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Qualifications

- MA,MEng Chemical Engineering, Jesus College, Cambridge, 1981
- PhD: Dept. of Chemical Engineering, Cambridge, 1986

Research

The aim of research is to apply the principles of chemical engineering to the problems of the food industry. The food industry differs from the conventional process industries in that:

(i) Product safety is as important as process safety: for example, we study the hygienic design of processes and the ways in which sterility of products can be assured. We have developed (with Prof Z Zhang) a novel probe for measuring the forces needed to clean surfaces; work is underway to use this understanding to define better cleaning procedures. We are also looking at how to assess safety, using enzyme measurements, and how to build mathematical models for processes. Currently a large (£3.6 million) project is underway, supported by Cadbury, Unilever, Scottish and Newcastle Brewery, GSK, Bruker, Ecolab, Alfa Laval and GEA is underway to design ways of cleaning plant which is more environmentally friendly.

(ii) Materials have a complex texture and structure which must be perceived by the consumer as attractive: projects have studied how food structure is developed through processing, for example in chocolate (funded by Cadbury and others), gels (funded by Unilever) and biscuits (a LINK scheme with Campden and Chorleywood Food RA).

Much of the basic design data is unavailable; we are using both conventional and tomographic techniques to study how food materials flow through process plant and respond to heating and cooling, supported by LINK and BBSRC funding as well as wholly-funded work from industry. Taste and texture result from processing; we have studied how flavours are developed in grain roasting, in work funded by Brewing Research International. Much of the work involves very close links with industry in the UK and elsewhere: currently students are funded by Cadbury and Unilever, and work has been supported by Campden Food RA, Marlow Foods, and others.

Many of the students work as part of the Engineering Doctoral Scheme in Formulation Engineering. This enables researchers to work between industry and academia on research projects, giving them a unique understanding of how research is done for industrial benefit.

We run courses in Food Manufacture: the aim of this course is to train engineers and food scientists in each others disciplines, and to develop the profession of chemical engineering within this important subject area. These modules can be accessed as part of the Advanced Chemical Engineering Masters Course.

Other activities

- Council Member, BBSRC
- Editor, "Food and Bioproducts Processing", Transactions of the Institution of Chemical Engineers Part C
- Member of the Editorial Board, "Journal of Food Engineering", Innovative Food Science and Emerging Technologies, Soft Matter
- IChemE representative, International Conference on Engineering and Food

Publications

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