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MASTER

MIMIC TOOL SETTER

by

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Personnel of Fabrication, Building 44 Machine Shop, Mr. J. Dallorosa, foreman, determined the technique of operation and tested the mimic tool setter. Mr. L. B. Brown aided in the design of the setter.

ABSTRACT

The mimic tool setter and the operational technique of the setter on an Ex-Cell-O 920 machine is discussed.

INTRODUCTION

The mimic tool setter was designed to "set" single point tool bits on two-axis numerical control turning machines. The prime design considerations were economy, accuracy, and operational speed.

Vendor equipment is used to set the first tool bit of a production run, and to determine the optimum location of the tool bit with respect to the setup plate. The mimic tool setter is then mounted on the setup plate with respect to the tool bit.

The tool setter retains manual operation, but eliminates operator "feel." By retaining manual operation, the cost of the setter is kept low, and reliability is kept high. By eliminating operator "feel," accuracy is increased, and operational time is reduced.

TECHNIQUE OF OPERATION

Ex-Cell-O equipment is used to "set" the first tool bit of a production run. (See Figure 1.) The tool set gage transfers dimension "A" from the tool set gage master to the tool bit and setup plate. The resultant tool bit location is called the "zero" location, but is seldom the actual starting location for automatic cycle. The zero shift is the difference between the "zero" location and the actual starting location and is determined by standard shop procedures.

The mimic tool setter is bolted on the setup plate with respect to a zero shifted tool bit as shown in Figure 2.

The indicators should read zero when swept across the face of the tool bit if the tool setter is properly mounted. Clearance between the mounting bolts and the mounting holes in the tool setter will accommodate zero shifts up

Figure 1. ORIGINAL TOOL SETTING EQUIPMENT

to 0.060 inch. Subsequent tool bits are "set" by sweeping the indicators across the replacement tool bits. The indicators are periodically rotated to sweep the reference surfaces to insure that no drift has occurred in the spindles or in the indicators. Spindle growth, temperature effects, and other factors usually cause small zero shift changes during the production run. Small zero shift changes (up to 0.001 inch) are made by setting the indicator pointers off zero on the reference surfaces.

DISCUSSION

Most tool setting equipment has been designed to hold the setup location constant. The mimic tool setter was designed to move the setup location to the starting location. The mimic tool setter sacrifices the ability to "set" the first tool bit because no great advantage is gained by setting the first tool bit, and because the design of the setter is simplified.

Figure 2. MIMIC TOOL SETTER MOUNTED ON SETUP PLATE

The accuracy of the tool setter is enhanced by eliminating operator "feel." This is important not only to reduce an individual machinist's variance in tool setting, but also because two machinists can "set" tool bits to the same location. Accuracy is also enhanced by mounting the reference or mastering surface directly to the setup plate, hence no moving parts. The accuracy is a function of manufacture of the tool setter and of the commercial indicators. The spindle design is shown in Figure 3. Mahr Supramess indicators (0.000020 inch per division) are presently used. Tests indicate that mimic setters built to date can repetitiously "set" tool bits well with ± 0.0001 inch, with an estimated standard deviation of 0.000017 inch.

Figure 3. INDICATOR SPINDLE DESIGN

The time required to "set" a tool bit is reduced due to the elimination of the need for extreme clean conditions, less machinist motion and skill, and because no "zero shift" is required. Elapsed tool change time ranges from 20 seconds to 1.5 minutes, depending upon the machinist. Setup time, or bolting the tool setter on the setup plate, ranges from 5 to 15 minutes.

Other advantages of the mimic setter include low cost (\$670 Dow Precision Shop fabrication charges — indicator cost not included), virtually zero maintenance and down time, and increased machinist confidence in final tool setting.