Traveling Wire Electrode Increases Productivity of Electrical Discharge Machining (EDM) Equipment

The problem:
To increase the productivity of electrical discharge machining (EDM) equipment. When cutting hard materials, such as rare earth metals and meteoric specimens, the plate electrode normally used for EDM cutting requires frequent replacement. In addition, the plate electrode tends to distort, making it difficult to maintain tight tolerances.

The solution:
A traveling wire electrode, used instead of plate electrodes, on the EDM equipment to reduce the time requirements for precision cutting. This device enables (continued overleaf)
cutting with a minimum of lost material and without
inducing stress beyond that inherent in the material.
The use of wire reduces the problem of electrode dis-
tortion, and permits tighter tolerances to be main-
tained.

How it's done:
A modified EDM unit is equipped with a traveling
wire electrode fixture. The single brass or copper wire,
100 feet or more long and as small as 0.005 inch in
diameter, is spool-fed. The wire is fed at 10 to 15
inches per minute and at approximately 5 to 7 pounds
tension, depending on the wire diameter used. The
fixture has a mechanism which reverses the direction
of the wire so that it can traverse from one spool to
the other several times before excessive erosion from
cutting causes it to break and necessitate replacement.
The wire is supported by two sets of guides which can
be adjusted to accommodate various sizes of objects
to be cut. A dielectric solution is circulated within a
container surrounding the cutting area to flush away
machined particles.

Because of the size of the wire and the characteristic
changing electrode contact of the moving wire, the
problem of electrode distortion is practically elimi-
nated. Thus, the cutting is more accurate and tighter
tolerances can be maintained. Time and cost savings
are realized because of the lower rejection rate.

In addition to reducing downtime for electrode
replacement, time requirements for cutting are
reduced because of the continuous cutting action of
the wire. Machined particles tend to be carried away
from the cut by the wire, resulting in a relative absence
of contamination of the dielectric solution. This
reduces the occurrence of "electrode hunting," a
condition caused by the presence of particles in the
dielectric, and provides a superior flushing capability.

Notes:
1. The traveling wire technique has been used to cut
rare earth metals, invaluable meteoric specimens,
and radioactive materials. It has also been applied
to the machining of metal bars of Incoloy 718 and
tungsten.
2. A plutonium hood has been fabricated to cover the
machining area and provide an inert atmosphere
for cutting radioactive materials.
3. Additional details are contained in: Tool & Mfg.
Engineering, Amer. Soc. Tool & Mfg. Engineers,
4. Inquiries concerning this innovation may be di-
rected to:
   Office of Industrial Cooperation
   Argonne National Laboratory
   9700 South Cass Avenue
   Argonne, Illinois 60439
   Reference: B67-10238
   Source: J. Kotora, Jr. and S. V. Smith
   Central Shops
   (ARG-136)

Patent status:
Inquiries about obtaining rights for commercial
use of this innovation may be made to:
Mr. George H. Lee, Chief
Chicago Patent Group
U.S. Atomic Energy Commission
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439

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