

ZScanner[®] Introduction

Handheld, Self-Positioning 3D Scanners



Z CORPORATION[®]

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Introducing Z Corporation



- Z Corporation® has created the category of high speed, low cost, full color 3D printing
- Z Corporation is the Growth and Innovation Leader in 3D Printing
- 3,000+ customers worldwide
- Located in Burlington, MA USA (Boston Area)
- Highlights
 - *Popular Science* “Best of What’s New” Award
 - *NASA Tech Briefs* “2006 Readers Choice Product of the Year”
 - *Product Design & Development* “11th Annual Engineering Award,” Bronze
 - *2006 Northeast Shingo Prize for Excellence in Manufacturing*, Bronze Medal
 - *2006 Design News* “Golden Mousetrap Award,” Runner-up Z Corporation has created the category of high speed, low cost, full color 3D printing



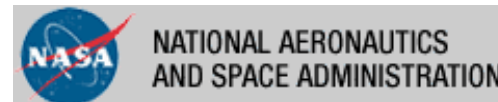
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Proven Technology



PORSCHE

invent



Why 3D Scanning?



- Collect large amounts of dimensional data in a short amount of time
- Measure delicate or complex parts without contact
- Reverse engineering
 - Digital archive
 - Production vs. CAD
 - Share and collaborate projects and revisions

Self-positioning, Digitize 3D Surfaces in Real Time



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- External positioning system not required
 - ZScanners are part-referenced
 - Can use external referencing if needed
 - Scan all sides of a part in one session
 - No need to re-orient part (saves time)
 - No need to stitch or register multiple data scans (saves LOTS of time)
- Output STL surfaces in real-time
 - No point clouds that need to be post-processed
 - You can see your scan progress on the screen



ZScanners



- The world's first self-positioning, hand-held 3D scanners



- Fast
- Easy-to-use
- Versatile
- Affordable

Why the ZScanner?



- Fast
 - Quick to set up
 - Collect millions of data points in minutes
- Easy to use
 - Experts are not required
 - Can be a shared resource, especially in education
- Versatile
 - Wide range of part sizes
 - Wide range of applications
- Transportable
 - Used in various locations and environments
- Non-Contact
 - Ideal for delicate or valuable samples

Easy to Use



- Simple set-up
 - Apply targets
 - Start scanning
- See results in real-time on monitor
 - Avoid missing some areas
 - Get real-time feedback on proper positioning of scanner
- Simple user interface
 - ZScan software easy to learn



Versatile



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- High-quality system with excellent CCD cameras
 - Can scan small parts with good detail
- Mobility lets you scan large objects like cars or yachts
 - Bring the scanner to immovable objects
- Ability to scan under and around objects
 - Under the dash of a car
 - Under a large statue that can't be moved
- Multiple resolution modes
 - Resolution can be changed globally or locally on-the-fly

Ensuring Success with the ZScanners



- Best in class application support
- Method sheets
 - Best practices
 - Tips and tricks
- Online resources
 - Software updates
 - Worldwide user group meeting

ZScanner[®] 700 CX



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New ZScanner[®] 700 CX

World's First Handheld Color Laser Scanner



- Extends proven ZScanner 700 platform
- Captures entire picture of an object, not just geometry
- White LEDs for consistent color capture
- Automatic, fully accurate texture mapping
- Adjustable and uniform texture resolution
- Dual scanning mode-color and monochrome in every scan
 - Push-button activation for color capture
- Multiple export formats
 - .OBJ, .WRL, .X3D, .ZPR, .PLY, .STL, .MA, .DAE
- Ideal for product design, cultural heritage, anthropology, archeology and art applications

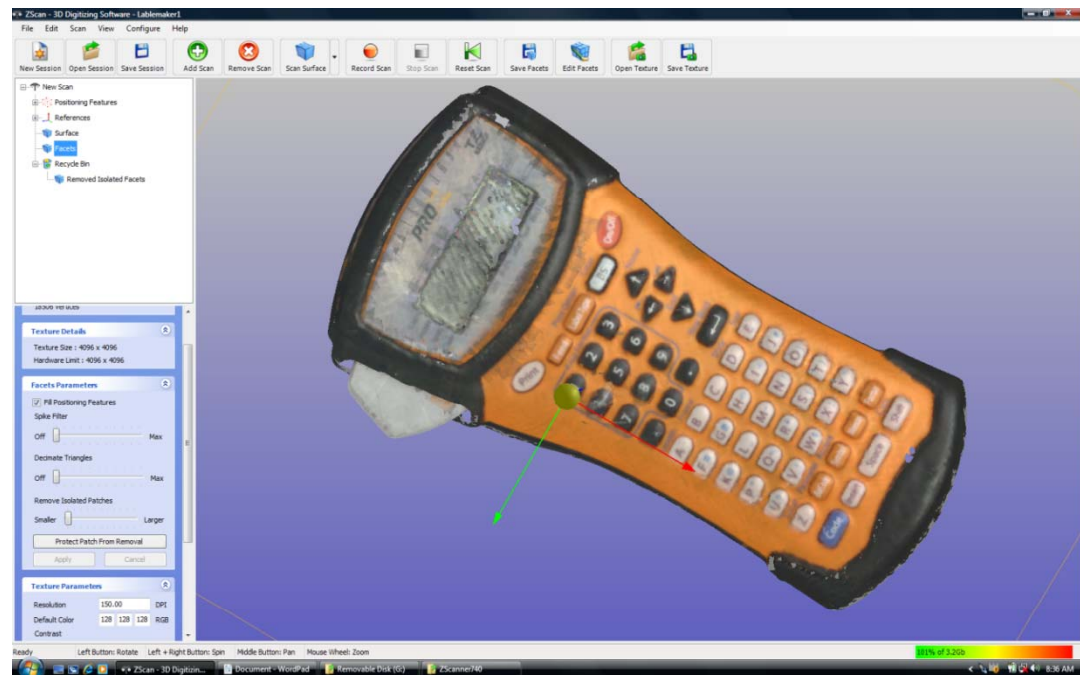


Color Capture



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- Captures color at user defined resolution
 - Up to 150 dpi
 - 24 bit sRGB calibrated

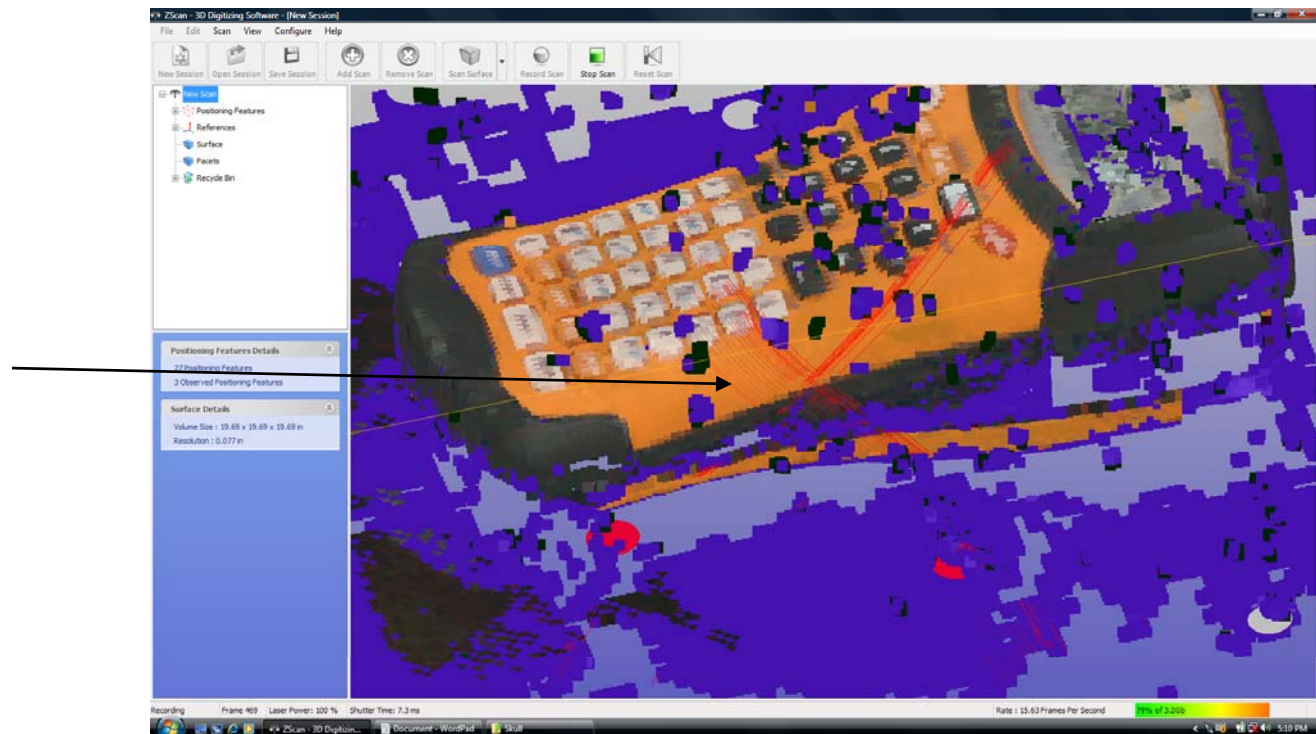


Color Capture



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- See color capture during the scan
 - Less rework

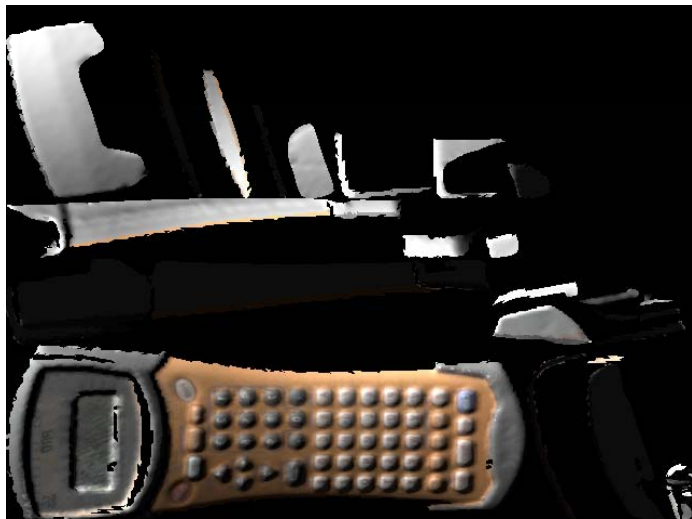




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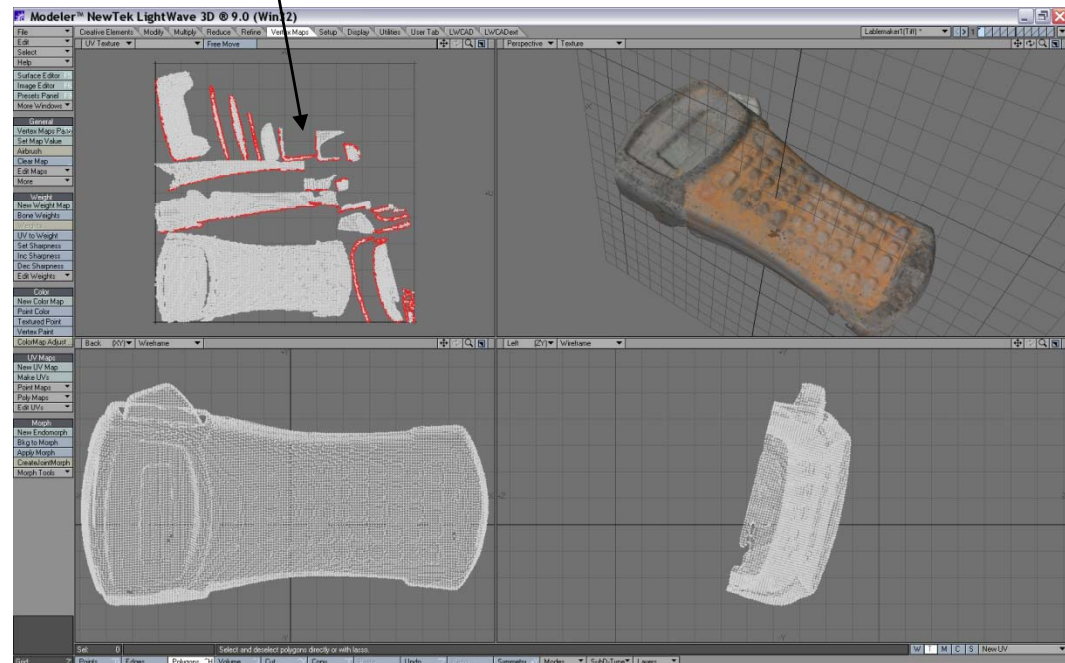
Color Capture

- Texture map can be saved separate from the mesh
 - Texture map can be cleaned up in photo editing software



↑
Scanned Texture
Applied to UV Map

UV Map



Note: Requires add'l software

Applications



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- Reverse engineering
 - Part to scan to color prototype in hours
- Heritage
 - Archival information
- Gaming
 - Rapid acquisition / rendering of complex geometry for game environments
- Multimedia
 - Websites and presentations

ZScanner[®] 700 PX



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New ZScanner[®] 700 PX

Only Handheld Laser Scanner With Large-Scale Photogrammetry



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- Delivers portability and ease of use of ZScanner 700, plus photogrammetric accuracy
- Up to 8X greater accuracy when scanning very large parts
- Unlimited and configurable working volume
- Scanning and photogrammetric data automatically stored and processed in one step
- Decimate Triangles slider provides higher resolution while maintaining larger triangles on flat surfaces for smaller .STL files
- Portable, lightweight, with easy plug and play setup
- Suitable for reverse engineering and inspection applications, 3D archiving, complex shape acquisition, measurements archiving, and damage assessment





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High Accuracy on Large Parts

- Built-in AICON™ photogrammetry software provides consistent, high data accuracy for large parts
 - Accurately, easily scan objects of any shape, color, finish, location
- Eliminates exponential error accumulation
 - No leapfrog or multiple set ups needed



Unlimited Working Volume



Z CORPORATION®

- Quick and easy measuring process
- Multiple set ups not required

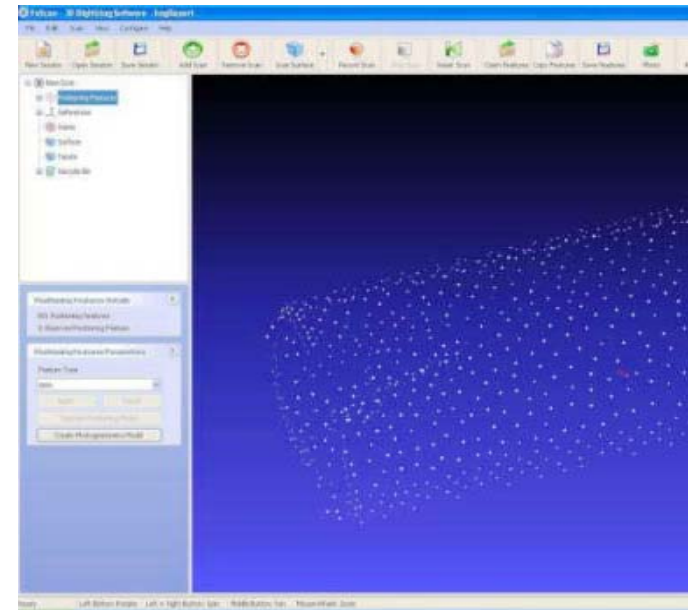


One Step Process



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- Automatically, simultaneously stores and processes scanning and photogrammetric data
- Eliminates external post-alignment



Applications



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- Reverse Engineering
 - Surface reconstruction
 - 3D modeling
 - Tooling & jigs development
 - Maintenance, repair & overhaul (MRO)
 - Finite Element Analysis (FEA)
- Inspection
 - Non contact inspection
 - First article inspection
 - Supplier quality inspection
 - Part-to-CAD inspection
 - Conformity assessment of 3D models against original
 - Conformity assessment of manufactured parts
- 3D archiving, complex shape acquisition, measurements archiving, damage assessment, digital models & mock ups, rapid prototyping

ZScanner[®] 800



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ZScanner[®] 800 Product Description



- All the great features of the ZScanner 700, plus
 - Third middle camera
 - Button for activating third camera for high resolution mode
 - Improved software algorithms
 - More rigid and precise hardware construction for enhanced accuracy
- Advantages
 - Higher Resolution
 - Automatic Multi-Resolution
 - Enhanced Accuracy



5X Resolution Improvement



- ZScanner 700 – Z Resolution is 100 microns
 - 250 micron XY
- ZScanner 800 – XYZ Resolution is 50 microns
 - 50 micron in all dimensions
- Standard Resolution mode (just like ZScanner 700) for regular scanning. High Resolution mode can then be engaged during scanning for areas of high detail

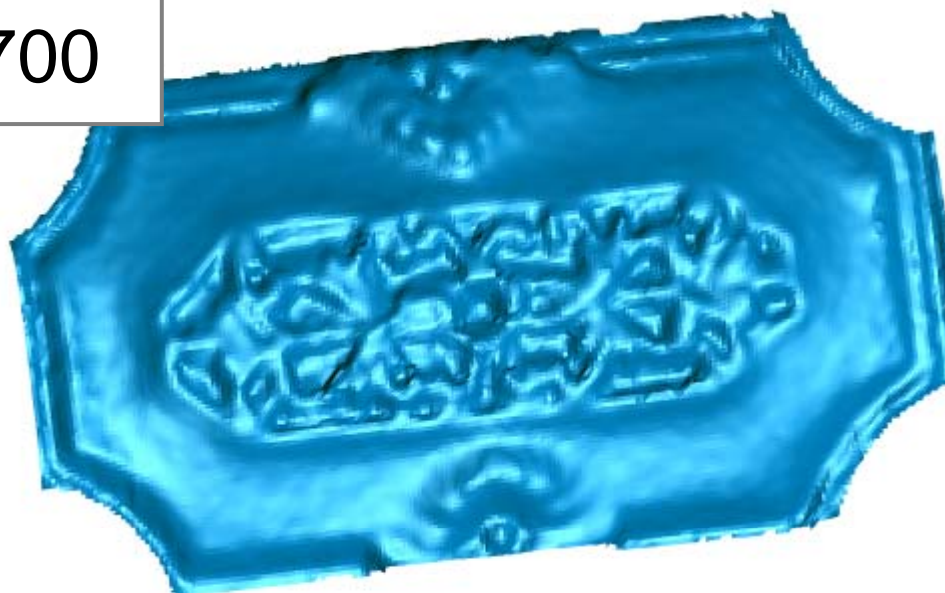


High Resolution



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Z Scanner 700



Selected Triangle: 0
Current Triangle: 44,718
Z: 0.476251 | 12.368938 | 12.84133964
Y: 1.622222 | -1.020754 | 0.5836414
X: 0.878887 | 8.922868 | 1.9816104

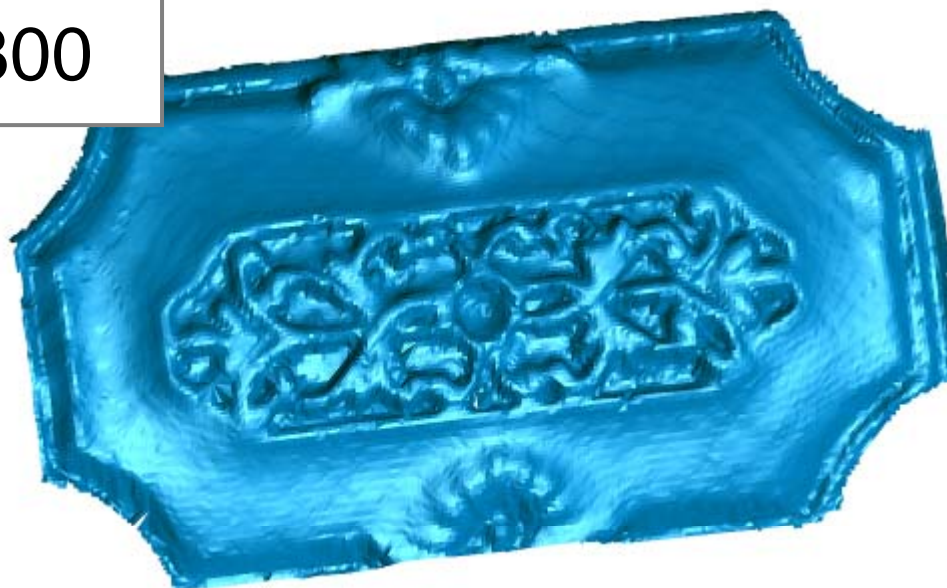


High Resolution



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ZScanner 800



Selected Triangle: 8
Current Triangle: 41384
Z: 0.452137 | 12.30078 | 12.8530524
Y: 1.626252 | -1.000782 | 0.5955224
X: 0.873422 | 8.507084 | 1.8864784

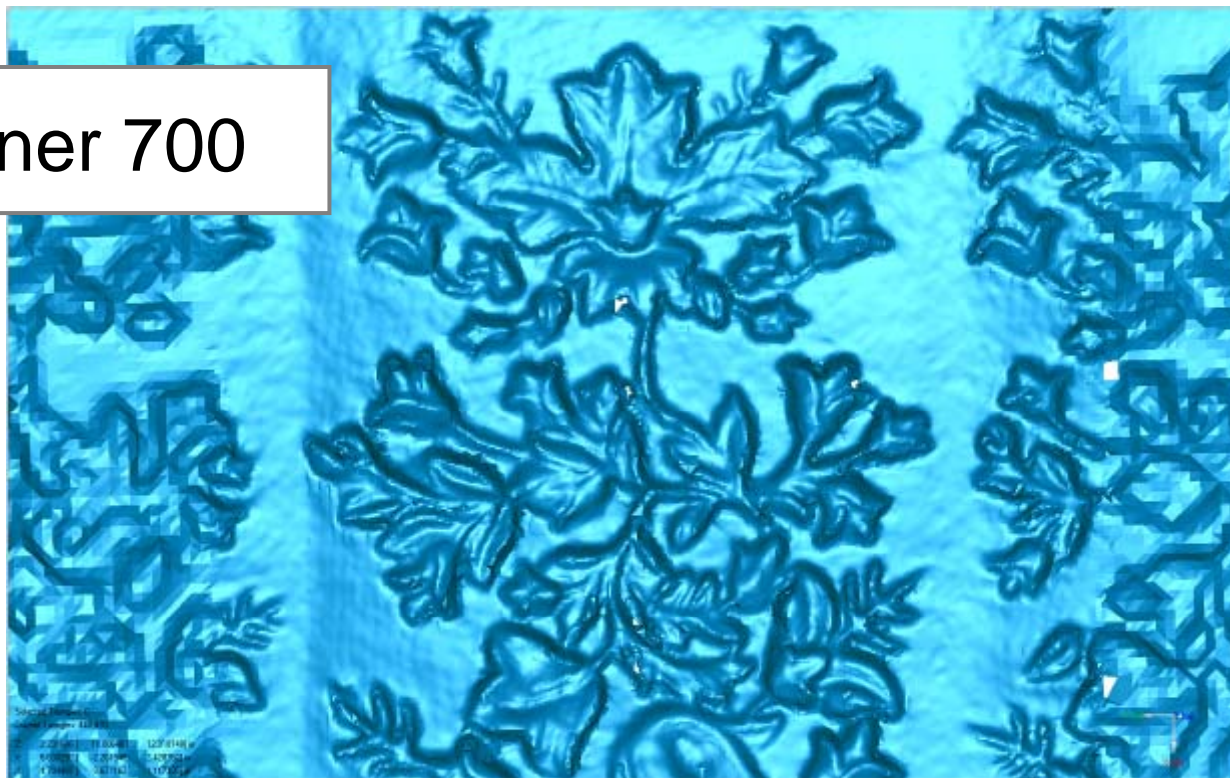


High Resolution



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ZScanner 700

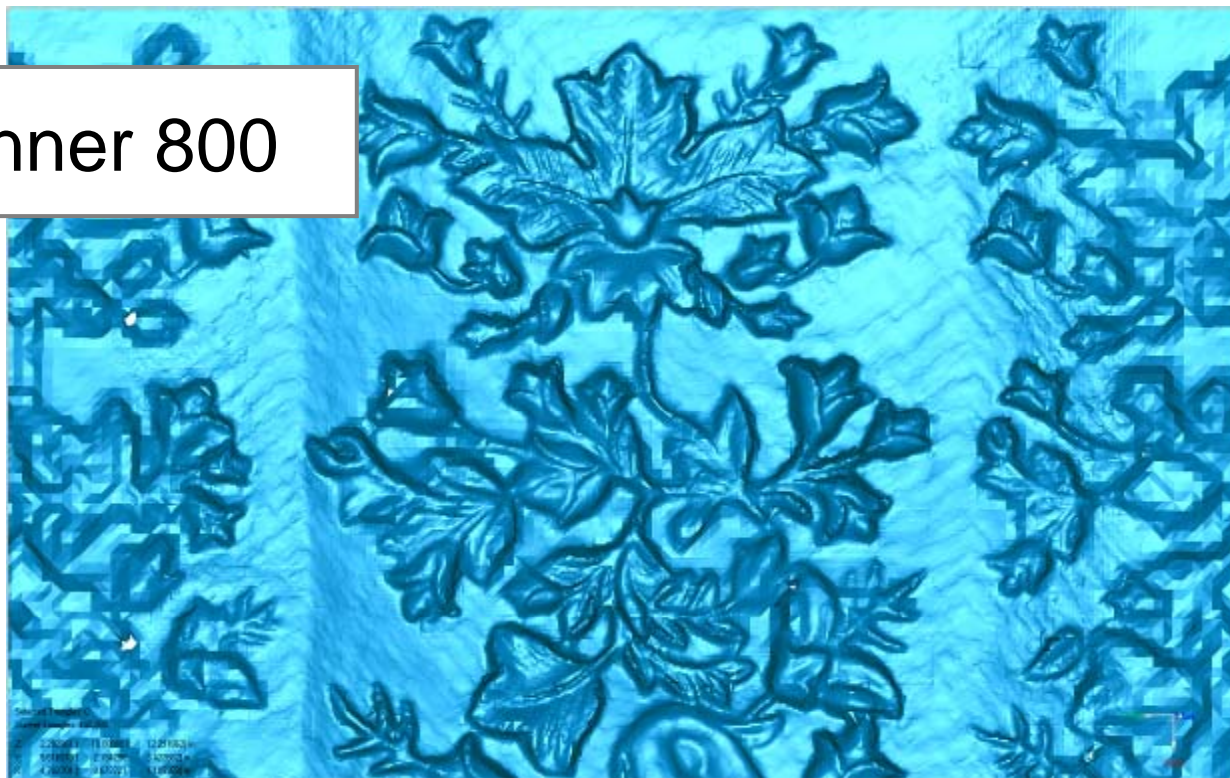


High Resolution



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ZScanner 800

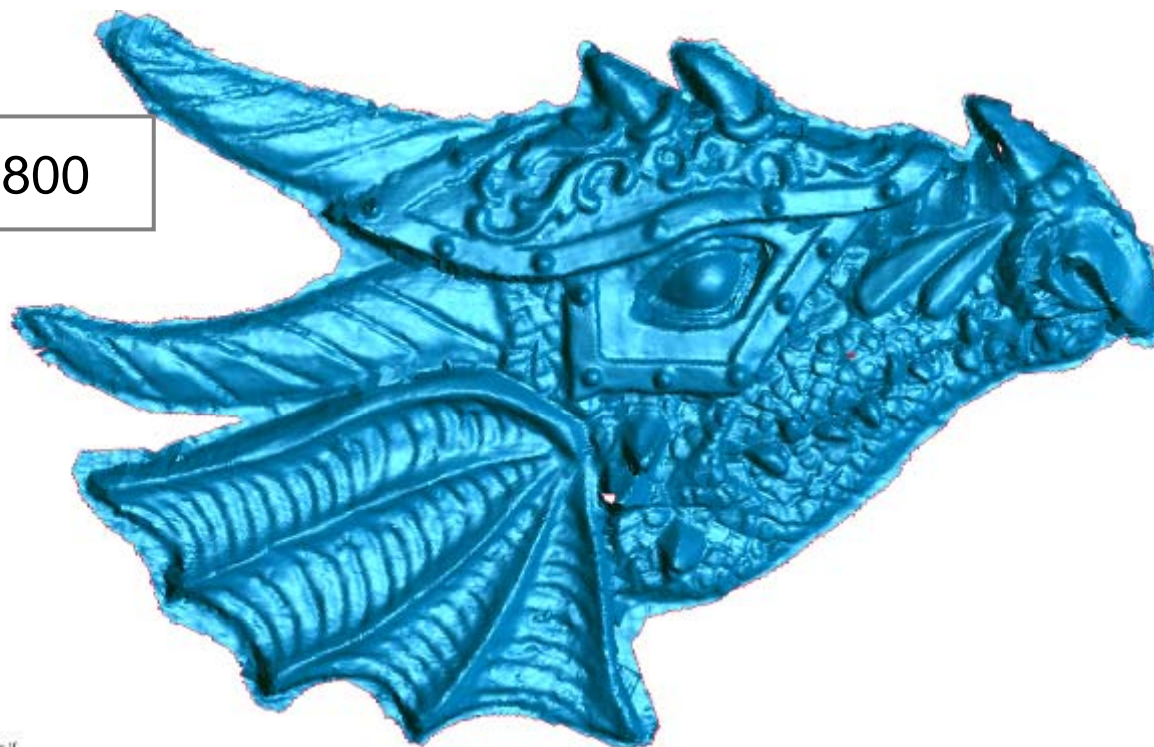


High Resolution



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ZScanner 800



Height: 16
Width: 120*107

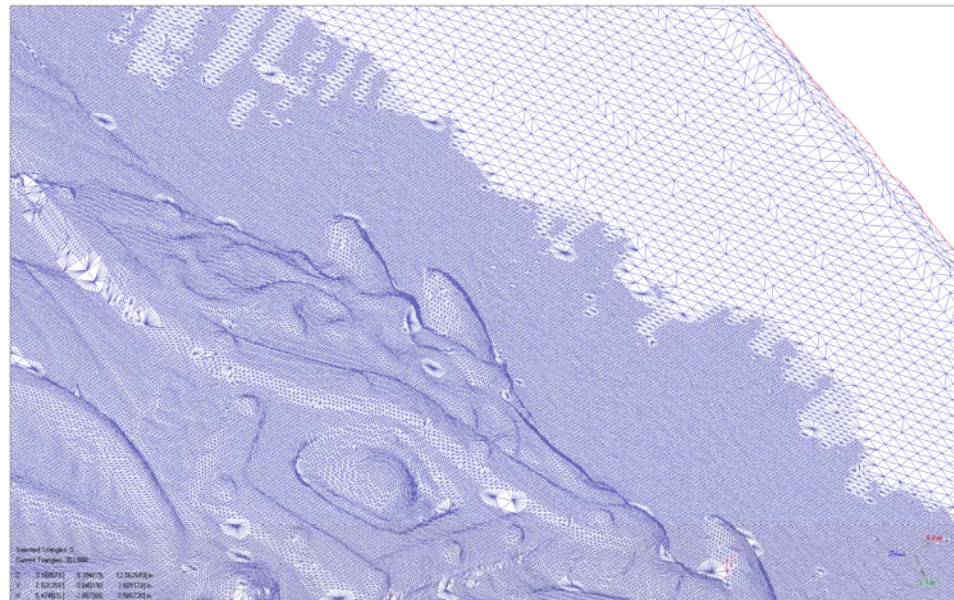
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Automatic Multi-Resolution

- Variation of triangulation based on resolution mode. Larger triangles in lower resolution mode, smaller triangles in high resolution mode.
- In High Resolution – field of view becomes smaller



Enhanced Accuracy

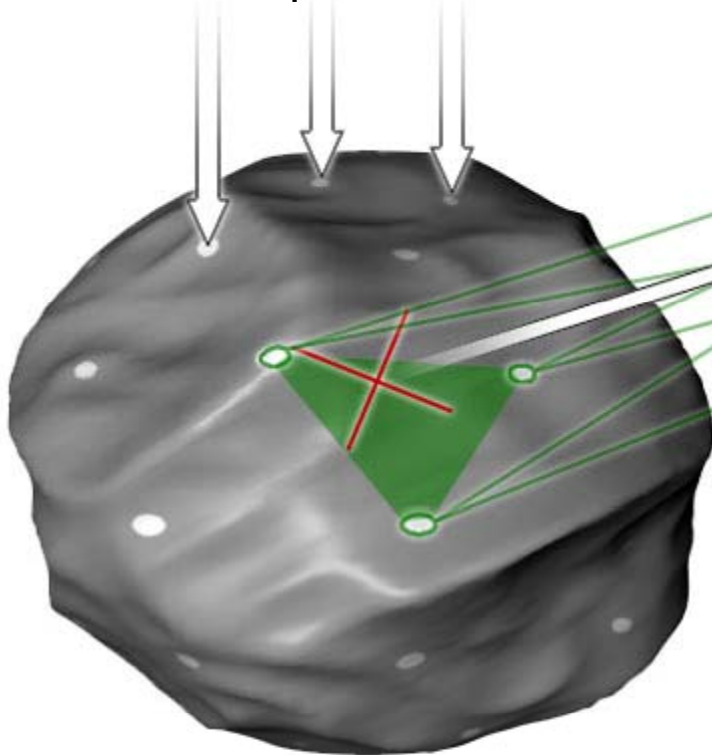
- More rigid and precise hardware construction
- Improved software algorithms
- More precise targets
- Comparison
 - 40 microns vs. 50 microns
 - ZScanner 700: 0.220 mm on 1m part
 - ZScanner 800: 0.120 mm on 1m part

How it Works: Auto-Positioning System



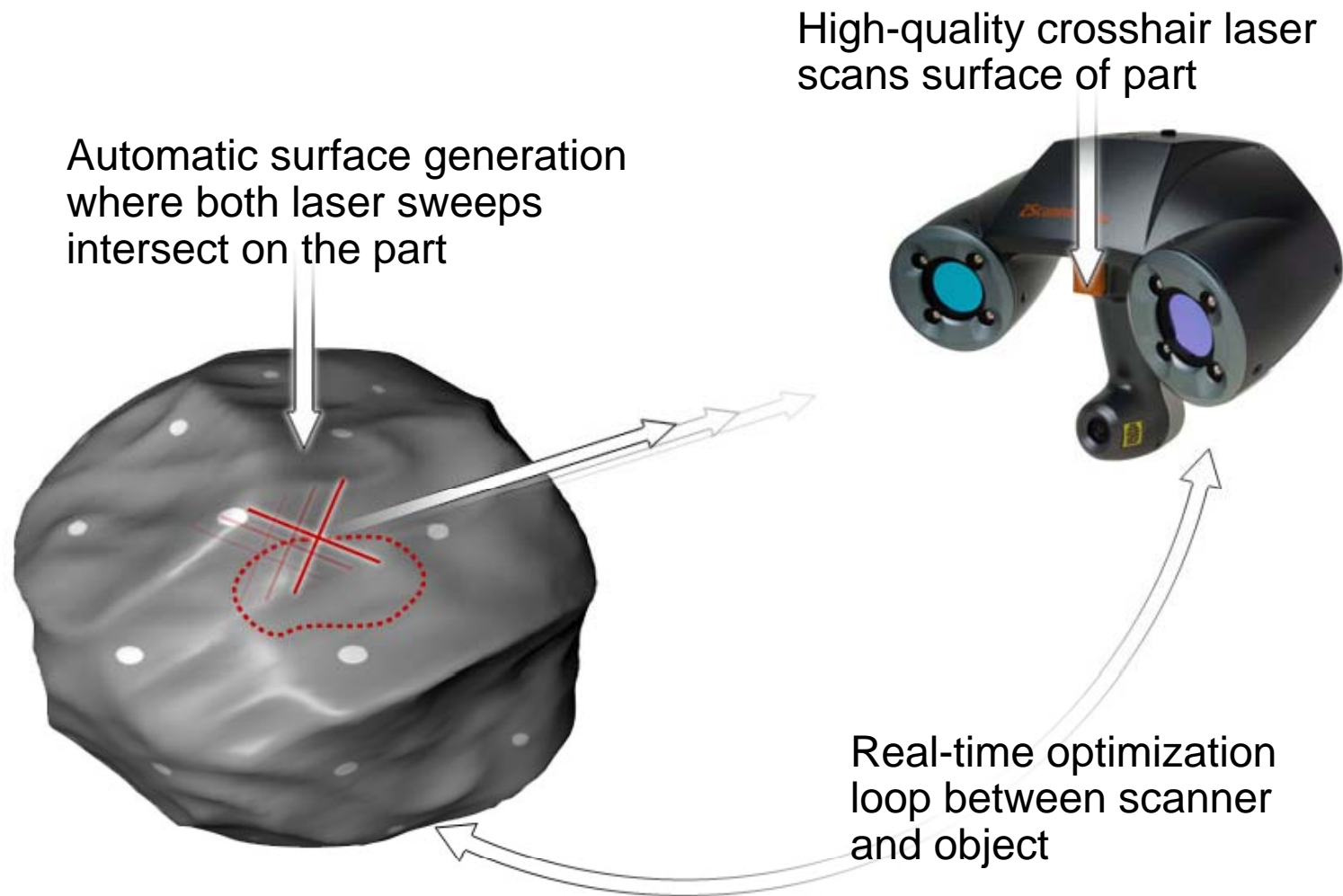
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Adhesive reflective dots mounted on scanned part in random fashion



High-speed CCD cameras track points and use proprietary triangulation to determine part orientation in real-time

How it Works: Real-Time Surface Generation

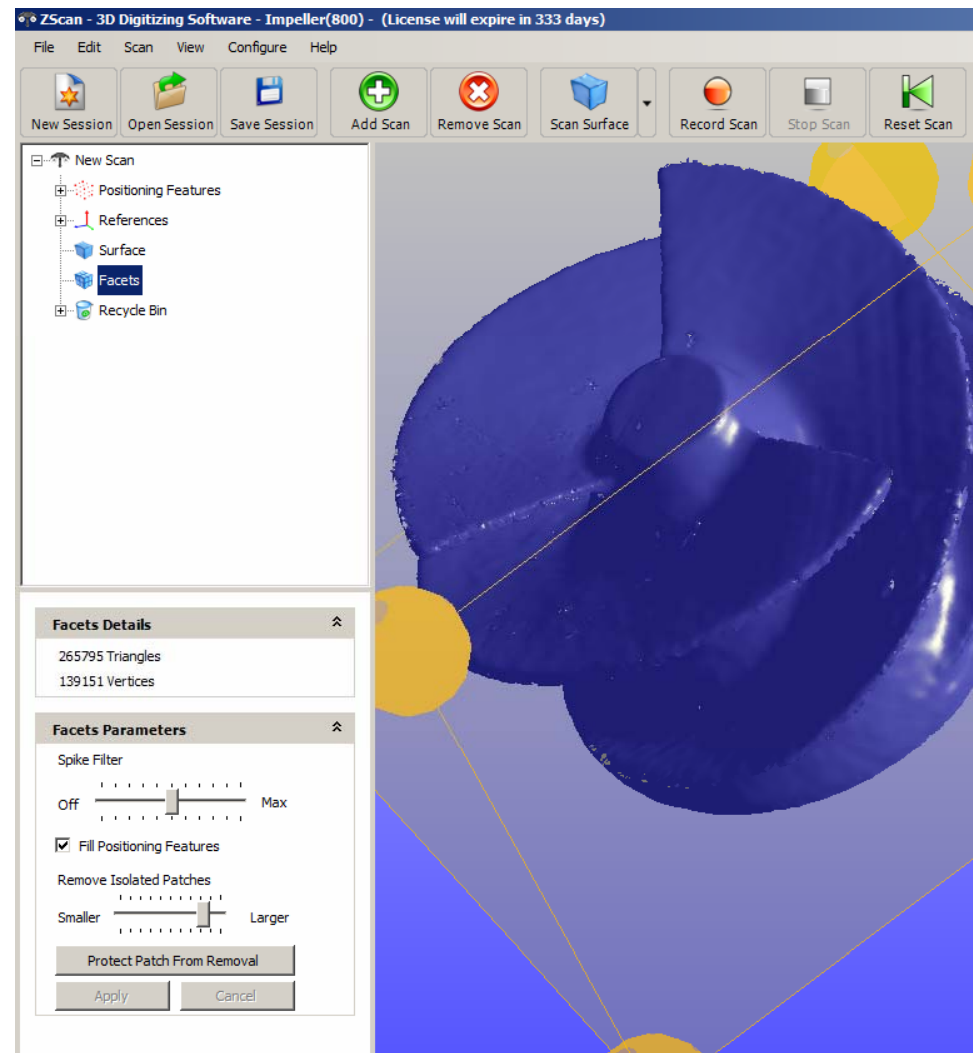




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Real Time Capture Software

- Easy to learn software
- Plug & play system
- Surface optimization algorithm
- Real time surface rendering
- File export in standard formats
- Meshing optimization
- Sensor auto-calibration
- Compatible with Windows operating systems
 - XP Business 32 bit
 - Vista Business 32 bit
 - Vista Business 64 bit



ZScan™ 2.1 Key Improvements



- Full compatibility for the ZScanner 700 and ZScanner 800 platforms
- **Decimate Triangles** function
- New **Lock Zoom** function lets the user zoom on particular details while scanning
- Redesigned live surface rendering has a better look and feel than previous versions
- Quick dynamic rendering mode to conserve graphics card memory
- 3D viewer control modes can mimic familiar 3D programs such as Geomagic
- Default scanning parameters can be customized
- Enhanced surface reconstruction including improved surface edge recognition and reconstruction
- Redesigned spike filter to improve details/noise differentiation
- Redesigned **Optimize Surface** algorithm for more efficiency

Applications



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- Reverse engineering
 - Speed, accuracy and ease-of-use for aftermarket product design
 - Without CAD data from the manufacturer in order to develop mating parts
- Packaging Design
 - Create custom packaging by scanning product samples for exact geometry and texture data

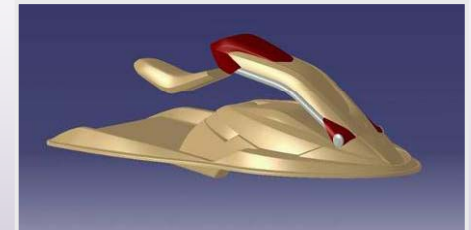


Applications



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- Ergonomic Design
 - Readily scan hand-crafted samples to produce complex designs from scratch
 - Incorporate unique shapes into design and engineering
- Arts & Cultural Heritage
 - Produce non-contact scans for accurate restorations and reconstructions of priceless artwork and architecture
 - Document, research and replicate great works for transportation, packaging, museum shops and historical archiving.

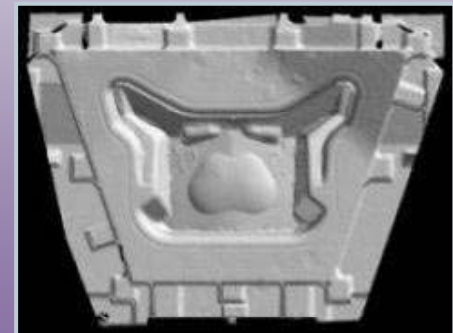
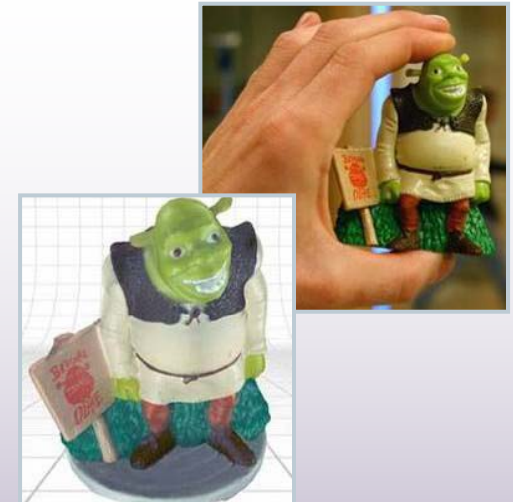


Applications



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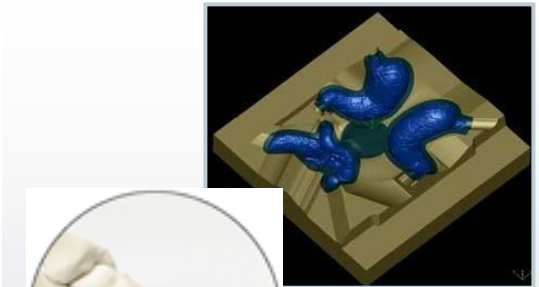
- Entertainment & Games
 - Create digital media for computer games and movies directly from artist's concept models
- Digital Archiving
 - Save money by storing tooling, samples and prototypes digitally
 - Capture legacy design that is not in CAD



Applications



- Medical Education
 - Create highly detailed reproductions of complex organs and bone structures
- Medical Orthosis
 - Custom design braces and other devices for precision comfort



Applications



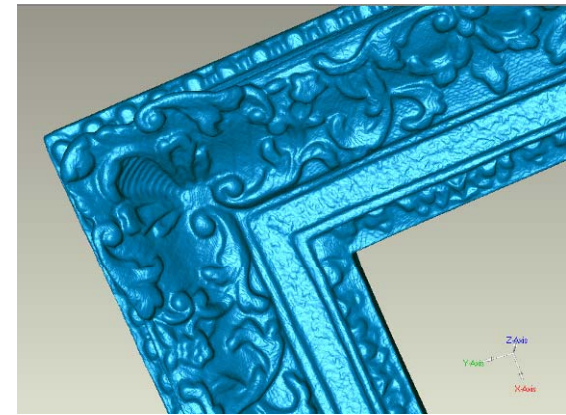
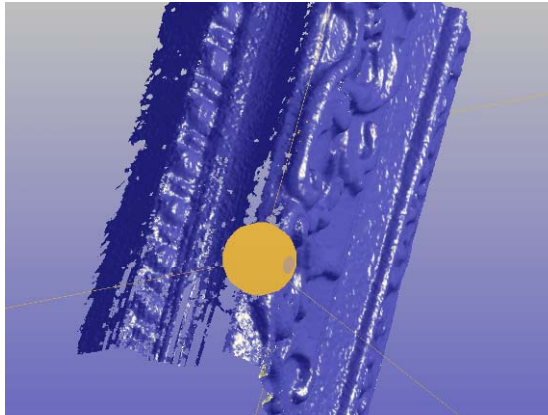
- Architecture
 - Custom Architecture Samples
 - Moldings, Columns, etc
 - Custom Statues and Logos
 - Company Logos
 - Architectural Themes
- Concrete Forms
 - Custom Concrete Decorations
 - Leaves and Nature
 - Artist Design that need to be in CAD data



Case Studies: Art Reproduction and Restoration



- Frame maker in Utah
 - Scans segments of giltwood frames then prints the segments in reverse for molds to be used in reproducing the frame
- Conservation team at a college art museum
 - Restoration of a 16th century Louis XIV giltwood frame
 - Scanning segments that are missing sections of gilt for molds to be used to restore the lost sections



Case Studies: Reverse Engineering



- Vehicle lighting and plastics manufacturer in Ohio
 - Uses the scanner to reverse engineer tooling
 - Many of their tools were not purchased with drawings and are in need of replacement
 - Using the ZScanners to create the drawings for replacement tooling
- A leading U.S. manufacturer of nuclear technology
 - Uses the ZScanner to convert legacy models to CAD
 - Imports the scanned models into CAD as parametric models
 - ZScanners are is used to replicate tooling on prototype machines
 - scanner outputs the stl files directly that are used on those machines

Specifications



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	ZScanner 700	ZScanner 700 CX	ZScanner 700 PX	ZScanner 800
Weight	0.98 kg (2.1 lbs)	1.3 kg (2.85 lbs)	1.27 kg (2.80 lbs)	1.25 kg (2.75 lbs)
Dimensions	160 x 260 x 210 mm (6.2 x 10.2 x 8.2 in)	172 x 260 x 216 mm (6.75 x 10.2 x 8.5 in)	172 x 260 x 216 mm (6.75 x 10.2 x 8.5 in)	172 x 260 x 216 mm (6.75 X 10.2 X 8.5 in)
Sampling Speed	18,000 measurements per second	18,000 measurements per second	18,000 measurements per second	25,000 measurements per second
Laser	Class II (eye safe)	Class II (eye safe)	Class II (eye safe)	Class II (eye safe)
XY Accuracy	Up to 50 microns	Up to 50 microns	Up to 50 microns	Up to 40 microns
Resolution	0.1 mm in Z	0.1 mm in Z	0.1 mm in XYZ	0.050 mm in XYZ
ISO	20 μ m + 0.2 L / 1000	20 μ m + 0.2 L / 1000	20 μ m + 25 μ m/m	20 μ m + 0.1 L / 1000
Texture Color	N/A	24bit sRGB calibrated	N/A	N/A
Data Transfer	Firewire	Firewire	Firewire	Firewire

ZScanner System Summary



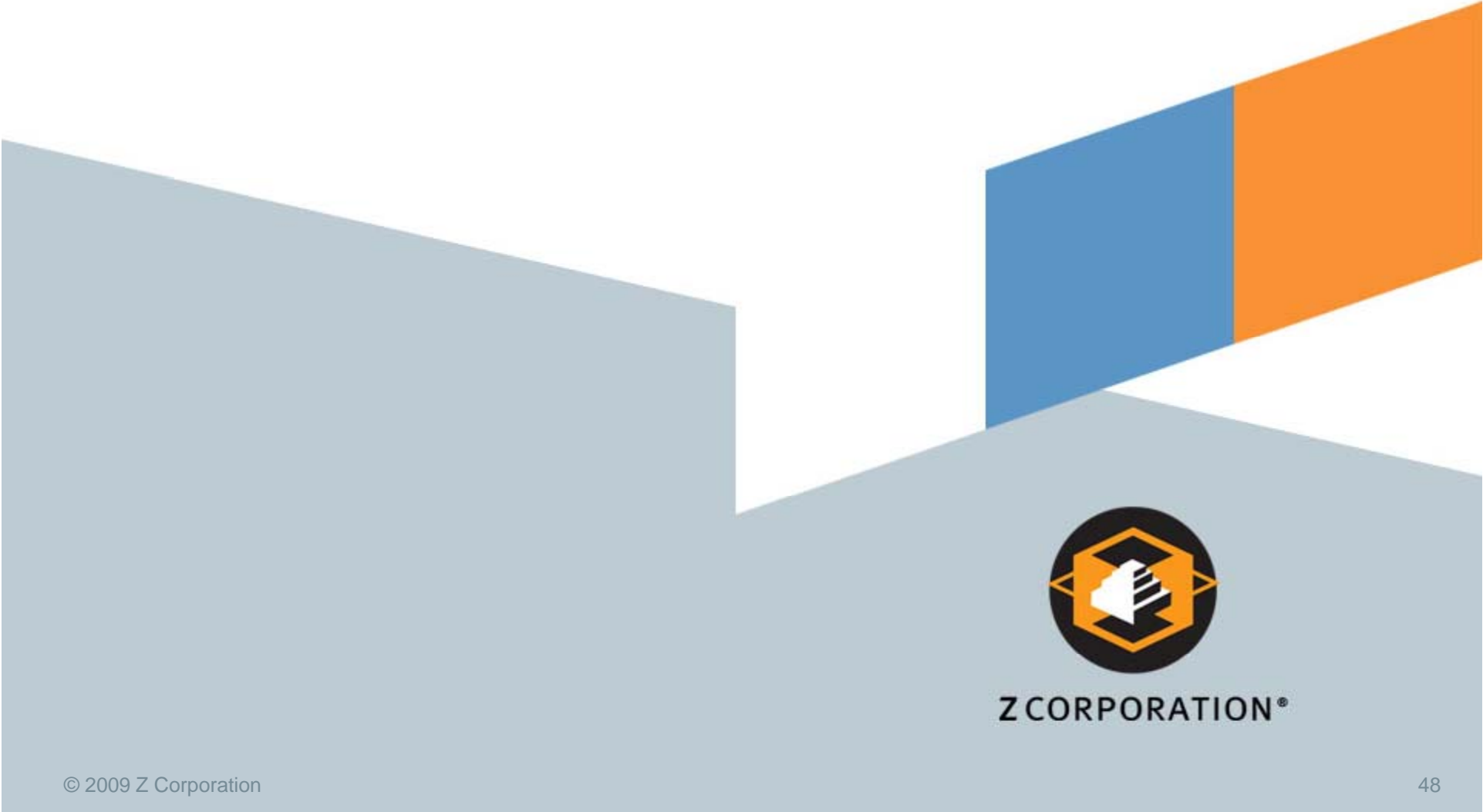
- The ZScanner 700, 700 CX, 700 PX, and 800 make 3D digitizing faster, easier and more portable than any other system
- Ease of use makes it a shared resource
- Versatile for a wide range of applications



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