



Simulation Platform for Materials and Processes

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In a large number of industrial sectors, the design and use of new materials adapted to their specific needs play a major role in competitiveness and innovation capacity. First and foremost with aeronautics and the automotive, composite materials for the manufacturing industry make it particularly feasible to reduce the weight and increase the functionality of various products as well as reduced impact on the environment and energy consumption. But many other sectors can be dependent on the availability of new, high-performance materials. One example is the building and construction sector, facing issues of ageing concrete structures or new materials to increase the energy performance of buildings. The field of woven materials also becomes essential in sectors such as health or technical clothing. Biomaterials could also be worth noted.

Design, control of manufacturing processes and the use of materials are fundamental elements for all these applications. In this context, digital technologies applied to modelling, simulation and machine learning will play a major role thanks to the development of the capabilities offered by HPC/HPDA systems and advances in modelling and simulation. These are used at all stages of the material's life cycle:

- Design of new materials
- Materials manufacturing
- Use and materials assembly in systems or infrastructures
- Recycling and materials end-of-life

Around one adapted service platform, it is therefore necessary to rely on the most efficient hardware and software tools to meet the needs of the different industrial sectors, and at competitive economic requirements. This enforces significant work in modelling and numerical methods as well as specific user environments facilitating use by the greatest number around the multi-scale digital material concept.

The objective of this initiative is to design, develop and implement a simulation platform for designers, manufacturers and high-end material users in major application sectors. This platform will be based on all available modelling techniques, requiring the best software tools for modelling, simulation and machine learning at all stages of the life cycle. This initiative is part of extending the actions from the CESIMAT laboratory and of the SMICE collaborative project.

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