



Grantec is very pleased to provide our clients and many friends with this update, covering some of our activities over the past year, within this inaugural annual Newsletter. The past year has been an exciting time for us. We have been engaged in a range of leading edge and challenging projects. We have continued to participate in the development of standards under the Canadian Standards Association (CSA), Standards Council of Canada (SCC) and the International Organization for Standardization (ISO). We have also been featured in various print and internet-based media.

Grantec Projects

Grantec has been, and continues to be, involved in exciting and often leading-edge projects. There have been considerable projects performed over the past year, some of which are briefly noted within this newsletter.

MSF Desalination Vessel

In 2006, Grantec was pleased to be engaged by one of North America's leading manufacturers of water purification and desalination systems to perform advanced analysis of a large Multi-Stage Flash (MSF) desalination vessel. The MSF vessel weighed in the order of 500 tons and consisted of a series of tubular exchangers in stages over the length of the vessel. Initially, Grantec's work scope was focused on performing advanced analysis of the stiffened-plate vessel shell and included design review of the existing analysis and calculations. The scope was later revised to include finite element analysis of all the primary pressure components for both the shell and the tube sides of the vessel. Some of the finite element based analysis performed included: non-linear buckling analysis of the shell under vacuum loading; exchanger tubesheet analysis including thermal growth of the tubes; detailed stress analysis of external waterboxes connecting the exchangers; stress analysis of the stiffened clad-plated shell; and advanced FE based reinforcement calculations for large stiffener-reinforced openings. The design code for the vessel was ASME Section VIII Division 1.

Offshore Drilling Marine Riser Analysis

In 2006, Grantec was engaged by Petro-Canada to perform marine riser analysis in support of drilling operations from the Rowan Gorilla VI jack-up unit. The dynamic analysis was performed following similar analysis conducted for Husky Energy for various other offshore sites. Grantec's experience in marine riser analysis now spans over 25 years. Some of our notable marine riser experience includes research activities to support Shell's deepwater drilling programs and independent critical and regulatory reviews of shallow and deepwater systems.

Neutron Acceleration Project

Grantec is engaged in the advanced analysis of a large vacuum chamber being developed for a US Department of Energy's (DOE) neutron acceleration research facility. The vacuum chamber is considered to be the largest vacuum chamber ever built in North America. Grantec is providing advanced analysis of the chamber, some of which includes: seismic analysis to strict DOE requirements; advanced fatigue analysis; non-linear buckling analysis; and stress analysis.

Los Alamos Trident Enhancement Project

One of Grantec's recent and challenging projects has been the analysis of the Trident Enhancement Project Vacuum Chamber for Los Alamos National Laboratories. The scope of this project included advanced analysis of the chamber and the associated optical table. Grantec was pleased to have had the opportunity to work directly with Los Alamos scientists and engineers. The base code for the pressure envelop integrity of the chamber was ASME Section VIII Division 2 with modifications consistent with vacuum chamber industry fabrication methods. Analysis performed by Grantec included: pressure envelop stress analysis; seismic analysis to DOE requirements; detailed FE based analysis of partial-penetration and intermittent vacuum chamber weldments; non-linear buckling analysis of the pressure envelop under vacuum loading; FE based analysis to assess O-ring sealing arrangements on



access panels; detailed stress analysis of the optical table including the effects of differential thermal growth; and detailed frequency analysis of the optical table. Grantec also provided fabrication support.

Onshore Drilling Derrick Collapse Investigation

Since mid-2006, Grantec has been engaged as an expert in the investigation of the collapse of an onshore drilling derrick. Grantec personnel have been engaged as experts in various failure investigations ranging from the structural collapse of hydraulic components to investigations into deleterious vibration of mining equipment such as vibratory feeders and ore crushers. It must be noted that one of Grantec's areas of specialization called upon for investigations is structural dynamics, which includes vibration. Grantec's analytical capabilities in this area are complemented by our ability to instrument structures and equipment using our portable multi-accelerometer vibration instrumentation system. In addition, we have a Shock Pulse Method (SPM) instrumentation system for condition monitoring.

Open Ocean Aquaculture

A very exciting focus of our recent Research and Development (R&D) efforts has been in the area of Open Ocean Aquaculture. In this area we have been actively engaged in the development of a new and proprietary (patent pending) offshore aquaculture system. We are pleased to bring a wide range of our expertise to this project including: offshore structures; mooring systems; ocean engineering; dynamic response; fatigue; and instrumentation.

Naval Shock and Vibration Analysis

Recently, we have been called upon to provide advice and expertise in the area of naval shock and vibration analysis. Grantec personnel have many years of experience in the area of naval shock and vibration analysis for projects such as the Canadian Navy's Maritime Coastal Defence Vessel (MCDV) and for equipment and weapons installations on various CF Naval Vessels including the Canadian

Patrol Frigates (CPF), AOR's, and O-Class submarines, to name a few.

Other Projects

The aforementioned projects reflect only some of Grantec's projects over the past year. Other notable projects include: fitness for service assessment of the Autoport (Dartmouth, NS) pier barges to support construction activities; non-linear analysis to access locked-in stresses in structure; support for the development of CNG transport modules; and research into wind turbine noise, rapid dynamic loading, Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI), to name a few.

Standards Development

Offshore Structures Standards

Grantec personnel continue to participate in the development of offshore structures standards under CSA and ISO. This year marks our tenth year contributing to the development of these standards. We are pleased to hold leadership positions on various committees under the CSA and ISO initiatives and to be contributing to the development of these standards. One of the areas that we have significantly contributed to has been in the area of accidental loads/actions including explosions, ship collisions, strong vibrations and dropped objects (our contributions include the authoring of provisions within the CSA S471 and the ISO 19901-3 standards).

It is important to note that several of the ISO offshore structure standards have now been adopted as National Standards of Canada. This will be the topic of an upcoming article in the July NOIA edition of the Ocean Resources magazine by Grantec's founder, Richard M. Grant.

Wind Turbine Standards

We are participating on the newly formed SCC/CSA Technical Committee on Wind Turbines. Grantec was approached in 2006 to participate on this



committee due to our expertise in offshore structures as well as our research efforts in the area of wind turbines. One of the current activities of the Technical Committee is the balloting of the wind turbine standards developed under the International Electrotechnical Commission (IEC).

Recent Media and Publications

Over the past year Grantec has been pleased to be featured in various print and Internet based media, some of which includes the following.

SolidWorks COSMOS Case Study

Early in March 2007, SolidWorks Corporation published a COSMOS Case Study featuring Grantec's application of the COSMOS finite element analysis programs including COSMOSWorks, COSMOSDesignStar, COSMOSMotion and COSMOSM. This was an excellent effort by SolidWorks and their technical writer and we are very pleased with the result. Several of the recent projects that we have been engaged on are noted within the case study. The publication of the case study comes as a result of Grantec personnel's experience with the COSMOS finite element analysis code that now spans 17 years. Over this period, the developers at COSMOS have been aware of many of our advanced analysis efforts using their code.

Link to: [Grantec SolidWorks Case Study](#)

COSMOS DesignStar 2007 Press Release

In addition to the COSMOS Case Study, Grantec was featured in SolidWorks Corporation's April 3rd, 2007 press release for the COSMOSDesignStar 2007 program launch. We also understand that we were noted in a similar press release in China.

Link to: [SolidWorks COSMOSDesignStar 2007 Press Release](#)

Desktop Engineering Magazine

Grantec is very pleased to be featured in an upcoming article in the Desktop Engineering magazine (NH, USA) on finite element analysis of composite materials (i.e. fiber reinforced plastic FRP, glass reinforced plastic GRP). The article will be published in the June 2007 edition of Desktop Engineering and, as we understand, will be available both in print and on the Desktop Engineering website.

Link to: [Desktop Engineering Magazine](#)

ICETECH 2006 Paper on Floating Arctic Structures

Of worthy note is the publication of the paper on the initiatives of the ISO Technical Panel on Arctic Floating Structures entitled "*The Development of an Arctic Standard for Floating Production Systems*" by Costas Makrygiannis, Richard McKenna, et al, presented at ICETECH 2006. Grantec is pleased to be participating in these endeavours in the development of the Arctic Offshore Structures standard, ISO 19906.

Ships and Offshore Structures Journal

Grantec would like to note that manuscripts are considered on a continual basis for potential publication in the international journal on *Ships and Offshore Structures* published by Taylor and Francis.

Link to: [Ships and Offshore Structures Guidelines](#)

Special Thanks

Grantec would like to thank our clients for the exciting and "dynamic" opportunities that they have provided us with.

Grantec would also like to take this opportunity to thank our friends at SolidWorks, COSMOS and Javelin Technologies for helping to contribute to our success over the past year.



Grantec Services

Grantec Engineering Consultants Inc. provides specialist engineering analysis and design services to the manufacturing, energy, petro-chemical, marine, offshore, insurance and defence sectors. The experience of our specialists not only includes application of advanced methods, but also a depth of practical and design experience.

Grantec's brochure is available upon request by emailing Grantec at info@grantec.ca.

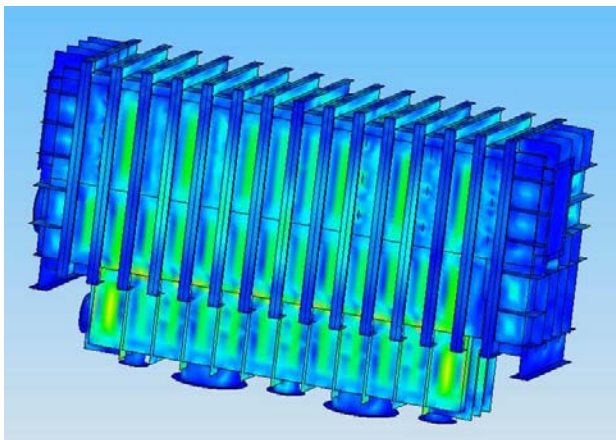
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*ASME Section VIII Division 1
Pressure Vessel Component Analysis by Grantec*

Some of the services offered by Grantec include:

- Mechanical Engineering
- Structural Engineering
- Ocean Engineering
- Subsea Engineering
- Naval Architecture
- Offshore Structures

- Process System Integrity
- Pressure Vessel Design
- Piping Stress Analysis
- Pipelines
- Fitness for Service Assessments
- Fatigue and Fracture Mechanics

- Marine Riser Analysis
- Mooring Analysis

- Structural Dynamics
- Vibration Analysis & Measurement
- Explosion Analysis & Assessment
- Response to Accidental Actions
- Seismic Analysis
- Equipment Vibration
- Naval Shock and Vibration Analysis
- Accelerometer Instrumentation

- Failure Investigations
- Insurance Investigations
- Expert Witness

- Advanced Finite Element Analysis (FEA)
- Computation Fluid Dynamics (CFD)
- Motion Analysis
- Solid Modeling

- Metallurgical & Welding Engineering

- Research and Development

- Independent Reviews
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- Training
- Specialist Placements