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# An optimized method for making thin primary mirrors for industrial scale telescopes

Samararathna K.G., Withanage N.S.D., Amaradasa H.D.S.,
Prasadh K.V.S., De Silva W.M.K., Perera H.A.D.S.D.,
Mahanama G.D.K.[1*]
*Department of Physics, University of Ruhuna, Matara, Sri Lanka.*

Fabrication of telescope primary mirrors is considered a costly and challenging process due to the optical precessions required in Astronomy. Conventionally, small telescope mirrors have been made from 3-5 cm thick borosilicate glass plates. However, at present, thin primary mirrors (1-2 cm thick) are at a high demand for applications due to their lightweight and cost-effectiveness. Here, preliminary results of the study on an optimized method for making telescope mirrors of 0.2032 m aperture and 1.2192 m focal length, from 12 mm thick thermally-treated soda-lime glass blanks are disclosed. Polarization tests conducted initially had indicated no signs of tension when loaded with a 100 N force. Dial-gauge measurements and Newton interferometer tests unveiled that the blanks retained the flatness after removing the load. Furthermore, the parallelism of the surfaces remained constant. The tests were conducted over two months period to study the behaviour of glass blanks under the load. The initial properties of the glass remained constant, proving the selected material and thickness were sufficient to withstand the force applied during grinding. Thermal analysis of the glass blanks revealed that a temperature shift of 25-100 °C had no effect on the material integrity. The adopted grinding method has shown a reduction of the material usage, a substantial decrease in the overall cost, and the time of the grinding process. The Ronchi test showed that the grinded mirror satisfies the quality requirement in Astronomy observations. The average cost estimate for finalizing the grinding process of a thin parabolic mirror is about 7,000.00 LKR.

**Keywords:** Thin telescope mirror, Mirror grinding, Industrial-grade, Glass blank, Ronchi test

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*Corresponding author: mahanama@phy.ruh.ac.lk