

PROFILES

IN SUCCESS

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► Phase III Success: \$1.35M from NAWC Lakehurst and \$425,000 from NAVSEA

Torque is a very useful parameter for health and usage monitoring and electronic control of engines and transmissions across a variety of land, air and sea-based vehicles.

MagCanica, Inc. is a well-recognized company in world class auto racing, including the Formula 1, NASCAR and Indy Car racing circuits. The company provides engineering services to various racing teams in the areas of design, development and the manufacturing of wireless torque sensors and rate-of-change-of-torque (ROC) sensors for high performance applications. These sensors can be used in racing power trains, turbohaft engines and associated rotorcraft transmissions. Recognizing the potential military value of their expertise in torque sensors and control systems, the MagCanica management team decided to apply this knowledge to torque measurement issues related to military aircraft. They received a NAVAIR SBIR contract (Topic N01-024) to address torque sensing issues for rotorcraft engines in 2001.

Torque is a very useful parameter for health and usage condition based monitoring and electronic control of engines and transmissions across a variety of land, air and sea-based vehicles, i.e. helicopters,

NAVSEA's LCAC hovercraft vehicle.



hovercraft, tanks and unmanned vehicles. Rotorcraft vehicles, such as the V-22 Osprey tilt rotor aircraft, face challenges with issues including high torsional stiffness of the torquemeter shaft, limited frequency response of the existing torquemeter and significant weight restrictions. Furthermore, helicopter transmissions which provide power to the main and tail rotors benefit greatly from actual torque measurement for vehicle control, flight testing instrumentation, and transmission component lifing.

The root issue being addressed by MagCanica relates to the limited torquemeter bandwidth (500 Hz to 1K Hz) of existing systems, which causes the inability of these systems to record various transient overload torques. This limitation then results in conservative lifing estimates of engine and transmission components which leads to significant increases in overall operating expense.

To address these issues, the MagCanica team applied its magnetoelastic polarized band technology as a novel method of torque sensing. The technology provides a wireless signal while maintaining superior torsional stiffness, low mass and packaging flexibility. The significant weight and cost reductions, not to mention the long-term rotorcraft safety enhancements achievable through this new torque-meter will satisfy the military's propulsion technology needs.

In September 2006, based on their success in this development activity, MagCanica was awarded a \$5M Indefinite Delivery/Indefinite Quantity (IDIQ) contract for development and production of a wireless torque sensor system for the V-22 Osprey. The IDIQ is from NAWC Lakehurst and covers the provision of services and materials for research and development,



“Winning a Phase III contract requires persistence as well as a viable technology.”

prototype development and fabrication, and retrofitting of the wireless torque sensor into existing air and sea-base platforms. Rolls Royce is the prime contractor for the V-22's engine torquemeter. MagCanica is working with Rolls Royce on development and testing of a new torquemeter.

Nader Bitar, MagCanica vice president of business affairs, explained that, “Being persistent in our pursuit of this NAVAIR contract required several visits to the NAVAIR facility in Patuxent River. Being a San Diego based company, it was not easy to stay abreast of the decision making process for this SBIR technology. Consequently, each time a senior MagCanica manager was on the East Coast, we would make sure that a special trip was made to Pax River to visit the engineers and program managers working on this technology.” This persistence was extremely important in keeping MagCanica's name and technology visible to the V-22 engineers, which helped lead to the successful signing of this IDIQ contract.

While the NAVAIR sponsored V-22 testing is continuing with Rolls Royce, MagCanica also received a separate \$425,000 order from NAVSEA (using the existing

IDIQ contract) to measure torque on its Landing Craft, Air Cushion (LCAC) hovercraft vehicle. The LCAC, a high-speed, over the beach, fully amphibious landing craft, is capable of carrying a 60-75 ton payload and is used to transport weapons systems, equipment, cargo and personnel of the Marine Air/Ground Task Force both from ship to shore and across the beach. The LCAC payload and speed capability enables the Marines to place more forces on the shore, in a shorter amount of time, with smaller intervals between trips—reducing costs and enabling the warfighter to move more efficiently.

In September of 2006, MagCanica was awarded a \$5M Indefinite Delivery/Indefinite Quantity (IDIQ) contract from the Naval Air Warfare Center (NAWC) Lakehurst for development and production of a wireless torque sensor system for the V-22 Osprey. To date from the IDIQ contract, MagCanica has a signed contract from the V-22 program for work in the amount of \$1.35M. For this project, MagCanica is working on development and testing of a new torquemeter with Rolls Royce, the prime contractor for the V-22's engine torquemeter. The company has also signed a \$425,000 contract with NAVSEA. ◀

“The TAP program is of great assistance to small technology companies in preparing them to effectively transition their technology to large prime contractors. ...”

– Nader Bitar