

SbD evaluation of filament manufacturing for Fused Deposition Modelling using the SAbYNA guidance platform

Davide LOTTI - *LATI Industria Termoplastici SpA*

The toxicity and environmental fate of nanomaterials (NMs) and nano-enabled products (NEPs) is an object of concern, as the current regulatory framework has been designed to evaluate and control the (eco)toxicology of substances whose classification mainly relies on their chemical composition.

NMs and NEPs at this respect are challenging as their properties depends on many parameters (form, aggregation/agglomeration, surface chemistry and functionalization). This has been outlined for the potential health and environmental risks during the life cycle of a product and a case-by-case approach has been deemed to be the most appropriate for hazard assessment.

One of the goals of SAbYNA, a European Union's Horizon 2020 Research and Innovation Programme, is to develop a web-based guidance platform, which will help the NMs and NEPs users to design and apply the most appropriate risk assessment & mitigation measures for workers, consumers and environment. This will be of paramount importance for SMEs which may lack the internal expertise for a case-by-case risk assessment and/or need a more cost effective solution.

The platform includes several guidance resources:

- SbD interventions towards safer processes
- SbD interventions towards safer products
- Database Resources
- Assess an SbD case (case studies-Platform)
- Sustainability and cost assessment
- Risk identification

The screening result guides the user to evaluate SbD possibilities early in the development phase thanks to user friendly modules: SbD interventions towards safer processes, SbD interventions towards safer products.

LATI is contributing to the validation of the tool with an industrial Additive Manufacturing (AM) case study in particular the manufacturing of a tailored nanoenabled thermoplastic compound for Fused Filament Fabrication (FFF). The safety of NMs enhanced polymeric compounds is under investigation to identify sector-specific activities and releases of associated nanoforms (NFs) along the entire life cycle. Intensive feedback has been provided to guide research partners to develop a guidance platform that would reach a widespread acceptance in the industrial AM sector thanks to user-friendliness and showing how usability can be increased on selected case studies. The guidance platform have been developed in the 'safe and sustainable by design' framework including dedicated resources to evaluate sustainability of products and processes involved, while evaluating at the same time the costs of different alternative products/processes. LATI's experience as user of the guidance platform as well as benefits and challenges will be outlined.