



WELCOME

# COMPACTION SIMULATION FORUM 2013

The Compaction Simulator Forum was launched in 2012 to connect scientists interested in compression technology and in particular the compaction simulation of tablets and ribbons.

This is an ever changing and developing area; we are pleased to announce the 2nd annual forum to share the best of what this technology can achieve.

This year's Forum and Conference will take place June 4th and 5th 2013.

University of Cambridge is hosting the 2013 Compaction Conference on campus in Cambridge, UK.

#### Program Committee:

Kevin J Bittorf (Chair), Living Proof, Inc.;  
info@CompationSimulation.com, 617.717.9823

Jean LeFloch, Huxley Bertram;  
jean@huxleybertram.com, 847.275.4799

James Elliott, University of Cambridge, Materials  
Science and Metallurgy; jae1001@cam.ac.uk

Elaine Harrop Stone, Merlin Powder Characterisation;  
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Sharon Inman, GlaxoSmithKline

Kendal Pitt, GlaxoSmithKline

Kate Boxell, Pfizer

Greg Thoorens, FMC

Clare Medendorp, Millennium:  
The TakedaOncology Company



**FITZWILLIAM COLLEGE**  
UNIVERSITY OF CAMBRIDGE

Fitzwilliam College  
University of Cambridge  
CB3 0DG Cambridge  
United Kingdom



#### Key Dates:

Compaction Course:  
Monday, June 3, 2013

Compaction Simulation Forum:  
Tuesday, June 4 - Wednesday, June 5, 2013

Welcome Reception:  
Monday, June 3, 2013, 7 – 10pm  
Sponsored By:

**Huxley  
Bertram**

Poster Presentations, Cocktails & Dinner:  
Tuesday, June 4 2013, 5 – 10pm  
Sponsored By:

 **Phoenix**

Deadline for poster presentations, May 17th  
Deadline for course registration, May 17  
Deadline for conference registration, May 24

**Registration Details available at:**  
[www.CompactionSimulation.com](http://www.CompactionSimulation.com)



Compaction Simulation Forum

CONNECTING SCIENTISTS AND COMPRESSION TECHNOLOGY



## CSF PRE-COURSE

### COMPACTION PRE-COURSE

#### Monday 03 June

##### Short Course on Powder Modelling and Compaction Simulation

The goal of the course is provide an intensive deep dive into the science of compression, teach relevant modelling techniques for pharmaceutical development, and be hands on Quality by Design (QbD) experimentation with a focus on compaction simulation applications. This course is limited to 5 to 10 participants to maintain to provide more personal instruction for the hands on portions of the course. The course syllabus is as follows:

##### Part 1: Modelling of Powder Compaction (Dr. James Elliott) 9:00-12:30

- Bulk powder behavior under shear flow and compaction
- Revision of stress analysis, including the concepts of yield locus and Mohr circle construction.
- Definition of the Coulomb yield criterion and discussion of Mohr-Coulomb failure analysis for powder beds.
- Methods for characterizing the flowability of powders, including the Jenike shear cell.
- Stress analysis of powders using finite and discrete element methods
- Stress analysis via Janssen-Walker theory for compaction of powders in cylindrical die
- Computational methods for dealing with complex powders, including the discrete (or distinct) element method and finite element analysis.
- Review of continuum constitutive equations for powders, including the Drucker-Prager Cap (DPC) and Cam-Clay models
- Show how these can be parameterized from uniaxial compaction data from instrumented dies.
- Hands on computational modelling session.
  - With the use of ABAQUS (finite element package),
  - How to set up a compaction model and enter material parameters

##### Part 2: Compaction Simulation (Dr. Kevin J. Bittorf) 1:30-5:00

- Examination of QbD principles in relation to compaction simulation
  - Importance and application of how compaction simulation in QbD submission
  - Logical and efficient experimental design to determine required powder and tablet properties required for performance
  - Live design for experimental testing section
- Hands on experimental testing
  - With the use of the Huxley-Bertram compaction simulator
  - Examination of various experimental parameters

As this is an intimate course, participants are encouraged to provide the instructors topics and/or experiments they would like to see covered.

*Dr. James Elliott, Department of Materials Science, University of Cambridge*

*Dr. Kevin Bittorf, VP Process Development and Analytical Technologies, Living Proof*





# CSF PROGRAMME

WELCOME  
RECEPTION

## Monday 03 June

Welcome Reception: King's College, 7-10pm, hosted by Huxley Bertram



servo hydraulic compaction simulators

KEYNOTE  
ADDRESS

## Tuesday 04 June

Modelling-led compaction simulation: a tool for Pharmaceutical powder formulation

*Dr. James Elliott, Department of Materials Science, University of Cambridge*

Analysis and interpretation of compaction simulator data

*Dr. Csaba Sinka, Mechanics of Materials Research Group, University of Leicester*

PRESENTATIONS

## Tuesday 04 June

Performance of formulated APIs into RC tablets: From the Compaction Simulator to the Production Scale Gerteis MiniPactor

*Claire Tridon, GlaxoSmithKline*

Micromechanics of granule deformation during compaction, determined by small-angle X-Ray scattering

*Dr Peter Laity, School of Applied Sciences, University of Huddersfield*

Simulating the Capsule Filling Process

*Ian Smales, Pfizer*

Simulation of tableting and the real-world payoff

*Kendal Pitt, GSK*

Excipients characterisation, are we measuring the right attributes?

*Gregory Thoorens, Senior Scientist, FMC BioPolymer*

COCKTAILS  
AND POSTER  
PRESENTATION

## Tuesday 04 June

Cocktail Reception Hosted By Phoenix Calibration. Poster Presentation Prize Sponsored By Pfizer.



**Phoenix**



Registration Details:  
[www.CompactionSimulation.com](http://www.CompactionSimulation.com)



Compaction Simulation Forum

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## CSF PROGRAMME

KEYNOTE  
ADDRESS

### Wednesday 05 June

Powder bed heterogeneities as a tool for tailoring product performance  
*Prof. Alberto Cuitino, Mechanical & Aerospace Engineering, Rutgers University  
NSF-ERC for Structured Organic particulate Systems*

PRESENTATIONS

### Wednesday 05 June

Principal Component Analysis as a Useful Tool in Tableting  
*Prof. Dr. Annette Bauer-Brandl, University of Southern Denmark  
Prof. Dr. Ingunn Tho, Department of Pharmacy, University of Tromso*

Multi-scale modelling and simulation as a cost-effective tool for design and optimisation of powder compaction processes  
*Dr. Marcial Gonzalez, Mechanical & Aerospace Engineering, Rutgers University  
NSF-ERC for Structured Organic Particulate Systems*

Multiscale Modelling of Pharmaceutical Powder Compaction  
*Dr. Jonathan Loh, Pfizer Institute for Pharmaceutical Materials Science, Univ. of Cambridge  
Dr. William Ketterhagen, Pfizer Worldwide R&D, Groton CT  
Dr. James Elliott, Pfizer Institute for Pharmaceutical Materials Science, Univ. of Cambridge*

Experimental study and analysis of breakage of pharmaceutical tablets  
*Dr. Chenglong Shang, Department of Engineering, University of Leicester*

Modelling entrapped air induced fracture during pharmaceutical tablet manufacturing  
*Prof. Chuan-Yu Wu, Department of Chemical and Process Engineering, University of Surrey*

Terahertz spectroscopy: toward in-die analytics and modelling  
*Dr. Axel Zeitler, Department of Chemical Engineering & Biotechnology, Univ. of Cambridge*

Conclusion: Tablet presses and compaction simulators, what does the future hold?  
*Jean LeFloch, Programme Committee, Compaction Simulation Forum*

### Monday 03 - Thursday 06 June

4:30-7:00 PM and as needed on Thursday morning.  
Small groups of attendees will be shuttled to Huxley Bertram to see a servohydraulic compaction simulator in action.

**Huxley  
Bertram**

SIMULATOR  
DEMONSTRATIONS

Registration Details:  
[www.CompactionSimulation.com](http://www.CompactionSimulation.com)



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**CSF 2013 CONFERENCE PROGRAMME**  
See abstracts at [www.CompactionSimulation.com](http://www.CompactionSimulation.com)

<b>Huxley Bertram</b>		<b>Monday June 3<sup>rd</sup></b>
<b>Guided Tour of Cambridge: 5 pm - 7 pm</b>		
<b>Welcome Reception: 7 pm - 9 pm at King's College, hosted by Huxley Bertram</b>		
<b>CSF Day 1 Tuesday, June 4th</b>		
8:15 - 9:00	Breakfast and Registration	
9:00 - 9:10	Welcome: Kevin J. Bittorf, President of the CSF	
9:10 - 10:10	<b>Keynote #1: Modelling-led compaction simulation: a tool for Pharmaceutical powder formulation</b> <i>Dr. James Elliott, Department of Materials Science, University of Cambridge</i>	
10:10 - 10:25	Break	
10:25 - 11:25	<b>Keynote #2: Analysis and interpretation of compaction simulator data</b> <i>Dr. Csaba Sinka, Mechanics of Materials Research Group, University of Leicester</i>	
11:25 - 12:30	User Presentations and Round Table	
12:30 - 1:30	Lunch and Poster Presentations	
<b>SIMULATION and CHARACTERISATION</b>		
1:30 - 2:00	<b>Performance of formulated APIs into RC tablets: from the Compaction Simulator to a Production Scale Roller Compactor</b> , Claire Tridon, GlaxoSmithKline	
2:00 - 2:30	<b>Micromechanics of granule deformation during compaction, determined by small-angle X-ray scattering</b> , Dr. Peter Laity, University of Huddersfield	
2:30 - 3:00	<b>Simulating the Capsule Filling Process</b> , Ian Smales, Pfizer	
3:00 - 3:20	Break	
3:20 - 3:50	<b>Simulation of tableting and the real-world payoff</b> , Dr. Kendal Pitt, GlaxoSmithKline	
3:50 - 4:20	<b>Excipients characterisation, are we measuring the right attributes?</b> Greg Thoorens, FMC	
4:20 - 5:00	<b>Round Table on Simulation and Characterization</b>	
5:00 - 7:00	Cocktails and Poster Presentation hosted by Phoenix Calibration	
7:00 - 9:00	Dinner	
<b>CSF DAY 2: Wednesday, June 5th</b>		
8:30 - 9:00	Breakfast and Registration	
9:00 - 10:00	<b>Keynote #3: Powder bed heterogeneities as a tool for tailoring product performance</b> <i>Prof. Alberto Cuitino, Mechanical &amp; Aerospace Engineering, Rutgers University NSF-ERC for Structured Organic particulate Systems</i>	
10:00 - 10:40	<b>Round Table of Keynote Speakers</b>	
10:40 - 11:00	Break	
<b>MODELLING and ANALYSIS</b>		
11:00 - 11:30	<b>Principal Component Analysis, as a Useful Tool in Tableting</b> , Dr. Ingunn Tho, University of Tromso and Dr. Annette Bauer-Brandl, University of Southern Denmark	
11:30 - 12:00	<b>Multi-scale modelling and simulation as a cost-effective tool for design and optimisation of powder compaction processes</b> , Dr. Marcial Gonzalez, Rutgers University	
12:00 - 12:30	<b>Multiscale Modelling of Pharmaceutical Powder Compaction</b> , Dr. Jonathan Loh, University of Cambridge; Dr. William Ketterhagen, Pfizer Worldwide R&D, Groton CT; Dr. James Elliott, Pfizer Institute for Pharmaceutical Materials Science, University of Cambridge	
12:30 - 1:30	Lunch and Poster Presentations	
1:30 - 2:00	<b>Experimental study and numerical analysis of breakage of pharmaceutical tablets</b> Dr. Chenglong Shang, University of Leicester	
2:00 - 2:30	<b>Modelling entrapped air induced fracture during pharmaceutical tablet manufacturing</b> Dr. Chuan-Yu Wu, University of Surrey	
2:30 - 3:00	<b>Terahertz spectroscopy, toward in-die analytics and modelling</b> Dr. Axel Zeitler, University of Cambridge	
3:00 - 3:20	Break	
3:20 - 4:00	<b>Round Table on Modelling and Analysis</b>	
4:00 - 4:30	Conclusion: Tablet presses and simulators, what does the future hold? Compaction Simulation Forum organizing committee's summary	

Deadline for poster presentations, May 17th  
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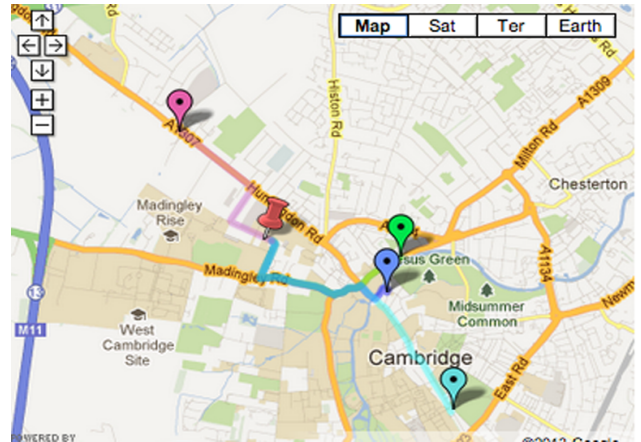


## REGISTRATION & TRAVEL

### HOUSING

The 2013 Compaction Simulation Forum will take place at the University of Cambridge, Fitzwilliam College Campus. For the ease and convenience of travelers, the following properties are recommended.

-  **Fitzwilliam College**  
University of Cambridge  
CB3 0DG Cambridge, UK
-  **The Varsity Hotel & Spa, Cambridge**  
<http://www.thevarsityhotel.co.uk>  
£165 – £205 per room.
-  **Regent Hotel**  
<http://www.regenthotel.co.uk/>  
Book via website quoting reference CSF2013
-  **Premier Inn**  
<http://www.premierinn.com>  
Rooms from £56
-  **Arundel House Hotel**  
<http://www.arundelhousehotels.co.uk/cambridge/index.php>  
Telephone 0044 01223 367701  
Booking reference: HUXL030613  
\*Room block held through May 6th, £85 per room



### REGISTRATION

Registration is now open for the Compaction Course and the Forum. Pre-registration is required for all activities. Payment pricing is in USD. Conversion rates will be processed by your credit card company. Registration rates are as follows:

Forum Only: Industrial Attendee	\$650.00
Forum Only: Academic Attendee	\$325.00
Forum Only: Student Attendee	\$163.00
Forum Only: One Day Pass (either day)	\$400.00
Compaction Course Only (1day)	\$1,800.00
Compaction Course + Forum (3 days) * <i>Best Value</i>	\$2,200.00

Discounts available for groups of 4 or more from the same company

To register, please visit:  
[www.CompactionSimulation.com](http://www.CompactionSimulation.com)



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