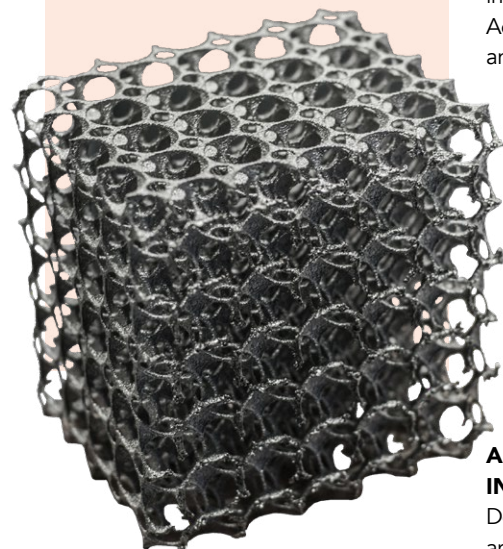


Additive Manufacturing:

A roadmap for improvement in the SUDOE region

Additive manufacturing is now offering a rapidly diversifying range of opportunities for small businesses and R&D centres alike. In the South-West of Europe, however, it appears that many of the technologies associated are not being adopted as widely as they could be. The Spread of Additive Manufacturing Technologies (SAMT) SUDOE project is studying how the sector can improve and has developed new objectives to transfer and disseminate information about additive manufacturing technologies within Spain, Portugal, and South-Western France. If successful, the project looks set to hasten the spread knowledge of additive manufacturing among companies, R&D centres, higher education institutions, and the public.



3D printed metal lattice structure.

Key Enabling Technologies (KETs) are rapidly becoming important tools for small businesses and R&D centres in the increasingly diverse industries of plastic processing and mould production. Within the wider field of KETs are included Additive Manufacturing: a group of technologies for building physical objects directly from computer data, by printing them from different materials layer by layer. As opposed to more traditional subtractive manufacturing, where valuable materials need to be cut away and thrown out, this technique allows manufacturers to form the component parts of their products through low waste additive processes.

In addition, KETs encompass the rapidly-growing field of Advanced Materials. These artificial materials can be engineered for improved properties and performance, giving them innovative new functionalities. Using Additive Manufacturing to produce and process them, biocompatible, responsive, and lightweight materials can be easily fabricated and transformed. This allows products to be manufactured closer to the times and places at which they will be used; both reducing waste and promoting economies of scale. Based on these numerous advantages, KETs look set to become core elements of a new, smartly-connected manufacturing process.

A LACK OF UPTAKE IN THE SUDOE REGION

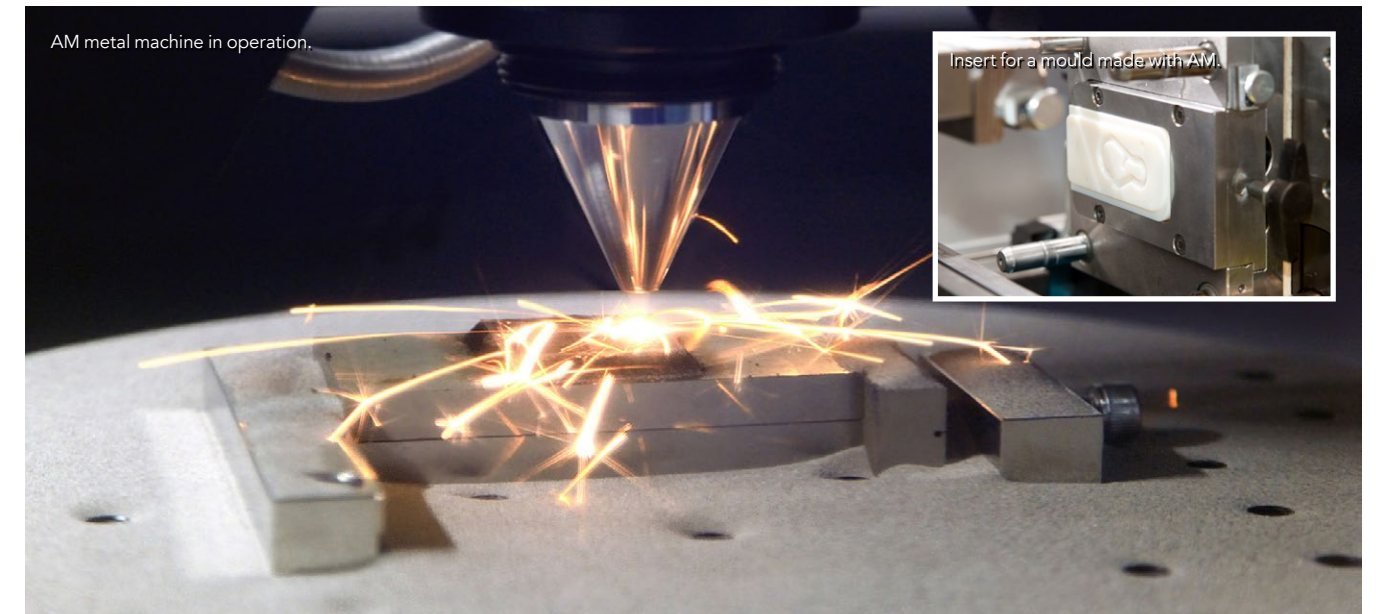
Despite such a promising future, KETs are seeing less of a boom in the SUDOE region, encompassing Spain, Portugal, and the South-West of France. Within these areas, SAMT SUDOE reports

a number of issues faced by many organisations which could see benefits from Additive Manufacturing. Currently, the study shows, many companies are struggling to develop a skilled workforce. In addition, some companies are not as actively involved in beneficial R&D activities as they could be, and remain sceptical that KETs will allow them to maintain the quality of their products.

“In the sectors of mould making and plastic processing, the level of quality of the parts produced with these technologies is one of the main barriers of adoption in the sector,” says Rui Soares at CENTIMFE, who is involved with the project. Yet despite these issues, there has so far been little inquiry into what is going wrong. “There is a huge deficit in available compiled and organised information about Additive Manufacturing and Advanced Materials in the SUDOE Region, which is demanded by companies,” Soares continues. Without this information, companies currently have little guidance on how they can improve.

SURVEYING THE FIELD

In their project, SAMT SUDOE aims to address the issues faced by a wide variety of sectors which stand to benefit from improved methods for plastic production. So far, the core of SAMT's efforts has been to construct a roadmap of the current state of KETs in the region, and of the industrial needs and requirements which will allow them to grow. “Understanding the possibilities and right applications for these technologies is key for their successful uptake”, says Soares. “There's a clear demand for progressing in the diversity of materials and their characteristics for use in Additive Manufacturing”.



To construct their roadmap, the SAMT SUDOE project began by surveying companies and institutions across a wide variety of sectors about their current use of KETs. They found that a majority of the companies they contacted have a reasonable knowledge of Additive Manufacturing technologies and use their own 3D printers to create functional prototypes of their products.

There is a huge deficit in available information about Additive Manufacturing and Advanced Materials in the SUDOE Region.

Encouragingly, this shows that companies have a reasonable knowledge of Additive Manufacturing and Advanced Materials and have some degree of confidence in their advantages.

CURRENT BARRIERS TO KET UPTAKE

Despite its recognised advantages, however, SAMT SUDOE's survey revealed that most companies outside of a few key sectors are still hesitant to invest heavily in KETs. This is largely due to preconceived notions of the high costs involved, along with a lack of knowledge of how the technologies can be used to produce high-quality final products, instead of just prototypes. All the same, these companies had certainly not dismissed a heavy reliance on KETs altogether. The survey also showed that

many companies would like to increase their knowledge of the different types of KET and their operation through demonstrations of the technologies, and through readily-available contact with scientific centres.

Currently, the project showed, there is a distinct lack of compiled information about KETs that is readily available

CURRENT INITIATIVES FROM GOVERNMENTS

In the face of these challenges, SAMT SUDOE has identified the ways in which the governments of France, Spain, and Portugal are currently addressing the issues involved with the spread of KETs in the region. The first of these initiatives is a drive towards what has been dubbed the ‘Fourth Industrial Revolution’. Following the first three phases of mechanisation, industrialisation, and automation, these governments are shaping plans to promote the digitisation of new technologies; an effort which includes the promotion of Additive Manufacturing and Advanced Materials.

Secondly, they are promoting the development of technological platforms: groups of technologies that companies can use as a base on which to build their applications. Such infrastructures are allowing companies to improve their competitiveness and are establishing

to these companies. In addition, there is little infrastructure in place which allows for streamlined collaboration between companies and researchers. Without such support, it is incredibly difficult for companies to find reports and demonstrations regarding the rapidly-evolving trends in the technologies, meaning the understanding and adoption of KETs cannot realistically progress in the SUDOE region. Based on these survey results, the study identified several ways in which these issues are currently being addressed and proposed further important measures which have yet to be taken.



Complex parts obtained by AM.

Roadmap cover showing parts produced in SLS technology.



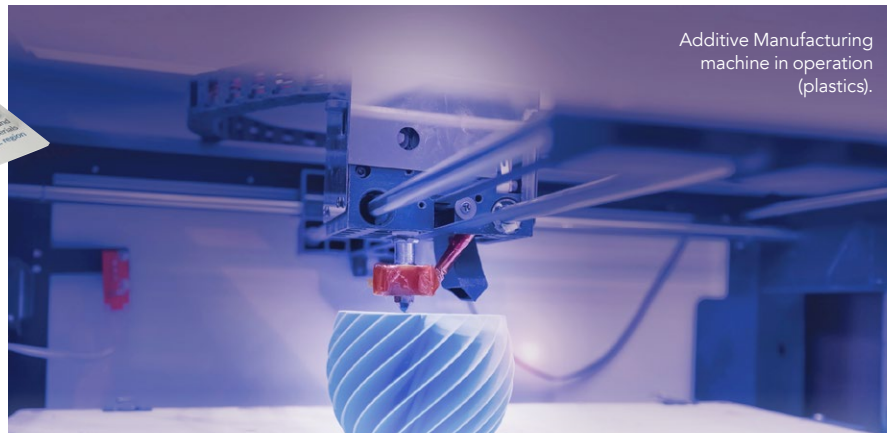
new relationships between research and industry. Thirdly, the SUDOE region is seeing rapid growth in its network of FABLABs – small-scale workshops which specialise in the digital fabrication of new materials. The labs are excellent platforms for entrepreneurs without the means to use and purchase expensive KETs for themselves; enabling new opportunities for invention and innovation. Fourthly, a wide range of active research centres are currently studying the entire Additive Manufacturing production chain, from scientific discovery, right through to large-scale commercialisation. Through these studies, production processes involving KETs can be planned out in detail, making them more feasible for use in industry.

Finally, the SUDOE region is seeing a growing number of partnerships, based around both specific manufacturing themes, and around smaller-scale geographic regions. These partnerships are showing promising signs of bringing business firms and research establishments together to develop competitive clusters of collaboration. The situation looks set to improve with these measures in place,

Moulds for short series made with Additive Manufacturing.



Additive Manufacturing machine in operation (plastics).



There's a clear demand for progressing in the diversity of materials and their characteristics for use in Additive Manufacturing.

but the SAMT SUDOE project urges that further actions must still be taken to ensure that KETs become truly ubiquitous.

A NEW PLAN OF ACTION

Overall, the study identified six key recommendations for the growth of KETs in the SUDOE region within the next five years. Firstly, the study encourages the creation of an Additive Manufacturing observatory to keep up with the rapid technological evolution of KETs. Such an infrastructure would provide companies with easy access to a centralised source of information about the field, allowing for more transparency between research and industry. Secondly, the knowledge of KETs should be stimulated

through the promotion of seminars and workshops, supplemented with visits to companies by current experts.

Thirdly, the project proposes that a Cost-Benefit Analysis methodology should be developed and made available to businesses. Such a resource would allow for a more streamlined transmission of information to companies; supporting their management, decision making and knowledge about the advantages of KETs. Fourthly, governments should create new opportunities for companies to participate in national and international research projects. Such projects would encourage developments of new collaborative networks, which would hasten the spread of knowledge of KETs from experts to industries. Fifthly, training programmes should be established to create KET demonstrators, who can teach the capabilities and applications of the technologies to specific industrial sectors.

Finally, SAMT SUDOE encourages research to explore new development opportunities among specific industrial sectors, helping companies in particular sectors to reach their full potential. With these measures in place, the researchers at the SAMT SUDOE project believe that Additive Manufacturing and Advanced Materials could soon begin to thrive in the SUDOE region. For now, their roadmap could allow the area's industries to improve their competitiveness in global markets.



Behind the Research

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Research Objectives

The SAMT SUDOE project aims to develop links and synergies between enterprises, R&D centres, clusters, higher education and R&D+i governmental and regional institutions to promote new KET in SUDOE space.

Detail

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Bio

Rui Soares is a Graduated Mechanical Engineer, senior researcher of the Innovation and Intelligence department at CENTIMFE since 1996. He has professional field experience on industry, academia and as an external consultant, being a researcher on Additive Manufacturing Technologies since 1998. He is responsible for the organisation of various conferences and author of numerous publications on AM.

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Personal Response

What future research do you have planned?

// The roadmap defined both a pathway for companies and RTDs. The components of the project can foresee several actions that are not covered in the project's main objective, these are compiled in two areas:

Transference of knowledge:

- Research in how to properly gather up-to-date information in such a rapidly evolving environment.
- How to address the increasing amount of innovative projects.

Technology and science:

- New materials for Additive Manufacturing with new properties.
- Technologies with better finishing to meet companies' requirements.
- Increasing the speed and size of the technology.
- Direct metal deposition for tools reconstruction and implementation of advanced hybrid production systems in the factory.

