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Subject: NNMI Comments

E. I. du Pont de Nemours and Company (“DuPont”) provides the following comments in response to the Request for Information for the National Network for Manufacturing Innovation (NNMI) from the NIST-hosted Advanced Manufacturing National Program Office (AMNPO). The interest of DuPont is concentrated in technology areas, as well as associated scalable processes for high volume manufacturing, which will have broad impact on industries with large job bases and established domestic supply chains (*e.g.*, automotive, aerospace, military, construction). Advanced materials science capabilities in areas such as light-weighting for energy efficiency, ballistic/blast protection, photovoltaics, advanced batteries, fuel cells and renewable materials, will enable advancements in the technology and manufacturing base for critical applications in national defense and security, including ground transportation, personal/individual mobility and protection, as well as air and maritime platforms. The particular areas of impact are mentioned below.

Technology Focus Areas of Interest to DuPont

Composites

DuPont’s position is that composites, being important for creating lightweight parts for multiple applications, should receive very strong consideration as a focus area of an Institute for Manufacturing Innovation (IMI) in the NNMI. Aspects of the composites technology focus area of interest to DuPont include:

- Cost efficient carbon fiber (*i.e.*, as supplied as tows, wovens, nonwovens or in composite systems, particularly thermoplastic composites), is a material of interest for future light-weighting goals. Thus, DuPont contends that *a Request for Proposals (RFP) be written to solicit proposals aimed at innovating carbon fiber and carbon fiber composite manufacture and processing capacity.*
- Uniform life cycle analyses of composite materials. To this end, *developing infrastructure and methods to increase the ease of recycling composite materials will improve their life cycle analysis results and should be an important focus of a composites-focused IMI.*

Sensors

- Fast and efficient detection of part defects or damage, introduced either during manufacture or service, will assist in the establishment of high quality standards. *Nondestructive evaluation techniques that can be applied in a variety of settings (e.g., in the plant, at the repair shop) to improve damage detection and assist repair procedures for parts in application should be a focus area of the NNMI.*

High Volume Parts Prototyping and Manufacturing

There is a critical near term need for the capability to be installed, with facilities developed, for part prototyping that integrates all of the technologies that exist today for part manufacture. DuPont's position is that such facilities should be located within close proximity to relevant manufacturing hubs (*e.g.*, an automotive-focused IMI near automobile manufacturers). *A focus area of the NNMI should include establishment of part prototyping capability.*

Aspects of high volume parts prototyping and manufacturing of particular interest to DuPont include:

- The capability for high volume production of parts with advanced geometries (*e.g.*, hollow interiors) that utilize thermoplastic composites is an important requirement for success in their utilization. DuPont contends that *the development and advancement of these high volume manufacturing technologies are critical to the success of the NNMI.*
- Fast and reliable procedures for the assembly of composites (via joining) to other components will greatly assist high volume vehicle production. The development of methods (*e.g.*, drilling, cutting and surface preparation) that prepare a part for assembly is necessary to realize this goal. *The refinement of various joining and bonding methods that can be used to assemble/attach parts, including adhesive bonding, various welding techniques and mechanical fasteners, will facilitate the integration of these next-generation materials into current products and is also critical to the success of the NNMI.*

Modeling

- A wide range of industries can benefit from software capable of describing a manufactured part's response to complex loadings where safety, performance and reliability are essential. DuPont contends that *the development of such software that can interface with existing finite element code packages would benefit all members of the NNMI and should be a focus area.*

Structure / Governance

- Consortia members should be granted access to technology that is developed within the framework of the consortium via licensing. However, licensing of related technology developed outside the consortium should be left to the discretion to the member company that made the investment for the development. *The preservation of options regarding IP release is a key to safeguarding the competitive advantages sought by those companies investing in the NNMI.*

Education and Workforce Development

It is the position of DuPont that one of the major problems in manufacturing competitiveness is the lack of alignment between what employers need and the skills taught by educational institutions. *DuPont contends that training a workforce skilled in the design and manufacturing of composite parts is a critical need and recommends that a partnership among academic institutions, businesses, state governments and professional organizations prioritize the following activities:*

- Definition of foundational skills needed to perform jobs in advanced manufacturing.
- Design and implementation of curricula and assessments that are recognized by employers.
- Implementation of databases of skills supply and demand.
- Increased internships and part-time work opportunities to provide relevant work-based training for students and displaced workers.
- Increased use of manufacturing “case studies” in the STEM curriculum (*e.g.*, assignments on product design, production system design, etc).

Regards,

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