IMPROVEMENT OF WEAR COMPONENT'S PERFORMANCE BY UTILIZING ADVANCED MATERIALS AND NEW MANUFACTURING TECHNOLOGIES: CASTCON PROCESS FOR MINING APPLICATIONS

Quarterly Technical Progress Report

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Abstract

In this reporting period, we continued full disc prototype manufacturing. The vacuum off-gas system no longer leaks and was modified to include a vapor condenser and a by-pass for argon purge. Two sand molds were made with an oxidation prevention agent and steel mandrels inserted in the center holes to reduce shrinkage restriction. A copper coating was applied between H13 and WC inserts. The two sand molds are ready to be HIPped and examined next quarter.

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Executive Summary

In this reporting period, we continued the effort of full disc prototype manufacturing. We checked our vacuum system for off-gassing. There is no leakage now. We also modified the system with a vapor condenser and a by-pass for argon purge. Two sand molds were made with steel mandrels inserted in the center holes to reduce shrinkage restriction. A copper coating was applied between H13 and WC inserts. An oxidation prevention agent was added into the sand molds. The two sand molds are ready to be HIPped.

It is planned to HIP the two disc prototypes and examine them in the next quarter.

Experimental

During this reporting period, we have taken several measures to overcome the cracking problem encountered in previous prototyping. The measures included 1) examination of the vacuum system for off-gassing; 2) modification of the off-gassing system with a by-pass for argon purging a HIPping can before cooling; 3) quenching HIP cans to increase the cooling rate and reduce exposure time at most oxidation temperature ranges; 4) addition of more oxidation prevention agent into the sand mold; and 5) utilization of a metal mandrel to reduce shrinkage restriction of the disc center hole.

Results and Discussions

Two 6.5" disc cutter sand molds have been made, canned, off-gassed, and sealed. They are ready for HIPping.

Conclusions

The experimental procedure has been modified, however, no conclusions are available yet regarding whether the modifications will give us the desired end result..

Future Work

We plan to make two 6.5" disc cutters by HIPping the HIP cans and examining the resulting disc prototypes.

References

No references are included in this quarterly report.