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## **Ion Beam Figuring of molds**

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Optical lenses for the consumer goods market made from glass or plastic are generally produced through molding techniques. These lenses only cost a few US dollars or less, but usually feature a surface of mediocre quality. To improve the quality through the application of a finishing technique after the molding process would not prove to be an economical exercise. The mold pins themselves typically cost between \$10,000 and \$30,000. As the quality of the lens depends on the surface of the optical mold, an error correction process on the mold itself would be of more advantage.

A method called Ion Beam Figuring can be used for manufacturing molds with a low surface error. The general advantages of the Ion Beam Figuring technology is the contactless polishing without any aging effects of the tool. This leads to an excellent stability of the removal rate without any mechanical surface damage. The related physical process is called 'sputtering' and can be witnessed on any material. Mold pins are made from various materials as for example steel, cupronickel, aluminium or very hard materials like silicon carbide or tungsten carbide. The Ion Beam Figuring process itself is identical for all these different materials; solely the removal rate differs and has to be calibrated in advance.

The process can be realized in an Ion Beam Figuring system in which the substrate is moved in front of a focussed broad ion beam. The local milling rate is controlled through a modulated velocity profile which is calculated specifically for each substrate in order to mill the material at the associated positions to achieve the target geometry.

The authors will present molds and metal surfaces which show very high surface form accuracies compared to conventionally manufactured samples.

### **Keywords**

Ion Beam Figuring

Plasma etching

contactless polishing

mold pins

metal surface polishing