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Metal Drilling with Portable Hand Drills

The problems of excessive burring, oversized holes, and out-of-round holes were among those studied during an investigation into the equipment and procedures used in drilling metals with portable hand drills. The study was aimed at defining the probable causes of such problems and recommending corrective measures. In the process, acceptable burr heights were also defined.

In general, the conclusions and recommendations resulting from the study include guidelines for operating portable hand drills; specific instructions for drilling nonferrous metals, titanium and steel and their alloys, and aluminum and aluminum alloys; and recommendations to manufacturers for improving their equipment.

Specifically, the study revealed that mechanical instability and vibration were major contributors to drill degradation and low quality holes. Furthermore, when spindle speeds were inadequate, chips entered and choked the flutes, and cut off the coolant flow to the cutting interface.

One conclusion was that the clamping force on the metal piece to be drilled should be increased considerably in order to reduce burr heights. Recommendations deal with using the proper chemical coolants, applying the coolants effectively, employing cutting oils, and dissipating the heat caused by drilling.

The results of this study have already been applied by portable hand drill manufacturers, and improved hand drills are now available.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
Marshall Space Flight Center
Code A&TS-TU
Huntsville, Alabama 35812
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Patent status:

No patent action is contemplated by NASA.

Source: H. W. Harrison, W. B. Edmiston, and H. E. Morris of
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