3D scanning for forensics

Solving more crimes, fast.

Use scientifically proven accuracy and extensive coverage of 3D scanning to achieve faster, more targeted investigations, arrests, and successful prosecutions.

Contents

Achieve faster, more targeted investigations, arrests, and successful prosecutions

With 3D scanning, operator error at the scene is virtually eliminated, and agencies can rest assured that everything from footwear impressions to bullet holes to wrecked vehicles was captured exactly as it was right after the incident. Such 3D evidence and scenes can always be revisited, analyzed, and explored anytime, for current and future investigations.

Scenes that normally require days or even weeks to document and process using traditional forensics methods can now be 3D scanned and processed in just hours or less, while saving cost and providing evidence that is indisputable.

These immediate and long-term benefits of 3D scanning solutions translate into a high ROI for the department, the community, and the world.

55%

of violent crimes and

83%

of property crimes went unsolved in the US in 2019 (source: FBI)

Limitations of photographs to record crime scenes

Camera angle and distance from which photograph is taken →

can lead to false interpretation of critical relationships among objects.

Lack of depth →

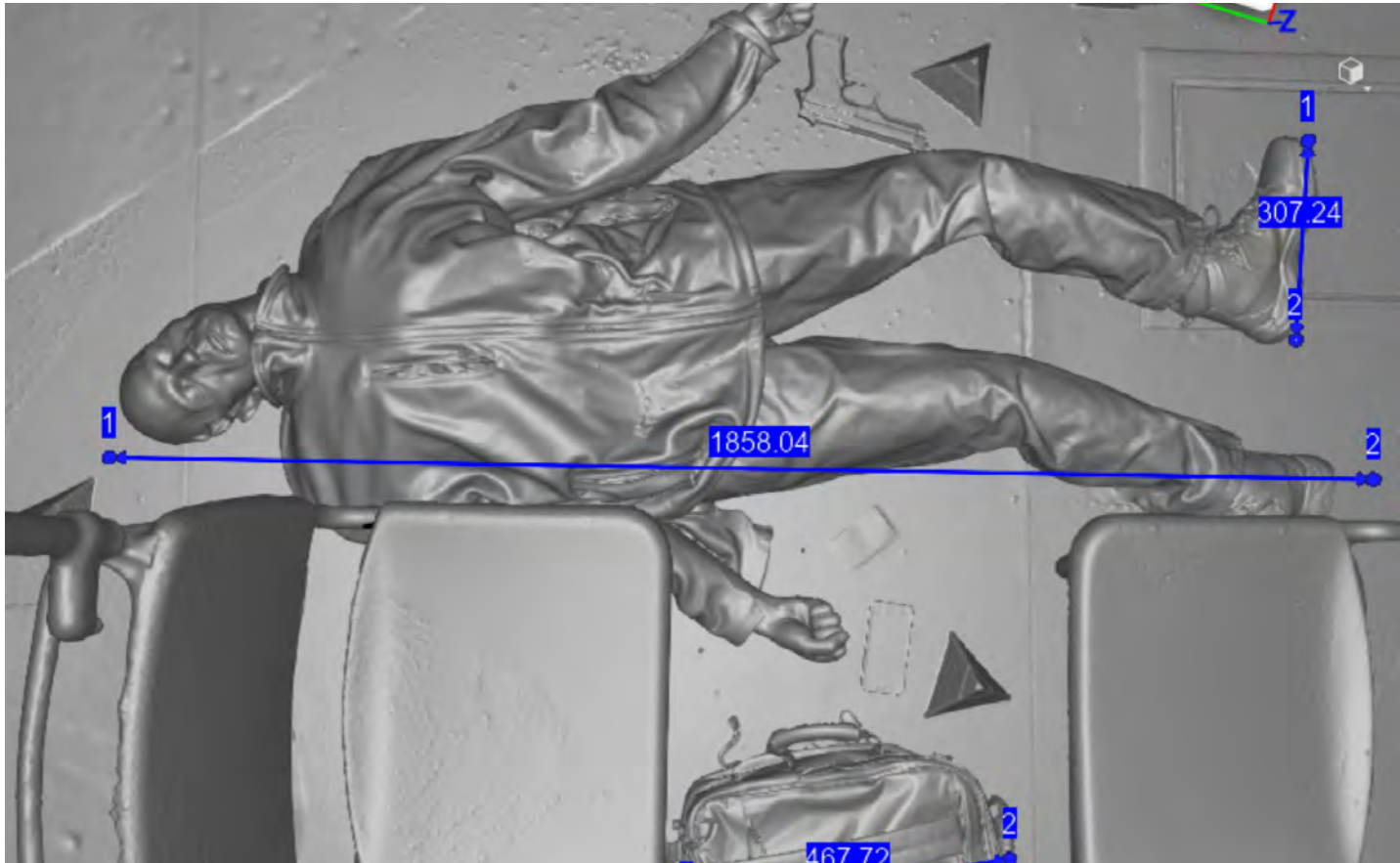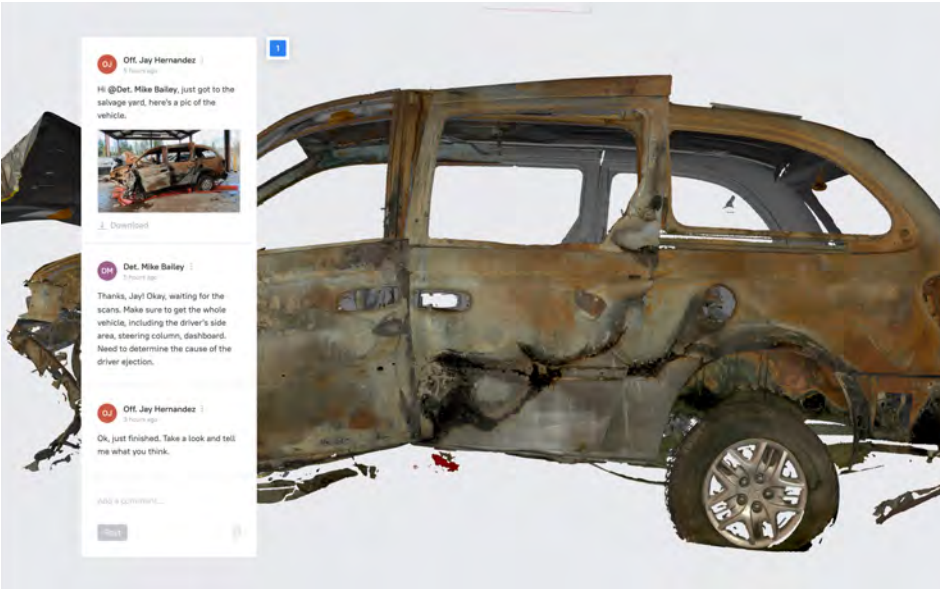failure to provide accurate representation of distances between items of evidence.

What can you do with 3D scanners?

Capture large amounts of data providing sources of additional information if needed later.

Share evidence with and consult forensic professionals across the world.

Measure objects and distances between objects.

National Institute of Justice: Benefits of 3D scanning technology [1]

Longevity
A complete record of the scene is available for subsequent analyses, giving end users the option to revisit the scene and examine the evidence in greater detail.

Thoroughness
Data obtained from scans documents the entire scene and may point to spatial evidence or relevant patterns previously missed, or not clearly visible.

Assurance
By employing 3D scanning, investigators can rest easy knowing that nothing at the scene has been tampered with or damaged during the documentation process.

Time-saving
Scans of accident and crime scenes can be obtained quickly and easily, and with fewer people required on site. The length of the documentation process varies depending on the type and complexity of a scene.

Increased public safety
The potential for faster scans may enable accident scenes to be cleared more rapidly, thus decreasing the potential for injuries to law enforcement as well as the motoring public.

Scientifically accurate data
3D scanning provides completely objective data and highly credible evidence that can be used for further analysis and investigation, or in a court of law.

[1] Landscape Study on 3D crime scene scanning devices — Riegl USA. (n.d.) rieglusa.com

Beat the clock and maximize return on your investments

> "3D scanning technology benefits outweigh costs for crime scene investigation units."
>
> Forensic Science International 2

3D scanning has been proven to be up to 6 times faster than traditional forensic documentation solutions, which means fewer specialists are needed at the scene, and they can work faster and more accurately than before.

While 3D scanners can entail a significant investment up front, they also deliver numerous benefits, both immediate and long-term. According to Forensic Science International, compared with traditional forensic documentation methods, 3D scanning solutions deliver faster, far more accurate data, with fewer personnel required, resulting in lower departmental costs and increased productivity.

Up to

6X FASTER

than using traditional documentation methods

When comparing two methods of data capture using a homicide mock scene for reference, Forensic Science International identified several advantages when using a more expensive, professional scanner:

Professional LiDAR 3D scanner:
Higher initial cost
Captured in 408 million points
Higher-quality data and more net benefits

Budget projected-light scanner:
Lower initial cost
37 million points – a far lower number by comparison
Lower-quality data and fewer benefits

[2] Tredinnick, R., Smith, S., & Ponto, K. (2019, September 18). A cost-benefit analysis of 3D scanning technology for crime scene investigation. Forensic Science International: Reports. Volume 1. Retrieved from sceincedirect.com

Artec 3D scanners for forensic analysis

Easily create virtual copies of physical evidence, and crime and accident scenes, exactly as they were when you scanned, with no risk of contamination or damage. The 3D data you obtain will give you the power to determine how and when an event occurred. In just minutes, capture evidence indoors or outdoors, including bloodstain patterns, bullet holes, tool marks, shoe prints, and more.

Fast

Artec 3D scanners capture at high speeds, keeping evidence intact and saving precious hours of work.

Up to 0.01 mm max. accuracy

By delivering unbeatable accuracy, scanning solutions help forensics teams reconstruct scenes precisely, and build stronger cases.

100% contactless

Contact-free data capture ensures all evidence is left intact and undisturbed, as it was at the time of the incident.

Easy to use

Training can take you and your team less than 2 hours, after which you will be ready to make highly precise 3D scans of evidence.

Leo

The world's fastest handheld 3D scanner, for small to medium-sized evidence, from bloodstains and bullet holes to human bodies, with 0.1 mm precision.

Learn more

Eva

A dependable, industry-favorite handheld 3D scanner for years, the Eva captures small to medium-sized forensic evidence at crime scenes in high-resolution color 3D.

Learn more

Ray II

This high-accuracy, long-range 3D laser scanner can rapidly document entire scenes up to 130 m away. Combine with an Artec handheld scanner for maximum coverage.

Learn more

Micro

For documenting small forensic evidence. This desktop 3D scanner excels at bullet casings, dental impressions, and other pocket-sized objects.

Learn more

Space Spider

A metrologically precise 3D scanner, the Space Spider documents even the finest details of evidence such as bloodstains, bullet holes, and footwear impressions.

Learn more

3D model of a mock crime scene from a Dutch Police training facility in the Netherlands. View 3D model

3D scanning applications in forensics

Forensic applications range from digitizing evidence to autopsy documentation
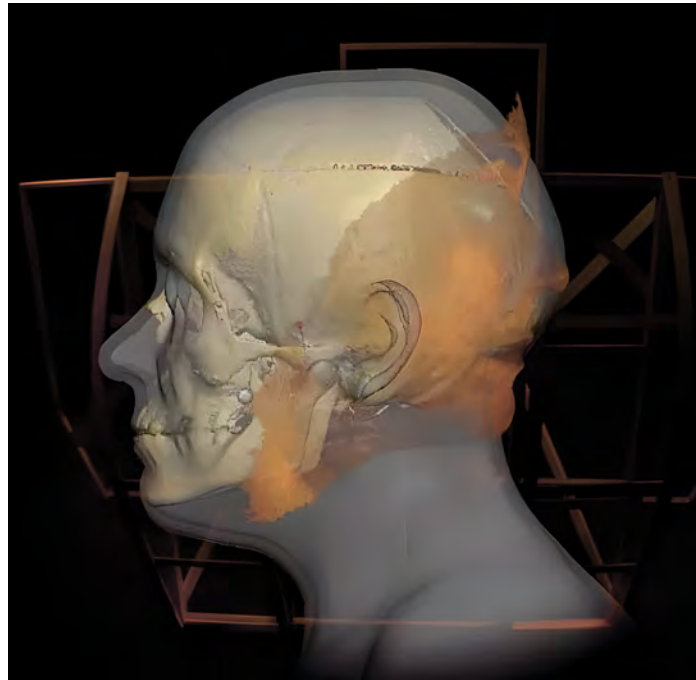
Collecting and digitizing evidence

Record and document all critical evidence onsite, so you can revisit and analyze any evidence later on.

All wounds and injuries captured for a complete picture

Forensic wound documentation

3D scanning with Artec Leo HD Mode:

- 2—5 min. to scan entire body
- <1 min. to scan specific wounds
- Submillimeter-precise 3D models
- Ready for VR, AR, courtroom usage

Traditional forensic photography & manual measurements:

- 30+ min. photographs, tape measurements
- High chance of operator error
- Extended photo processing required
- Unable to easily share 2D results

Scan dead bodies at the scene of the crime

Forensic footwear impression documentation

3D scanning with Artec scanners:

- 1 minute to scan an impression
- <5 min. scanning specific wounds
- 3D model ready for sharing/3D printing

Traditional footwear impression casting:

- 24+ hours for casting to dry
- Difficult dental stone casting method
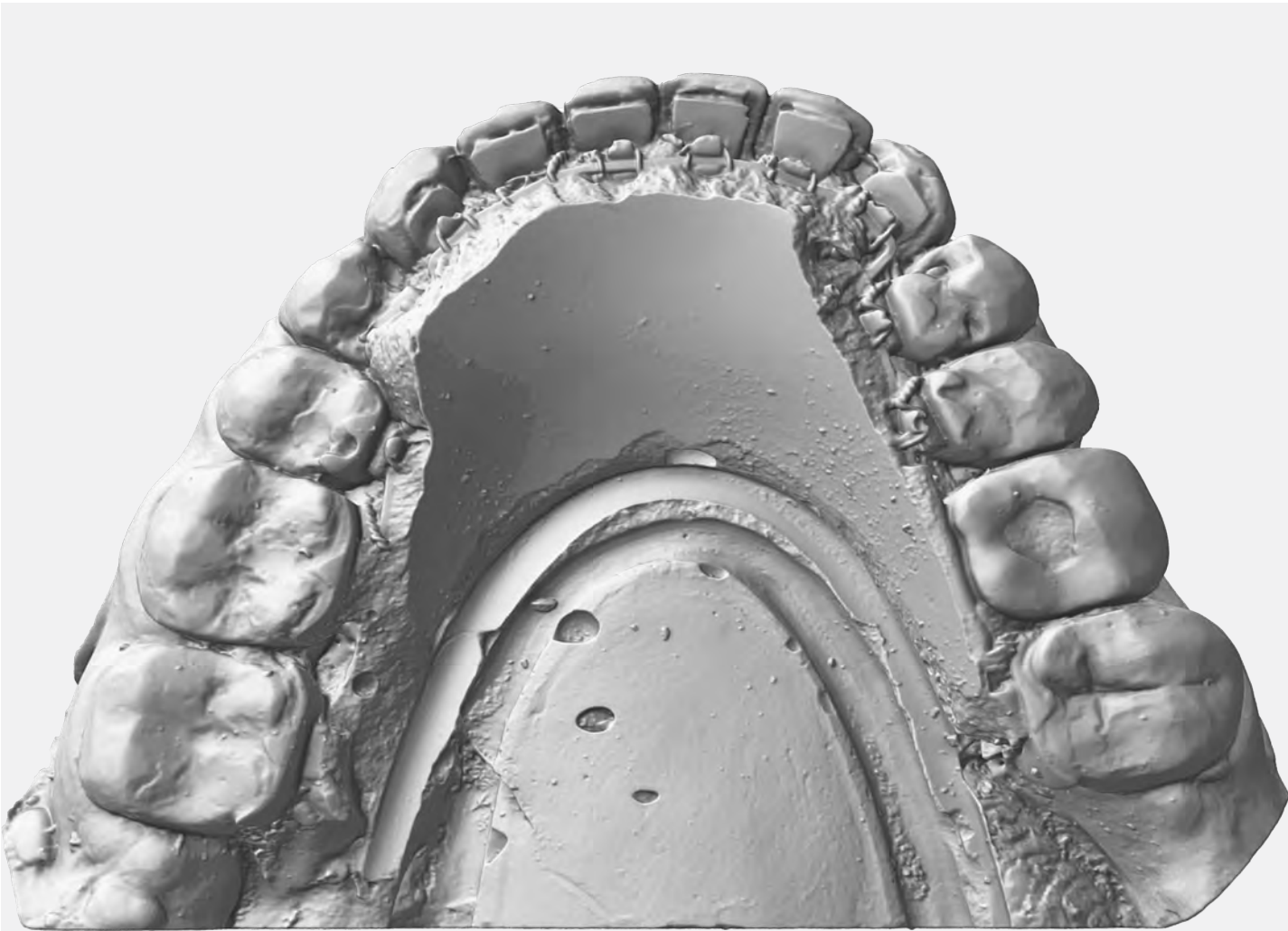- Chance of gaps, extraneous matter present

3D model of a footprint for further investigation

Forensic anthropology & odontology

3D scan human skeletal remains and entire death scenes to determine the identity of the deceased, estimate the time of death, and interpret any signs of trauma present.

3D model of teeth. View here

Clandestine grave documentation

3D scanning with Artec Leo HD Mode:

3—5 minutes to capture entire grave
Touchscreen confirmation of scan coverage
Scan during excavation, layer by layer
Option to include iPhone or DSLR texture

Forensic photogrammetry:

5+ minutes for entire grave
Risk of gaps in photo coverage, found too late to retake
No built-in measurement scale
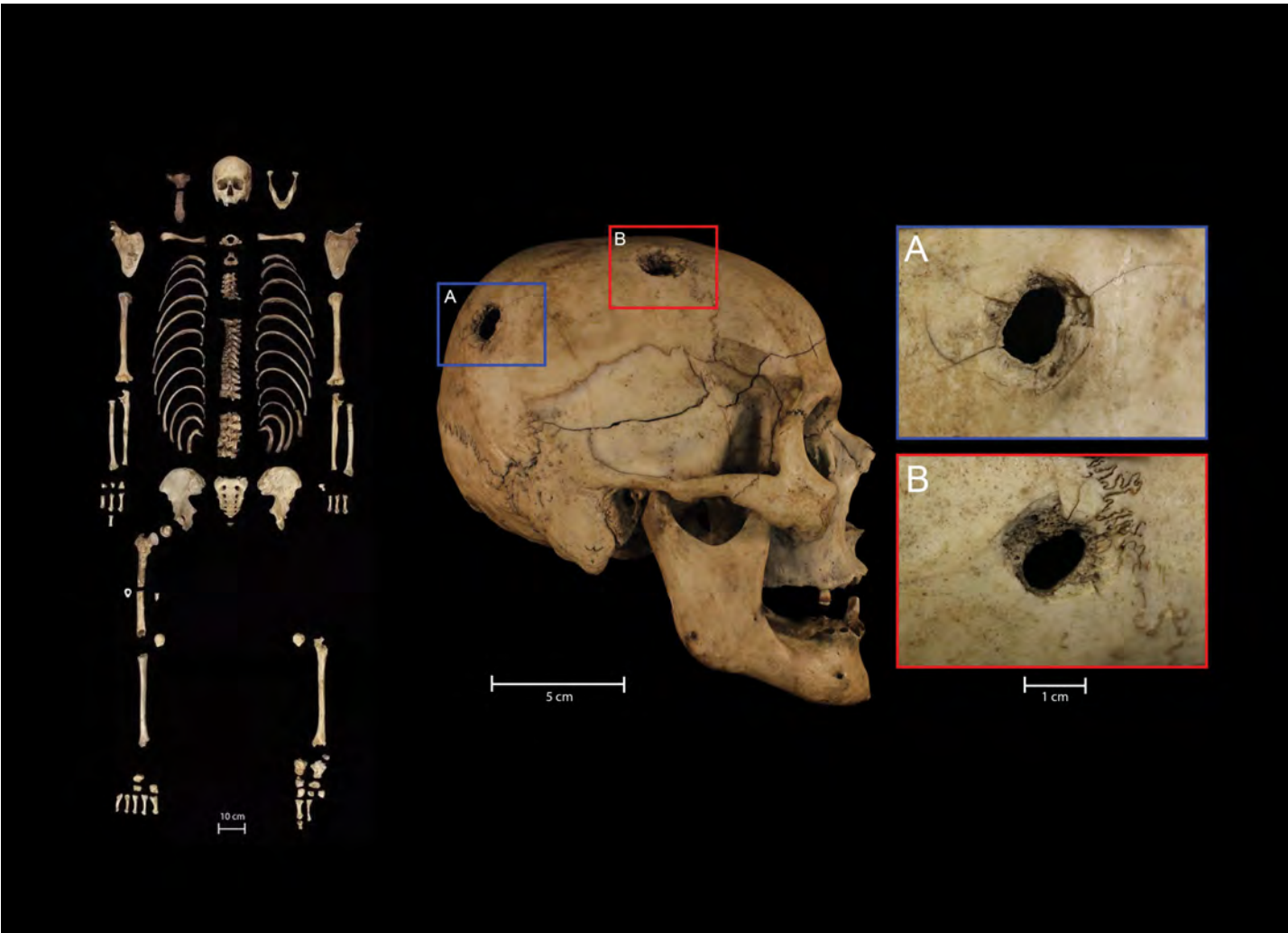
Disarticulated skeleton & cranium photos, courtesy of Dr. Dennis Dirkmaat, Ph.D.   View here

Illuminating the field of forensic anthropology with Artec 3D scanners

MERCYHURST UNIVERSITY

Challenge

A leading forensic anthropologist needed a way to 3D scan bones, skeletons, and entire death scenes quickly, with minimal post-processing work.

Results

Dr. Dennis Dirkmaat, Ph.D., uses a trio of Artec 3D scanners at forensic death scenes, to digitally capture in high-resolution color everything from the bones themselves, to all potential evidence, to the surrounding ground, leaves, landscape, etc. Learn more

"Artec has truly changed the face of forensic anthropology with Space Spider, Leo, and Ray. I've integrated Artec's solutions into my daily field work as well as my regular and special classes for investigators, law enforcement officers, and college students, and the results have been nothing short of spectacular. My students pick up the scanning process quickly, and the levels of detail we get now, especially considering the little time needed for doing so, are truly remarkable."

Dr. Dennis Dirkmaat, Ph.D.

Image courtesy of Forensic Anthropologist Dr. Dennis Dirkmaat, Ph.D., Mercyhurst University

Forensic facial reconstruction of the 3500-year-old Griffin Warrior in Greece

University of Dundee
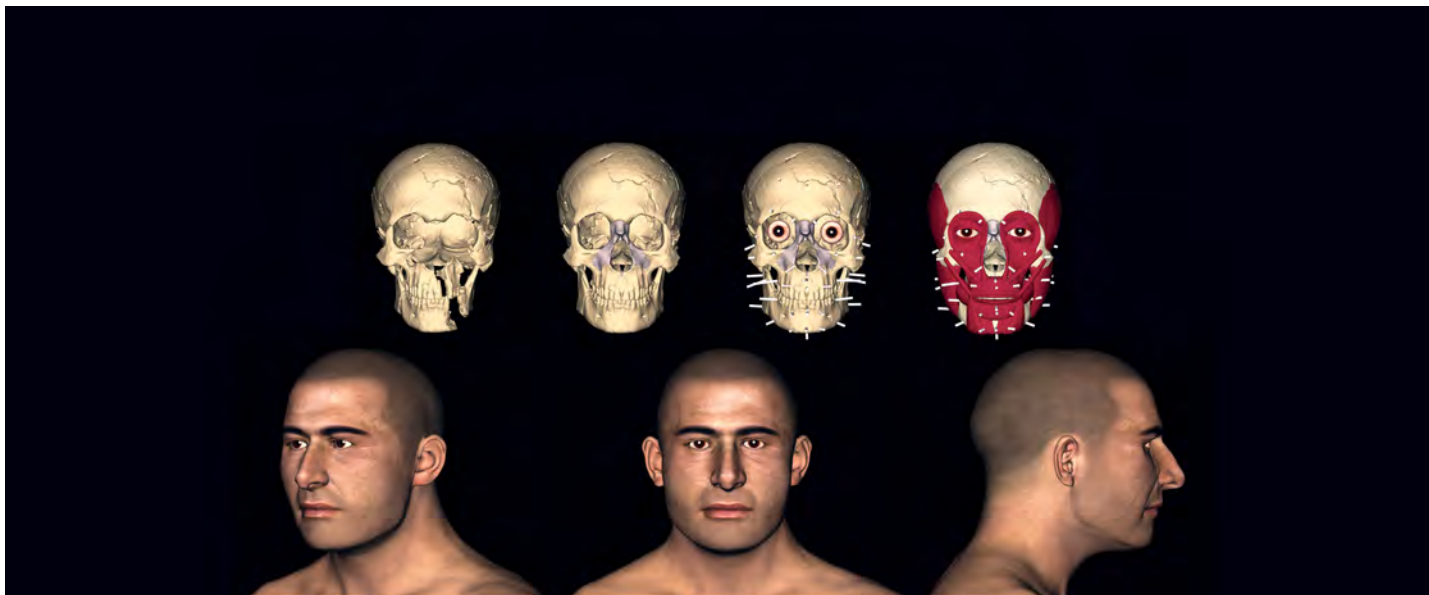
Challenge

To digitally reconstruct the skull of an ancient warrior and create a painstakingly accurate approximation of his face as it had appeared in real life.

Results

Each cranial fragment was scanned, along with groups of fragments, and the skull was digitally reconstructed in Artec Studio software. From there, the 3D model of the skull was exported to Geomagic Freeform, where it served as a detailed reference model for creating the facial approximation, now ready for use online, for research, and 3D printing. Learn more

"When you're looking at the Artec 3D scans, it's as close to looking at the real skull as anything else."

Dr. Tobias Houlton, University of Dundee

Artec 3D scanners help create the world's first Virtual Reality Human Osteology course

Document forensic crash evidence following serious vehicle accidents.
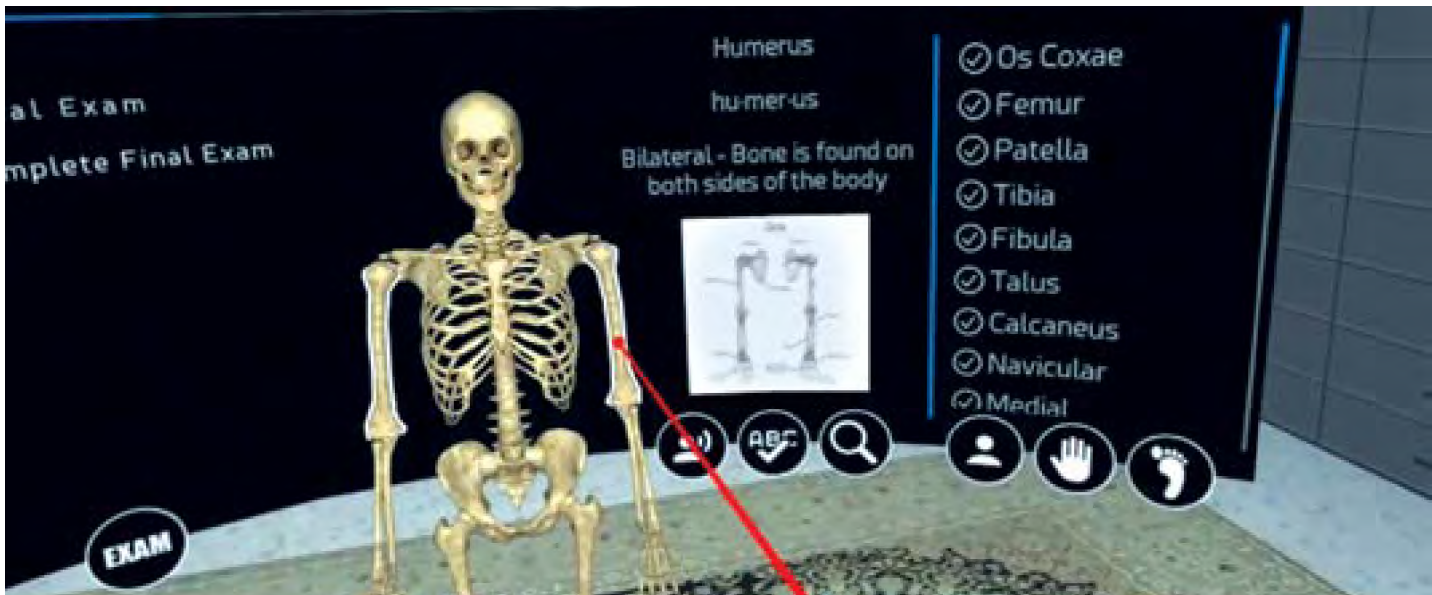
Challenge

A renowned forensic anthropologist turned to 3D scanning when he needed to capture hundreds of bones and transform them into anatomically precise 3D models for a groundbreaking VR course.

Results

In just a few weeks, the desktop Artec Micro and the handheld Artec Space Spider were used to scan all the surfaces of each bone in minutes. The scans were then processed in Artec Studio and exported as high-resolution 3D models ready for VR use. Learn more

"Artec 3D scanners capture bones perfectly, whether it's the long, sweeping surfaces of the femur, the many threadlike sutures and deep recesses of the skull, or the really tiny bones of the hands and feet."

Anthony Lanfranchi, Mercyhurst University forensic anthropology Master's student and one of the designers of the VR course.

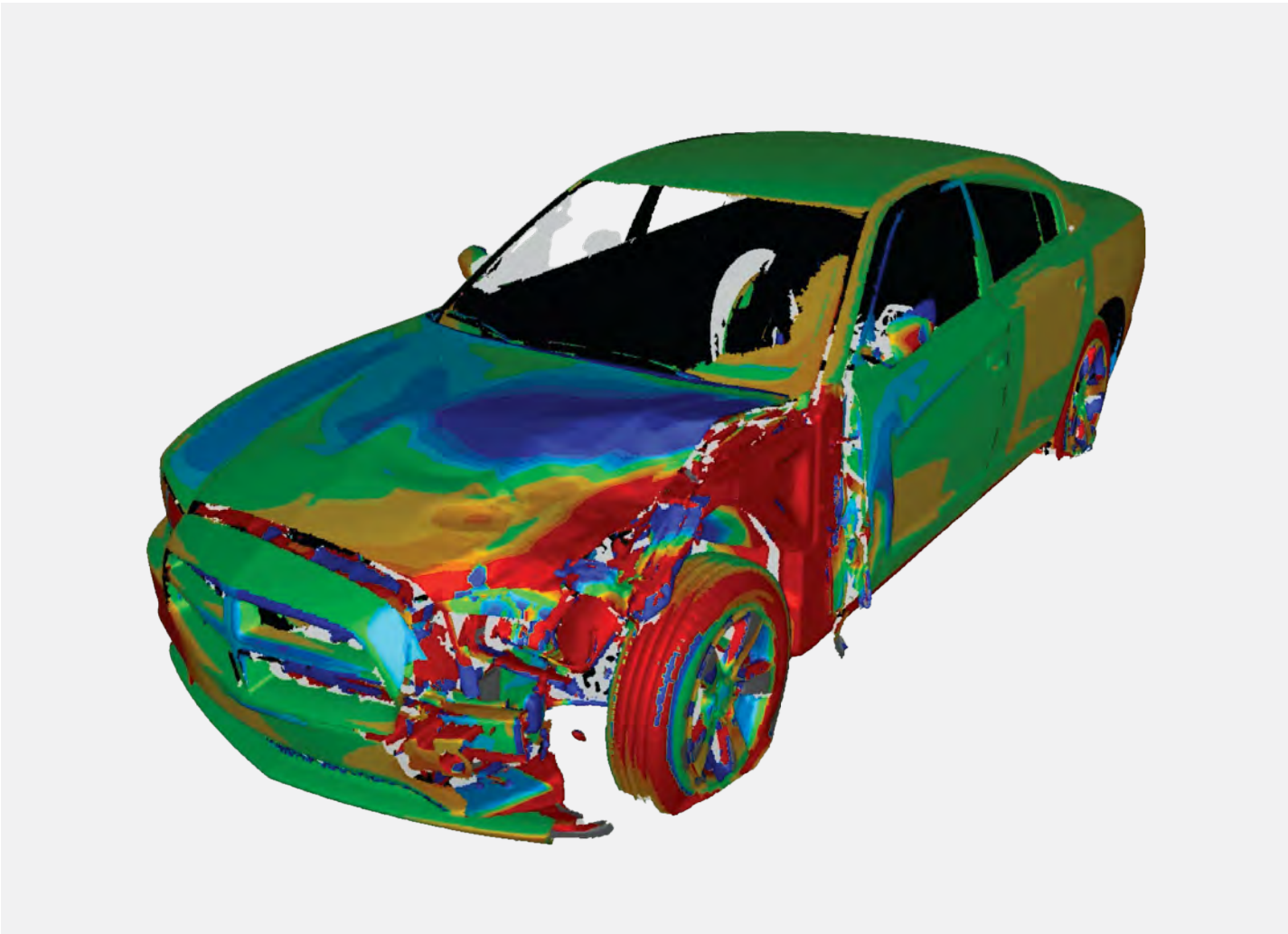Image courtesy of Forensic Anthropologist Dr. Dennis Dirkmaat, Ph.D., Mercyhurst University

Wrecked Dodge minivan model, Origin Forensics LLC
Learn more

Forensic vehicle accident reconstruction

3D scanning for traffic accident reconstruction

3D scanning with Artec scanners:

- Document the entire vehicle in under an hour
- Handheld, easy to maneuver around vehicle
- Submillimeter-accurate, lifelike color capture
- Full-capture scan review via Leo's touchscreen
- Precise 3D models ready for investigators, courts

Forensic photogrammetry:

- Requires 1-3 hours repositioning and scanning
- Cumbersome to set up and use
- Accurate geometry, subpar color capture
- External laptop required

"I was looking for speed and flexibility, which Leo gives us, especially since it has no cables or attached computer to slow you down. I no longer feel as though the rest of the inspection is being rushed so that I can make sufficient time to scan the vehicle."

Jarrod Carter, Ph.D., Origin Forensics

ORIGIN FORENSICS LLC

Wrecked Dodge Charger model, Origin Forensics LLC

Learn more
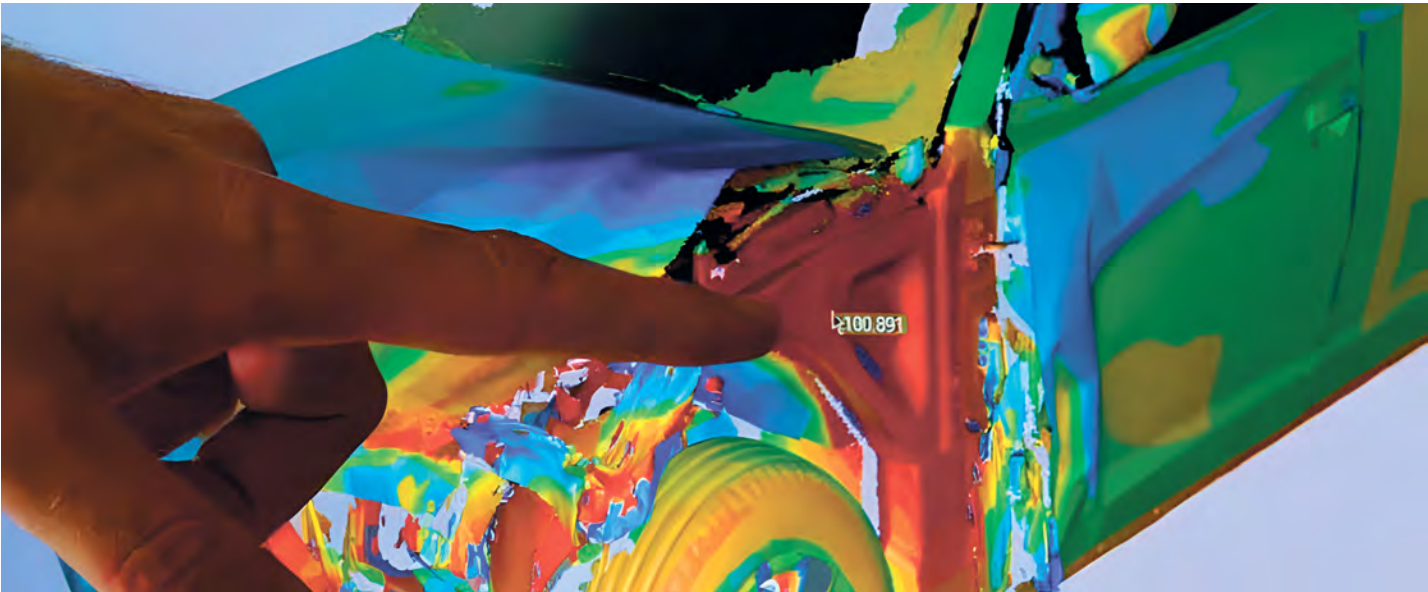
Challenge

To 3D scan crashed vehicles for accident reconstruction & investigation, capturing the full extent of body damage in color submillimeter 3D, for legal proceedings and court.

Results

Previously, using a terrestrial laser scanner, it would take Origin Forensics 3-4 hours to make vehicle scans. Now with Artec Leo it takes them under one hour. Learn more

Forensic tool mark analysis

Bullet hole documentation

Investigators can 3D scan a variety of tool marks found at crime scenes and use these to identify and trace suspects, even at multiple scenes, leading to arrests and prosecution.

3D scanning with Artec Leo HD Mode:

1–3 minutes to capture 1 square meter
Submillimeter accuracy, full color capture
Easily capture textured, curved, complex surfaces
True-to-life scale measurements from scans

Forensic photogrammetry:
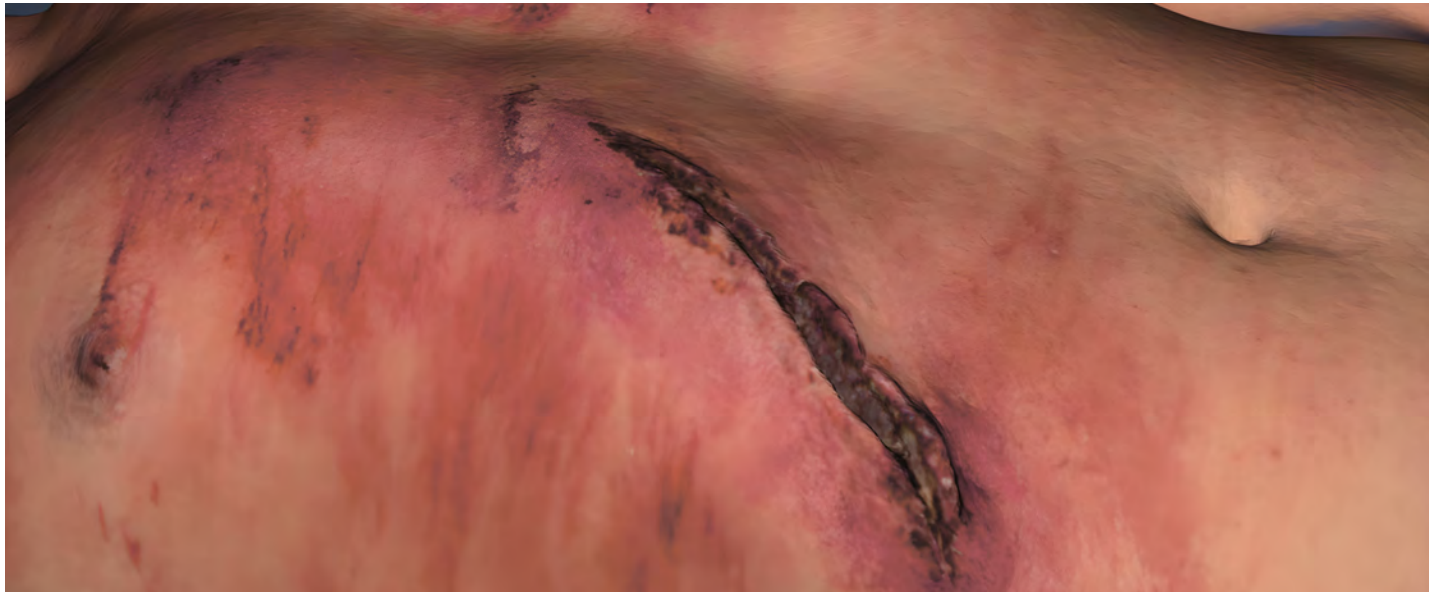
Hundreds of photographs needed
Operator-dependent results
Risk of gaps in photos, found too late to retake
Difficult to resolve flat textured walls
No built-in measurement scale

3D model of hatchet. Learn more

Leo scanning a bullet-riddled Mitsubishi in Ukraine, KODA Ltd.

Wound and autopsy documentation

By using 3D scanning, specific wounds, injuries, and surface conditions of the body can be fully captured in seconds, while documenting the entire body for autopsies can be done in just minutes.

Watch video

3D scanning tested against photography in a study on forensic methods

Over 2X FASTER for full documentation

UNIVERSITY OF TORONTO

Challenge

To use a 3D scanner in a mock autopsy to digitally capture a human body with simulated tattoos and wounds, to compare the results (accuracy and speed) of the scanning with those of traditional forensic photography.

Results

With traditional photography, it took exactly 54 minutes and 30 seconds for full documentation, yet with 3D scanner Artec Eva, it required less than half the time, only 26 minutes and 1 second, for full, submillimeter-accurate color 3D documentation. Learn more

Artec 3D

Photo courtesy of Janujah Sivanandan and Eugene Liscio, P. Eng., Forensic Program, University of Toronto

Crime scene documentation and reconstruction

3D scanning solutions help you capture crucial data in a matter of minutes: examine and document crime scenes indoors and outdoors, night or day.

Capturing and documenting evidence

Project

The Luxembourg Directorate of Defense delivered Artec Leo 3D scanners to Ukraine to capture forensic evidence in 3D. While the Ukrainian Armed Forces have been working on cleaning up conflict zones, potential evidence of crimes can be contaminated, destroyed, or lost. This makes it especially important to capture and document evidence of war crimes in Ukraine before it disappears.

Results

The Kyiv Scientific Research Institute of Forensic Expertise are using the wireless 3D scanners and software to collect crucial evidence in war zones for use in court. The data can be securely uploaded and stored on the cloud, where it can be safely shared with, accessed, and processed by investigators anywhere in the world. Learn more

3D model of park bench. View here

The Kyiv Scientific Research Institute of Forensic Expertise

3D documentation of complex fatal fire & mass disaster scenes

Challenge

To document difficult-to-capture fire & mass disaster scenes immediately after the incident, in submillimeter color 3D, using a combination of 3D scanners, tripod-mounted & handheld, capturing all the evidence within, and then combining the 3D datasets for unified 3D models admissible as criminal evidence.

Results

The tripod-mounted Artec Ray and handheld Artec Leo scanners were used to document simulated fire & mass disaster scenes, including burnt structures, detonated vehicles, and simulated human victims, in accordance with protocols by the US NIJ & DOJ. Instructed on scene by the chief forensic anthropologist for the 9/11/2001 United Airlines Flight 93 crash.

More applications

For identification & surveillance

Combining pre-captured 3D facial scans with CCTV footage makes it possible to more easily and accurately identify suspects and obtain convictions.

Running simulations for various crime scenarios

Reconstruct pieces of evidence in a digital environment, use 3D data for extensive forensic analysis, and export it for crime scene simulations to visualize multiple scenarios on your screen.

Creating virtual crime scenes for court

Use 3D scanning to thoroughly capture details for presenting lifelike virtual replicas of evidence during pre-trial and court hearings.

Forensic facial reconstruction

Accurate 3D scans of unidentified skulls can be used to more quickly create lifelike facial reconstructions and approximations to help identify missing persons.

Artec Leo

Artec Ray II

2—3 minutes to scan a human body

Artec Leo is the fastest handheld 3D scanner on the market. It takes just seconds to scan many small pieces of forensic evidence, 2—3 minutes for a human body, and 5+ minutes for a small crime or death scene.

Full dome in 1.7 mins

Artec Ray II's data capture speed of up to 2 million pt/s allows you to create highly detailed full dome scans of a crime scene in just 1.7 minutes.

<1 hour to master

Artec Leo and Ray II are very easy to use. After less than 1 hour of training, users with no prior scanning experience can start capturing everything from pieces of evidence to entire crime scenes, accurately and in full color.

Digital storage

Thousands of 3D scans of evidence and entire scenes can be stored locally or in the Cloud (including Cloud-in-a-box solutions), and shared with other forensic professionals.

Analysis & reconstruction

Having Leo and Ray II scans of your most crucial evidence and scenes means being able to deliver pinpoint precise measurements for forensic analyses, reports, and crime, death, or accident scene reconstructions.
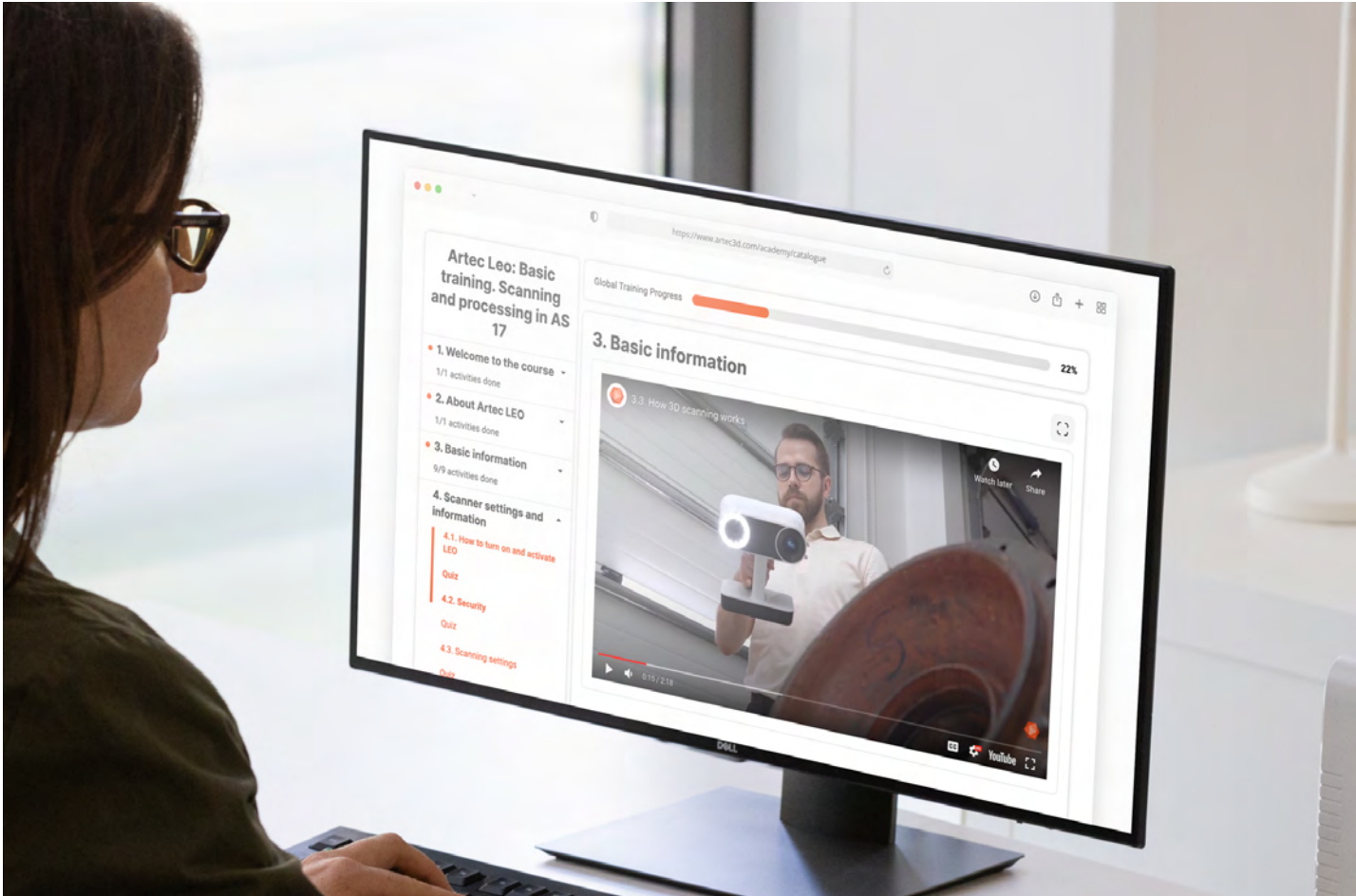
100% portable, with no cables

Without any extra laptop or cables to get in the way, Artec Leo and Ray II give forensics experts the freedom to maneuver around any object with ease, meaning nothing can hamper their work.

Intuitive software

In Artec Studio software, with its easy-to-use interface and full set of editing tools, scans are transformed into 3D models in minutes. Then, the 3D models can be shared with colleagues, other agencies, or exported to various software applications for further analysis and use.

Vibrant color capture

Both Artec Leo and Ray II allow you to capture the rich colors of objects and environments in stunning high resolution and create true to life 3D models with perfect geometry.

Accuracy: up to 0.1 mm
Resolution: up to 0.2 mm
Scanning object size: medium to large

3D point accuracy: 1.9 mm @ 10 m
Resolution: 3 / 6 / 12 mm @ 10 m
Scanning object size: large to extra large

# Artec Academy: Online training course for 3D scanning for forensics

Artec 3D offers industry-specific online courses to ensure that all Artec 3D clients are trained and set for success when using Artec Leo for forensic applications.

With a particular focus on documenting evidence from crime scenes or areas that require inspection, you will learn basic steps and easy Autopilot data collection, as well as manual processing features for results you can use for further analysis, or as evidence in court.

Learn more

Used by major organizations and businesses across the industry

Artec 3D
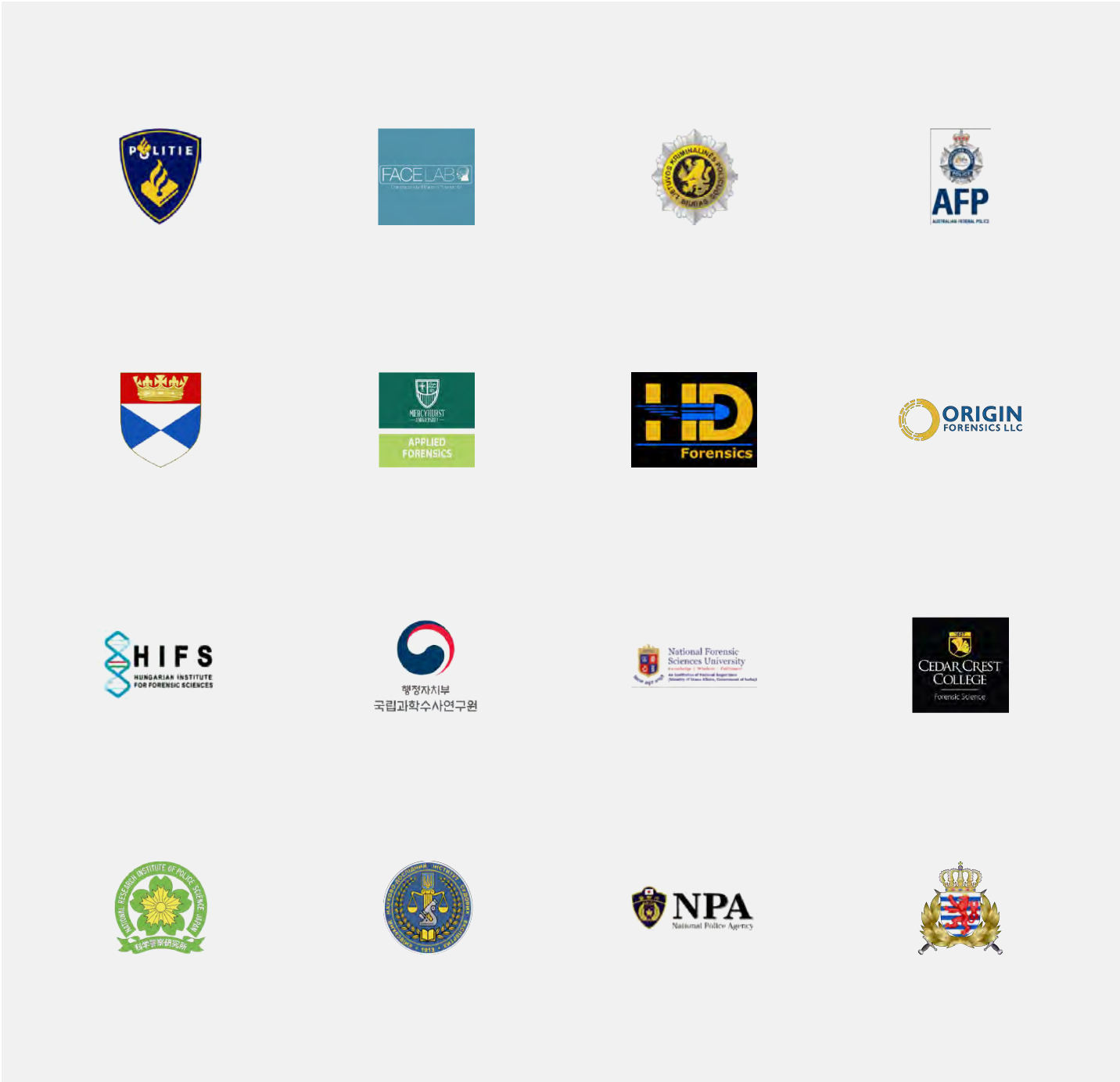
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