



The PTF Newsletter

New PTF Website

www.aicheptf.org

The new official PTF web site is located at www.aicheptf.org. A change to this new format and platform has been made in an effort to ease content contribution and to improve the presentation of information to all visitors. The site is built on an open source content management system that enables contributions by registered users of the site. All PTF members are asked to browse the site and make suggestions on what sort of particle technology information they'd like to see included. We will be adding PTF



members to the site as users and contributors soon. Suggestions and questions can be sent to the site administrator, Pat Spicer, at spicer.pt@pg.com.

Call for Papers for Annual Meeting

The Call for Papers is open for AIChE's Annual Meeting (October 16-21, 2011, Minneapolis, MN) and can be accessed via

<http://www.aiche.org/Conferences/AnnualMeeting/index.aspx>

We urge everyone to submit ASAP but by no later than May 2nd.

If you submit your abstract BEFORE April 24th (and contingent upon eventual acceptance), the AIChE will enter the presenter into a drawing for a chance to receive 50% off the registration fee! The AIChE will be awarding a total of ten reduced registration fees - so please submit early!



NOMINATIONS FOR PTF AWARDS ARE NEARING THE DEADLINE

Nominations for all of the PTF Awards are due May 10, 2011. This year, the PTF will be presenting the Shell Global Solutions Thomas Baron Award for recent outstanding achievements, the DuPont Particle Technology Forum Award for lifetime achievements, the Dow Chemical Fluidization Processing Award for outstanding contributions to one or more commercialized processes



and the PFT Best PhD Award.

This is the opportunity to award those who have done distinguishing work in the area of particle technology. The AIChE Award form for the PTF Award Nomination can be found at www.aicheptf.org/activities/awards-through-ptf.

More details can be found on Page 6.

LETTER FROM THE CHAIR

There has been a changing of the guard. I, Dr. Ray Cocco, am now the current PTF Chairman and Prof. Jennifer Curtis is the Cochairman. Prof. Alissa Park is the Treasurer, and Dr. Stephen Conway is the Secretary. I would first like to thank our past Chairman, Prof. Hugo Caram, for all his hard work in making the PTF a better resource for all of us. Indeed, much of what we are implementing now is due to his vision and leadership.

The PTF, however, is more than just its officers. We have a dedicated team of volunteers that are helping to bring the PTF closer to you. Prof. Christine Hrenya is and continues to be the PTF Newsletter Editor. Dr. Pat Spicer has assumed the role of PTF Webmaster and is responsible for its recent upgrades. Prof. Hugo Caram, Mr. Karl Jacob, Dr. Shrikant Dhodapkar and myself are all actively involved in the Student PTF Workshop, which in the past has attracted hundreds of interested young professionals to the world of particle technology. Both Dr. Manuk Colakyan and Dr. Shrikant Dhodapkar have dedicated countless hours to ensure our AIChE Annual Meeting sessions are available and coordinated. We also have Prof. Hamid Arastapoor and Dr. Greg Mehos to provide us with academic and industrial representation. We also need to gratefully acknowledge our PTF sponsors too. Company's like CPFDF-Software, Shell Global Solutions, Dupont, Dow Chemical and PSRI are all making significant contribution to keep the PTF thriving.

That brings us to the next topic, what is new with the PTF? First, we have just rolled out the PTF's new website at www.aicheptf.org. This website provides information on the officers, PTF awards, future meetings, student outreach, relevant journals, research centers and particle standards for calibration, with job postings, discussion blogs and tutorials soon to follow. We want the www.aicheptf.org website to be your first stop for not only getting information on the PTF but on particle technology in general. In addition, we will have web space available so each group of the PTF has their own web pages to better serve their members as well. Yet, we don't want to stop there. Thanks to Pat's

efforts, the website is flexible and amenable to new ideas and applications from you.

Next is our PTF Newsletter. Christine has given it a new look with easier navigation and web links. It will continue to provide information on upcoming conferences and book reviews as well as provide important articles on the particle technology, such as Know Floe's Corner. In addition, expect to see the PTF Newsletter come around three times a year instead of the previous two times a year.

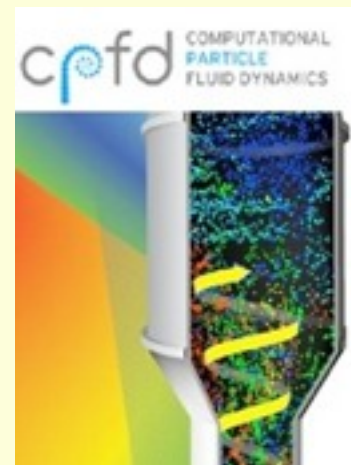
Finally, the PTF will become even more committed to student education. In the past few years, the PTF has been active in promoting particle technology in the AIChE Student Workshop. Activities include a presentation on the function of each of the PTF groups plus demos such as a fluidized bed, hopper demonstration, hydrophilic particles, etc. We will also be adding a student web-based discussion board so students can better interact among themselves about particle technology. In addition, we are upgrading the web-based tutorial to better serve those who are new to particle technology to get them up to speed quickly.

So, expect to see significant changes in the PTF. Changes that will allow better communication and education.

However, this is a team effort. We need your help. We need your written contributions for our quarterly newsletter. We need your suggestions and educational material for our website, and we need your help with education for our students.



Sponsor of the 2010 PTF Dinner



**Outlet Stresses in Bins and Hoppers***Lyn Bates, Ajax Equipment Co. (UK)**Sbrikant Dhodapkar, The Dow Chemical Company**George Klinzing, University Of Pittsburgh*

Loads acting through the outlet of a hopper can be highly significant for valve operation, feeder drives and weighing applications. The selection of a drive for a large belt or screw feeder is a major decision as an incorrect assessment of the power required can lead to serious commissioning problems or excessive capital, installation and lifetime running costs. The outlet size of a hopper is often much larger than the critical orifice size required for reliable flow to deal with product variability or uncertainty, save headroom or to enlarge the storage capacity. Such forces can therefore be large and significant for feeder performance. The density and flow properties of the bulk are key material factors affecting these forces

therefore measured values of these parameters are prime design requirements.

Static storage stresses and the stresses that are acting when flow is fully mobilized are radically different. The stresses created in bulk storage hoppers during the filling process develop as active forces on the growing bed and the walls, due to the weight of the material and inertial forces from the in-flow stream. Wall friction resists the linear growth of pressure with depth of bed, as described by Janssen, such that a limiting compacting stress is attained in deep storage containers. When discharge occurs, the pressure is reduced as material is extracted and an arched stress field develops over the outlet. Consequently, the direction of principle stress changes from vertical to an inclination from the flow boundary according to the angle of frictional resistance acting on the ends and aligns as a centenary arch over the outlet.

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2010 PTF AWARD RECIPIENTS

**Procter and Gamble Best PhD in Particle Technology**

Fanxing Li of Ohio State University with L-S Fan as his advisor. For his doctoral work which laid the foundation for the on-going scale-up efforts in commercializing the novel chemical looping gasification process.

**DuPont Particle Technology Award**

Joachim Werther of Technische Universität Hamburg-Harburg. In recognition of his distinguished career, contributions to particle technology research and scholarship, and for outstanding leadership to the Particle Technology community worldwide.

**Shell Global Solutions Thomas Baron Award**

Tony Ladd of the University of Florida. For his contributions to the fundamental understanding and seminal contributions to the development of the lattice-Boltzmann technique for application to fluid-particle systems

**PSRI Lectureship Award**

Jinghai Li of The Chinese Academy of Sciences. In recognition of his pioneering research, outstanding contributions and tireless leadership in Fluidization and Fluid-Particle Systems.

Best Poster in Particle Technology

1st Place: Nyah V. Zarate from Purdue University with "Nano Scale Moisture Effects on Pharmaceutical Particle-Surface Interactions"

2nd Place: Huang-Chaio Huang from Arizona State University with "Polymer-Coated-Gold Nanorods for Administration of Extracellular Hyperthermia and Delivery of Nucleic Acids to Cancer Cells"

3rd Place: Adel F. Alezi from University of Pittsburgh with "Consolidation of Granular Material Subject to Thermal Cycling"



During discharge a stressed arch is developed in the material above the outlet but, because the opening is larger than the 'critical arching span' for the material to flow, it is in a state of continuous collapse. However, when flow is restrained by a feeder, the underside of the collapsing arch is not unconfined, but is bearing down on the material underneath, adding to the weight of the material under the stressed arch that is also carried by the restraint of the feeder, which bears the total load. The force through the outlet therefore consists of the weight of material under the stressed arch, plus the force that is restraining the arch from unconfined failure.

As the slope of the hopper wall of a mass flow bin is also related to the angle of wall friction, the arch height can be calculated, and hence the weight of material bounded by this shape. By contrast, the arched stress field in a non-mass flow bin is inclined according to the angle of internal friction of the bulk material, inevitably leading to a deeper arch; as otherwise the material would slip on the wall if the combinations of the angle of wall and the wall friction angle were less than the angle of internal friction. Non-mass flow bins also require a larger outlet for flow than a mass flow bin, so forces acting through the outlet tend to be significantly higher. These features show that simple formulas based on orifice dimensions also are inadequate to secure reliable estimates, but that a useful guide can be secured from first principles and relevant qualifications.

Good practice therefore dictates: -

1. Wall friction should be measured to determine the optimum wall slope for mass flow or minimum self-clearing angle of wall for non-mass flow. (Too many designs fall short of mass flow but are far steeper than necessary when mass flow is not required).
2. Extraction should be progressive over the total outlet, whether mass flow or not, to reduce shearing loads.
3. Allow expansion in the shear plane for dilatation in incipient shear and translation from vertical to horizontal movement. This is particularly helpful for hard, granular products that resist confined compaction.
4. Retain a heel of product above the outlet to minimize re-start loads after re-filling the hopper.
5. Ensure that a dense feed stream does not impinge on product immediately above the bin outlet.
6. Taper the outlet transition along the wall of a V shaped hopper to provide an increasing width and depth of bed and an angled translation of the flow direction from vertical to horizontal.
7. Provide a small, unconfined surface close to the shear plane by way of step-back in the wall surface or outlet connection, or by an insert, to allow expansion of the local bed.
8. Ensure that drives with limited overload capacity are not subjected to excessive starting loads by: -
9. Running out a small amount of material at a low fill condition.
10. Interspersing a temporary flow restriction on part of the outflow route.
11. Preventing time consolidation by the continuous injection of bleed air during static storage to compensate for the de-aeration of a fine, cohesive product.
12. Allow a small increase in clearance height across the end of a slot outlet, above the side walls of the hopper, to provide space for expansion of the shear layer of the emerging bed.
13. Never be shy of seeking professional advice. Project engineers cannot be specialists in all disciplines and experts in the field are available to provide a service. Consultants are generally much cheaper than mistakes.

References:

1. Jenike, A.W.: Storage and flow of solids, Bulletin No 123, Utah Eng. Exp. Station, Univ. of Utah, Salt Lake City, 1964 (revised edition 1970)
2. Motzkus, U.: Belastung von Siloböden und Auslaufrichtern durch körnige Schüttgüter, Dissertation TU Braunschweig (1974)
3. Powders and Bulk Solids: Behavior, Characterization, Storage and Flow by Dr.-Ing. Dietmar Schulze, Publisher Springer-Verlag, 2008
4. Arnold, P.C., McLean, A.G.: An analytical solution for the stress function at the wall of a converging channel, Powder Technology 13 (1976), pp. 279-281
5. Lyn Bates. Loads on feeders. Ajax Equipment Ltd. Publication.
6. Roberts, A. Concepts of feeder design and performance in relation to loading bulk solids onto conveyor belts. Univ. of Newcastle. N.S.W. Australia.



GROUP 3 SESSION LINEUP FOR ANNUAL AICHE MEETING

Group 3A: Particle Production and Characterization
Prof. Ecevit Bilgili (Chair) & Dr. Pavol Rajnaiak (Co-Chair)

Session ID	Session Title	Chair	Co-Chair
03A03	Population Balance Modeling for Particle Formation Processes: Nucleation, Aggregation and Breakage Kernels	Rohit Ramachandran	Pavol Rajnaiak
03A04	Agglomeration and Granulation Processes	Padma Narayan	Defne Talay
03A05	Applications of Engineered Structured Particulates	Philip Bell	Wai Kiong Ng
03A06	Characterization of Engineered Particles and Nanostructured Particulate Systems	Daniel Lepek	Stephen L. Conway
03A07	Dynamics and Modeling of Particles, Crystals and Agglomerate Formation	M. Silvina Tomassone	Deliang Shi
03A08	Particle Breakage and Comminution Processes	Priscilla Hill	Ecevit Bilgili
03A09	Magnetic Particle Synthesis and Properties	Robert N. Grass	Evangelos K. Athanassiou
03A10	Engineered Composite Particulate Systems for Pharmaceutical Active Ingredient Delivery	Rajesh Dave	Stephen L. Conway
03A11	Characterization of Engineered Particulate Systems for Pharmaceutical Active Ingredient Delivery	Stephen P. Beaudoin	Matteo Strumendo
03A12	Particle Formation and Crystallization Processes From Liquids, Slurries and Emulsions	Ranjit Thakur	Seth Huggins

Group 3B: Fluidization and Fluid-Particle Systems
Dr. Reza Mostofi (Chair) & Prof. Ah-Hyung Park (Co-Chair)

Session ID	Session Title	Chair	Co-Chair
03B01	Special Session: To Celebrate Ted Knowlton's Career Long Accomplishments	Ray Cocco	Reddy S. B. Karri
03B02	Fundamentals of Fluidization I	L. S. Fan	Reddy S. B. Karri
03B03	Fundamentals of Fluidization II	T. C. Ho	S. B. Reddy Karri
03B04	Fluidization and Fluid-Particle Systems for Energy and Environmental Applications	Juray De Wilde	Fanxing Li
03B05	Applications of Fluidization	Isaac K. Gamwo	Youngjune Park
03B06	Industrial Application of Computational and Numerical Approaches to Particle Flow I	Ray Cocco	Fei Wang
03B07	Industrial Application of Computational and Numerical Approaches to Particle Flow II	Ken Williams	Azita Ahmadzadeh
03B08	Circulating Fluidized Beds	A. Issangya	Hadjira Iddir
03B09	Sustainable Energy Systems In Fluidization and Fluid-Particle Processes: Plenary	Ron Breault	Ah-Hyung Alissa Park
03B10	Panel Discussion on Emerging Areas In Fluidization and Fluid-Particle Systems	Reza Mostofi	Yong Liu

Group 3 Special Sessions

Session ID	Session Title	Chair	Co-Chair
03001	Particle Technology Forum Poster Session	Manuk Colakyan	Ray Cocco
03002	Particle Technology Awards Lectures	Ray Cocco	Jennifer Sinclair Curtis

Group 3C: Solids Flow Handling and Processing
Dr. Bruce Hook (Chair) & Prof. Kimberly Henthorn

Session ID	Session Title	Chair	Co-Chair
03C01	Solids Handling and Processing	Shrikant Dhodapkar	Brenda Remy
03C02	Mixing and Segregation of Particulates I	Bruce D. Hook	Isabel Figueroa
03C03	Mixing and Segregation of Particulates II	Kerry D. Johanson	Bruce D. Hook
03C04	Dynamics and Modeling of Particulate Systems I	Deliang Shi	Kimberly H. Henthorn
03C05	Dynamics and Modeling of Particulate Systems II	Ben Freireich	M. Silvina Tomassone
03C06	Characterization and Measurement In Powder Processing	Clive E. Davies	
03C07	Challenging Problems In Solids Handling - Panel Discussion	Shrikant Dhodapkar	J. J. McCarthy
03C08	Solids Processing Challenges In Biomass Conversion	Manuk Colakyan	Kimberly H. Henthorn
02F08	Developing Industrial Fluid Particle Separation Systems	Seyi A. Oduyungbo	
03C09	Measurement, Monitoring and Characterization Methods for Particulate Systems Research In Powder and Granular Mixing	Clive E. Davies	
02F10	Solids-Liquid Separation Processes for the Petroleum Industry	Seyi A. Oduyungbo	

Group 3D: Nanoparticles

Dr. Gary Liu (Chair) & Dr. Jan Paszynski (Co-Chair)

Session ID	Session Title	Chair	Co-Chair
0DC01	Gas Phase Synthesis of Nanoparticles	Amit Limaye	Robert N. Grass
03D02	Synthesis, Characterization and Modelling of Nanoparticle Systems with Pharmaceutical Applications	M. Silvina Tomassone	Rajesh Dave
03D03	Health and Environmental Effect of Nanoparticles	Evangelos K. Athanassiou	Amit Limaye
03D04	Nanostructured Particles for Catalysis	J. Ruud Van Ommen	Kishori T. Deshpande
03D05	Functional Nanoparticles and Nanocoatings on Particles I	David M. King	Karsten Wegner
03D06	Functional Nanoparticles and Nanocoatings on Particles II	M. Silvina Tomassone	David M. King
03D07	Aggregate and Agglomerate Nanoparticle Formation Dynamics	Gregory Beaucage	Gary Liu
03D08	Polymer Nanocomposites	Gary Liu	
03D09	Handling and Processing of Nanoparticles	Richard C. Flagan	
03D10	Nanoparticles In Energy Applications	Alan Weimer	

Group 3E: Energetics

Dr. Chester Clark (Chair) & Prof. Gregory Beaucage (Co-Chair)

Session ID	Session Title	Chair	Co-Chair
03E01	Nanoenergetic Materials	Jan A. Puszynski	Edward Dreizin
03E02	Processing and Safety of Energetic Materials	Suzanne Prickett	John Bolognini
03E03	Thermophysical Properties of Energetic Materials	Veera Boddu	Paul Redner
03E04	Advance On-Line Analytical and Optimization Tools In Pilot Plants	David C. Attridge	Jerry S. Salan
03E05	Best Practices In Pilot Plant Separation	David C. Attridge	William Hollar



BEST PHD IN PARTICLE TECHNOLOGY

This award recognizes an outstanding dissertation by an individual who has earned a doctoral degree. The dissertation can be in any discipline in the physical, biomedical or engineering sciences, but must be in particle science and engineering. Selection criteria include: (i) an outstanding original dissertation with relevance to particle technology, and (ii) the candidate must have received a doctoral degree within the last three calendar years prior to the year the award is given. Nominations should include:

1. A letter of nomination. The letter of nomination should include a critical review stating the value of the dissertation in terms of its originality, significance, and potential applications in the field of particle science and technology. The supporting letters may focus on any of these attributes.
2. An extended abstract of up to six pages including a list of refereed publications resulting directly from that dissertation,
3. No more than three supporting letters, all of which must be from institutions outside the one granting the dissertation, and
4. At least one letter from industry.

PARTICLE TECHNOLOGY FORUM AWARD

This award recognizes a forum member's lifetime outstanding scientific/technical contributions to the field of particle technology, as well as leadership in promoting scholarship, research, development, or education in this field. Nominations can be made by any member of the Particle Technology Forum. Nominations should include:

1. A letter of nomination stating how the nominee contributed to the field of particle technology in terms of scholarship, research, development and education, and
2. At least three supporting letters.



DuPont
Sponsor of the 2011
PTF Award



**Shell Global
Solutions**

Sponsor of the 2011
Thomas Baron
Award Award

THOMAS BARON AWARD

This award recognizes an individual's recent outstanding scientific/technical accomplishment which has made a significant impact in the field of fluid particle systems or in a related field with potential for cross fertilization. Selection criteria include: (i) An outstanding contribution advancing fluid-particle systems, or a related field, (ii) The awardee is invited to deliver a Plenary Lecture at an AIChE Annual Meeting session, and (iii) The awardee is also required to submit a written manuscript. Nominations can be made by any member of the Particle Technology Forum. Nominations should include:

1. A letter of nomination stating how the nominee has made significant impact in the field of fluid-particle systems or a related field with potential for cross-fertilization, and
2. At least three supporting letters.

LECTURESHIP IN FLUIDIZATION AWARD

This award recognizes an individual's outstanding scientific/technical research contributions with impact in the field of fluidization and fluid-particle flow systems. Selection criteria include: (i) An outstanding contribution advancing fluidization or fluid-particle flow systems, (ii) The awardee is invited to deliver a paper at the AIChE Annual Meeting, and (iii) Membership in the Particle Technology Forum or AIChE is not required. Nominations can be made by any member of the Particle Technology Forum. Nominations should include:

1. A letter of nomination stating how the nominee contributed to the field of fluidization and fluid-particle flow systems, and
2. At least three supporting letters with at least one letter from industry.



PSRI
Sponsor of the 2011
Lectureship in
Fluidization Award



Dow
Sponsor of the 2011
Fluidization
Processing Award

FLUIDIZED PROCESSING AWARD

The award recognizes a Forum member who has made significant contribution to the science and technology of fluidization in the commercialization of fluidized processes, and who has shown leadership in the engineering community. Nominations can be made by any member of the Particle Technology Forum. Nominations should include:

1. A letter of nomination stating how the nominee has made significant impact in the field of fluid-particle systems or a related field with potential for cross-fertilization, and
2. At least three supporting letters with at least one from an industry leader.



Item	Ref Date	AICHE PTF Account		Independent PTF Account	
		Activity	Balance	Activity	Balance
Starting Balance	Sep-10		\$ 14,865.57		\$ 5,833.10
Dues Income	Sep-10	\$ 855.00	\$ 15,720.57		
PTF Dinner Income	Sep-10	\$ 5,100.00	\$ 20,820.57		
Dues Income	Oct-10	\$ 330.00	\$ 21,150.57		
PTF Dinner Income	Oct-10	\$ 510.00	\$ 21,660.57		
Dues Income	Nov-10	\$ 555.00	\$ 22,215.57		
PTF Dinner Income	Nov-10	\$ 2,720.00	\$ 24,935.57		
Dues Income	Dec-10	\$ 615.00	\$ 25,550.57		
PTF Dinner Expense	Dec-10	\$ (9,367.84)	\$ 16,182.73		
PTF Awards	Dec-10	\$ (3,500.00)	\$ 12,682.73		
Award Plaques	Dec-10	\$ (983.29)	\$ 11,699.44		
Dues Income	Jan-11	\$ 330.00	\$ 12,029.44		
PTF Award	Jan-11			\$ (85.00)	\$ 5,748.10
Interest	Jan-11	\$ 1,524.44	\$ 13,553.88		
Totals	Jan 1, 2011		\$ 13,553.88		\$ 5,748.10

Calendar

CFB 10

May 1-5, 2011, Sunriver Valley, OR
<http://www.cfb10.org>

5th International Granulation Workshop

June 20-22, 2011, Lausanne, Switzerland
<http://www.shef.ac.uk/agglom2011/home.html>

8th International Conference on CFD in the Oil & Gas, Metallurgical and Process Industries

Jun 21-23, 2011, Trondheim, Norway
<http://www.sintef.no/Projectweb/CFDCONF>

Particles 2011: Stimuli-Responsive Particles and Particle Assemblies

July 9-12, 2011, Berlin, Germany
<http://nanoparticles.org/Particles2011/>

Particulate Processes in the Pharmaceutical Industry III

Jul 24-29, 2011, Gold Coast, Australia
<http://www.engconfintl.org/11aifee.html>

ZCAM Granular and Active Fluids

Sep 11-14, 2011, Zaragoza, Spain
http://www.z-cam.es/view_activity.php?num=50

2011 AICHE Annual Meeting

October 16-21, 2011, Minneapolis, MN
<http://www.aiche.org>

6th Sino-US Joint Conference of Chemical Engineers

Nov 7-10, 2011, Beijing, China
<http://www.sinouschemeng.com/>

2011 APS Division of Fluid Dynamics

Nov 20-22, 2011, Baltimore, MD
<http://www.aps.org/units/dfd/meetings/meeting.cfm?name=DFD11>

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NEW BOOK

Computational Gas-Solids Flows and Reacting Systems: Theory, Methods and Practice

Editors: Sreekanth Pannala, Madhava Syamlal, Thomas J. O'Brien

<http://www.igi-global.com/bookstore/titledetails.aspx?TitleId=40275>



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