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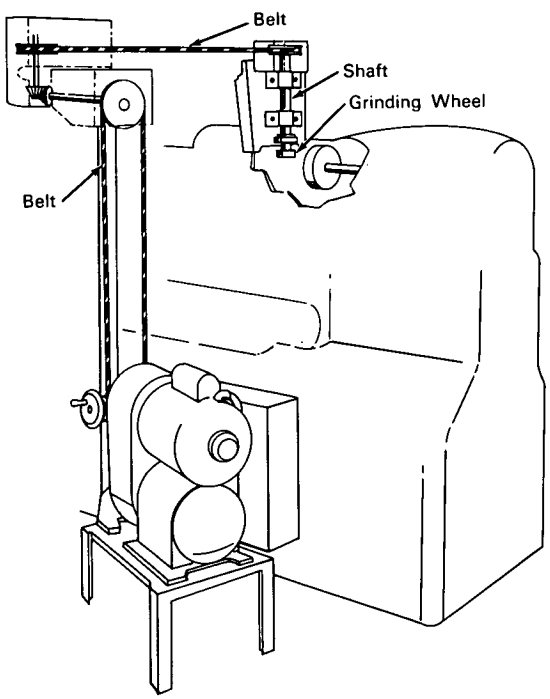
NASA TECH BRIEF

This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the space program.

Lathe Converted for Grinding Aspheric Surfaces



The problem: Normal aspheric grinding equipment is specialized and prohibitively expensive for short production runs.

The solution: A standard overarm tracing lathe converted by the addition of an independently driven diamond grinding wheel guided by the lathe tracer.

How it's done: A precision stainless-steel template was made in accordance with the desired aspheric profile coordinates. Motion of the independently driven diamond grinding wheel was controlled by the lathe air tracer following the stainless-steel template, thus producing the desired aspheric profile. The resultant machine grinding achieved an aspheric surface accuracy of ±0.001 inch and a machine finish of AA-16 or better on quartz blanks at a rate of three to five per eight-hour day. Periodic zonal corrective grinding was required due to the constant headstock speed. For fine grinding, a conventional lapping tool was modified by cementing six 3/4-inch brass discs onto a rubber base, bonded to the metal lapping tool. This was mounted on a lapping wheel and randomly traversed over the rotating workpiece using successively finer grinding compounds. The lenses were polished to the design optic tolerance of ±300 fringes.

(continued overleaf)

Notes:

1. Diamond and quartz particles caused slight surface damage to ways and fixtures, requiring nominal reconditioning of the equipment before it could be returned to normal production work.

2. Cooling of the diamond drill and workpiece was achieved using a conventional water-supply system.

3. For further information about this innovation inquiries may be directed to:

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Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

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