Karlsruhe Institute of Technology

1st CIRP Conference on Composite Materials Parts Manufacturing

Conference Program
Karlsruhe, Germany | June, 8 - 9, 2017

WBK - INSITUTE OF PRODUCTION SCIENCE

Introduction

The *1st CIRP Conference on Composite Materials Parts Manufacturing* hold from June 8 - 9, 2017 in Karlsruhe, Germany, will be a great chance for experts from academia and industry to present and discuss their findings on a very high level. This will further deepen and encourage the knowledge in the field of composite manufacturing.
The conference is the result of the *CIRP Collaborative Working Group on Composite Materials Parts Manufacturing*, which was founded in 2015 by Prof. Teti and me. Prof. Teti's support in organizing the conference in his function as co-chairman is also highly appreciated. The same holds for the assistance of the international scientific committee, including the greatest researchers in this field. Their work allowed the peer-review of all contributions, so only the papers with the highest contribution to science were accepted.

Prof. Dr.-Ing. Jürgen Fleischer

In this conference, highest quality research findings in the area of composites manufacturing technologies will be presented. The main topics will be discussed in sessions with about 60 papers all related to the production of composite parts: placement as well as forming, cutting, additive manufacturing, recycling, mechanical design and simulation, axis-symmetric parts and quality control. Moreover, process chains and advanced manufacturing processes will be part of the program.

It is an honor for me to welcome you to Karlsruhe and to be your host for the *1st CIRP Conference on Composite Materials Parts Manufacturing.*

Chairmen and Scientific Committee

Chairmen

Prof. Jürgen Fleischer, Germany

Prof. Roberto Teti, Italy

Scientific Committee

Prof. Helmi Attia, Canada

Prof. Dirk Biermann, Germany

Prof. Fritz Bleicher, Austria

Prof. Christian Brecher, Germany

Dr. Alessandra Caggiano, Italy

Prof. Berend Denkena, Germany

Prof. Antoniomaria Di Ilio, Italy

Prof. Welf G. Drossel, Germany

Prof. Robert Gao, USA

Prof. Frank Henning, Germany

Prof. Steffen Ihlenfeldt, Germany

Prof. Jack Jeswiet, Canada

Dr. Yigit Karpat, Turkey

Prof. Gideon Levy, Switzerland

Dr. Rachid M'Saoubi, Germany

Prof. Dieter Meiners, Germany

Prof. Christian Möhring, Germany

Prof. Dimitris Mourtzis, Greece

Prof. Stephen Newman, Great Britain

Dr. Jose Outeiro, France

Prof. Gerard Poulachon, France

Prof. Scott Smith, USA

Prof. Tullio Tolio, Italy

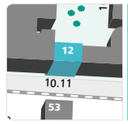
Prof. Konrad Wegener, Suisse

Prof. Rafi Wertheim, Israel

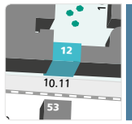
Content

Program Overview

Building 11.30
Neuer Senatssaal



Building 10.11
Alter Senatssaal



Building 10.11
Rooms 111.1/111.2

Wednesday, June 7

Registration and Welcome Reception

18.00 - 21.00 – Location: Building 11.30, Neuer Senatssaal

Thursday, June 8

Opening Session / Keynote Presentations
9.00 - 11.00 – Location: Building 11.30, Neuer Senatssaal

Advanced Manufacturing Processes	**Cutting of FRP**	**Additive Manufacturing**

Lunch
12.20 – 13.20 - Location: Building 11.30, Foyer

Advanced Manufacturing Processes	**Cutting of FRP**	**Recycling / Reusability**
Overall Process Chains	**Cutting of FRP**	**Axis-Symmetric Parts**
Mechanical Design and Simulation (I)	**Cutting of FRP**	**Quality Control and Structural Health Monitoring (I)**

Conference Dinner
from 19.00 – Location: Karlsruhe Palace

Friday, June 9

Keynote Presentations
9.00 - 11.00 – Location: Building 11.30, Neuer Senatssaal

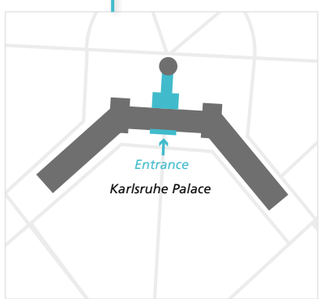
Mechanical Design and Simulation (II)	**Placement and Forming of Fiber Reinforced Plastics**	**Quality Control and Structural Health Monitoring (II)**

Lunch
13.00 - 14.00 – Location: Building 11.30, Foyer

Goodbye

Lab Tours
14.20 – Start: buses in front of building 11.30

Location Guide



Dinner Venue:
Gartensaal
Schloßbezirk 10
76131 Karlsruhe
Germany

Conference Dinner

Thursday, 08.06.2017, from 19.00
Dinner and drinks included.

Conference Venue:
Ehrenhof
Kaiserstraße 10
76131 Karlsruhe
Germany

Conference Rooms

Building 11.30:
Foyer (Registration, Break area)
Neuer Senatssaal

Building 10.11:
Alter Senatssaal
Rooms 111.1/111.2 (1. Floor)

Thursday, June 8

	Neuer Senatssaal	Alter Senatssaal	111.1/111.2
8.00-9.00	**Registration** *Location: Building 11.30, Foyer*		
9.00-9.30	**Opening and Welcome Address** *Location: Building 11.30, Neuer Senatssaal*		
9.30-10.00	**Keynote** Roberto Teti: Machining of FRP Composite Materials *Location: Building 11.30, Neuer Senatssaal*		
10.00-10.30	**Keynote** Frank Henning: Development of Structural Thermoplastic Composites by Considering Influence of Manufacturing *Location: Building 11.30, Neuer Senatssaal*		
10.30-11.00	**Morning Break**		
Session	**Advanced Manufacturing Processes** *Chairman: J. Fleischer*	**Cutting of FRP** *Chairman: R. Teti*	**Additive Manufacturing** *Chairman: F. Henning*
11.00-11.20	Joining of thermoplastic tapes with metal alloys utilizing novel laser sources and enhanced process control in a tape placement process *C. Kukla, T. Peters, H. Janssen, C. Brecher*	Improved tool geometry to enhance surface quality and integrity in trimming of CFRP composite materials *A. Caggiano, V. Lopresto, R. Teti*	Material extrusion of continuous fiber reinforced plastics using commingled yarn *T. H. J. Vaneker*
11.20-11.40	Advanced molds and methods for the fundamental analysis of process induced interface bonding properties of hybrid, thermoplastic composites *T. Joppich, A. Menrath, F. Henning*	Ultrasonic assisted milling of reinforced plastics *E. Uhlmann, F. Protz, B. Stawiszynski, S. Heidler*	Applications of Fiber-Reinforced Polymers in Additive Manufacturing *T. Hofstätter, D. B. Pedersen, G. Tosello, H. N. Hansen*
11.40-12.00	Influence of processing conditions on the mechanical behavior of MWCNT reinforced thermoplastic nanocomposites *S. D.Rad, A. Islam, J. S. Jensen*	Core Drilling of Fiber Reinforced Materials using Abrasive Tools *T. Bathe, D. Biermann, C. Rautert*	Investigation of a new approach for additively manufactured continuous fiber-reinforced polymers *F. Baumann, J. Scholz, J. Fleischer*
12.00-12.20	Continuous film stacking and thermo-forming process for hybrid CFRP/aluminum laminates *D. Nestler, M. Trautmann, C. Zopp, J. Tröltzsch, T. Osiecki, S. Nendel, G. Wagner, L. Kroll*	Experimental investigation of the hole accuracy, delamination, and cutting force in piercing of carbon fiber reinforced plastics *F. Klocke, A. Shirobokov, S. Kerchnawe, M. Wahl, R. Mannens, A. Feuerhack, P. Mattfeld*	Composites Part Production with Additive Manufacturing Technologies *D.-A. Türk, R. Kussmaul, M. Zogg, C. Klahn, B. Leutenecker-Twesliek, M. Meboldt*
12.20-13.20	**Lunch** *Location: Building 11.30, Foyer*		
Session	**Advanced Manufacturing Processes** *Chairman: J. Fleischer*	**Cutting of FRP** *Chairman: R. Teti*	**Recycling / Reusability** *Chairman: P. Mativenga*
13.20-13.40	The interface of an intrinsic hybrid composite - development, production and characterisation *R. Kießling, J. Ihlemann, M. Riemer, W.-G. Drossel, I. Scharf, T. Lampke, S. Sharafiev, M. Pouya, M. F.-X. Wagner*	Analysis and Modeling of Heat Flux into the Tool in Abrasive Circular Cutting of Unidirectional CFRP *W. Hintze, C. Klingelhöller*	A direct process to reuse dry fiber production waste for recycled carbon fiber bulk molding compounds *O. Saburow, J. Huether, R. Maertens, A. Trauth, Y. Kechaou, F. Henning, K. A. Weidenmann*
13.40-14.00	Semi-Solid Joining of Aluminum and Carbon Fabric *L. Marx, M. Liewald*	Experimental study on water jet cutting of unidirectional carbon fiber fabrics *M. Voit, G. Reinhart, T. Metzger*	Nonwovens from recycled carbon fibres - comparison of processing technologies *J. Wölling, M. Schmieg, F. Manis, K. Drechsler*
14.00-14.20	Precisely Adjustable Inserts for Stiffness-Driven CFRP Sandwich Structures *E. Relea, L. Weiss, R. Kussmaul, M. Zogg, G. Ramstein, K. Wegener*	Machinability of Continuous-Discontinuous Long Fiber Reinforced Polymer Structures *A. Helfrich, S. Klotz, F. Zanger, V. Schulze*	Carbon fibre recycling from milling dust for the application in short fibre reinforced thermoplastics *E. Uhlmann, P. Meier*
14.20-14.40	**Coffee Break**		
Session	**Overall Process Chains** *Chairman: C. Möhring*	**Cutting of FRP** *Chairman: W. Hintze*	**Axis-Symmetric Parts** *Chairwoman: A. Caggiano*
14.40-15.00	A holistic and DoE-based approach to developing and putting into operation complex manufacturing process chains of composite materials *H. Wiemer, M. Schwarzenberger, G. Dietz, M. Juhrisch, S. Ihlenfeldt*	Machining of CFRP via short amplitude torsion pendulum drilling *L. Herberger, B. Kirsch, B. Henn, J. C. Aurich*	Lightweight design and manufacturing of composites for high-performance electric motors *S.-F. Koch, M. Peter, J. Fleischer*
15.00-15.20	Development, analysis, and validation of an economically efficient process chain for a rigid CFRP plate assembly using finger joints *C. W. P. Fischbach, M. F. Zaeh, S. C. Hottner, J. Hornung, M. Voit*	Characterization of the surface roughness of milled carbon fiber reinforced plastic structures *U. Teicher, T. Rosenbaum, A. Nestler, A. Brosius*	Automated preforming of braided hoses made of thermoplast-glass fiber hybrid yarns *A. Liebsch, R. Kupfer, A. Defranceski, B. Rösler, J. Janik, M. Gude*
15.20-15.40	Introducing a novel manufacturing process for automotive composite components *H. Amel, N. Raath, G. Williams, S. Cozien-Cazuc, M. Ravaioli, S. Currie, A. Bools, M. Hawrylak, E. Goodman, D. J. Hughes*	Research on Cutting Force Model of Triangular Blade for Ultrasonic Assisted Cutting Honeycomb Composites *X. Hu, B. Yu, X. Li, N. Chen*	Analysis of filament winding processes and potential equipment technologies *N. Minsch, F. H. Herrmann, T. Gereke, A. Nocke, C. Cherif*
15.40-16.00	**Coffee Break**		
Session	**Mechanical Design and Simulation (I)** *Chairman: V. Schulze*	**Cutting of FRP** *Chairman: W. Hintze*	**Quality Control and Structural Health Monitoring (I)** *Chairman: M. Bauza*
16.00-16.20	An improved fatigue failure model for multidirectional fiber-reinforced composite laminates under any stress ratios of cyclic loading *V. G. Mejlej, D. Osorio, T. Vietor*	Low frequency oscillated milling of carbon fiber-reinforced plastics *K. Szallies*	Direct printing of strain sensors via nanoparticle printer for the applications to composite structural health monitoring *G.-Y. Lee, M.-S. Kim, H.-S. Yoon, J. Yang, J.-B. Ihn, S.-H. Ahn*
16.20-16.40	Design for manufacturing of multi-material mechanical parts: A computational based approach *K. Anyfantis, P. Foteinopoulos, P. Stavropoulos*	Diamond drilling of Carbon Fiber Reinforced Polymers: Influence of tool grit size and process parameters on workpiece delamination *P. C. C. Priarone, M. Robiglio, R. Melentiev, L. Settineri*	Sensing and Actuating Functions by Shape Memory Alloy Wires Integrated into Fiber Reinforced Plastics *B. Senf, T. Mäder, I. Navarro y de Sosa, A. Bucht, M. Knobloch, D. Löpitz, W.-G. Drossel*
16.40-17.00	Carbon Fiber Reinforced Polymers for High-Dynamic Testing Machines *R. Kussmaul, M. Zogg, L. Weiss, E. Relea, R. Jacomet, P. Ermanni*	Cutting Process Tribometer Experiments for Evaluation of Friction Coefficient close to a CFRP Machining Operation *R. Voss, L. Seeholzer, F. Kuster, K. Wegener*	
from 19.00	**Conference Dinner** *Location: Karlsruhe Palace*		

Friday, June 9

	Neuer Senatssaal	Alter Senatssaal	111.1/111.2
9.00-9.30	**Keynote** Hans-Christian Möhring: Composites in Production Machines *Location: Building 11.30, Neuer Senatssaal*		
9.30-10.00	**Keynote** Jürgen Fleischer: DFG SPP 1712 „Intrinsic CFRP-Metal Hybrids for Lightweight Structures“ *Location: Building 11.30, Neuer Senatssaal*		
10.00-10.30	**Keynote** Marcin Bauza: High Speed Inspection of Composite Parts using CT X-Ray and Deflectometry *Location: Building 11.30, Neuer Senatssaal*		
10.30-11.00	**Morning Break**		
Session	**Mechanical Design and Simulation (II)** *Chairman: V. Schulze*	**Placement and Forming of Fiber Reinforced Plastics** *Chairwoman: A. Caggiano*	**Quality Control and Structural Health Monitoring (II)** *Chairman: M. Bauza*
11.00-11.20	Thermo-chemo-mechanical effective properties for homogeneous and heterogeneous n-phase mixtures with application to curing *C. Dammann, P. Lenz, R. Mahnken*	Influence of AFP process parameters on the temperature distribution used for thermal in-process monitoring *C. Schmidt, B. Denkena, T. Hocke, K. Völtzer*	Characterisation and optimization of in-process eddy current sensor arrays using computed tomography *D. Berger, H.-C. Töpper, T. Will, G. Lanza, D. Koster, H.-G. Herrmann*
11.20-11.40	A CONCRETE AND VIABLE EXAMPLE OF MULTIMATERIAL BODY: The Evolution project main outcomes *E. Cischino, Z. Vuluga, C. E. Ezeiza, I. Lopez Benito, E. Mangino, J. de Claville Christiansen, C.-G. Sanporean, F. Di Paolo, M. Kirpluks, P. Cābulis*	Optimization of variable stiffness composites in Automated Fibre Placement Process Using Evolutionary Algorithms *V. G. Mejlej, P. Falkenberg, E. Türck, T. Vietor*	Manufacturing of textile preforms with an intelligent draping and gripping system *F. Förster, F. J. Ballier, S. Coutandin, A. Defranceski, J. Fleischer*
11.40-12.00	Simulation of RIM-process for polyurethane foam expansion in fiber reinforced sandwich structures *J. Troeltzsch, K. Schäfer, D. Niedziela, I. Ireka, K. Steiner, L. Kroll*	From UD-tape to final part - a comprehensive approach towards thermoplastic composites *M. Kropka, M. Muehlbacher, T. Neumayer, V. Altstaedt*	New concepts for quality assurance of lightweight material *M. Zaiß, J. Demmerle, J.-N. Oergele, G. Lanza*
12.00-12.20	A Benchmark Study of Finite Element Codes for Forming Simulation of Thermoplastic UD-Tapes *D. Doerr, W. Brymerski, S. Ropers, D. Leutz, T. Joppich, L. Kärger, F. Henning*	Efficient production of tailored structural thermoplastic composite parts by combining tape placement and 3d printing *H. Janssen, T. Peters, C. Brecher*	Machine Learning Approach for Optimization of Automated Fibre Placement Processes *J. Brüning, B. Denkena, M.-A. Dittrich, T. Hocke*
12.20-12.40	New Methods for Computing and Developing Hybrid Sheet Molding Compound Structures for Aviation Industry *M. Fette, M. Hentschel, J. g. Santafe, T. Wille, H. Büttmeyer, P. Schiebel*	Automated Stamp Forming of Continuous Fibre Reinforced Thermoplastics for Complex Shell Geometries *M. Micke-Camuz, B.-A. Behrens, A. Raatz, S. Hübner, C. Bonk, F. Bohne, C. Bruns*	CFRP-Part Quality as the Result of Release Agent Application - Demoldability, Contamination Level, Bondability *D. Blass, K. Dilger*
12.40-13.00	Concurrent design & life cycle engineering in automotive lightweight component development *A. Kaluza, S. Kleemann, T. Fröhlich, C. Herrmann, T. Vietor*	Simultaneous Grasping and Heating Technology for Automated Handling and Preforming of Continuous Fibre Reinforced Thermoplastics *C. Bruns, A. Raatz*	Method for quantitative 3D evaluation of defects in CFRP using active lock-in thermography *S. Ekanayake, C. Isenberg, R. H. Schmitt*
13.00-14.00	**Lunch** *Location: Building 11.30, Foyer*		
14.00-14.20	**Goodbye** *Location: Building 11.30, Neuer Senatssaal*		
14.20-17.00	**Lab Tours** *Start: buses in front of building 11.30*		

Notes

Arrival and Tram System

Travelling to Karlsruhe by road or rail
Karlsruhe is located on a major road and rail intersection and can be reached quickly and easily from all directions via the A 5, A 8, or A 65 motorways to all parts of the city.

Tram
Provide your connection to the city centre (from central railway station to Durlacher Tor/KIT-Campus Süd take Tram 2).

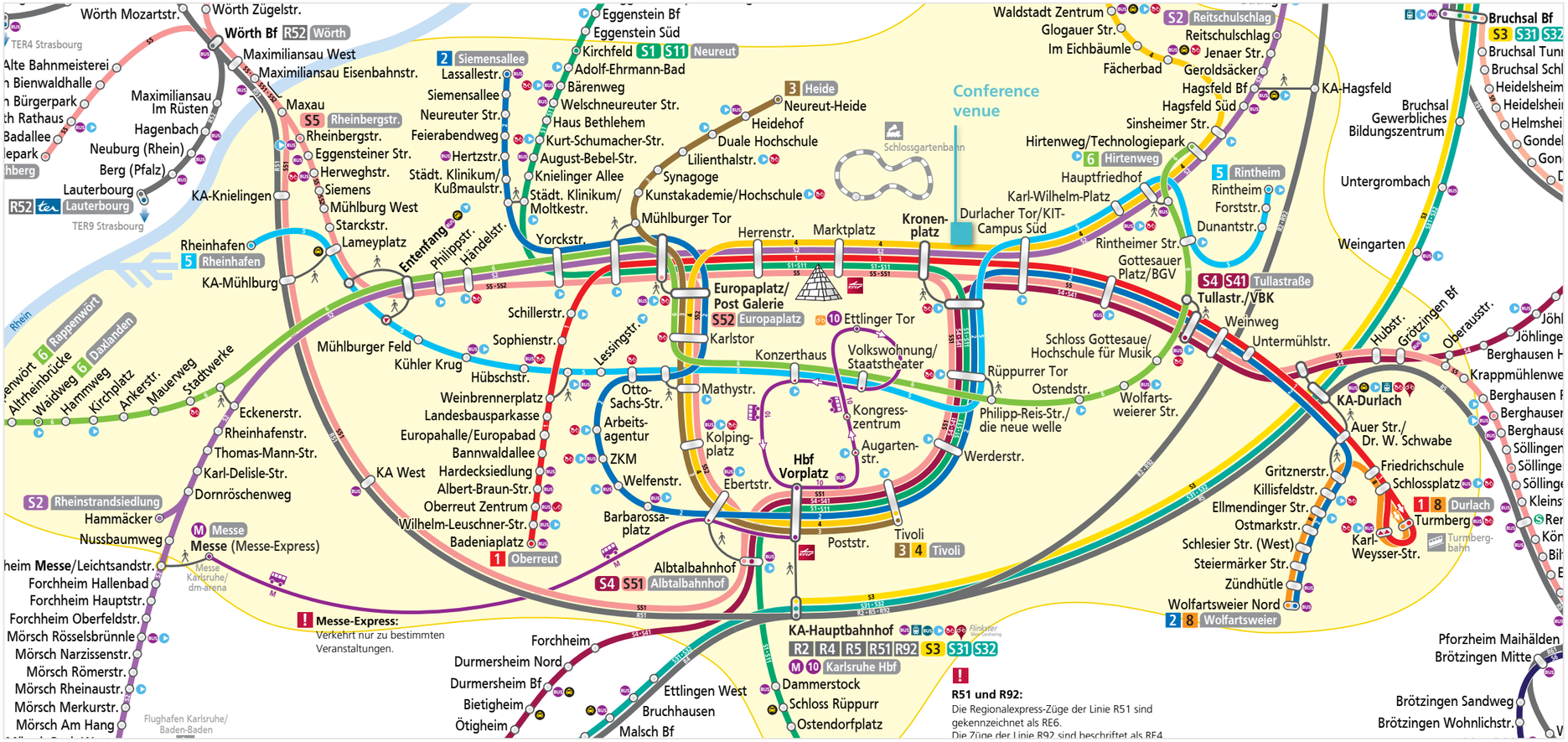
Travelling to Karlsruhe by air
Karlsruhe/Baden-Baden (30 minutes by car), the international airports of Stuttgart and Strasbourg (50 - 60 minutes by car). Or arrive at Frankfurt/Main international airport and take a high-speed train from the adjoining ICE station to Karlsruhe in exactly one hour.

Further Information

Public transport
en.kvv.de
www.bahn.de

Organisation of the conference
www.cirp-ccmpm2017.com
info@cirp-ccmpm2017.com

Taxi centre in Karlsruhe
Tel. 0721 944 144
Tel. 0721 160 200



Your way to conference and conference dinner by public transport

Tram
Tram 1, 5, S1, S2, S5

The conference venue is situated between the Stations Kronenplatz and Durlacher Tor/KIT-Campus Süd.

For Conference Dinner exit the tram at Marktplatz.

Notice
Due to construction work in the tram system all over Karlsruhe, the system might not be working as expected.
Please check: **en.kvv.de/**

wbk Institute of Production Science Karlsruhe

Prof. Dr.-Ing. Jürgen Fleischer

Machines, equipment and process automation

Prof. Dr.-Ing. Gisela Lanza

Production systems

Prof. Dr.-Ing. habil. Volker Schulze

Manufacturing and materials technology

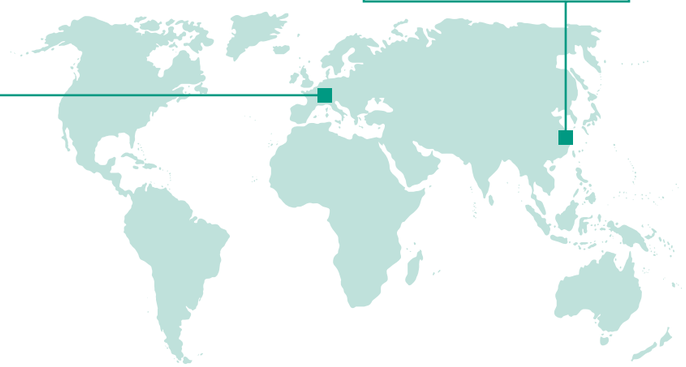
wbk at Fasanengarten (Karlsruhe Institute of Technology)

wbk at Ehrenhof (Karlsruhe Institute of Technology)

AMTC - Advanced Manufacturing Technology Center (Shanghai, China)

GAMI - Global Advanced Manufacturing Institute (Suzhou, China)

wbk at Campus Nord (Karlsruhe Institute of Technology)



wbk Institute of Production Science

wbk.kit.edu

Notes

Contact

Karlsruhe Institute of Technology (KIT)
wbk Institute of Production Science

Campus Süd
Kaiserstraße 12
76131 Karlsruhe

www.cirp-ccmpm2017.com
info@cirp-ccmpm2017.com

Graphic design & Production

Der Punkt GmbH

Issued by

Karlsruhe Institute of Technology (KIT)

President Professor Dr.-Ing. Holger Hanselka
Kaiserstraße 12
76131 Karlsruhe, Germany
www.kit.edu