

3D PRINTING: PROMISE AND PROBLEMS

Additive manufacturing (AM), also commonly referred to as 3D-printing, is a process in which a product is made by printing successive layers of material.

This technology has the potential to be the future of sustainable manufacturing for many applications by reducing cost, waste, and transportation while permitting increased customization and design complexity free from the restraints of traditional manufacturing.

Originally, 3D-printing was limited to a small palette of plastic materials. This sector has grown to include diverse materials, including a wide array of plastics, many metals, ceramics, chocolate & other foods, and even cultured human-based cells.

Unfortunately, hazardous materials have crept into this palette. End users are unaware of the safety issues with some materials, and unknowingly use inappropriate, hazardous materials for food contact or even for children's toys.

During printing, filament materials are aerosolized, creating toxic particles that are hazardous to the health of adults and children who inhale them.

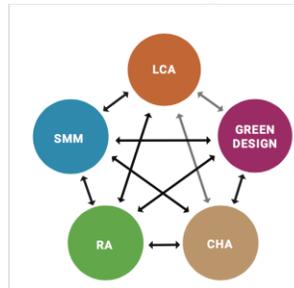
By bringing the factory into kitchens and classrooms, inadequate personal protections and inappropriate process waste disposal methods are all too common. Ecological impacts from disposal of unidentified print materials are not well understood creating further questions about reusability and recyclability.

Now is the time to address issues of sustainability for this promising technology.

BIOFRIENDLY PRODUCT FRAMEWORK FOR ADDITIVE MANUFACTURING

Comprehensive whole-product assessment tools are needed so that everyone involved in AM—innovators, developers, product designers, printer operators, and print end-users—can create and select safe and appropriate materials and AM processes for their specific uses.

The future of sustainable product design means integrating diverse metrics - life cycle analysis, risk assessment, and chemical hazard assessment - with green design and sustainable materials management principles - to generate a comprehensive picture of materials across the entire product life cycle, including process treatments and waste. Green chemistry and engineering can be operationalized to support informed decision-making for sustainable design.



The Biofriendly Product Framework was originally created by Autodesk, Inc. with UC Berkeley's Greener Solutions program. Now, in collaboration with Northwest Green Chemistry (NGC), the prototype framework will be shared with other thought leaders via a structured peer review process and case study using 3D printing. Please join NGC in this opportunity to learn and to be on the forefront in aligning emerging practices in alternatives assessment with innovative product design and procurement. Please contact lheine@northwestgreenchemistry.org; M: 360-220-2069

