How to use our films PHD-LUX and PHD-S

Instructions

Phoenix Holographix GmbH
Melchior-Huber-Strasse 25, D-85652, Pliening-Ottersberg, Germany

info@phoenix-holographix.de

Table of Contents

Phoenix Holographix GmbH
Melchior-Huber-Strasse 25, D-85652, Pliening-Ottersberg, Germany

info@phoenix-holographix.de

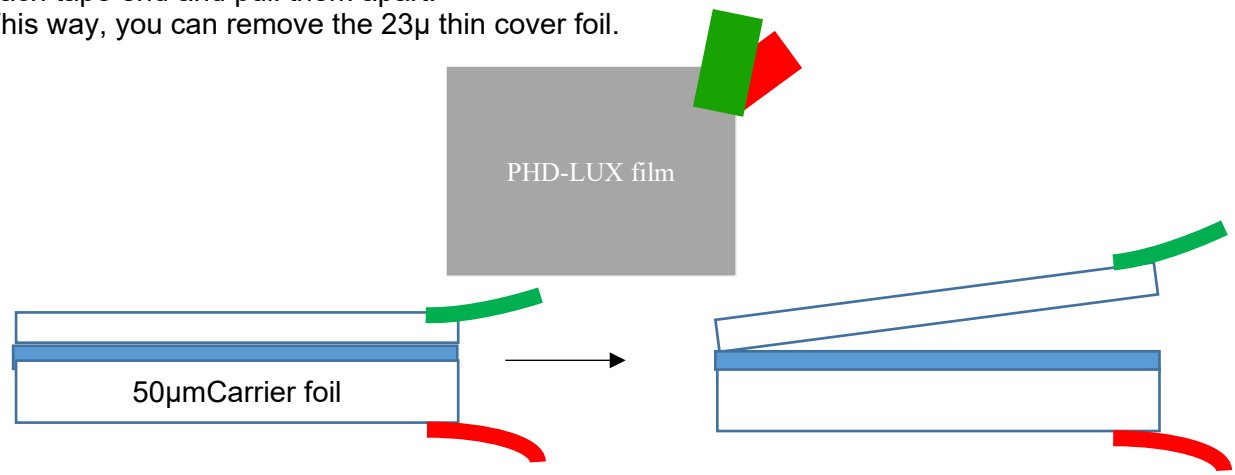
1. How to make a Reflection-type hologram with Photopolymer PHD-LUX film.

The light-sensitive photopolymer film PHD-LUX is suitable for holographic recording in the wavelength range from 450 to 660 nm, creating reflection and transmission holograms.
The PHD-LUX consists of three layers:

All further explanations refer to reflection-type holograms:

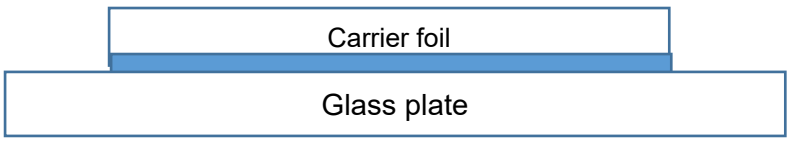
Step 1: Work under dark conditions!

Remove the cover foil from the film: stick two vital tape pieces to one corner of the film piece on both sides. Keep care that the two tapes do not completely stick together. Then grasp each tape end and pull them apart:
This way, you can remove the 23µ thin cover foil.



Step 2:

lamination of the film piece with the sticky polymer side onto a glass substrate or onto the glass surface of a master with a **soft** lamination roll



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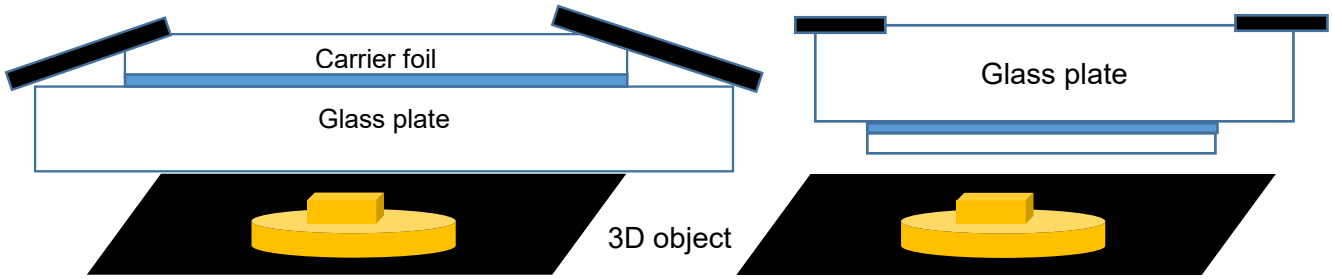
Step 3:

Before you start the laser exposure, protect the glass and film edges with, e.g., a black paper frame to avoid coupling in unwanted laser light (scattered light, light reflections). Otherwise, you will get unwanted ghost images that disturb your reflection hologram.

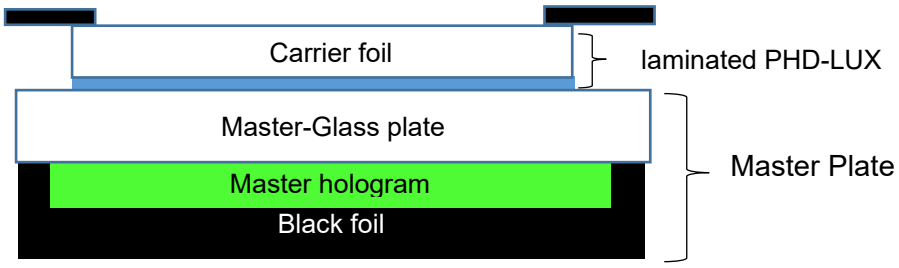
Step 4:

Here, you see a setup A) for making a Denisyuk reflection hologram from a 3D object and B) for making a contact copy from a reflection master: The laser light comes from the top at a desired angle.

A) Denisyuk: You can make it with the film facing up or facing down relative to the glass plate.
Facing down, you can get the object's surface closer to the film.



B) Contact copy from master plate:



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Step 5:

Avoid overexposure, especially when you record a Denisyuk hologram!
Measure your expanded laser beam intensity (mW/cm²), which hits the film! However, the measuring devices differ from one another. We recommend doing a series of test exposures and evaluating the recorded hologram brightness after baking (see step #7). We measured the following values:

Blue:	450 nm	0,85 mW/cm² :	90 sec exposure time	= 77mJ/cm²
	488 nm	0,70 mW/cm²:	50 sec "	= 35mJ/cm²
Green:	514 nm	2,40 mW/cm²	15 sec "	= 36 mJ/cm²
	520 nm	1,20 mW/cm²	40 sec "	= 48 mJ/cm²
Red:	633 nm	1,30 mW/cm²	40 sec "	= 45 mJ/cm²

Step 6:

After the laser exposure, the film plate is exposed to UV/Vis light (e.g., a Solarium lamp) for 20 seconds. Then, the film is removed from the glass plate or master plate, and an additional 5 min of UV/Vis light is fixed.

Step 7:

The hologram brightness is weak after the Laser exposure and UV fixing step. A 15-minute Baking process at 100-120°C in an oven visibly improves the hologram brightness.
A hologram can be made even brighter using our PHD-tuning film for color-tuning.

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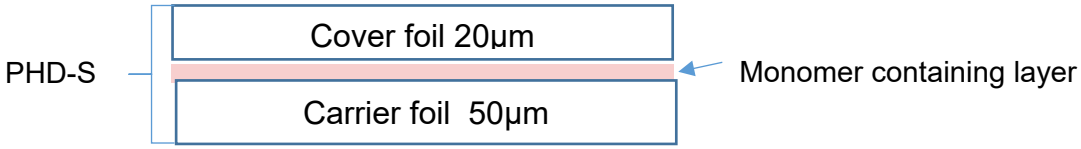
2. How to make a color-shifting process with our PHD-S film on a hologram already made with PHD-LUX film.

Many holographic artists use the color-shifting process to change the color of their monochrome blue or green recorded reflection volume holograms. The color-shifting process can shift the color of the hologram reconstruction to longer wavelengths. When you change a hologram, the visibility (bandwidth) angle can also be expanded, and the hologram becomes brighter. Many artists want a better true-color impression of the recorded 3D objects. Creating new holographic features, like letters, symbols, etc, within the recorded hologram is also possible. That's why we developed a color-shifting film PHD-S.



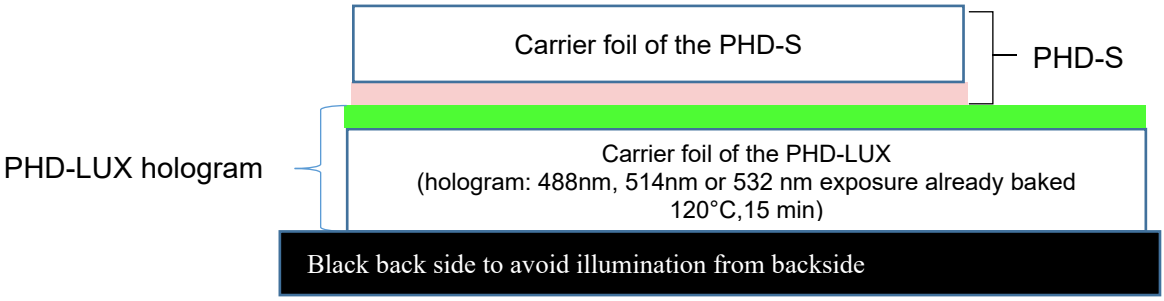
How to use the light-sensitive PHD-S:

Step A:

Work under yellow light!
Remove the cover foil of the PHD-S in the same way as the PHD-LUX (see step 1-Instruction #1)

Step B:

Laminate the PHD-S with the sticky tuning layer onto the open hologram layer with a soft lamination roll.



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Step C:

If you want to shift from green to red hologram, bake at 100°C for 30 minutes.
If you wish to change from green to golden color, expose this film composite for 8 sec with UV/light and bake at 100°C for 30 min.
If you want a feature with a color different from the recorded hologram, use a black/transparent mask, expose UV/Vis for about 15 sec through the mask, and bake at 100°C for 30 min.
These are only examples of how to do it.

Step D:

All shifted hologram composites should be fixed with UV for 10–20 minutes, and then the PHD-S carrier foil should be removed.

Don't hesitate to contact us if you have questions regarding converting the holograms to labels.

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