

3D Printing for the remote world

By Brennan Purtzer



One of the most revolutionary new technologies in today's world is the engineering marvel known as 3D printing. The science-fiction sounding concept of being able to remotely "print out" functional objects even thousands of miles away from wherever the digital model was conceived holds the potential to radically change supply chains the world over.

Theoretically, the technology could reduce or eliminate the need for some types of finished products to be delivered at all. Instead, in certain cases, only raw materials may be needed to feed the printing machines.

The most dramatic outgrowth of this concept is the application of a 3D printer on the International Space Station, launched last year, to make it possible for an infinite number of objects to be printed directly in space, eliminating the need for extraterrestrial delivery at a cost of several thousands of dollars per ounce.

My research was borne out of the reflection that if 3D printing makes sense on the space station because of the extreme expense of delivery, that it would also provide great benefit to corners of the Earth which also have extreme delivery costs.

Delivery costs are determined by the distance an item must travel and the order frequency/quantity in demand. This combination leads to some of the highest supply costs to be found in the sparsely populated, remote islands of the Oceanic region now being referred to as "The Blue Continent."

As an American, I selected Pohnpei, the capital island of The Federated States of Micronesia because of its historic ties to the USA, to conduct my research on opportunities for 3D printing to make an impact on product sourcing, environment and reducing one of the worst trade imbalances in the world, where 82% of the national GDP is spent on imports.

After nearly three months on the island, interviewing business owners and government leaders about their business operations, I determined that the strongest opportunities for applying 3D printing lay in the technology's ability to replicate industrial components, which can cause significant delays and lost economic activity. When a machine breaks down on Pohnpei, the time required to acquire a replacement part is commonly more than a month, and sometimes takes several. Using a metal 3D printing technology known as direct metal laser sintering (DMLS) and a powerful digital mesh editing software, it is possible to scan both healthy and damaged components and create functional replications. This can be used for industries components, but also automotive components. My research resulted in a private-sector business model that could be used to profitably employ this technology to save the country hundreds of thousands of dollars in import costs. Despite this, I found a still greater opportunity to affect the trade imbalance through a progressive restructuring of local agricultural policy, where \$26 million is spent on food imports for an island of just 33,000 low wage earners.

Pohnpei represents just one tiny slice of the planet's many remote regions. Though some of their issues may be emblematic of struggles common to much of the world, more research remains to be done on the potential of 3D printing in developing countries.

You can read more about my thesis work by visiting www.3dprintmicronesia.net