

DANIEL BURRUS'

TECHNO TRENDS

THE BIG IDEAS THAT ARE
CHANGING EVERYTHING

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3D Printing Breakthrough

By Daniel Burrus, CEO of Burrus Research

We're about to start seeing the most fascinating proof of concept projects hit the consumer markets. The business sectors that will be most dramatically affected will be healthcare, manufacturing, construction, transportation, aerospace, and life sciences. But 3D printing is going to be hugely disruptive to every industry — including, most especially, yours.

Enter Multi-Materials Printing

The most promising and newest 3D printing technology enables the use of dozens of different materials simultaneously in one print run. Materials range from biological filament and living tissue to chocolate, rubber, metals, plastics, clay, and wood fiber.

We have reached the point where 3D-printed electronics can be successfully integrated with multiple materials and complex shapes. In short, we are rapidly entering a world in which many of the things, which you could previously only imagine, can be created — right in front of you. Don't believe me?

Last year scientists at Princeton University 3D-printed an ear out of living tissue, and embedded it with an antenna for a cochlear implant. This year they used the university's \$20,000 LED 3D printer to create quantum dot LEDs which they then integrated with a contact lens. The result is a lens that can project rays of light.

The possibilities are endless. From transparent to opaque, rigid to flexible — you can mix and match materials in a single build to meet highly complex engineering or medical device needs, or to make realistic prototypes to accelerate testing and time to market.

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The power train, suspension and steering components are taken from a Renault Twizy hybrid. On a full charge, the Strati has a range of about 62 miles and a top speed of 50 miles per hour. Wheels, lights and seats are the only other parts that are not 3D printed.

The company's sustainable and flexible factory model calls for 100 microfactories to be built over the next ten years, which will provide the services to fabricate and support the Strati and future models.

*For information: Local Motors Headquarters, 1576B S. Nelson Drive, Chandler, AZ 85226; phone: 888-256-2028; Web site: <https://localmotors.com>
Local Motors Microfactory, 515 E. Stewart Avenue, Las Vegas, NV 89101; phone: 702-464-3294
Local Motors Microfactory, 11 Market Square, Knoxville, TN 37902; phone: 865-249-8280*

Water-Repellent Coating



Water repellent coatings are already being used in a variety of energy-saving applications from self-cleaning buildings to more fuel-efficient ships. Now engineers have found a way to use them for reducing carbon emissions from fossil-fuel-burning power plants by improving the efficiency of steam condensers.

As fuel is burned, it produces steam which is fed into a condenser. In the condenser, it cools down and condenses back into water, creating a suction force that helps drive a turbine. Normally, there is a tendency for water to build up on the walls of

the condenser pipes, which slows down the cooling process. But coating the pipes with the new water-repellent prevents that from happening and thereby increases the suction force.

The coating itself must be thick enough to withstand the high temperatures and steam, but thin enough so as not to slow down the cooling process in and of itself. A deposition process was developed whereby two gases flow past heated filaments causing a reaction that forms a polymer coating of the optimum thickness.

It has been estimated that the annual reduction in carbon emissions that would be realized by using the coating at just one coal burning power plant would be equivalent to taking as many as 4,000 cars off the road. And with 85 percent of the world's power still coming from steam turbine power plants, the potential global impact could be significant.

For information: DropWise Technology Corporation, 21 Drydock Avenue, 6th floor, Boston, MA 02210; email: info@drop-wise.com; Web site: www.drop-wise.com

3D Printing Breakthrough

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Not that you need to stop at prototypes. Earlier this month, Stratasys, a manufacturer of huge 3D printers, announced it had built a working electric car using its large format multi-material 3D printer to create all exterior plastic parts, including door panels, bumpers, wheel arches, and some of the interior components as well.

Using 3D printing, sophisticated engineering projects — such as, yes, printing a car — can be designed, built, and brought to market in months, rather than the typical year- or multiyear-long development cycle.

But as I've written before, when breakthrough technologies arrive, they do not simply replace older

ones. We integrate the old and the cutting edge to create new value, and that in turn alters how we relate to the older technology without erasing that older technology completely. Transformation is seldom a simple case of a new tech replacing old tech.

So 3D printing is not going to replace traditional manufacturing; it will instead be integrated with it to provide even more value. Traditional manufacturing has perfected ways to reliably make mass production at a low price. 3D printing — at least for the time being — is far more agile but slow. Designs can be created and altered quickly but the actual process of printing takes time.

All of this is to say we've already leapt out of the realm of prototypes and proof of concept projects. 3D printing is already used for producing final products and will soon be ready for the big league. Think about how you can be pre-active here. Anticipate consumer desires; see the next big thing, and then build it.

Technology-Driven Change Coming To A Market Near You

We're about to witness an explosion of new applications. Rapid prototyping, as well as personalized manufacturing, has allowed manufacturers to innovate with custom-treated plastics and new designs. The spectrum of products that will be available from 3D printers includes household goods, jewelry, clothing, human implants, jet engine parts, and, well, essentially anything.

One of the consequences of that is healthcare will soon be a huge breakout market. I suspect it will become a multibillion dollar business for 3D printing within the next five years.

I've spoken a lot about the Hard Trend — a future fact that is inevitable — of the aging baby boomer

population. Personalized medical devices will fit better, perform better, and perhaps reduce medical costs, enabling us to replace everything from pacemakers and pins to new organs created out of organic tissue. 3D printing is a good example of a technology that will help us meet the needs of a generation getting older.

I expect to see 3D printing used cosmetically, as well as to repair failing or non-functioning body parts more and more within the next five years. Replacement bones have successfully been built with 3D printing, and far more complex eye and ear proof of concepts have very recently been developed, although they are not yet ready to bring to market. But the technology and processes will be refined over the next few years – it's far too important and profitable not to fund and push development.

Whether it's fashion objects like designer shoes or replacement body parts, where 3D truly excels is in its ability to enable personalization. This ability to economically create a very limited run of widgets or entire devices — down to a single part run — is what makes 3D a truly disruptive technology. Add in the ability to utilize multiple materials and build structures both vertically and horizontally and you have a technology that will drive change.

Now, it's your turn – how do you envision using 3D multi-material printing? Don't fall into the trap of seeing this as overhyped, a fad, or something that's just going to go away. Instead, ask yourself: How do the potentials of this technology excite and inspire you? What will you make of it?

If nothing else, 3D printing has closed the gap between imagining something and building it. Go and do likewise!

Burrus
Research



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