

How collaborative research can help meet the challenge of advanced manufacturing and automation

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Capability acquisition through collaboration

Technology (TRL)
Research Partners & UTCs

Validation Demonstrators

Programmes Engine Programmes

31 UTCs

14 other Research Partnerships

Research Partners & UTCs
Research
Manufacturing (MCRL)

Manufacturing Research Centres
Pre-Production

Facility Investment
Industrialisation

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Manufacturing Technology Drivers

Market Drivers
Fuel efficiency - up
Weight - down
Emissions - down
Ownership Cost - down
Reliability - up
Time to market - down

Business Needs
Cost base - down
Safety - up
Stability / Capability - up
Responsiveness - up
Capital exposure - down
Globalisation - up

New Product
• Advanced affordable materials
• Novel low part count geometry
• Fit for purpose specifications
• High perform durable products

New Processes
• Fundamentally Capable
• Stable & Low Cost
• Flexible & Transferrable

New Skills
• Flexible & cost conscious
• Higher capability baseline
• Technology & IT savvy

New Factories
• Standard Template
• Low energy & low cost
• Future proofed

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Industry Weakness: MCRL 3-6

Manufacturing Capability Readiness Levels (MCRLs)

MCRL Levels	1	2	3	4	5	6	7	8	9
Activity	Technology Assessment & Proving			Pre-Production		Production Ramp-up			
MCRL Description	Process concept proposal with scientific foundation	Applicability & validity of concept described & vetted	Experiment start-up of concept complete	Process validated in laboratory using representative development equipment	Basic capability demonstrated using production equipment	Process optimised for capability & rate using production equipment	Capability & rate confirmed via economic trial parts (FAIR sig 1)	Fully profit capable process qualified on all parts over significant period (FAIR sig 2)	Fully profit capable process qualified on all parts over extended period

AxRCs

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Manufacturing Research Centres - A Proven Collaborative Model

What are they ?

- Collaborative public / private partnerships
- Location to share knowhow and 'Best Practice'
- A training ground for the future innovators
- Manufacturing Technology 'Sand Pit'
- Focused on 'Step Change' improvements

Why do they work ?

- Strong industry leadership
- Industry scale equipment & real components
- High caliber interdisciplinary teams
- Extensive sharing of knowledge & resources
- Focus on technology transfer & exploitation




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Network of Manufacturing Research Centres (AxRCs)

 Advanced Manufacturing Research Centre Rotherham, UK, 2008	 Advanced Forming & Forging Research Centre Glasgow, UK, 2010	 Manufacturing Technology Centre Coventry, UK, 2011	 National Composites Centre Bristol, UK, 2011
 Nuclear - Advanced Manufacturing Research Centre Rotherham, UK, 2011	 Commonwealth Centre for Advanced Manufacturing Virginia, USA, 2012	 Advanced Remanufacturing and Technology Centre Singapore, 2014	 High Temperature Research Centre Coventry, UK, 2015

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Generic Relationship Model Manufacturing Technology Centres



Government

- Land
- Buildings
- Initial Equipment
- Start-up Revenue
- Core funding

Partners


- Technical Packages
- Know-How
- Training
- Membership and project fees

Supply Chain

- Manufacturing plants
- Competitive Methods
- Regional expertise
- Applications Engineering
- Source of independent Audits & Reviews


Partners / Govt

- Skills & Capabilities
- High Value Jobs
- Access to Markets
- Global reputation
- National resilience & economic growth

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Supply Chain Engagement



- **AMRC Machining Events**
 - 3 regional workshops, 51 suppliers, 248 attendees
 - Current total 27 AMRC visits
 - To date 30% of AMRC reports have resulted in committed / launched projects
- **AFRC Forging Event**
 - 15 Suppliers, 50 attendees
 - 10 'Competitive Forging' modules delivered by AFRC

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