STC E
Materials for Additive Manufacturing – *D. Bourell (2) et al.* - Contact: dbourell@mail.utexas.edu

STC F
Hot stamping of ultra-high strength steel parts - *K.I. Mori (1) et al* - Contact: mori@plast.me.tut.ac.jp

STC G
Recent Developments in Grinding Machines - *K. Wegener (2) et al.* - Contact: wegener@iwf.mavt.ethz.ch

STC M
Fluidific Elements in Machine Tools – *J. Mayr, K. Wegener (2)* - Contact: wegener@iwf.mavt.ethz.ch

STC O
Learning Factories for Future Oriented Research and Education in Manufacturing - *E. Abele (1) et al.* - Contact: abele@ptw.tu-darmstadt.de
STC P
Contributions of Precision Engineering to the "New SI" OR Changes in SI system and demands from precision engineering - *H. Bosse (3) et al.* - Contact: Harald.Bosse@ptb.de

STC S
Nanomanufacturing - perspective and applications - *F.Z Fang (1) et al.* - Contact: fzfang@tju.edu.cn

Cross-STCs
Laser Based Additive Manufacturing in Industry and Academia - *M. Schmidt (2) et al.* - Contact: Michael.Schmidt@fau.de

Cross-STCs
Design, Management and Control of Demanufacturing / Remanufacturing Systems" - *T. Tolio (1) et al.* - Contact: tullio.tolio@polimi.it

2018 Key-note proposals

STC A
Life Cycle Engineering of Light Weight Structures - *C. Herrmann (2) et al* - Contact: c.herrmann@tu-braunschweig.de

STC C
Deep Hole Drilling - *D. Biermann (2) et al* - Contact: Biermann@isf.de

STC Dn
Tolerancing: Managing Uncertainty from Conceptual Design to Final Product - *Edward Morse (3) et al.* - Contact: emorse@uncc.edu

STC F
Flexibility in Forming

STC G
Abrasive Machining of Non-Metallic Materials - *A. Shih, B. Denkena, J. Köhler, D. Curry, H. Hong, H. Tsai, H. Ohmori, K. Katahira, M. Mizutan* - Contact: shiha@umich.edu

STC O
Value Creation in Production: Reconsideration from Interdisciplinary Approaches - *T. Kaihara (1) et al.* - Contact: kaihara@kobe-u.ac.jp

STC P
Geometrical Modeling and Traceability for Computationally-Intensive Precision Engineering or Metrology - *J.-M. Linares (1) et al. - Contact:* jean-marc.linares@univ-

amu.fr

STC S
Multi-scale Characterizations of Topographies and their Applications – *C. Brown (2) et al.* –Contact: brown@wpi.edu

Cross-STC
Composite Material Part Manufacturing – *J. Fleischer (1)* - Contact: juergen.fleischer@kit.edu

2019 Key-note proposals

STC G
Micro Abrasive Processes - *J. Aurich (1)* - Contact: aurich@cpk.uni-kl.de

STC M
Robots in Machining

STC O
Global Production Networks - *G. Lanza (2)* - Contact: gisela.lanza@kit.edu

STC P
Precision Engineering for Additive Manufacturing - *R. Leach (2) et al.* - Contact: richard.leach@nottingham.ac.uk

STC S
On-machine and in-process surface metrology for precision manufacturing – *W. Gao (1) et al.* - Contact: gaowei@cc.mech.tohoku.ac.jp

Cross-STCs
Advanced Manufacturing for Enhancing the Performance and Functionality of Tooling for Metal Forming - *J. Cao (1) et al.* - Contact: jcao@northwestern.edu

2020 Key-note proposals

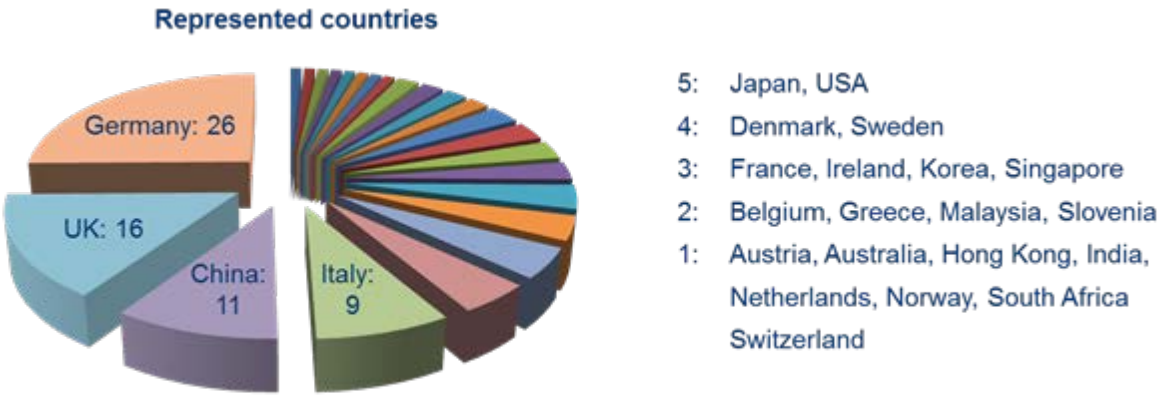
STC P
Pre Calibration Standards, Reference Objects and calibrated Workpieces in Dimensional Metrology - *L. De Chiffre (1) et al.* - Contact: ldch@mek.dtu.dk

Cross-STCs
Intelligent Machining System – *H.C. Möhring (2) et al* - Contact: hc.moehring@ovgu.de

From the Research Affiliates

P. Wiederkehr (Chair)

On behalf of the Research Affiliates (RAs), it is a great pleasure for me to give a brief update about the RA network. Since 2013, the number of RAs is stable at around 100 to 110 participants. At the moment, the 108 RAs are coming from 24 different countries. Most of the RAs are coming from Germany, the UK, China and Italy, but there are also RAs, e.g., from Australia, India or South Africa. The RA network is highly interdisciplinary, since the main interests cover the whole STCs.



Number of RAs and the represented countries

Looking at the activities of the last half year, we had the 4th CIRP Global Web Conference on Production Engineering entitled “Understanding the life cycle implications of manufacturing” in the end of September/beginning of October, which was successfully organized by J. Erkoyuncu (Cranfield University, UK) and R. Lupoi (Trinity College, Ireland). There were 46 paper presentations coming from 11 different countries.

During the CIRP Winter Meeting in Paris, we focused on the discussion of international collaborative work. For this purpose, we had presentations of current and upcoming projects. In addition, we introduced a new topic during our RA meeting: a poster presentation to discuss ideas for new collaborative work.

CIRP Winter Meeting 2016: Research Affiliate Dinner

In 2016, we are looking forward to different RA events. In the mid of June we will have our Annual Workshop in Stockholm, Sweden (13th-14th June) hosted by the KTH Royal Institute of Technology. We are in pleasant anticipation of an interesting workshop including technical presentations, discussions about the constructive alignment for course design in higher education, company visits and lab tours. At the beginning of October, there will be the next CIRPe Online Conference about “Research and Innovation for Future Production” (4th-6th October 2016). Details can be found on the conference website (http://lms.mech.upatras.gr/cirpe2016).

I would like to invite you to join our activities, e.g. our meetings during the General Assembly 2016 in Portugal, and to discuss your comments and ideas for the RA network.

From the STC's

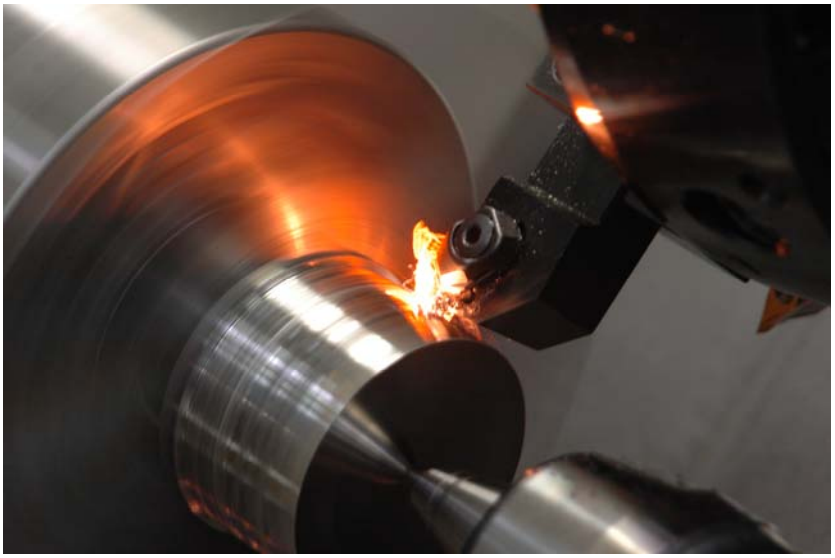
In this newsletter, a brief presentation of 2 STC's (STC C and STC O) has been prepared by the STC board members and has been presented during the CMAG meeting (Winter Meeting 2016).

STC C

(D. Biermann, Vice-Chair)

Mission of STC C - Cutting

- **STC C - Cutting deals with processes and techniques used to shape components by material removal (turning, milling etc.), including the processes of chip formation, the physical laws governing the wear of cutting tools and the factors influencing surface finish.**



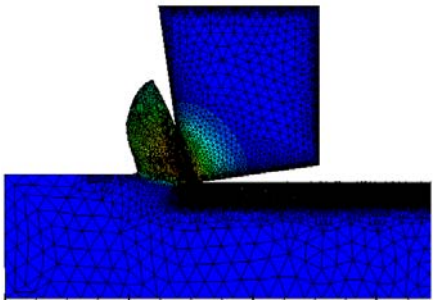
STC C - Cutting – Motivation

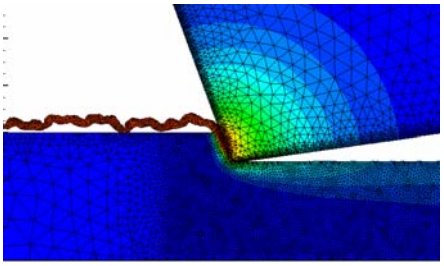
- Such an old process

Source: http://forum.archaeologie-online.de

… but still so many open questions …

- Chip formation simulated with different material models for the same material

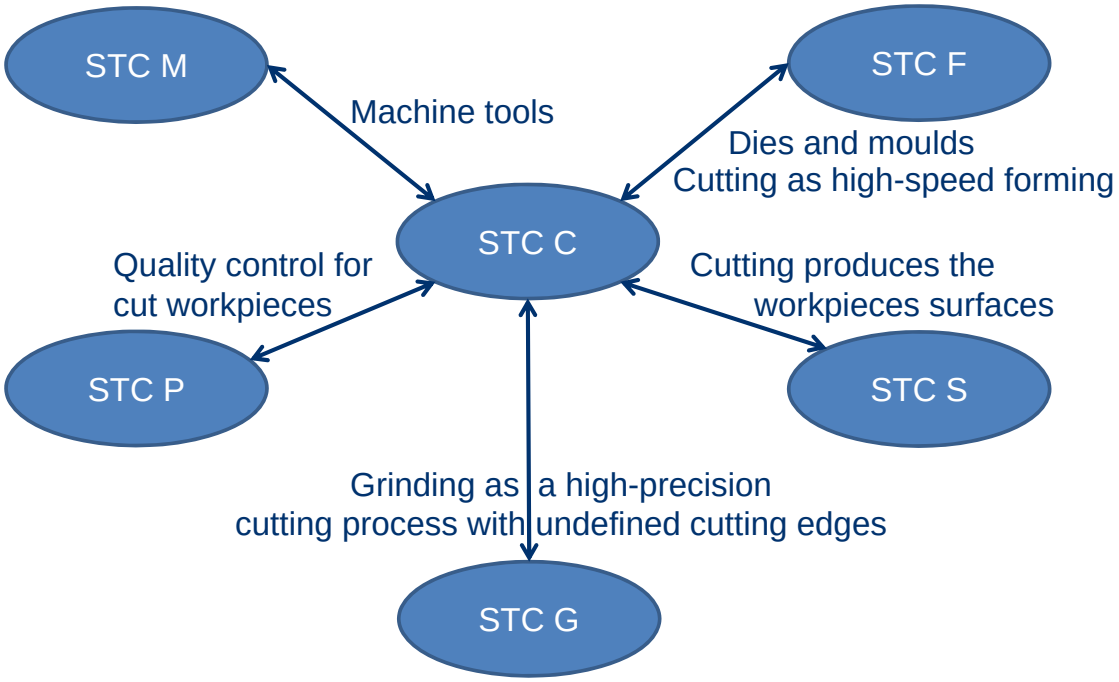




[2] Machining simulation benchmark in German PP 1480, internal presentation

STC C - Cutting – Within CIRP

- Largest STC: 68 members declare STC C as their primary STC
- Strong relations to other STC



Activities – Working Groups with STC C - Cutting Involvement/Support

- The following working groups have STC C involvement and support:

  1. **Micro-Production Engineering** (Track 2, 2012-2014)

  2. **EERU - Efficient and Effective Resource Utilization** (2012-2015)

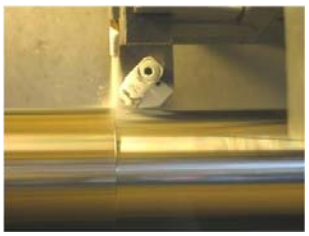
  3. **Laser in Production** (2013-2015)

- **Composite Materials Parts Manufacturing** (STCs A, C, F, M, P)
  Duration: Aug. 2015 - Jan. 2018
  Chairman: Prof. Jürgen Fleischer
  Vice Chairman: Prof. Roberto Teti
  Secretary: Dr. Alessandra Caggiano and Prof. Hans-Christian Möhring

Recent Topics of STC C - Cutting

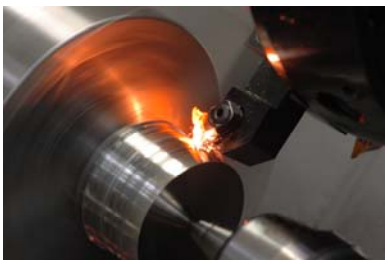
- **Specific processes and process strategies:**
  - Micro-machining
  - Diamond turning (of optical components)
  - Deep hole drilling
  - Cooling strategies (cryogenic machining, carbon dioxide snow, MQL)
  - Cutting fluids
  - Process monitoring

Source: ISF



Source: ISF

- **Specific Materials**
  - Machining of aerospace materials (CFRP, Nickel based and Ti based alloys)
  - Machinability of high-strength bainitic steels and aluminium-alloyed UHC-steel

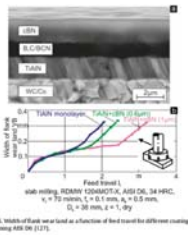


Source: ISF

- **Surface Integrity**
  - Residual stress

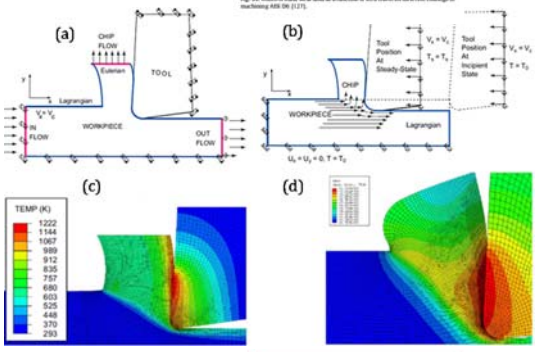
Recent Topics of STC C - Cutting

- **Cutting Tools**
  - (PVD) Coatings
  - Optimization for the machining of different materials
  - Cutting tool edge preparation



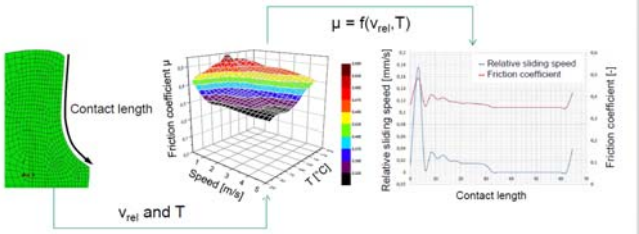
STC „C“ Keynote 2012: Cutting with Coated Tools, fig.35

- **Modelling and Simulation**
  - Cutting forces
  - Residual stress
  - Phase transformations
  - Microstructure and heat partitioning
  - Energy consumption



STC „C“ Keynote 2013: Machining Simulation, fig.8

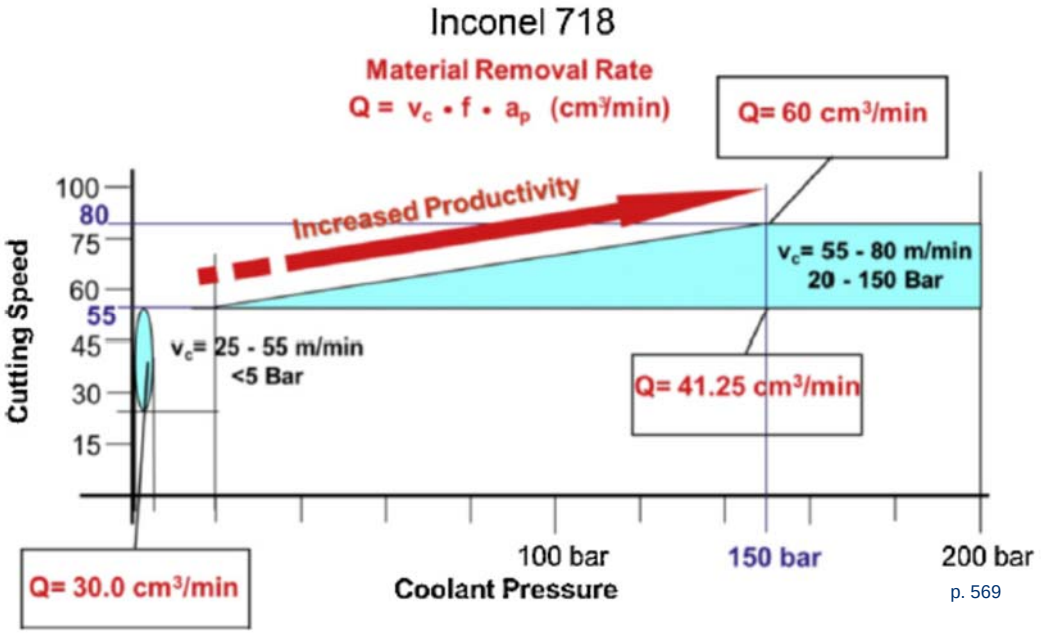
- **Measurement and characterization**
  - Characterization of friction coefficients
  - Temperature measurement



Presentation in STC „C“ Zanger, Schneider, Bollig, Schulze, Feb. 2015, Tribological Investigations using Near Cutting Conditions

STC C - Cutting – Keynote Paper 2015

- 2015: M'Saoubi, R., Axinte, D., Soo, S. L., Nobel, C., Attia, H., Kappmeyer, G., Engin, S., Sim, W.-M.: **High performance cutting of advanced aerospace alloys and composite materials**



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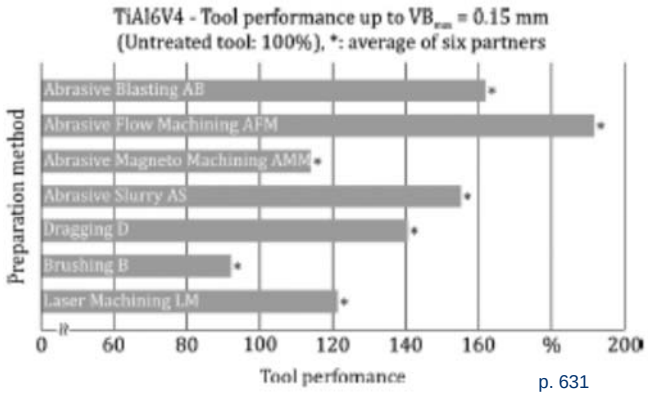
STC C - Cutting – Keynote Paper 2014

- Denkena, B., Biermann, D.: **Cutting edge geometries**



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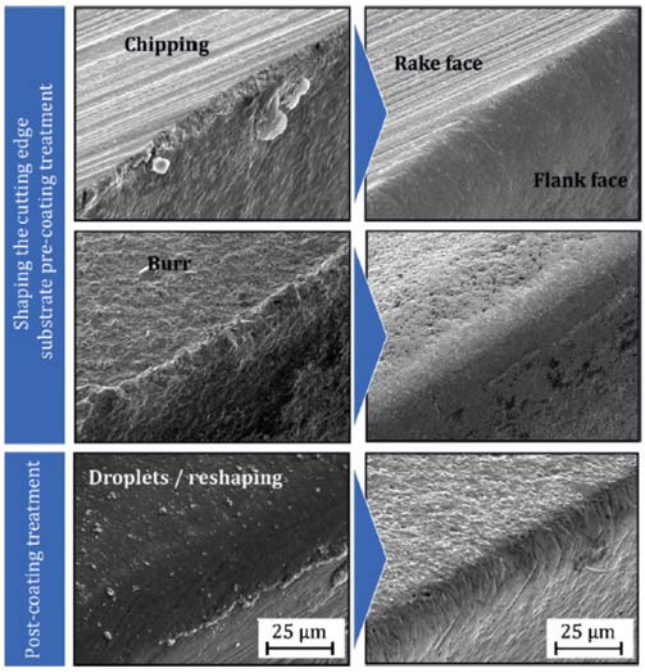

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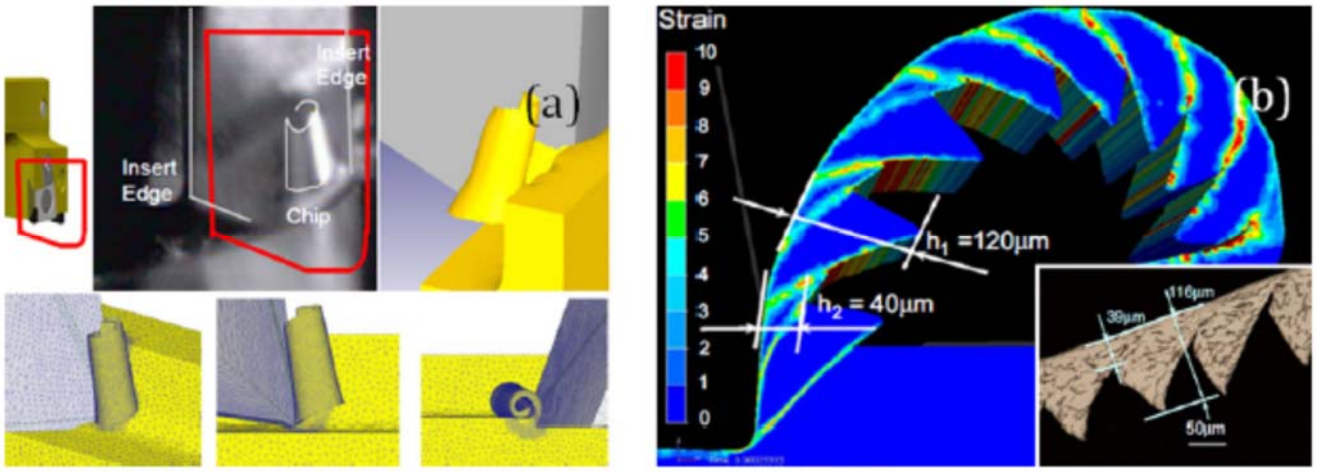
STC C - Cutting – Keynote Paper 2013

- Arrazola, P.J., Özel, T., Umbrello, D., Davies, M., Jawahir, I.S.: **Recent Advances in Modelling of Metal Machining Processes**



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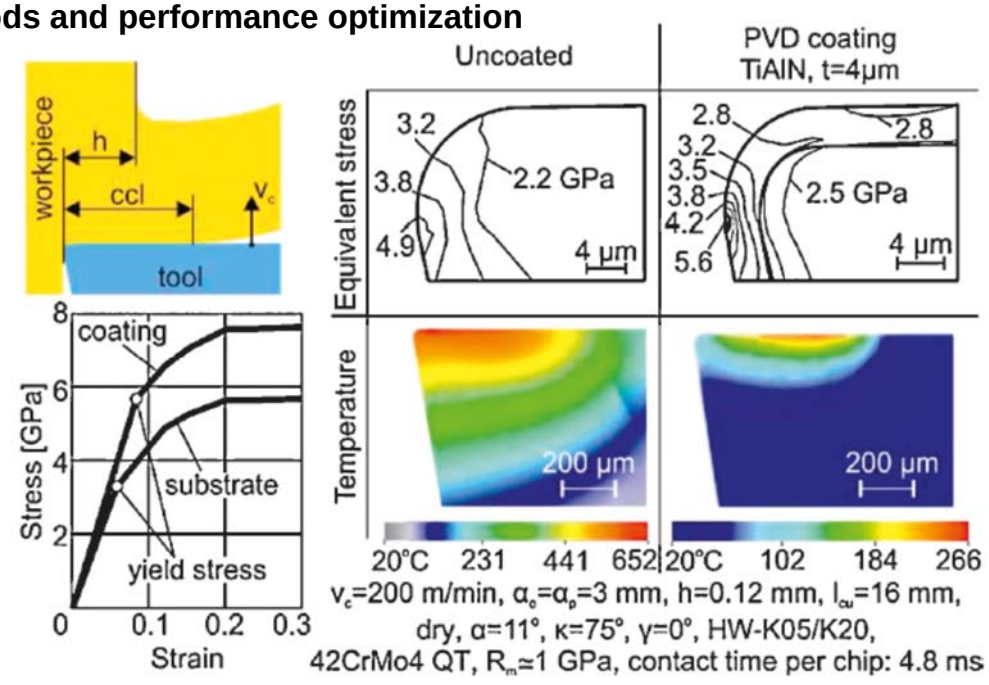
STC C - Cutting – Keynote Paper 2012

- Bouzakis, K., Michailidis, N., Skordaris, G., Bouzakis, E., Biermann, D., M'Saoubi, R.: **Cutting with coated tools: Coating technologies, characterization methods and performance optimization**



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Activities – Future Keynote Papers / Future Conferences

- 2016: **Cryogenic Manufacturing Processes**
- 2017: **Advances in Material and Friction Data for Modelling of Metal Machining**

- **7th CIRP Conference on High Performance Cutting HPC 2016**
  31st May - 2nd June 2016, Chemnitz, Germany
- **3rd CIRP Conference on Surface Integrity (CSI)**
  8th - 10th June 2016, Charlotte, NC, USA
- **ICME '16 – 10th CIRP Conference on INTELLIGENT COMPUTATION IN MANUFACTURING ENGINEERING. Innovative and Cognitive Production Technology and Systems**
  20th - 22nd July 2016, Gulf of Naples, Italy

Officers of STC C

Rachid M´Saoubi
Chairman

Dirk Biermann
Vice-Chairman

Shreyes Melkote
Secretary

STC O
(R. Teti, Chair)

Scientific Domain of STC O

STC O was proposed by M.E. Merchant as the “Optimization” scientific-technical committee in CIRP. The first STC O Keynote Paper was presented by him in 1967:

M.E. Merchant, “Progess and problems in the application of new optimization technology in manufacturing”, Annals of CIRP, 16/2/1967, p. 151.

New STC O definition since 2007:

“Design and modelling of production and service systems and organizations, as well as planning, control, simulation, optimization and management of their operations including related organizational and human issues” (CIRP web site)

The “O” meaning shifts from “Optimization” to “Organization”

Fields of study within STC O

- Holistic approach to product, process and system design and optimisation
- Application of ICT technologies in all fields of designing, modelling and managing production systems: digital manufacturing, virtual factory, cyber-physical systems, cloud manufacturing, Industry 4.0, SMLC (smart mftg leadership coalition)
- Resource and energy management; process planning; production scheduling, planning and control
- Flexible, reconfigurable and changeable manufacturing systems
- Enterprise value chain organization and integration
- Internal and external logistics, including management of supply chains and production networks
- Industrial product-service systems, maintenance strategies, production quality management and zero-defect manufacturing strategy
- New system concepts through the study of adaptivity, sustainability, complexity, scalability, emergence, self-organization and cooperation
- Human factors in manufacturing, education and training, including learning factories approaches
- Terminology, symbols and standards for manufacturing systems

CIRP GA Paper Topics (2011-2015)

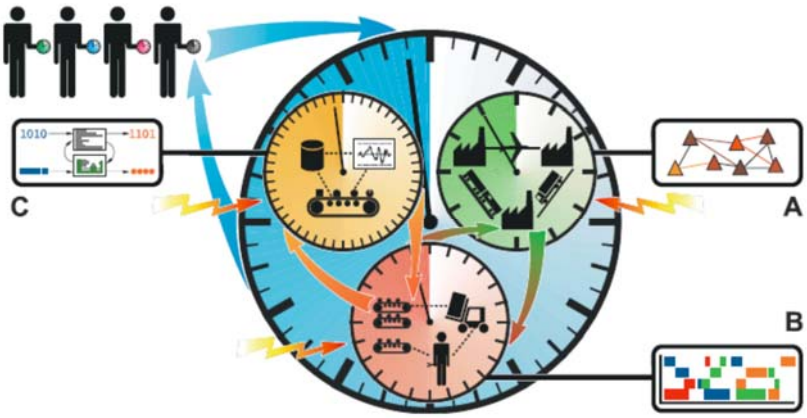
- Production Planning, Scheduling and Control (13)
- Manufacturing Systems Design, Modelling, Simulation and Optimisation (12)
- Intelligent Manufacturing Systems (evolutionary algorithms, multi-agents, genetic algorithms, knowledge management, data mining, decision-making) (12)
- Supply Chains and Production Networks (11)
- Reconfigurable, Flexible and Changeable Manufacturing Systems (7)
- Resource and Energy Efficiency (6)
- Sustainable Manufacturing Systems (6)
- Advanced IT for Manufacturing (Virtual Factory, Cloud Manufacturing, Cyber-Physical Systems, Industry 4.0) (5)
- Maintenance Strategies (5)
- Process Planning and Control (5)
- Customer Driven Products/Production (5)
- Production Quality (4)
- Logistics Systems (4)
- Industrial Product-Service Systems (3)
- Inventory Management (3)
- Human Factors in Manufacturing Systems (3)

Keynote papers presented (2011 - 2015)

- Cooperative and responsive manufacturing enterprises, J. Vancza , L. Monostori, D. Lutters, S. Kumara, M. Tseng, P. Valckenaers, H. Van Brussel, 2011
- Complexity in engineering design and manufacturing, W. ElMaraghy, H.A. ElMaraghy, T.Tomiyama, L. Monostori, 2012
- Scalability in manufacturing systems design and operation: State-of-the-art and future developments roadmap, G. Putnik, A. Sluga, H. ElMaraghy, R. Teti, Y. Koren, T. Tolio, B. Hon, 2013
- Design and management of manufacturing systems for production quality, M. Colledani, T. Tolio, A. Fischer, B. Iung, G. Lanza, R. Schmitt, J. Vancza , 2014
- Cloud-enabled prognosis for manufacturing, R. Gao, L. Wang, R. Teti, D. Dornfeld, S. Kumara, M. Mori, M. Helu, 2015

Cooperative and responsive manufacturing enterprises

J. Vancza , L. Monostori, D. Lutters, S.R. Kumara, M. Tseng, P. Valckenaers, H. Van Brussel, 2011



Overall structural view of cooperative and responsive manufacturing enterprises.

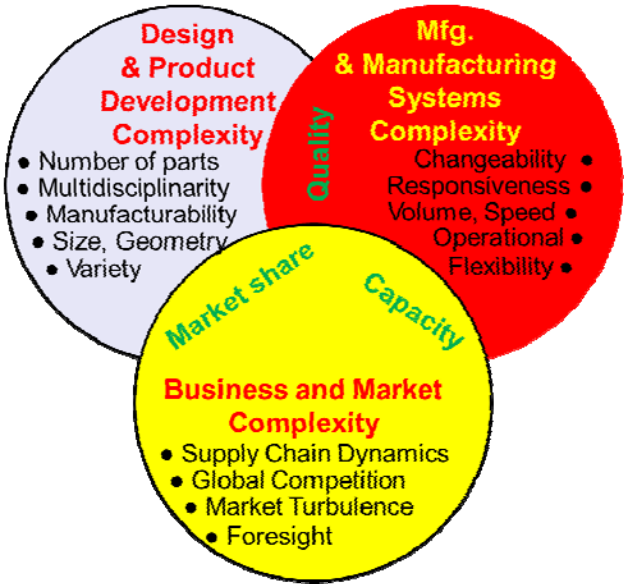
Complexity in engineering design and manufacturing

W. ElMaraghy, H.A. ElMaraghy, T.Tomiyama, L. Monostori, 2012

- **Design**
- **Manufacturing**
- **Business**
  (global supply chain)

- **Functional &**
- **Physical Domains**

- **Static & Dynamic Complexity**

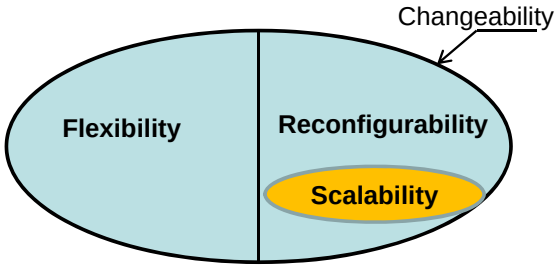


Complexity of the design, manufacturing and business with examples of related sub-topics.

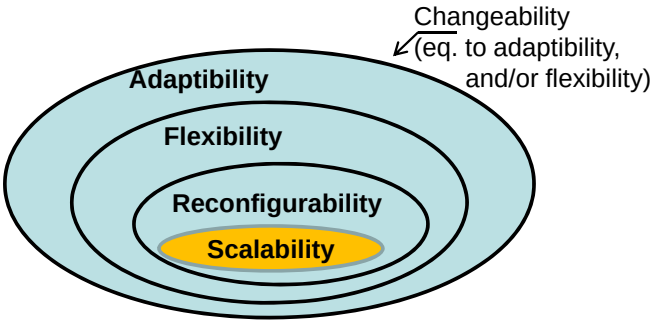
Scalability in manufacturing systems design and operation

G. Putnik, A. Sluga, H. ElMaraghy, R. Teti, Y. Koren, T. Tolio, B. Hon, 2013

Scalability is the capacity for adding or removing the resources in a cost-effective manner, in order to adjust the production capacity on a system in steps or stages.



Scalability as a subset of reconfigurability and distinct form flexibility.

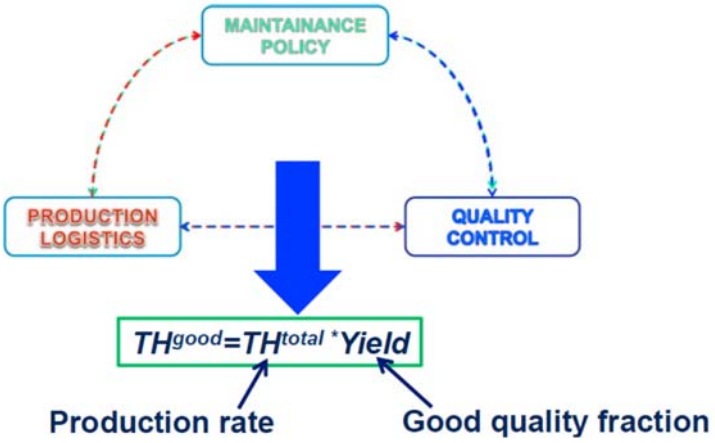


Scalability as a subset of both flexibility and reconfigurability.

Design and management of manufacturing systems for production quality

M. Colledani, T. Tolio, A. Fischer, B. Iung, G. Lanza, R. Schmitt, J. Vancza , 2014

"*Production Quality*" is the discipline that combines quality, production logistics, and maintenance methods and tools to maintain the throughput and the service level of conforming parts under control and to improve them over time, with minimal waste of resources and materials.

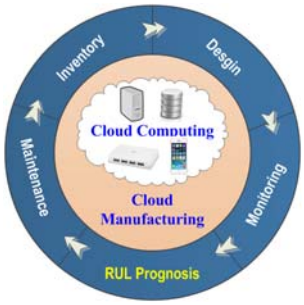


Cloud-Enabled Prognosis for Manufacturing

R. Gao, L. Wang, R. Teti, D. Dornfeld, S. Kumara, M. Mori, M. Helu, 2015

- **Prognostic Methods:**
  - Comparative review of various methods in terms of ***computing efficiency***, ***uncertainty analysis***, and ***robustness***
  - Focus on link to ***physics***, especially for ***remaining useful life*** (RUL) prediction

- **Cloud-Enabled Prognosis:**
  - Integration of in-process sensing, monitoring, analysis, and controls by leveraging *collaborative* knowledge and parallel computing enabled by the *cloud* infrastructure, including consideration of cyber-security related issues



Cloud manufacturing in view of prognosis.

- **Cloud Manufacturing:**
  - Architectures, supporting technologies, and computational platforms to achieve *collaborative* production and *intelligence sharing-based* design, production, and decision-making

STC O and Collaborative Working Groups

STC O sponsored CIRP Collaborative Working Groups (CWG):

- Learning Factories for future oriented research and education in manufacturing
  CWG officers: E. Abele; G. Chryssolouris: W. Sihn; S. Metternich (2014-2017)
  - Outlining what is meant by the term Learning Factories and generating a description model (morphology) for learning factories with the most relevant characteristics and features in several dimensions
  - Illustrating actual learning factories initiatives in diverse application scenarios: from industrial training to education and to research

Further CIRP CWG may ask STC O support: e.g. the new CIRP CWG on Composite Materials Part Manufacturing (2015-18: J. Fleisher, R. Teti, C. Mohring, A. Caggiano) for novel system requirements for composites mass production vs. small batch prod.

CIRP STC O Conferences

CIRP Conferences related STC O:

• CIRP Conference on Manufacturing Systems (CIRP CMS), Coordinated by K. Ueda

• CIRP Conference on Intelligent Computation in Manufacturing Engineeering (CIRP ICME), Coordinated by R. Teti

• CIRP Conference on Industrial Product Service Systems (CIRP IPS2), Coordinated by Y. Shimomura

• CIRP Conference on Learning Factories, Coordinated by E. Abele

48th CIRP Conference on Manufacturing Systems 24-26 June 2015, Ischia, Italy

Participation of Corp. Members in STC O

Presentations by corporate members during STC O meetings :

- Example: August 2014 - Automatic planning tool for plant assembly and disassembly work, Y. Nonaka (3), Hitachi Ltd., Yokohama Res. Lab, Japan

Co-authorship of STC O joint papers and presentations:

- Examples:
  - 2015 - Renewable energy integration into factories: Real-time control of on-site energy systems, P. Ghadimi, S. Kara, B. Kornfeld (3)
  - 2014 - Co-simulation environment for optimizing energy efficiency in production systems, F. Bleicher (3), F. Duer, I. Leobner, I. Kovacic, B. Heinzl, W. Kastner / G. Pritschow (1)

CIRP members (Fellow, Associate) can support paper submissions from corporate members for the GA Session - Part I (Annals of CIRP)

Participation of Corp. Members in STC O

Participation of industrial members in STC O meetings and activities is of high value in order to:

- ✓ Better understand relevant and impending industrial needs and priorities
- ✓ Industry can propose technical-scientific challenges for joint Research & Development activities
- ✓ Academic research results can be discussed in order to receive feedback from industrial members
- ✓ Set-up of academic-industry collaboration projects at bi-lateral, national, European, international level

Further information

- **Contacts**
  - STC Board: R. Teti, Chair; J. Vancza, Vice-Chair; G. Lanza, Secretary
  - Other STC O members (see CIRP website)
- **You are warmly invited to participate in the next STC O meetings!**



From the CIRP Office

Chantal Timar-Schubert

Annals papers/keynote papers submission process, CIRP meetings, the Website, candidatures for Membership, Internal Regulations and any internal information.

Agnès Chelet

Financial aspects: accountancy, membership fees, page charges, conferences sponsorships, Winter meetings registration + Agendas & Minutes of the scientific meetings

News

- We are happy to celebrate our 20 years in CIRP! We have always enjoyed being here since the first day, when we started discovering the great CIRP family from all over the world. Thank you for your trust and friendliness all along these years.
- General Assembly in Portugal: All information on the next CIRP General Assembly is available online on the Website. If not done yet, please urgently book your hotel as this is a very touristic location!
- Commemorations: we remind you that commemorations on our past members are available online through "About CIRP". You are welcome to send us by email all the missing commemorations, there has been no update since quite a long time.
- Last General Assembly in Cape Town: we got very few pictures from last General Assembly in Cape Town. You are welcome to forward us your own pictures to be gathered and uploaded on our usual CIRP Family Website.

With kind regards,

Chantal

Future Meetings

Winter Meetings	General Assembly's
15-17 February 2017, Paris 21-23 February 2018, Paris	21-27 August 2016, Guimaraes, Portugal 20–26 August 2017, Lugano, Switzerland