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PROFESSIONAL PROFILE

Chemical engineer with extensive experience in bulk solids handling and processing in the pharmaceutical and chemical industries, including drying, fluidizing, feeding, dispersing, conveying, storage, extrusion, reacting, blending, granulating, testing, and mixing with fluids. Expert on handling and processing challenging materials such as carbon black and fumed silica. Professional experience includes manufacturing, research and development, consulting, and training. Spray drying knowledge includes bench, laboratory, pilot, and commercial equipment. Author of subsection on powder flow and hopper and chute design in Perry's Chemical Engineers' Handbook, 9th edition. Licensed Professional Engineer, Colorado and Massachusetts. American Institute of Chemical Engineers Fellow.

QUALIFICATION SUMMARY

Powder handling and processing

- Designed hoppers, bins, silos, transfer chutes, and feeders for handling bulk materials handled in the chemicals, energy, pharmaceuticals, biomass, and plastics industries.
- Optimized flow properties of pharmaceutical formulations.
- Optimized wet granulation process to produce high-strength agglomerates.
- Determined causes of caking of pharmaceutical and food powders and provided remedies.
- Designed air-assisted hopper for handling powdered metals.
- Designed extension hopper that prevents compaction of powder in gravimetric feeder so that desired powder discharge rate is maintained during filling cycle.
- Developed new surge tank design for feeding fluffy carbon black into pelletizing equipment; steady, uninterrupted discharge improved pellet quality and reduced dust levels.
- Designed innovative moving bed reactors, heaters, and dryers for processing powders.
- Designed, fabricated, and installed moving bed conditioner for removing static charge from powders.
- Developed patented process for solventless extraction of cannabinoids from cannabis.

Process development

- Developed and implemented continuous granulation process at contract manufacturing organization (CMO).
- Designed and implemented pilot plant process for surface modification of fine particles.
- Designed moving bed induction heater process for manufacturing highly conductive grades of carbon black.
- Designed, fabricated, and installed moving bed conditioner for preventing static charge of powders.
- Co-inventor of continuous solvent-free process for removing cannabinoids from cannabis.
- Scaled-up spray dryer based process for attaching polymers onto inkjet pigments, key accomplishment in the launch of new products for printing companies.
- Designed and implemented pilot plant process for surface modification of fine particles.
- Reduced the cost of spray drying at toll manufacturer by stretching capacity of existing process equipment.

Project management

- As project engineer, managed testing programs and designed or recommended equipment for storage, handling, and processing of bulk solids.
- Successfully completed solids handling projects for the chemicals, pharmaceutical, plastics, biotechnology, food, and energy industries.
- Executed research and development activities through stage-gate process.
- Evaluated CMO options and managed projects at selected organizations.

Spray drying

- Managed pilot plant for scaling up spray drying processes for isolating emulsified solids.
- Established operating conditions for Buchi, GEA/Niro, and Roberts Box spray dryers with evaporative capacities ranging from 1 – 1,000 kg/hr.
- Developed novel method for improving flowability of spray-dried powders.

- Created Visual Basic-macro-interfaced spreadsheet for establishing operating conditions of spray dryers.

Materials science

- Established testing laboratory for measuring fundamental flow properties of bulk solids.
- Evaluated and authored operating procedures for Schulze, Peschl, Brookfield, Anton Paar, and Freeman shear cell testers.
- Fabricated bulk solids permeability and wall friction testers.
- Interpreted inverse gas chromatography (surface energy) and sorption test results.

PROFESSIONAL EXPERIENCE

GREG MEHOS & ASSOCIATES LLC, WESTFORD, MASSACHUSETTS

Greg Mehos & Associates (www.mehos.net) provides consulting, testing, and training services related to bulk solids handling and processing. 2017 – present.

JENIKE & JOHANSON, INC., TYNGSBORO, MASSACHUSETTS

Jenike & Johanson is a material testing and engineering consulting company that specializes in the storage, handling, and processing of bulk solids.

- Senior Project Engineer, 2014 – 2017
- Project Engineer, 2006 – 2011

CABOT CORPORATION, BILLERICA, MASSACHUSETTS

Cabot is a specialty chemical company that manufactures fine particles and inkjet colorants.

- Lead Engineer, 2011 – 2014
- Senior Process Development Engineer, 1996 – 2006

ROHM AND HAAS COMPANY, BRISTOL, PENNSYLVANIA

Rohm and Haas is a specialty chemical company that produces acrylic monomers and polymers, ion exchange resins, and agricultural products. It is now wholly owned by the Dow Chemical Company.

- Senior Process Development Engineer, 1992 – 1996
- Process Development Engineer, 1989 – 1992

MASSACHUSETTS INSTITUTE OF TECHNOLOGY SCHOOL OF CHEMICAL ENGINEERING PRACTICE ALBANY STATION, ALBANY, NEW YORK, BOULDER, COLORADO, AND CAMBRIDGE, MASSACHUSETTS

The MIT Practice School is a program in which chemical engineering graduate students work on projects at host companies (GE Silicones, Waterford, NY, GE plastics, Selkirk, NY, Syntex Chemicals, Boulder, CO) in lieu of a masters thesis.

- Director and Assistant Professor, 1987 – 1989
- Assistant Director, 1986 – 1987

UNIVERSITY OF RHODE ISLAND DEPARTMENT OF CHEMICAL ENGINEERING, KINGSTON, RHODE ISLAND

- Adjunct Professor, 2012 – present

PROFESSIONAL AFFILIATIONS

- American Institute of Chemical Engineers Fellow; past Chair, Boston local section; past Executive Committee Member, Particle Technology Forum
- Institute for Briquetting and Agglomeration, Board of Directors Member
- Licensed Professional Engineer, Massachusetts, Colorado

EDUCATION

- Ph.D. (Chemical Engineering), University of Colorado
- M.Ch.E., University of Delaware
- B.S.Ch.E., University of Colorado, special honors

SELECTED PUBLICATIONS

Mehos, G., “Maximum Discharge Rates of Powders”, *Chem. Engr. Res. Des.*, 191, 564 (2023).

Mehos, G., “Using Solids Flow Properties to Design Mass- and Funnel-Flow Hoppers”, *Powder Bulk Engr.*, 34, 2 (February 2020).

Mehos, G., "Choosing Agglomeration Technologies", *Powder Bulk Engr.*, 34, 1 (January 2020).

Mehos, G. and J. Carson, "Bulk Solids Flow and Hopper Design", subsection in Perry's Chemical Engineers' Handbook, 9th edition, McGraw-Hill, New York, 2018.

Mehos, G., "Designing Hoppers, Bins, and Silos for Reliable Flow", *Chem. Engr. Progress*, 114, 4 (April 2018).

Mehos, G. and S. McClory, "Gravimetric Feeders: The Achilles' Heel of Continuous Manufacturing", *Powder Bulk Solids*, 33, 4 (2018).

Mehos, G. and C. Kozicki, "Choosing Agglomeration Processes", *Chem. Engr.*, 127, 8, 51 (October 2017).

Mehos, G., M. Eggleston, T. Trautman, M. Freeman, N. Stevens-Murphy, "Using Fundamental Powder Properties to Optimize the Flowability of Formulations", *Tablets & Capsules*, 15, 7, 11 (October 2017).

Mehos, G., "Prevent Caking of Bulk Solids", *Chem. Eng. Progress*, 112, 4 (April 2016).

Mehos, G., and D. Morgan, "Hopper Design Principles", *Chem. Eng.*, 126, 1 (January 2016).

Mehos, Gregory J., "Feed Considerations for Continuous Dryers", *Pharm. Processing*, July/August 2014, pp. 24-25.

Mehos, G., A. Boroch, and C. Wykoff, "Using an Air-Assisted Discharge Hopper to Eliminate Powder Flow Problems", *Powder Bulk Eng.*, 27, 11 (November 2013).

Mehos, G. and C. Kozicki, "Improving the Flow of Powders by Agglomeration", presented at the 32nd biennial Institute of Briquetting and Agglomeration Conference, New Orleans, September 26, 2011 (*Winner of the Neal Rice Award for best paper and presentation*).

Mehos, G. and J. Paternina, "Design Considerations for Bulk Solids Gravity Flow Processing Vessels", presented at ChemInnovations, Houston, September 13, 2011.

Mehos, G., "Designing Dust Collectors", *Chem. Eng. Progress*, 107, 9 (2011).

Mehos, G. and C. Kozicki, "Consider Wet Agglomeration to Improve Powder Flow", *Chem. Eng.*, 121, 11 (January 2011).

Hartford, C., G. Mehos, and S. Clement, "Caking Problems in Candy Manufacturing", *Manuf. Confect.*, 90, 12, 77 (December 2010).

Mehos, G., "Designing and Operating Gravity Dryers", *Chem. Eng.*, 116, 5, 34 (May 2009).

Mehos, G., "Modifying Your Storage Vessel for Trouble-Free Continuous Purging or Conditioning – Part 1", *Powd. Bulk Eng.*, 22, (November 2008).

Mehos, G., "Modifying Your Storage Vessel for Trouble-free Continuous Purging or Conditioning –Part 2", *Powd. Bulk Eng.*, 22, 13 (December 2008).

Jacobs, K. and G. Mehos, "The Importance of Using Limiting Flow Rates to Assess the Flowability of Pharmaceuticals, Excipients and Their Mixtures", presented at AIChE 2008 Annual Meeting, Philadelphia, PA, November 17, 2009.

Mehos, G. and S. Clement, "Prevent Caking and Unwanted Agglomeration", *Chem. Eng.*, 115, 8, 55 (August 2008).

Ennis, B. and G. Mehos, "Characterizing the Impact of Flow Aids on the Flowability of Pharmaceutical Excipients by Automated Shear Cell", presented at AAPS 2004 Annual Meeting, Baltimore, MD, November 10, 2004.

Wang, M.-J., Y. Kutsovsky, P. Zhang, G. Mehos, L. Murphy, and K. Mahmud, "Effect of Functionalization of Carbon Black on Rubber Properties", presented at "Functional Tire Fillers 2001", Fort Lauderdale, Florida, January 29-31, 2001.

PATENTS

Mehos, G. and A. Boroch, "Mass Flow Hopper", U.S. Patent No. 11325776 (2022).

Zagars, R., M. Tyler, New York, NY, N. Axelsen, N. Costa, M. Finkenaur, G. Mehos, H. Siddiqui, G. Jordan, "Methods of Continuous and Semi-continuous Production of Electrochemical Cells", Patent No. 12125984 (2021).

Sherwood, R., S. Sherwood, C. Cullimore, and G. Mehos, "Systems, Methods, and Equipment for Chemical Extraction", U.S. Patent No. 10,765,965 B1 (2020).

Mahmud, K, J. Belmont, James A, Y. Kutsovsky, W. Devonport, M. Wang, C. Galloway, and G. Mehos, "Polymers Containing Modified Pigments and Methods of Preparing the Same", U.S. Patent No. 6534569 (2003).

Mehos, G. and H. Tu, "Methods for Preparing Silica-coated Carbon Products", U.S. Patent No. 6541113 (2003).