

Reflector preshaping procedure for NPS calorimeter

In order to maximize the light collection of the calorimeter module and preventing from “optical” cross talks with adjacent crystals the reflecting material wrapped directly on exterior of the scintillator crystal. In the past the material of choice for similar type calorimeters was VM2000 reflector, which no more available at the market. The direct replacement for VM2000 is ESR reflector material from 3M vendor (for details see 3M-ESR-TDS.pdf). Both materials had nearly identical reflective properties, with ESR being slightly thicker at 65 μ m. The ESR material is more ridged than the VM2000 and require work to shape it around the exterior of the crystal in order to prevent air gaps between the reflector and the crystal surface. This would also allow for much easier assembly of modules which would reduce the opportunity for damaging the crystals themselves. The ESR presaphing form was designed to allow for onsite shaping of precut ESR rectangles prior to their installation into the detector modules. The form is simplistic in design to accommodate rapid production. The frame of the form is made from stock extruded aluminum L bracket and 1cm thick aluminum base plate which provides the majority of the structural strength. The core of the form has external dimensions (width and height) to match that of the average crystal dimensions, the length of the core is extended to allow for mounting points, tolerances is important in order to minimize dimension spread and exclude overlaps or gaps between reflector edges. The ESR is wrapped around the core and four blocks are placed around it to create a ridged constraint on all sides of the ESR. The entire form is made from 6061 aluminum alloy to prevent uneven heat expansion. All of the form utilizes 1/4-20 nc threaded hex head screws to secure the individual parts together as well as to provide the force to keep the internal blocks compressed around the core. Once the ESR is in place and all the compression blocks are locked into place the form is then moved into the oven where it will cycle up to 100°C where the temperature must remain for 10-15 mins at which point the form should remain in the oven until it is cool enough to handle safely.

List of hardware pieces for single preshape tool:

1) Base plate	(Baseplate.png)	1 pcs	tolerances not critical
2)ESR mold core	(ESRMold_core.png)	1 pcs	25 um desirable
3)ESR mold long	(ESRMold_long.png)	2 pcs	tolerances not critical
4)ESR mold short	(ESRmold_short.png)	2 pcs	tolerances not critical
5)L-shape bracket	(Lshape_bracket.png)	2 pcs	tolerances not critical
6) 1/4-20 nc threaded hex head screws	2cm, 2.3 cm , 3.3 cm, 4cm long	10pcs each	