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Engineer Your Own Success



*Article Prepared By
Gerard Hillenbrand, P.E*

That was the stimulating topic presented at ASME's Metropolitan Section Technical Dinner meeting held Thursday April 19, 2012, at Con

Edison Headquarters on 14th Street in Manhattan. This meeting, well attended by 30 practicing engineers and student members, featured as speaker Mr. Anthony Fasano, P.E., founder of the professional development firm of powerful purpose associates, and author of the bestselling book "Engineer Your Own Success – Seven (7) Key Elements to Creating an Extraordinary Career." Attendees at this meeting learned about some of the personal skills that are critical to both finding and engineering job and then experiencing an extraordinarily successful career.

The technical portion of the meeting was opened by Met Section's Program Director, Edward G. Ecock, P.E., and longtime senior mechanical engineer working for Con Edison. Ed Ecock first introduced Peter G. Thurlow, a Con Edison employee who joined the firm's electrical engineering department in 1990 as a transmission and distribution engineer, and in 1995 was transferred to the law department to concentrate on transmission, environmental and regulation issues. Mr. Thurlow graduated the United States merchant Marine Academy in 1988 and received his MBA degree from Pace University in 1992, after which he subsequently earned a law degree from the Brooklyn Law School, and became a registered Patent Attorney. Mr Thurlow's engineering experience includes work at the Bethlehem Steel Corporation and service with the U.S. Naval reserve as a Mechanical Engineer from 1988 to 1998. His career is an excellent example of the complimentary relationships between the engineering and legal profession, contrary to popular opinion.

There are currently about 30,000 patent attorneys practicing in the United States, and these lawyers have certified educational training in the sciences as well as engineering and law. An issued patent

excludes others from making, using, selling and offering for sale the protected device of concept throughout the United States (20 year term for devices, concepts, methods, etc.) and design patents (14 year term for appearance, color, trade name, etc.). IN 2011 approximately 500,000 patent applications were filed and about 250,000 were issued, all with an estimated value of \$% Trillion and an estimated creation of 40 million new jobs. An interesting note Mr. Thurlow said was that Met Section's program and meeting host Ed Ecock has a pending patent application scheduled issue in the near future entitled "System and Method for Operating Steam Systems." Also Con Edison Engineers Calvin E. Phelps Sr. Et Al, were recently granted patent #8,017,100 entitled "Conversion of Urea into Retardants for NOx Reduction." Since 2000 Mr. Thurlow has also been granted a partnership with the Law Firm of James Day, LLP.

Next Ed Ecock introduced the meetings speaker Anthony Fasano, P.E., Leed AP, Acc., the author of the book entitled "7 Key Elements to Creating an Extraordinary Career." Mr. Fasano is a graduate Civil Engineer and a Licensed Professional in both New York and New Jersey, and began his presentation by emphasizing that each and every engineer is responsible for his and her own success and adoption of an action program for achieving same is essential. One key element in this action program is the development of an impressive career resume. Typical of such a resume is its brevity – it should be digested by a reader in less than 10 seconds. It should employ bullet – like notations to list education and professional credentials, it should use numbers in preference to words in all references to employment records, it should state the applicant's goals and objectives, and it should state that personal data and references are available if requested.

Hopefully the impressive resume will result in a job interview which, of course, is critical to successful career advancement. At the start of the interview introduce yourself briefly, and ask what the organization is seeking in its new employees. The applicant should then respond with listing the qualifications that will fulfill the organization's needs. All questions should be

answered succinctly with emphasis on being responsive to the company's concerns. At the conclusion of the interview the applicant should ask for a statement of the time line the employer will use for making a decision, and offer to use e-mail facilities for providing additional application information.

Mr. Fasano then proceeded to describe the 7 key elements for creating such an extraordinary engineering career:

1. Establish career goals by defining your ultimate engineering destination. Write down your objectives and values with projected dates for where, when, why and how. Formulate an action plan and prioritize various milestone dates.
2. Obtain credentials such as licenses, awards, publications, and advanced education degrees, to establish credibility and to distinguish you from the competition. Make careful use of company benefits to help finance your search for credentials. All ambitious engineers should seek professional engineering licensure. Apply for admission to the fundamentals and specialized engineering exams as soon as possible after earning your Bachelor's Degree. If necessary enroll in review courses. Carefully choose the reference books that you are allowed to bring into the exams. If you fail the exam, try again as soon as possible. If your goal is to specialize in an engineering law or patent career, take the appropriate specialty exams before you take the bar exam.
3. Find a mentor through whom you can further your career. This mentor can be your boss, an associate, or a co-worker. When offered the opportunity, become a mentor yourself.
4. Become an effective communicator by stressing personal honesty, practicing public speaking, and being responsive to all inquiries. Remember that communications is a two-way street and you must become an effective listener.
5. Develop your networking abilities by building personal relationships, by subtly calling

attention to your opportunities, and joining professional societies and community groups whenever possible. Become increasingly comfortable in dealing with people. Learn their interests, hobbies, and family histories. Make liberal use of Facebook, twitter, and linked-in electronic communication to network with colleagues.

6. Improve your organizational skills by maintaining an up-to-date "To-Do" list and by using bound notebooks to record chronologically career hallmarks stored at your own personal desk. Manage your time effectively by minimizing your access to email communications.
7. Emphasize your leadership skills constantly be responding to all opportunities with energy and optimistic attitudes. Build trust and respect among colleagues by defining your roll and responsibly delegating tasks. Frequently become a coach to subordinates to increase their motivation to contribute to the success of your team.

Mr. Fasano then went on to discuss briefly such topics as the need for a Master's Degree in Engineering rather than the more conventional MBA degree, how to explain technical matters to non-technical people, and how prepare for your annual performance review. He reminded his audience that these additional topics were covered in more detail in his bestselling book, copies of which he offered for sale at the conclusion of the meeting. His audience must have been favorably impressed since copies of the book almost totally sold out by the end of the evening. As an aid to getting Mr. Fasano's message out, Met Section arranged for a discounted price of each book to increase sales.

Thank you, Anthony Fasano, for an entertaining, informative, and stimulating presentation! Engineers interested in more information should contact the author at: Powerful Purpose Associates - powerfulpurpose.com

Air Conditioning The Subways



*Article Prepared By
Gerard Hillenbrand, P.E*

That was the interesting subject of ASME's Technical Dinner meeting sponsored by our Metropolitan Section on Thursday, June 21st, 2012 at Con Edison Headquarters, 14th Street at Irving Place in Manhattan. The official title of the presentation was "Major Issues in the Design and Operation of the HVAC Systems in Underground Subway Environments." The presentation described the many technical issues confronted in the design, commissioning and operation of these HVAC systems, along with the practical guidelines developed to provide efficiency and reliability for the operation of these systems underground facilities. Professional engineers attending this meeting earned 1.5 hours of professional development credit toward their continuing education requirements as mandated by the NY State Department of Education. The technical portion of this multi-faceted meeting, including dinner, socializing and networking was hosted by Edward G. Ecock,

P.E., Met Section's Program Committee Chair, who welcomed all attendees and proceeded to introduce the meeting's distinguished guest speaker, Syed Qadeer, P.E., a Mechanical Engineer working for NY City Transit Authority and its parent organization, The Metropolitan Transportation Authority. Mr. Qadeer has earned a Master of Science Degree in Mechanical Engineering and has worked for the MTA for more than 25 years. He is also an active member of ASHRAE.

Mr. Qadeer began the presentation by noting that air conditioning requirements vary greatly among the various users such as manufacturing facilities, stores, offices, banks restaurants, and educational institutes, such as schools and libraries. Among the most demanding of these facilities are the subways where temperatures can reach as high as 97°F accompanied by very high humidity. Any underground air conditioning system has major design issues such as the location of the system air intake, the rejection of the extracted heat, the continuing maintenance of indoor air quality, and the remote connections between the cooling unit, the space being cooled, and the exhausting unit to the surface environment. These remote connections place a premium on the efficient design of ductwork, piping, and electric controls, all in accordance with relevant codes and industry standards, and with particular emphasis on public safety. The typical cooling unit consists of the following basic components:

- A refrigerant, a volatile liquid chemical at room temperature and pressure, enclosed in a closed, high pressure piping system.
- An evaporator, or refrigerant boiler, which converts the liquid refrigerant to a vapor by exposure to the heat from the area to be cooled. The vapor exits the evaporator at low temperature and pressure. The evaporator includes a fan to optimize flow.
- A compressor, a power driven machine which compresses the vapor to high temperature and pressure.
- A condenser, which is a heat exchanger equipped with a cooling fan, extracts the heat

from the compressed vapor and converts the refrigerant to a liquid.

- AN expansion valve, which converts the liquid refrigerant temperature and pressure to optimum values before reentering the evaporator where the entire cycle is repeated.
- In a underground system, the condenser, ejects heat and its location is a major problem. It is usually located just below street level, where it indirectly ejects heat to the atmosphere through shielded gratings. There are limitations on how remote these various components can be located from each other. For example, the distance between air intake and the exhausting condenser cannot exceed 250 feet. The length of the refrigerant piping should not be greater than 150 feet. The sum total of the ductwork to a multi-evaporator system cannot exceed 500 feet. Hence, these limitations dictate efficient and cost effective design for all connections.

HVAC systems for subway installations usually consist of packaged units consisting of evaporator and compressor in a concrete floor mounted common enclosure, costing \$7,500 to \$10,000. Air passages via ductwork connect the HVAC unit to the condenser. This arrangement is known as a split or "DX" HVAC system with the condenser located underground just below street level as previously described, on located remotely outside the installation in a separate facility or on the building roof. These HVAC systems are rated in the number of Tons of conditioned, air produced, one ton is equivalent to 12,000 BTU expelled per hour. The effectiveness of a packaged evaporator and compressor unit is defined by its coefficient of performance (COP) – the ratio of the heat entering the evaporator to the energy supplied to the compressor. The effectiveness of an entire air conditioning installation is defined by its Energy Efficiency Ratio (EER) – the ratio of the heat extracted by the system to the total energy required for steady state operation of all components. IN certain split systems with ceiling or floor mounted evaporator remote form the compressor, system ratings vary from 1.5 to 30 tons of air conditioning at corresponding costs of \$20,000 to \$40,000.

There are several types condensers employed air cooled, water cooled and evaporative types, known as Chillers. The air cooled types are good for underground installations where no corrosion components are a high priority. Air cooled condensers have maximum ratings of 100 tons, and driven by fans utilizing propellers (Axial Flow) or centrifugal (High Velocity) configurations. The water cooled types are primarily used for external roof or cooling tower installations. Evaporative condensers are employed for both indoor and outdoor installations depending on local conditions. The refrigerant line piping is sealed and may contain accessories such as individual accumulators to capture refrigerant exiting the condenser downstream. The refrigerant piping is rated at producing a pressure vapor drop of 0.25 to 1 psi per 100 linear feet. Condensers also require air filters and vibration absorbers for efficient, quiet performance. Water cooled installations may use a glycol-water cooled solution which must be continually monitored and changed at least once every six months. Locations of condensers must be carefully planned to avoid vandalism as well as providing easy access for maintenance and electrical safety with adequate ground connections according to code. In subway installations steel dust generated from wheel and rail contact is a serious problem, necessitating condenser filter cleaning at least once every two weeks.

Various types of refrigerant may be employed, all in accordance with ASHRAE standards 15 and 34. All chlorine, fluorine and hydrogen based chemicals are prohibited because they have resulted in serious ozone depletion in the atmosphere. Similarly, all Freon-based chemicals, as well as the R-22 class of refrigerants, have been banned. ASHRAE Standards recommend the usage of refrigerants #R-123, T-134, R-407 and R-410A, all of which have proven to be environmentally friendly.

Once all air conditioning systems are in place and operating, the quality of the indoor air must be monitored and continually maintained in accordance with ASHRAE Standard 62.1. A minimum of six complete air changes per hour must be provided along with a flow rate of 20 cubic feet of fresh air per person in the enclosure. Low concentrations of carbon dioxide (CO₂) must

also be maintained. Standard 62.1 also applies to control of the system filters which must be inspected and cleaned at least once every two weeks in underground applications. Three types of filters are used the throw away type, the washable type which may be reused, and the electrostatic type for higher performance applications.

Before an air condition installation can be used, the entire system must undergo a lengthy and detailed commissioning process consisting of three stages. First the components must pass pre-start functional tests including inspections including vacuum and pressure tests. Second the system must undergo hydrostatic testing and pass inspections for pipe leaks. Third the system must pass functional and operational tests including the accompanying alarms and interlocks. The length of these functional tests must satisfy code and system balancing requirement. For underground subway systems the use of package, standardized components somewhat simplifies the commissioning process, but places the design emphasis on the interconnecting ductwork, piping and electrical systems.

After the usual question and answer period, the attendees gave Mr. Qadeer a vigorous round of applause for his excellent, highly technical presentation. The subject presented at this meeting is typical of the ground breaking, innovative, state of the art topics that met section offers to practicing mechanical engineers. We look forward to seeing all of you at future monthly seminars. ASME, setting the standard!



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MET SECTION UPCOMING MEETINGS

Schedules of upcoming meeting are as follows.

Executive Committee Meeting Schedule

The Technical Dinner Meeting dates for the coming year is:

Date	Meeting	Topic	Location	Notes
June 20, 2013	HVAC	Boilers	Cooper Union	Syed Qadeer

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