

## Use of Second Generation HTS Wire in Filter Inductor Coils

C.L.H. Thieme, J.P. Voccio, K.J. Gagnon, and J.H. Claassen

**Abstract**— AMSC's process for manufacturing Second Generation (2G) YBCO High Temperature Superconductor wire provides the flexibility to engineer practical 2G conductors with various architectures. For applications with high frequency ac components, a stainless-steel stabilizer is used to minimize eddy current losses. An example of such an application is the so-called Buck Inductor, a filter inductor carrying a DC current onto which a 5 KHz ac current is superimposed. Previously we reported on the development and initial testing of the first 2G HTS toroid for this application. We demonstrated a strong reduction of the ac losses with a DC bias current. In this work, we present results on a toroid using a different double pancake design with better cooling. This design allows operation of the double pancake in liquid nitrogen at high frequencies without heating effects.

**Index Terms** — High-temperature superconductors, ac loss, superconducting inductor coils.

Manuscript received 19 August 2008.

This work was supported by the Defense Advanced Research Projects Agency and the Naval Research Laboratory. C.L.H. Thieme is with American Superconductor, Devens, MA 01434, USA. Phone: 978-842-3355; fax: 978-842-3024; e-mail: [cthieme@amsc.com](mailto:cthieme@amsc.com)).

J. Voccio is with American Superconductor, Devens, MA 01434, USA. e-mail: [jvoccio@amsc.com](mailto:jvoccio@amsc.com)).

K.J. Gagnon was with American Superconductor. He is now at the Chemistry Department, Texas A&M University, College Station, Texas 77843 (e-mail: [kgagnon@mail.chem.tamu.edu](mailto:kgagnon@mail.chem.tamu.edu)).

J. Claassen is with the Naval Research Laboratory, Washington, DC 20375 (e-mail: [john.claassen@nrl.navy.mil](mailto:john.claassen@nrl.navy.mil)).