



GE

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Chairman Burgess,

Thank you very much for the opportunity to present views on the disruptive nature of additive manufacturing at your recent "Disruptor Series: 3D Printing" committee hearing. Responses to additional questions for the record are included below.

Sincerely,

A handwritten signature in black ink that reads "Edward D. Herderick".

Edward D. Herderick
Additive Technologies Leader
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The Honorable Gregg Harper

1. What kinds of cost savings do you think can be achieved if a manufacturer is able to take full advantage of 3D printing and integrate it as fully as possible into its supply chain? How do you think these cost savings will benefit consumers?

The cost savings for additive integration can be dramatic. For example, GE Aviation is targeting a 25% reduction in lifecycle cost for our new CFM LEAP series of aircraft jet engines that power the Boeing 737-MAX line of aircraft. Those savings represent improvements in fuel efficiency and emissions reductions that dramatically improve the environmental footprint of engine operation and are the foundation for affordable air travel for years to come. Those savings are enabled through advanced design creating additive parts that could not be made any other way.

Another way this will impact consumers is in the healthcare market. At GE Healthcare, we are working on projects to improve the cost for CT scanners using additive metal printing leading to more affordable healthcare solutions for consumers. Again, in this

case additive manufacturing can create high tech components that could not be made any other way.

The Honorable Tony Cárdenas

1. 3D printing has spawned an international maker movement. People and businesses are harnessing this technology to engage in creative learning, build functioning prosthetics, engineer human organs, and more. How can we make sure that the policy frameworks that take shape around this technology --- in such areas as intellectual property, product liability and free expression --- encourage, rather than stifle, the creativity this movement has sparked?

This is an essential and fundamental question that this exciting field is faced with. The promise of 3D printing is very much wrapped up in an ability to revolutionize design of new products. Thinking about policy frameworks, much of the need rests with broadening an understanding of where the technology is today and how that fits into different markets. For example, the maker movement has been largely centered on mass customization of polymer components for consumer and home applications that would originally be manufactured using injection molding or another mass plastic manufacturing technique. In that space, design creativity is the driver, not necessarily performance in demanding environments. In regulated industries like aerospace and healthcare, a robust framework for verification and validation of additively built parts by agencies like the FAA and FDA are supporting the growth of this industry today and continuing investment of resources will provide a foundation for future growth.

2. 3D printers make valuable tools for innovators. They can be used to build prototypes of novel items at all levels of intricacy. How can we make this technology more available to individuals who have good ideas, but no idea how to bring them into the world for the first time?

Supporting public private partnerships like America Makes is a great start as are demonstration centers like the MDF at Oak Ridge National Laboratory. Many of the polymer additive machines are very accessible, however the industrial metal machines can be prohibitively expensive for individual innovators. Supporting training programs where innovators can gain access to design software, industrial equipment, and have the ability to test out their concepts would increase accessibility. It also ties back to ensuring that innovators who have an interest in regulated industries like aerospace or medical applications understand the qualification and certification requirements. In that way, they can focus their efforts in areas that do not have the same barriers to entry.