

## **Commercialization of SEMA Optimized Controls Accelerated by State Funding**

Kinetic Art and Technology (KAT, [www.KATech.com](http://www.KATech.com)), is commercializing its proprietary SEMA optimized motor controller with the assistance of a \$267 thousand State of Indiana grant. KAT was selected as one of the winners of the very first offering of the Indiana SBIR/STTR Commercialization Enhancement Program (ISCEP) grant. Established under Governor Mitch Daniels in 2005 to replace the former Department of Commerce, the Indiana Economic Development Corporation (IEDC, [www.iedc.in.gov](http://www.iedc.in.gov)) manages the ISCEP grant.

KAT received this grant to commercialize its proprietary "CL1 Controller". The CL1 Controller was initially developed under a NASA SBIR Phase II contract, with additional funding from a US Navy SBIR Phase II subcontract. While KAT's advanced Segmented Electro-Magnetic Array (SEMA) motor technology is compatible with current motor controllers, the CL1 Controller was designed specifically to take full advantage of many of the features of SEMA technology, as well as to continue KAT's legacy of innovation in electronic controls.

Kinetic Art & Technology (KAT), a corporation formed in 1990, develops concepts, techniques and designs for highly efficient and compact electromechanical systems. KAT's developments have been funded by Small Business Innovation Research (SBIR) grants, along with private investment and commercial development contracts. The company has designed SEMA-based motors and generators for the U.S. Department of Energy, Department of Defense, NASA, and manufacturers within aerospace, automotive, and industrial markets. SEMA motors and generators, ranging from 3-inch to 33-inch diameter have been constructed and tested, further underscoring the value of SEMA technology in the commercial and military sectors. The power levels of these devices currently range from fractional horsepower to over 200 horsepower. SEMA-based Electric motors and generators have demonstrated precision, peak power and efficiency, along with modular design and unique packaging options.

The CL1 Controller continues a long history of innovation in controls development at KAT. It was designed to demonstrate a high bandwidth, fault tolerant controls scheme for incorporation into a thrust vector control system for NASA spacecraft. At the same time, it was designed to meet the requirements of a littoral marine environment in an electric-diesel hybrid vessel for the US Navy. The commercialization effort shall produce a design that can be manufactured at reasonable cost, while retaining a focus on high performance and taking full advantage of the benefits of the SEMA motor technology. Innovations applicable to other motor technologies are also being incorporated.

The CL1 Controller will especially find application in areas where high performance is required, and most directly in environments in which the SEMA motor technology has an advantage. One specific market that shows tremendous potential is high performance servomotor applications. The CL1 Controller, coupled with a SEMA servomotor, is expected to improve on the state of the art in this field. Due to its unique ability to make better utilization of bus voltage, especially when coupled with an appropriately designed SEMA motor, the CL1 Controller will likely find its way into applications where bus voltage is limited, such as electric vehicles. In addition to direct sales of CL1 Controllers, in-

tellectual property is being developed that may see licensing in even more demanding markets, such as aerospace.

Another key aspect of the commercialization project is its utilization of the talent and resources of other firms in Indiana. KAT is taking advantage of the design-for-manufacturing expertise and manufacturing capability of Electronics Manufacturing Solutions Incorporated (EMS) of Mooresville, Indiana. KAT is also working with Mechanical Electrical Systems Incorporated (MESI) of Indianapolis to identify demanding servomotor customers that can benefit from the high performance of SEMA servomotors driven by the CL1 Controller. KAT looks to MESI as taking a lead in the marketing of the CL1 Controller. The results will be a long term manufacturing base in Indiana for the CL1 Controller, in addition to possible licensing revenue for KAT. This means increased stability for the current KAT employees and growth in Indiana jobs to support this emerging market opportunity.