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Si-PM wrap/attach

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Hello Julie,

Prior to the wrapping would be all the processes of QC/inspections to weed out any bad articles. Usually this is in regards to any physical damage to the blocks themselves or the dimensions being out of spec. This process usually could be done by 2x FTE processing 25-30 crystals per day. **For x3000 Crystals ~24 weeks.** Assuming more manpower is available this could be reduced significantly. Also included in this time is all the steps for cataloguing and inventory management.

Also prior to wrapping there is a decent amount of prep time required to make all of the wrapping material. The NPS used a 3M product called ESR to serve as the reflective material which needed to be cut to size from the raw sheets as well as a material called TEDLAR which was light tight black (took around a month to cut all for the NPS with 10% spares for error). **So for x3000 Crystals 13 weeks.**

Then they need to be shaped in a low temperature oven to allow them to be workable. The time for this can be estimated, it is a function of how many ovens are available at the time but, for a rough number, we can say ~32 wrappers could be produced a day with the hardware we have at JLab now and this could be scaled up. **For x3000 Crystals 19 weeks**

There will also need to be space set aside for storage both prior to and post assembly/wrapping this will need to be a space with stable temperature and humidity.



Each rack can hold 250 Crystals.

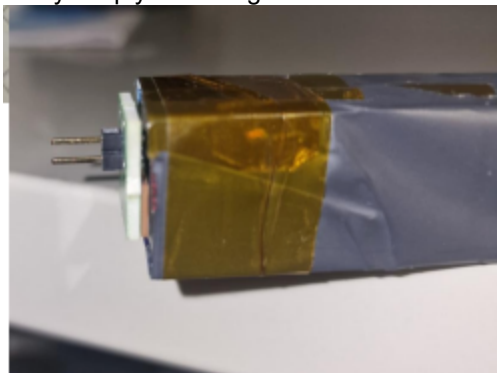
In regards to the Si-PM wrapping, as an outline of the process:

1. PbWO block is cleaned of any dust particles on surfaces.
2. PbWO block is warped individually with a reflective material to ensure light collection is maximized, on all sides except the front and back faces (two smaller ones).
3. Wrapping again with another layer of black light tight material to eliminate cross talk.
4. Si-PM is attached to the rear of the module.

This can be accomplished with either a mounting clip which we 3d printed in house, assumable in bulk this could be a manufactured part.



Or by simply mounting the Si-PM surface to the back end of the crystal.



Both types of the attachment process will require a glue either UV cured resin or an RTV Silicone. UV cured is more permanent and durable but is harder to remove after the fact.

5. Module stored for further checkout & tests.

I can go into these steps in more detail if it is desired, this link is to our wrapping overview for the NPS detector, https://www.jlab.org/div_dept/physics_division/dsg/technical_documentation/Hall_C/NPS-2/Readings/PWO_wrapping.pdf

Roughly it took almost 3 weeks with 8 FTE working 5-6 day weeks to finish out the NPS detector (~1100 modules).

In terms of time scales, one person can wrap usually 10 blocks per day. Assuming 10x full time workers then, **for x3000 Crystals 6 weeks.**

The time for adhering to the Si-PM can vary depending on the method used. If it's a RTV then it is recommended to leave the crystal vertical for 24 hrs to ensure no bubbles or detachment(see attached PDF). If it's the UV cured method then less than a minute of curing time. Neither would have a significant impact overall on the timetable, but the RTV would require a dedicated(safe where the won't be disturbed) space at stable temperature for it to cure after it is attached.

Let me know if you have any questions regarding this or if you would like more details on anything.

Thanks,
Josh Crafts



sipm_3x3_proto.pdf

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