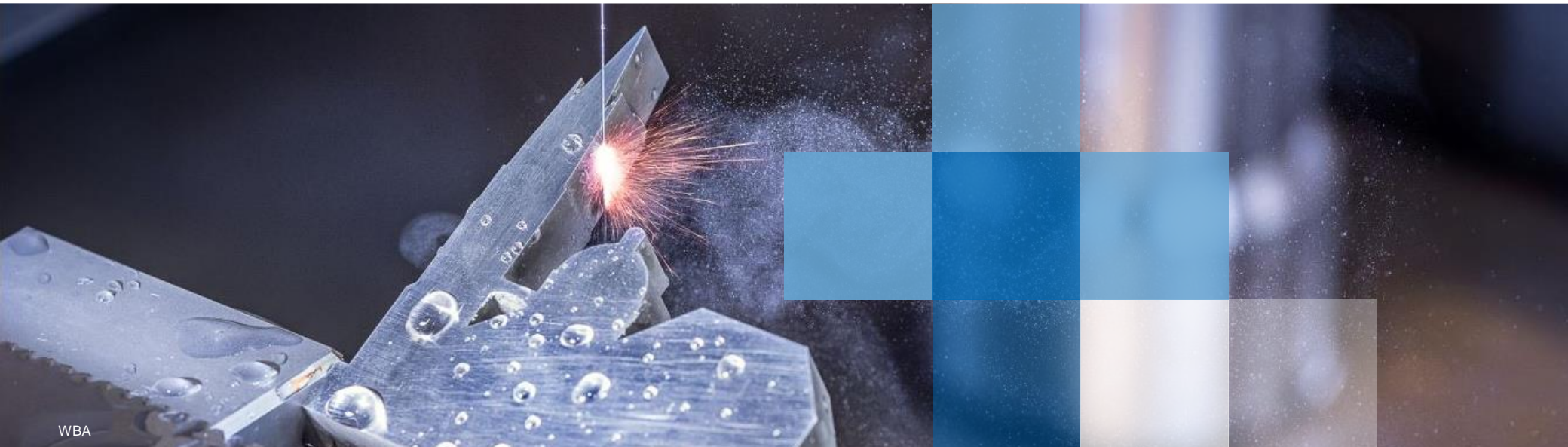




**WBA
WERKZEUGBAU
AKADEMIE**



WBA

WBA Tooling Academy Aachen

Presentation

Version 18.2018

Agenda



1 The WBA Tooling Academy Aachen - Tooling in Series

2 RWTH Aachen Campus - the Engineering Valley

3 Production Engineering in Aachen - Excellence in Teaching and Research

Agenda



1 The WBA Tooling Academy Aachen - Tooling in Series

2 RWTH Aachen Campus - the Engineering Valley

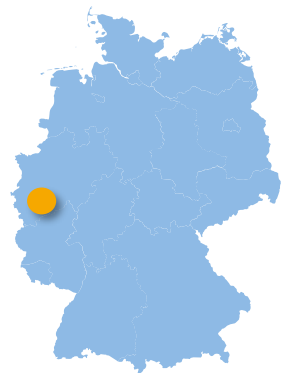
3 Production Engineering in Aachen - Excellence in Teaching and Research



The WBA Tooling Academy Aachen

Tooling in Series

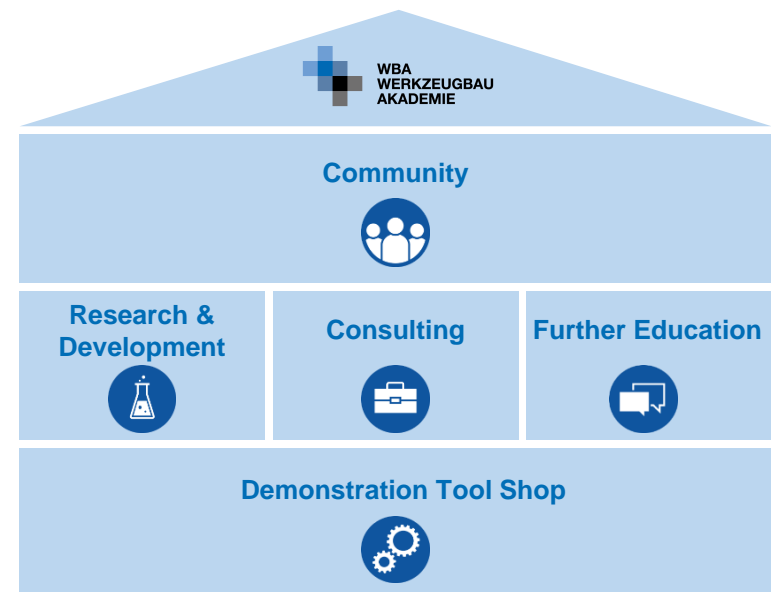
University and research institutes in Aachen



Further institutes relevant to toolmaking



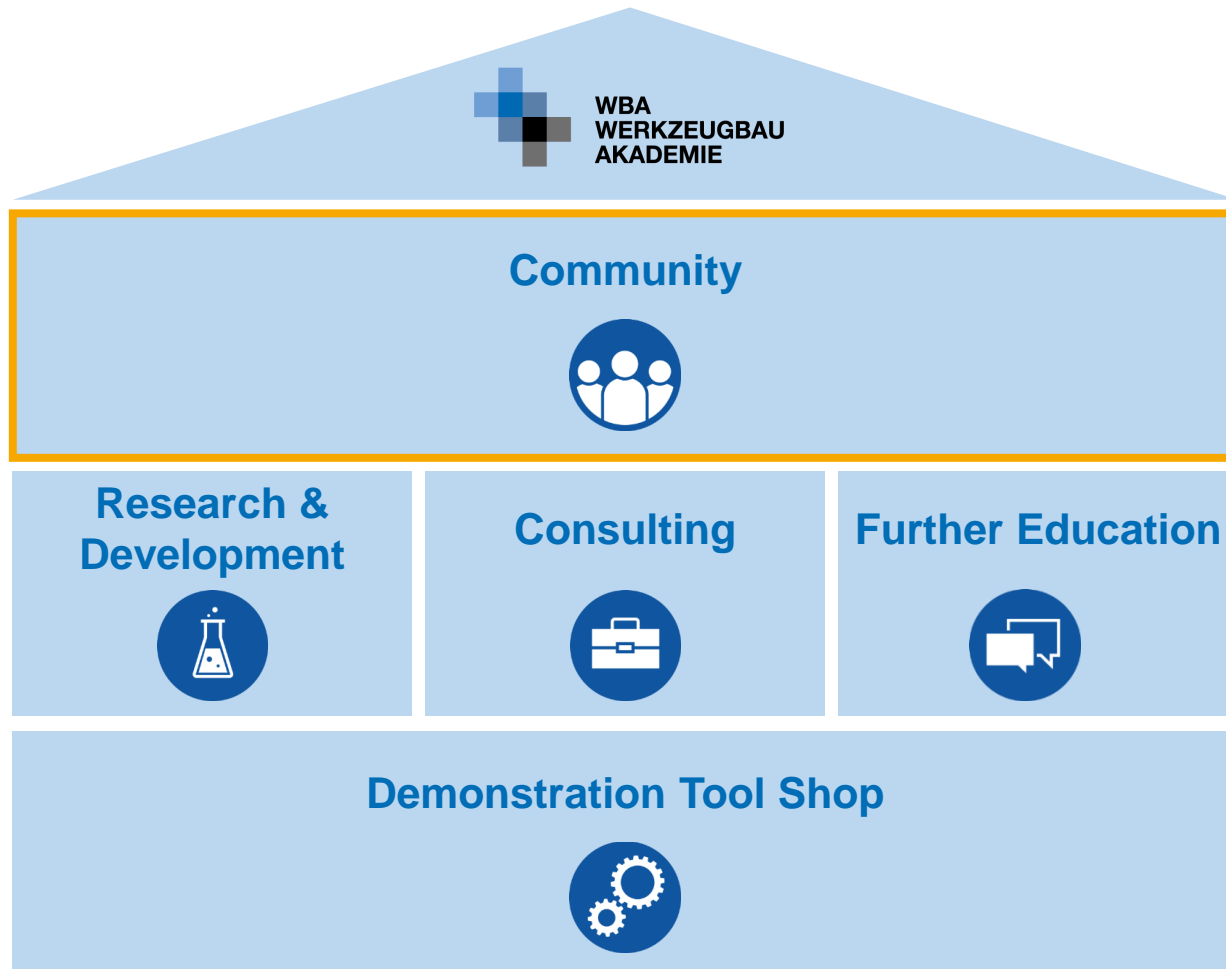
WBA Tooling Academy Aachen



- Founded in 2010 as a spin-off of RWTH Aachen University
- 30 scientific and non-scientific employees

In 2010, WBA was launched as a spin-off of WZL and IPT as a central point of contact for toolmaking companies and has by now developed into a leading partner in tooling worldwide.

The WBA Tooling Academy Aachen Community



Community

Members of the WBA Tooling Academy



Premium

Business

Basic

Cooperation

Community Consortia Projects at WBA



7,3 Average number of consortia projects per year since 2013

8,7 Average number of participating companies per consortia project

WBA-Projekte 2013

Titel
Integri
Lean+
Leistung
Proces
Standz
System
Wisser

WBA-Projekte 2014

Titel
Bench
Market
Metho
Optimi
Richtig
Werkz

WBA-Projekte 2015

Titel
Best-of-
Fertigbe
Fräswei
Mitarbei
Entlüftu
Qualität
Shopflo

WBA-Projekte 2016

Titel
Angewa
Automa
Entlüftu
Intellige
Intellige
Neue G
Richtig
Taktung

WBA-Projekte 2017

Titel
Aglier v
Augmer
Aus- ur
Best of
Effizien
Erfolgre
Konven
Montag

WBA-Projekte 2018

Titel
Benchmarking des Senkerosionsprozesses
CHECKPOINT 5 – Höchste Genauigkeit für Ihre 5-Achs-Bearbeitungszentren
Data Analytics im Einkauf von Werkzeugbaubetrieben
Optimierte Wertschöpfung durch künstliche Intelligenz
Papierlose Auftragsabwicklung durch digitale Workflow-Steuerung
Prozess- und Ergebnisoptimierung im Try-Out – Fokus Blechumformung

With its members WBA conducts research on a wide array of organizational, technological and interdisciplinary topics in toolmaking and jointly develops application-oriented solutions.

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

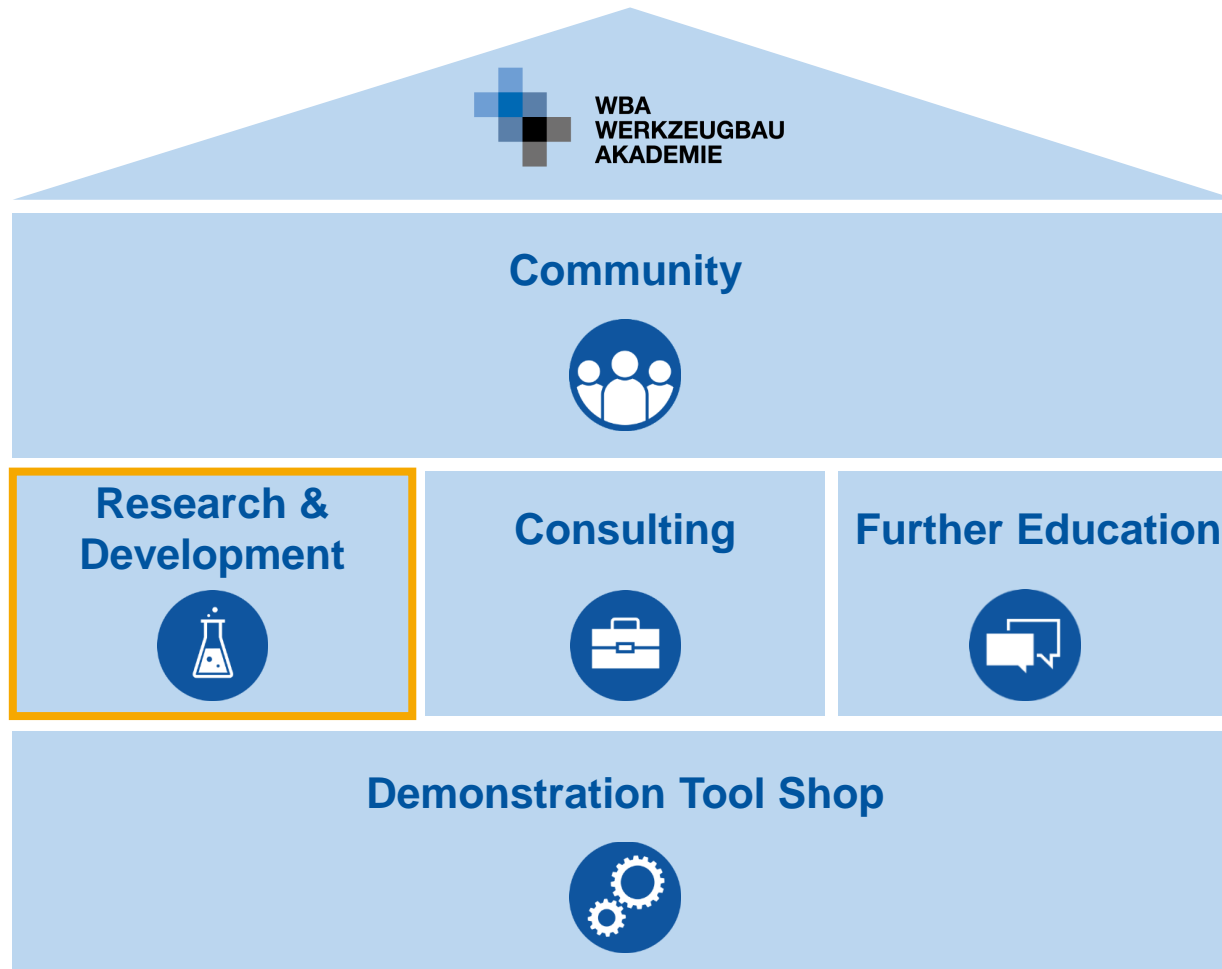
Senior Expert and Expert in Toolmaking	Checks Usable/ -30%	Checks Usable/ -30%	-	-
Certificate Courses/Modules	Checks Usable/ -30%	Checks Usable/ -30%	-	-
Workshops and Intensive Trainings	Checks Usable/ -30%	Checks Usable/ -30%	-30%	-30%
Basic Courses and Advanced Courses	Checks Usable/ -30%	Checks 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	€	€	€

The WBA Tooling Academy Aachen Research & Development



Research & Development

WBA as a Test Environment for Industry 4.0 Applications



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

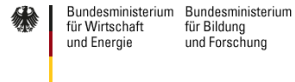
WBA is present on all relevant BMBF, BMWi and other platforms as a test environment for industry 4.0 applications and hence disposes of facilitated access to publicly funded research projects.

Research & Development

Current Publicly Funded Research Projects of WBA

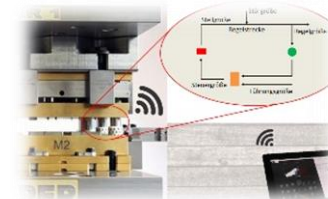
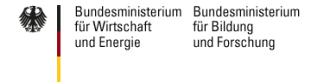


PrioTisch



Interactive order management on the shop floor using a digital order management table

SeMeSta



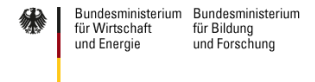
Development of a self-learning mechatronic punching tool

FixTronic



Industry 4.0 during the milling process: Flexible, mechatronic clamping systems with active vibration damping

E-Mas

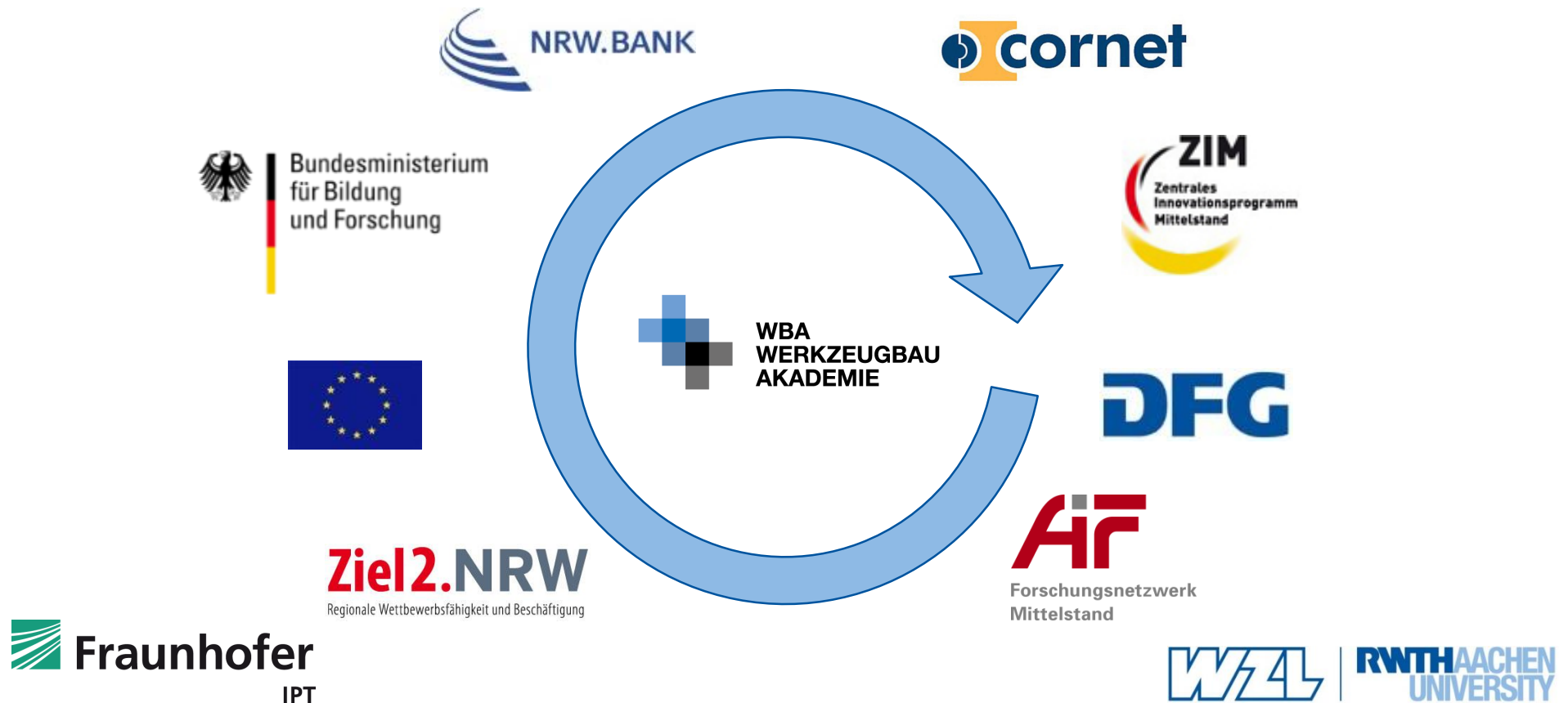


Education export to the Mexican automotive industry concerning work planning and process optimization using a blended learning approach

WBA is intensively involved in toolmaking research and participates in publicly funded research projects. The focus of approved and research projects and submitted applications lies on digital interlinking.

Research & Development

Conduct Research Together with WBA



If you would like to participate in publicly funded research projects do not hesitate to approach us! Together with our research partners WZL and IPT we collaborate with all relevant research bodies.

Research & Development Studies of the WBA Tooling Academy Aachen



Strategic
Development



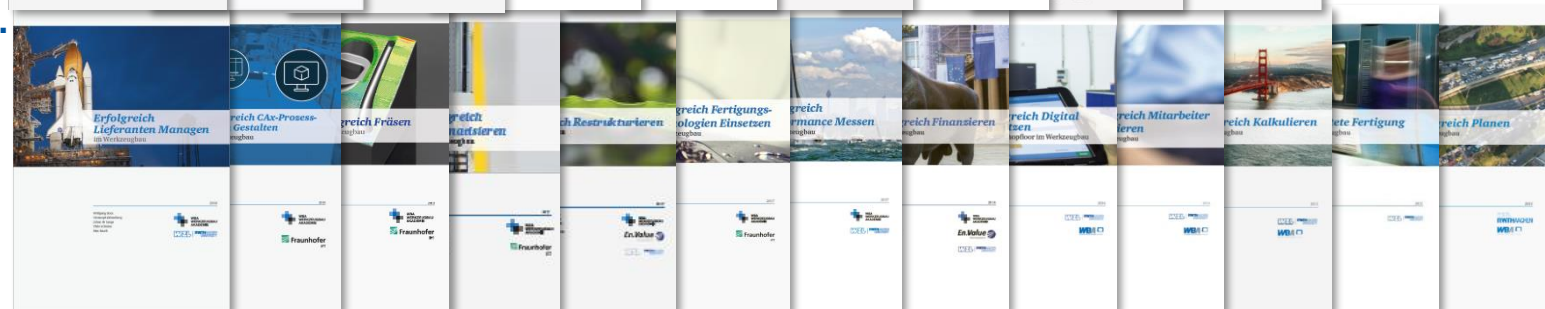
29

Studies have been published by WBA since 2014

Tooling in...

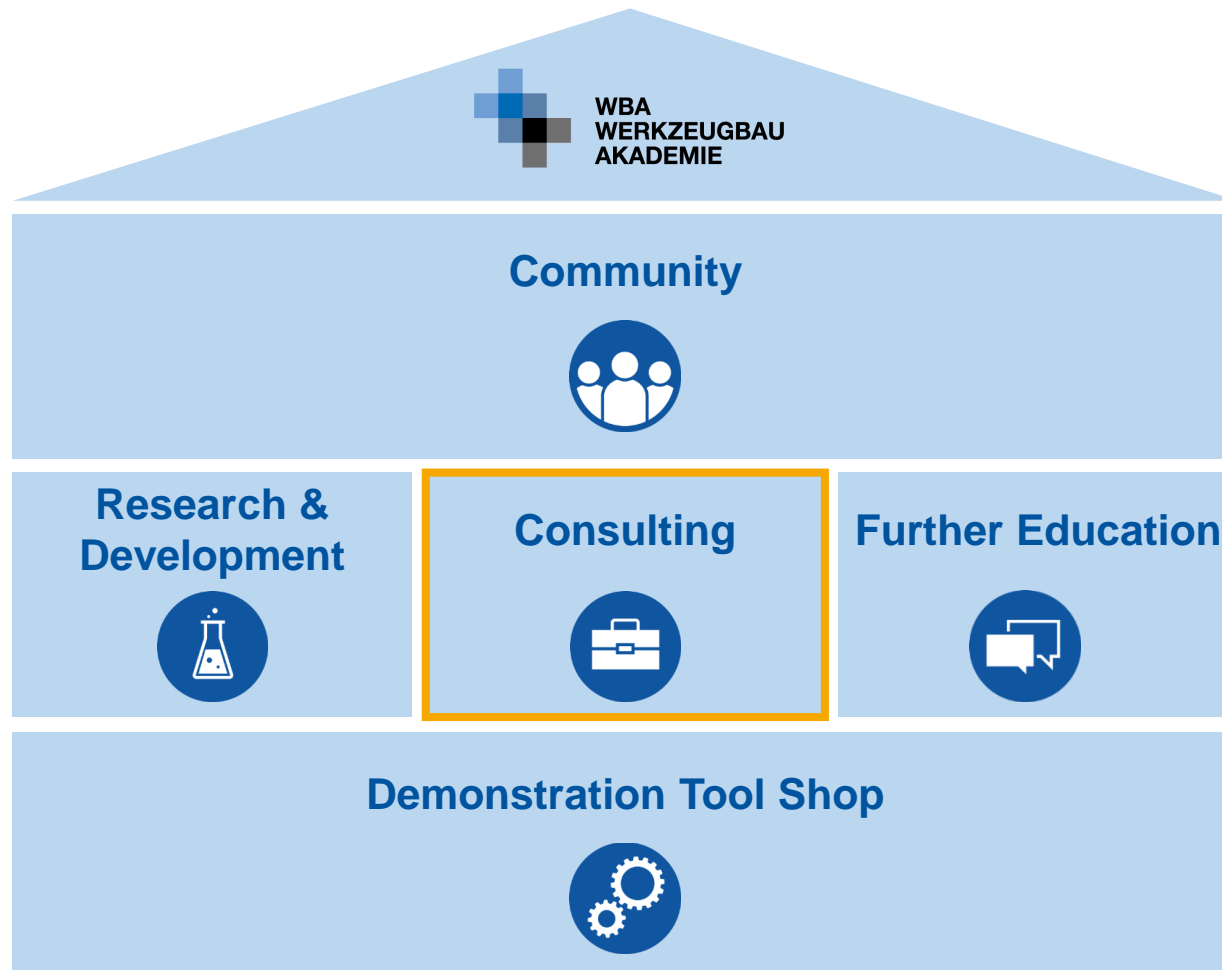


Successfully...

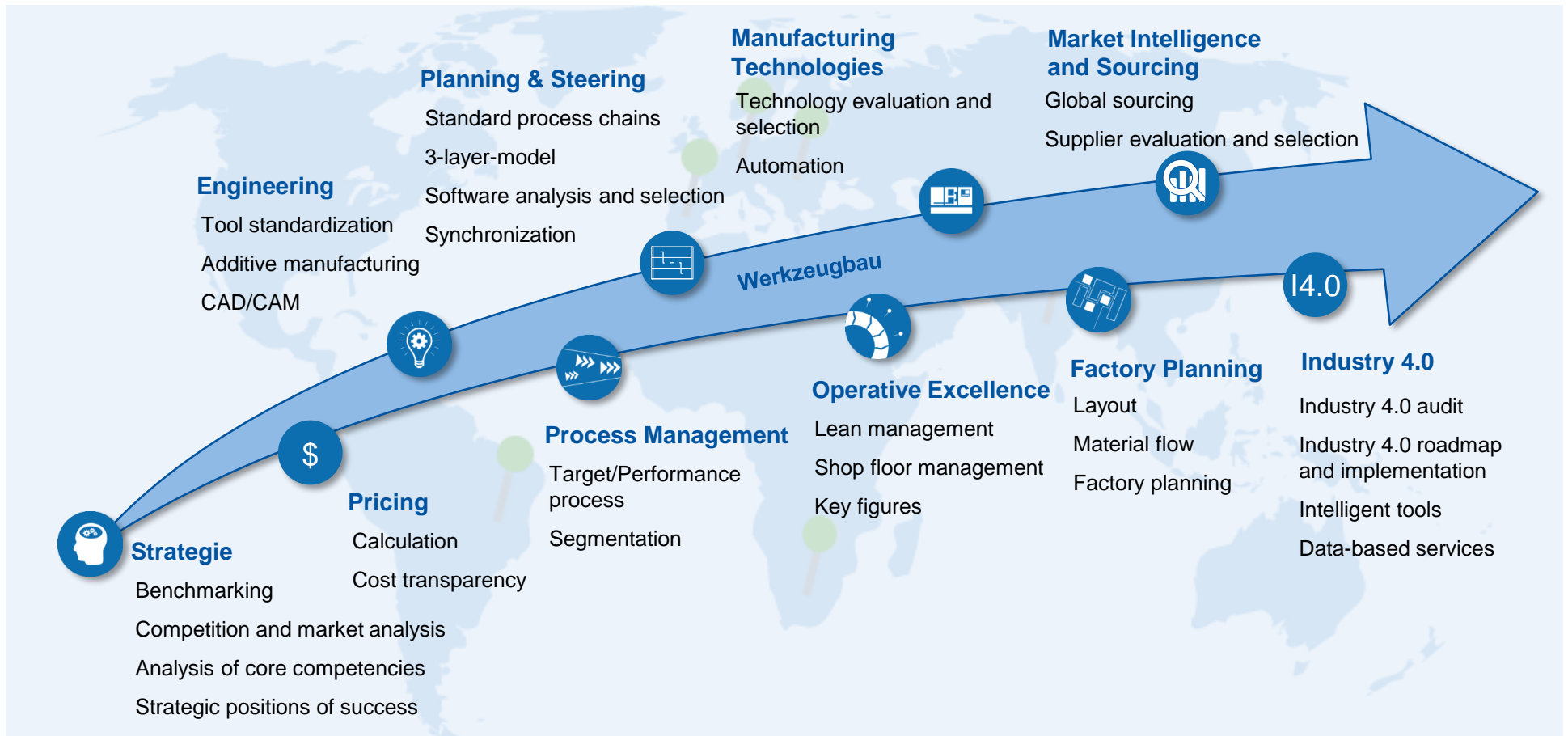


Since 2014, WBA regularly publishes studies regarding strategic development, international tooling markets, and the successful value creation in the tooling sector.

The WBA Tooling Academy Aachen Consulting



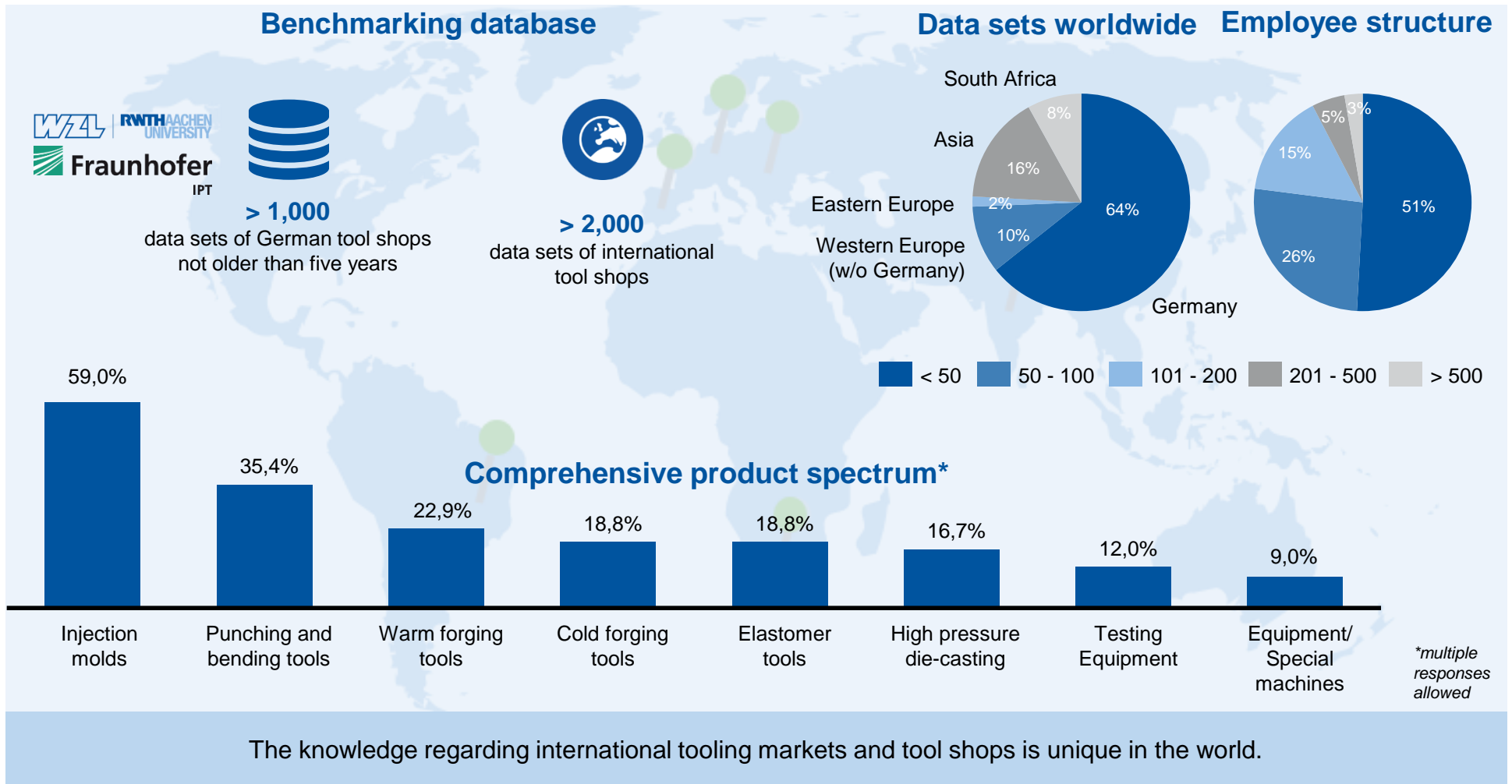
Consulting Services Offered by WBA



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

Consulting

Comprehensive Product Spectrum via Benchmarking Database



Consulting

Overview of Selected Industry Projects



Injection molding

Sheet metal and massive forming

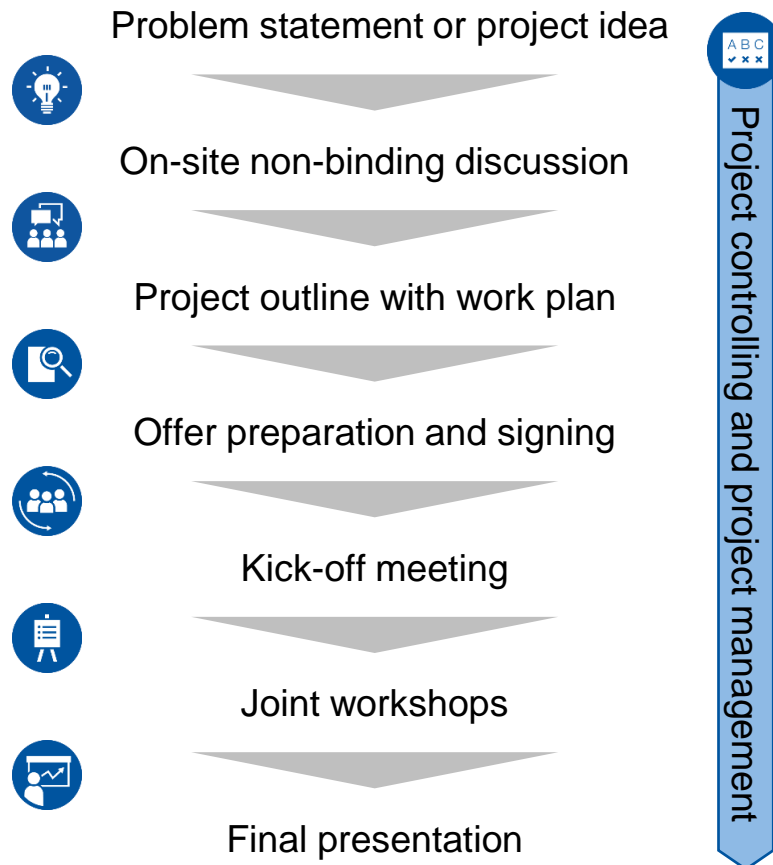
Internal
tool shop

External
tool shop

Consulting Presentation of the Project Approach



Approach



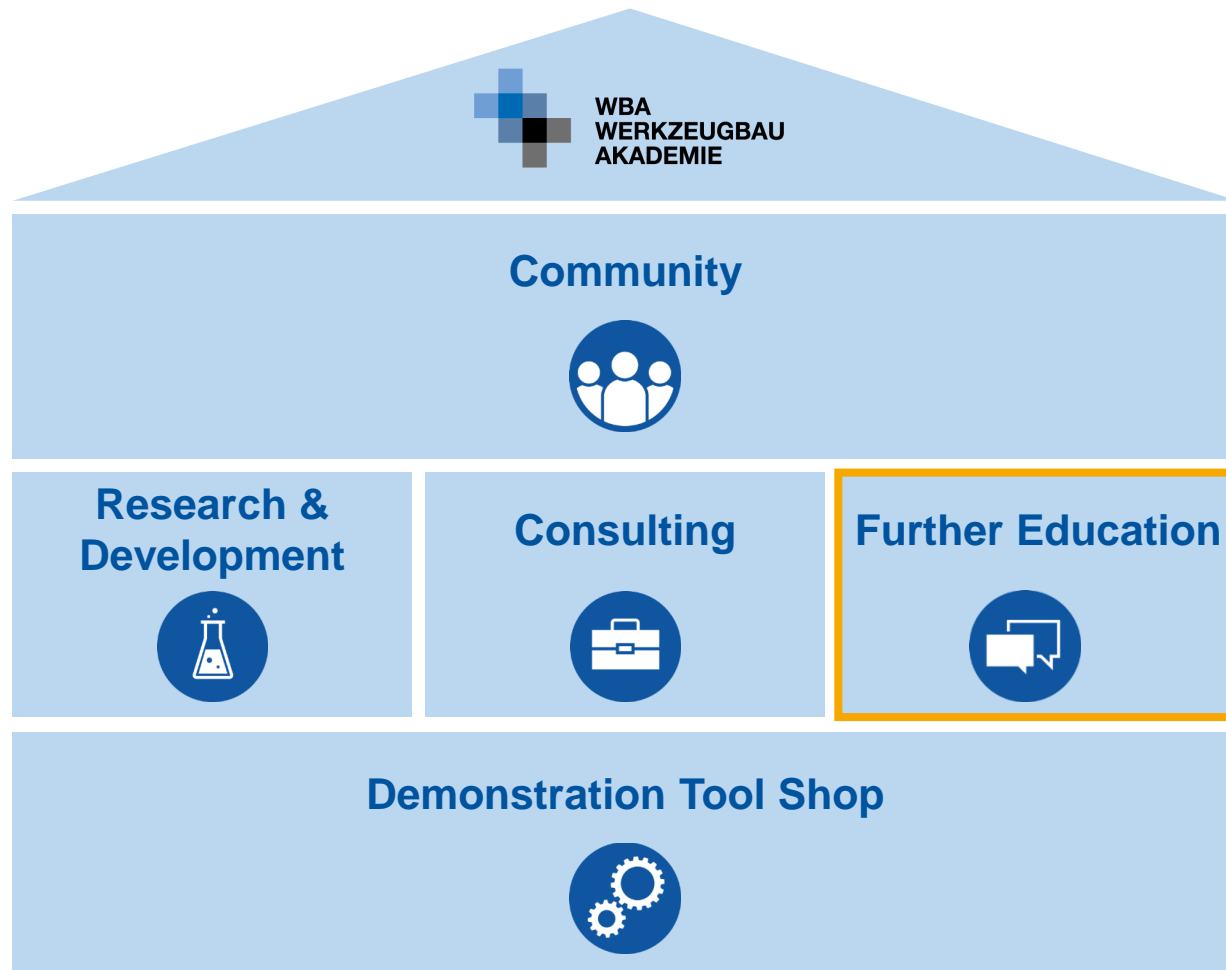
Success factors

- ★ **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

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

25th - 27th September 2018

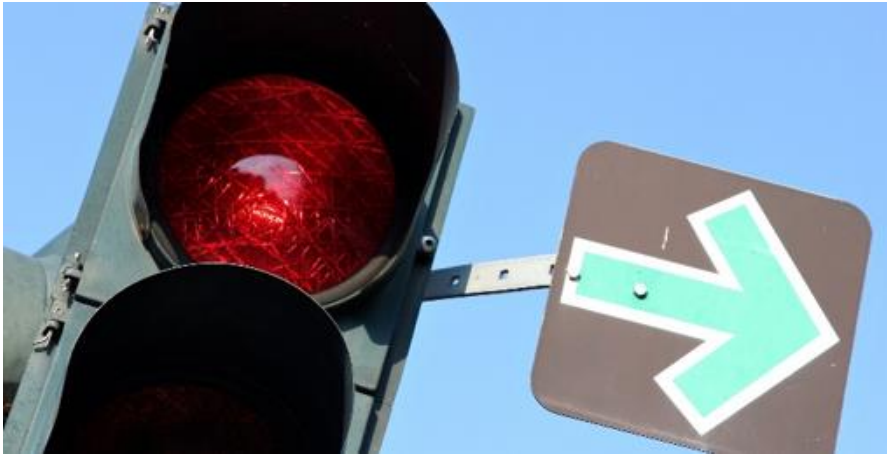
19th - 21st February 2019

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 March 2019

Registration

www.werkzeugbau-akademie.de/veranstaltungen

Practice-oriented workshop „Foundations of and innovations in the milling technology“



„With the workshop „Advanced milling“ we offer a practical manufacturer-independent training format aimed at qualifying machine operators and CAM programmers.“

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



Contents

- Current milling technologies
- Established roughing and finishing strategies
- New technologies for boosting productivity, profitability and process security
- Practical implementation of the acquired knowledge in the WBA demonstration tool shop

Target group

- Machine operators
- CAM programmers

Date
15th May 2019

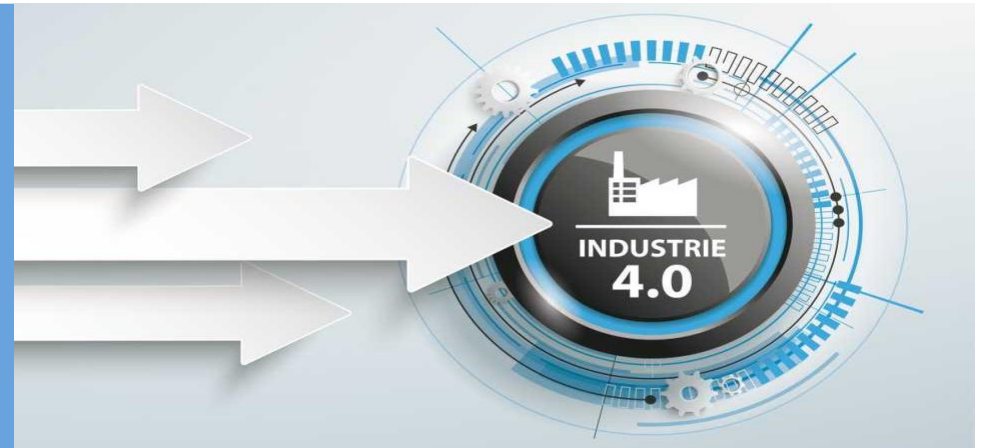
Registration
www.werkzeugbau-akademie.de/veranstaltungen

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**

Further Education

Modules of the Expert and Senior Expert in Toolmaking



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

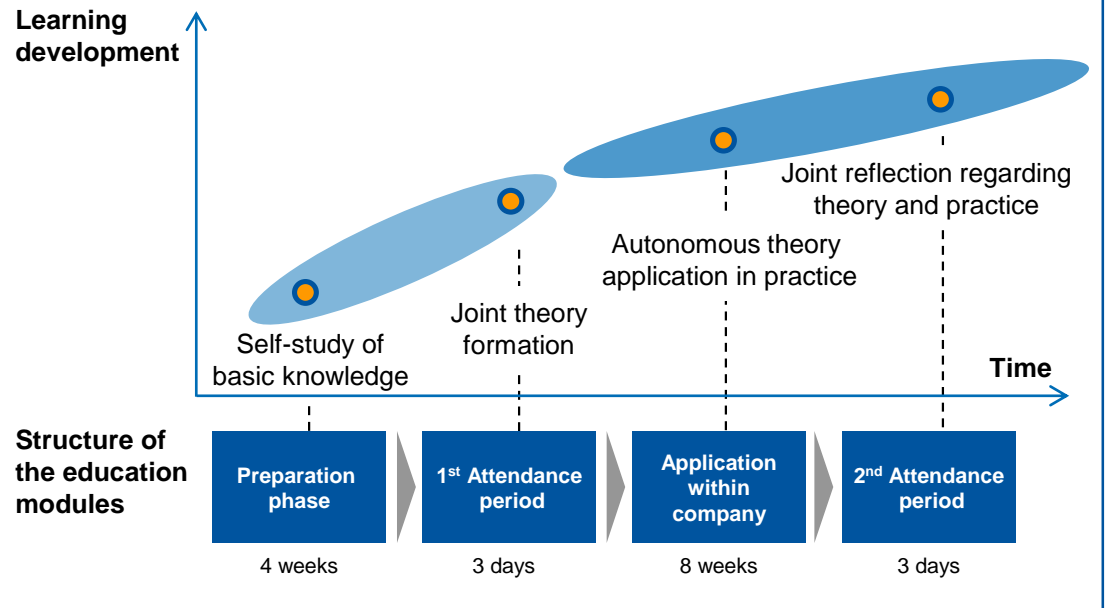
Module for character development

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



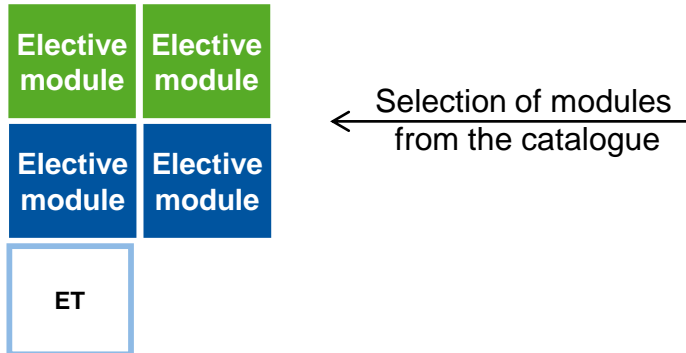
Further Education

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

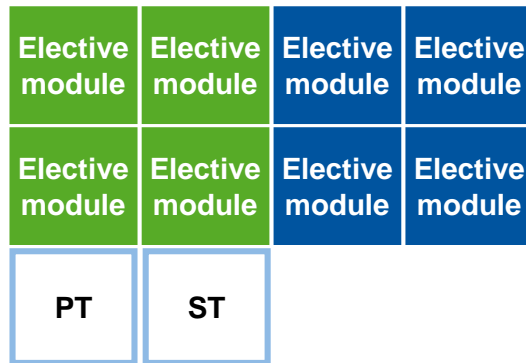
Further Education

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

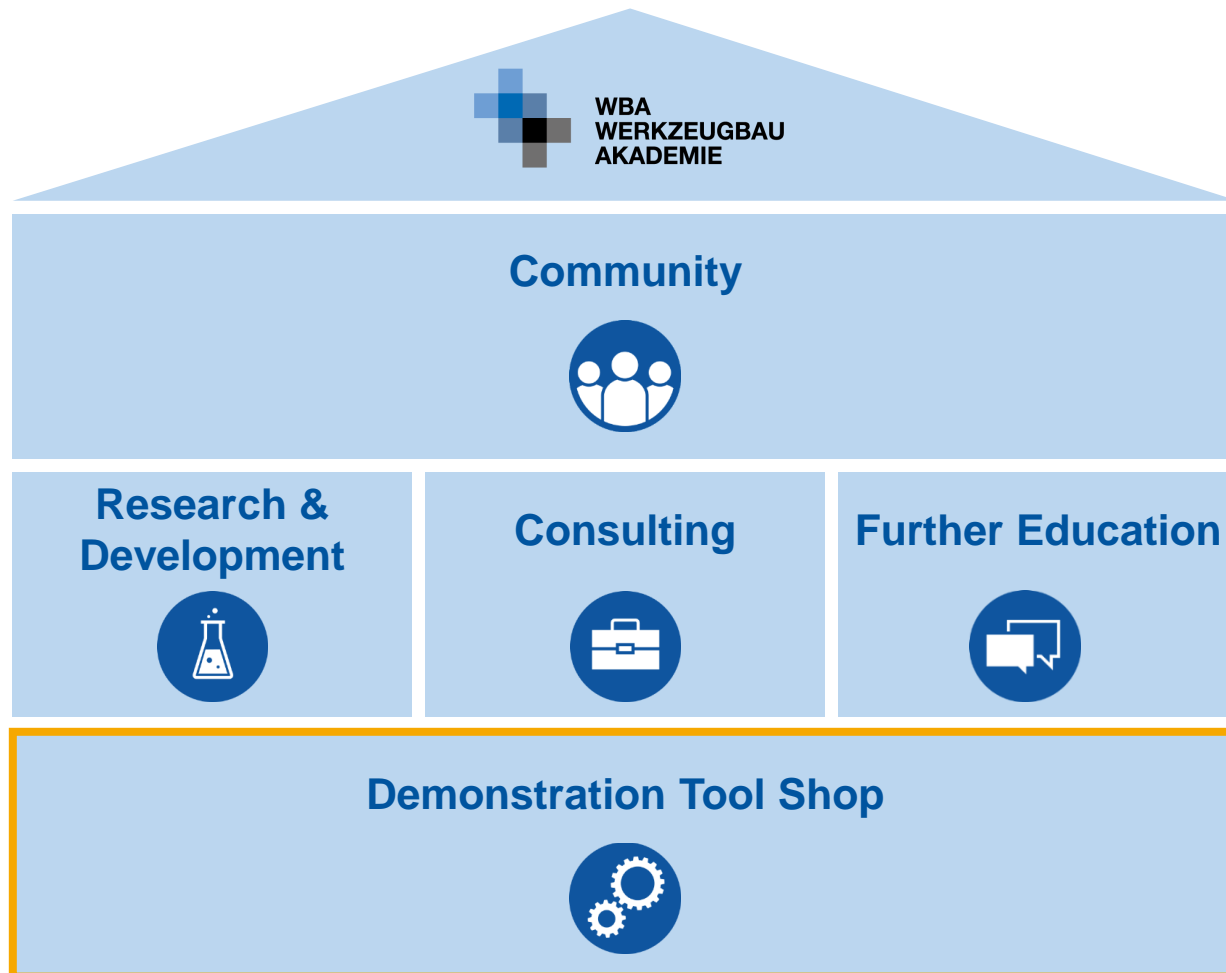
Price overview



	regular price	for WBA members*
Webinars	€ 79	free
<i>Basic knowledge - compact courses</i>		
Basic course “Industrial tool making”	€ 1,295	€ 906.50
Advanced course “Industrial tool making”	€ 1,295	€ 906.50
Tool making challenge	€ 1,750	€ 1,750
<i>Intensive trainings</i>		
Current manufacturing developments in tool making	€ 695	€ 486.50
Planning & controlling and project management in tool shops	€ 995	€ 696.50
<i>Workshops</i>		
Foundations of and innovations in the milling technology	€ 695	€ 486.50
Digital transformation	€ 695	€ 486.50
Data analytics & machine learning	€ 695	€ 486.50
Executive workshop „Strategies for the tool shop of the future”	€ 1,495	€ 1,046.50

The WBA Tooling Academy Aachen

Demonstration Tool Shop



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.

Agenda



1 The WBA Tooling Academy Aachen - Tooling in Series

2 RWTH Aachen Campus - the Engineering Valley

3 Production Engineering in Aachen - Excellence in Teaching and Research

RWTH Aachen Campus A Unique Research Landscape – the Engineering Valley



Building and exchanging knowledge...

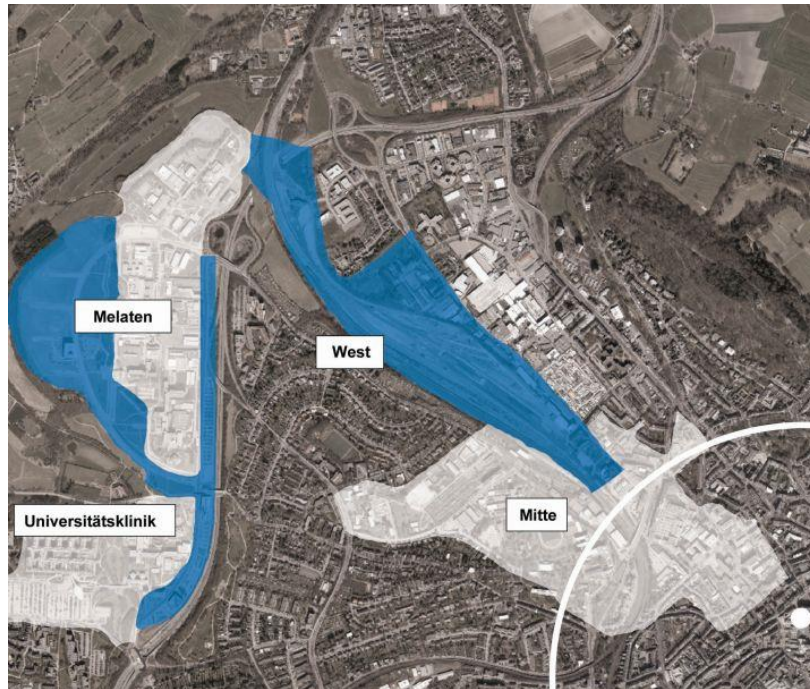


...between research and industry

Companies, institutes and the university share resources, utilize synergies and jointly conduct research on sustainable innovations.

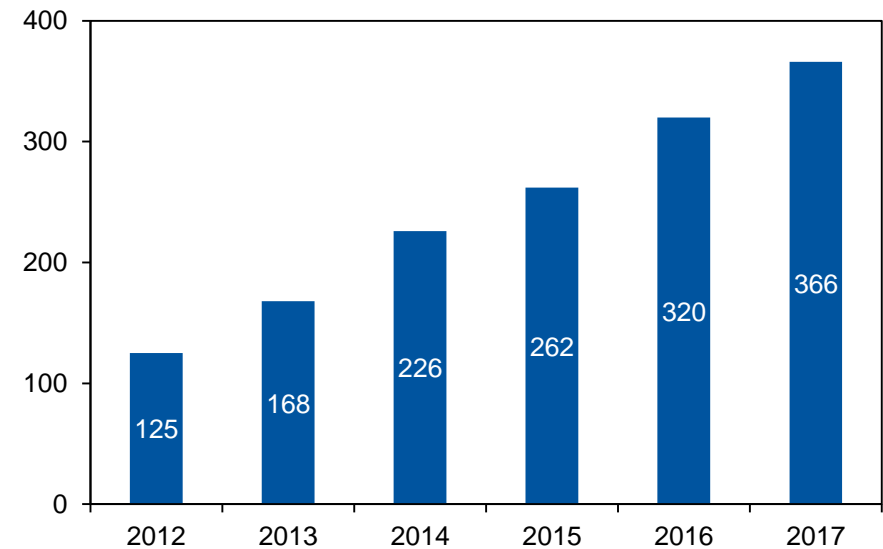


A campus for research. Learning. Developing. Living.



- The area grows by 800,000m² to 2.5km²
- Investment volume amounts to approx. €2 billion
- 10,000 jobs are created directly and indirectly

Number of enrolled companies



Start-ups / Spin-offs

- Around 45 to 50 start-ups originate in the science region Aachen per year
- The Campus initiative is a catalyst for further start-up activities

RWTH Aachen Campus

Campus Melaten Grows and Flourishes



Campus Melaten 2012

Campus Melaten 2016



RWTH Aachen Campus

Outlook: There Is Still a Lot to Do in the Engineering Valley





View from the South



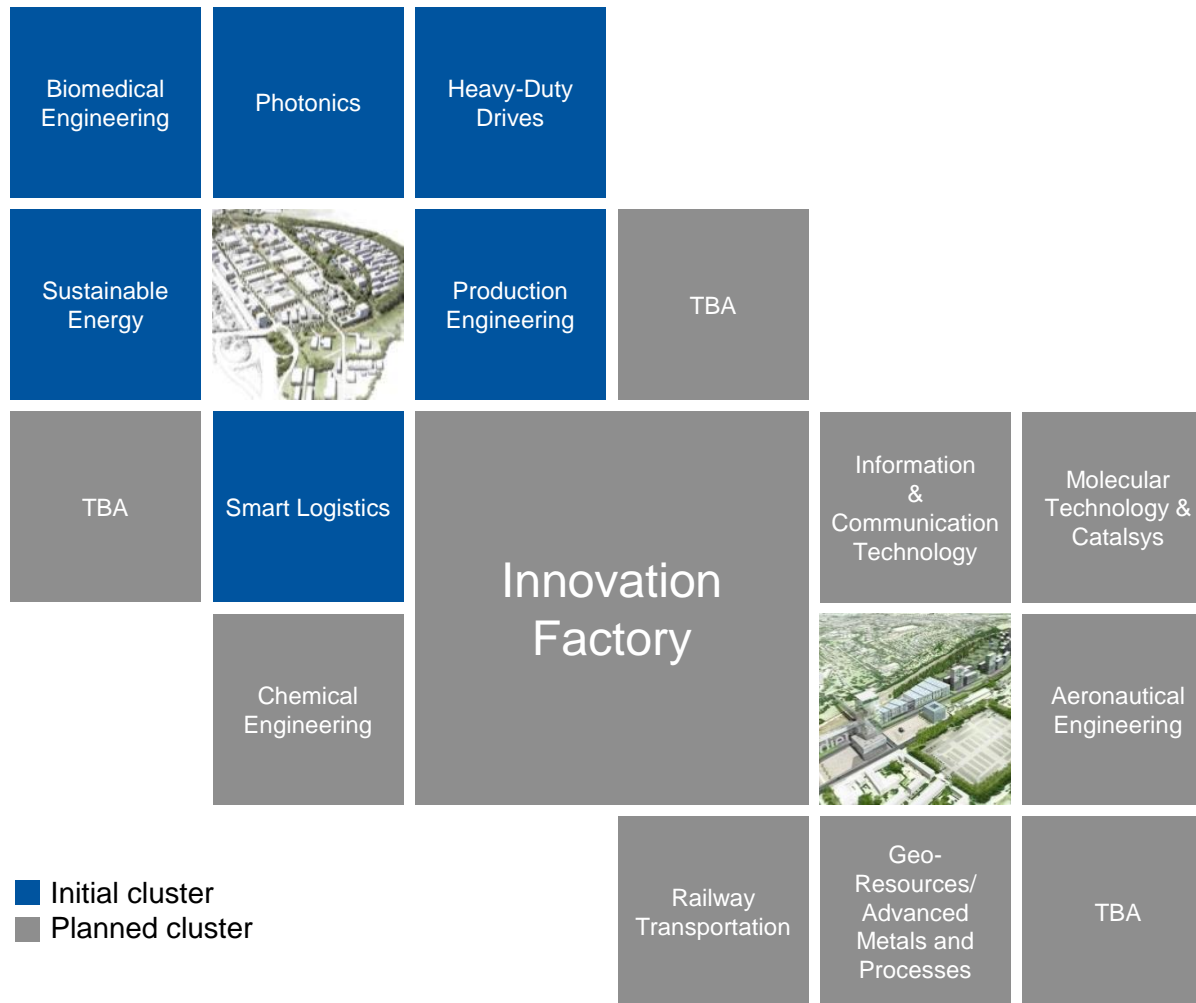
View from the Northeast

Legend:

-  Already existing buildings
-  Buildings to be constructed

RWTH Aachen Campus

16 Research Clusters Are Developing...



Cluster Biomedical Engineering



Cluster Photonics



Cluster Heavy-Duty Drives



Cluster Sustainable Energy



Cluster Production Engineering



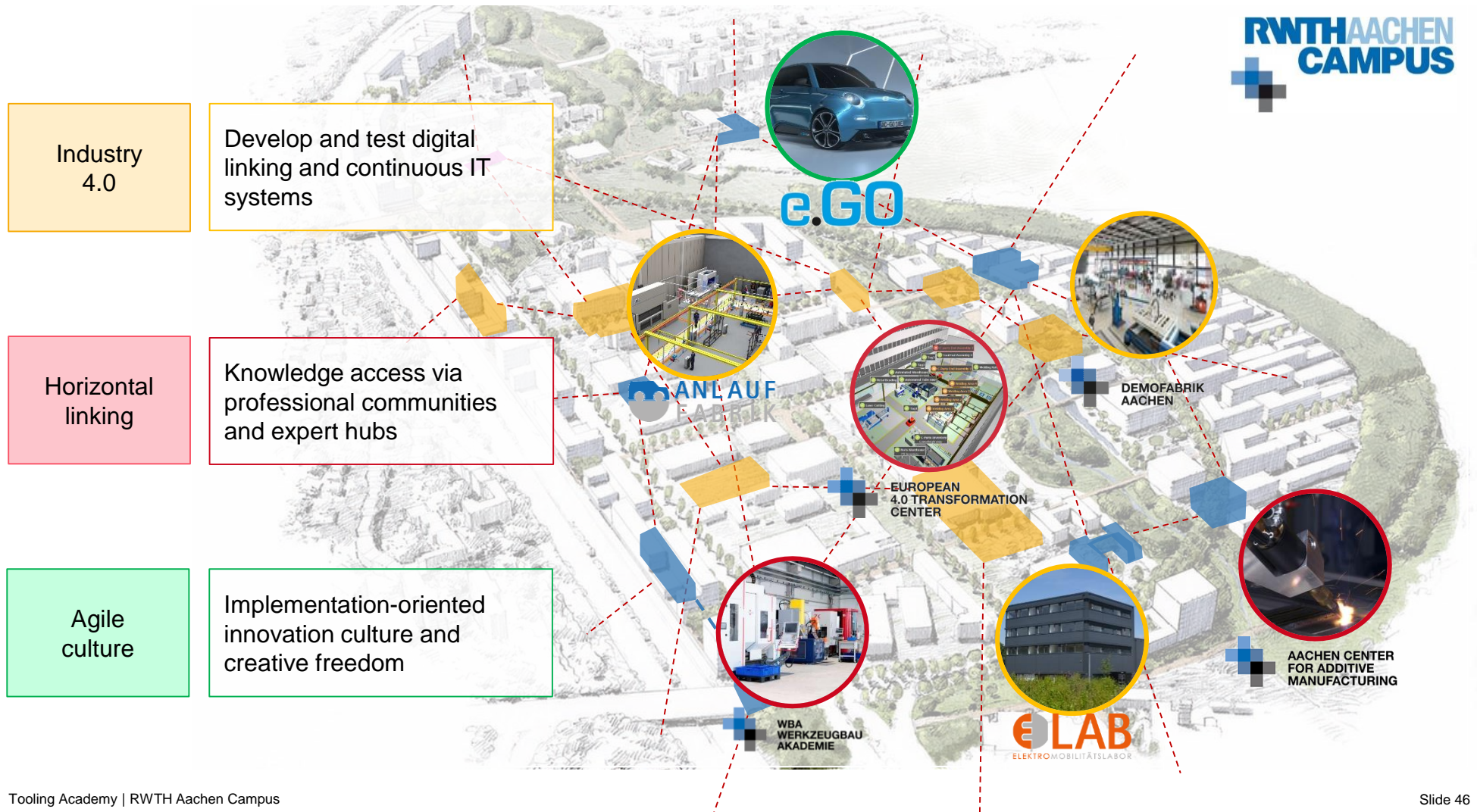
Cluster Smart Logistics

RWTH Aachen Campus ...Divided in Organizational Centers



RWTH Aachen Campus

e.GO as a Result of Campus Performance

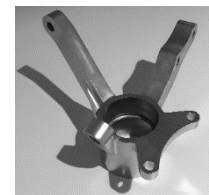
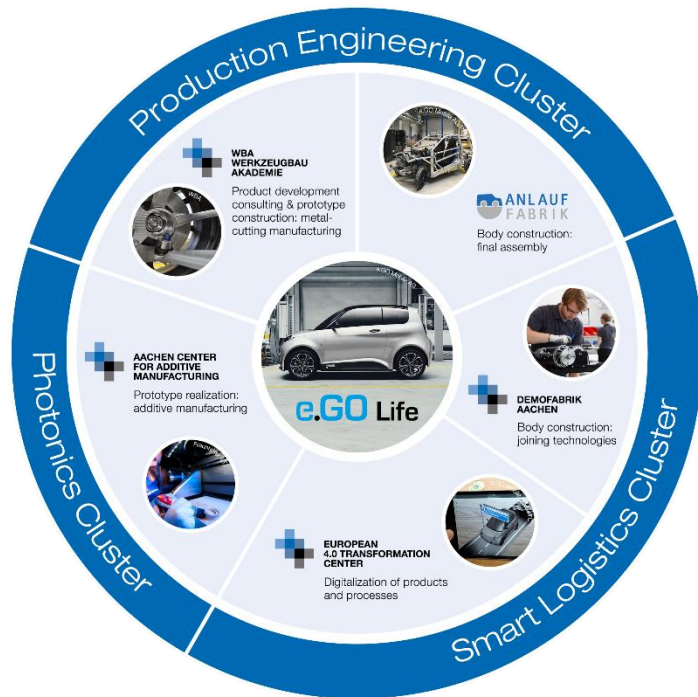


RWTH Aachen Campus WBA as a Campus Toolmaking Company and Prototype Manufacturer



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

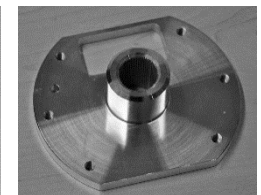
... has enabled the fast and cost-efficient development of an affordable electric car.



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 e.GO Mobile AG.

Agenda



1 The WBA Tooling Academy Aachen - Tooling in Series

2 RWTH Aachen Campus - the Engineering Valley

3 Production Engineering in Aachen - Excellence in Teaching and Research

Excellence in Teaching and Research

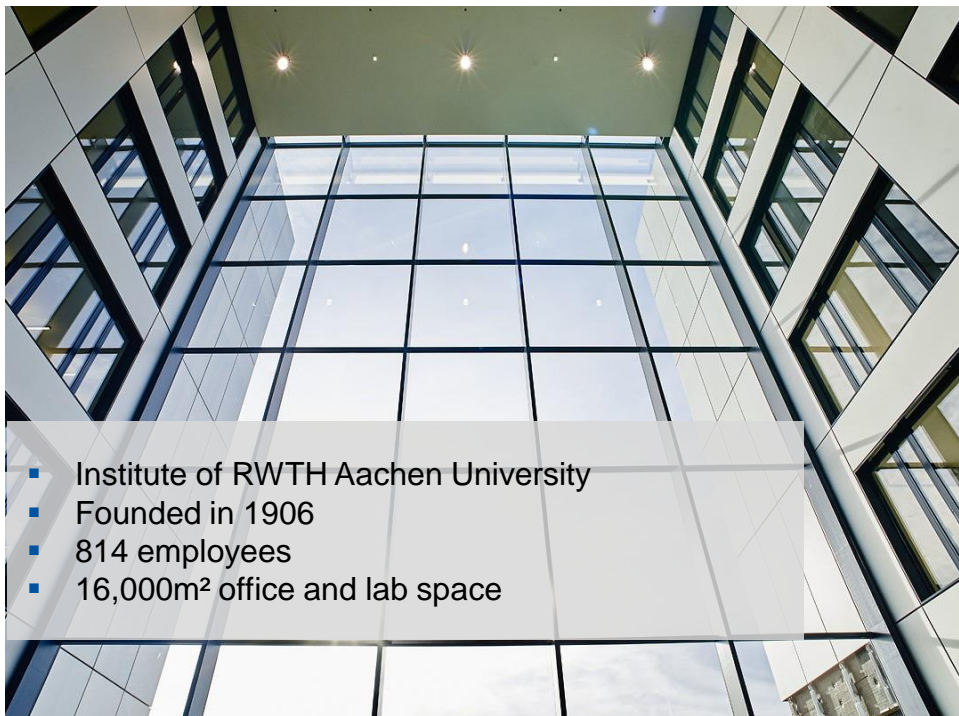
Production Engineering in Aachen – WZL and IPT



Laboratory for Machine Tools and Production Engineering WZL of RWTH Aachen University



Fraunhofer Institute for Production Technology (IPT)



- Institute of RWTH Aachen University
- Founded in 1906
- 814 employees
- 16,000m² office and lab space



- Institute of the Fraunhofer-Gesellschaft
- Founded in 1980
- 459 employees
- 9,000m² office and lab space
- Certified according to DIN EN ISO 9001:2008

WZL and IPT constitute one of the worldwide leading research institutes in the area of production technology.

Excellence in Teaching and Research

Two Institutes – one Philosophy



- Process technology
- Production machines
- Production quality and metrology
- Technology management

- Technology of manufacturing processes
- Transmission technology
- Machine tools
- Production measurement technology and quality management
- Production systems

As part of RWTH Aachen Campus, WZL and IPT are integrated into one of Europe's largest research landscapes.

Excellence in Teaching and Research

RWTH Aachen University and Fraunhofer-Gesellschaft



RWTH Aachen University





-  Founded in 1870
-  44.517 students

Faculty for mechanical engineering

-  12.573 students
-  66 professorships
-  3.067 employees
-  227 doctorates



Fraunhofer-Gesellschaft

-  67 institutes and institutions
-  24.000 employees
-  Research volume over €2 billion
-  3 institutes in Aachen



Excellence in Teaching and Research

The Cluster for Production Engineering on RWTH Aachen Campus



- Gross floor space: 30,000m²
- Usable floor space (office and machine hall): approx. 11,000m²
- Mixed use: approx. 3,500m²
- Investment: approx. €60 million



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

The WBA Tooling Academy Aachen

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