

## [3-D Printers Help Identify Missing Soldiers](#)

By Lauren Wolf

Months ago, I wrote on this blog about a new fascination of mine: three-dimensional printers. At the time, I found an amusing YouTube clip from CSI:NY that features one of these printers in action. In the video, a crime scene investigator (played by Gary Sinise) works to save the life of a police horse by printing a replica of the bullet lodged in its body. This animal-friendly forensic work didn't exactly seem like a reasonable application of the technology to me, but it sure made me laugh.

A recovered skull (left) next to a printed skull demonstrates 3-D printer ability. Credit: JPAC

Recently, however, a legitimate forensic use for 3-D printers came across my desk. A military lab is now printing 3-D models of the skulls of living people to refine its techniques for identifying the remains of prisoners of war (POWs) and soldiers missing in action (MIA). Located on Oahu, in Hawaii, the Central Identification Laboratory of the Joint POW/MIA Accounting Command (JPAC) is the largest forensic anthropology lab in the world.



One of the methods used by the lab to help identify the remains of soldiers is a quantitative skull/photograph superimposition technique, which involves aligning an old photo of a missing serviceman with an image of a recovered skull. The overlapped images are resized and oriented for a "best fit," and then the composite is comparatively scored in areas such as the nasal aperture's length and width, the teeth and lip alignment, and the mandible's length and fit with chin shape, according to Audrey L. Meehan, project leader and a DNA sampling specialist at JPAC.

The problem with this method is that if scientists only have photographs to work with, there's not really a control experiment for validating the accuracy of the scoring. That's where the lab's 3-D printer comes in. With a Zprinter from [Z Corp.](#), the Central Identification Laboratory is printing replicas of the skulls of living individuals based on their CT scans. These are then being compared with photographs of the people to refine the superimposition scoring system and "to develop a better understanding of the relationship between the skeleton and the overlying soft tissue," Meehan says.

A printed skull fresh out of the Zprinter build bed. Credit: JPAC

"To put it a bit darkly, they're using the printer to prototype the remains of someone who's still alive," says [Joe Titlow](#), vice president of product management at Z Corp. "As a prototyping machine," he adds, the Zprinter is certainly "doing what it was intended to do."

According to Titlow, something the size of a skull would probably be replicated in the build bed of a Zprinter in about four or five hours. I tried to get a little more insight into the nature of the powders these machines use to construct desired pieces, but alas, the stuff is proprietary. Titlow said only that the powders are an engineered composite material eventually stuck together with a water-based binder solution.

3-D printers are “gaining acceptance in the medical field,” Titlow says. They are currently being used in the planning of difficult surgical cases and for visualization of models by doctors. But this is the first time Titlow has heard of a 3-D printer being applied to forensic work. Well, other than the imagined efforts of those crime scene investigators in New York, that is. Titlow said that he and his coworkers at Z Corp. also got a chuckle out of the fanciful clip. But, he says, “no one around here seems to know of another forensic-type application” like this POW/MIA work.

