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DRY WHEEL CENTERLESS GRINDER
FOR DEVELOPMENT LABORATORY USE

April 1969

AEC RESEARCH &
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DRY WHEEL CENTERLESS GRINDER
FOR DEVELOPMENT LABORATORY USE

By

J. L. DeMeyer

FFTF Fuel Department
FFTF Project

April 1969

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J. L. DeMeyer

INTRODUCTION

A grinding device was designed and constructed to fill a need for a relatively simple and inexpensive means of making small reductions in diameter of oxide pellets used in nuclear reactor fuel elements. Such a device must necessarily be small enough to be easily introduced into and removed from development laboratory glove boxes typically used in preparing fuel pellets. It must also be adjustable to meet grinding tolerances of ± 0.002 in. Other desirable requirements are that the machine be capable of dry grinding, which would eliminate contamination of pellets and neutron moderation by grinding fluids, and grinding a few to a few hundred pellets in a short time.

DISCUSSION

Experience has shown that in any given mixed oxide pellet sintering run, diameter tolerances can be held to ± 0.001 in. However, minor variations in a production process can make pellet diameters vary as much as ± 0.003 to 0.004 in. among consecutive sintering runs.

The small, dry wheel centerless grinder illustrated in Figures 1 and 2 of this report was designed, constructed, and tested. Performance has been significantly better than anticipated. The original machine and modifications thereof have been used routinely at the Pacific Northwest Laboratory by Battelle-Northwest for preparing UO_2 - PuO_2 pellets for a wide variety of irradiation test pins for fast and thermal neutron spectrum reactor and for out-of-reactor thermal-fluidic and mechanical test assemblies.

Production rate using hand feeding is about 300 pellets per hour when removing from 0.002 to 0.004 in. on diameter. Diametral tolerance can easily be held to ± 0.0002 on a 0.200 in. diameter pellet. A tendency for pellets having a length to diameter ratio of less than one to flip out and turn crossways was corrected by incorporating a holddown bar. This bar, positioned between the regulating and grinding wheel, arrested any tendency for pellets to flip.

Later developments led to using a Syntron rotary vibration feeder in conjunction with the grinder to increase production rate to between 1200 and 1800 pellets per hour, depending on amount of reduction.

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FIGURE 1. MK 3 Grinder

FIGURE 2. (contd.)

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