Inicjatywa FoF – cele, strategia, działania

KIC AVM

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Director of Centre for Advanced Manufacturing Technologies / Fraunhofer Project Center – FhG- IWS
Dresden
Topics:

- European strategy of manufacturing
- new technologies in product development
- new technologies in process development
- EIT KIC AVM
Strategy for Manufuture

1. Customization
   Quality, Cost, Time

2. Global Production

3. Leadership in Technology

4. New Technologies for Strategic Technology-Platforms

Diagram:
- Today Markets
- New Markets
- Today Products
- New Products
R&D Key Challenges

Paradigm: Life Cycle Orientation

- Engineering
- Manufacturing
- Usage Service
- Recycling

Paradigm: Product Integrated Knowledge (Intelligent Products)

- Adaptive ... Processes, Systems, Structures
- Digital and Virtual ... Engineering Methods and Tools
- Integrated Networks ... Supply Chain and E-Manufacturing
- Knowledge based ... Process Control and Engineering
- High Performance ... Quality, Time, Cost
- New Taylorism ... „Scientific Management by Workers”
Case study

- Project Management
- BOM Management
- Process Planning
- Workflow Management
- Logistics Management
- Collaborative Engineering
Animation of simulation model
1. Build chamber volume (V in $m^3$)
   1a) $V < 1 \, m^3$
   1b) $1 \, m^3 \leq V \leq 8 \, m^3$
   1c) $V > 8 \, m^3$

2. Build-up rates (production speed at highest quality in $cm^3$/h)
   2a) 1 - 10 $cm^3$/h
   2b) 11 - 40 $cm^3$/h
   2c) 41 - 100 $cm^3$/h
   2d) > 100 $cm^3$/h

3. High process stability

4. Integration of electronic circuits into additively manufactured parts

12. Processability of materials with AM-machines
   12a) Magnesium
   12b) Shape memory alloys (SMA)

13. Availability of new material properties
   13a) Fire resistance
   13b) Thermal conductivity
   13c) Electrical conductivity
   13d) Self-healing properties

14. Recyclability of materials

16. Provision of design rules

17. Availability of a database containing properties of Additive Manufacturing materials (e.g. thermal characteristics, tensile strength etc.)

Source: Thinking ahead the Future of Additive Manufacturing – Exploring the Research Landscape – Project DMRC and HN Institute at Paderborn University
• FoF 01-2016: Novel hybrid approaches for additive and subtractive manufacturing machines
• FoF 02-2016: Machinery and robot systems in dynamic shop floor environments using novel embedded cognitive functions
• FoF 03-2016: Zero-defect strategies at system level for multi-stage manufacturing in production lines
• FOF 04-2016: Continuous adaptation of work environments with changing levels of automation in evolving production systems
• FoF 05-2016: Support for the further development of Additive Manufacturing technologies in Europe
• FoF 06-2017: New product functionalities through advanced surface manufacturing processes for mass production
• **FOF 07-2017**: Integration of unconventional technologies for multi-material processing into manufacturing systems
• **FOF 08-2017**: In-line measurement and control for micro-/nano-enabled high-volume manufacturing for enhanced reliability
• **FoF 09-2017**: Novel design and predictive maintenance technologies for increased operating life of production systems
• **FoF 10-2017**: New technologies and life cycle management for reconfigurable and reusable customised products
• **FOF-11-2016**: Digital automation
• **FOF-12-2017**: ICT Innovation for Manufacturing SMEs (I4MS)
• **FOF-13-2017**: Photonics Laser-based production
### Conditions for the Call for Factories of the Future call

**Opening date(s), deadline(s), indicative budget(s):**

1 Topics

<table>
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<th>Topic</th>
<th>Type of Action</th>
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Proposal
Towards a CLCs approach for the AVM KIC
Different approaches for CLC structure

Approaches delivered by different partners

- Geographical structure
- Thematic structure
- Operational structure
- Sectorial perspective
KIC & CLCs participation

Criteria (indicative)

- Strong participation and/or coordination in European research & innovation activities / projects
- Excellence / technical expertise related to a number of manufacturing related topics
- Industrial collaboration at a national and international level with manufacturing companies
- Wide range of manufacturing research and innovation activities
- Scientific publications in the field of manufacturing
- Compliance with the Knowledge Triangle
- Regional and national commitment to support the KIC
KIC & CLCs participation
(MoUers as of 22/5/2015)

NORTH

Catapult
Chalmers
ICMR
FIMECC
NTNU
SINTEF
Teknikforetagen
TUT
TWI
UCD
VTT

CENTRAL

CEA
CETIM
EC Nantes
IK4
INESC Tech
Mondragon
TECNALIA

EAST

EffizienzCluster
FhG ILT
FhG IML
FhG IPT
it’s OWL
KU Leuven
PTW Darmstadt
RWTH Aachen
TNO

SOUTH

FhG IWU
LMS
SZTAKI
TU Wien
Wroclaw University

WEST

COMAU
EPFL
FESTO
FhG IPA
ITIA-CNR
PoliMilano
PRIMA
A number of five (5) key areas taken from the research and innovation priorities of the FoF2020 roadmap were identified as priority themes for the technical competences of the CLCs:

- Human-centred & Customer-focused manufacturing
- Advanced manufacturing processes
- Digital, virtual & resource efficient factories
- Adaptive & smart manufacturing systems
- Collaborative & mobile enterprises
Advanced manufacturing processes
- Catapult
- CETIM
- COMAU
- EC Nantes
- FhG IML
- FhG ITL
- FhG IPA
- FhG IWT / RWTH
- FhG IWU
- KU Leuven
- PRIMA
- SINTEF
- TECNALIA
- TNO
- TWI
- UCD
- ...
Thematic structure
(CLCs core themes mapping)

Human-centred & Customer-focused manufacturing
Advanced manufacturing processes
Digital, virtual & resource efficient factories
Adaptive & smart manufacturing systems
Collaborative & mobile enterprises
Operational structure
(CL Cs core / complementary themes approach)

Human-centred & Customer-focused manufacturing

Advanced manufacturing processes

Digital, virtual & resource efficient factories

Collaborative & mobile enterprises

Colouring reflects the region:

North
West
South
Central
East

Adaptive & smart manufacturing systems
KIC Added Value Manufacturing Regional Approach for CEE

Results of preparatory workshops of the stakeholders of the Central East Europe (CEE) Region

Version 05, 18.09.15
Who we are

5 core partners and their network to drive the innovation capability of the CEE Supply Chains
Who we are

5 core partners and their network to drive the innovation capability of the CEE Supply Chains

- **Poland**: TU Wroclaw and ...
- **Eastern Germany**: Fraunhofer IWU and TU Chemnitz with Automotive Cluster of East Germany (ACOD)
- **Austria**: TU Vienna and national platform (Magna, Infineon, BRP Rotax, etc.)
- **Hungary**: MTU Sztaki/TU Budapest and ...
- **Greece**: LMS Patras ...

Strong connection of CEE to the Vanguard Initiative as a cluster of innovative regions
Regional situation and strengths
CEE is an important factor for the Manufacturing output of the European economy

- High **GDP ratios of manufacturing** in key-CEE countries
- **Complete supply chains** in CEE enable competitive production of OEMs and market leading SME (hidden champions) all over Europe
- Well networked **regional clusters** and **ecosystem** of education, research and industry

- „To be a supplier = to be an enabler for technology!“
Challenge for CEE

Build on strength - Create added value in the Supply Chain through Smart and Adaptive manufacturing

- **Use digitalization** to maintain and increase leading position as supply chain for OEM and leading SMEs
- Use opportunity of **smart and adaptive** manufacturing in I4.0 environment to advance supply chains
- Create even closer collaboration with OEMs and leading SMEs to **identify** their **demand** and **benefit** in digitalization
- **Connect education and research** output to industry demand in smart and adaptive manufacturing
- Enable added value in the region to **secure and increase employment** where it is needed
Our approach
Increase supplier readiness for I4.0 to maintain and advance position as leading European supply chain for the Automotive and Transport sector

- Develop and implement criteria for a »Supplier readiness* for I4.0«
  - Focus on SME
  - Support 2nd tier
  - Create new 3rd tier

**Sample: Business field MOBILITY with Automotive, Aviation, Railway industry, Commercial vehicles, Ship building / water transport, others, ...**

*compare e.g.:
- »INDUSTRY 4.0 - The new industrial revolution, How Europe will succeed«; Roland Berger
- »4.0 Readyness Level in the Mechanical Engineering Sector«, VDMA
- »Industry 4.0 – The Capgemini Consulting View«, Capgemini Consulting
Focus on the Supply Chains, leveraging existing regional industry clusters

- OEM
- OEM
- OEM

- Hidden Champions / Product ownership companies

- Supply chain triangle for complete manufacturing systems

- Companies interlinked with full supply chains

- Supplier
- Technology Providers
- ICT + Automation Providers
Structural approach for CEE CLC (proposal) inclusive RIC’s (Regional innovation/impact center) and/or CoC’s (Center of Competence)
Proposed PL structure

- **Poland**: 16 technical universities, 38 industrial institutes
- KIC AVM declared partners:
  - Wrocław (WCE/CAMT-FPC) – Polish virtual office of CEE CLC
  - Kraków (Cracow University of Technology and AGH University of Science and Technology) – automotive R&D
  - Warsaw/Radom (Institute for Sustainable Technologies) – advanced materials, R&D equipment
  - Rzeszów (Rzeszów University of Technology) – “Aviation Valley” with 86 aerospace companies
- Negotiations with next partners – Poznań and Gliwice
## Polish industrial clusters

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### Biggest industrial clusters in CEE

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<th>No</th>
<th>Cluster name</th>
<th>Industry</th>
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