

# People **over**profit

John Garamendi,  
Lt. Governor of California,  
condemns the health  
insurance racket





Keith Regan learns how Grantec Engineering Consultants Inc. is working on projects from mine countermeasures to the capturing of wave energy and how it helped the Spallation Neutron Source project bring its Sequoia Spectrometer Instrument online

After nearly 25-years' experience performing advanced engineering in the areas of structures, mechanical systems and naval architecture, including his work as the principal structural analyst for the design of the Canadian Navy's Maritime Coastal Defence Vessel (MCDV), Richard M. Grant founded Grantec Engineering Consultants Inc. in May 2006 with the idea of combining world-class advanced engineering consulting services with specialties in the fields of structural dynamics,

pressure systems and structures.

Since then, the Hammonds Plains (Halifax), Nova Scotia, firm has helped customers in the defense, offshore, marine, manufacturing, energy and aquaculture fields advance new designs and systems.

One of the firm's specialties includes analyzing and evaluating the response of structures and systems to time-varying loads, such as how structures will respond to explosions, earthquakes, ocean waves or strong vibrations. The firm has also done extensive work with fluid dynamics to help create safer and more structurally sound





offshore structures and systems.

“We’re using not only our expertise but very advanced technology to make this happen,” Grant says. About a year ago, the firm invested heavily in the advanced ANSYS Multiphysics and ANSYS CFX software for performing computational fluid dynamics (CFD) and fully coupled fluid structure interaction (FSI) analysis. The acquisition adds to Grantec’s already impressive suite of in-house modeling and analysis codes for advanced non-linear dynamic analysis.

The firm’s talents and capabilities are being drawn on by a growing number of interests in Canada, the United States and overseas, with the firm having done work—often remotely—as far away as the East China Sea.

Grantec has recently performed advanced analysis in the area of naval shock and vibration

to support the design of the US Navy’s new Expendable Mine Neutralization System (EMNS) to be deployed on its Avenger-class mine countermeasure (MCM) ships.

The firm also has been involved with highly specialized work for the \$1.4 billion Spallation Neutron Source (SNS) project at the Oak Ridge National Laboratory (ORNL) site in Tennessee. The SNS is an accelerator-based neutron source for scientific and industrial research and development. It is recognized by Guinness World Records as the most powerful neutron source in the world. It will enable advanced materials research in a host of areas and will lead to many advances such as more efficient engine lubricants, lighter materials for aircraft, and “the creation of materials that never existed before,” says Grant. “There’s a very competitive advantage for the US in having this technology and the ability

## Cubic Designs

The Cubic Designs mezzanine system provided for Oakridge National Laboratory is a great example of where Cubic really shines with custom applications. This design was extremely challenging, with multiple interfacing levels, various loadings, and literally no square corners anywhere in the system. PE stamped drawings, a lifetime structural warranty, and powder coat paint are standard with every Cubic mezzanine.

## GNB Corporation

GNB is a leading US manufacturer of high-vacuum valves, chambers, and related components. With over 40 years in the vacuum industry, GNB maintains a reputation for expert custom engineering, reliable products, on-time delivery, great value and unsurpassed customer service. Continuous innovation and product development provides GNB customers with products that will meet the most demanding applications. Quality certified to ISO9001.

to break new ground in materials research.”

Grantec was engaged on the SNS project because of its expertise in large structures, advanced pressure vessels, stress analysis, fatigue and dynamic response analysis. Starting in 2006, the firm performed the mechanical and structural analysis and design for the Sequoia Detector and Sample Vessels, the primary neutron containment envelopes for the Sequoia Fine-Resolution Fermi Chopper Spectrometer instrument. The Sequoia Detector Vessel is considered to be one of the largest vacuum chambers in North America and is the largest vacuum chamber at any neutron-scattering facility in the world. Grantec performed follow-on work in 2007/08 to assess the vessels and neutron shielding for a higher safety level seismic event. In the fall of 2008 the neutron beam line was turned

on, producing a successful start-up of the Sequoia instrument. “It was a very technically rewarding and exciting project to be a part of,” says Grant.

Another project Grantec has been involved with that could easily have equally far-reaching implications for the world’s economies is the development of a device for capturing the energy in ocean waves and converting it into electricity.

The WET EnGen being developed by Wave Energy Technologies is a revolutionary power generation device, capable of generating as much as 250 kilowatts of electricity from a single unit, enough to power some 150 homes. Larger versions in the range of 500 kilowatts to 1 megawatt are being considered. A scaled version of the device has been tested in waters just off the coast of Nova Scotia, and another has recently undergone performance tests at the Institute of Ocean Technology in St. John’s, Newfoundland.

Grant says the WET EnGen is quite unique

because it captures both wave energies—the heave, or up-and-down motion, as well as the surge. The result is that the WET EnGen is able to capture up to 50 percent more energy from waves than other competing technologies. “It can capture more energy and in a more efficient manner,” says Grant. Grantec is providing advanced analysis and technical expertise for the further development of the device, including methods for deployment in deeper waters. “We’re bringing our expertise in the area of hydrodynamic response analysis for the development of a reaction mass mooring system. It really lends itself to our experience in fluid-structure interaction and mooring analysis.”

The firm is also working to help develop offshore aquaculture systems, having been engaged since 2006 by the developer of a proprietary aquaculture system for offshore waters. Grantec has provided technical expertise to the project and has developed the methodology for advanced hydrodynamic modeling of the cage system to help steer the design. “The research and development is proprietary, but they have developed a system the likes of which nobody else has done in the world,” says Grant. Full-scale trials of the technology have been ongoing for well over a year, he adds.

Grant himself is an instrumental leader in the development of safety and offshore structures standards through groups such as the Canadian Standards Association (CSA) and the International Organization for Standardization (ISO). He is the vice-chair of Canada’s Strategic Steering Committee on Offshore Structures, the principal committee responsible for the direction for the CSA and ISO initiatives in Canada.

Grant says his firm remains small by design for the present—a number of professionals work alongside him, many of them working virtually and remotely. Grantec’s expertise has been recognized by other consulting firms and it has been approached to form partnerships with firms in the US to enable those firms to offer more specialized and advanced capabilities to complement their own, he says.

“People have sought us out because they know we perform very advanced engineering and can address some pretty complex problems,” he adds. Solving those very specific and specialized problems could have profound ramifications for industry and society in the end – *Editorial research by Sam Howard* ■