

BEHAVIOUR OF RUBBER MATERIALS

SHORT COURSE PROGRAM SCHEDULE

MONDAY 8 FEBRUARY

9:00-9:45

POLYMERS, ELASTOMERS AND RUBBERS – WHAT ARE THEY?

Which elastomers are commonly used in tyre and non-tyre products? Introduction of issues related to materials selection, compounding, the role of fillers and oils as well as an overview of rubber processing.

9:45-10:30

THERMODYNAMICS OF ELASTOMERS

The basic thermal properties that control rate of cure and susceptibility to heat build-up; glassy and rubbery states; thermodynamics as a source for useful interrelationships; solubility parameters; connection between thermodynamics and statistical physics.

10:30-11:00

MORNING BREAK

11:00-12:30

PHYSICS OF RUBBER ELASTICITY

Building up an elasticity model from a consideration of a single molecule to represent the behaviour of a macromolecular network. Effects of different types of fillers on the stress-strain behaviour

12:30-1:30

LUNCH

1:30-2:15

FINITE STRAIN ELASTICITY THEORY

The use of stored energy functions to show how general deformations can be modelled or analysed during product design. Advice on which phenomenological approaches work best for real materials and applications.

2:15-3:00

INELASTIC BEHAVIOUR

The time-dependent behaviour of rubber materials including creep and stress relaxation as well as dynamic properties and damping.

3:00-3:30

AFTERNOON BREAK

3:30-5:00

STRENGTH AND FATIGUE OF ELASTOMERS

Determining the limiting strength of an elastomer and extending the approach to predict fatigue crack growth. What factors influence these behaviours and how can laboratory tests be related to failure seen in a product?

TUESDAY 9 FEBRUARY

9:00-10:30

DESIGN WITH RUBBER MATERIALS

How to design simple rubber components with a consideration of the incompressibility constraints and other factors. Difficulties encountered with constrained geometry such as cord reinforced products or rubber-steel laminates.

10:30-11:00

MORNING BREAK

11:00-12:30

FAILURE OF ELASTOMER PRODUCTS

An overview of the typical failure modes that can arise in normal service such as rupture, heat build-up, chemical ageing and bond failure.

12:30-1:30

LUNCH

1:30-3:00

FRICITION & ABRASION

Insight into friction is provided by application of dynamic stress-strain behaviour, contact mechanics and interfacial energetics, together with considerations of small scale, high frequency and the macromechanics of the system. Abrasion combines all these complexities of friction with those of strength and fatigue.

3:00-3:30

AFTERNOON BREAK

3:30-4:15

VIBRATION AND SHOCK CONTROL: ISOLATION AND DAMPING

Elastomers are often used in products to isolate and damp the vibrations to minimise their transmission through a system. The approach to design such systems from a consideration of their stiffness, damping and resonance is considered.

4:15-5:00

TESTING RUBBER MATERIALS & COMPONENTS

The design process is underpinned by the provision of suitable materials behaviour. The various pitfalls that are commonly encountered and advice on how to make suitable measurements are given.

"The Course Instructors are members of the Rubber in Engineering Committee of the Institute of Materials, Minerals and Mining, which is organising a conference session of 7 presentations on the latest applications and developments of the course material on Wednesday 10th February"

INSTRUCTOR BIOGRAPHIES

THE COURSE WILL BE DELIVERED BY:

DR JAMES BUSFIELD

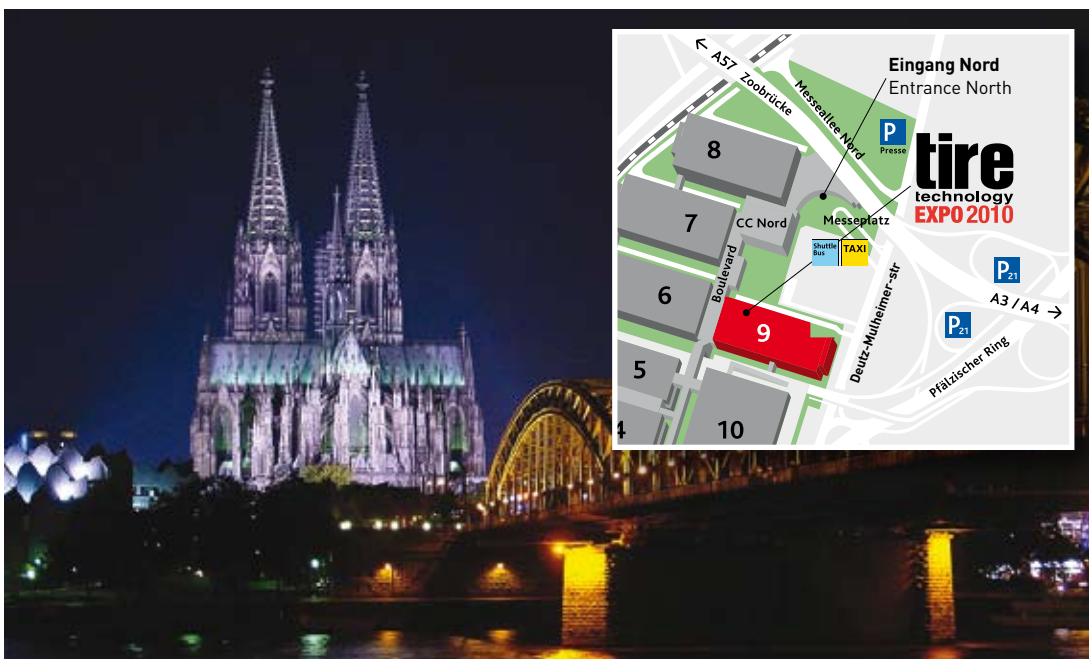


James has been head of the Rubber Research Group at QMUL since 1994. He has published more than 100 journal or conference papers on elastomer materials.

DR ALAN MUHR



Alan has been head of the Engineering Design Unit at TARRC since 1999. He has published more than 150 journal or conference papers on elastomer materials.



HOW TO GET THERE



AIR Cologne-Bonn Airport is a 20-minute taxi ride or a 15-minute train ride from the exhibition centre. Intercity Express, regional and suburban trains, for example the S-13 S-Bahn (suburban train) operate regularly from Cologne-Bonn Airport and stop at the exhibition centre station (Koeln-Deutz), opposite the trade-fair grounds.

TRAIN Koelnmesse is easily accessible from many cities in Germany and foreign countries by Deutsche Bahn. The exhibition centre station is Cologne-Deutz (Koeln-Deutz) and is located opposite the trade-fair grounds. Please follow the Koelnmesse signage at the station.

CAR Ten motorways lead into Cologne's motorway ring, and you can reach the exhibition centre without encountering junctions or traffic lights. Follow the green signs for Koelnmesse on the motorways and federal highways. The entrance to visitor car park P21 is off Deutz-Mülheimer-Straße opposite Eingang Nord.

Register online at www.tiretechnology-expo.com