3D printers may be the next best piece of farm equipment

BY LOIS HARRIS
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If predictions are on target, the day will come, in the not-too-distant future, when farmers will use 3D printers to make their own replacement parts for equipment when it breaks down.

Nearly every day we hear about how 3D printing is progressing and changing the way things are made - from providing an ailing man with a comfortable and functional prosthetic jaw, to crank out useful household items like lamps and vases, to fabricating kids’ toys.

Basically, 3D printing makes solid objects from a digital file. Using a computer-aided design (CAD) file, the printer lays down micro-thin layers of material (plastic or steel), which eventually build up into the final product. Combined with farmers’ ingenuity, it could be a game-changer in terms of drastically reducing downtime and increasing productivity during planting and harvest seasons.

“Farmers have a can-do mentality and are a nice fit for adopting the technology, since they are familiar with working on equipment and aren’t afraid to experiment,” says Joshua Pearce, an associate professor of material science and engineering.

He runs the Michigan Tech Open Source Technology (MOST) research group where he recently worked with the Nitrile Elimination Company to develop and print a handheld photometer to test for nitrates and phosphates in soil, water and forages.

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Joshua Pearce: “We save thousands of dollars ourselves making our own equipment and making parts for broken pieces of our own equipment,”

In the coming five years, 3D printing could become a staple in the agricultural industry.

Farm equipment manufacturers in the U.S. already use 3D printing to build concept models and prototypes to determine design flaws in models before putting them into production.

Leah Olson, President of the Agricultural Manufacturers of Canada, says her members perceive some opportunities with 3D printing but at this time, few manufacturers have adopted it - most are still exploring its possibilities.

In Pearce’s language, there’s a ‘high church’ and ‘low church’ of 3D printing. The high church covers the multi-million dollar printers that produce steel items like the Shelby Cobra car that was recently printed by the Oak Ridge National Laboratory in Tennessee. The low church is where his interest lies because it’s at the affordable end of the spectrum that makes polycarbonate and other plastic products.

“The costs have come way down, the quality of the printer outputs has gone way up over the past few years,” Pearce says. What once was a complicated, $20,000 machine can now be bought for around $2,000.

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The point of the experiment was to show how open-source 3D printers can reduce the cost of farming. The Delta RepRap printer used in the experiment was built in less than eight hours in his laboratory for under $450 in parts.

This particular printer can be built, fixed and upgraded by the user to suit his or her needs. As a result of Pearce’s strong belief in open source sharing, all of the design files, schematics and build instructions for the printer are available for free on Appropedia.

“Any farmer with any technical capability can build these printers,” he says. A bonus is that they can even make up to 50 per cent of their own replacement parts.

To save money in his own lab, Pearce and his students build all the printers they use, and the equipment they print is made for a fraction of the cost of buying it.

“We save thousands of dollars ourselves making our own equipment and making parts for broken pieces of our own equipment,” he says.

If building the printer isn’t appealing, Pearce says that a high-quality plastic printer can be bought for less than $2,000, and in five years, he predicts that the printers producing steel and aluminum products will come in at less than $10,000. Not only are 3D printed products cheaper, they can be custom made to fit the user - a real plus for, say, tool handles that are repeatedly used throughout the day. Once it’s set up with a design, the printer can run by itself while the user gets on with other chores.

Thousands of free, 3D product designs are available via websites like Thingiverse, Youmagine and YEGGI.

Pearce hopes that farm equipment manufacturers will follow the lead of Nokia, which has provided the 3D print design for their mobile phone cases for free so customers can make their own.