SELF DRESSING RESISTANCE WELDING ELECTRODE

Period: FIRST QTR.
Ending: MARCH 31, 1992

Task 1: PRODUCE PROTOTYPE ELECTRODES AND TEST TO ESTABLISH OPTIMUM WELD PARAMETERS FOR A VARIETY OF APPLICATIONS.

A purchase order was written to Tipaloy Inc. to cover their quote to make available the equipment and provide the services to support our test and evaluation requirements. Equipment availability projected for the 2nd quarter 1992.

Task 2: EXPAND THE CONCEPT APPLICATION - DESIGN IT INTO A BROADER RANGE OF ELECTRODES AND PRODUCE PROTOTYPE ELECTRODES FOR TEST TO ESTABLISH OPTIMUM WELD PARAMETERS.

Le Bronze Industriel notified Lektocorp that they were no longer interested in being involved in our electrode development program. An agreement was subsequently reached with Tipaloy Inc. to be the new prototype source. Accordingly, the tooling for the production of the new prototype electrodes was transferred to Tipaloy from Le Bronze Industriel.

Work commenced at Tipaloy to make modifications to the prototype tools so that they would conform to their process equipment.

Tool and development activity was begun to adopt the self dressing and finned cooling cavity design concepts to a male electrode configuration. Tipaloy Inc. will produce the male electrode prototypes from tools made by Toolco Inc. of Plymouth Michigan. Funds to support this activity are being diverted, at the direction of Lektocorp, from those awarded to Tipaloy for their programmed support of task 3.

A new quote was solicited from Ticaloy to establish a projected cost for this change in direction.

Task 3: DEVELOP A PROCESS TO PRODUCE THE REFRACTORY REINFORCED EMBRIDGE. PRODUCE PROTOTYPES EMPLOYING A VARIETY OF ELECTRICALLY CONDUCTIVE MATERIALS. TEST TO VERIFY PERFORMANCE IMPROVEMENT, AND ESTABLISH WELD PARAMETERS.

An order for an additional ten Ag/SiC composite prototype electrodes was placed with Asulab. The design for these electrodes was modified to increase the rigidity of the electrode body by adding a 1/2 inch thick shell.

All prototype electrodes ordered to date (thirty pieces) were received for evaluation from Asulab S.A. this quarter.
Ceramic network, voids are created when these
material attributes filter external interfaces the
are expelled from the network, external as the
layer (substrate), if the substrate cannot pass
attributed to the network structure of the ceramic.

Matrix network,
Ceramic network feature within the ceramic layer
fully not only the matrix surface, pass through
interfaced a resistive interfacial contact to the
substrate, matrix interfacial resistance are the electrical, more,

Turning functional tests, values were conserved at the

Negative Results:
An acceptable level of performance can be
expected than the ceramic surface processes
between the metal/ceramic interface can be
and the solution, this interface, they are connected to the
The same extensive good bonding between the any

At At least.
were fabricated in a precision cast by the critical shield made
than prototypes, electrodes were released that were

As expected, the electrodes over what would have been expected of one
to the electrode, they are not between the material/layer, and the image of
The presence of the ceramic layer between, matrix significantly

The evaluation are viewed as a cut of correct,
Conductive element, and the possible results of
conductivity element, and the possible results of
it does not seem to be the most practical, or a
of high volume commercial application, the selection

It is recognized, that due to the high cost, cannot be considered a practical material.
The use of a satisfactory method
as expected, reduced the overall energy necessary to
interfaced between the electrodes and workforce which,
The high substrate material provided a lower resistance

Positive Results:
Electrodes produced both positive and negative results.
Preclinical testing and evaluation of the first batch of

Task 3 (cont.)
Task 3 (cont.):

gasses are entrapped in localized pockets as the substrate cools and solidifies. The voids compromise the structural integrity of the composite by keeping the filler material from fully encapsulating the ceramic filaments.

A hollow filament structure is inherent in the method used to manufacture ceramic foam. An open cell polyurethane foam is dipped in a ceramic slurry, the excess squeezed out, and then fired. The polyurethane vaporizes at the firing temperature leaving a skeletal structure that surrounds a continuously networked void left in place of the vaporized polyurethane.

It was observed in electron micrographs that the filaments contained an abundance of surface cracks and structural flaws, as well as a generally rough texture.

The voids in the substrate coupled with the flaws in the filaments to produce a disappointingly weak composite material with otherwise highly desirable electrical properties.

Proposed Resolution to Problems:

It is clear that the validity of the product concept and/or the feasibility of a proposed manufacturing process cannot be established until a better grade of ceramic foam is made available to resolve the issues regarding the structural integrity of the composite material. Since none is commercially available it will have to be made.

The inherent weakness of commercially available ceramic foam led to the conclusion that it would be more desirable for the filaments to be solid.

Although this material is not available commercially it can be made by the same process used to make metal sponge.

Action taken:

Tipaloy was directed to indefinitely postpone their efforts to develop a vacuum casting process (which at
Task 3 (cont.):

A new quote was solicited from TIPALOY to establish a projected cost for this change in direction.

Special note:

The reallocation of a portion of the Task 3 funds to support Task 2 is anticipated to impact the degree to which Task 3 can approach a satisfactory conclusion. Preliminary review indicates that the funds required to develop a commercial viable product from the AE218C material may be sufficient to allow the project to continue. The major focus is on completing the remaining test items in this program. Since, in excess of those remaining in this program, the project is viewed as being more productive.

Task 4:

No activity on this task during the 1st. quarter of 1972.

Signature:

[Signature]

Director, Project Director, LEKTRICAL INC.