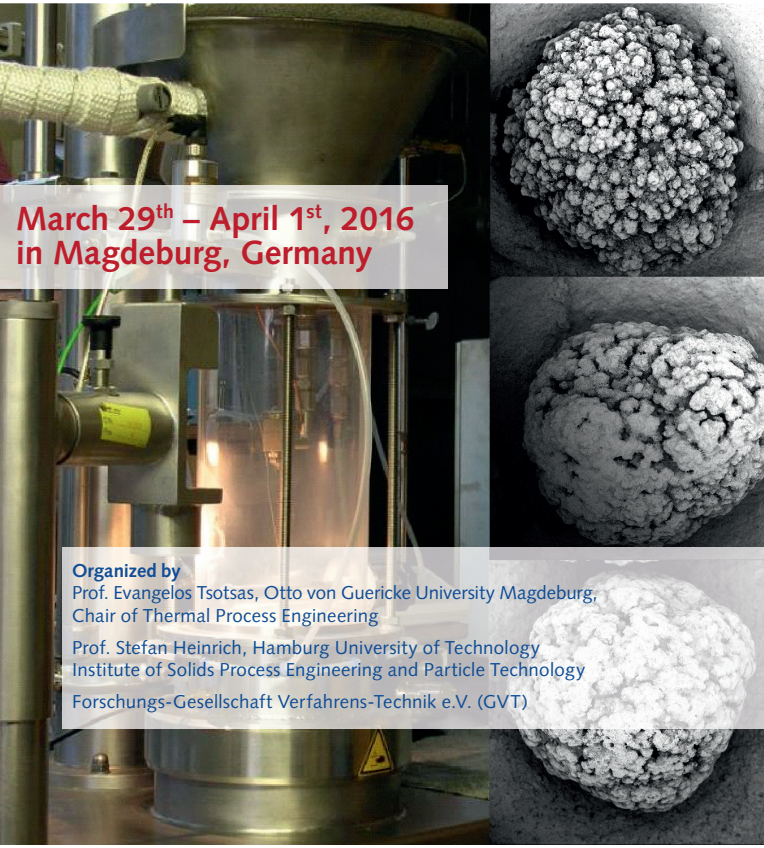
THERMISCHE VERFAHRENSTECHNIK
OTTO-VON-GUERICKE UNIVERSITÄT MAGDEBURG

University Course Drying

Fundamentals and Applications



March 29th – April 1st, 2016
in Magdeburg, Germany

Organized by
Prof. Evangelos Tsotsas, Otto von Guericke University Magdeburg,
Chair of Thermal Process Engineering

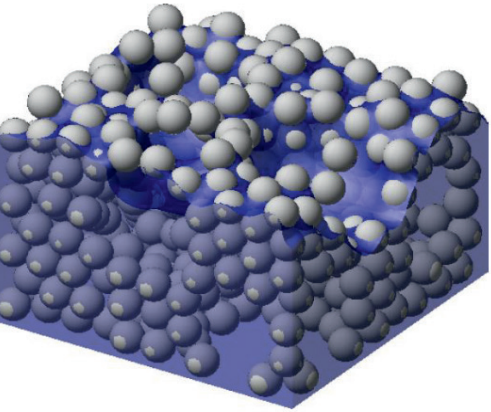
Prof. Stefan Heinrich, Hamburg University of Technology
Institute of Solids Process Engineering and Particle Technology

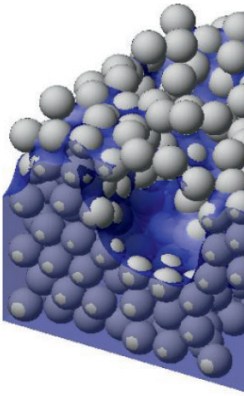
Forschungs-Gesellschaft Verfahrens-Technik e.V. (GVT)

OTTO VON GUERICKE
UNIVERSITÄT
MAGDEBURG

Target audience

The course is designed for people from various backgrounds (engineers, chemists, food and pharmaceutical technologists) and with different levels of experience, who need to understand the fundamentals of modern drying technology and apply them to produce better solid / particulate products with more efficient drying processes. The course language is English.

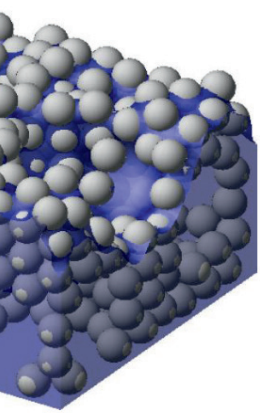


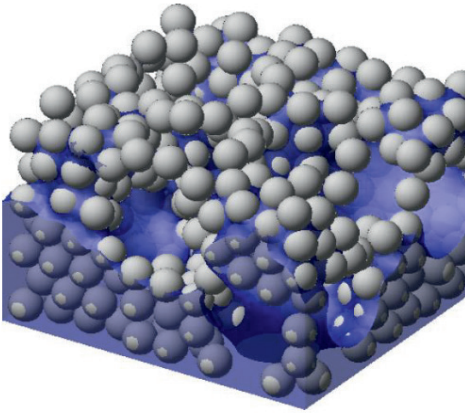


Topic

Almost every material used in solid form (from foods to pharmaceuticals, from minerals to detergents, from polymers to paper, from raw materials and commodities to highly formulated specialties) is dried during production. Drying technology is, therefore, a continuously developing field with various challenges referring to process design, development, operation and automation, to equipment selection, development and use, as well as to the preservation or even creation of desired product properties.

The purpose of the course is to provide the essentials of modern drying technology to the participants in a broad but compact way, at a high but understandable level close to practice. The course starts at the very beginning (why shall materials be dried and how can this be done?), and then discusses: elementary approaches and methods (how does the drying medium used relate to the capacity of the process and to the achievable product moisture?); drying kinetics (why are certain materials more difficult to dry than other ones?); dryer design and scale up methods (how long will drying of a specific product take, how big will the dryer need to be?);





instrumentation (how can gas moisture or even product moisture be measured and monitored in my equipment?); options and alternatives (why shall I use a certain drying method and the respective equipment, instead of another one?); and opportunities (how can I use drying for particle formulation, how can I reduce the energy demand of my process?).

This is done in three complementary ways: Lectures, laboratory work (demonstration of experimental methods and equipment in one of the leading laboratories in drying technology), and tutorials (ranging from simple exercises to solidify the understanding of principles, and the guided evaluation of data measured in the lab, to the application of modern computational tools for dryer design). Beginners in drying will take with them from the course the broad overview and the sound basis of skills that they need for their every-day work; experienced people will refresh their knowledge and renew their point of view up to the cutting-edge of drying technology in experimentation and modelling.

Course program

Fundamentals of drying technology

- Goals of drying: product quality and process efficiency
- Relevant material properties (sorption, water activity, glass transition etc.)
- Particle / product formulation by drying
- Drying methods, types of dryers, dryer selection

Properties of wet air, capacity of convective dryers

- States and processes on psychrometric charts
- Adiabatic saturation temperature
- Air conditions in and capacity of convective dryers

Moisture measurement

- Gas moisture, particle / solids moisture

Drying kinetics of single particles or droplets

- Wet bulb temperature, drying curve, drying periods
- Methods of measurement or of indirect determination
- Normalization, second drying period models
- Understanding drying with the help of pore networks

Major drying processes: Equipment, dryer design, scale up

- Generic examples of convective dryer design
- Fluidized bed drying
- Spray drying
- Vacuum contact drying, freeze drying

Special drying processes and their application

- Atmospheric freeze drying, microwave and high-frequency drying, microwave vacuum / freeze drying, superheated steam drying, impingement drying, supercritical drying

Laboratory work (guided exercises and demonstrations)

- Various equipment for moisture measurement, particle characterization, drying
- Drying kinetics of droplets in the acoustic levitator
- Drying kinetics of particles in the magnetic suspension balance
- Batch and continuous fluidized bed drying

Tutorials (guided practical computations and simulations)

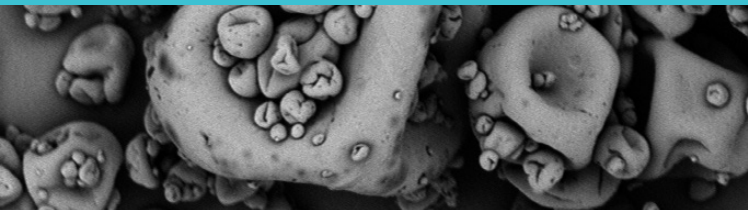
- Exercises on material properties, wet air, dryer capacity
- Evaluation of drying kinetics for single droplets and particles
- Fluidized bed dryer design and scale-up (batch, continuous)
- CFD simulation of spray dryers

Speakers

From the Otto von Guericke University Magdeburg
Prof. Evangelos Tsotsas
Jun.-Prof. Andreas Bück
Dr.-Ing. Abdolreza Kharaghani
M.Sc. Maciej Jaskulski

From the Hamburg University of Technology
Prof. Stefan Heinrich

External speakers
Dr.-Ing. Michael Jacob, Glatt Ingenieurtechnik GmbH, Weimar
Prof. Mirko Peglow, IPT-Pergande GmbH, Weißandt-Gölzau
Dr. Roland Wernecke, Dr. Wernecke Feuchtemesstechnik GmbH, Potsdam



Date and venue
Otto von Guericke University Magdeburg
Bld. 10-110 and various labs
Universitätsplatz 2
39106 Magdeburg, Germany

Contact
Jun.-Prof. Andreas Bück
Phone +49 391 6718319
E-mail andreas.bueck@ovgu.de

Start Tuesday, 29th March, 2016, 1:00 p.m.
End Friday, 1st April, 2016, 1:30 p.m.

Attendance

To register, please either fill the attached form or send an informal letter to

Forschungs-Gesellschaft Verfahrens-Technik e.V. (GVT)
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60486 Frankfurt am Main, Germany

Phone +49 69 7564-118
Fax +49 69 7564-437
gvt-hochschulkurse@gvt.org
www.gvt.org

Course fee

1500 Euro for members of GVT
1575 Euro for non-members of GVT

The participation fee includes extensive course materials (lecture slides, notes on laboratory work and tutorials), refreshments, lunches, and dinner at the 3rd evening.
Please do not remit the course fee before receiving confirmation of attendance and the invoice. Upon cancellation before **March 4th, 2016**, we remit the fee less 50 Euro handling costs. Upon later cancellations no remittance is possible, however, the course documents will be sent. Furthermore you may nominate a substitute participant. Course fees are sales tax free.

Accommodation

Hotel Ratswaage Magdeburg (15 min. walking distance) offers single rooms with breakfast and use of wellness facilities for a special rate of 86 EUR upon availability.
Keyword: University Course Drying
Phone +49 391 5926192 (Mrs. Rode),
Fax +49 391 5619615, E-mail: reservierung@ratswaage.de
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Fax +49 69 7564-437

Registration form for the University Course on Drying: Fundamentals and Applications from March 29th – April 1st, 2016, in Magdeburg
Drying: Fundamentals and Applications in Magdeburg

Deadline March 4th, 2016. Participation is limited. Registrations will be confirmed on a first come first serve basis.

Participant

Mr. ☐ Mrs. ☐

Surname

First name

Title, Position

Company

Phone, Fax

E-mail

Invoice address

Company

Department

Address

Place

Company is GVT-member

yes ☐ no ☐

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