



# 3D SCANNING AND PRINTING TECHNOLOGY

PRINTING TECHNOLOGY TAKEN TO THE NEXT – 3D – LEVEL, AIDED BY HAND-HELD, HIGH-RESOLUTION SCANNING

Z Corporation makes products that enable users to capture, edit, and print 3D data with unprecedented speed, ease, versatility and affordability. Their product lines includes the world's fastest high-definition 3D printers - machines that produce physical 3D models from digital data in full colour - and handheld portable 3D scanners that digitize 3D surfaces in real time. Z Corp. technology enables a wide range of applications in manufacturing, architecture, civil engineering, reverse engineering, geographic information systems (GIS), medicine and entertainment. This article looks at that technology and some interesting applications in which it is used.

## Fast, 3D Colour Printing

Z Corporation's ZPrinter® 650 is engineered specifically to satisfy the demanding requirements of applications in engineering, education, AEC, GIS and entertainment. With the largest build volume of any 3D printer, it enables users to print very large, high-resolution, multicolour models in hours or to make many smaller models at once.

The ZPrinter 650's 10 x 15 x 8 inch (254 x 381 x 203 mm) build size prints very large models in a single piece, enabling users to produce multiple models at once - virtually impossible with competing technologies that rely on structural supports. The ZPrinter 650 employs full-spectrum 24-bit colour and five print heads – clear, cyan, magenta, yellow and black – to simultaneously print in multiple colours, thus avoiding the need for separate builds, repetitive manual material loading and painstaking assembly to create multicolour models. The ZPrinter 650's 600 x 540 dpi resolution is the highest resolution in a 3D printer, producing models with the finest detail and accuracy. Print speed is claimed to be five to ten times faster than other systems,

enabling model production in hours. It offers fully automated set-up and monitoring, no-touch powder and binder loading, and automatic powder recycling, and is quiet, safe and clean with an all-in-one self-contained design compatible with other equipment in the professional office environment.

Stanley Tools uses 3D printing for concept prototypes from initial idea through to the unveiling of products at its annual sales meeting. Their engineering and executive teams demand fast turnaround on an ever-increasing quantity of models, and are all "sticklers for quality." The large build volume, colour quality, resolution and automation enable the ZPrinter 650 to deliver full-scale multicolour concept prototypes on deadline "every time without much user interface with the printer." A spokesperson at another beta tester, Timberland, claimed that "the new automation reduces touch time and keeps our work area tidy, and the new black really makes our footwear concepts pop. The large build volume significantly improves our productivity, which is critical for a busy company like Timberland."

### Transforming Satellite Imagery into 3D Physical Landscapes

LandPrint.com is offering 3D physical models of any landscape on the planet. Consumers visit [www.LandPrint.com](http://www.LandPrint.com), select their favourite place – e.g., a mountain, canyon, forest, river, volcano, waterfall or glacier – and submit their order. These models are "3D-printed" in full colour by Z Corporation and shipped directly to the customer's door.

LandPrint.com gets its digital terrain data from NASA and the US Geological Survey, and will soon incorporate street, building and other data from additional third parties, making the site a powerful tool for professionals like architects, contractors and civil engineers.

"We help consumers capture the landscape they yearn to remember and professionals visualise the terrain that looks so nondescript in their blueprints," said Tom Gaskins, CEO of LandPrint.com, based in Redmond, Washington. "Together with Z Corporation, we're taking raw geospatial data and turning it into something they can savour and understand at a much deeper level. Z Corporation 3D printers offer a superior blend of speed, colour, resolution, and affordability, so they were the obvious – rather, the only – choice for us.

"This is one of the first forays into printing services for Z Corporation, maker of the world's fastest 3D printers and the only ones that print in multiple colours. 3D printing creates physical objects from 3D data much as traditional office printers create documents from 2D document files. Z Corporation's 3D printers ZPrint landscape models using an ink jet system to bind together ultra thin layers of composite powder.



Examples of models produced by the ZPrinter



The level of detail made possible is stunning.

"LandPrint.com is a premier example of a new breed of business that is driving 3D printing more deeply into the mainstream, not only in traditional engineering circles but in consumer products, architecture, civil engineering, medicine, the arts, entertainment and beyond," said Scott Harmon, Z Corporation vice president of business development. "We're eager to support the evolution of these exciting applications and look forward to LandPrint.com's success."

LandPrint.com enables anyone to inexpensively create custom 3D models of

any place on Earth, and soon other planets. Through the magic of 3D printing, personalised replicas of vacation spots, journeys and natural wonders can be created with a few clicks on a personal computer. GPS tracks can be uploaded and included in the LandPrint. Users select from a variety of surface features, and will soon be able to apply their own surface imagery. Never before has this capability been widely available, and at prices well within reach of consumers. LandPrints are available in a range of sizes and start at \$23.95 USD.



The ZScanner 700CX in action



The ZScanner 700PX in its fitted travelling case.

### Breakthrough in handheld laser scanners

The ZScanner 700 PX and ZScanner 700 CX extend the ZScanner 700 platform that in 2006 introduced speed, ease-of-use and versatility to 3D scanning. The ZScanner 700 was the first-handheld, self-positioning scanner on the market that could digitize 3D surfaces in real time. It lets users scan any object in the tightest spaces with one continuous scan. Conventional scanners require multiple setups with fixed-position tripods, mechanical arms, or external positioning devices that must be aimed and re-aimed directly at target surfaces. The ZScanner 700 also captures information in a single reference model, meaning users do not need to invest time or risk errors in tedious post-processing to stitch multiple scans into one.

The new ZScanner 700 PX is the world's only handheld laser scanner that precision-scans large objects such as aircraft and automobiles, items that previously have been too big to capture by hand. The breakthrough stems from built-in AICON™ photogrammetric software, previously available only in fixed-position 3D scanners that lack the handheld's mobility, speed and convenience. As users of the ZScanner 700 PX choose larger target objects for scanning, its accuracy increases, to up to eight times that of the standard ZScanner 700. The new ZScanner's ease of use, accuracy and portability make it ideal for applications such as reverse engineering, inspection, 3D archiving,

complex shape acquisition, measurement archiving, damage assessment, digital modeling/mockups and rapid prototyping. The speed and accuracy translate into cost savings, increased quality and additional revenue.

### Capture the 'whole picture' with colour

The ZScanner 700 CX is the world's first handheld laser scanner that can capture surface information in full 24-bit colour, rendering the complete picture of an object, not just the geometry. Colour 3D data enables more realistic and informative 3D visualization and concept models, making the ZScanner 700 CX ideal for cultural heritage, anthropology, archeology, art, entertainment and Web applications, as well as product design and reverse engineering.

In addition to capturing colour, the ZScanner 700 CX provides automatic, fully accurate texture mapping. Texture maps can be saved separately from the mesh, meaning users can modify or refine the texture in photo editing software without compromising accuracy. Flexible resolution during scanning enables the user to reduce resolution to obtain a lighter weight file or smoother surface appearance. Dual scanning mode lets the user toggle between colour and monochrome modes during the same scan.

The ZScanner 700 CX colour scanner creates the first full-colour scan-to-print solution when combined with Z Corporation's 3D printers, which are the only ones capable of printing in multiple colours. ZPrinters create physical models directly from ZScanner data, or any 3D data, just as 2D printers create documents from word processing text.

### ROYAL COLLEGE OF ART, UK

It's not just the commercial sector that has discovered the benefits of 3D printing and hand-held digital scanning. Leading design colleges such as London's Royal College of Art are investing to help students better understand the creative process, get hands-on experience with the latest technology, achieve higher grades and be better prepared for the workplace. ZCorporation have worked closely with the London based Royal College of Art to assist their students from all design disciplines - automotive, architectural, fashion and textile to name but a few - to create innovative and exciting models throughout their courses on the 3D printers housed in their in-house dedicated RP unit - RapidformRCA. RapidformRCA also provide services throughout London to small and medium sized design and architectural firms, producing 3D models in an easy and cost effective fashion.

### TILKE, GERMANY

Using 3D printing technology from Z Corporation, German architecture firm Tilke, famous for building state-of-the-art Formula 1 race circuits around the world, can now create precision 3D colour models of new building concepts and proposed track layouts, which include the topography of the development site.

### UNIVERSITY OF SUNDERLAND, UK

The University of Sunderland recognised that their Engineering students really needed to acquire hands on experience with the most up-to-date technology by using it for commercial projects. ZCorporation 3D Scanning and Printing technology helps them to deliver this high quality solution. From this concept, Digital Factory was born. Digital Factory is a training and technology transfer project focused around digital engineering technologies. This project has provided companies in North East England, such as 3M and the Beamish Museum, with technical support in computer aided design, engineering and rapid prototyping.