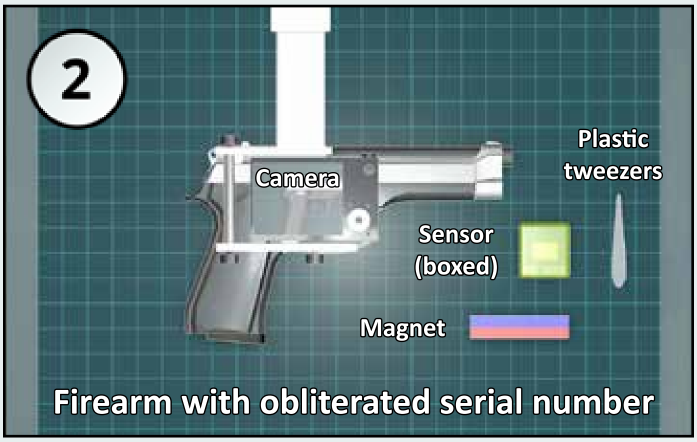
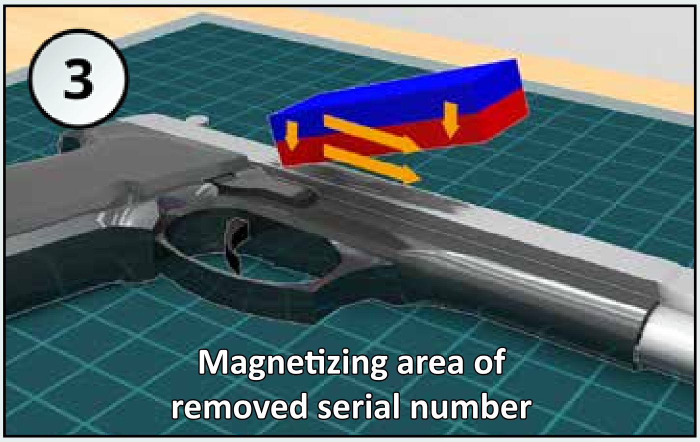
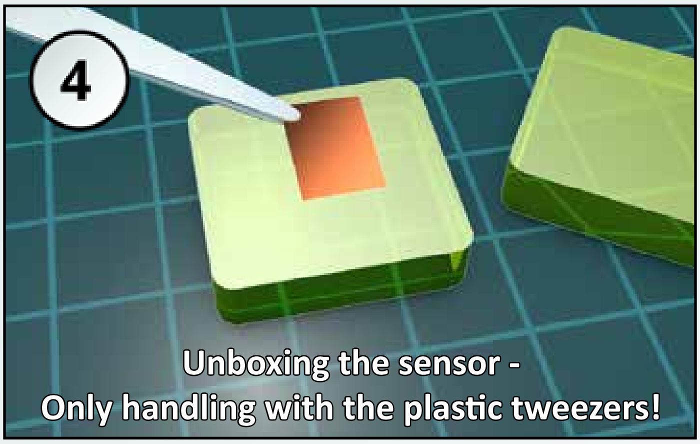
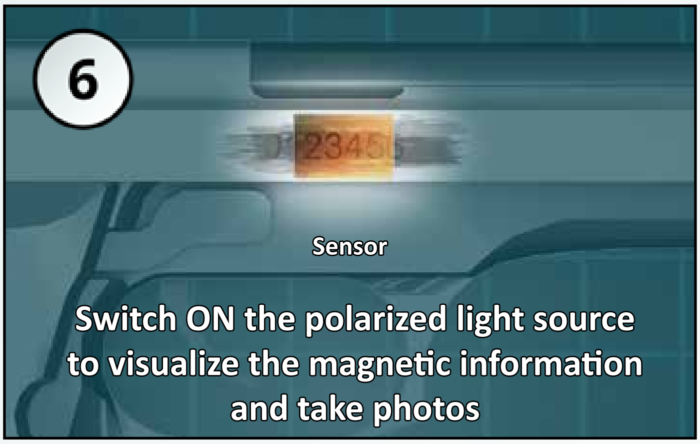
MO sensor instructions

Visualization of manipulated serial numbers









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Magneto Optical Sensor Technology

Magneto-optical (MO) sensors are a new and innovative tool for observing the structure of magnetic information in magnetic materials. They can visualize two dimensional profiles of magnetic fields with nearly optical resolution using the Faraday Effect in real time thus allowing to analyze fields by a magneto-optical image. The sensor works in direct contact to the magnetic material. The MO sensor is made up of four layers: substrate, magneto-optical film, mirror and protection layer (Figure 1). The thin mirror layer is been upset on the MO layer to enable a light reflection during the application.

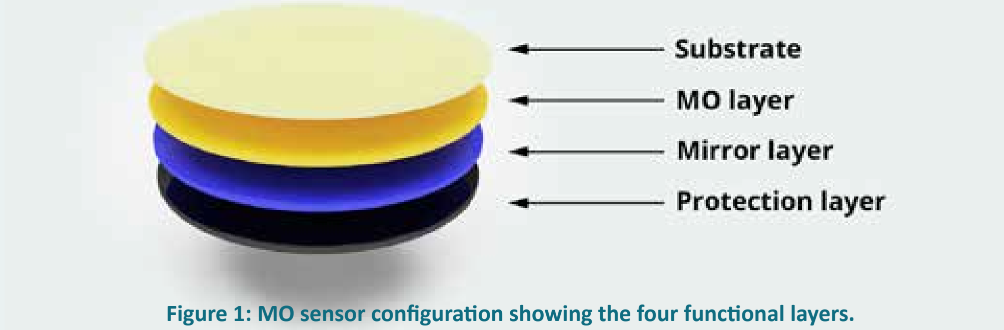

Figure 1: MO sensor configuration showing the four functional layers.

During imaging of a magnetic field the MO sensor is placed directly onto the surface of the magnetic material. The light enters the sensor by the substrate side (transparent) and the protection side (dark sensor surface) is in contact to the sample surface. Using reflection by illuminating with linear polarized light, light passes the transparent MO sensor film, reflex by the mirror coating and passes the MO sensor layer a second time. The light exits through the substrate side in direction to the detection unit (camera).

The system works only by detection of the directly reflected light not with the scattered light. The reflection mode occurs a doubling of the Faraday Effect. This Effect in the MO sensor film causes a rotation of the polarization plane which is linearly proportional to the normal component of the magnetic field. Using an analyzer filter (second polarizer on the lens), intensity contrast imaging is created by the north and south pole structure of the magnet sample (Figure 2). Both polarizers are working close to the crossed position. A good range of angles between the polarizer and analyzer is between 0 and 10 degrees. Mapping of the magnetic properties of the sample is performed along the x-y plane over the entire sensor size to visualize static magnetic field distributions.

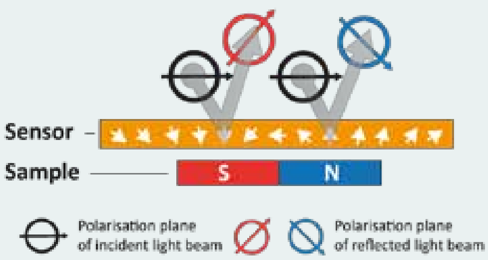

Figure 2: Rotation angle differences caused by the poles of the magnetic material. S and N denote the south to north orientation of the sample

Reference:

1.	Performance evaluation and utility assessment of magneto-optical sensor technology for detecting and visualizing obliterated serial numbers in firearms	http://www.crime-scene-investigator.net/detecting-and-visualizing-obliterated-serial-numbers-in-firearms.pdf
2.	Validation and evaluation of magneto-optical imaging technology for recovering obliterated serial numbers in firearms	

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