

Building an Additive Manufacturing Industry and Technician Workforce in Kentucky

Additive manufacturing, also known as 3D printing, is a key component of the advanced manufacturing ecosystem and the next industrial revolution. If Kentucky workers and companies are not prepared for the transition, companies will go elsewhere, jobs will be lost, and economies drained. Somerset Community College, through National Science Foundation grant funding, developed Kentucky's first statewide certificate program for additive manufacturing technicians and has been helping manufacturing companies and entrepreneurs integrate polymer based additive manufacturing into their existing operations. However, to make a measurable impact on the markets, our workforce must be prepared for 3D printing with metals. With funding from KY NSF EPSCoR, the project will help make additive manufacturing in Kentucky a reality, create a skilled workforce, improve the profitability of current business, attract new advanced manufacturers, and improve the economy of the entire state, especially low income rural regions.

Publications point out almost daily that additive manufacturing applications are a game changer in virtually every industry. Enterprise level companies, such as GE, Airbus, BMW, Mercedes-Benz, Volkswagen, Caterpillar, Ford, Honda, and GM, are pointing out the benefits and the need to integrate additive manufacturing into their end use product applications. Entire countries, such as China and the United Kingdom, are developing economic strategies to become global leaders of additive manufacturing.

However, the sad truth is that there is relatively little additive manufacturing integration and essentially no trained workforce available in the rural low cost of living areas that enterprise level companies prefer to operate. Kentucky's number one and two exported products are in the aerospace and automotive markets, and many of these component producers are desirably located in rural regions of Kentucky. However, this is where additive manufacturing is not integrated and the workforce is not trained in its applications. The issue with existing company integration of any new technology is the risk versus return ratio, and currently many companies have not integrated additive manufacturing because of the cost and the fact that they already have a working income model with conventional manufacturing methods.

The project strategy involves two components. The first is to expand our existing additive manufacturing technician certifications to include a metal 3D printing curriculum. The curriculum will be structured to provide a career pathway for students interested in advanced manufacturing, as well as those that have an interest in design and engineering, but cannot complete traditional engineering programs due to difficulties with upper level mathematics. This is a common problem that has been observed for many years with no appropriate transition pathway for these students, and has resulted in subpar career choices.

The second component is to establish a metal additive manufacturing equipment lab where technician students can gain hands-on experience. By establishing this lab, we will also be able to offer a free trial program where existing companies can experiment with metal 3D printing while assisted by trained technicians at no risk to themselves. When they experience the power of its applications and potential income generation first hand, the next obvious step is to purchase equipment and hire technicians. This project will also increase the likelihood of bringing to Kentucky new manufacturing companies that are transitioning to 3D printing production because of the established skilled workforce.

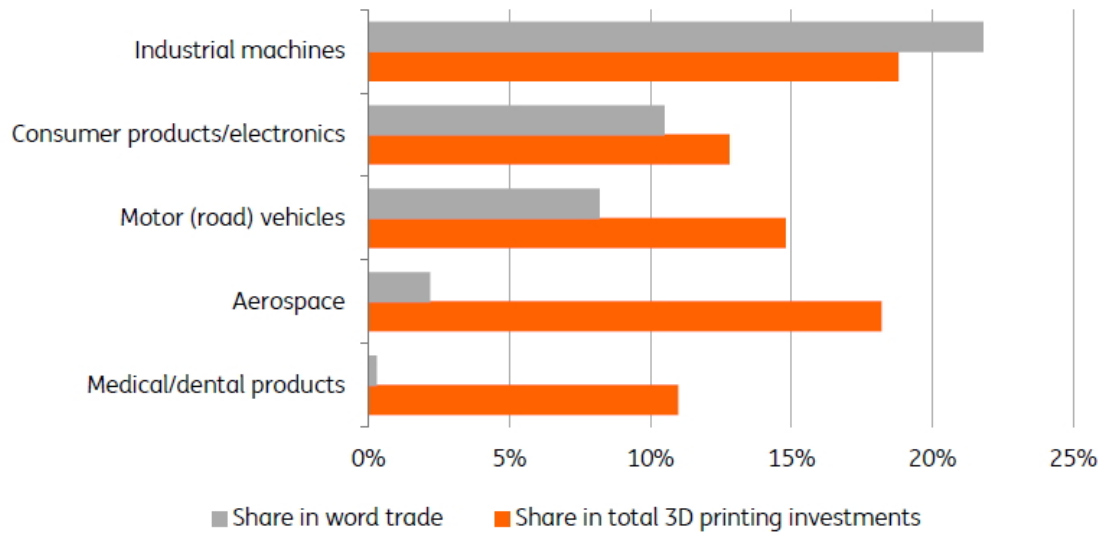
This project will also facilitate partnerships with Kentucky colleges of Engineering with SCC serving as a pre-engineering feeder program focusing on additive manufacturing. This will create an ideal pipeline with multiple options for careers in additive manufacturing for our state's future workforce. Additionally, as SCC exists within the KCTCS system, our additive manufacturing technician certificate model will be replicable within the entire state community college system which will allow for maximum educational and industry impact.

As Joshua Mook from GE Additive says, "You will be a leader of this technology or you will be a victim." Kentucky must become a leader.

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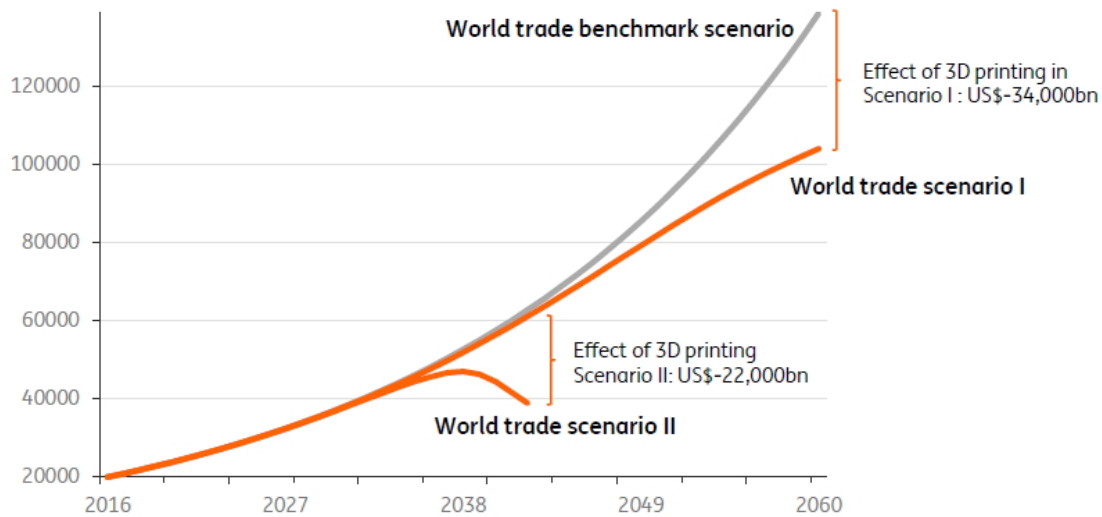
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Manufacturing is increasingly transitioning from conventional to additive manufacturing



Source: Unctad database; Wohlers report 2017, 3D printing and additive manufacturing, state of the industry

The impact of 3D Printing in the next 50 years is estimated to be as high as \$35,000 Billion



*See note below Figure 5 for explanation of scenarios and Appendix 2 for calculations

Source: Oxford Economics; Wohlers report 2017, 3D printing and additive manufacturing, state of the industry, annual progress report; Unctad, calculations by ING