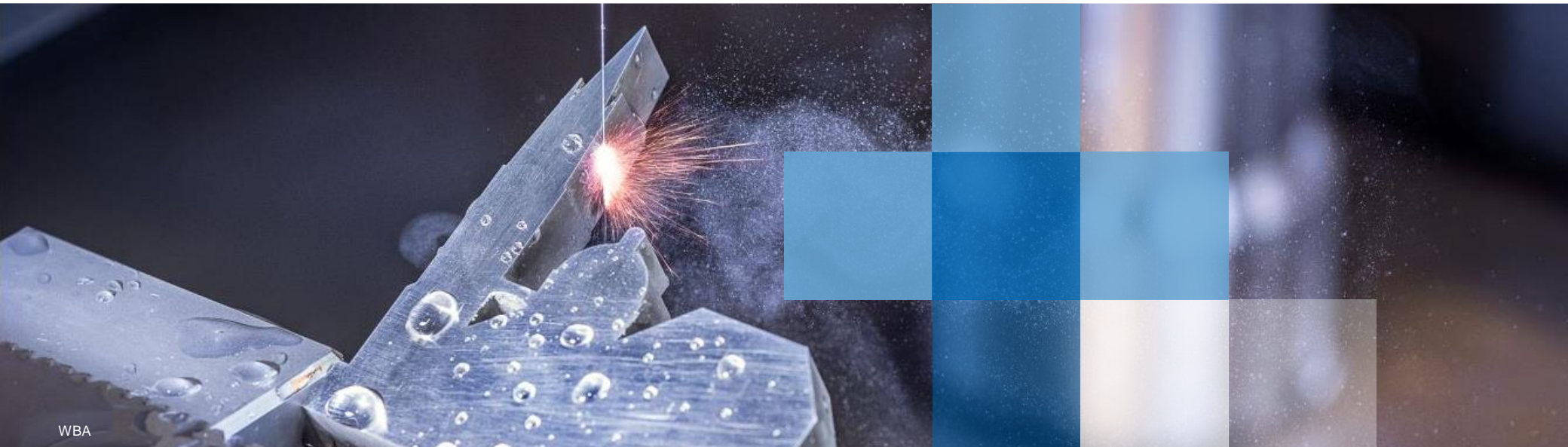




**WBA
WERKZEUGBAU
AKADEMIE**



WBA

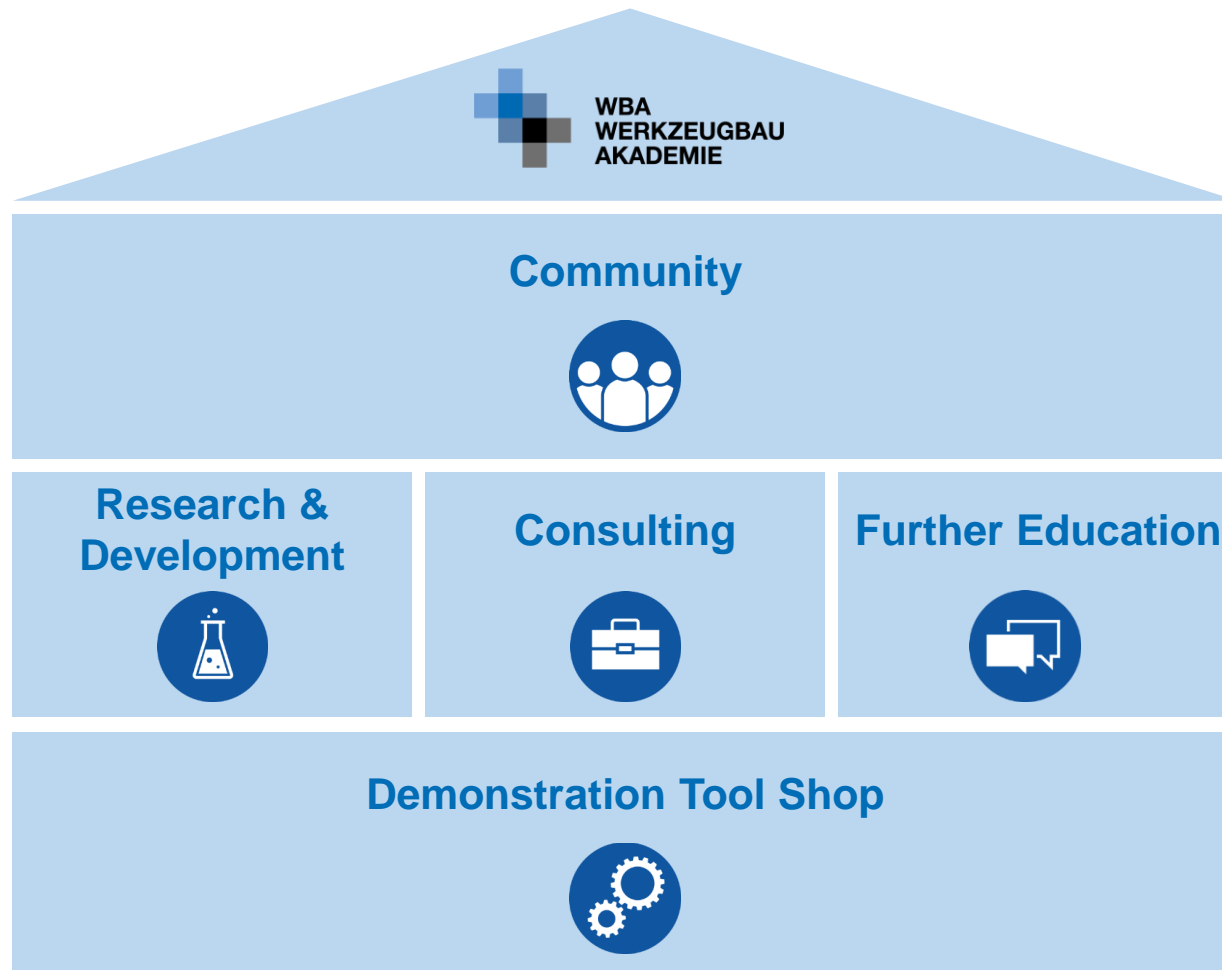
WBA Tooling Academy Aachen

Membership

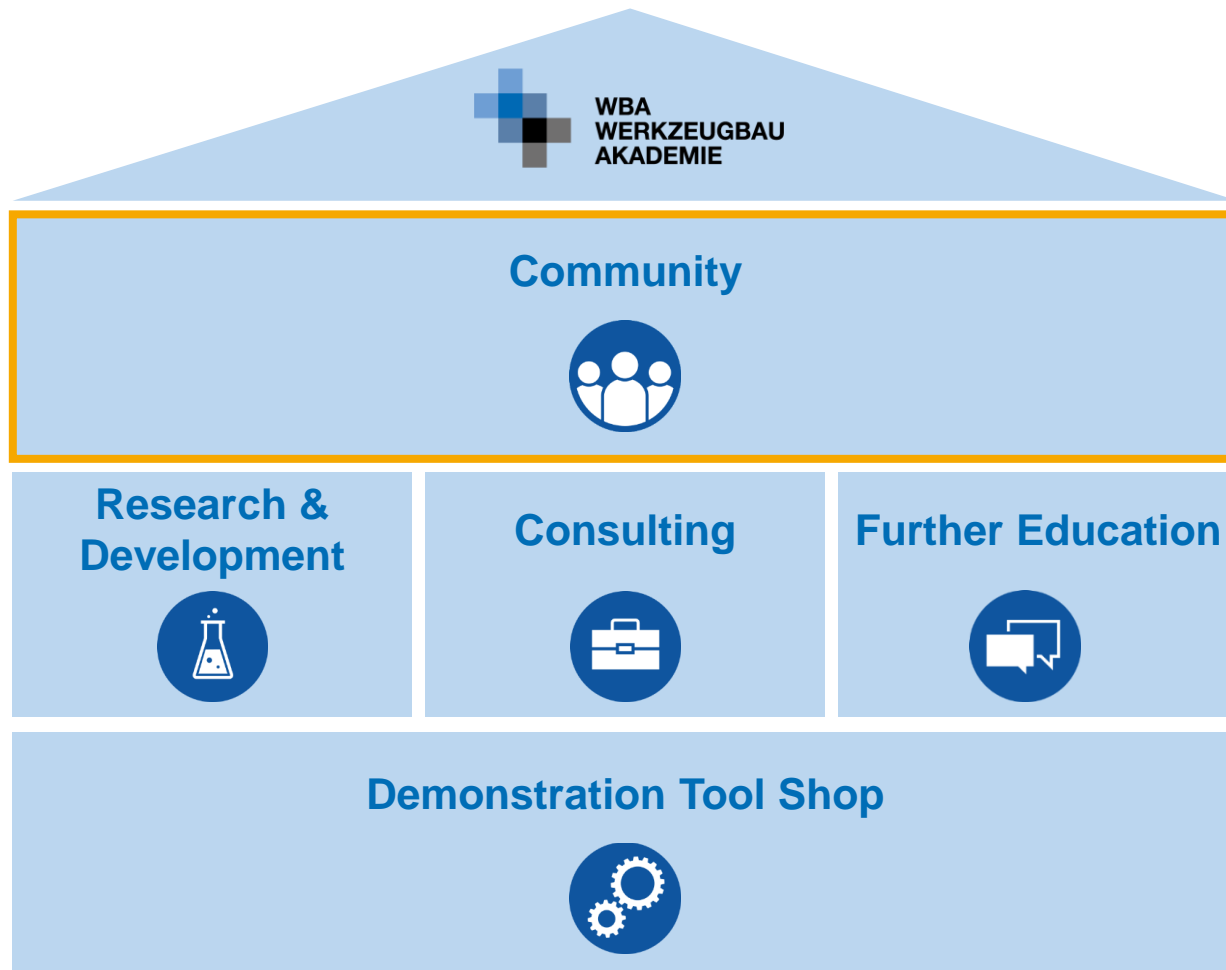
Version 02.2019

The WBA Tooling Academy Aachen

Tooling in Series



The WBA Tooling Academy Aachen Community



Community

Members of the WBA Tooling Academy



Premium

Business

Basic

Cooperation

Community Participation Model for Toolmaking Companies



BENEFITS	PREMIUM	BUSINESS	BASIC	COOPERATION
----------	---------	----------	-------	-------------



Membership

Number of Project Checks p/a	4	3	2	-
Project Check Budget p/a	€10,000	€7,500	€5,000	-
Validity of Project Checks	All Activities	All Activities	Consortial Projects	-
Saving Limit of Project Checks	€25,000	€15,000	€0	-
Regular Newsletter	Yes	Yes	Yes	Yes



Research & Development

Project Proposals	Yes	Yes	Yes	Yes
Project Prioritization	Yes	Yes	-	-
Project Selection & Participation	Checks	Checks	Checks	€
Annual Research Report	Yes	Yes	Yes	Yes
Access to Publicly Funded Research Projects	Yes	Yes	Yes	Yes



Community

Semiannual Meeting at a WBA Member	Yes	Yes	Yes	Yes
Annual Meeting in Aachen	Yes	Yes	Yes	Yes
Access to Virtual Campus	Yes	Yes	Yes	Yes
Participation of Career Fair/Use of Job Portal	Yes	Yes	Yes	Yes
Studies in Printed Version	Yes	Yes	Yes	Yes

BENEFITS	PREMIUM	BUSINESS	BASIC	COOPERATION
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Further Education

Senior Expert and Expert in Toolmaking	Checks Usable/ -30%	Checks Usable/ -30%	-	-
Certificate Courses/Modules	Checks Usable/ -30%	Checks Usable/ -30%	-	-
Workshops and Intensive Trainings	Checks Usable/ -30%	Checks Usable/ -30%	-30%	-30%
Basic Courses and Advanced Courses	Checks Usable/ -30%	Checks Usable/ -30%	-30%	-30%
Webinars	Free of Charge	Free of Charge	Free of Charge	Free of Charge



Services

Industry Consulting	Checks Usable/ -10%	Checks Usable/ -10%	€	€
Software Development	Checks Usable/ -10%	Checks Usable/ -10%	€	€
Manufacturing in Demonstration Tool Shop	Checks Usable	Checks Usable	€	€
Access to "Tooling Theme Park" ("Erlebnisswelt Werkzeugbau")	Yes	Yes	Yes	Yes
Utilization of Offices and Premises	Yes	€	€	€

Community

Annual and Semiannual Meeting

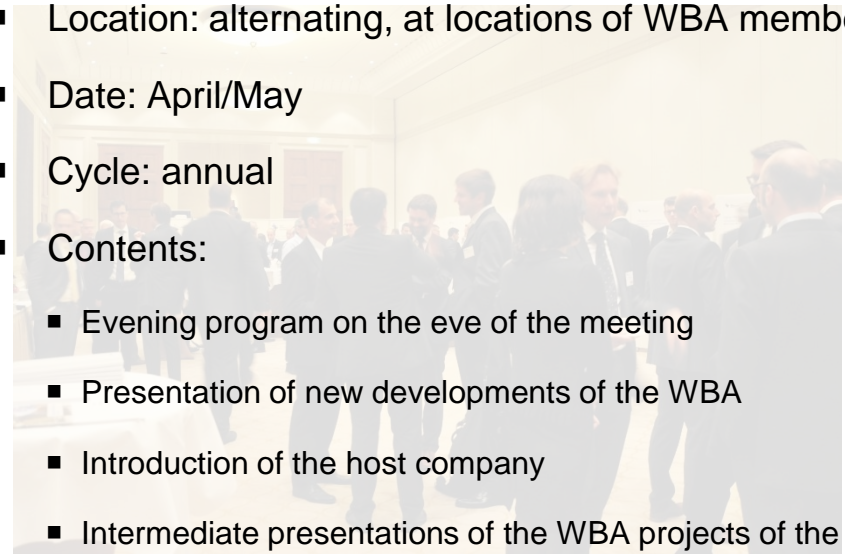


Annual meeting in Aachen

- Location: Aachen
- Date: October/November
(on the day of the award ceremony of the competition „Excellence in production“)
- Cycle: annual
- Contents:
 - Presentation of new developments of the WBA
 - Result presentations of WBA projects of the past year
 - Handing-over the annual research report
 - Presentation and selection of the WBA projects for the next year
 - Exchange with other members

Semiannual meeting at a WBA member

- Location: alternating, at locations of WBA members
- Date: April/May
- Cycle: annual
- Contents:
 - Evening program on the eve of the meeting
 - Presentation of new developments of the WBA
 - Introduction of the host company
 - Intermediate presentations of the WBA projects of the past year
 - Company visit of the host incl. the tool shop
 - Exchange with other members
 - Previous hosts:



PÖPPELMANN



SIEBENWURST
MODELLBAU & FORMENBAU



Audi
Werkzeugbau



KIRCHHOFF
AUTOMOTIVE

BMW
GROUP



PHENIX
CONTACT
INSPIRING INNOVATIONS

Community Virtual Campus



WBA-Projekte 2017

Titel
Agiler Werkzeugbau im hochiterativen Entwicklungsprozess
Augmented Reality im Werkzeugbau
Aus- und Weiterbildung in Zeiten neuer Berufsbilder
Best of Benchmark Frässtrategien im Werkzeugbau
Effiziente Gestaltung der CAI-Prozesskette im Werkzeugbau
Erfolgreich Lieferanten audieren und qualifizieren
Konventionelle vs. Additive Manufacturing Prozesskette
Montage 4.0
Prozesskette »Ambient Lighting 3D«
Smart Manufacturing – Fokus Auftragsdatenanalyse
Smart Manufacturing – Fokus Fertigungsoptimierung

WBA-Projekte 2017

Augmented Reality im Werkzeugbau

Projektinformation

- Start: 01. Dezember 2016
- Ende: 29. September 2017

Motivation und Zielsetzung

- Viele Aufgaben im Werkzeugbau erfordern, dass Mitarbeiter beide Hände frei verwenden können
- Datentafeln ermöglichen erstens die parallele Arbeit mit beiden Händen und gleichzeitig die Bereitstellung von Informationen in direktem Sichtfeld der Mitarbeiter
- Durch die Informationsverfügbarkeit kann die Produktivität manueller Arbeitsplätze erhöht werden

Ergebnisse des Projekts

- Nutzenanalyse: Wo lässt sich „Augmented Reality“ durch Datenblöcke insbesondere im Werkzeugbau vorantreiben?
- Integrationsanalyse: Wie können entsprechende AR-Softwareanwendungen im Werkzeugbau eingesetzt werden?
- Pilot-Implementierung: Definition von 3 Use-Case-Anwendungen für die Remoteunterstützung per Video und für intuitive Videoanleitungen mit Datenblöcken

Vorgehensweise

- Vorstudie aktueller Hardware und Software für Augmented Reality-Anwendungen in der Industrie
- Gemeinsame Anforderungsdefinition an die Nutzung von Augmented Reality im Werkzeugbau und Definition von 3 Use-Cases
- Ausarbeitung und Implementierung echter Use-Cases in der WBA über die Cloud-Plattform der octavis GmbH
- Projektspezifische Softwareumsetzung durch die octavis GmbH


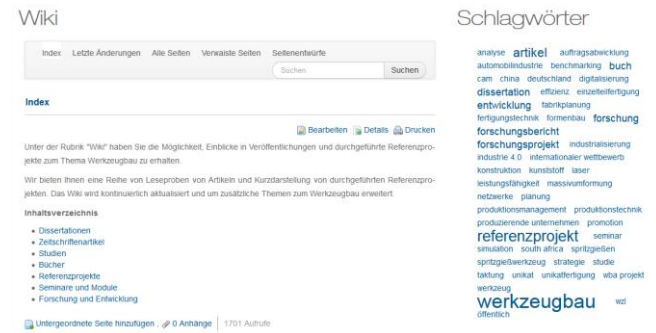
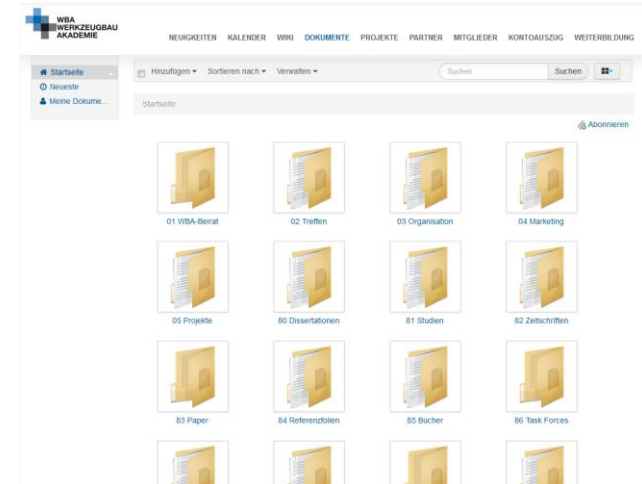
Projektanforderungen

- Dauer des Projekts: Januar 2017 – September 2017
- Anzahl der Projektleiter: 4
- Minimale Anzahl an Projektschritten: 3
- Offene und transparente Kommunikation zwischen allen Teilnehmern und aktive Mitarbeit im Projekt
- Je Teilnehmer muss ein Ansprechpartner für das Projekt definiert werden

Dokumente:

- Augmented Reality im Werkzeugbau

Ansprechpartner:
Dr. Gustavo Cabral
g.cabral@werkzeugbau-akademie.de
024198910.304

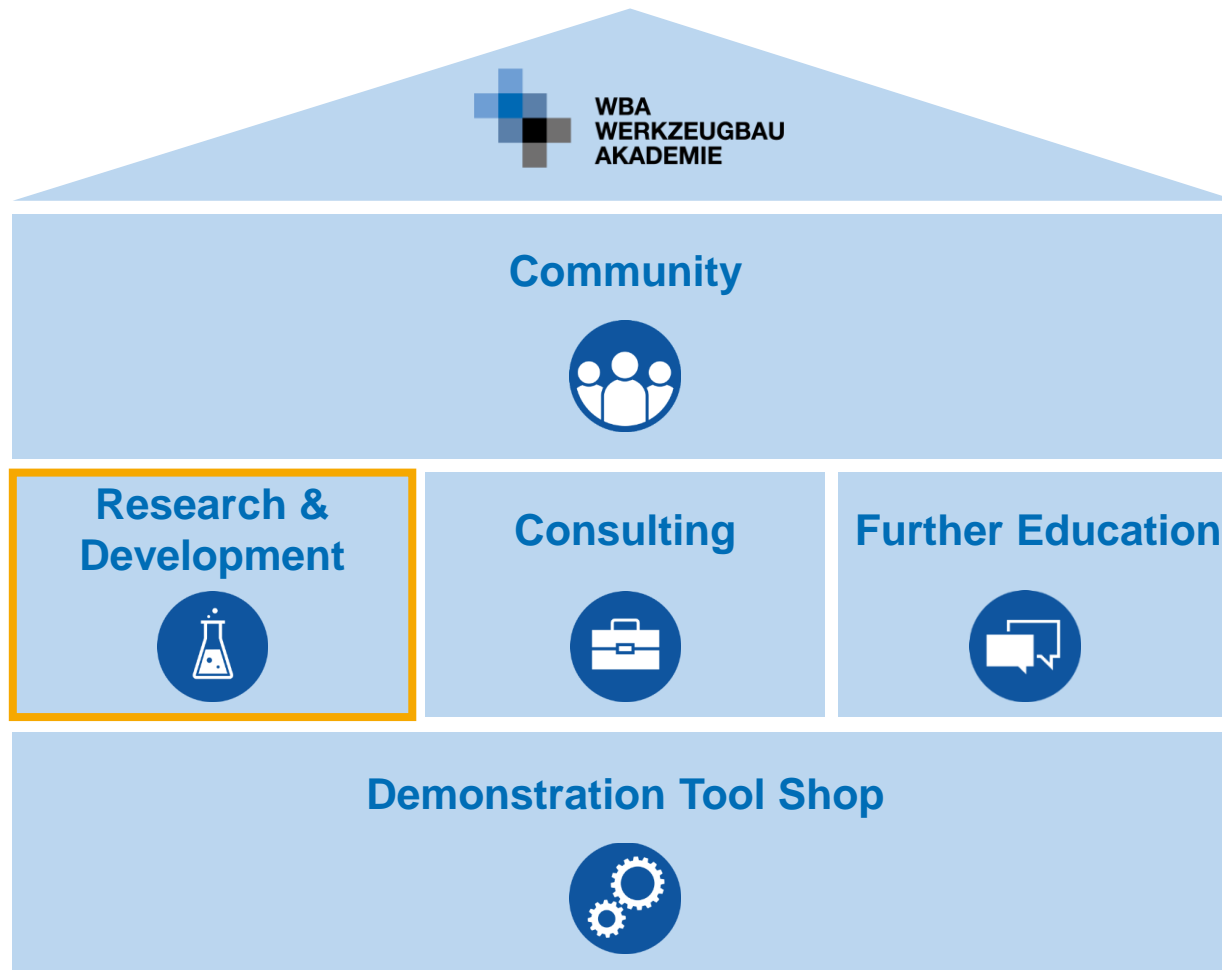



- Access to project-specific information and documents
- Information about upcoming events and dates
- Toolmaking wiki for an exchange with other companies
- Overview of all activities of the company with the WBA

WBA members get access to the platform „Virtual campus“, a platform for exchanging knowledge and which also gives information, documents as well as an overview of previously attended events like seminars, etc.

The WBA Tooling Academy Aachen

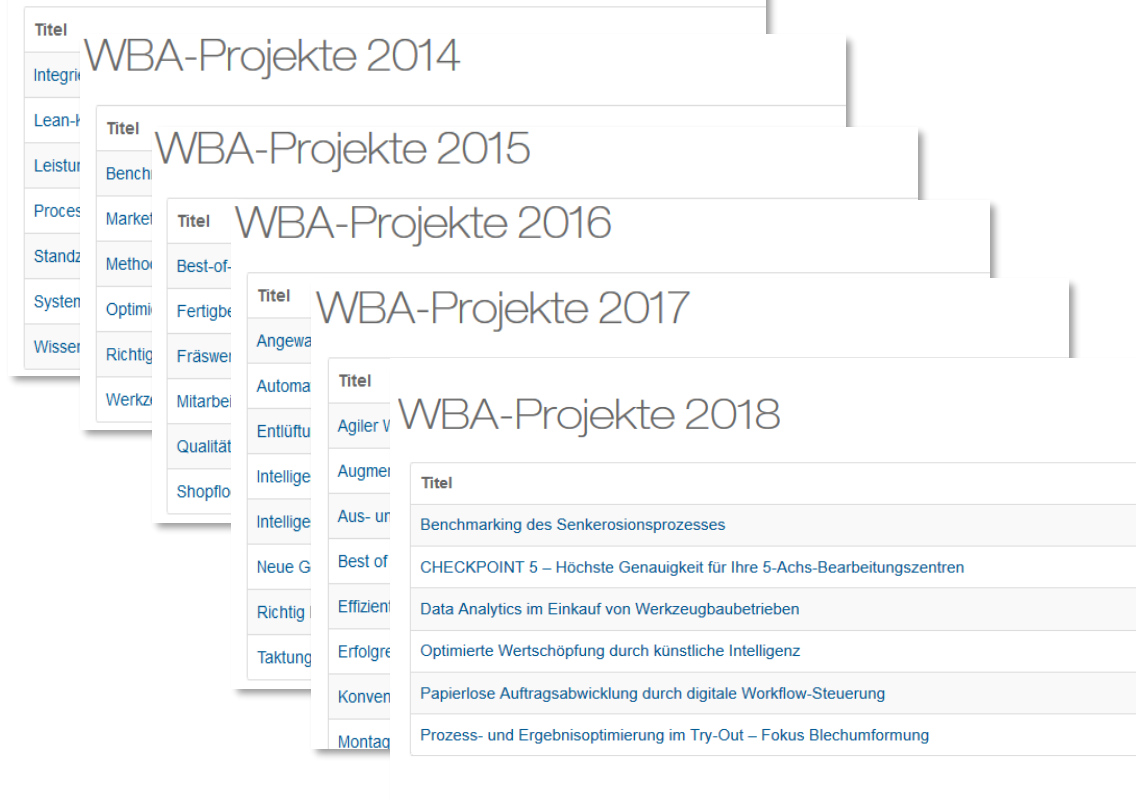
Research & Development



Research & Development WBA Projects (I/III)



WBA-Projekte 2013



WBA projects

- Execution of different projects with an organizational, technological and interdisciplinary background
- Proposal of interesting project topics by all WBA members and WBA itself, subsequent preselection/prioritization by premium and business members
- Execution of four project meetings at different hosts of the WBA network for each project
- Interactive workshops and company visits



Process

- According to their status, members receive a defined number of project checks with a value of € 2,500 each (Premium: 4, Business: 3, Basic: 2)
- Prioritization of suggested topics by premium and business members
- During the annual meeting in Aachen, all members choose the projects for the next year by using one project check for each participation in a project
- Participation in consortial projects with 2 to 3 people per company
- Special advantages exist for business and premium members:
 1. Use of up to 3 or 4 project checks per year (business members and premium members, respectively)
 2. Use of project checks for other WBA activities like bilateral consulting projects
 3. Saving up project checks for 3 or 5 years for individual use (business members and premium members, respectively)
- Preparation, execution and follow-up of all project meetings by the WBA
- Content steering and provision of impulses by the WBA

Research & Development WBA Projects (III/III)



Research report

- All members receive an exclusive research report during the annual meeting in Aachen. On more than 100 pages the report includes a wide array of topics:
 - Report about all WBA projects executed during the past year
 - Presentation of current research projects in the RWTH Aachen University environment relevant to toolmaking
 - Presentation of published dissertations and publications in the field of toolmaking
 - Description of bilateral industry projects with WBA members and external tooling companies conducted by WBA worldwide
 - Presentation of new developments in the demonstration tool shop and current further education offerings
- Currently, only available in German

Research & Development Studies of the WBA Tooling Academy Aachen



Strategic
Development



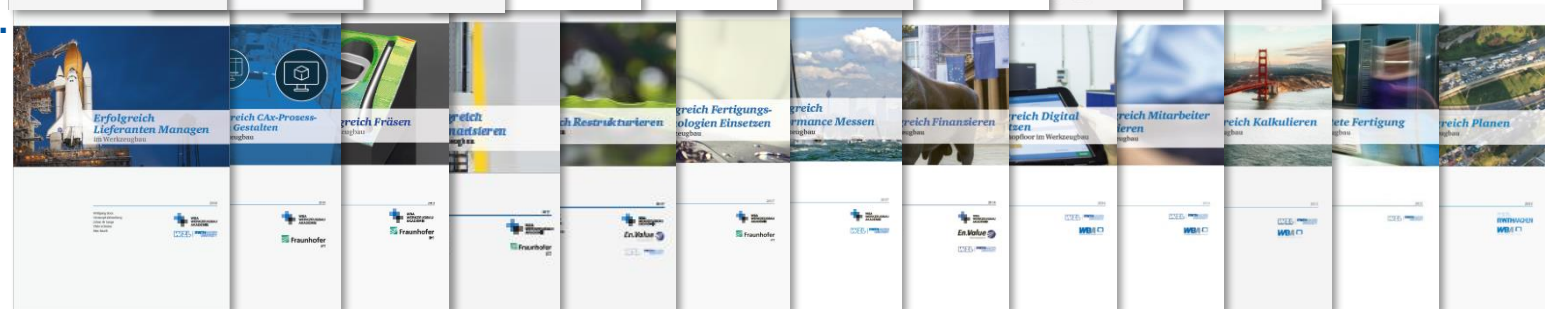
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Studies have been published by WBA since 2014

Tooling in...

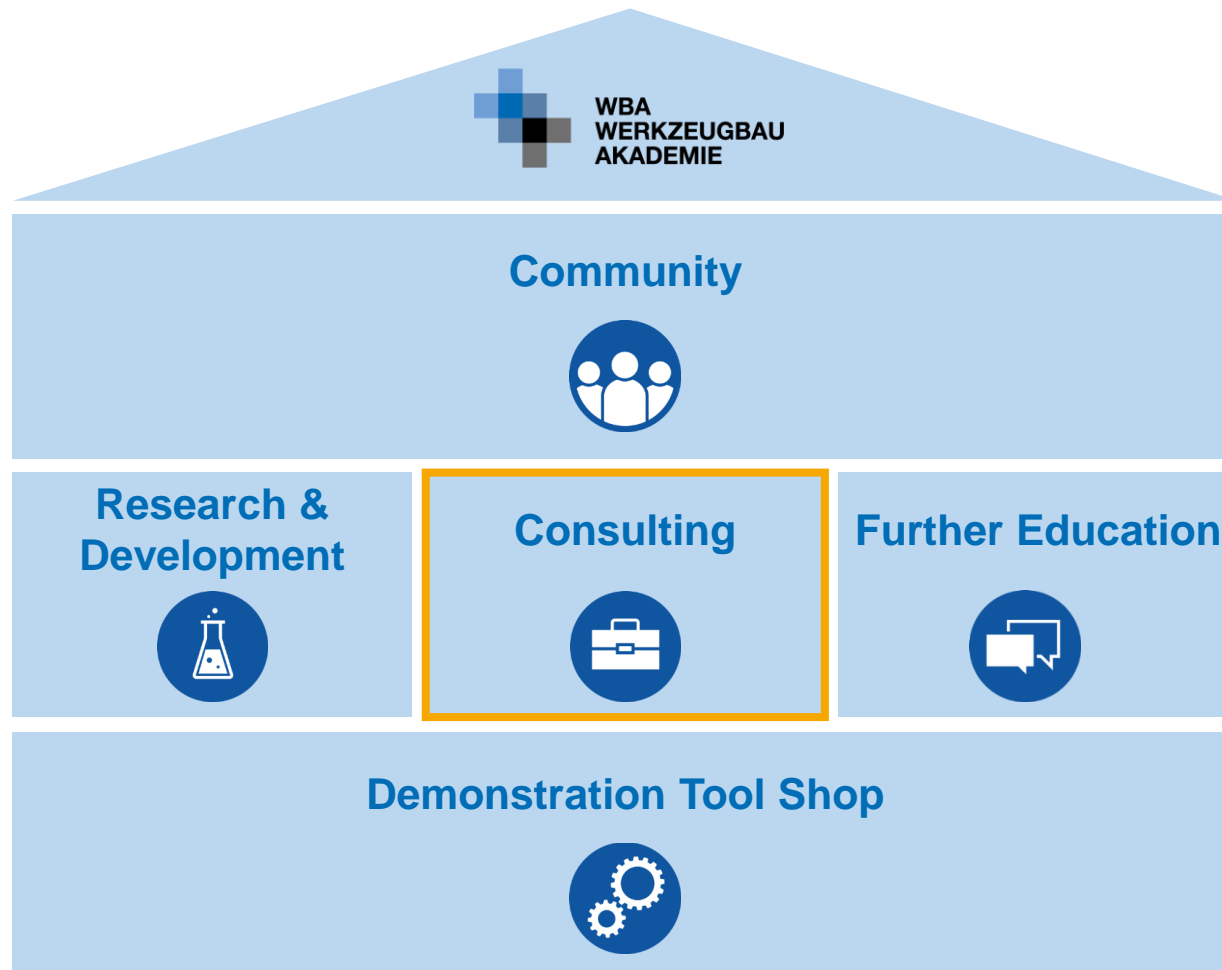


Successfully...



Since 2014, WBA regularly publishes studies regarding strategic development, international tooling markets, and the successful value creation in the tooling sector.

The WBA Tooling Academy Aachen Consulting

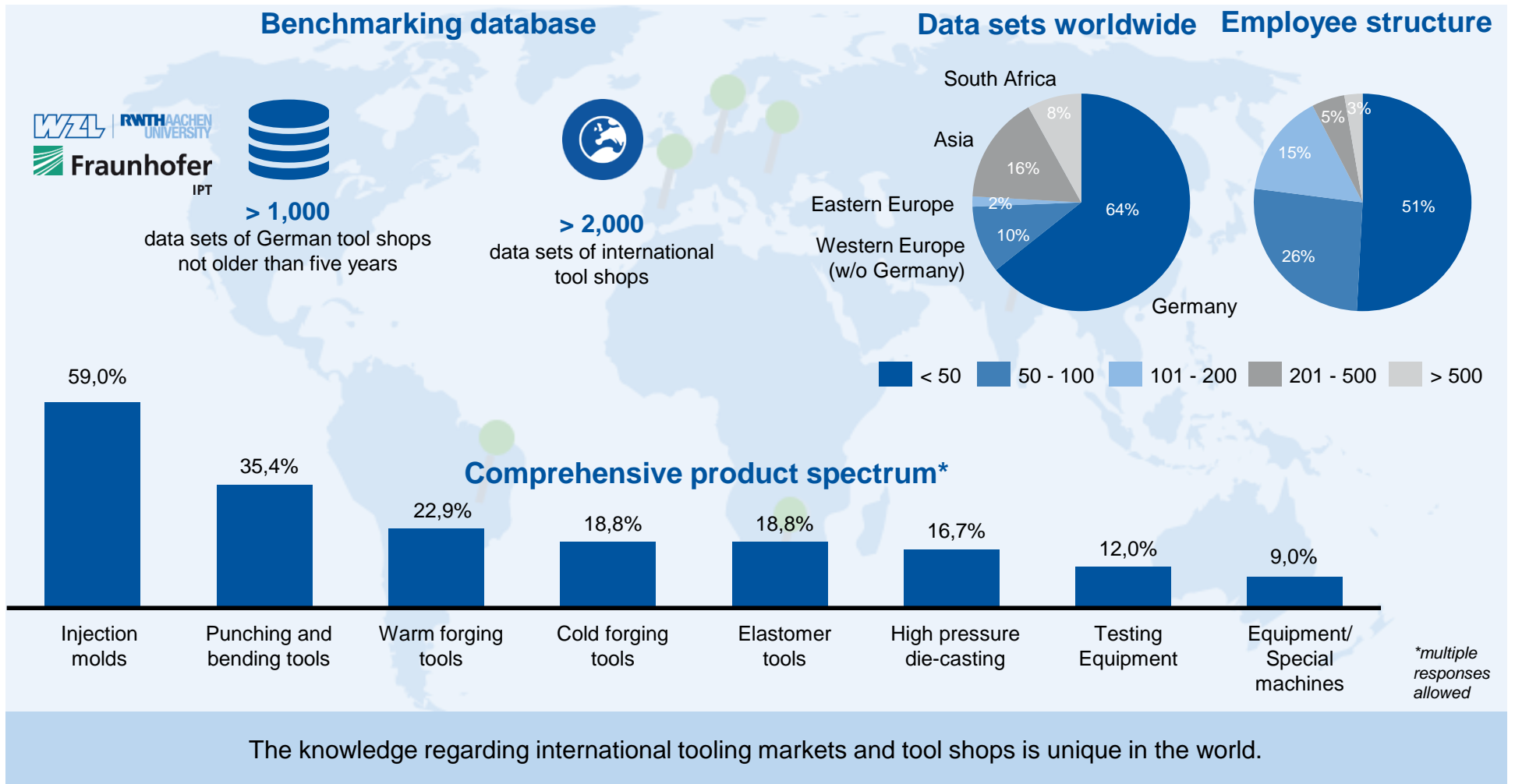


Consulting Services Offered by the WBA



In order to address specific questions, WBA globally conducts about 50 bilateral consulting projects per year.

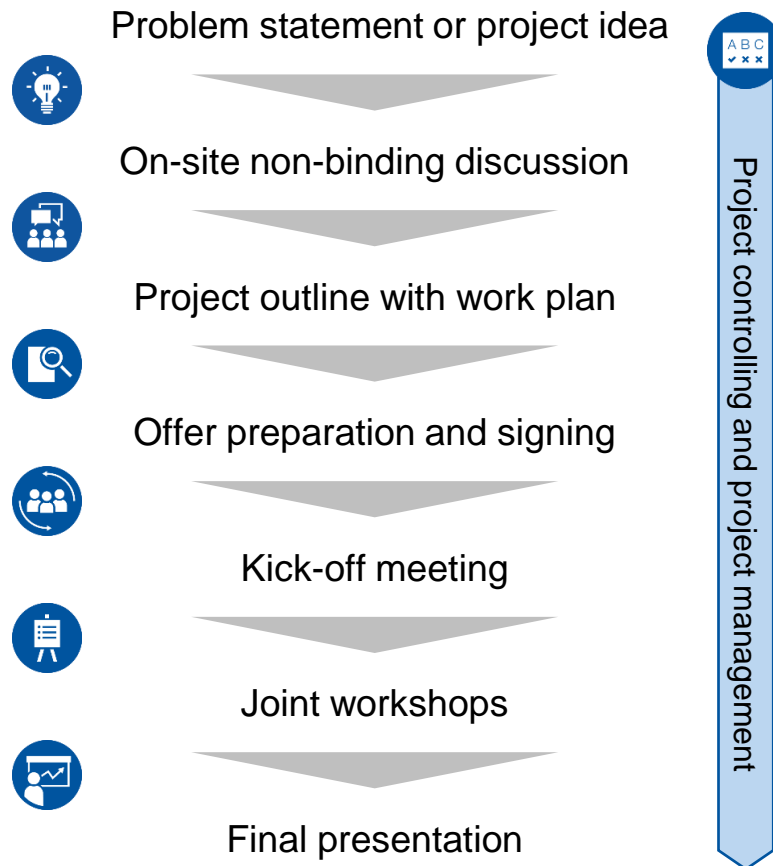
Consulting Comprehensive Product Spectrum via Benchmarking Database



Consulting Presentation of the Project Approach



Approach



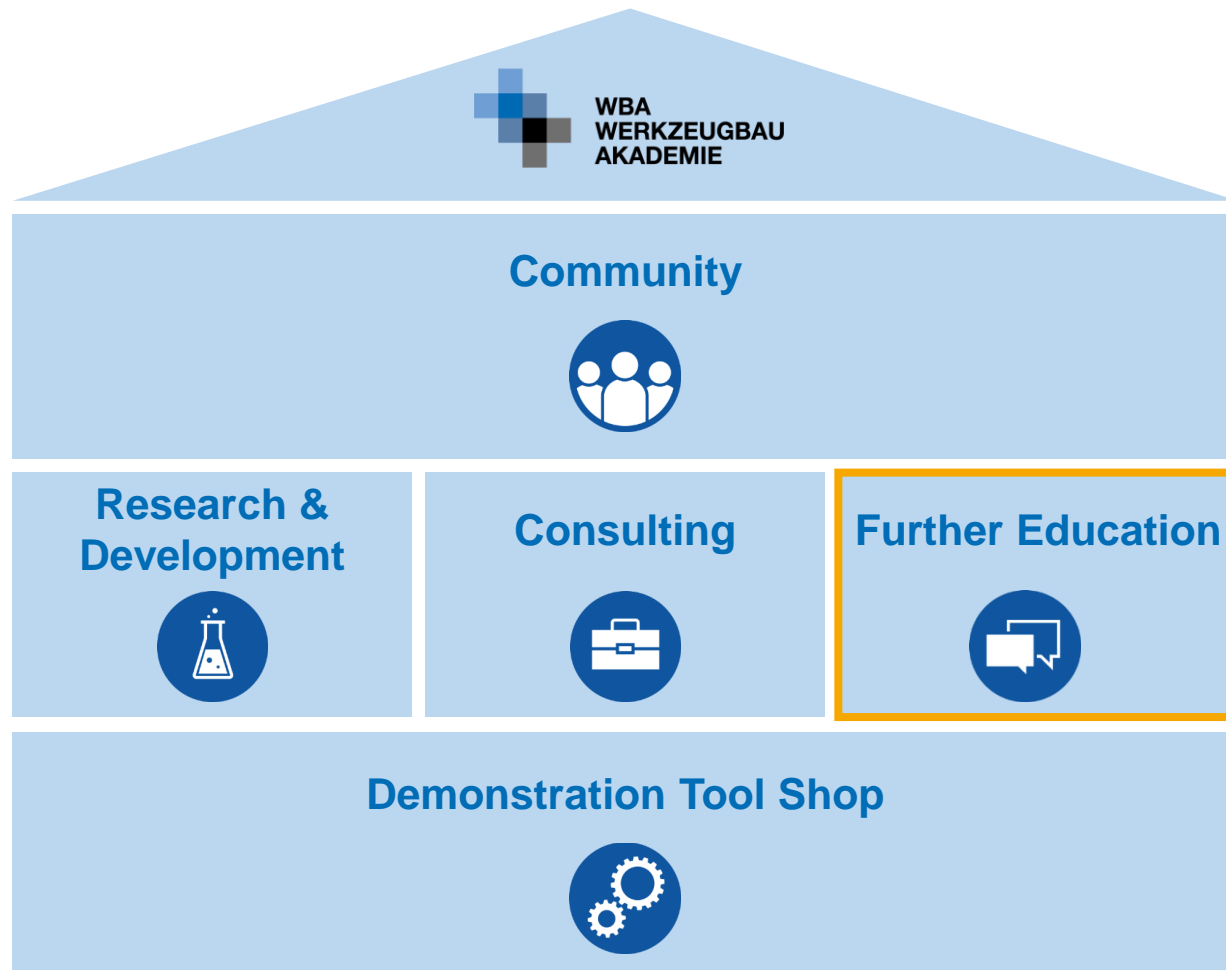
Success factors

- ★ **Workshop**-based elaboration of the results
- ★ Intensive **involvement** of all relevant employees of the tool shop
- ★ Contribution of **external impulses** and integration of topic-specific **best practices**
- ★ Detailed **documentation** of project results and clear definition of **further procedure**

Profit from WBA's experience gained during the approximately 50 consulting projects we conduct each year.

The WBA Tooling Academy Aachen

Further Education



Webinars 2019



Dates*

Dates*	Subjects
17.01.2019	Methods of project management
31.01.2019	Non-conventional manufacturing processes
14.02.2019	Foundations of layout planning
28.02.2019	Methods of process analyses
14.03.2019	3-level-model of planning
21.03.2019	Visual management on the shop floor
04.04.2019	Lean management & 6S in tool shops
18.04.2019	Manufacturing conception for tool shops
09.05.2019	Employees in the smart factory
23.05.2019	Agile tool development
06.06.2019	Smart products, services & applied Industry 4.0 in tool shops
19.06.2019	Overview of the CAx process chain in tool shops
04.07.2019	Artificial intelligence in tool shops
18.07.2019	Additive manufacturing
08.08.2019	Automation in tool shops
22.08.2019	Tool cost calculation and cost transparency in tool shops
05.09.2019	Clocking in tool shops
19.09.2019	Smart manufacturing in tool shops
17.10.2019	Supplier selection and assessment in tool shops
28.11.2019	Self-organization made easy

*always from 10.00-11.00 am



Target group

All those interested in obtaining a first overview of a specialist topic

Registration

www.werkzeugbau-akademie.de/veranstaltungen
(access data for WBA members on the intranet)

Basic course „Industrial tool making“



Concept and objectives

- Compact training to generate an understanding for industrial tool making
- Discussion of all relevant topics relating to industrial tool making
- Conveying contents and methods for application

Target group

- Employees in work preparation, machine operators, tool designers, fitters, and all those who are supposed to gain an understanding of industrial tool making

Day 1

- Industrial tool making
 - Product standardization
 - Process standardization
 - Flow production and clocking

Day 2

- Process management and lean production
- Manufacturing segmentation
- Planning and controlling

Day 3

- Supplier management
- Technologies in tool making
- Automation and Industry 4.0 outlook

Dates

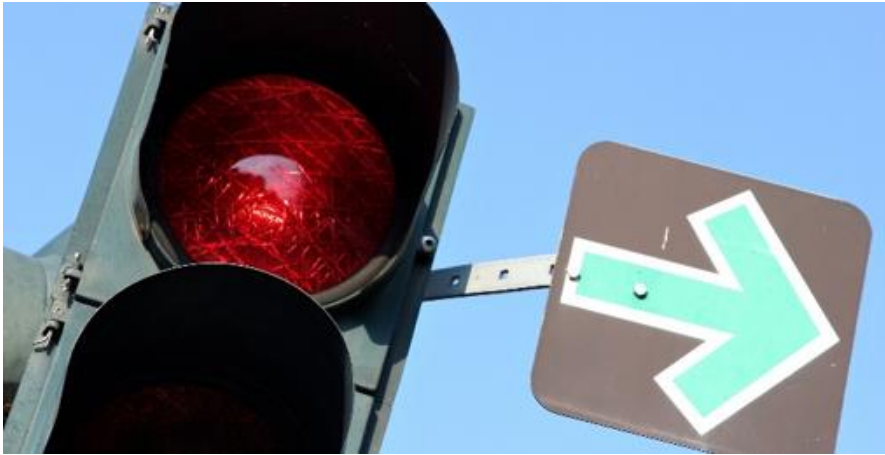
26th-28th February 2019

10th-12th September 2019

Registration

www.werkzeugbau-akademie.de/veranstaltungen

Advanced course „Industrial tool making“



Concept and objectives

- Compact training to deepen the understanding of industrial tool making by consolidating and supplementing the contents of the basic course
- Deepening the methodological competence in relevant organizational and technological topic areas

Target group

- Participants of the basic course and all tool shop employees who would like to expand their basic knowledge in further topic areas

Day 1

- Review of industrial tool making and outlook on future trends
- Deepening process management knowledge including learning and applying a process modelling language
- Project management

Day 2

- Layout design
- Shop floor management
- Outlook: Tool making in the future
- Next level industrialization

Day 3

- Iterative tool development
- Maintenance and servicing meeting the requirements

Date

9th-11th April 2019

Registration

www.werkzeugbau-akademie.de/veranstaltungen/



„Tool making challenge“ for apprentices and young professionals



Concept and objectives

- Young tool making talents develop an understanding of the industrial tool production
- Knowledge is imparted and consolidated during practice-oriented presentations, group work sessions, educational games and visits to best practice tool shops

Target group

- Motivated apprentices from the 3rd year of training onwards as tool and cutting mechanics as well as talented young professionals aged 18 or older

Contents

- Tool making in Germany and worldwide
- Pillars of industrial tool making
- Lean production
- Technologies in tool making
- Process management
- Shop floor management
- Layout design
- Industry 4.0 in tool making
- and much more

Link to the movie:



Date

29th July-2nd August 2019

Registration

www.werkzeugbau-akademie.de/veranstaltungen



Intensive training

„Current manufacturing developments in tool making”

„Only those who are always up to date with state-of-the-art technology and who are interested in innovation and technological progress, can produce technological high-tech products.“

(Dipl.-Ing. Michael Breme, Head of production and tool planning – AUDI AG)



Contents

- Overview of manufacturing technologies in tool making
- Current developments in milling
- Current developments in wire-cut and die-sink EDM
- Additive manufacturing processes in tool shops
- Automation in tool shops
- Guided tour at the Fraunhofer Institute for Production Technology IPT

Target group

- Machine operators
- Shop foreman
- Head of manufacturing

Date

13th March 2019

Registration

www.werkzeugbau-akademie.de/veranstaltungen

Intensive training „Planning & controlling and project management in tool shops“



Concept and objectives

- The participants acquire competences in implementing a sustainable planning and controlling of the production
- Methods for planning and carrying out projects are conveyed



Contents

- Challenges and factors of success of successful planning in tool shops
- The 3-level-model of systematic planning
- Successfully shaping planning
- Clocking in single or small batch production
- Foundations of project management
- Methods of project management
- Project prioritization and time management

Target group

- Work planner
- Project manager
- Team leader
- Head of manufacturing

Date
7th-8th May 2019

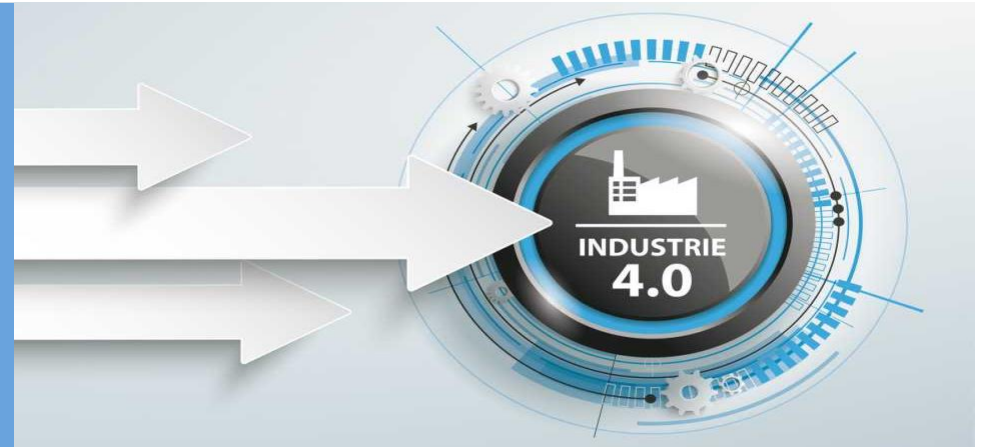
Registration
www.werkzeugbau-akademie.de/veranstaltungen

Workshop „Digital transformation“



„The aim of the workshop „Digital transformation“ is to communicate Industry 4.0 in tool shops in a comprehensible manner. In doing so, our “tooling theme park” will take a key role by demonstrating innovative technologies within the context of digital interconnectivity and letting participants test these. The focus of the workshop is both on Industry 4.0 applications for tool shops and the transformation process for introducing these.”

(Prof. Dr.-Ing. Wolfgang Boos, MBA)



Contents

- Modern information and communication technologies
- Smart tools und smart services
- Sensor technology on the shop floor
- Problem solving through modern technologies and concepts
- Employees in times of Industry 4.0
- Best practices in tool making and other industries
- Visit and use of the “tooling theme park” (“Erlebnisswelt Werkzeugbau”) and the WBA demonstration tool shop

Target group

- Team leader
- Head of manufacturing
- Technology officers
- CIP officers
- Quality managers

Date

10th October 2019

Registration

www.werkzeugbau-akademie.de/veranstaltungen

Workshop „Data analytics & machine learning“



„The new workshop “Data analytics & machine learning” provides insights into the world of artificial intelligence with theoretical background knowledge and practical applications, presented live on the RWTH Aachen campus. The use of this new technology in tool shops is the central topic of this workshop.”

(Prof. Dr.-Ing. Wolfgang Boos, MBA)



Contents

- Foundations of data analytics and machine learning
- Types of data analytics and machine learning as well as the application in the proper tool shop
- Applications in order processing of tool shops
- Technical requirements and operative implementation in tool shops
- Applied artificial intelligence
- Interactive Tour: experience Industry 4.0 solutions live

Target group

- Team leader
- Head of manufacturing
- Technology officers
- CIP officers
- Quality managers

Date

19th November 2019

Registration

www.werkzeugbau-akademie.de/veranstaltungen

Certificate courses 2019



Concept and objectives

- Expert and managerial knowledge in specific topic areas is built up using a blended learning approach
- The contents learned are applied in the proper tool shop and enable the participants to follow a strategic approach

Business & personnel management / Employee motivation

Topics: Importance, foundations, methods and concepts of business management, performance measurement, foundation of an enterprise, personnel management, personnel marketing and recruiting, change management, conflict management, employee motivation

Target group: Tool shop managers, head of manufacturing, team leaders, junior staff

Costs: € 3,950 including meals and evening program

Dates:

1st attendance phase: **10th-12th January 2019**

2nd attendance phase: **18th-20th March 2019**

Repair and service / Maintenance

Topics: KPIs, new technologies, planning and controlling, knowledge management in maintenance, damage patterns, data analytics, predictive maintenance, industrial services, pricing, service engineering, importance of service innovation, lean & smart services

Target group: Tool shop managers, head of manufacturing, team leaders, junior staff

Costs: € 3,950 including meals and evening program

Dates:

1st phase of attendance: **20th-22nd May 2019**

2nd phase of attendance: **8th-10th July 2019**

Strategic management and industrialization / Lean management

Topics: Fields of action of industrial tool shops, benchmarking, product and process standardization, flow production and clocking, employees as the key to success, lean management, corporate strategy

Target group: Tool shop managers, head of manufacturing, team leaders, junior staff

Costs: € 3,950 including meals and evening program

Dates:

1st attendance phase: **24th-26th January 2019**

2nd attendance phase: **21st-23rd March 2019**

Expert / Senior expert tool making

By combining 4 or 8 certificate courses as well as project works and theses you can obtain the expert or senior expert degree in tool making, respectively.

The entire range of certificate courses can be found on our homepage **www.werkzeugbau-akademie.de/veranstaltungen**



Technological modules

Module	Manufacturing and tool technology I Manufacturing and tool technology II
Module	Theory of design Materials and surface engineering
Module	CAD-CAM-NC-chain & automation Simulation
Module	Repair & service Maintenance

Organizational modules

Module	Strategic management Industrialization and Lean Management
Module	Financial planning and controlling Purchase and distribution
Module	Quality management Metrology
Module	Process and project management Labor organization and logistics

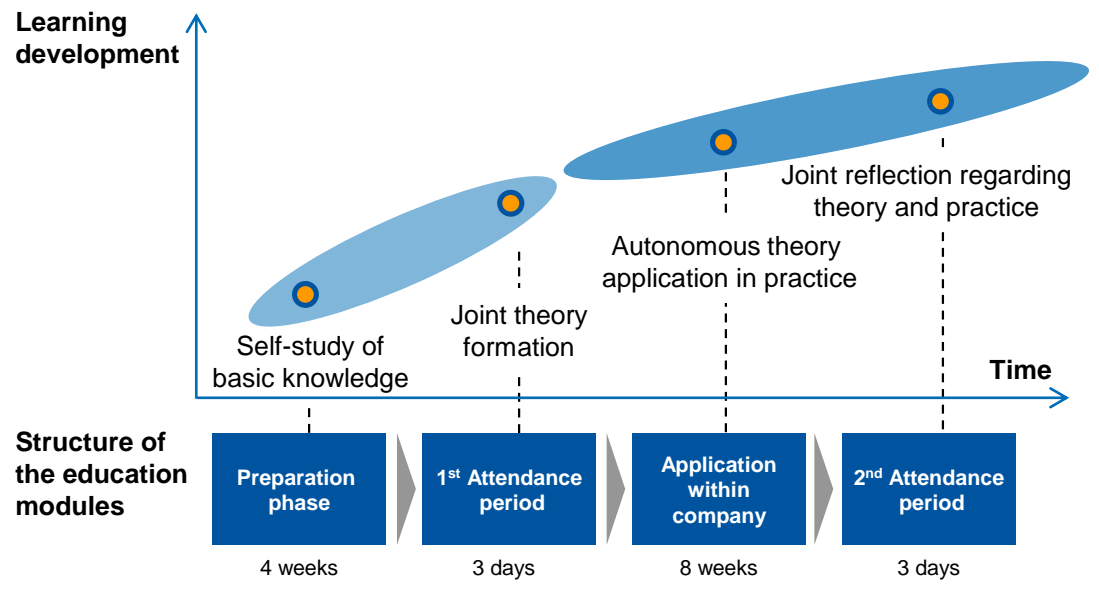
Module for character development

Module	Knowledge management Contract and employment law
Module	Business and HR management Employee motivation

■ Technological modules
 ■ Organizational modules
 ■ Modules for character development

Single module - Certificate Course (1 Module, €3,950)

- Participants get to know a selected topic comprehensively
- Newly gained knowledge can be directly applied to daily work



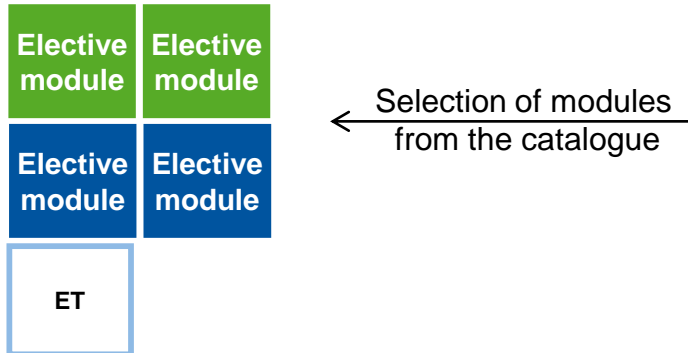
Further Education

Expert in Toolmaking



Expert in Toolmaking (5 modules, €18,500)

- 2 technological + 2 organizational modules
+ 1 expert thesis



- Admission criteria:
 - Professional education in the tooling environment
 - 3 years of work experience
- Duration: 15 months

■ Technological modules ■ Organizational modules ■ Modules for character development

ET: Expert thesis

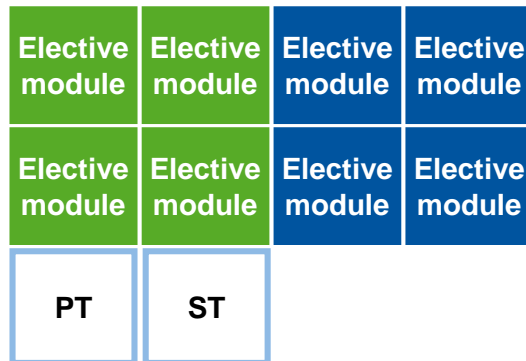
Further Education

Senior Expert in Toolmaking



Senior Expert in Toolmaking (10 modules, €28,500)

- 8 modules of the WBA of choice
(4 technological + 4 organizational modules)
+ 1 project thesis
+ 1 senior expert thesis



← Selection of modules from the catalogue

- Admission criteria:
 - Professional education in the tooling environment
 - 3 years of work experience
- Duration: 30 months

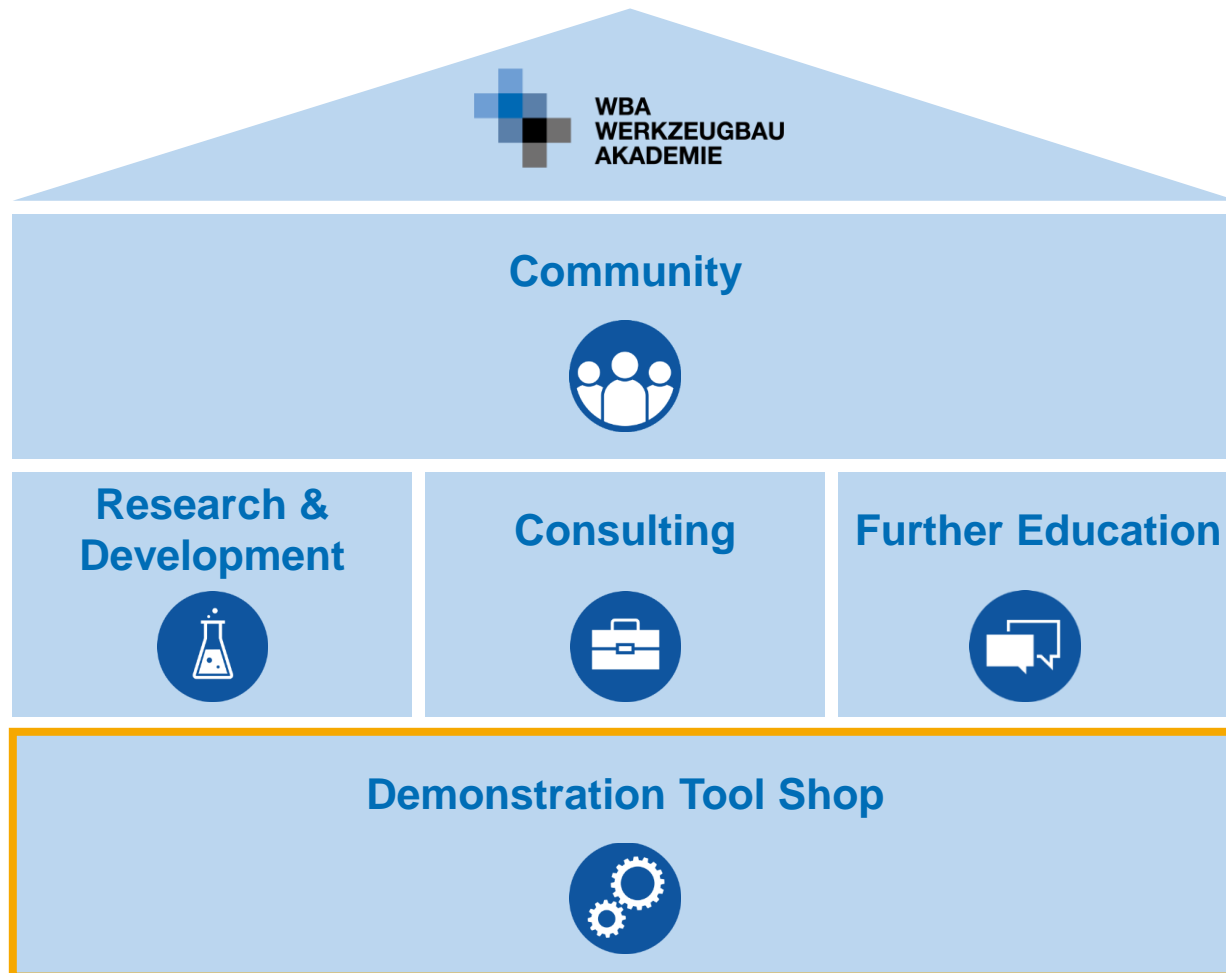
■ Technological modules ■ Organizational modules ■ Modules for character development

PT: Project thesis

ST: Senior expert thesis

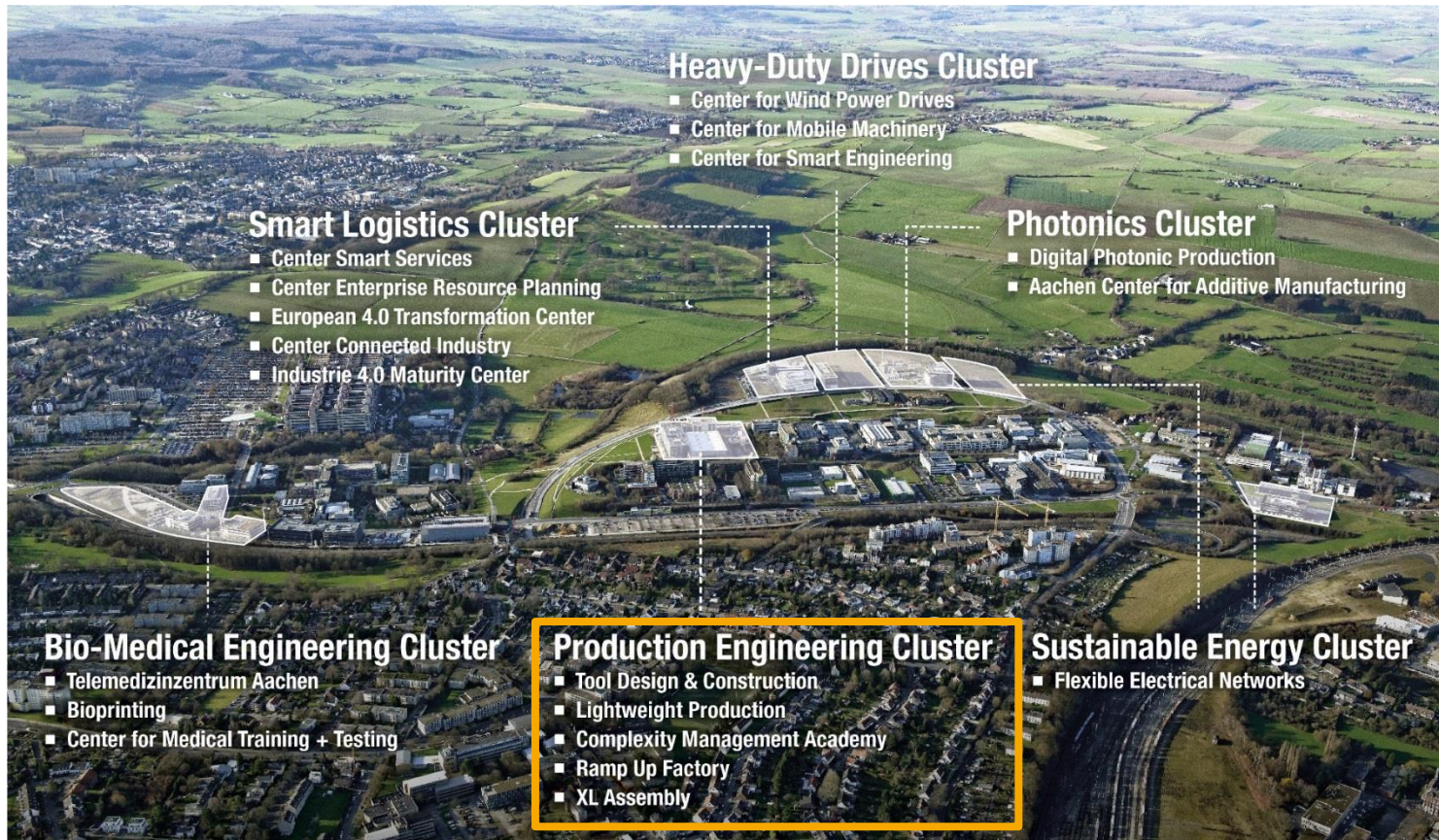
The WBA Tooling Academy Aachen

Demonstration Tool Shop



Demonstration Tool Shop

The RWTH Aachen Campus



The new home of the WBA lies at the heart of the RWTH Aachen University Campus, within the cluster for production engineering.

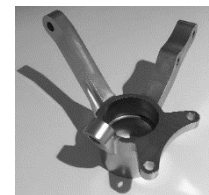
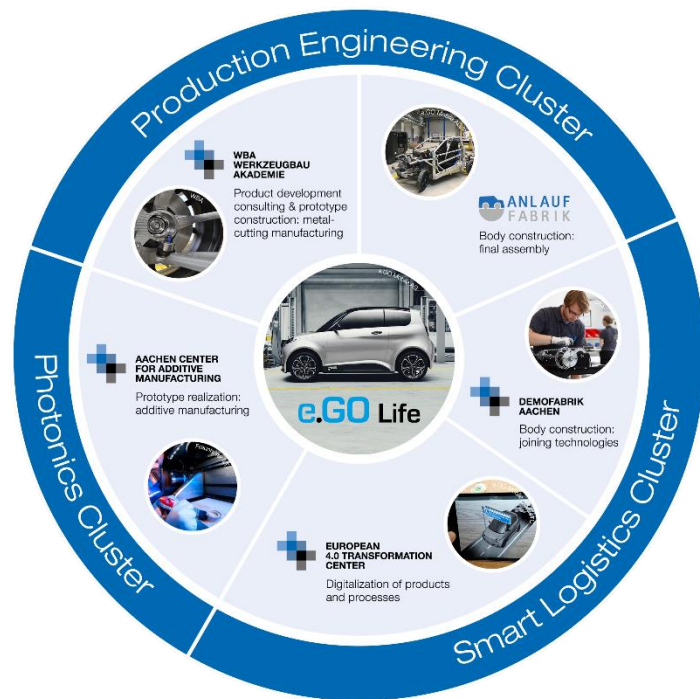
Demonstration Tool Shop

WBA as a Campus Toolmaking Company and Prototype Manufacturer



The intelligent connection of all competencies and resources available on campus...

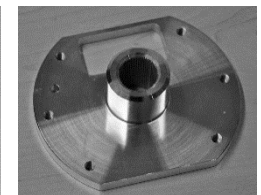
... has enabled the fast and cost-efficient development of an affordable electric car.



Front-wheel carrier



Rear-wheel carrier



Adapter plate for steering wheel

The WBA is a central component of the RWTH Aachen Campus and development partner of the e.GO Mobile AG.

Demonstration Tool Shop

Access to Publicly Funded Research Projects



PLATTFORM
INDUSTRIE 4.0

4 KMU 14.0-TESTUMGEBUNGEN
FÜR KMU

LNI4.0 LABS
NETWORK
INDUSTRIE 4.0



1. Contribution of an „industry 4.0“ idea into the WBA
2. Joint discussion and ascertainment of the idea
3. Approach of the granting authority by the WBA
4. Submission of a joint application by the WBA
5. Joint project execution

WBA members receive exclusive access to publicly funded research projects including industry 4.0 projects – here, the WBA is present on all federal platforms as a test environment for industry 4.0.

Demonstration Tool Shop

The WBA Demonstration Tool Shop



Current machinery

- Hermle C40
- Hermle C22 (incl. automation)
- OPS Gantry Eagle & Agie Drill 20
- TransClean (incl. automation)
- Agie Cut 2000
- Erowa CMM Qi



Objectives

- Mapping the entire process chain
- Focus on innovation in the area of process optimization – both on an organizational as well as on a technological level

Demonstration Tool Shop “Tooling Theme Park” (“Erlebniswelt Werkzeugbau”)



In the “Tooling Theme Park”, the WBA presents new industry 4.0 applications based on modern technology. Within this unique infrastructure, digital networking and the future of toolmaking can be experienced live via demonstrators.

Demonstration Tool Shop Office and Seminar Spaces



The WBA rooms can be rented for exclusive events. Through their different room concepts they offer an ideal work environment to foster communication, creativity and innovation.

The WBA Tooling Academy Aachen

Contacts



Prof. Dr.-Ing. Wolfgang Boos, MBA

WBA Aachener Werkzeugbau Akademie GmbH
CEO

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