Mathematical solutions for industry

The Mathematical Institute has a long-established reputation for successfully providing practical solutions to industrial problems across many sectors.

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Through the Industry Club and (since 2014) the EPSRC Centre for Doctoral Training in Industrially Focused Mathematical Modelling (InFoMM CDT), the Mathematical Institute has stimulated new partnerships and solved business critical issues by engaging with companies to understand their technical challenges.

Our workshops provide a forum in which technical experts from industry present unsolved challenges that have arisen within their company to members of faculty, research assistants and doctoral students, who are interested in providing practical solutions using mathematics.

Problems have been addressed in areas such as defence, oil exploration, batteries, furnaces, food manufacturing, communication networks, optimisation algorithms, image and signal processing, data analytics, biological applications, banking and others.

By the end of each workshop, the group from the Mathematical Institute can usually suggest methods to tackle the challenge and estimate the level of difficulty involved. They also provide potential mechanisms to progress the work collaboratively. This is typically through sponsorship of a three-year doctoral research project with the InFoMM CDT (http://www.maths.ox.ac.uk/infomm), or of a postdoctoral researcher. For less complicated problems, sponsorship of a 10-week mini-project with the InFoMM CDT is usual; alternatively an MSc student can be appointed. Industry club workshops benefit from a workshop report that provides partial results and lists references or suggestions for collaboration. The company generally accepts the suggestions for further collaboration or simply follows up on the references internally.

Workshops, run by the Mathematical Institute, have addressed a large variety of problems across a wide range of sectors.

Companies that have presented challenges include Schlumberger, Elkem, BP, Sharp, Thales, VerdErg, PDS, SharkNinja, CCFE, dunnhumby, BT, Teknova, Schott AG and many others. All of these companies have joined the InFoMM CDT's industrial partnership through engaging in projects. Every year around 12 new students join the InFoMM CDT, each of whom will undertake two 10-week mini-projects and one three-year research project. All projects involve an industry partner.

Companies also engage with the InFoMM CDT by offering courses and industrial visits for the centre's doctoral students. Courses include overview sessions of company and sector, generic business courses and training courses involving mathematics in an industrial context.

'Regular meetings that we have had with the staff and students have helped us to understand better not only the nature of the technical difficulties involved in our attempts to resolve current problems, but also the theoretical limitations of what might be achievable in our pursuit of new and innovative ideas.'

Professor Edward V Stansfield,
Technical Specialist at Thale Research & Technology

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