

- industry cross-fertilisation
- technology transfer
- industry forum
- seminars
- consultancy and case studies
- training

# IMPROVING PERFORMANCE THROUGH UNDERSTANDING AND APPLICATION OF CONTROL TECHNOLOGIES



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## What the ACTC Does

The Applied Control Technology Consortium (ACTC) helps its member companies understand and apply control technologies through company specific activities and a industry relevant general awareness programme.

Self-financing since 1993, the ACTC has grown to become truly international. It now provides support in control technology to many 'world-class' companies operating in industries as diverse as Automotive, Aerospace & Defence, Chemical & Petrochemical, Energy, Marine, Metal Processing, Food and Drink manufacturing.

The success in meeting the expectations and needs of its member companies arises from the Consortium's flexibility responsiveness and impartiality in sharing an understanding of industrially relevant technology.

### ■ Training

Highly regarded and proven training. Tailored courses at company premises and centrally held, scheduled training.

### ■ Case Study

Company driven feasibility studies of new techniques to address difficult or back-burner applications.

### ■ Problem Solving

Impartial consultancy help with immediate problems. For example PID re-tuning, plant investigations, improving procedures.

### ■ Awareness Programme

Industry relevant technical events. Technical reports and introductory educational notes. Software tools to enable familiarisation

### ■ Industry Forum

Networking with like-minded people from industry in an open and non-competitive environment. Share ideas and solutions.

*"...associated with the ACTC for over 5 years, and have found your Member services invaluable through that period.*

*The breadth and depth of knowledge provided, during several case studies, on a wide range of practical industrial control issues, has helped to deliver tangible benefits, and led to much greater understanding on our site.*

*Training courses, particularly on the subject of Industrial Process Control, have been extremely well received, and reflect very highly on yourself and your highly trained, thoroughly professional, and extremely enthusiastic staff."*

*GlaxoSmithKline*

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## Company Specific Activities

- Tailored training courses at company premises
- Case studies of general interest
- Consultancy and problem solving
- On-site visits

## General Awareness Activities

- Regular technical events on basic and advanced subjects
- Scheduled, centrally held training courses
- Access to consultants / academia
- Special Interest Groups that focus on particular industries
- Introductory and technical reports for industrial engineers
- Software for familiarization of techniques
- Access to commercial control packages
- Regular conference reports and mailings

## Our People



### Professor Michael J. Grimble, Director

Mike was awarded a BSc (Coventry) in Electrical engineering in 1971, MSc, PhD and DSc degrees from the University of Birmingham in 1971, 1978 and 1982, respectively. Whilst in industry he started an Open University Degree studying mathematics and was awarded a BA in 1978. The University of Strathclyde, Glasgow, appointed him to the Professorship of Industrial Systems in 1981.



### Dr. Arek Dutka, ACTC Manager

Dr. Arek Dutka received his MSc degree in Control Engineering and Robotics from Silesian University of Technology in Gliwice, Poland in 2002 and the PhD degree in Electronic & Electrical Engineering from the University of Strathclyde in Glasgow, UK in 2005. He has been involved in the project work on a range of industrial subjects including model identification, estimation and control. The non-linear control algorithms, predictive control, fault detection and isolation are within his scope of expertise.

## Current Members

- Axelon Technologies Ltd.
- Boeing, USA
- BP (Sunbury)
- British Energy plc
- Caledonian Paper
- DaimlerChrysler (USA)
- Ford Motor Company (USA)
- GlaxoSmithKline
- Jaguar / Land Rover
- Lloyds Register
- Marathon Oil, Aberdeen
- Millennium Inorganic Chemicals
- National Instruments (Corporate)
- Perceptive Engineering Ltd.
- RWE Npower
- Scottish Power
- SELEX S.A & S
- Shell, Aberdeen
- Total Oil
- University of Florida
- University of Strathclyde
- Yorkshire Water

There are extensive links with UK and North American Universities, particularly the University of Florida at Gainesville that offers services in the US. Partners in the UK host major meetings include AJM Consulting at Grimsby and the University of Brunel, London.

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## Highlights of Achievements

### ■ Training Course “Introduction to Servomechanisms”

Eight engineers from BAE Systems in Edinburgh attended this course given by Andy Clegg and David Anderson and held at the ACTC offices in Glasgow. The course, which was specifically designed for BAE Systems, was very well received with the attendees finding the mixture of formal lectures and hands-on sessions being very useful. An additional delegate from the Royal Fleet Auxiliary also attended to assess this course for their own needs

### ■ Consultancy for Jaguar

Consultancy for Jaguar under the title “Development of a dry clutch model in SIMULINK” is now completed and with Jaguar for final review. This work required the development of a complex dynamic model of the entire clutch mechanism and the forces and torques acting upon it (clutch hydraulics, engine/flywheel/driveline torques etc.).

Two variants of the simulation were developed – one using the accepted practice of switching between dynamic powertrain model describing the slipping and lock-up states of the clutch and a second simulation which uses a state-of-the-art dynamic friction model (LuGre) to predict the clutch behaviour.

### ■ Training Course “Advances in Real-Time Control of Nonlinear Systems”

This workshop focused on the real-time control of nonlinear dynamical systems. A real-time control system normally involves a computer system of limited resources that introduces a range of additional implementation problems. The problems of nonlinearities often limit the performance of real systems or in extreme cases can cause instabilities leading to major shut downs and loss of production or even dangerous failures. This is an important area with a wide variety of applications in automotive and machinery controls and for applications in the process industries, including the design of supervisory control and data acquisition systems. It is relevant to the control of robots and servo systems and for the embedded systems in machine tools or domestic devices.

Twenty-seven delegates from twelve organisations attended the workshop.

## Case Study and Consultancy Entitlement

The ACTC members have an entitlement for an annual case study or consultancy help. The case studies are to enable companies to have help in improving control loops or in evaluating new control methods. These can involve application on real systems and other ACTC partners may provide further support where they have specialist knowledge or technology. These studies can range from integration of software tools to proposal for improving process controls. The consultancy support is shorter term help to assist companies with problem solving where time is critical.

## An Invitation

The ACTC welcomes enquiries from industry to discuss potential membership. For further information on membership or to arrange an initial visit please contact:

**Arek Dutka (ACTC Manager), Lesley Breen (ACTC Event Coordinator)**