Comments on PMT Mounts

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PMT Mount Design Considerations

PMTs have shown "infant mortality" associated with poor mounting with excessive stress on the pins of the base (and due to poor "potting" of the base).

A good PMT mount should restrain the PMT with minimal force. Strength per se is not a good thing here.

Particular care should be made to minimize torques on the base/pins relative to the glass bulb of the PMT.

In air, the weight of the PMT base leads to torques on the pins when the PMT axis is horizontal. The potting of the base should extend up the glass neck of the PMT so the weight of the base can be support off the neck rather than off the pins.

In liquid, the base is roughly neutral buoyant, and so leads to very little torque on the pins.

The PMT mount should clamp to the "equator" of the bulb of the PMT. A compliant material such as Gore Joint Sealant should be applied between the metal clamp and glass bulb.

http://www.gore.com/en_xx/products/sealants/gaskets/gore_tex_joint_sealant.html

The PMT mount should also lightly restrain the neck of the PMT, so as to counter the small tendency of the PMT to rotate under buoyant torques.

The PMT mount should not clamp to the base, thereby avoiding any possibility of stress on the pins due to forces transmitted between one clamping ring and another.

The PMT mount should be nonmagnetic, with care that joints by welds or rivets do not create localized magnetic fields.

A Successful Example: MiniBooNE

1200 frames in use for several years with no failures.

Welded SS frame + SS band; cost under $25 per mount.

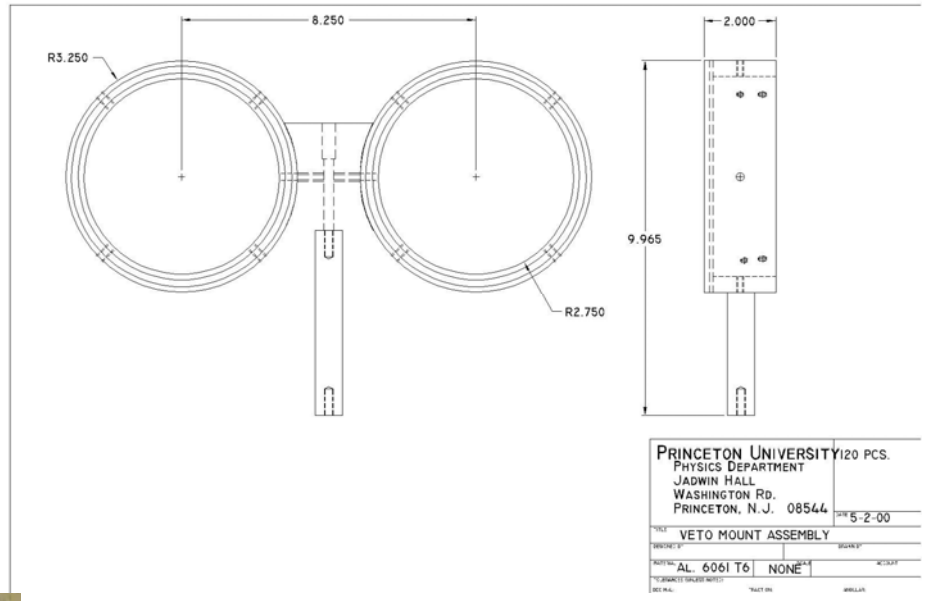
Magnetization of welds is negligible. [DocDB #1298]

PMT neck restrained, but not clamped.
(LSND had no restraint on the neck,
and a few PMTs worked loose
– without failing.)

Neck restraint

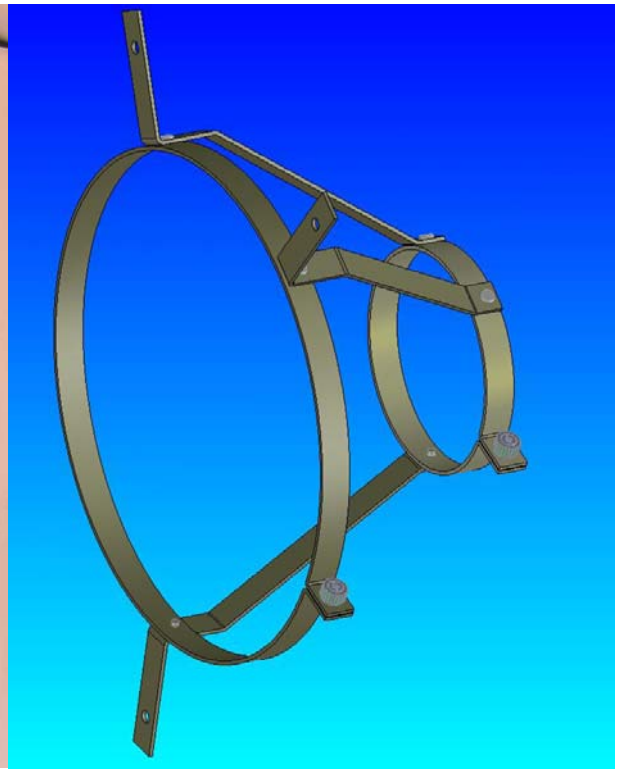
via 2 wire loops

Could Clamp PMTs by Neck Only



240 PMTs in MiniBooNE outer veto clamped by neck only.

Comments on Daya Bay Design of DocDB #1635, 1852

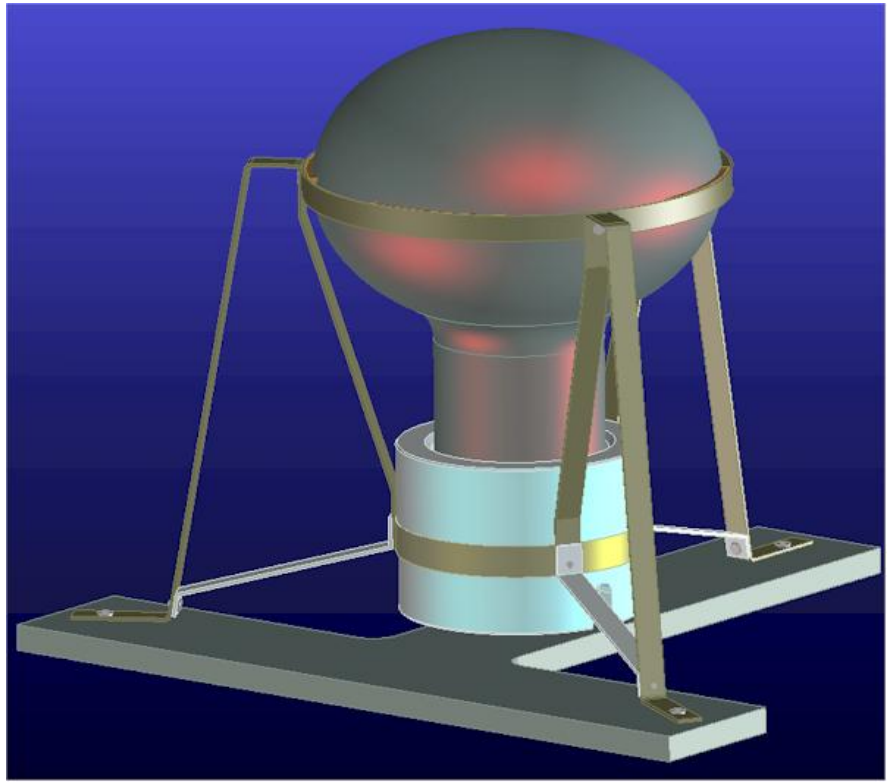


Riveted structure with 3-point support, clamps to both bulb and neck.

Basically fine.

Recommend only one of the 2 clamps be tight; the other should be loose.

Comments on Redesign of 5 March 2008



This design clamps to bulb of PMT and to the PMT base.

This is very risky compared to the previous design that clamped to bulb and neck.