FIREFLY

COMBUSTIÓN INGENIEROS S.A.S

FIREFLY®
Micro-lithography Mastering System


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DESCRIPTION

Firefly® is a state-of-the-art, single-pass, single-head micro-lithography origination system that has been developed to produce high-quality holograms; it is capable of recording optically-variable diffraction features suitable for security applications with Level 1 (naked-eye), Level 2 (handheld-viewer) and Level 3 (forensic) verification.

Firefly® is powered by a dedicated, multi-core, high-end computer with 32 GB of RAM and a version of the LINUX® operating system that is tailored to perform calculations and control tasks. This operating system selection and configuration make Firefly® a truly secure, reliable, virus-free machine.

Firefly® can be controlled by one touchscreen, or by a device that shares a network connection with it if requested. To increase Firefly®'s security, it can only be operated by authorized users who plug a provided USBkey into the machine.

For hologram design, Firefly® comes with Project Manager software that uses image files uploaded in standard bitmap formats (such as .tiff, .jpg, .png, and .bmp) to create projects and expose them as holograms. Each project is saved as a single .holo file, which can be uploaded to Firefly® to begin the hologram origination process.

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FIREFLY®'S TECHNICAL SPECIFICATION

Geometric Resolution:	Spot Size:	Focusing System:
158,750 dpi (317,500 dpi in 2X exposure mode)	418 nm	Automatic and optoelectronic
Translation stage travel range:	**Origination Speed:**	**Diffraction Grating Pitch:**
150 by 150 mm*	Up to 2 cm^2 / hour (in 1X exposure mode)	> 900 um
	Software:	
	Firefly® operating software and Project Manager for multiple computers	

Optical Effects Description

The Firefly® microlithography origination system is designed to produce holograms composed of features that have either basic or high-security optical effects. Firefly® can combine all of its effects through the use of layers, which allow one holographic object to be superimposed over another without needing to mask the original images, and also permit holographic effects and objects to be combined over the same area of a hologram while control of the relative brightness of each holographic object remains possible.

Basic Optical Effects

Photo:
A Photo effect is a photographic replica of an uploaded image. Also the object can be given a single depth or 3-D depth range.

Kinetic:
When the origination's viewing angle is changed in the Kinetic effect, certain groups of pixels in the object brighten while others darken, creating the illusion of movement.

MultiChannel:
A MultiChannel object contains a series of objects in the same area of a origination, where each object has a specific viewing angles. This effect allows the creation of 3D images as well as animations.

Optical Effects Description

High-Security Optical Effects

LayerMask:

A LayerMask object is created by a set of binary images that are superimposed on top of each pixel of an origination area, allowing to alter their shape. The images can be added to the object either in order or randomly, and as they can only be seen with an instrument of high magnification, they can be used for Level 3 verification.

Diffractive and Non-Diffractive Micro-Texts and Micro-Images:

Thanks to its high resolution, Firefly® can produce micro-texts and micro-images as small as a few microns (µm). For normal characters, the recommended minimum height is roughly 25 µm in diffractive mode and 6 µm in non-diffractive mode.

Fresnel:

The Fresnel effect is used to create the appearance of a convex or concave lens. Where the lens can appear as a sphere, cone or pyramid.

Engraved:

The Engraved effect creates an object that appears to be a carving placed on top of the surface of the final origination.

Hidden:

The Hidden effect is used in high-security holograms and is very difficult to counterfeit, as the concealed image (Image to be Hidden) in a Hidden object is not visible at any viewing angle until it is illuminated by a laser or point source (such as a flashlight). The Hidden effect is available in Laser-Readable Image (LRI) or Point Source-Readable Image (PSRI) mode.