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SmartMultiMedia™, Inc. is an award-winning, high-end multimedia company specialized in the "real-world" application of digital 3D data, visualization and deployment of immersive digital learning tools. Our mission is to leverage the information surrounding us by providing valuable, "intelligent" data to our clients and partners in order to strengthen their operational practices.

Our core team of educators, graphic artists, 3D modelers/compositors, editors, writers and subject matter experts, along with strategic partners in various industries, enable us to offer superior value-added solutions to various market sectors. With over 30 years of visualization and interactive digital learning development experience covering every major industry, SmartMultiMedia™ is your high-end data integration and visualization solution provider.

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MARCH 2010

POB

POINT OF BEGINNING

'Capturing' the Mighty Mo

PLUS:

- Surveying a Superfund Site with GNSS
- Mapping Australia's Wimmera Mallee Pipeline

When the USS Missouri was decommissioned in 1992, the 887-foot-long Iowa-class battleship looked tired. Its worn and pitted teak deck had supported hundreds of naval officers and their crews through three wars spanning five decades. It was on this deck that Gen. Douglas MacArthur accepted Japan's unconditional surrender in a ceremony on Sept. 2, 1945, ending World War II and securing the USS Missouri's place in history. However, the ensuing years and battles had left multiple scars on the noble ship—particularly in the form of rust.

The USS Missouri had actually been decommissioned once before, in 1955. Thirty-one years later, the Missouri underwent an extensive modernization of its weaponry. Equipped with four Tomahawk missile launchers, it was recommissioned and called into

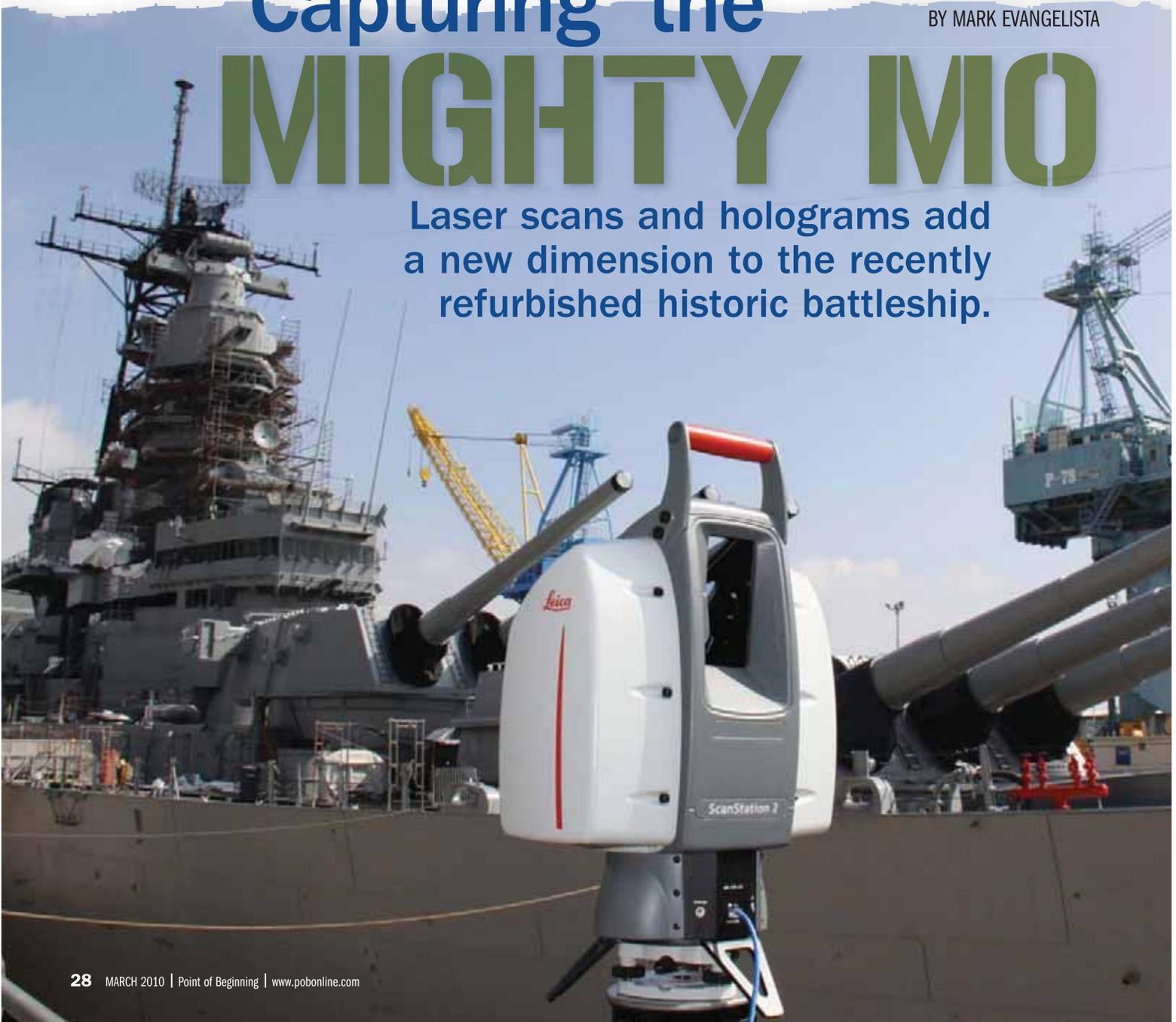
action for Operation Desert Storm. Six years later, in 1992, "Mighty Mo," the last battleship built by the United States, was finally allowed to rest.

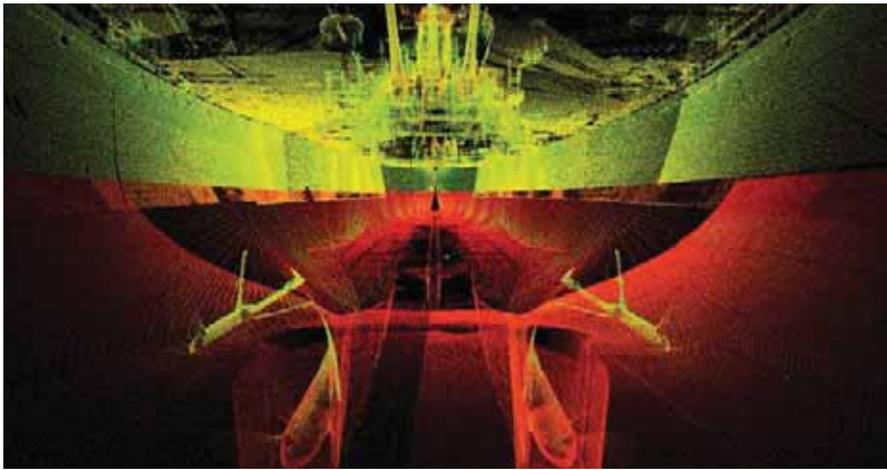
For the next several years, the magnificent vessel remained docked at the Puget Sound Naval Shipyard in Bremerton, Wash. Then, in May 1998, the Navy officially granted the battleship's care to the nonprofit USS Missouri Memorial Association Inc. The donation launched a new mission for the historic battleship as a floating World War II museum, docked next to the USS Arizona on Pearl Harbor's Battleship Row. The museum opened on Jan. 29, 1999, a testament to the vision and perseverance of the association's directors. But the directors had an even bigger vision in mind—one that involved repairing and preserving the battleship for generations to come.

'Capturing' the MIGHTY MO

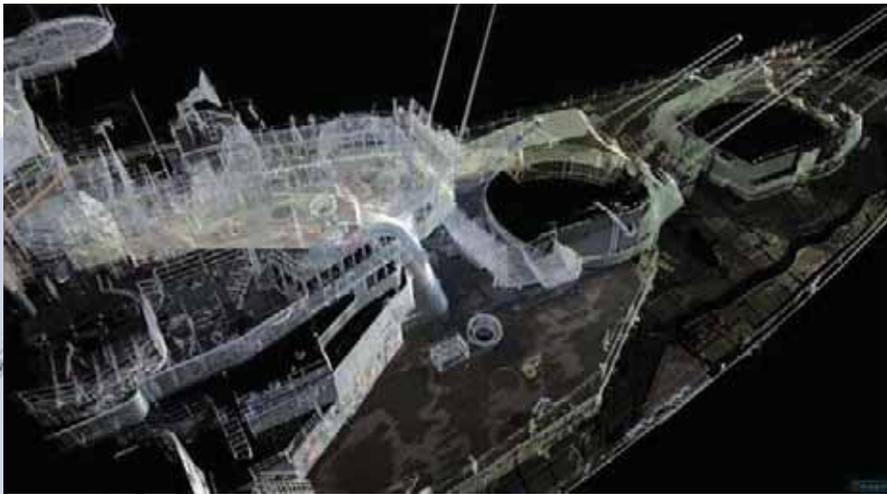
BY MARK EVANGELISTA

Laser scans and holograms add a new dimension to the recently refurbished historic battleship.





Opposite: The USS Missouri dwarfs a laser scanner ready to capture the historic ship that served its country in World War II, Korea and the Persian Gulf. Left: The Missouri's exterior hull, imaged from the inside, was taken just aft of the propellers and rudders. Below: A point cloud shows the bridge and surrender deck of the USS Missouri, the site of Imperial Japan's unconditional surrender, which ended World War II.



A War on Rust

That vision was realized in October 2009 when the Missouri was moved to Pearl Harbor Naval Shipyard's largest dry-dock facility for a three-month, \$18-million preservation project. The project included inspecting and refurbishing the hull, sandblasting and repainting the ship's exterior, replacing rusted steel, and installing a system to monitor corrosion. It also included a comprehensive documentation project that incorporated 3D laser scanning, high-dynamic-range photography and traditional surveys. "Having the battleship Missouri in dry dock provided a unique opportunity to completely scan the ship while it was out of the water," says Michael A. Carr, president and CEO of the USS Missouri Memorial Association. "It was an opportunity we will not see again for decades and certainly one we did not want to miss."

A month before the preservation project began, Carr and other association directors had met Richard Lasater, president of Smart GeoMetrics, a division of Houston-based laser scanning firm Smart MultiMedia, at the Historic Naval Ships

Association conference in Alabama. Smart GeoMetrics had scanned the interior of another historic battleship, the USS Texas, earlier in the year, and Lasater was eager to demonstrate the results.

After seeing the photographic panoramas and video flythroughs, the association directors were impressed. The technology offered the potential to improve the overall visitor experience at the museum. If they didn't act then, they probably wouldn't have the chance in the future. "There is no way to complete an accurate scan of an entire ship while it is in the water," Lasater says. "Not only is it impossible to image areas below the waterline, even on a calm day, the tiniest movements of the water and ship would degrade scan accuracy."

The budget for the preservation project was already set. But the association directors decided they had to make the documentation project work. Through an extraordinary amount of teamwork, the project was funded at a level that was acceptable to all participants, and Smart GeoMetrics began honing its strategy.

Calling in the Big Guns

The documentation effort would be the last part of the preservation project before the Missouri was returned to its home on Battleship Row in January 2010. Smart GeoMetrics and its team would have a four-day window to scan the vessel as scaffolding and protective covers were removed. The massive endeavor would require three scanning crews, each equipped with a Leica HDS laser scanner, to complete the project. A fourth crew was assigned to create and maintain the survey control network. "The Missouri is a very, very big ship, and we only had four days to complete an estimated 14 days worth of work among an army of shipyard workers," Lasater says.



USS Missouri Quick Facts

USS Missouri (BB-63)

Class: Iowa-class battleship

Length: 887 feet

Height: 209 feet from keel to mast

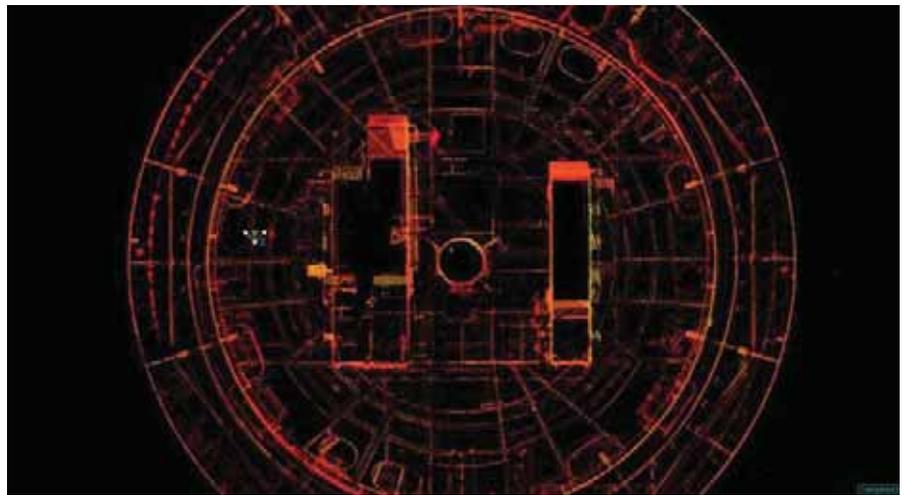
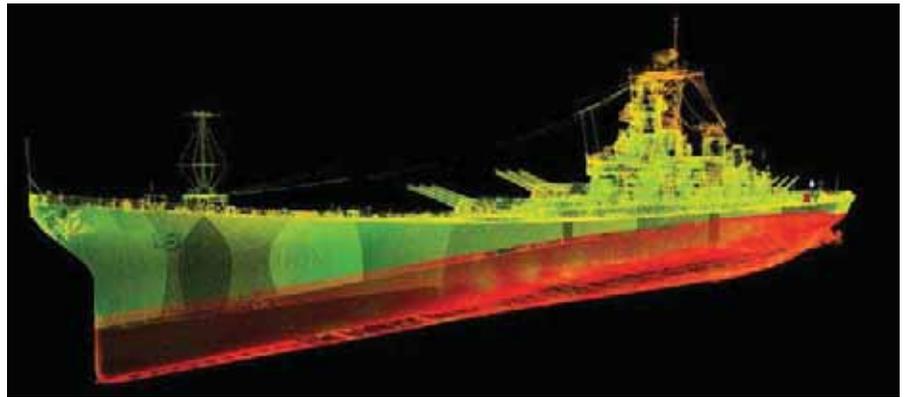
Beam: 108 feet

Weight: 58,000 tons (full load);
45,000 tons (unloaded)

Speed: In excess of 30 knots (35 mph)

- Iowa-class battleships were designed for speed and firepower.
- Designing the Missouri took 175 tons of blueprint paper.
- The ship was built in three years and required more than 3 million “man-days” to complete.
- Only four Iowa-class battleships, including the USS Missouri, were built during World War II.
- The Mighty Mo is 5 feet longer and 18 feet wider than the RMS Titanic.
- If you could stand the ship on end, it would be 332 feet taller than the Washington Monument.
- Mighty Mo’s trademark feature is its set of nine 16-inch guns. Each barrel is approximately 67 feet long, weighs 116 tons, and can fire a 2,700-pound shell 23 miles in 50 seconds with pinpoint accuracy.
- The Missouri was the last U.S. battleship to be launched and the last to be decommissioned.

Source: www.ussmissouri.com



Above left: Scan team member Donald Axtell positions a Leica HDS 6000 laser scanner near a commemorative plaque on the surrender deck of the USS Missouri. **Top:** A point cloud of the USS Missouri’s port bow from below reveals a virtual snapshot of the historic naval vessel. **Bottom:** A plan view of the powder handling area in turret No. 2 displays a projectile storage area in the upper outer ring.

“The ship’s location in Hawaii also made logistics a bit challenging.”

However, Smart GeoMetrics was up to the task. The firm quickly assembled a team of HDS professionals from Meridian Associates in Houston and As-Built Modeling Services Inc. in nearby Pearland, Texas, with Houston-based Mustang Engineering Inc. providing special assistance.

The team arrived onsite January 3 and established a control network of more than 400 points. Crews then captured scans at 160 locations on and around the ship’s exterior and took thousands of photographs—5,400 in all. “The documentation teams were really moving fast on this project, and not all of the ship was accessible at the same time,” says Jonathan White, a senior project manager for Meridian, who headed up one of the scan crews. “We were working in and around dockyard preparations to return the ship to sea.”

By January 6, one day before the Missouri was scheduled to leave dry dock, the scanning and photography work was finished. “Ships such as the Missouri entail a great combination of grace and beauty combined with an industrial structure that comes out very well in scan data,” Lasater says. “This was an exciting project that just would not have happened if such a great team of companies and professionals had not been able to collaborate and contribute their expertise.”

With the scans in hand, the team turned its attention to the next phase of the project—turning data into deliverables.

A Lasting Legacy

The scans of the battleship generated billions of data points that the team immediately began processing into point clouds, CAD drawings and 3D models.

The team also decided to take the deliverables one step further by adding holo-

Workers scramble to complete the scan project while the USS Missouri is in dry dock.



grams, a capability provided by Austin, Texas-based Zebra Imaging. "The technology from Zebra Imaging is so compelling," Lasater says. "Zebra agreed to provide the initial examples [at no charge] as part of the team. However, the Missouri Memorial Association immediately realized the value of the technology and is already working with us to provide specific exhibits and materials."

This project marks the first time holograms have comprised part of an archival record. The results of the entire documentation project will be used by the USS Missouri Memorial Association as a historical record and for ongoing maintenance and educational purposes.

On Jan. 30, 2010, the Battleship Missouri Memorial officially reopened to the public looking much like the day it was first launched 66 years ago. The freshly painted steel glistens in the sunlight. The teak deck gleams. Tours and signs have been enhanced, and special touches have been added to improve the ship's capabilities as a venue for special events. But the Missouri Memorial Association directors and the Smart GeoMetrics team are still working behind the scenes brainstorming new ideas to create and maintain a fitting memorial worthy of the battleship's legacy. "I am very happy with what is being produced and excited to start planning for how we can use it here to improve the overall visitor experience," Carr says. ☺

Mark Evangelista is a writer for Smart MultiMedia/Smart GeoMetrics (www.smartmm.com). More information about Meridian Associates can be found at www.meridianassoc.com, and more details about Zebra Imaging are at www.zebraimaging.com. The USS Missouri Association's Web site is www.usmissouri.com.



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GR-3

Friday, January 1, 2010

Smart Multimedia scans map history

Local firm preserves church, battleship in virtual 'point clouds'

Houston Business Journal - by [Ford Gunter](#)

Smart MultiMedia is laser-scanning a local church and a U.S. battleship to virtually map the historic landmarks and preserve them for posterity.

On Dec. 22, the Houston firm visited **Immanuel Lutheran Church** in the Heights to collect millions of data points throughout the unused former chapel. These will be tied together to create a three-dimensional "point cloud," which can be used to produce CAD drawings, 3D models and virtual tours.

In early January, Smart Multimedia President Richard Lasater is leading a team of three companies to Pearl Harbor to scan the exterior of the USS Missouri in dry dock.

Lasater approached the Heights church and offered his company's services free of charge after hearing about the battle to save the building (see related box).

"Houston has such a problem with historic buildings being torn down, and this is not a very hard project to do," says the Houston native.

The little old church in the Heights, a small project that would run about \$8,000, is a dry run of sorts.

"We are trying to prove the technology in the Houston area," Lasater says. "Historical sites are generally \$3,000 to \$4,000 a day, plus post-processing expenses. The church is a one- to two-day deal."

Mapping the Missouri — site of the Japanese surrender in World War II — will run in the "tens of thousands" of dollars range, and that's after cutting the nonprofit **USS Missouri Memorial Association** a deal.

Smart Multimedia generates about 40 percent of its business from historic sites. In addition to work on the USS Texas, the firm recently did an exterior map of the Savoy Hotel before the downtown structure was demolished.

Other business is split between civil projects such as a recent exterior mapping of an 11-story parking garage that needs a "new skin" in the Texas Medical Center, and petrochemical projects. Mapping a refinery costs between \$6,000 and \$12,000 a day.

An epic 'Battleship'

The size of the structure dictates the number of scanner positions.

"In one position, the laser scanner will scan everything it sees, and create a point cloud," Lasater explains. "Then you repeat it from position two, and put the two scans together."

The exterior of the USS Missouri will require 90 scans.

The anchor vessel of Pearl Harbor's Battleship Row is currently in dry dock undergoing sandblasting and repainting. When this work is complete, the Smart GeoMetrics division of Smart MultiMedia will have a three-day window before the ship re-enters the water on Jan. 7.

"When it's in the water, it's moving," says Douglas Smith, vice president of communications. "And the lasers don't work under water."

Lasater is bringing along two "friendly competitors" with offices in the Houston area — Meridian Associates and **As-Built Modeling Services Inc.** — for on-the-ground support.



Michael Stravato/HBJ

Richard Lasater (left) and Douglas Smith of Smart MultiMedia: Testing HD scanning technology on Immanuel Lutheran Church in the Heights.

[View Larger](#)

“It’s a big, big ship,” Lasater says. “It’s probably a 12-day project that we have to do in three.”

The two companies will provide expertise and equipment, with Meridian contributing survey services for a “control network” — essentially a grid made up of target points placed throughout the ship to ensure accuracy.

“It’s the first time ever that the exterior hull of a naval ship has been documented using a laser,” Lasater says.

The team will also scan the bridge, the “handling room” where shells were loaded into 16-inch guns, and the fire control center for Industrial Light & Magic.

The special-effects company created by George Lucas will use the scans of the Missouri for digital effects in the 2011 movie “Battleship,” directed by “Friday Night Lights” creator and “Hancock” director Peter Berg.

Eventually, Smart MultiMedia will scan the entire ship from the inside out, but that will likely take years.

Says Lasater: “It’s very similar to a petrochemical job. It’s essentially a giant machine.”

Smart education

Smart MultiMedia started in 2006 with two basic business units.

One focused on laser scanning for the petrochemical industry while the other concentrated on 3D and non-3D interactive teaching and training materials for **Hewlett-Packard Co.** and the Texas Medical Center.

Lasater says the recession wiped out the educational side of the business.

“The phone stopped ringing last August, and didn’t ring again for eight months,” he says.

In contrast, he sees abundant opportunities in the refining sector, which has “completely turned around” in the last few months.

The company is back up to seven employees after wilting to four, and hopes to be back up to nine in a few months. Considering the company’s niche, the goal would appear to be achievable.

“There are a limited number of HD laser scanners in the world,” says Smart MultiMedia communications honcho Smith. “It takes six months to get one, they are built by hand and there’s quite a lot of software that goes with them.”

The scanners Smart MultiMedia uses run between \$120,000 and \$160,000, although the company will begin the new year as an official distributor for the dominant manufacturer, **Leica Geosystems.**

“Most companies with HD scanners only do petrochemical or civil surveys,” Lasater says. “There are probably only three or four in the world like us, and only one other one — **Plowman Craven Ltd.** in England — that does the weird stuff like battleships.”

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