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ADDITIVE MANUFACTURING ACADEMY
TO BOOST TRAINERS' COMPETENCES IN INDUSTRY

Summary

Industrialization of Additive Manufacturing

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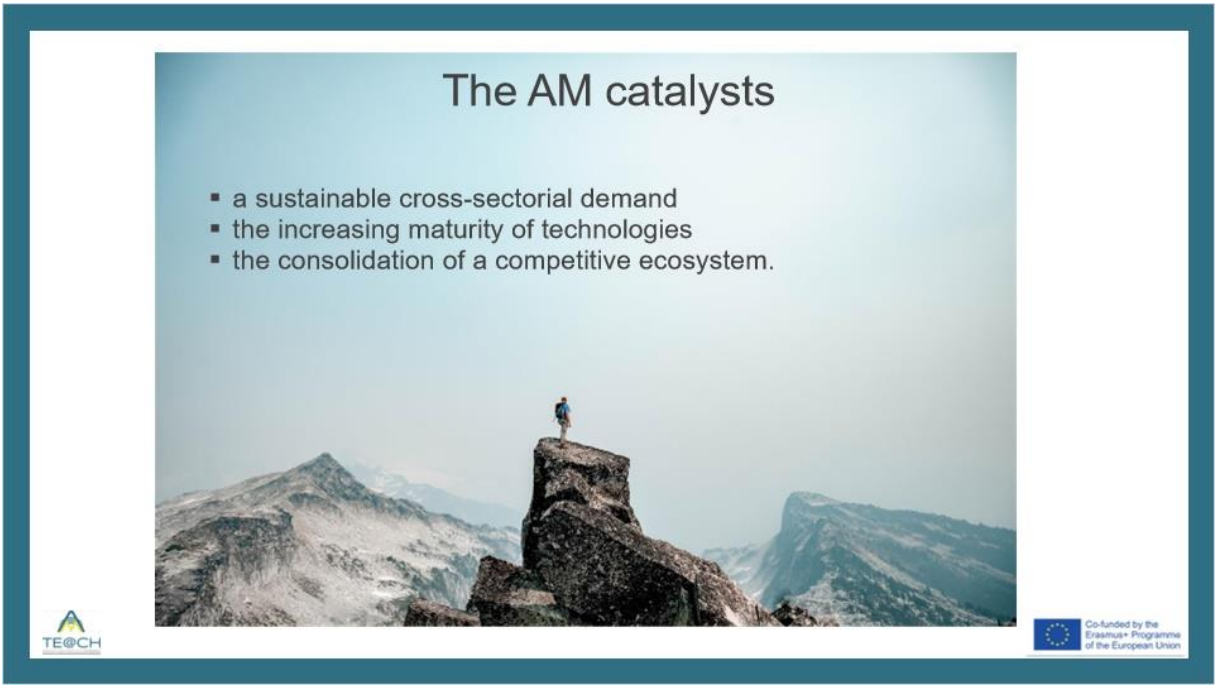
Course Content

The online course provides insights to the industrialization of Additive Manufacturing, from achieving a full potential, to the challenges that needs to be overcome and the importance of building an ecosystem.

Driving catalyst of AM evolution



Since its birth back in the 1980s, additive manufacturing has changed a lot: from a rapid prototyping solution then to a viable production method today. This rapid evolution of the industry had been driven by three catalysts in particular:

- a sustainable cross-sectorial demand
- the increasing maturity of technologies
- the consolidation of a competitive ecosystem

Steps towards AM full potential

Business Model

Understanding forthcoming disruptions will promote the right investments under an Industry 4.0 strategy.

Operating models

Transformation carries inherent uncertainties regarding the distribution of added value along the supply chain or risk-sharing and IP ownership.

Technological roadmap

Selecting appropriate partnerships with 3D printer manufacturers while factoring in current technological limitations.

Evolve operational process

New engineering approaches will benefit from cheaper iterative testing, adopting more agile designs, through a “test and learn” mode. Eventually, all manufacturing processes will have to fully integrate into end-to-end digital chains, including cybersecurity options to secure the distribution of Intellectual Property.

New mindset

Organizations will need to adjust to these new processes. Beyond hiring new skill sets, a profound cultural change is required. Moving away from design to manufacturing dogmas into design to costumer value will profoundly expand capital opportunities.

Implementation of AM

Implement in iterations

The implementation of AM requires a wide range of skills, and the learning curve might result excessively steep if not approached in the right way. To develop their AM knowledge, firms are advised to start the adoption with low-complexity application then, go through an iterative learning process.

Pull, don't push

The adoption of AM is typically a highly capital-intensive process, since it requires investment in machines, education, research, and development. To increase the likelihood of a successful implementation, the AM application should be motivated by a valid costumer need and a convincing business case.

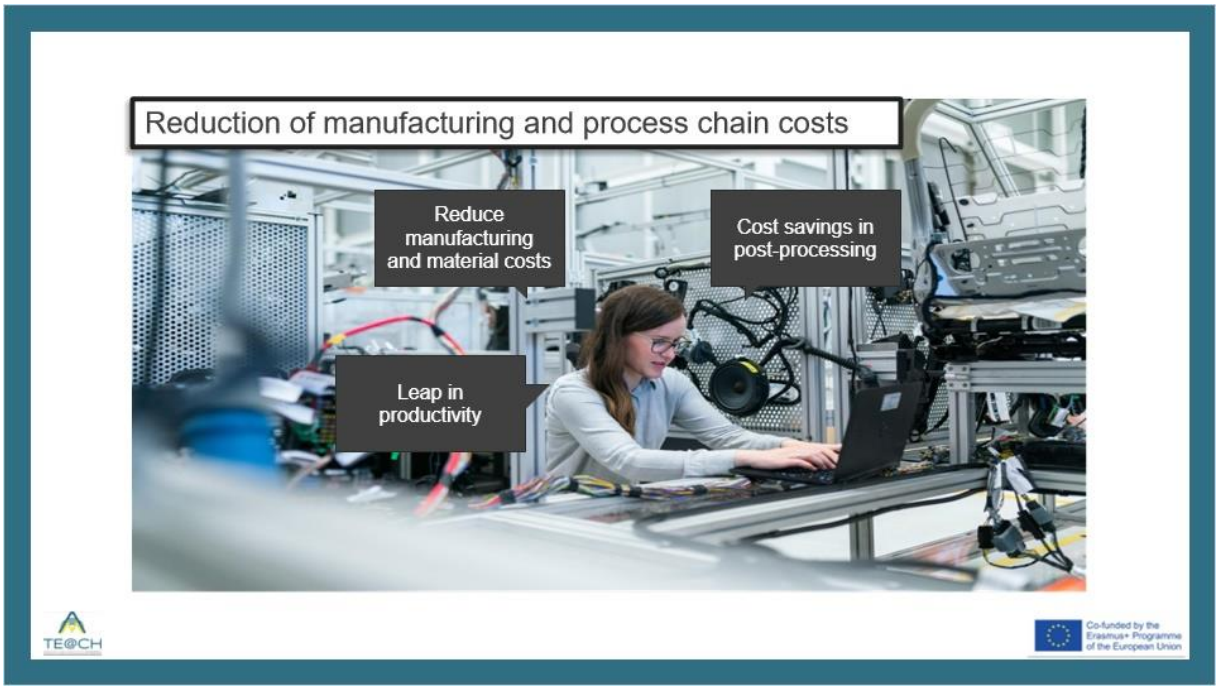
Collaborate to complement

The implementation of AM typically requires a broad range of competences along the entire process chain. It may be very hard for an individual company to cover all these internally. To deal with this issue, firms are encouraged to create a network and cooperate with external partners to fill competence gaps or lack of specialized skills and knowledge.

Strategize and support

AM implementation should typically be of strategic importance within the adopting company, as significant changes in the operational structure are often required. To address this, firms are encouraged to create an AM strategy early on.

AM industrialization enablers



Reduction of manufacturing and process chain cost

Material costs are expected to further decrease due to new or improved material production methods and economies of scale. Automation along the process chain is under development and could lead to further cost savings, particularly in post-processing. In conclusion, it is possible that technical enhancements will lead to a leap in productivity and significant decrease in parts cost.

Qualification of production and quality assurance

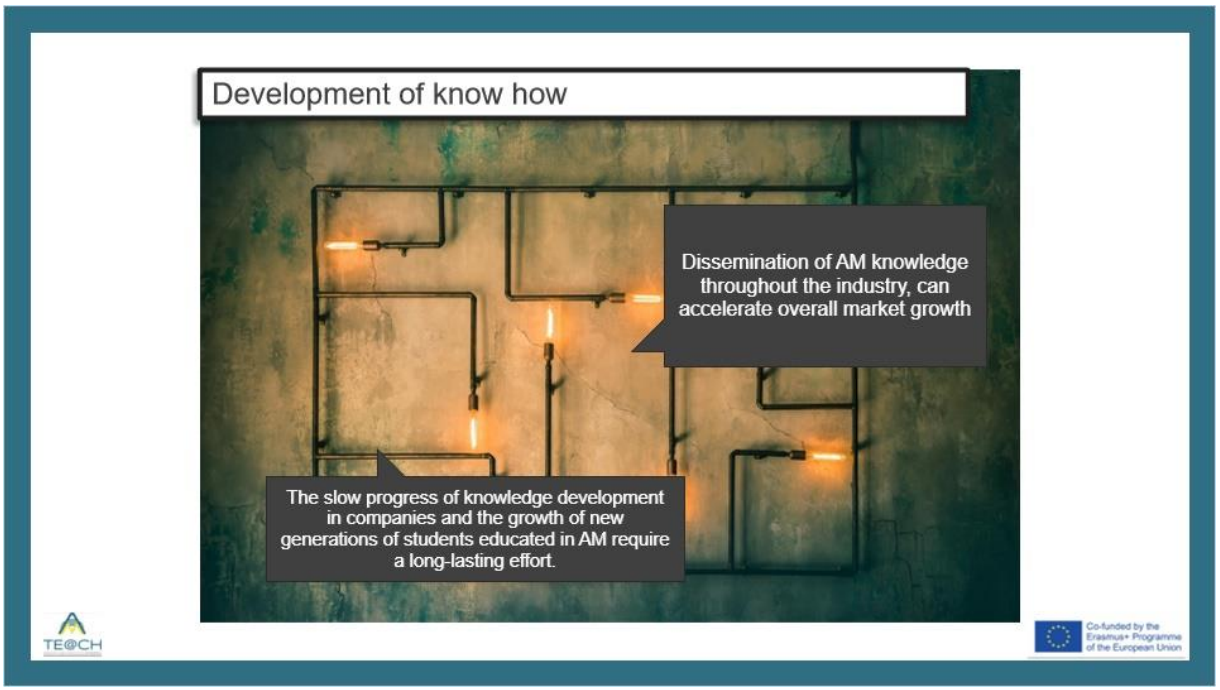
High quality AM parts can be produced. But a less complex and costly qualification approach for additive manufacturing is needed to enable future production. Enhancement of quality assurance methods such as in-process monitoring are a priority in current research.

Integration of AM into production

Only companies that are investing with a long-term strategic agenda and have consistent management support are today able to fully integrate AM as a production technology. The digital process chain – for instance, process planning software – holds potential for a significant improvement. In the long term, in five to ten years, Fraunhofer experts predict that AM could be an integrated production technology with a mature digital process chain.

Determination of further standards and norms

Standards in AM are already progressing swiftly. Nevertheless, AM processes and operations, sustainability assessments, data formats and digital security need greater standardization. The widespread use of common standards is expected to increase the overall quality of AM and the industrialization of AM across all industries.



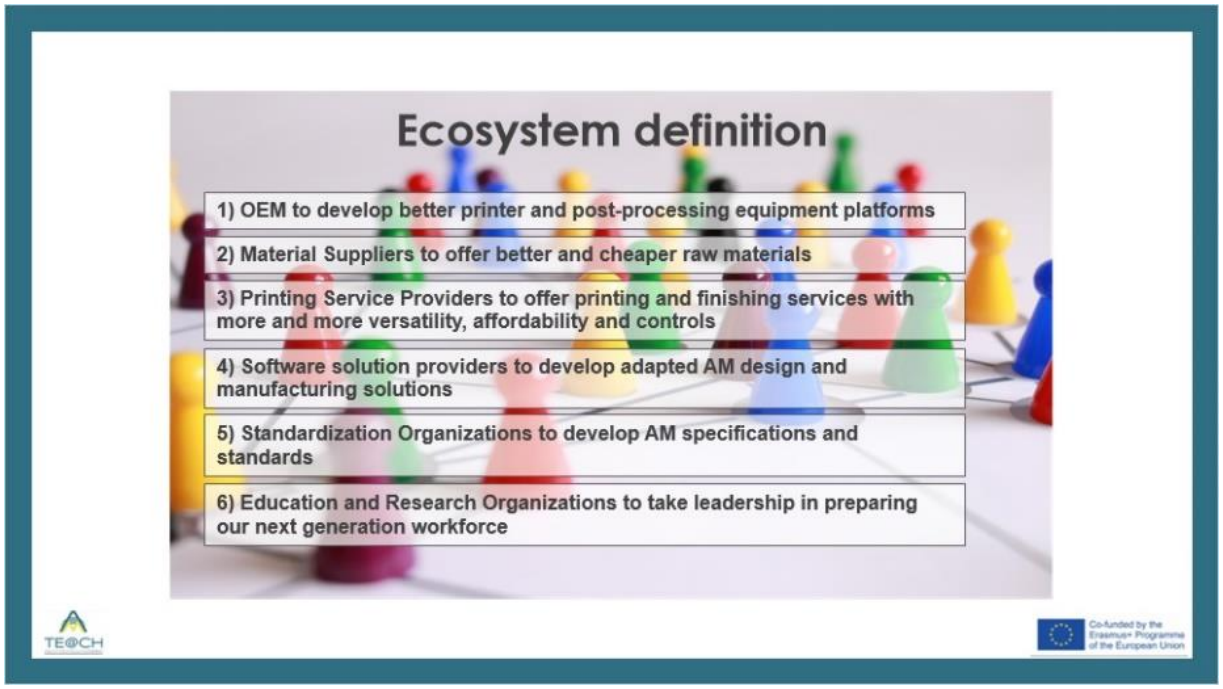
Development of know-how

The dissemination and deepening of AM knowledge throughout the industry, including small and medium sized enterprises (SMEs), can accelerate overall market growth. The slow progress of knowledge development in companies and the growth of new generations of students educated in AM require a long-lasting effort.

Development of new applications

The success of additive manufacturing market leaders is based on rethinking applications and processes using an intrapreneurial mindset. Identifying the right use case and the corresponding design is expected to be a key enabler in developing additive manufacturing business cases. Ongoing innovations are expected to lead to new business cases, creating a further broadening of the market for niche application.

AM ecosystem



Ecosystem definition

A strong ecosystem needs to be created by equipment manufacturers, material suppliers, service providers, standardization organization, software providers and research and education organizations in order to improve the AM integration in the market. Every member of the network should put on the table innovative solutions to benefit AM progression.

Ecosystem relations

Around the AM ecosystem there are many players that contributes to innovate and sustain it. Universities, technology centers and companies' R&D departments provide a continuous stream of innovation, while production services, quality control centers and post processing facilities offer support to the companies.

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