DIY Besalign-style Lens Board

Feel free to pass around.
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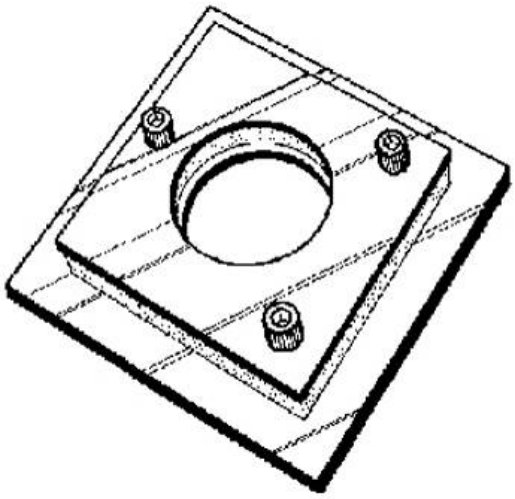
The Besalign board was designed to help you get critical enlarger alignment, particularly with enlargers that have little or no adjustments for the lens stage.

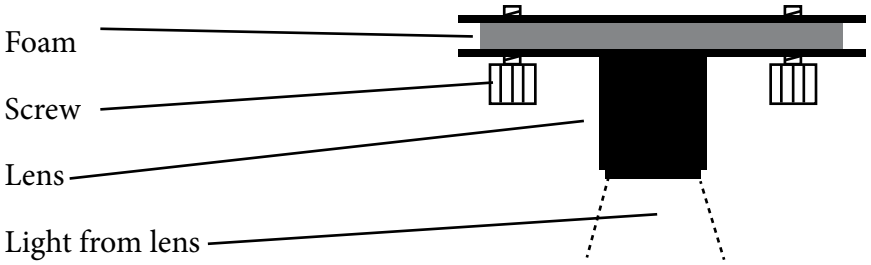
They can be used with various alignment tools, like the (awesome) Versalign Parallel; or you can take a black, developed piece of film leader, and scratch a grid into it with a needle, and check alignment visually.

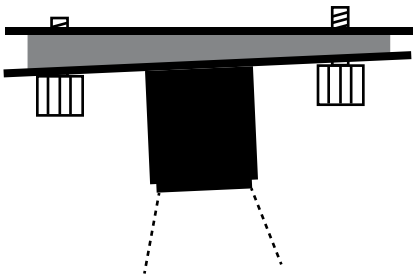
The only real shortcoming is you can lose the light-path that illuminates the F-stop for lenses that don't carry enlarging light to the f-stop ring.

The concept:



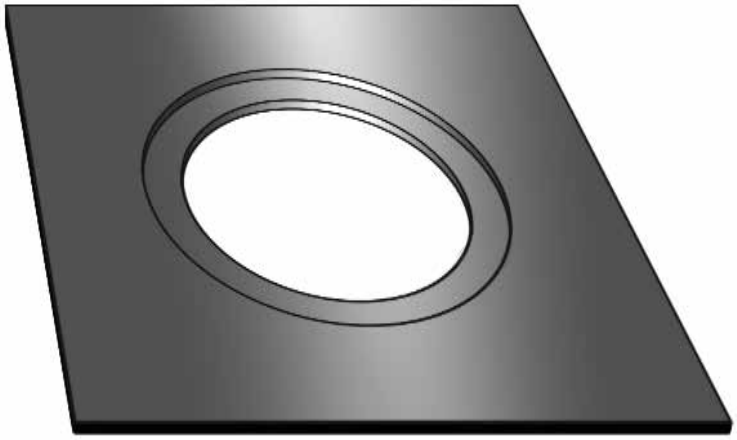
The board is essentially two lens boards, with black foam - about the thickness of a mouse pad or yoga mat - sandwiched between them. Three screws allow you to tighten or loosen the setup, to cover any possible angle needed.



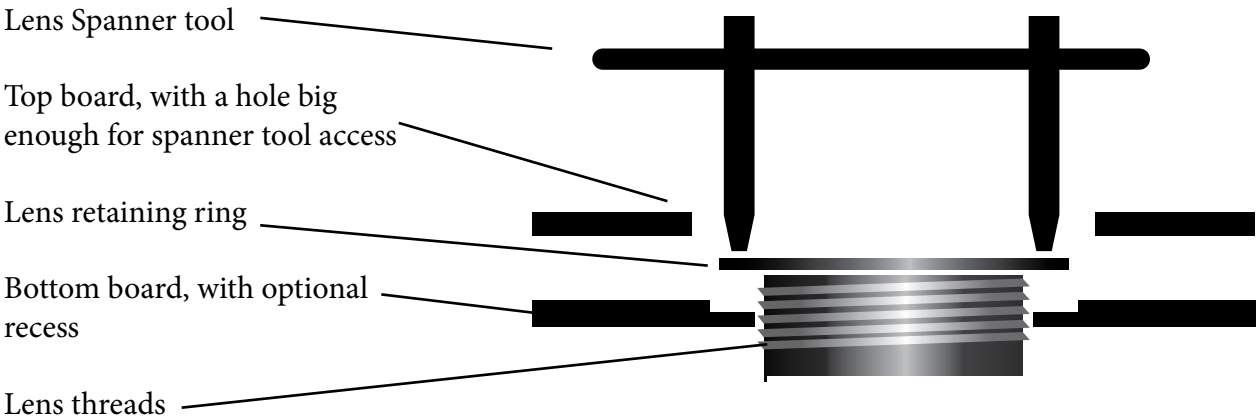


Tighten a screw, and the angle changes

Take a look at a standard lens board - simple, flat piece of aluminum in most cases, with an opening for the lens, surrounded by a recessed edge. The recess is for the lens retaining ring. It's not 100% necessary, but usually there.



Here's the Besalign board in cross section:

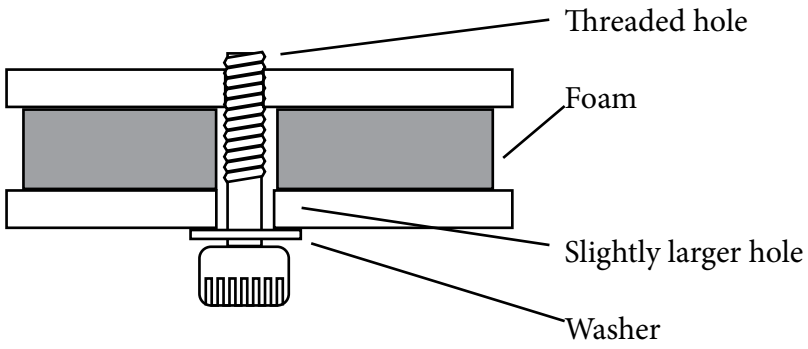


The three screws are threaded machine screws - a "socket cap screw" is a good choice, in a small size - like a metric M6.

These screws usually have an Allen-keyed head, with a knurled grip area. So the matching-sized Allen key is handy to have as well.

The top board mounts to your enlarger like any lens board would. The bottom board may need to be slightly smaller, depending upon the specific enlarger.

The screw installation is the key to how it works. The top board has a threaded hole; tightening or loosening the screw moves the screw up and down; the bottom board has a hole large enough for the screw to pass through; the screw head (and usually a small washer) pushes the bottom board upwards against the foam. The resistance of the foam holds the bottom board in position.



The length of the screw is important, in that it shouldn't protrude too far up into the lens stage to interfere with any enlarger parts, but should give you at least a 1/8" or so adjustment range.

MAKING THE BOARD

OK, I'll assume you have decent shop skills or are giving this to someone who does. Don't go whacking a finger off, please. You should know how to drill and tap a hole (which is very easy, especially with aluminum).

TOOLS:

A drill press is pretty necessary.
A tap and drill that matches your chosen screws.
A drill bit slightly larger than the screw size - the screw should pass through this hole cleanly.
You may need a hole saw that will cut aluminum (my woodworking hole saws all do fine, but check for safety).
Some strong tape and some wood scraps.
Some small wood screws that will fit through the screw holes for clamping.
WD 40 or oil for drilling and tapping.
A small round file or emery paper for cleanup.

MATERIALS:
2 lens boards; one should fit the lens you'll be using. One can be undrilled, or can have a regular or smaller or larger lens opening.

3 machine screws suitable for this project. And three washers to match the screws.

A mouse pad or yoga mat. Preferably black - light should not be able to pass through it.

Here are the steps I took, but I'm no master engineer by any means.

1). Inspect the lens boards. They should suit the enlarger. Determine if a stack of two boards with foam between them will fit your setup, or if the lower board needs to be smaller.

Install a lens and determine the optimal position for the 3 screws. They should be a fairly even triangle, allow access to the lens F-stop settings, and not interfere with anything in the lens stage. You might make a paper template. One thing I did is make the front screw a bit closer to the edge, making it easier to suss out aligning the boards for the screws when assembling.

Also, if you want the top board to allow spanner-tool access, determine the hole size that this will require and make sure the screw holes are free of this area. (You can swap lenses by disassembling the Besalign - it just adds a few minutes).

2). Tape the 2 lens boards together firmly. If you use a template, attach it (spray glue works well).

3). Clamp the stacked boards in a drill press and line up the areas to be drilled. Using the drill bit that matches your tap, drill ***straight down*** through ***both boards***. This will ensure the holes line up. Remove the tape.

4). Identify the lower lens board - it's the one that fits your lens and possibly has a recess for the locking ring. Drill through the three holes you just made with the larger bit, and ensure the screws will pass through without scraping or resistance. Make sure the holes are smaller than the washer you'll use.

5). Tap the holes in the upper lens board. Use some oil or WD40, keep the tap straight, etc.

6). If needed, cut the access hole in the upper board - the hole needs to be at least large enough for light to enter the lens unobstructed. It's a nice bonus if you can get a spanner in there. To drill an aluminum lens board, I placed the top board on scrap wood, and used small wood screws (driven through the three tapped holes, small enough not to damage the threads of the tapped holes) to hold it firmly to the scrap. I used a hole saw in a drill press with plenty of oil - is this stupid or dangerous? I don't know. I did have the board screwed to scrap wood, and the scrap wood clamped to the drill press bed.

If you need to find the center of the board, trace the board on the scrap wood, and make an "X" through the corners of the tracing. (If the board has no hole at all, do this on the surface of the board).

I clamped the scrap wood to the drill press, and used a hole saw of the proper size to make the hole. Clean up any sharp edges with a file or emery paper.

7). Clean all debris and oil from the boards with hot, soapy water (the hot water will help them dry quickly - a wipe with a towel and you're good). If you want to paint them, scuff them a bit with fine sandpaper or steel wool, clean with alcohol or solvent, and paint with matte black spray paint and let dry.

8). Assembly - cut the foam to the size of the boards. Use an exacto or box knife to cut the lens opening. You can compress the foam with a board to make cutting easier. For the three screw holes, I found just poking a slit with an exacto worked fine. Assemble by screwing the three screws through the "sandwich", with the knurled ends going up through the lower board, through the foam, and into the threaded holes.

Install the lens, place the new board on your enlarger and check for mechanical interference, and for any vignetting. Then remove it, and do whatever you usually do to level your baseboard and align the film plane. Re-install the lens board, and fine-tune the lens stage alignment using the three screws.