



Editorial for recent advances and trends within the French Manufacturing'21 network

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Manufacturing'21 is an association of research laboratories from French-speaking countries working in manufacturing. Its aim is to federate research teams, encourage exchanges between PhD students and create links between all affiliated laboratories. The association brings together 25 laboratories, around a hundred Full Professors and Associate Professors and over a hundred PhD students. Over the past few years, it has helped to develop collaborative research projects that promote the international influence of this community. The association's wide-ranging research themes cover the full spectrum of scientific issues related to all manufacturing processes.

The aim of this Special Issue is to offer a collection of high-level scientific articles from this community.

The guest editors are Dr. Vincent Wagner, Associate Professor-HDR at the National Engineering School of Tarbes and Dr. Sébastien Campocasso, Associate Professor at the University of Toulon. They are also co-hosts of Manufacturing'21.

With regard to the cutting process, an article provides a history and assessment of activities provided by Manufacturing'21 laboratories in this field. The author summarises the activities carried out over the last twenty years related to cutting process analysis, tool wear, and surface integrity. This state of the art is completed by a review of cutting assistances and their effect on wear and surface integrity. The use of new assistants such as tools with rotating inserts is also presented in another article. The cutting process analysis is widely addressed in this Special Issue, for example, through the development of a new quick-stop device for micro-machining or the study of the effect of coatings and their

surface characteristics on tool wear. Although much of the work focuses on the cutting process from an experimental point of view, other studies concern the development of numerical models for titanium, the implementation of predictive models for FSW based on orthogonal cutting tests and finally the use of Artificial Intelligence with the aim of developing increasingly accurate models. Machining machine-tools are also approached from the point of view of control, with the development of tri-dexel models and the implementation of spindle health diagnostics based on e-learning models. Finally, the machining of parts produced by additive manufacturing requires special knowledge in terms of material discontinuity; this aspect is addressed through the development of a digital model presented in an article.

Mechanical manufacturing has undergone radical change in recent years with the advent of additive manufacturing. These new technologies, complementary to machining, require further investigation. The number of Additive Manufacturing processes requires work specific to each of them, and multi-parameter studies are often complex because they combine mechanics, control, thermal, etc. The Manufacturing'21 community deals with additive manufacturing from all these aspects and many more. Whatever the process, the analysis of solutions from different points of view, such as economic and energy criteria, is essential. These aspects are dealt with in a separate article of this Special Issue. With regard to WAAM technology, the work presented here addresses its optimisation from different angles, such as layer-by-layer optimisation, with the aim of reducing deposition times while guaranteeing homogeneous material and minimal machining thicknesses. The development of the Laser Powder Bed Fusion process is also addressed, with the development of a method for optimising substrates to reduce costs and times, and the study of the effect of grain size in part quality. Finally, studies on the EBM process focus on rapidly identifying the effect of part orientation, verifying the relevance of a layer-by-layer

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deposition strategy and integration of thermal effects, and testing the impact of lattice geometry in part behaviour.

We would like to extend our warmest thanks to the researchers in the Manufacturing'21 community for their work and for taking part in this Special Issue.

Finally, thanks to Prof. Andrew Yeh Ching Nee (Editor in chief) and Prof. Kai Chang (Editor for Europe) for allowing us to publish this Manufacturing'21 Special Issue.

Declarations

Competing interests All authors declare no competing interests.

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