Nanomanufacturing Utilizing the Triple-Helix Concept for Workforce Development

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Abstract

The renaissance of manufacturing is at the cusp of what some industry experts are calling a megatrend. Nanomanufacturing is the new robust entity in manufacturing whose material properties, hazardous waste management, etc demand a complete revolution of the way manufacturing companies make their products and train their workers. When manufacturing evolves from traditional top-down manufacturing to revolutionary bottom-up manufacturing, a completely new worker skillset is required. Top-down manufacturing, where one begins with a large chunk of material and removes material, shapes, drills, bends, or involves all processes required of the material, to end up with a desired product versus bottom-up manufacturing where one begins with a single atom or molecule and builds the desired product up atom-by-atom or molecule-by-molecule. The results of nanomanufactured products are superior strength and lesser weight compared with other processed materials. With nanomanufacturing, one might ask the question "What are the revolutionary skillsets required and how does a workforce acquire them?" The globalization of nanomanufacturing appears to present the same problem to manufacturers regardless of the locale. How does an organization bridge the gap between laboratory concept to mass production and commerilization of products. This is another important issue that demands attention.

This paper uses the Triple Helix concept to show why it is important for U.S. nanomanufacturing companies to adopt university/industry /government collaboration to develop novel solutions to emerging problems in nanomanufacturing. Just as traditional manufacturing of the 1980's and 1990's tore town departmental silos and merged several areas of production activities to exponentially reduce the time of concept to end product, so too must university, industry, and government collaborate to meet the growing twenty-first century demand for nanomanufactured products. This synergy will be a better tool to advance nanomanufacturing in the U.S. and to lead in the manufacturing arena globally.

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Biographies

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