

# Laser Lab Equipment Overview

New to laser use, this document is designed to provide an overview of how one can ensure sufficient beam control using some of the elements listed below. The Radiation Safety Office can help you with any or all of your control and safety questions. We are highly experienced in operational laser safety and have dealt with safety for most every laser application.

We will cover

- [Optical Tables](#)
- [Barriers and Beam control](#)
- [Beam stops](#)
- [Beam shutters](#)
- [Beam finding](#)
- [Beam stability, supports and holders](#)
- [Tools](#)

## Table

Optical tables allow for attachment points for repeatable and stable measurements. It is highly recommended that optical tables be grounded (top and bottom). Tables come in all sizes, some even sit on suspension to minimize vibrations.



- Example: Thor Labs [MB12D](#) 12" x 12" x 1/2" Aluminum Breadboard, securely mounts optics for repeatability but contains no anti vibration.



## Barriers and Beam control

Enclosures are useful in fully or partially enclosing a laser. The correct use of an enclosure can minimize or eliminate the need for many safety features. In some cases the LSO can verify your use of an adequate control and reclassify the laser such that no laser safety program is required. All enclosures must be made of material that the beam can not escape if impinges on the surface. For a complete class1 encloser the class 3B or 4 laser cannot escape the enclosure during normal operation (interlocked openings, or secured with fasteners requiring tools) thus it would be at class1 levels and incapable of causing injury during normal operation.

- Thor Labs [Enclosures](#)



- Beam [tubes](#) to enclose beam. Beam tubes can enclose the beam while moving from optic to optic. So enclosing some or all of the beam will minimize the potential for operator induced scatter (watch in the beam, tweezers or shiny tools moving across the beam, etc.)



Curtains and barriers can be table mounted or wall mounted to provide a clear delineation of the nominal hazard zone whereby within this space a hazardous situation can exist thus eyewear, etc. is required, but outside it is not hazardous. Curtains and barriers must be able to handle the irradiance of the beam at its location.

- Kentek [Flex guard](#) Fabric Laser curtains  
Sample with plain, button, toggle, Velcro, and toggle ends



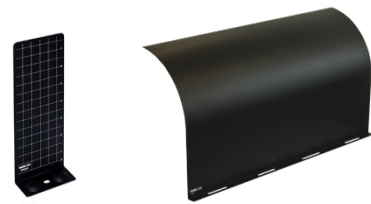
- Kentek [Everguard](#) ridged panels (1200w/cm<sup>2</sup>)
- kentek [Benchguard](#), or
- kentek [Table Guard](#),



- Kentek Acrylic sheets for [viewing windows and viewing panels](#). these sheets must be able to handle beam at the location for prolonged durations



- Thor Labs [Laser Safety Screen](#), attach directly to a surface (optical table, etc). They come in various lengths and heights. Be sure the height is sufficient to block the beam.



- Some barriers have their own hardware to attach to a table, sometimes 8020 [posts](#) are used to hold various barriers (order black with threaded ends or “L” the brackets to attach)



## Beam stops

Beam stops are devices that can terminate a beam completely without ancillary scattering. For example, a poor beam stop would be a class 4 laser into a flat aluminum block. This would create a multitude of scatter thus the Diffuse Nominal Hazard zone would be created.

- Thor Labs [beam stops](#)
- Kentek [beam stops](#)



## Beam Shutters

Shutters, either on the laser or on a beamline can allow the user to eliminate the hazard. For example, if doing an alignment, close the shutter before moving optics, then reopen.

Attenuators can reduce the beam. This is beneficial if you need to reduce it to safe levels, maybe where LSO approved lower OD eyewear can be used, or for alignment, etc. or reduced to prevent damage to equipment such as power meters.



- Thor Labs beam [shutters and attenuators](#)

## Beam Finding

When the beam is invisible or your eyewear is blocking the visible beam, one must locate the beam to ensure all is not lost. If eyewear is blocking the beam, do not remove eyewear, instead use a camera or cell phone to view the beam and all around (walls, ceilings, etc.) Record video of the setup, and view outside the area where eyewear can be removed.

The primary beam can be located with a power monitoring (if all the power is in the line then none has escaped)

For invisible beams items such as Zap it paper or Infrared detectors of viewers convert the invisible signal to a visible stimulus (burn mark, visible color, etc.)

- Kentek beam [zap-it](#) paper (find beam and/or beam profile)



- Kentek [VIEW-IT](#) Infrared laser detector (invisible beam locator)



- Thermal cameras: see heat generated from beams (visible or invisible)



- Beam power meter



## Table supports, beam stability, and sample positioning

Connecting and holding optics securely will prevent mis-alignment thus less need for re-alignments. There are countless optics that can be secured with various holders, posts, etc. to precisely position items for safer operation.



- Thor Labs [FP01](#) Plate Holder, 0.9" Wide, Holds Plates up to 0.58" Thick

- Thor Labs [TRA2](#) 1/2" Aluminum Post, 8-32 Setscrew, 1/4"-20 Tap



- Thor Labs [PH2-P5](#) 1/2" Post Holder, Spring-Loaded Hex-Locking Thumbscrew



- Thor Labs [SH25S075](#) 1/4"-20 Stainless Steel Cap Screw, (holds post holder to bench)



- Thor Labs [FH2D](#) Dual Filter Holder, Stackable Holder or Thor Labs [DH1](#) Compact Dual Filter Holder



## Tools (long and non reflective)

Tools should be used only when the beam is not present. If needed, then tools that put the operators hands out of the beam are required.

This long Allen ball driver will allow for tightening of post and holders while minimizing touching the beam plane.



All tools should be non reflective because an reflections can make the beam go somewhere unintended. Matte black tools can be acquired or simply created (spray painting a tool set)

