

BRAND NEW!

PAPILLON SURFACE SCANNER

*For PAPILLON ARSENAL — Automated Ballistic
Identification System*



Images of ballistic samples in the current version of ARSENAL are acquired with a new versatile PAPILLON Surface Scanner. This new scanner like its forerunners has been designed and is being manufactured by PAPILLON. Its versatility consists in its ability to operate with specimens fired from both rifled and smoothbore firearms, with both bullets and cartridge cases as well as with fragmented shells and deformed bullets.

The scanner provides automatic image scanning of the side of bullets taking a linear scan of the whole length (360°) and of the side and head of cartridge cases. De-formed and fragmented bullets as well as the charges fired from the smoothbore shotguns are scanned in portions enabling a capture of particular areas of significance containing tool-marks imparted to samples from firearms.

There are no constraints imposed on the dimensions and shape of specimens to be scanned. Thus, specimens may have deformation of more than 3 mm and may jut out from the edge of fixing stands (for instance, cartridge cases relating to smoothbore shotguns).

Scanning is carried out in a slit mode. Efficiently realized, the algorithms of “splicing” make it possible to completely exclude artifacts when generating a resultant image of the surface by pasting together the linear fragments captured.

The scanner is supplied with ad hoc accessories including: ▶ a special holder to capture images of one cartridge case head ▶ an ad hoc semi-automatic unit of a revolver type enabling scanning of up to ten cartridge case heads continuously ▶ magnetic, adhesive-coated and plastic-coated stands to scan the side of objects ▶ a special holder for small shots and buckshots fired from smoothbore firearms.

The device is easy-to-use. Rather simple operation of positioning and centering objects, no special requirements to initial orientation of cartridge cases when scanning their heads, maximum automation of the scanning process control – all these factors enable even ordinary staff to carry out, after they accordingly instructed, the said procedure and thereby to free the forensic experts from this type of chores.

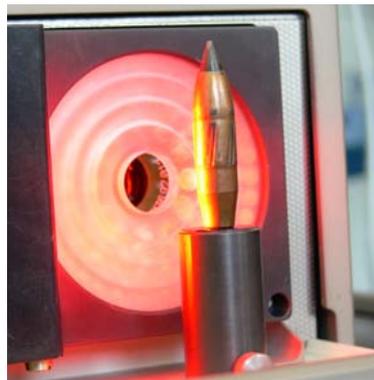
The scanner uses several diverse modes for illuminating objects:

▶ side surfaces of bullets and cartridge cases, fragmented shells and deformed bullets are scanned using oblique (indirect) lighting,

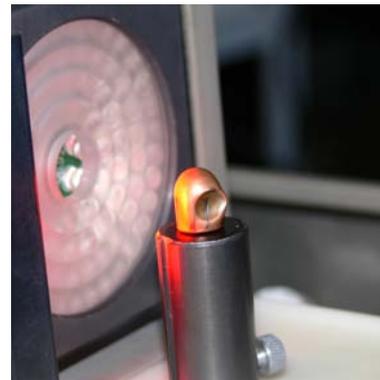
▶ heads of cartridge cases are scanned using the following lighting conditions:

- ▶ direct and diffuse ring lighting,
- ▶ 45°-sectored lighting at different angles.

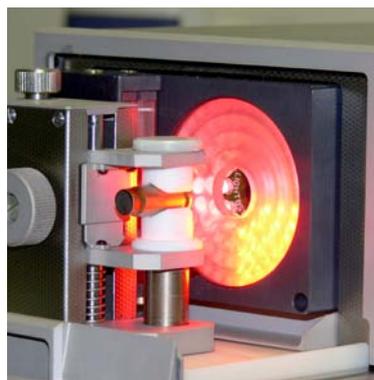
So, for a cartridge case head there can be captured either 2 (in direct and diffuse ring light) or 10 images.



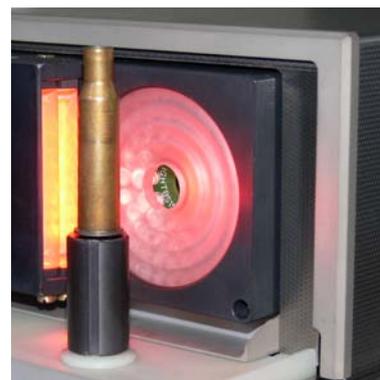
*Bullet side scanning in
oblique light*



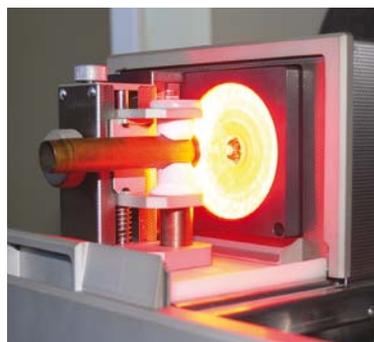
*Deformed bullet scanning in
oblique light*



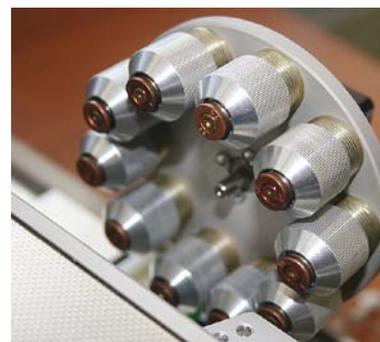
*Cartridge case head scanning in
sectored light*



*Cartridge case side scanning in
oblique light*



*Cartridge case head scanning in
ring light*



*Cartridge case heads scanning in the
semi-automatic unit of a revolver type*

PAPILLON SURFACE SCANNER

Technical Features of PAPILLON Surface Scanner

CCD-sensor	7500 elements
Resolving capacity	▶ 2D: 2,7 microns ▶ 3D: 20 microns
Maximum depth of scanning	12,4 mm
Field of vision	20 x 20 mm
Caliber of bullets/cartridge cases	from 5,45 to 25mm
Average time of bullet scanning	3 minutes
Average time of cartridge case head scanning	▶ 1,5 minutes (2 ring lighters) ▶ 11,5 minutes (2 ring lighters + 8 sectors)
Power supply (DC voltage)	15 V
Power consumption	40 W
Interface	External PCI Express
Dimensions	390 x 258 x 216 mm
Weight	13,5 kg

There are some weighty reasons to scan the case cartridge head in sector lighting:

▶ Lighting by sectors in full circumference is as much orientation-independent as ring type of illumination, i.e. it uniform the process of input regardless of initial orientation of the object.

▶ Lighting by sectors allows for more complete shadow picture of the surface, which is very helpful for both visual analysis of images and automatic matching.

▶ Firing pin impressions, breechface and ejector marks captured using sector lighting conditions are more informative and visually more legible.

▶ Sector lighting weakens accidental characteristics, i.e. those imperfections or irregularities produced accidentally during manufacture.

With this special lighting technology - sector lighting - the AR-SENAL system has greatly improved the results of automatic comparison of breechface marks on cases pertaining to high-powered cartridges. Considerable improvement is gained also in automatic correlations of ejector marks.

the sector lighting conditions are expedient to use in some particular cases, viz. for cartridge cases pertaining to firearms normally utilizing high-powered cartridges (e.g. TT) and to those imparting some specific toolmarks to a cartridge case (e.g. Glock's firearms).

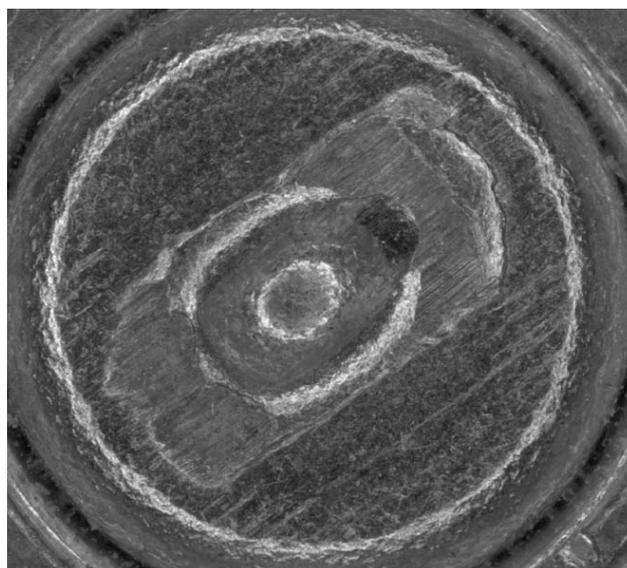
To reduce the expenditure of time for capturing images of cartridge case heads referring to the same batch, PAPILLON engineers have invented an ad hoc semiautomatic unit of a revolver type enabling continuous scanning and this device is currently being implemented.

The new PAPILLON Surface Scanner has an advanced automatic engine for calculating the lighting level, which lowers over-illumination on images thereby allows to avoid information losses caused by it.

The scanner is equally efficient when operating with objects made of different materials - reflection power is given consideration at calculating light exposure.



Scanned image of the bullet side



Scanned image of the cartridge case head