Neill and Gunter

DESIGN NOTES

SPRING NEWSLETTER 2002

IN THIS ISSUE:

Engineering – Art or Science?

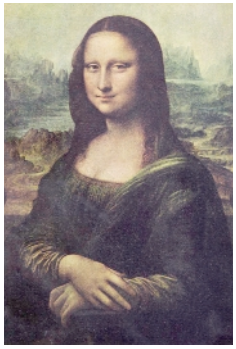
Article by: Gene Farach, P.E., Manager of Civil / Structural Engineering, Business Manager

When I think of great Engineers who have left a legacy of innovative design ideas, and have challenged our imagination beyond our possible expectations – I must turn to Leonardo da Vinci.

Not a single person in History can be considered to have been a greater contributor to our contemplation of the relationship between Art and Science. What is Art and what is Science? How do these apparently distant areas of human endeavor interface with each other? Do they? If so, how do they reveal themselves to us?

The dictionary defines Science as: *Exact knowledge, well reasoned about a subject based on its principles and causes.*

The dictionary defines Art as: *Desirable quality, power, efficiency, the ability to do something well.*



Now, if we integrate these definitions, namely that the ability to reason utilizing knowledge on a subject based on its principles and causes as we efficiently, powerfully and with much virtue apply it to a process as we seek to resolve something well . . . can we call this engineering?

As a structural engineer I have quite frequently experienced the opportunity to perform designs as I use my sense of perception and integrate the technical knowledge with the elegance of design. Elegance of course, revealing itself in many ways. I evaluate it as being a *"sixth sense"* that becomes a method of *"feeling one's ways to achieve a design answer"*. Inevitably, this sense contributes to visualize not only the effects of that which causes design but also that which realizes the design itself! I define this as the art of applying science to engineer a solution.

What is needed to exercise this *"sixth sense"*? How can this ability be developed such that the mental process to visualize problems and solutions can be enhanced? How did Leonardo train so that this special talent was developed to such a high degree? Is our training as engineers lacking in this area? Can it be improved?

I am of the opinion that an artist comes in contact with its subject in a very intimate way . . . that is, the artist must understand the very pieces that composes the entity that is being contemplated. This intimacy involves the physical as well as the emotional and it must be at all levels. Consider a portrait . . . unless the expression of the eyes is captured on canvas, the soul of the person is not revealed – therefore the similarities between subject and painting fails. Indeed the artist must become one with the expression of the inner person being painted. The artist must use that *"sixth sense"* to find revealed the inner most expression before each eye cast upon the subject as the painting evolves. One wrong interpretation and the painting, as the stokes of the brush transfers the image onto the canvas, fails to reveal the real person.

Model

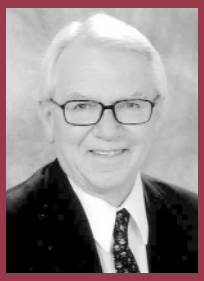
Sketch

Let us take a structural design, say a framing supporting a roof, with long spans located at a high elevation and subjected to wind, seismic and vertical dead and live loads! Let us become intimate with these loads to the point that we can close our eyes and see the structure's behavior as it deforms resisting these outside effects. We call it *"chasing the loads"* in

ART OR SCIENCE Continued on pg. 3

Neill and Gunter Incorporated — Staff Announcements

Neill and Gunter is pleased to announce that **Neil Morang** has joined our team as Senior Consultant – Power and Utilities.



Mr. Morang has over twenty years experience in the Industrial Gas Turbine industry, with emphasis on electrical power generation. His areas of expertise include Product Development, Program Management, Applications Engineering and Performance Engineering. He has extensive experience with both aeroderivative and heavy frame gas turbines operating in Simple Cycle, Cogeneration and Combined Cycle applications.

Neill and Gunter is pleased to announce that **Gene Farach, PE** has joined our team as Manager of our Civil/Structural Department. Mr. Farach is a graduate of The University of Florida and holds a Bachelor of Science in Civil Engineering.

Mr. Farach brings twenty six years experience in the field of Structural Engineering. He has been an avid contributor in the areas of Cold Formed Engineering, High, Mid and Low Rise building design using a multitude of building design materials and systems for a multitude of different building usage. Mr. Farach brings expertise in a variety of specialized fields within structural engineering such as crane design, seismic design, post-tensioned design and many others. He has been involved in research and development and has effectively applied his unique administrative abilities while performing his responsibilities as Principal Owner of his own business for ten years in Mid-Florida. In addition to his professional accomplishments, Mr. Farach participated as Mayor of the City of Longwood, Florida from 1988 to 1990.

STAFF Continued on pg. 3

Engineering Design for Two Cath Labs at Maine Medical Center

Article by: Keary C. Willette, Senior HVAC Engineer

Neill and Gunter recently completed detail design of two new cardiac catheterization labs and an electrophysiology/pacemaker (EP) lab at Maine Medical Center in Portland, Maine. The two catheterization labs share a common control room and electrical equipment room. These renovations also included the phased construction of a new waiting room, nursing station, patient holding/setup room and staff lounge.

The primary function of the cardiac catheterization is to locate any clogged or narrowed places in the coronary arteries and to determine how well the heart muscle and valves function. If a blockage is found angioplasty can be performed to open the restricted artery. The hospital is utilizing the GE Innova 2000 digital cardiovascular imaging system in the cardiac catheterization labs. The Innova converts X-ray signals into digital images at the point of acquisition. As a result, the resolution of the images is twice as clear as with older technology. The exceptional clarity makes inserting stents easier and more accurate. An added benefit is the surgeon can have a compact disc made of the images for future reference or exchange with other physicians.

Recognizing the benefits of this new technology to both patients and staff MMC established an aggressive design and construction schedule. The compressed project delivery schedule required that NGI maintain close interaction and cooperation with all project team members. Neill and Gunter's expertise with medical renovation work enabled us to develop a preliminary mechanical and electrical conceptual design scope within the first 2 weeks of the project, and to prepare mechanical and electrical specifications for purchasing equipment identified as long lead deliverables.

After careful analysis of the hospital's existing mechanical systems, it was determined that a new 25-ton air cooled chiller would be required. The chiller would serve a new built-up air handling unit equipped with chilled water coil, economizer and final 95% filters. To promote physician, staff and patient satisfaction maintaining proper space environmental conditions and minimum air change rates was critical. To accomplish this goal a variable air volume system with both variable air volume and constant volume boxes was selected. Variable frequency drives were utilized to modulate the supply and return air fan speeds to compensate for final VAV box throttling and filter loading. An air flow measuring station was located in the fresh air intake of the air handling unit to maintain the ASHRAE required minimum outdoor air flow. New medical gas piping including valve boxes and area alarm panel were also provided. New DDC controls with pneumatic valve and damper operators were specified. A steam to steam humidifier was utilized to provide a clean source of moisture to maintain the cath lab suite's humidity level above 40% during the winter.

Hospital staff, physicians and facilities personnel were included in the electrical design decisions from the beginning of the project. Incandescent down lights were chosen for the Labs to eliminate electrical interference with the sensitive electronic equipment and still provide a full range of dimming for use during procedures. Powering the Cath Lab and the EP Lab equipment from the hospital's emergency power system was closely analyzed but ultimately dismissed as too costly when compared to the high reliability the local utility has maintained to the site. Existing 480 volt distribution equipment was utilized to power all three labs, reducing capital cost and eliminating some long lead time equipment. The existing fire alarm system was modified to accommodate the new spaces and meet the requirements of the American's with Disabilities Act. A

CATH LAB Continued on pg. 3

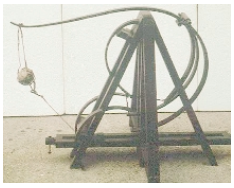
new nurse call system was provided and new telephone and data distribution as well.

The country has seen an increasing demand in cardiac catheterization procedures. This increased demand is due to an aging population. Heart disease and coronary artery disease now account for 40% of deaths in the United States. Neill and Gunter's achievement in the medical industry has allowed us to participate in revolutionary new advancements in the diagnosis and treatment of this deadly disease. Neill and Gunter recently completed a similar cardiac catheterization lab for a major hospital in Augusta, Maine, and a 90,000 sq. ft. orthopedic outpatient clinic in Auburn, Maine.

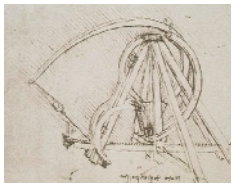
Contact Keary Willette or Bill Heil at 207-883-3355 for further information regarding Neill and Gunter's MEP design capabilities within the medical sector.

ART OR SCIENCE Continued from pg. 1

structural talk. Now, have we become intimate enough to be compared to an artist? If this intimacy is profound enough, can we say that we can see that which causes design and that which realizes the design itself? Did we not pair our ability to apply knowledge as we seek the efficiency and as we embrace the power to develop a solution enveloped in a desire to achieve quality of a design solution? Can this intimacy indeed lead us to a system of support for the framing that enjoys total harmony with the imposing loads? Can we say that this relationship between Art and Science engages our energies to understand, identify and resolve the needed geometry, size and stamina of the subject frame to enjoy a long structural life? Did we capture the image of the imposing loads as we developed a design to resist them? Is this the same as capturing the essence of a person's appearance as we labor to transfer this image onto a canvas? I wished that Leonardo could hear these questions . . . I am sure he would have the answers! What do you think?



Model



Sketch

STAFF Continued from pg. 2

Mr. Farach has authored and published a number of technical articles and enjoyed the opportunity to teach, Light-Gauge Engineering Design, at Montana State University in Billings, Montana under the auspices of a Continuing Education program designed for Architects, Engineers and Contractors. Some representative projects engineered by Mr. Farach which have enjoyed high visibility include: The Orlando International Airport in Orlando, Florida, the Hilton at Lake Buena Vista, Florida (just outside Walt Disney World), and The National Award winning Downtown Bus Terminal in Orlando, Florida which was published in the National as well as International Architectural and Engineering magazines.

Vacation Days for the Victims of 9/11

In a follow-up to last quarters newsletter we are very proud to report that Neill and Gunter employees donated close to $10,000 to a WTC charity by cashing in one of their vacation days.

The heroism of the NYFD, NYPD, Port Authority and people of New York, as well as, their counterparts in Washington, D.C. and the "Lets Roll" passengers of Flight 93 will never be forgotten. Their courage will live forever in our hearts and surely be the inspiration that sees us through this war on terrorism, keeping us united as one nation, under God with Liberty and Justice for all.

PROCESS CONTROL SYSTEMS

Mid 1980s and earlier wood panelboard mills are typically faced with controls which were state of the art during implementation but now are presently considered outdated black box technology, unreliable, difficult to maintain and in many cases, not well understood, lacking support services and spare parts. To compete with today's mill designs, maintain production and manufacture high quality product, these mills must continually upgrade and modernize controls and processes.

The forming line and press controls are key to maintaining a competitive edge. A controls upgrade includes review of potential options, conceptual design, replacement of controls systems, field devices, VFDs and motors, as applicable. The benefits of forming and mat length accuracy, dependable operation and reliability can offer a quick payback and improvement to a mill's profitability.

Langboard Inc., Quitman, Georgia recognized the merits of upgrading the forming line and press controls. Tony Hamill of NGM worked with Langboard to implement a conceptual design incorporating the latest technology resulting in a very successful commissioning effort in January 2002. Mill Manager Chris Reid stated " . . . that they were so pleased with the engineering services and results", he thought it necessary to personally pass this through to NGM Management.

Thank you, Chris, for allowing us to be part of your team.

For further information regarding your plant control or electrical power system challenges, please contact any of the Neill and Gunter offices.

INFORMATION:

Neill and Gunter's newsletter *Design Notes* will be published periodically to provide news about some of Neill and Gunter's activities and achievements to our clients. Your comments and suggestions are always welcome. If you wish to receive our newsletter contact any of the offices listed below.

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WELCOME — TRAINING COORDINATOR

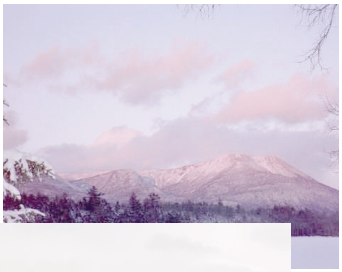
As a direct result of our Employee Opinion Survey, we're pleased to welcome Ms. A. Barry MacMillan to Neill and Gunter Incorporated. Barry began work with us in early February – serving as our Training Coordinator. In this role, Barry will oversee all training activities for NGI staff.

We are most fortunate to have someone of Barry's caliber in our organization. She brings over 25 years of training experience, working in several industries. Much of Barry's career was spent in her own business, ProAct Associates, based in Rochester, NY. One of her company's major clients was Kodak Corporation; where she worked with staff of all disciplines, to meet their technical, managerial and general training needs. Barry holds both Bachelor's and Master's degrees.

One of Barry's first tasks has been to consolidate all training requests and recommendations from our staff's annual performance reviews. She is now helping us identify common training needs, sources for job-specific training, and cost effective options to fulfill the training plans of each department. In addition, she is developing an expanded safety training program to be implemented organization-wide.

Please join us in welcoming Barry to Neill and Gunter.

NGI Scarborough Employees Undertake Winter Trek



Article by: J. Louis Chartier, Mechanical Designer

Maine's Baxter State Park and its crown jewel, Katahdin, are a prime tourist attraction and favorite camping destination in the warm months of summer, but few people dare to visit the park in winter. Sr. Mechanical Designer Louis Chartier, Sr. Electrical Designer Jim Landry, Structural Department Supervisor Scott Maines and a former Neill and Gunter employee made the trek in February, spending four days exploring the area around Daicy Pond.

The park's remote character makes the trip a significant challenge in winter. While summer visitors can drive cars to most of the campsites, this trip requires full winter backpacking experience and equipment. The Park Authority's registration form states that "rescue may be slow in coming or not come at all" and asks each team member to list "next of kin" in case of emergency. Team members carried sixty-pound loads on snowshoes seven miles to the cabin at Daicy Pond. The heavy packs allow for the menu to include such fine cuisine as Shrimp Creole, Red Beans and Rice, and Pasta with Sausage and Mushrooms, all cooked over a single-burner backpacking stove.

The first day's effort, this year accomplished in a driving rain, are rewarded by two full days of unencumbered snowshoeing and exploring the incredible beauty and tranquility of the park in winter. Views of Katahdin and signs of wildlife abound. The team enjoyed tracking moose, deer, coyotes, otters and rabbits. Wildlife visitors included deer, squirrels and Canada jays looking for handouts. The nocturnal wailing of coyotes sent momentary chills down the spine and, along with the cold of course, helped to expedite the occasional trip to the privy! The long hike back to the car, with much lighter packs, allowed time to enjoy the ever changing vistas of the surrounding mountains.

All team members enjoyed their vacation immensely and agreed that the trek was well worth the effort. Plans are already under way for an autumn trip to Baxter to climb Katahdin. More on that expedition in future newsletters.

Neill and Gunter would like to thank everyone who responded to our "DESIGN NOTES Opinion Survey". The information provided was most informative. THE WINNER of the Palm M105 is Chet Manuel of SAPPI, Skowhegan, Maine. Congratulations Chet!