

Design and Development of stress relieving support system for TMT primary glass blanks

The Thirty Meter Telescope (TMT) adopts a recently developed technology known as Stressed Mirror Polishing (SMP) for the polishing of its 492 glass blanks. In this process, first the meniscus type spherical shape glass blanks are converted in to the conjugate of desired aspheric shape by the application of forces around the edges using warping arms. This is followed by spherical polishing in the stressed condition to obtain the required surface figure. The stress accumulated in the glass blank needs to be released before the metrology to measure the asphericity of the surface. Hence it is essential to remove the stress by keeping the glass blank in a free floating condition. To achieve this, the glass blanks need to be kept over a platform or a support system which will provide a zero gravity condition.

As a part of this, we designed and simulated a passive support system which works using the whiffletree mechanism to produce a floating condition. This is achieved by sensing the reaction force at each support point and nullifies the gravity effect by giving equal and opposite counter acting forces. This stress relieving support system which additionally gives optimized support for the glass blank and helps to minimize the surface deformation due to its self weight sagging. This paper discusses about the design and analysis of the support system and it also discusses about the sensitivity, tolerance on position and force and alignment sensitivity of the glass blank over the support system.