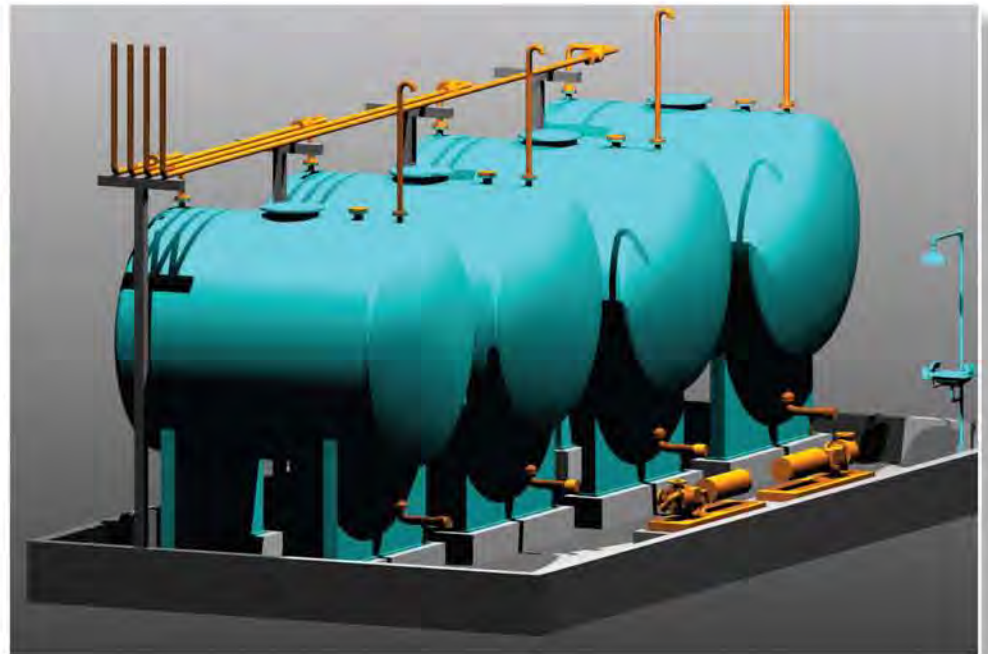


# progress

**2013 INDUSTRIAL/PROCESS ISSUE**

## Tank Farm Design for Flammables

Designing a tank farm for combustible and flammable liquids is a combination of engineering and art. While engineering a project can span weeks and months, each client must live with our completed designs every day. An efficient layout and design improves both safety and productivity. Proper engineering starts with NFPA 30 – especially Chapters 21, 22 and 27. Consideration must be given to additional requirements of each client's insurance carrier which often means following FM Global Data Sheets 7-88 and 7-32. Concurrently, OSHA regulations 1910.106 and state environmental agency containment requirements that cover both the tank farm and the associated loading and unloading areas must be addressed. Engineering practice must also include a thorough knowledge in materials of construction to handle the inevitable spills. Our design team is fluent in all applicable regulations and engineering standards. We possess extensive experience to show a working knowledge of all such requirements. Engineering must be coupled with practical experience and a working knowledge of tank farms in order to simplify their operations. Several key points to consider include:



- ***How to handle drainage for normal rainfalls and wash downs while still providing proper containment. This can be especially challenging with adjacent truck or rail loading areas.***
- ***How to economically handle all the associated piping and conduits without creating a tripping hazard or increasing the footprint. This challenge is becoming even more difficult due to requirements for vapor recovery when storing VOC's.***
- ***How to best handle fire protection and the drain off of the resultant water or foam presents a study on its own, with unique safety and cost implications.***
- ***The decision of how far to automate and how best to control changes with tank size and number of tanks given the nature of what is being stored must be made. An important sub-topic is the handling of inventory/level control. What type of instrumentation and field bus should be used taking into effect the tank farm's electrical classification.***
- ***How to best access the valves and instruments at the top of the tank is a job-specific decision. When accesses to multiple tanks are connected, we include provisions for a second means of egress.***

# Industrial Plant Electrical Safety

To improve plant-wide electrical safety EI Associates recently assisted a major industrial/manufacturing client by performing a comprehensive evaluation of all electrical equipment and systems within their existing plant. The plant consists of eight buildings totaling over 250,000 sq.ft. Since many of the buildings were constructed in the early 1900's with numerous additions and renovations performed over the years, the existing electrical infrastructure varied dramatically and was not well documented. Given the age of the systems and the nature of the heavy electrical loads throughout the facility, safety of the electrical infrastructure was a serious concern for our client.

As part of our work EI Associates evaluated 14 substations and related equipment and prepared electrical single line drawings and as-built documentation of all electrical systems. In addition, from the field data collected EI Associates developed a computer-based model to generate short circuit calculations and develop a comprehensive arc flash hazard report. As a result of our arc flash hazard analysis, EI Associates provided our client with approximately 500 code required arc flash hazard labels to be installed on all electrical equipment. These labels now alert employees and workers to the required Personal Protective Equipment (PPE) based upon the identified hazard. A protective device coordination study was also performed to recommend proper trip settings for all over current devices.



# On-Site Engineering Services



EI Associates is equally adept at performing assignments at our Cedar Knolls, NJ headquarters or at any client based location. Our team of professionals is currently providing on-site design and construction services to many industrial clients and corporations throughout the Northeast. These assignments typically range from short term durations to the length of a project which can last several months to years. Our on-site services have included Process Design, Project Management, As-Built Plant Documentation, HAZOP Facilitation, CADD Services, Construction Oversight, Owner Rep Services and Construction Management.

Our team of experts understands the critical day-to-day operations and working environment of industrial plants through our experience which spans nearly 7 decades. Many members of our staff were previously employed as plant engineers and managers for companies for which we now serve. EI Associates professional staff of engineers, architects and construction managers can become an extension of your team, and provide on-site services to augment your current staff. We will work with you to assign an industry expert to your staff until the project is complete and your needs are fulfilled.

# Understanding the Finer Points of Spray Drying

The spray drying process mixes a heated gas with an atomized (sprayed) liquid/emulsion stream within a vessel (drying chamber) at the proper vaporization rate to produce a free-flowing dry powder with a controlled average particle size. The vaporization rate and the difference between the inlet and outlet air temperatures control the size and the cost of each system. The particulate size requirement influences the choice of atomization and the size of the spray dryer which is an important factor for thermally-sensitive products.

EI Associates has a specialized engineering team to design Spray Drying Manufacturing Facilities covering Process, Structural, Electrical, Controls, and Instrumentation engineering as well as architecture to custom design each installation and make each client's spray drying project a success. EI's integrated engineering and architectural team has the know-how and experience to coordinate the multi-discipline aspects of project, client requirements, and equipment vendor

requirements as a single cost-effective package. Our in-depth knowledge of spray drying system requirements, process and control requirements, and cost-effective material selections is essential for your project success.

Depending on the specific project requirements, EI Associates can assist with preliminary design and value engineering, code analysis, detailed design, bidding assistance, procurement assistance, and Construction Management services. Our services cover all aspects and systems of the spray drying process including Emulsion Preparation, Spray Drying, Dehumidification, Clean-in-Place (CIP) Systems, Scrubbing/Thermal Oxidization, and utility requirements and upgrades.

EI Associates has designed spray dryer systems to serve a wide range of pharmaceutical food, and industrial applications for many clients such as IFF, DSM and TEVA to name a few. Our integrated team of spray drying system experts can assist you with your project needs.



# Reverse Engineering and Pressure Certification

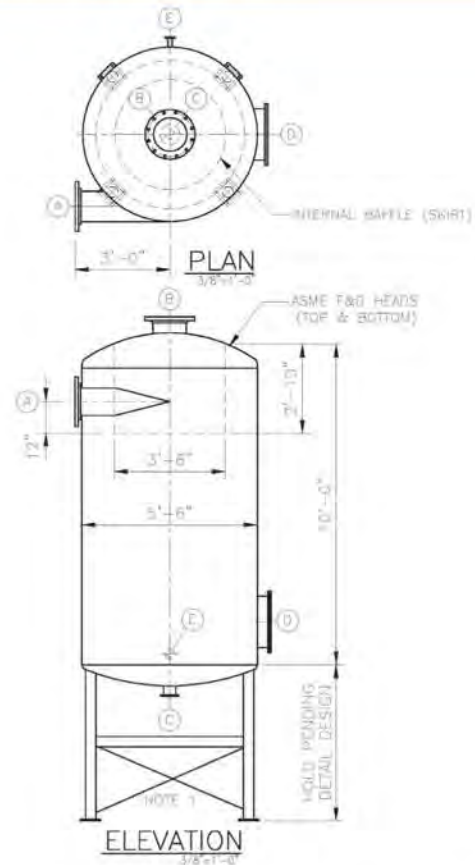
ASME Pressure Vessel Code Sec. VIII Div. 1 requires that all vessels with internal pressures greater than 15 PSIG (100 kPa) maintain proper certification and over-pressure protection. This is backed by legislative enactments in every State of the Union. It is customary during an OSHA inspection for an inspector to request copies of the backup calculations showing the adequacy of all safety relief devices. This applies to not only vessels but also to both the shell and tube sides of heat exchangers, dryer steam drums, filter housings, gas holders and many other types of process equipment.

The starting point for all safety relief calculations is the "Maximum Allowable Working Pressure [MAWP]" of the vessel. Usually this is taken from the "U" or "R" stamp on the piece of equipment, from a certified shop drawing or from a manufacturer's U-1 form. However due to changes in ownership or working with used equipment, the MAWP may not be readily available. Similarly, due to corrosion or wear, the original pressure rating may no longer be valid. This doesn't mean that the device cannot be certified and must be discarded. In such instances EI Associates has worked with qualified inspection firms to determine wall thickness by ultrasonic or other non-destructive test methods. These firms work under EI Associates' direction for frequency and location of test points. Using minimum wall thickness at various locations combined with visual inspection of all welds will allow reverse engineering of both internal and external (vacuum rating) MAWP.

While this effort is normally only done for sizing relief devices for a pressure vessel EI Associates has also used this same technique for thin-walled, atmospheric vessels. With today's integrated emphasis on safety and environmental considerations, the addition of nitrogen blanketing or a conservation vent to an existing vessel that was previously open to the atmosphere is often considered. Here again, reverse engineering is used to determine the pressure and vacuum rating for the vessel and to size both its safety relief device plus its new pressure and vacuum breathing instrumentation.



# Vessel Pressure Relief



Without proper vessel pressure relief there can be a serious risk to both personnel and equipment safety. The ASME Pressure Vessel Code states that all pressure vessels must be provided with a means of overpressure protection. This protection is usually a rupture disk, a safety relief valve, or a combination of the two. EI Associates is prepared to run the required calculations and to prepare instrument data sheets to keep our clients in compliance with codes and with OSHA requirements and to allow the client to bid and procure the relief devices. Where required EI Associates can design vessel modifications when new vessel usage requires a larger relief device.

Selecting and procuring a proper safety device is only step one of safe-guarding personnel and property. The emergency discharge must be directed in a way to prevent injury or damage. Depending upon the vessel contents and the relief pressure and temperature conditions, the emergency relief discharge must be routed to a Catch Tank (also called a Rupture Tank or Blowdown Tank), a flare, an incinerator, a scrubber or condenser. Discharges through a pipe connected to the safety relief device can affect the relief device capacity and must be designed by an experienced, licensed Professional Engineer. Reaction forces on the discharge line must be carefully considered as part of the pipe support criteria.

A Catch Tank must be designed to disengage and contain any liquid carryover. This can be done with a cyclonic upper section for vapor-liquid separation on top of a larger containment volume. Depending upon the vessel contents, the Catch Tank must be able to contain 100 to 150% of the process vessel volume in conformance with AIChE-DIERS and FM Global recommendations. If more than one vessel will be connected to the same Catch Tank, additional complications of material compatibility and compressible flow pressure drop must again be addressed by an experienced professional engineer. EI Associates is ready to assist each client with designing new vessels and associated safety relief systems or in providing required safety calculations and vessel modifications for existing systems.

# EIAD Energy Solutions

EI Associates has recently formed a new Strategic Business Group, EIAD Energy Solutions (EIAD), in order to offer our clients Turn-Key Energy Solutions while leveraging both Federal and State incentive programs. EIAD offers the unique combination of in-house expertise across energy auditing, design and construction of Energy Conservation Measures (ECM's), program administration and project financing. For process related industries, incentives covering up to 50% of the cost to implement Energy Conservation Measures (ECM's) are available if such ECM's reduce per meter energy usage by at least 4%. These incentive programs can offset the cost of new energy efficient equipment and advanced technologies and even assist with technical studies.



# EI Associates Hosts AIChE Fall Lecture Series



EI Associates recently hosted the AIChE Fall Lecture Series covering Project Management training led by Peter J. Sibilski, P.E., of Pharmetic Manufacturing Co. Project Management in all its forms and tasks is linked to all engineering disciplines allied to the process industries. Whether the project is several hundred, or several million dollars in value, consistent basic project management principles apply across the board. Project management requires the engineer to integrate three major management areas:

- 1. Generally accepted project management and practice tools and techniques**
- 2. General management knowledge and practice tools and techniques, and**
- 3. Application area knowledge and practice tools and techniques.**

In many cases, the project manager may be an expert in one or more of the management areas, but it is rare that they are expert in all three. Consequently, it is important for the project manager to understand how these management areas interconnect and their critical importance in the execution of a successful project.

The lecture series introduced attendees to the Project Management Body of Knowledge - a compilation of 42 recognized processes that fall into five basic process groups and nine knowledge areas typical to most projects. Real-life examples of how these processes were implemented were also presented. Attendees of the two session training course were also provided with a total of 6 Professional Development Hours. The Fall Lecture Series is presented annually by the North Jersey Section, American Institute of Chemical Engineers.

## News, Notes & Events

### New Projects

- BMW North America, Port Jersey, NJ – HVAC System Upgrades and Energy Study
- Confidential Fragrance Client, North Jersey – Facility Expansion Master Plan
- Confidential Flavors and Fragrance Client, North Jersey – Spray Dryer Installation
- Confidential Industrial Client, NJ – Comprehensive Electrical System Evaluation and Arc Flash Hazard Analysis
- Firmenich, Newark, NJ – Arc Flash Hazard Analysis and Desiccant Wheel Project
- GlaxoSmithKline, Clifton, NJ – Facility Decommissioning
- IFF, Hazlet, NJ – Life Cycle Assessment
- Instrumentation Laboratory, Orangeburg, NY – Emergency Generator Installation
- Maquet Cardiovascular, Wayne, NJ – Ongoing Facility Renovations
- Musculoskeletal Transplant Foundation, Edison, NJ – As-Built P&ID's and Process System Upgrades
- Munzing, Bloomfield, NJ – Development Lab Expansion
- Par Pharmaceuticals, Spring Valley, NY – Facility Expansion Master Plan
- Pepsi Cola Co., Valhalla, NY – Tech Center Optimization Study and Master Plan
- PIM Brands LLC, Somerset, NJ – Plant Upgrades
- Stepan, Maywood, NJ – Ongoing Plant Upgrades