

RECOVER

Latent Fingerprint Technology

"This discovery gives us the ability to recover fingerprints from items that would have been previously difficult or impossible"



foster+freeman
Forensic Science Innovation

RECOVER

Latent Fingerprint Technology

Revolutionary New Technology for the Development of 'Impossible' Fingerprints

Jointly developed by foster+freeman, the MoD Defence Science & Technology Laboratory (dstl), the Home Office Centre for Applied Science and Technology (CAST), and Loughborough University, RECOVER LFT is a cutting-edge technique that uses an innovative chemical vapour fuming process to develop fingerprints on a range of difficult surfaces including those that have been exposed to extreme heat (discharged bullet casings, for example) and items that have been washed 'clean' in an attempt to prevent identification.

RECOVER LFT can reveal fingerprints even after they have been physically removed from an object, and has been demonstrated to consistently out-perform existing fingerprint development techniques across a range of 'difficult' surfaces.

Key Benefits

- Reveal fingerprints on metals exposed to extreme temperatures such as fired ammunition cases or vehicles that have been set on fire.
- Develop fingerprints on metal/alloy surfaces, including surfaces that have been corroded such as knives that have been thrown into rivers or canals, as well as surfaces that have been deliberately washed.
- Develop consistent fingermarks across different surfaces simultaneously such as the plastic and metal on a shotgun cartridge.

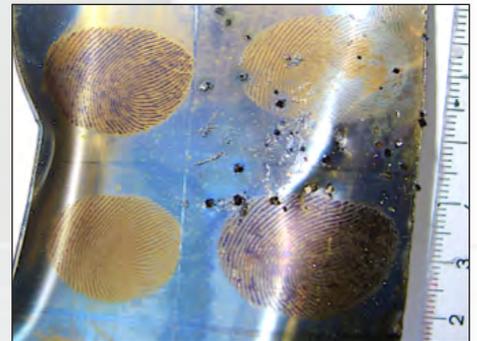
Collaborative Effort

Discovered at Loughborough University, developed with the backing and support of the UK Defence Science and Technology Laboratory (dstl), and now, refined by foster+freeman, RECOVER LFT fingerprint technology represents a fantastic example of collaborative working to achieve innovation that will help the police and security services to identify criminals and link them to their crimes.



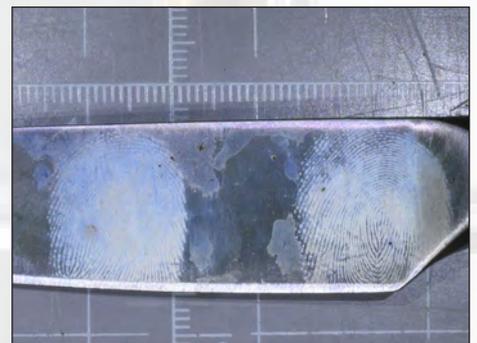
RECOVER Bullet Casings

Fired bullet cartridges are notoriously difficult to retrieve 'usable' prints from. RECOVER can yield fingerprints of an incredibly high quality.



RECOVER IED Fragments

The original RECOVER application, prints can be visualised on metals exposed to extreme heat, including Improvised Explosive Device (IED) fragments.



RECOVER Washed Items

Even when an item of evidence has been washed clean, or submerged for an extended period of time, RECOVER can *still* retrieve identifiable prints.

RECOVER Compact Laboratory System

RECOVER semi-automates the complex chemistry required to produce consistently high-quality fingerprints on untreated or cyanoacrylate-fumed items of evidence.

Designed, engineered, and refined to provide a simple, low-maintenance solution, RECOVER contains all of the hardware and software components required for fingerprint development, within a compact laboratory system.

Motorised Lid

Adjustable capacity

Operated *via* the touchscreen, enables development chambers of varying capacity to be used.

Development Chamber

360° visibility

Available in 2 sizes, allows the user to monitor the development of fingerprints from all angles.

Precursor Activation Stage

Initiates precursor transition

Pre-weighed precursor 'charges' are placed into the temperature-controlled activation stage.

Integrated System

Turnkey laboratory solution

Compact and uncomplicated, the RECOVER system takes up minimal workspace and is delivered ready-to-use.

Touchscreen Interface

Intuitive software design

User-friendly, icon-driven software reduces complex chemistry to a simple step-by-step process.



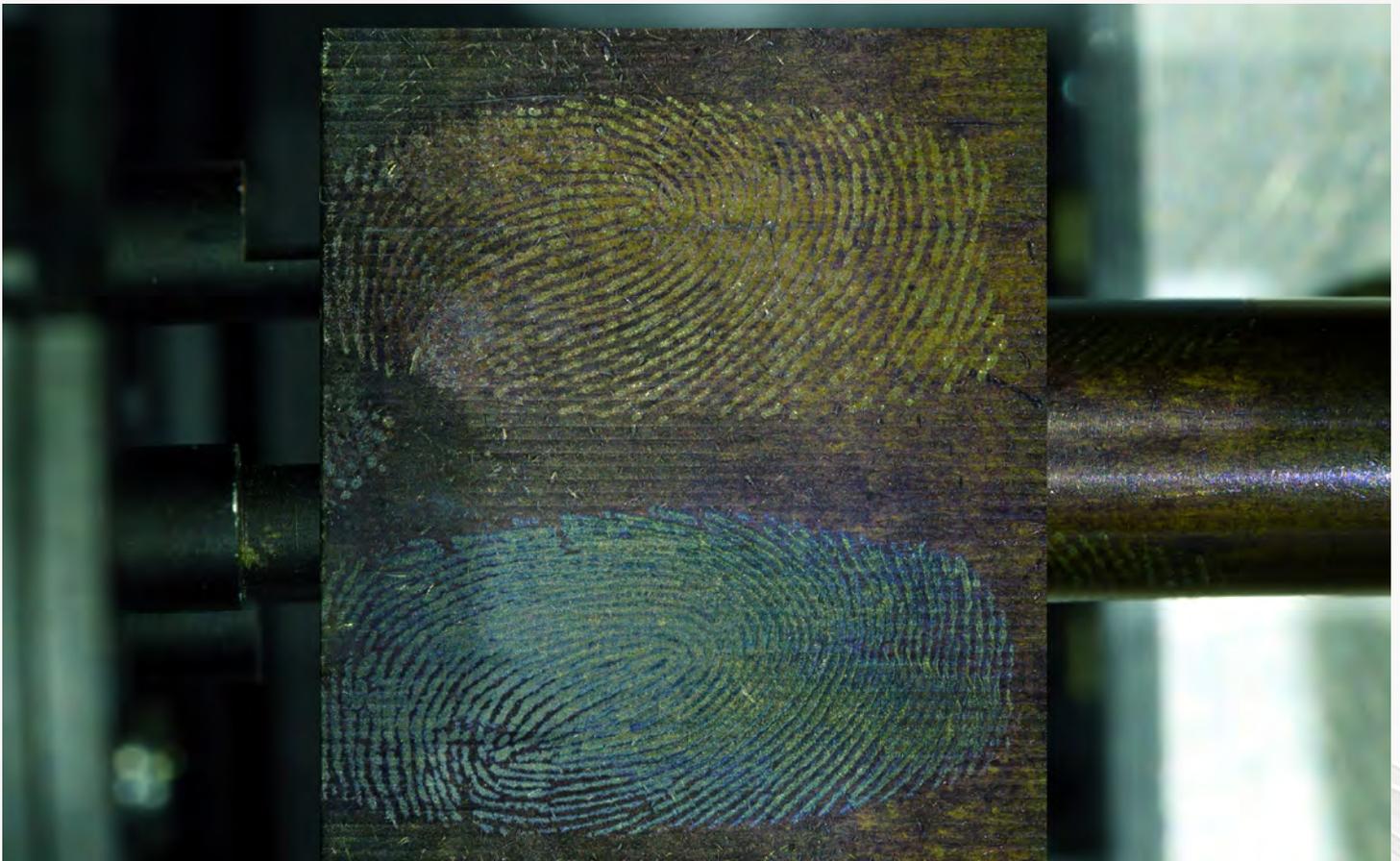
Simple Operation for Optimised Development

RECOVER's icon-driven interface enables *all* users to achieve high-quality results:

1. Evidence is placed within the RECOVER development chamber together with a pre-weighed 'single-shot' charge of the unique precursor chemical DEVELOP.
2. The user initiates the RECOVER LFT process.
3. After 30 minutes development, the evidence is ready to be removed and fingerprints examined.



The DEVELOP precursor chemical is supplied in pre-weighed 'single-shot' cartridges



Visible image of 2 fingerprints on a bullet casing that has been 'unwrapped' using the Cylindrical Surface Unwrapper



RECOVER Fingermarks from fired ammunition casings

Using traditional development techniques, the chances of locating a usable fingermark on a fired bullet casing are so low that many forensic fingerprint laboratories have abandoned the practice of examining this type of evidence altogether.

Now, thanks to the unique chemical reaction of the RECOVER LFT process, it is possible to develop high-quality fingermarks on fired ammunition casings as well as other items that have been subject to extreme heat, IED fragments or items that have been burnt, etc.

In the example above... a firearm has been manually loaded with live rounds. After firing, the bullet casing has been collected and placed within the RECOVER development chamber.

The two most common materials used in the manufacture of bullet casings, nickel and brass are both particularly well suited to the RECOVER LFT process. As such prints are developed within minutes, appearing dark against the casings metallic surface.

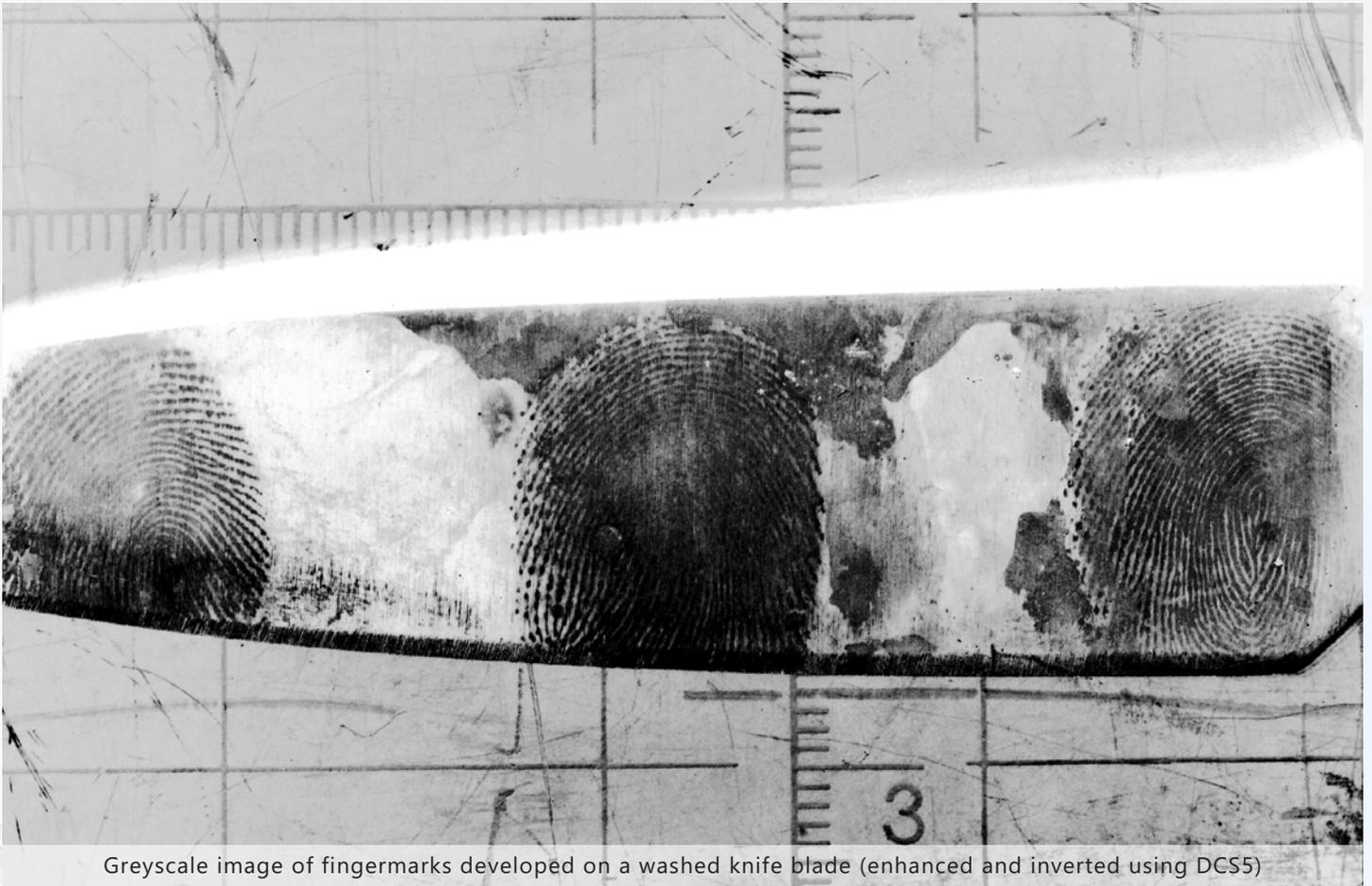
Cold Case Review

The unique chemical vapour process by which RECOVER develops fingerprints has the potential to reveal fingermarks that would previously have been deemed impossible, making it of immense benefit to investigators seeking to reappraise cold case evidence.

An entirely new process, the limits of the RECOVER LFT technique are still being explored. Ongoing tests are yet to discover an upper limit for the development of aged prints.



Sized bullet fragments held by West Midlands Police



Greyscale image of fingermarks developed on a washed knife blade (enhanced and inverted using DCS5)



LW Reflected-UV Illumination



Visible Illumination



RECOVER Fingermarks from items purposely washed 'clean'

Perhaps the most remarkable aspect of the RECOVER LFT technique is its ability to develop prints on items that have been submerged in liquids, including harsh environments such as bleach, and those that have been purposely washed clean.

Unlike other techniques, the RECOVER LFT process does not require the presence of sweat or naturally occurring skin oils in order to develop a fingerprint. RECOVER LFT can also develop prints due to the unique corrosion signature that remains even after any fingerprint residues have been removed.

In the example above... Fingermarks have been placed on a knife blade. After several minutes, the knife has been thoroughly washed under warm water using a common dishwashing liquid.

Having been washed, the knife is placed into the RECOVER chamber where fingerprints soon start to become visible on the steel blade and are fully developed a short while later.

Exceptional Results on almost any metallic surface

Whilst developing fingerprints on fired ammunition and washed items may be standout applications, the RECOVER LFT technique is capable of delivering exceptional results on a wide range of metallic items. To date, tests have confirmed RECOVER LFT to be an ideal process for the visualisation of fingerprints on a multitude of surfaces including *all* common metals.

RECOVER LFT is an ideal process for the treatment of all metallic items including:

- ▶ Items exposed to extreme heat
- ▶ Items that have rusted or corroded
- ▶ Items that have been submerged
- ▶ Items that been folded or deformed

RECOVER Further Testing and Validation

Today, more than ten years since the initial work on the RECOVER LFT technique first began at Loughborough University, the process continues to undergo extensive and uncompromising scientific study.

FIELD TESTING: The Firing Range

Mixed-calibre ammunition was hand-loaded into a selection of firearms at a Las Vegas gun range. After firing, the shell cases were collected and subjected to the RECOVER LFT process. Where other techniques have previously had some success at visualising fingermarks on a low percentage of bullet casings, RECOVER was able to reveal usable marks on the *majority* of casings examined.

Video Available: fosterfreeman.com/innovation



Firing hand-loaded ammunition at the range

EVALUATION: Independent Evaluation

A peer-reviewed paper compares the RECOVER LFT technique against other leading processes for the visualisation of fingerprints on metals exposed to a range of environments.

Notably, the study reveals LFT to be the superior technique for the development of prints on several significant evidence types

Published Paper: <https://doi.org/10.1016/j.scijus.2019.06.011>



1-week old prints on stainless steel washed with detergent

IN-HOUSE TESTING: Exploring the Limits of RECOVER

Having produced impressive results on a wide range of evidence types previously considered to be difficult or *impossible* to obtain prints from, in-house chemists have now moved on to testing the absolute limits of the RECOVER LFT technique.

Recent tests have produced high-quality fingermarks on metal plates that have been submerged in harsh chemicals including disinfectants and bleach.

Stay up to date: fosterfreeman.com



Fingermarks on brass that have been submerged in bleach

RECOVER Fingerprint Imaging Solutions



DCS 5 Fingerprint Imaging Workstation

A comprehensive imaging workstation for the detection, capture and enhancement of almost any type of fingerprint on any surface or background.

An expert system, DCS 5 images are captured using a custom-modified UV/VIS/IR camera fitted with a choice of application specific macro lenses.



CSU-2 Cylindrical Surface Unwrapper

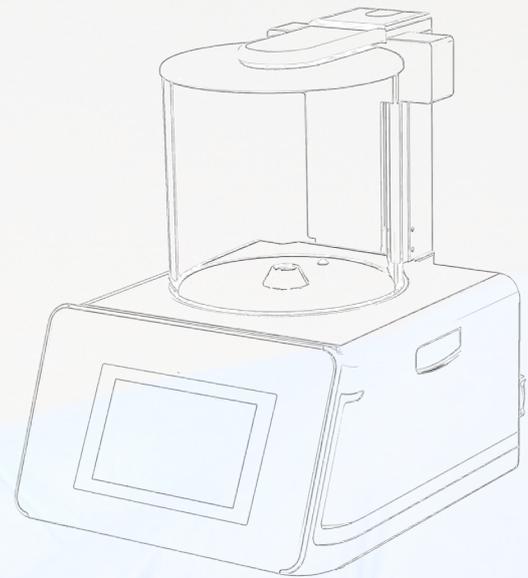
Designed for use with the DCS 5, the CSU-2 enables the examiner to extract 2D images of prints from a 3D cylindrical surface. The CSU-2 uniformly rotates evidence (bullets, pens, handtools etc.) while the DCS workstation captures, stitches and blends a series of images together to create a single 2D image of the fingerprint.

RECOVER System Specifications

RECOVER LFT Development Chamber [LFT/R1/SYS1](#)

Turnkey RECOVER LFT system with integral precursor activation stage, motorised lid, touchscreen display and leak detection system.

- ▶ touchscreen display with RECOVER software interface
- ▶ internal micro controller monitors all aspects of the development process
- ▶ precursor activation stage
- ▶ Multi-functional/adaptable evidence rack
- ▶ Motorised lid
- ▶ 2 x standard development vessels (one mounted one spare)
- ▶ Precursor chemical and control samples
- ▶ External power supply unit



LFT/R1

Ductless Fume Enclosure [LFT/DFE](#)

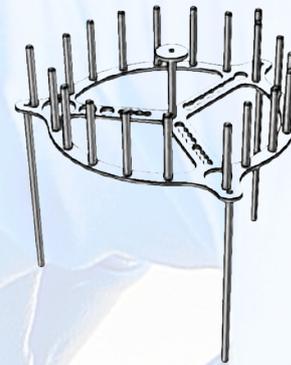
Optional accessory for when laboratory fume extraction is unavailable

- ▶ 800mm x 500mm x 1145mm ductless fume enclosure
- ▶ Keypad control panel
- ▶ Supplied with 1x filter set

Additional Carbon Filter Panel for LFT/DFE [LFT/DFE/FC](#)

Additional Pre-Filter Panel for LFT/DFE [LFT/DFE/PFC](#)

Optional Mobile Bench Stand for LFT/DFE [LFT/DFE/ST](#)



LFT/R1/RACK
Evidence Rack

System Consumables

DEVELOP Precursor Charge 1

For Cuprous Materials (Copper, Brass, Bronze etc.)

- ▶ For use with Standard development vessel [LFT/D/R1](#)
- ▶ For use with Large development vessel [LFT/D/R3](#)
- ▶ Set of Brass control samples [LFT/D/R1/S & R3/S](#)

DEVELOP Precursor Charge 2

For Aluminium, Stainless Steel, Nickel etc.

- ▶ For use with Standard development vessel [LFT/D/R2](#)
- ▶ For use with Large development vessel [LFT/D/R4](#)
- ▶ Set of Steel control samples [LFT/D/R2/S & R4/S](#)

Optional Accessories

Large Development Vessel [LFT/CYL/2](#)

Extend the capacity of the RECOVER LFT Development Chamber

- ▶ Double capacity development vessel cylinder

RECOVER Spares & Accessories Kit [LFT/ACC/KIT](#)

RECOVER LFT Transport Case

For mobile deployment of the RECOVER system

- ▶ Case 1 for RECOVER Development Chamber [LFT/CASE/1](#)
- ▶ Case 2 for Accessories and Consumables [LFT/CASE/2](#)



LFT/DFE

Specifications are subject to change without notice

fosterfreeman.com/innovation

foster+freeman's success has been built upon an ability to create new and innovative solutions to the unique requirements of forensic professionals. Ongoing investment into the research and design of new products and technologies has allowed the company to retain its position as the leading manufacturer of forensic science equipment for the past 40-years.

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