CATAPULT
High Value Manufacturing

Additive manufacturing

July 2025

Additive manufacturing roadmap

CATAPULT High Value Manufacturing

Industry challenges

Short term	Medium term	Long term
Fast validation of product performance and shorten development cycle		
Enabling higher performance sustainable energy systems e.g., aerospace, hydrogen, nuclear, renewables		
Reconfigurable manufacturing (function + product output)		
Extend life of components across lifecycle, e.g. through repair / remanufacture		
	Predict impact on material properties to enable optimisation of component and process	
Open access methods for material traceability		
Circular metals strategy and technologies	New materials characteristics & performance database for Industry	
	Develop sustainable materials for advanced processes	
	Manufacturing methods to minimise waste	
	Develop and prove higher strength/capability materials	
Adoption of circularity principles by UK industry, specifically supply chains		
Increased resilience, capacity, scale up, productivity and process intensification		
Distributed (and reconfigurable) manufacturing system and increased supply chain collaboration for resilience/ centralise (i.e. clustered) factories		
Improve designs of next-generation components (better performance, more sustainable, better value) with lower through-life cost		
Advanced design, materials and manufacturing concepts to enable large complex assemblies with lower part-count		
	Integrated decision tools for production based on combination of simulations and real data	
Define acceptable read across conditions (multiple apps)		
Reduce cost of manufacturing through more efficient and flexible manufacturing process		
Process optimisation and predictability (using data, simulation, control systems) for productivity, performance, energy use, assurance and cost savings		
Improved sustainable manufacturing through reduced material waste and reclamation, and reduced energy use		
Develop and deploy advanced digital tools and end to end manufacturing data processing frameworks		
Digitalisation and data-driven manufacturing for efficiency, quality, cost and sustainability improvements		
Manufacturing skills and workforce development across value chain		

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	Short term	Medium term	Long term
Technology capabilities	Develop tools and capture AM-specific data and knowledge for sustainability to inform better decision-making for design and manufacture		
	Demonstrate improvement of environmental impact over lifecycle from using AM compared to conventional technologies		
	Develop an efficient and joined up workflow for design of AM product and process to achieve optimal outcomes, cost, quality, delivery and sustainability		
	Develop digital tools, techniques and processes to capture and analyse manufacturing data to enable manufacturing, quantification and traceability		
	Understand, apply and support adoption of AM technology capabilities given the rapid pace of development across a diverse set of technologies and considering full process chain		
	Broaden the range of materials available for AM processing to enable broader application of AM		
	Support the development of standards for the certification of AM components, feedstocks, and processes		
	Support the development of a strong UK supply chain for materials, equipment, labour, and manufacturing		

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HVM Catapult developments

Short term	Medium term	Long term
Clarify current AM standards, certification routes and regulatory for priority sectors and applications, and create practical user guides	Encourage adoption of standardised guidelines across industry	Continuous improvement of the standards / data sets to keep up with technology developments
Identify where standards are lacking and need support for development	Establish HVM Catapult data sharing and ability to share externally, adopting data management structures in line with existing standards	Establish approaches to handling supplier interchangeability to enable more resilient and flexible supply chain
Support availability of credible material property data		Enable interchangeable AM processes & interoperable process chain steps
Fill AM data gaps in lifecycle assessment (LCA) databases for priority equipment (incl. post-processing) and materials	Ensure support for existing and new UK-based suppliers of critical and/or exportable AM capability across process chain	Support high-potential technology developments so that they exist in the UK supply chain, e.g. materials, manufacturing etc.
Identify areas of strength and weakness for UK considering scale-up predictions for key sectors	Explore “digital warehouse” concept for spare parts qualified for AM	
Encourage market demand by demonstrating that AM is the best option, informed by cost-models that adequately describe the value-add and knock-on cost savings that may be missed by conventional approaches		
Automate design workflow for high complexity geometry supported by process modelling		
AM process development and optimisation for improved part performance and reliability for priority applications	Demonstrate end-to-end digital thread	
Establish rapid build strategies in powder bed systems for increased productivity and cost reduction	Achieve mature processes for larger parts	
Post-process development for improving part performance and manufacturing efficiency	Achieve mature cost-effective / sustainable material feedstocks	
Mature the reuse and recycling of raw materials	Increase digitalisation and process control towards closed-loop for improved quality	
Focus on materials to enable priority industrial applications and support development of emerging high-potential materials	Demonstrate automation for scaled-up production, particularly focussing on down-stream process steps	
Improve efficiency and efficacy of part inspection for QA, creating routes to rapid qualification		Pull-through novel AM technology developments that provide step changes in rate / scale / quality
Implement in-situ process monitoring and control		Unlock next generation of higher value applications through multi-material, functionally graded components and establish effective corresponding design workflows
Assess and benchmark emerging AM systems		
Implement technical and commercial training programmes, incl. apprenticeships, upskilling of existing / related roles, and support for pipeline of talent coming from universities with solid grounding in manufacturing practicalities		


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