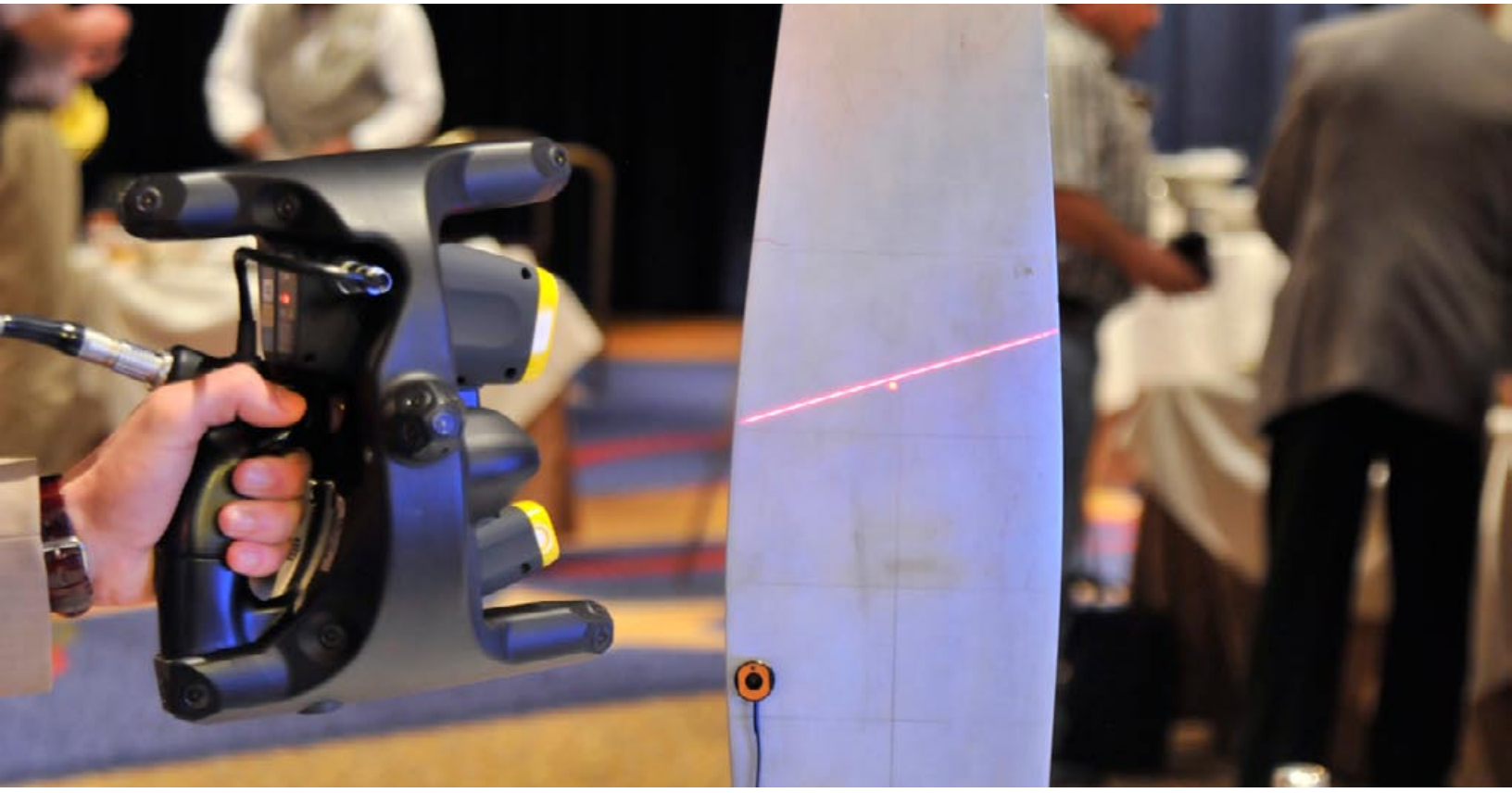
FLAAR Reports

May 2010

Portable 3D scanners



Studied at RAPID 2010 3D expo

Anaheim, California, May 2010

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FLAAR Reports
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I had three goals to achieve at RAPID 2010 3D conference and expo:

1. **To look at all 3D rapid prototypers and additive manufacturing machines, especially 3D printers such as from Zcorp and Objet Geometries.**

2. **To look at the several leading brands of modeling software, especially**

   - Geomagic
   - PolyWorks
   - RAPIDFORM
   - Materialize

3. **To look at all 3D scanners and understand which scanners were most appropriate for the several interests that FLAAR has in 3D scanning:**

   - scanners for Mayan ethnozoology and ethnozoology to record tropical fruits, vegetables, animals, and Mayan artifacts of small to medium size (scanner idealized for objects 5 cm to 80 cm in size, with average 12 to 25 cm in size).3D scanners to record Maya stone sculpture and architectural stucco decoration and friezes (in other words, objects larger than an artifact).
   - scanners to record the corbel vault architecture features of the Maya (so architectural space, but interior and thus max height 3 meters and max width 5 meters).
   - Scanners to record sacred Maya ballcourt architecture and playing fields.

Nicholas Hellmuth with Oxana Yashchenko and Juan Luis at Rapidform booth.

Of course since RAPID was an event for rapid prototypying, 3D scanners for architectural spaces were not the focus of this show.

There are thousands of museums and universities who now seek to enter the world of 3D scanning. They do not themselves have the time to come to scanner trade shows; they definitely do not have time to study each scanner to decide which brand to buy. So often they make a mistake and buy the wrong scanner (or give up and don't get any scanner at all since they can't figure out which scanner is best for their needs).

There is never just one perfect product that can do well in all applications. Each university, each museum, every botanical and zoological project will have their specific needs. So the goal of FLAAR Reports is to assist these thousands of potential users of 3D scanners to understand the pros and cons of each level of scanner:

- Beginner
- Entry level
- Mid-range
- High-end

Naturally we are fully aware that the main market for 3D scanners is in industry, for scanning machine parts.

At FLAAR we purposely began at entry level. But we also recognize the value of the absolutely cheapest scanner for beginners. We realize that a low-cost scanner will be essential for many projects, but we decided that since we used Leica and Hasselblad cameras in the 1970's, 1980's, and 1990's, and use Nikon, Canon, Hasselblad, 48-megapixel BetterLight, and 80-megapixel Cruse digital equipment since 1997, that we prefer to concentrate on the entry-level through high-end, but not point-and-shoot cameras.

Nicholas Hellmuth At Zcorp booth.

However, that said, I will admit that one of my favorite digital cameras is the point-and-shoot Canon camera that we use for underwater botanical photography, to photograph water lily plants and flowers. Water lilies were the most sacred plant, flower, and seed pod of the Classic Maya for a thousand years.

So the first scanner we have systematically evaluated is the Zscanner 700. During a six month period we produced more than 30 FLAAR Reports so far, and another ten are in preparation. We have evaluated both the scanner and also Geomagic modeling software.

Here is a list of the scanners that we noticed at the RAPID 3D exposition:

- **Beginner**
  - threeRivers 3D: user friendly, fast, lightweight so portable, very reasonable price.
  - 3D3 Solutions, white light scanner
  - NextEngine
- **Entry level**
  - Zscanner 700: easy to learn, portable, well known brand name (Zcorp)
  - Zscanner 800 (color)
  - Creaform, various models and OEM manufacturer for other brands.
  - Nikon ModelMaker MMDx, MMC
- **Mid-range**
  - Dimensional Imaging, DI3D, uses four Nikon cameras
  - FARO
  - Konica Minolta Range 7 and other models
  - Capture 3D, ATOS
- **High-end**
  - Steinbichler Vision Systems

Non-portable 3D scanners, such as Metrotom from Zeiss, are half-million dollar machines, and not intended for use in the field!

Breuckmann scanners were exhibited in 2009, but I did not notice a single Breuckmann scanner this year in 2010. If they were present, they were well hidden.

3D Scanner by Next Engine.

3D Scanner by Faro.

Favorite scanners

A scanner for beginners or an entry-level 3D scanner could be ideal for a community college, college, or university that wished to teach 3D scanning and 3D modeling software. Once they were familiar with the low-priced scanners, it is logical they would graduate to mid-range.

So the threeRivers 3D or 3D3, or Zscanner, would be logical options for an educational institution. Since FLAAR has been on-campus half of its life (we created the digital imaging entities at two universities, BGSU in Ohio and Francisco Marroquin University in Guatemala). So we have plenty of experience with what universities seek for teaching equipment.

FLAAR is now independent because no university has space for our staff of 21 people. But we have been asked a trade school to prepare training courses in 3D imaging for a trade school in Guatemala . And in Slovenia I lecture each year at the University of Ljubljana and assist students with thesis topics related to digital imaging hardware and software.

At mid-range, the FARO and Konica Minolta 3D scanners are definitely of interest. I do not know the ATOS scanner or Capture 3D as well.

At the high end, Steinbichler Vision Systems is definitely a series of products that would be appropriate for a museum or an advanced technology research institute. Actually all Bureaus of the Federal US government come to FLAAR to ask for assistance in what products to consider. All the US Military, intelligence agencies, all Federal departments, and probably more than 20% of all Fortune 500 companies read the FLAAR Reports during 2001 through the present time (in those past years on wide-format inkjet printers, flatbed scanners, and advanced digital cameras).

So it is logical that all these US federal government agencies will continue to read FLAAR Reports when they notice that we now evaluate and recommend which brand and model of 3D scanner (and rapid-prototyper) to consider. For example, FLAAR is presently a consultant to a branch of the US military on which half-million dollar printer and which quarter-million dollar flatbed XY cutter/CNC router to consider.

Therefore it is useful if we have access to each range of 3D scanner so that we have our own practical experience from actually using each selected scanner in our own projects. Otherwise, if we have not used a scanner, we have no way to recommend its ease of use and capabilities.

Steinbichler Vision Systems Comet5 Laser Scanner.

A 3D scanner of special interest

The company dimensional imaging had a remarkable product. It consisted in an arrangement of four identical cameras. They used Nikon, but I assume you could use Canon also. I tend to use Nikon myself, but at FLAAR we also have Canon.

What was memorable about the DI3D system was its instantaneous capture capability, and the fact they are high resolution: you can use 12 MB or 20+ MB Nikon cameras, and I would assume a Zeiss lens if you wish added quality.

A Russian student of architecture at a local California community college, Oxana Yashchenko, was with the FLAAR team at the RAPID show. The kind personnel in the booth of dimensional imaging scanned her face, the face of FLAAR 3D team member Juan Luis Sacayon, and me.

Already while at the expo I felt this scanner was definitely unique, so I returned the second day and asked if they could scan the sides, back, and top of my head so we could do a complete 3D model. As soon as we process this image we will report back how it went.

In the meantime, here are the comments of Oxana:

“I opened up mine yesterday in rhino and it is pretty amazing! but I don’t have full set - its only half of me (front face). I would like to see what I can do . well I can definitely can do a cast already just by having these! I am pretty impressed about the quality and the surface - it is absolutely workable 3-d material ! w o w”.

Juan Luis Sacayón being photographed for a 3D picture at the Dimensional Imaging booth.

FLAAR experience in evaluating digital imaging products

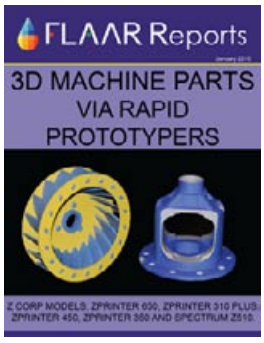
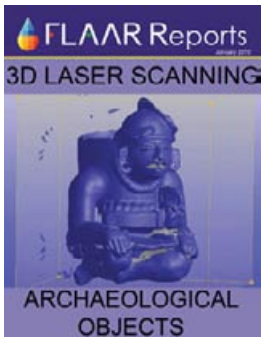
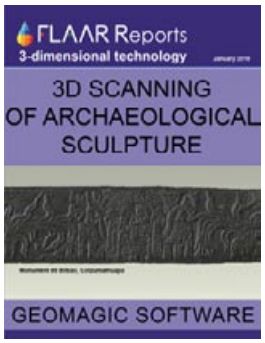
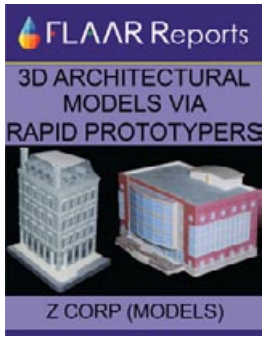
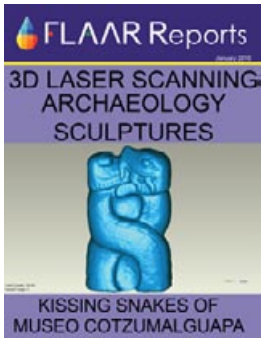
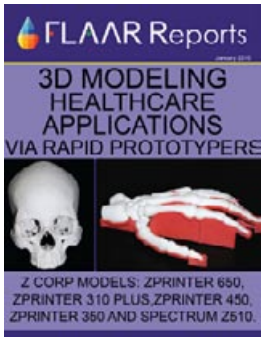
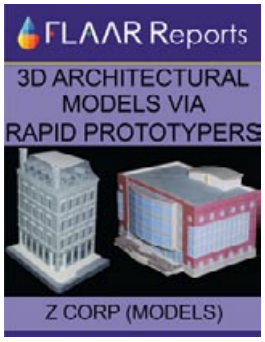
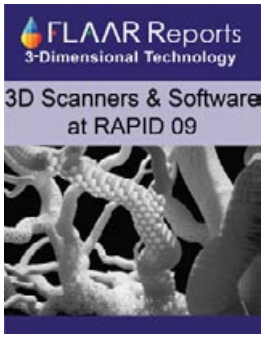
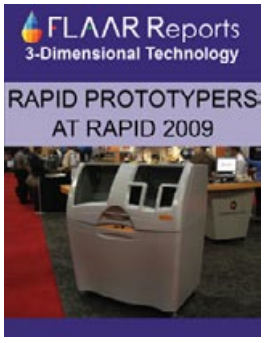
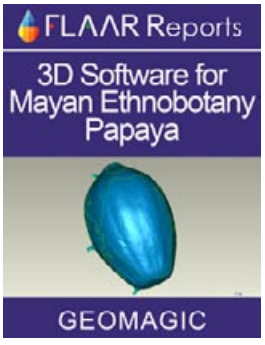
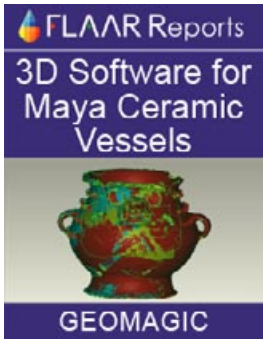
FLAAR is a non-profit research institute. We have been active in photography of archaeological artifacts and monumental pyramid-temple, palace and sacred ballcourt architecture in Guatemala, Mexico, Belize, Honduras, and El Salvador for over 40 years.

FLAAR has been the world leader in evaluation of wide-format inkjet printers, RIP software, color management, inkjet inks and substrates for over eleven years. Our FLAAR Reports on wide-format printers have been read by millions of people around the world.

Dr Nicholas Hellmuth is a VIP guest at signage and inkjet printer events in many countries and is consultant for corporations on every continent. For example, Nicholas is on the FESPA committee for organizing FESPA Americas (a new trade show that is replacing Graphics of the Americas). Dr Hellmuth is the Head of the Jury for selecting the best advertising prints in Dubai and has been VIP guest at the Sign & Graphics Imaging expo in Dubai the last several years.

All of this experience in advanced digital imaging is now being focused on 3D scanners, 3D modeling software, and 3D rapid prototypers and additive manufacturing equipment. This is a new division we started in winter 2009, and we are already high in search engines: just Google 3D scanner reviews

Even though thousands of 3D web sites have existed long before ours; even though we only started a few months ago, the FLAAR web sites are already on the first page of Google returns; indeed we are there TWICE.

So we can understand that a FLAAR Review evaluation of a 3D scanner will get plenty of attention in every country on earth.

FLAAR Reports and Reviews on 3D Scanners and Software