ID SERIES

Identicoat Forensic Coaters

HHV Ltd

Thin film deposition tools
for science and industry

Vacuum Metal Deposition Systems for the Development of Latent Fingerprints

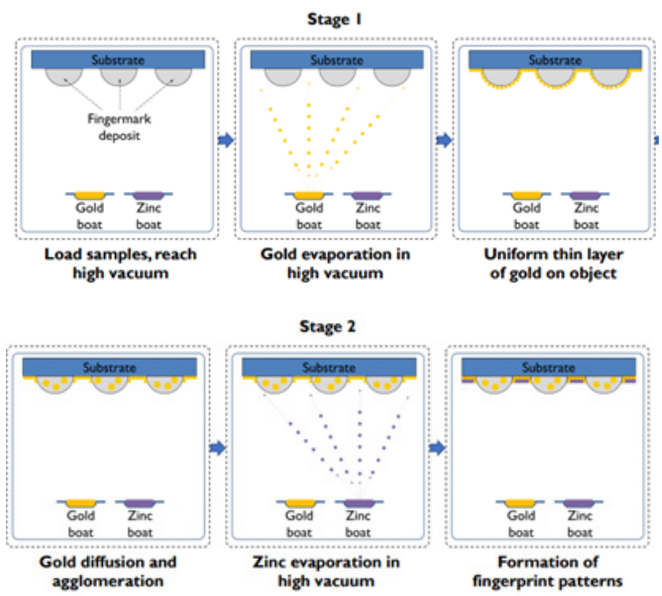
The ID series of coaters are designed for various laboratory sizes, including small (ID300 Ultra), medium (ID500 Ultra), and large capacity (ID750 Ultra) solutions for forensic laboratories for the development of latent fingerprints by thermal evaporation of gold/silver + zinc on various evidence such as paper, fabrics, plastic, polyester, fire ammunition, rifles, metals, and so on.

PROCESS

Vacuum Metal Deposition, or , is one of the most effective latent fingerprint development procedures. It creates fingerprints through the process of metal deposition on surfaces.

The process takes place in a specially constructed vacuum chamber into which the articles to be coated are placed.

The air in the chamber is pumped away by a set of vacuum pumps. The metal is melted and evaporated in an electrically heated 'boat'. The metal vapor is free to travel through the vacuum inside the chamber. The vapor condenses on any object in its path and forms a thin film.



Role of Gold:
Gold serves as a primer for subsequent zinc deposition; it deposits across the entire surface, but the size and dispersion of the gold nuclei generated are determined by surface characteristics. It is utilized as the first deposition metal since it is inert and does not react with fingerprint residues or ambient contaminants. The low deposition pressure ensures that gold atoms go from the evaporation vessel to the surface without interacting with a large number of air molecules in the chamber, resulting in an equal coating.

Role of Zinc:
The finger mark is delineated principally by the differential in zinc growth rate on the nuclei present on the finger mark ridges against those present in the background. Zinc is particularly useful for this purpose since it readily reevaporates from the surface unless a suitable nucleation site is present; consequently, the sort of gold nuclei created determines how zinc layers form later. The chamber pressure utilized for zinc evaporation is higher than that for gold, giving the operator better control over the zinc deposition process. Allowing additional air into the chamber improves the uniformity of zinc deposition across the exhibit, but the pressure must be kept low enough to prevent oxidation of the zinc film.

BENEFITS

Vacuum Metal Deposition offers several significant benefits, particularly in forensic science and other applications:

- **High Sensitivity:**
  Is highly sensitive and can develop latent fingerprints on a variety of surfaces, including non-porous, semi-porous, and even some porous materials.
- **Enhanced Detail:**
  The technique provides high-contrast and high-definition fingerprint images, often revealing third-level details such as pores and ridge edges.
- **Versatility:**
  Can be used on a wide range of materials, including plastics, glass, fabrics, metals, firearms, fired immunizations, paper, thermal papers etc. It is also effective on items that have been submerged in water or exposed to adverse conditions.
- **Minimal Interference:**
  The process has low interference with subsequent DNA testing, making it suitable for use in conjunction with other forensic techniques.
- **Rapid Processing:**
  The process is relatively quick, typically taking less than 10 minutes to develop fingerprints.
- **Durability:**
  Fingerprints developed using are stable and do not fade over time, allowing for long-term analysis and documentation.
- **Environmental Impact:**
  The controlled vacuum environment minimizes waste and environmental impact, making it an eco-friendly option for surface enhancement.

APPLICATION

- **Fingerprint Development:**
  Is highly effective in revealing latent fingerprints on a variety of surfaces, including non-porous materials like plastic, glass, and metal, as well as semi-porous surfaces such as fabrics.
- **Post-Submersion Evidence:**
  It can be used to develop fingerprints on items that have been submerged in water, which is often challenging for other fingerprint development techniques.
- **Aged and Degraded Prints:**
  Can enhance fingerprints that are old or have been exposed to harsh environmental conditions, making it possible to recover prints that might otherwise be undetectable.
- **Multi-Surface Capability:**
  The technique is versatile and can be applied to a wide range of objects, from small items like bullets and cartridges to larger surfaces like vehicle parts.
- **DNA Compatibility:**
  Does not interfere significantly with subsequent DNA analysis, allowing forensic scientists to use both fingerprint and DNA evidence from the same item.
- **High-Resolution Imaging**:
  The method provides high-contrast and high-definition images of fingerprints, which can be crucial for detailed forensic analysis and comparison.

SYSTEM FEATURES

The HHV identicoat series of coaters designed specifically for the development of latent fingerprints with a compact design, modern touch screen interface for ease of operation and fast cycle times. The system can process a wide range of exhibits such as plastic bags, sheeting, bottles, bullet casings semi-porous, porous and non-porous exhibits using metals such as Gold, Zinc or Silver

User-friendly Interface:

Touch screen displays and intuitive icon based control interfaces make operation and process management simple.

LED lighting system:

Internal LED lighting is installed in the vacuum chamber so that the operator can watch and keep an eye on the process. The touch screen controls the lighting

AutoStart mode (ID500 and ID750):

The system will turn on the pumps at a user-specified time thanks to an autonomous system start function, which increases processing time and saves important time.

High-Quality View Port Window:

Allows real-time monitoring of the deposition process without compromising the vacuum environment

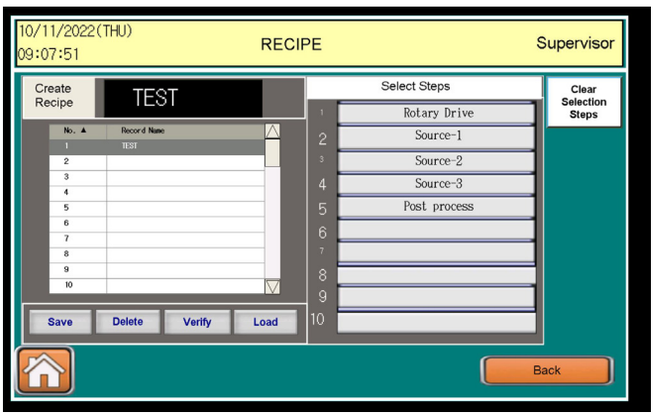
Deposition sources:

The evaporation sources are positioned on circular copper busbars that are centered. The system is quite versatile because of its creative design, which allows the user to deposit a combination of three metals—gold, zinc, and silver—in a single deposition process. Depending on the size of the evidence, the source placements can be adjusted to maximize the coating performance.

Flexible workholder design:

A creative and adaptable evidence holder made of magnetic stainless steel that is semicylinder in shape To make attaching the evidence to the holder easier, it can be turned to different angles and retracted from the chamber.

Recipe based coating process:



Recipe based coating cycles includes automatic control of the pumping system, deposition source, Rotation

Remote support:

The control system is provided with hardware which allows the unit to be connected to HHV's software applications specialists for remote diagnostics and support.

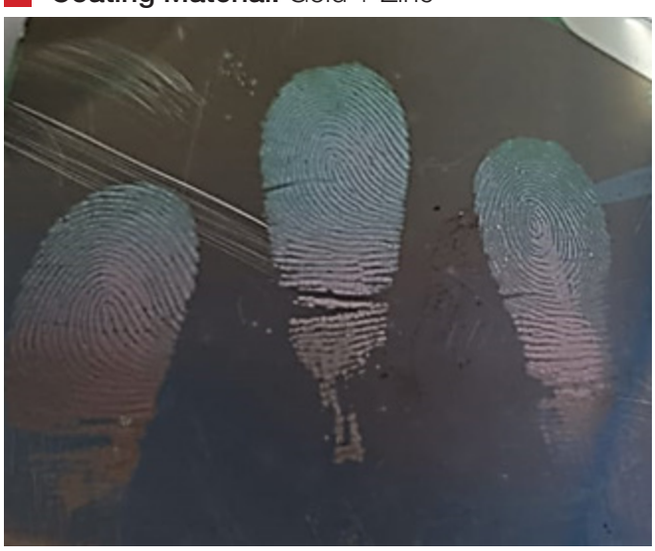
SYSTEM SPECIFICATIONS

FEATURES	ID300 Ultra	ID500 Ultra	ID750 Ultra
Chamber Dimensions In mm	360 (W) x 300 (D) x 360 (H)	500 (Ø) x 620 (D)	750 (Ø) x 1250 (D)
View port In mm	300 (L) x 300 (H)	300 (Ø)	400 Ø)
LED lighting system	✓	✓	✓
Evidence Holder	Semi Cylindrical and a flat	Semi Cylindrical	Semi Cylindrical
Maximum sample size (W x D) in mm	480 x 285	825mm x 560mm	1225 x 1200
Number of Evaporation Sources	2 sources	3 sources	3 sources
Evaporation Materials	Gold/Silver + Zinc	Gold + Silver + Zinc	Gold + Silver + Zinc
Pumping System	Turbomolecular	Diffusion pump Optional: Cryopump	Diffusion pump Optional Cryopump
Process Time (Typical)	10 min	10 min	10 min
System Control	7" HMI touch screen	10" HMI touch screen	10" HMI touch screen
Remote Diagnostics	✓	✓	✓
System Dimensions (W x D x H) in mm	900 x 603 x 705	1120 x 750 x 1740	1950 x 1500 x 2050
			

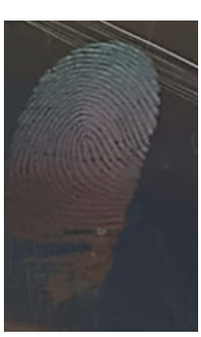
COATINGS ON VARIOUS SAMPLES

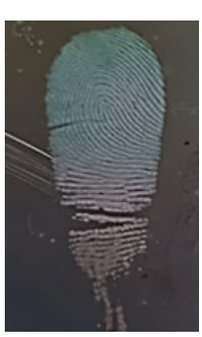
HHV has effectively utilized vacuum metal deposition () techniques to enhance the visibility of latent fingerprints on various surfaces. By applying a thin layer of metal, such as gold, zinc or silver under vacuum conditions, HHV has been able to create high-contrast images of fingerprints that are otherwise invisible to the naked eye. This method is particularly useful on non-porous surfaces like plastic, glass, and metal, where traditional fingerprinting techniques may fall short. The precision and sensitivity of make it a valuable tool in forensic investigations, allowing for the recovery of critical evidence that can be pivotal in solving cases.

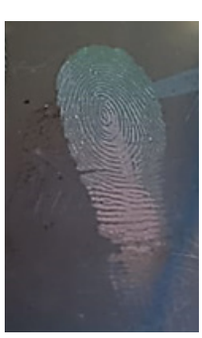
Material: Metal Surface
Coating Material: Gold + Zinc



Result:
Gold followed by Zinc was deposited on the metal surface. High quality fingerprints with detailed ridge details were visualized.

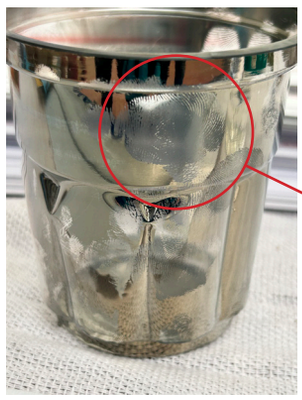


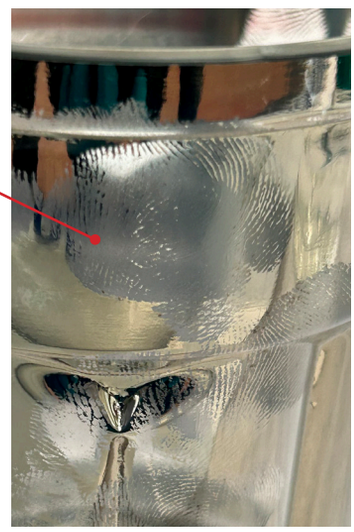




Conclusion:
It is clear that the Gold + Zinc deposition approach was the most effective way for a metal surface to produce high-quality fingerprints.

Material: Disposable plastic cups
Coating Material: Silver





Result:
The disposable plastic cup has a very smooth surface which poses a great challenge to develop and visualize the fingerprints.
Different combinations of metals were carried out such as Gold + Zinc, Gold + Silver and Silver metals were deposited. Silver deposition was found to develop fingerprints with moderate (>50%) details of ridge patterns.

Conclusion:
It is highly evident that Silver metal deposition was proven to be most effective method for developing fingerprints on plastic surfaces.

Material: Glass
Coating Material: Gold + Zinc

Result:
Gold followed by Zinc was deposited on the Glass surface. High quality fingerprints with highly detailed ridge details were visualized

Conclusion:
It is clear that the Gold + Zinc deposition approach was the most effective way on a Glass surface to produce high-quality fingerprints.

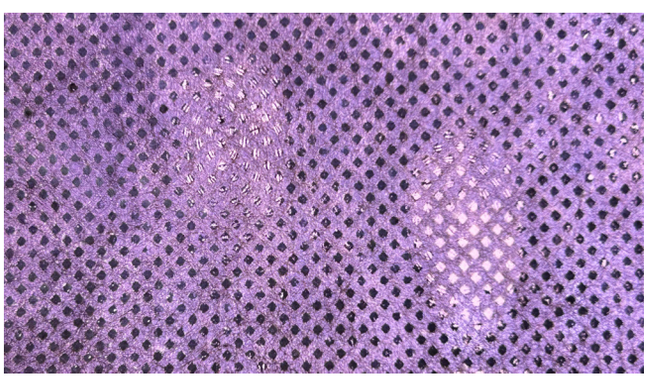
Material: Jewelry Handbag
Coating Material: Gold + Zinc

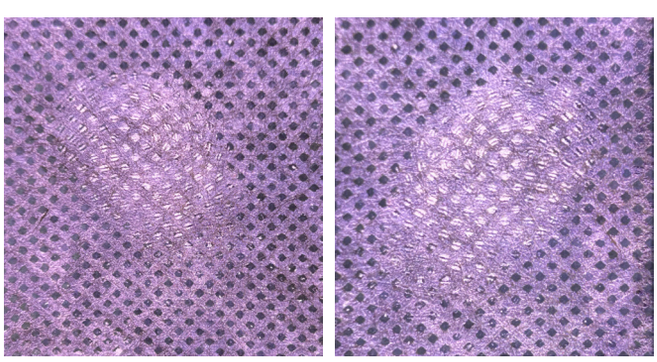
Jewellery handbag

Result:
Gold followed by Zinc was deposited on the Glass surface. High quality fingerprints with highly detailed ridge details were visualized.

Conclusion:
Moderate ridge patterns were developed with ridge details of about 40%.

Material: Porous Fabric
Coating Material: Gold + Zinc

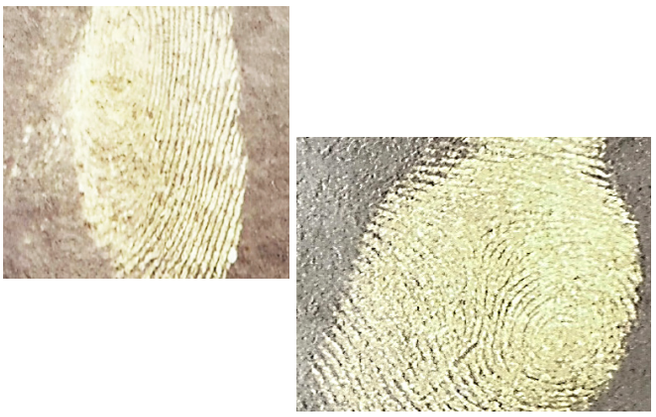




Result:
Gold followed by Zinc was deposited on a loosely woven fabric material. An interesting pattern of fingerprints was developed on the sample material.

Conclusion:
Moderate ridge patterns were visible

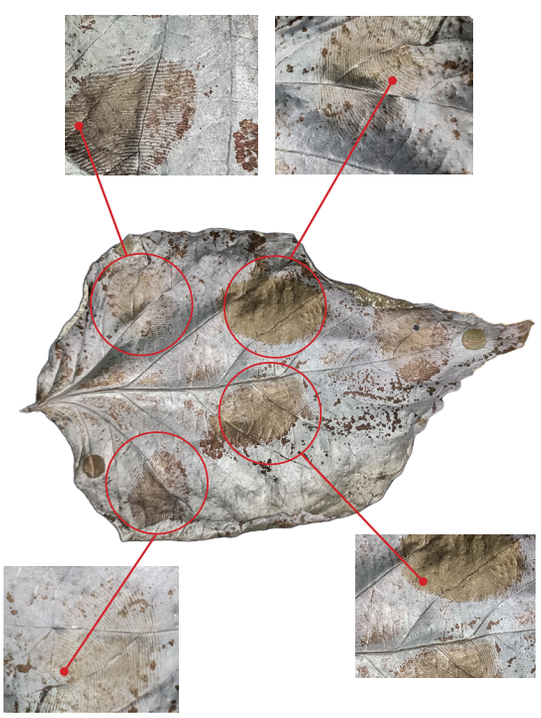
Material: Paper
Coating Material: Gold + Zinc/Gold + Silver

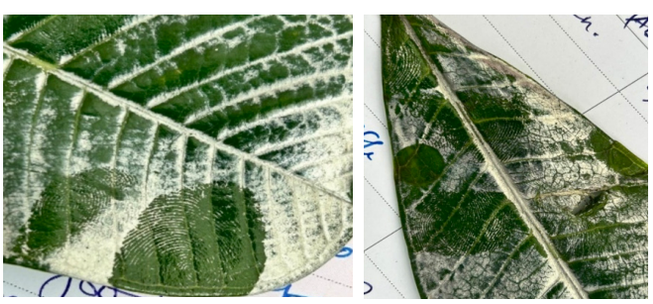


Result:
Various combinations of metals such as Gold + Zinc, Gold + Silver, Silver were deposited on the sample. High quality fingerprints with detailed ridge pattern visible.

Conclusion:
It is evident that Gold + Zinc deposition is the most suitable Method to develop finger print on paper material.

Deposition on some interesting items





AFTER SALES
INSTALLATION, TRAINING AND SUPPORT

Our after-sales support is dedicated to ensuring that your experience with our products remains exceptional long after your purchase. We offer a comprehensive range of services designed to provide you with peace of mind and continuous satisfaction.

Before the installation, our team will conduct a thorough consultation to understand your specific requirements and site conditions. Our skilled technicians are trained to handle all aspects of the installation process. They bring expertise and precision to ensure that your system is installed correctly and functions optimally from the start. After installation, we conduct thorough testing to verify that the system is operating correctly. This includes performance checks, functionality tests, and ensuring that all components are working as intended.

To help you get the most out of your new system, we provide comprehensive training for your team. This includes hands-on demonstrations, user manuals, and access to online resources for ongoing support.

Our support doesn't end with the installation. We offer ongoing assistance to address any questions or issues that may arise. Our goal is to ensure that you are completely satisfied with your new system.

We provide detailed documentation of the installation process, including configuration settings, test results, and any modifications made. This ensures you have a complete record for future reference.

To keep your system running smoothly, we offer regular maintenance services and software upgrades. This helps in enhancing performance and extending the lifespan of your product.

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CONTACT US FOR YOUR
THIN FILMS AND OPTICS NEEDS TODAY

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