

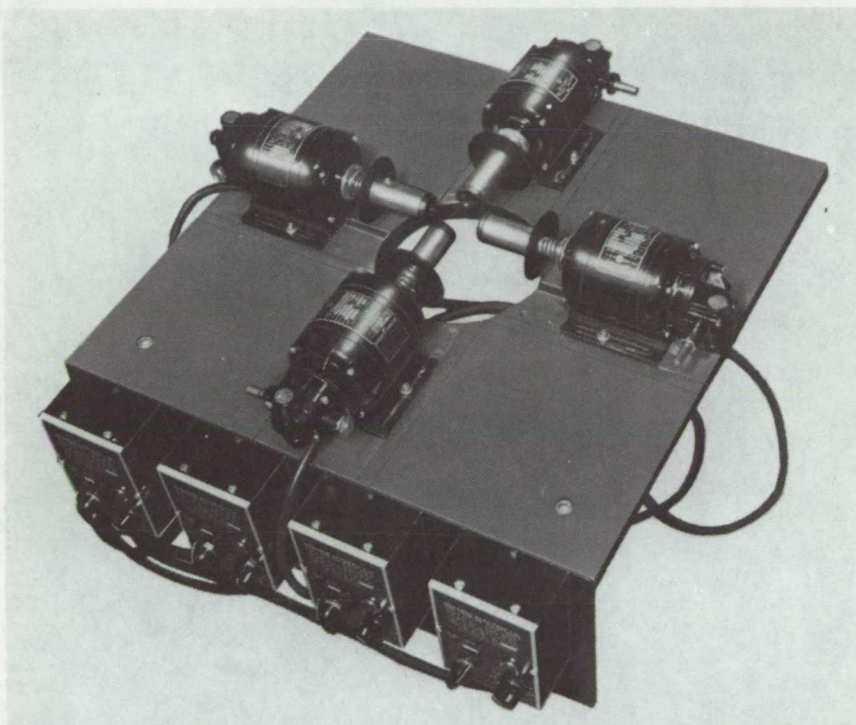
NASA TECH BRIEF

Marshall Space Flight Center



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Machine Finishes Balls to High Degree of Roundness



The machine shown in the figure will finish a ball to roundness (sphericity) within 12.5 nm (half a microinch) from any type of hard material. Machines used previously would produce a ball with accuracy of only 125 nm (five microinches) roundness. Grinding and polishing of the ball to this tolerance are accomplished by lapping elements on four to six motor-driven spindles.

Four spindles with lapping elements used for grinding and polishing a relatively small ball are positioned around a circular opening in an aluminum platform which is supported by one solid-metal side and two leg brackets on the opposite corners. The spindles holding the polishing laps are adjustably spring-loaded to ensure constant contact pressure on the ball and are driven by

four electric motors mounted on the platform. Individual motor controls are mounted on the side of the platform and allow variation of the speed and direction of spindle rotation, which results in a random motion of the ball. It is this random motion with respect to the polishing laps that effects the high degree of uniform roundness in the ball.

The grinding-lapping compound drips onto the ball from a container positioned directly overhead (not shown). The excess compound and the abraded ball particles are collected in a container below the opening in the platform. For a heavier and larger diameter ball, a fifth spindle is used to support the ball from below; this spindle is driven by an electric motor mounted on

an angle arm beneath the platform. When the fifth spindle is used, a ring channel beneath the spindle catches the compound and material removed from the ball, thus preventing coating and clogging of the motor. A sixth spindle and motor may be mounted directly over the ball to provide a faster finishing rate and improved roundness.

Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

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