

Thinking in 3D: Special Report: 2016 Consumer Electronics Show (“CES”)

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Benesch’s Mark Avsec attended this year’s CES show in Las Vegas, where additive manufacturing took center stage.

In 2015, 3D printing stories each seemed to possess a similar headline: “Here is the first 3D-printed _____ (fill in the blank, e.g., car, prosthetic limb, running shoe, your favorite food item, etc.).” This year we are moving beyond the hype.

According to CES presenters, the manufacturing landscape will be reshaped when the printers are faster and the materials are better and cheaper. 3D printing machines at CES this year were in an “evolutionary” class. “2D” companies like Hewlett Packard, Canon, Ricoh, Fuji, and Epson all showcased 3D machines. Cincinnati Inc. unveiled a printer that could print in sizes up to 20 feet long, eight feet wide, and six feet high! 3D Systems showcased a metal printer much faster than its predecessors. Other trends included automation (including ideas for automated digital scanning, directed in part to the “spare parts” market) and multi-technology/hybrid machines (machines that combined CNC (subtractive manufacturing) with additive manufacturing).

Elite companies Voxel8, Carbon3D and Hewlett Packard were on the leading edge.

Voxel8 was created and founded by Jennifer Lewis in her Harvard laboratory. Voxel8 is doing exciting things with ink designs, i.e., conductive inks embedding electronics, and generally creating materials that go beyond form and integrate function. The company has developed multi-material print heads with a variety of nozzles that can print metals, ceramics, polymers, conductive inks, and flexible electronics. The company’s nozzles facilitate seamless moving from material to material within one build. With multiple nozzles, Voxel8 is approaching build times of five minutes! But the heart of the company’s mission is to embed functionality: print the wires and wearable sensors using highly concentrated inks. And, while industrial printers are obviously more robust, Voxel8 is focused on the desktop, in pertinent part (said Professor Lewis), because people are underutilizing the desktop for plastic trinkets and prototypes. Voxel8’s goal is to integrate seamless electronic wiring into desktop 3D printers. To further that goal, Voxel8 offers a Developer’s Kit 3D Printer, which enables prototyping of 3D electronic devices via co-printing of thermoplastics and a highly conductive silver ink. Printers can be ordered now and will ship in Q2 2016.

Hewlett Packard showcased its thermal inkjet technology: a density of nozzles within a defined space. Because the technology is thermal, there are no moving parts on print heads (each of which can have a high amount of nozzles within a small place). In fact, each print head has 10,000 nozzles and can fire 48,000 times a second - a prodigious amount of data. Hewlett Packard also talked about its HP Multi-Jet Fusion Technology; the technology can print at breakthrough speeds and in

millions of colors in one build, with highly natural and beautiful color gradations. According to HP, HP Multi-Jet Fusion technology will enable the world to realize “the full potential of 3D printing - in highly functional parts - with control over part and material properties beyond those found in other 3D printing processes, from texture, friction, strength, and elasticity, to electrical and thermal properties, and more.”

Clearly, when printing speed improves and materials' cost comes down the massive adoption we are expecting will occur; almost all manufacturing processes will be affected. Carbon3D is a Silicon Valley-based 3D printing company working (in its own words) “at the intersection of hardware, software and molecular science.” In August 2016, Carbon3D secured a \$100 million funding round led by Google Ventures. Earlier last year Carbon3D introduced its Continuous Liquid Interface Production technology (“CLIP”), which uses a tuneable photochemical process instead of the traditional mechanical approach. According to a press release, CLIP “eliminates the shortcomings of conventional layer-by-layer 3D printing technology to rapidly transform 3D models into final parts in a key range of engineering-grade materials.” Automotive, consumer electronics, aerospace, athletic apparel and industrial products companies are reportedly already working with Carbon3D's CLIP technology. Carbon3D's mantra is: *does the part have enough materialistic properties to be a final performance product?* The company is focused on 3D printing of final parts with the right properties: rigid polyurethanes with the impact strength to be a final part in a car or airplane; electrical conductors; semi-rigid polyurethanes; and really high performance resins such as Cyanate Ester, which can withstand the heat under the hood of an automobile (for example).

I came away from CES convinced that Voxel8, Hewlett Packard and Carbon3D were key players to help dramatically expand the 3D printing market and reshape the manufacturing landscape.

Finally, I witnessed several presentations on 3D printing licensing models, because brands and IP rights-owners (as our team had begun counseling clients in 2015) will inevitably have to consider licensing their intellectual property for printing by customers. Benesch will showcase some of these licensing models at its next 3D Printing Annual Conference, which will take place this year on **April 21, 2016** at the Ritz-Carlton Hotel in Cleveland. **Please hold the date.**

It was clear from CES 2016 that the 3D printing industry is a young, dynamic industry which is here to stay and will transform manufacturing. Gartner analysts continue to predict that by 2018 there will be \$100 billion per year in intellectual property losses as a result of rogue 3D printing. Particularly vulnerable are the “spare parts” or replacement parts industries when customers begin scanning parts and printing them out themselves instead of purchasing them from the OEM. To mitigate such threats, precautions should be considered today, including licensing models, patent claiming strategies, and certain trademark validation features.

This is a time when most businesses are doing strategic planning for 2016. Almost every business doing long-term planning should be thinking about 3D printing and the impact it will have on its business. Our 3D Printing Industry Group is here to help, and is happy to participate in planning sessions.

3D Printing has the potential to revolutionize the way we make everything. Because the technology will change our clients' businesses, Benesch has formed a 3D Printing Industry Group, a multidisciplinary team led by core members of the firm's Innovations, Information Technology & Intellectual (3iP) Property Group.

For more general information and to learn more (including by viewing more than 20 Benesch-produced videos on 3D printing), click [here](#).

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