

Chicago s e c t i o n Columns

Chicago Section
American Institute of Chemical Engineers
www.aiche-chicago.org



November Meeting Notice

Wednesday November 12, 2003

BP Naperville
Cantera Two
28301 Ferry Rd.
Warrenville, Illinois

Agenda

Cash Bar.....6:00 - 6:30 pm
Dinner.....6:30 - 7:30 pm
Speaker.....7:30 - 8:30 pm

Cost

\$20 for members
\$23 for non-members
No charge for AIChE student chapter members
(see your advisor).

Menu

We will have a selection of gourmet sandwiches, including turkey, beef and ham. A vegetarian dish will also be available. Please indicate your meal choice when making your reservation.

Directions

From the city. Take I-88 west towards Aurora. Take the Winfield Road exit towards Warrenville. Turn left onto Ferry Road.

Reservations

Make your reservations by calling the AIChE Reservation Hotline at 847-588-3323 or emailing evalopez@teianalytical.com. Or register online at www.aiche-chicago.org. Deadline is noon November 7, 2003.

The Future of Refining

A Senior BP Refining Manager will be giving a general talk on the impact of refining technology on the refining business.

AIChE Students Need Your Help!

The Illinois Institute of Technology AIChE student chapter will host the 2004 North Central Student Conference from April 1 - 3. Current needs for this event include:

- ♦ Cooperate Sponsorship
- ♦ Career Fair Participants
- ♦ Workshop Speakers
- ♦ Plant Tours
- ♦ Competition Judges

For more information on how you can help, please visit our website at: www.iit.edu/~aiche.

Chair's Corner

Dennis O'Brien
Chair 2003-04
Chicago Section AIChE

Communities

People commonly organize themselves into communities. Many of us are members of several communities: technical, such as AIChE; religious, such a temple or church; or sports, such as a baseball league. What each of us gets out of these communities depends on the energy that we put into them.

There are many demands on our time and that rations how much time we can put toward our communities. The steering team would like to ask a few of you to give us ten to fifteen hours a year in board meetings. We need some new voices and new ideas. Please contact any of the board members if you are willing to give us some of your time.

There is something that you can do for your community as an engineer. During the school year, many of the school districts try to give students an idea of what engineers do. Alan Zagoria has prepared material that can be used in these presentations, or you could prepare your own. This a very easy task and requires only about three hours to travel and present. Presenters who register with TEI get a certificate good for one free dinner at the local section meeting.

There is something that the AIChE Chicago community can do for you. If you are unemployed, the dinner fee is cut in half. Coming to meetings is an excellent way to introduce yourself to a prospective employer. The meeting in Lombard last Spring had six managers present-an excellent market for prospecting. The September meeting had several managers present who may need to hire people soon.

Speaking of the September meeting, Mr. Bob Anderson was excellent. His presentation covered the essentials and he pointed out where engineers need to hand off the work to patent attorneys. We had 27 attendees, one of whom joined the section that evening. The discussions were animated and interesting and it was almost a shame to interrupt them to introduce our speaker.

The November meeting is designed to appeal to more of the petroleum refining based engineers. A number of our members work in this area. Almost a third of the Chicago membership is from UOP. BP has over 10% of the membership. The meeting notice is elsewhere in this newsletter.

We will be updating the web and looking to improve the service. As of late September, we have been locked out of the old server. It has run out of hard disk capacity and operating on an old version of the OS.

Election Results

Officer elections were held at the September meeting. Brian Gahan was elected Treasurer, Howard Sachs as Secretary, Annette Johnston as Vice Chair Programs, and Allan Fluharty was elected as Director-at-Large, all by unanimous vote. Becky Patrick was elected as Chair Elect, narrowly defeating Gary Coleman (I-Ca). Dennis O'Brien succeeded to Chair. Congratulations to all!

In other election news, the group unanimously voted for the Chair to end all meetings with the "ziggy zuggy, ziggy zuggy, oy oy oy" cheer, and Chumbawamba's "TubThumping" was named the official song for the 2003/2004 season.

Mentors and Judges Needed for 2004

Future City Competition

This nationwide contest asks Chicago regional seventh and eighth-graders to design and build cities of tomorrow. For the past eleven years, junior high and middle school students from across the country, including the Chicago area, have designed their versions of a city of the future for the National Engineers Week Future City Competition. This year Chicago is getting an early jump on the contest. In preparation for the competition, Don Wittmer, regional coordinator for Chicago, is requesting Chicago area teachers and engineers to demonstrate an interest in the program. Many of the schools that have participated in the program in prior years have now incorporated the Future City Program in to their science curriculum.

The non-profit competition asks seventh - and eighth-graders to design -- first on computer, then in large three-dimensional models -- a city of the future. The students work with their teacher and a volunteer engineer mentor from the community. Though they may sound like a fantasy, the designs are far from pie in the sky. The students must take into account real city problems such as pollution, crime, traffic, and unemployment and then solve them. Students from the Chicago area will begin work on their future cities in September, and will compete in regional finals in January, 2004 at the University of Illinois - Chicago.

The area's first place team wins a trip to Washington, D.C., for the national competition to be held during National Engineers Week, February 22-28. (National Engineers Week is always celebrated around the time of George Washington's birthday, since, as a surveyor, he was one of the nation's first engineers.)

More than 30,000 students from 1040 schools in 31 regions participated in the 2003 competition. It is sponsored by the National Engineers Week Committee, a consortium of engineering associations and major U.S. industries. Co-chairs of 2004 National Engineers Week are The Institute of Electrical and Electronics Engineers (IEEE) and Fluor Corporation.

Regional first place teams receive a free trip to Washington, D.C. for the national finals during National Engineers Week. Prizes for the 2004 competition winning Future City team include a free trip to U.S. Space Camp in Huntsville, Alabama. Other prizes include scholarships, computers and savings bonds. In addition, teams will be eligible for special awards and recognition sponsored by engineering societies and other organizations.

Schools wishing to sign up for the 2004 Chicago Regional Future City Competition, or engineers interested in volunteering as mentors should contact Don Wittmer, Chicago regional coordinator, at (312) 930-9119 or via e-mail at [dwittmer@hntb.com](mailto:d Wittmer@hntb.com).

More information on the competition can also be found at the Future City Competition home page at <http://www.futurecity.org>.

The objectives of the AIChE are to advance chemical engineering in theory and practice, to keep you free and clean, to maintain a high professional standard among its members and to serve society, particularly where the Federales can contribute to the public interest. If you have any questions, comments or wear your skin like iron, please contact either Poncho or Lefty at polarbear4x@yahoo.com.

Chicago Section Columns is published eight times a year on the road my friend. Opinions expressed herein are those of the authors and are not necessarily those of Merle or Willie. Articles for inclusion in the next Chicago Section Columns must be received no later than November 28, 2003, I suppose.

Sausage

J. Peter Clark

This is the first of a series of short articles on foods in which chemical engineering unit operations and principles have a prominent role. Each of these foods has been written about at length elsewhere, but rarely with this perspective. Space constraints dictate that these pieces will be incomplete, but one hopes they will be still be interesting and informative.

Sausage describes any of a wide number of processed meat products in which various meats are ground, seasoned and preserved. The name derives from the Latin word for salt, because from the beginning of sausage making, salt has been a common ingredient.

Fresh meat, as most people know, deteriorates quickly unless preserved by refrigeration or some other means. Refrigeration being a relatively modern invention, preservation years ago was by drying, cooking, smoking, or salting. The result of most of these processes is a tough, hard to chew, and not very tasty material close to leather.

The breakthrough for sausage was the discovery that chopping meat into small pieces (size reduction) improved texture, reduced curing time (increased reaction rate and increased mass transfer), and permitted the mixing of several sources of meat and flavors. However, chopped meat does not easily hold a form, so a second discovery was the idea of stuffing some container with the mixture. Containers may be reusable, such as molds or pans, or edible, as in animal intestines.

Modern sausages, of which the popular hot dog is a good example, are made in very large quantities. The classic hot dog is made of pork, beef and veal with added salt and sodium nitrite. These are

ground and mixed. The objective is a relatively homogeneous mixture which is pumpable. This is stuffed into cellulose tubing, divided into appropriate lengths, cooked, chilled, stripped of the casing, packed and kept refrigerated.

Each of these steps poses challenges. Meat is hard to grind unless it is cold or nearly frozen, because it is naturally soft. The process of grinding and mixing generates heat from the mechanical work (thermodynamics) and so cooling is provided by a jacket on the vessel, adding ice, or injecting liquid carbon dioxide. The amount of water permitted in the formula is limited, so only a certain amount of ice can be used. The surface to volume ratio of large mixer/grinders is such that jackets are not very effective. Thus direct injection of coolant is common.

The mixture is quite viscous, so diffusion of salt, nitrite and any other flavors is slow. The only study I have seen of mixing in a meat system found that it took about 25 minutes in a typical machine to reach relative uniformity, as measured by standard deviation of salt content among samples. In actual practice, meat mixtures are typically agitated for about 2.5 minutes. Thus it is safe to assume that they are not well mixed by conventional standards. This might normally be a concern, but most such products are cooked and kept refrigerated, so the fact that preservatives, such as salt and nitrites are not uniformly distributed is not a great worry.

Why don't the mixers operate longer, you might ask. The result if they did would be a mush that would barely be edible because the resulting sausage would be very tough. In addition, the extra equipment to produce the same amount in a given time would be a major investment in a low margin business.

In addition to hot dogs, there are many other sausages, fresh, cooked and preserved in other ways. One of the more interesting is Italian Salami. This is typically made from pork, rather coarsely chopped. It is chopped frozen so as to preserve visible pieces of lard, which otherwise might smear and disappear if allowed to melt under the heat of chopping and mixing. Because there is no heat treatment in this process, the raw pork must be treated, by regulation, to kill any possible parasites. This is done by storing the raw pork for a specified time at near freezing conditions, which the parasites cannot survive. (Modern pork is not as subject to infestation as it once was, but this precaution is still taken.) The chopped meat with added salt and spices is stuffed into cellulose casings which are porous because they have been punctured with fine holes.

The sausages of various sizes are hung in drying rooms where temperature and humidity are carefully controlled. In San Francisco, the natural climate is conducive to the curing, but it can take up to thirty days. Elsewhere, and under economic motivation, rooms are artificially maintained to accelerate curing in as few as two days.

Curing involves a complex combination of drying and fermentation, in which moisture is lost from the meat mixture by diffusion through the casing and naturally occurring bacteria (or those inoculated deliberately) ferment available sugars to generate lactic and other organic acids. The combination of reduced water activity (also known as fugacity, related to but not equal to water content) and low pH means that harmful microorganisms cannot grow in the meat. At the same time, distinctive flavors and textures are created. In some Italian Salamis, a white mold grows on the outside of the casing and is considered a sign of authenticity, but it contributes little if any flavor.

Other familiar products, such as bologna, pepperoni, mortadella, fresh Italian sausage, breakfast sausage, Polish sausage, are made in their own unique ways, differing in seasoning, casing or forming (natural, artificial, mold, etc.) and whether they are cooked or not. Lunchmeats and hot dogs are cooked in ovens with or without added smoke. Fresh sausages are not cooked until they are prepared by the user.

Edible casings are another accomplishment of chemical engineering. Natural casings are the intestines of animals, such as pigs, cattle or sheep, which have been carefully cleaned, but the supply is limited and their dimensions are inconsistent. Edible casings are made from collagen solutions which are extruded in precise cylinders and then fixed by calcium chloride baths.

Cellulose casings, which are stripped in the factory or by the user, are made by creating a cellulose xanthate solution which is then precipitated by extrusion into an alkali bath. The process is similar to that for viscose fibers or films.

An interesting variation is a process developed by Unilever, but not widely applied, in which a meat mixture is co-extruded with a collagen coating and then the coating is fixed before the co-extruded tube is divided and cooked. The result is a sausage similar to our hot dog, but with an edible casing.

Sausages are widely variable, depending on seasonings, meat formulas, fineness of chop, type of cook, and size and shape. The best tend to be made in small quantities by artisans, but the mass-produced varieties are safe, consistent and economical.

Volunteers Needed for Process

Development Division Symposium

As you have read, the Process Development Division Symposium will be here in the Chicago area in June 2004. The Chicago Section is cosponsoring this event. As with an Annual Meeting, the AIChE National Office will provide support for Registration and Hotel Arrangements. The rest is up to the Symposium Committees and the Local Section.

The Symposium Steering Committee is working diligently on identifying Session Chairs and shaping the program for the meeting. Local Section help will be needed for the following activities:

TABLE TOP SHOW - Recruit and coordinate with vendors of modeling software, pilot plant equipment, laboratory equipment and possibly consulting to present at a table top show during the symposium.

PUBLICITY - Spread the word beyond AIChE to all engineers that might be interested in registering worldwide.

PROCEEDINGS - Collect information for a booklet available for participants, and possibly for a CD of proceedings.

ROAD TRIP - Set up a trip to downtown Chicago for participants during one of the free afternoons.

GIFT BAG - Purchase a suitable bag, and collect giveaways from local businesses and Table Top vendors for a gift for participants.

Please contact Annette Johnston at 847-935-5120 or email to Annette.Johnston@abbott.com with questions or to volunteer.

Nominations Requested For

The Ernest W. Thiele Award

The Ernest W. Thiele award is sponsored by BP and recognizes the outstanding contributions to our profession by a Midwest region chemical engineer. This award was established by the AIChE Chicago Section and is presented annually to a Midwest region AIChE member. This internationally recognized award consists of an engraved plaque and \$1000 honorarium presented at our sectional meeting.

Nomination forms and additional information can be obtained from the Thiele Committee Chair. Completed nominations are due to the committee chair no later than March 01, 2004.

One of the highest honors a distinguished chemical engineer can receive is our Chicago Section Thiele award. Please consider nominating a deserving engineer for this prestigious award.

Jim Simnick

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Seeking Position

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Over 25 years in extensive process and project engineering in food, detergent and fine chemical industry. BS ChE and MBA in Finance.

Experience includes project management, project appropriations, cost estimating and equipment specification/procurement. Prepared operating procedures and trained equipment operators.

For further information, contact: J. L. Frankel @ (847) 913-9792.

Jobs Available

A-0046 SENIOR EDITOR Chemical Processing magazine is looking for a chemical engineer to join its editorial staff at the head office in Itasca, IL.

The candidate should have a BS or BE in chemical engineering with at least five years of experience in plant operations or design.

Duties include developing, writing and editing content for this leading monthly magazine serving engineers involved in the design and operation of chemical plants. The job involves heavy contact with a wide variety of people, some domestic travel, and the ability to write clearly on technical subjects while meeting regular monthly deadlines. We are looking for someone who would enjoy covering a wide variety of subjects related to chemical engineering and who can write clearly.

Contact: Mark D. Rosenzweig

Editor-in-Chief

Chemical Processing

555 West Pierce Road

Itasca, IL. 60143-2649

(630) 467-1301 ext 478

Major A&E firm with over a dozen offices nationwide seeks a Business Unit Manager to join its staff in the metro New York City area. Position Overview: Responsible for managing a designated sector of the business. From client development to resource planning, the Business Unit Manager will oversee the operations of the business unit.

Requirements: Critical: Astute business expertise / Outstanding leadership skills / 15+ years of overall experience. Marketing/business development skill set / Negotiation skills / Industrial experience.

Highly desirable: Pharmaceutical experience / Consulting experience / Licensure (Architect or Engineer)

Responsibilities: P/L statement for business unit / Generate & manage 12-15 million in revenue / Business development / Extensive customer contact / Project profitability / Direct & indirect responsibility for 50-60 employees, some on-site at clients' facilities / Mentor, motivate & develop staff / Oversee project managers / Key leadership role in division.

Contact Jim Jeranek

704-583-3151

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American Institute of Chemical Engineers

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