

the chatsworth group

Chatsworth●Associates

“Strategies for the Continuous Pursuit of Knowledge”

One-day Intensive Training Course
“Smart Moulding”
The Theory and Practice of Injection Moulding

Pan Pacific Orchard Hotel
Singapore

Wednesday, April 11th, 2012

Presented by:

Dr Phil Adams

the chatsworth group

Supported by:



The Plastics and Rubber Institute of Malaysia



The Plastics and Rubber Institute of Singapore

“Theory & Practice of Injection Moulding”

Introduction:

This course takes a fundamental approach to the injection moulding process - in addition to the basics of the physics and chemistry of polymer materials; along with the injection moulding machine and mould, the course takes a holistic approach to the properties and behaviour of plastics materials when they are subjected to changes in temperature and pressures: namely heating, flow, packing and cooling, and how these changes affect both plastic properties (and ultimately the moulded part properties) and processing characteristics. These characteristics will then be explored when trouble-shooting injection moulding problems.

The course will therefore serve a wide range of interest groups from technical personnel working within the injection moulding industry – including OEM companies engaged in electronics manufacturing, medical devices, packaging, telecommunications etc - to set-up, process, R&D, sales and engineering staff, already knowledgeable in their own field of application, yet who may desire to know more about the fundamentals of the injection moulding process. The course will provide a more professional approach to the injection moulding process and hence will benefit not only process and engineering personnel, but higher level management staff.

About the Workshop Organiser / Leader :

Dr Phil Adams is Principal and Managing Director of Chatsworth Associates Pte Ltd, a company engaged in market research, conference organization and executive recruitment, focused on the plastics industry in Asia. He has over 36 years experience within this industry in Asia, and has worked in a variety of senior management positions in Singapore within such companies as GE Corporate Research and Development (GE USA Asia Co); Nypro Inc and UFE Inc, (the latter two being US-based injection moulding and tooling companies) prior to establishing his own consulting and market research company in 1990. During this period he was also Adjunct Associate Professor (R&D) at the Nanyang Technological University, Singapore.

Dr Adams graduated in Plastics Engineering from the Polytechnic of the Southbank, London, and has postgraduate degrees in Polymer Physics from UMIST. He is Founder, past-President and Honorary Life-Vice President of the Plastics and Rubber Institute of Singapore, and is also a Fellow of the Plastics and Rubber Institute in Malaysia, a past Fellow of the Institute of Materials, Minerals and Mining and a Senior Member of the Society of Plastics Engineers, USA. Dr Adams currently serves as a Member of the Advisory Committee for curriculum development in the Singapore Polytechnic School of Chemical and Life Sciences and was also a member of the Singapore government's Chemical Standards Committee and was past Chairman of the Plastic Packaging Standards Committee.

He has authored numerous papers, chaired many conferences and given presentations on injection moulding and plastics technology throughout SE Asia.

Course Outline:

- 08:00 Welcome Coffee and Registration
09:00 Introductions and Review of Course Objectives

SESSION 1. - **Structure of Plastics:**

- ❖ Nature of Plastics;
- ❖ Chemistry of Plastics
- ❖ Crystal and Amorphous Structures
- ❖ Molecular Weight & Molecular Weight Distribution
- ❖ Solid and Fluid Properties of Plastics
 - Solid (Elastic) Properties } ⇨ Viscoelastic Properties
 - Fluid (Viscous) Properties }

SESSION 2. - **Injection Moulding Machine:**

- ❖ Types of Machines
- ❖ Injection Moulding Cycle
- ❖ Injection Unit
- ❖ Clamping Unit
- ❖ Control Unit
 - Pressure and Temperature Controls
 - Speed Control
 - Additional Controls
- ❖ Injection Moulding of Thermoset Materials

SESSION 3. - **Injection Mould:**

- ❖ Mould Construction and Mould Types
 - Cold Runner
 - Insulated / Hot Runner
- ❖ Cooling System
- ❖ Ejection System

SESSION 4. - **Basics of Mould and Part Design that affect Part Quality:**

- ❖ Mould Design Components
 - Runners / Gates / Venting / Cooling
- ❖ General Design Considerations
 - Shrinkage / Warp / Sink Marks / Stress
 - Nominal Wall Thickness / Projections / Ribs / Bosses
 - Weld Lines
- ❖ "MeltFlipper[®]" Concept

Course Outline (cont):

SESSION 5. - **Machine – Plastic – Moulded Part Relationships**

- ❖ Factors Affecting Properties of Plastics Parts
- ❖ Plastic Behaviour:
 -during Filling
 -during Packing
 -during Cooling
- ❖ Effects on Moulded Part Properties of:
 - Plastic Temperature
 - Plastic Pressure
 - Flow Rate
 - Cooling Rate
- ❖ Pre- and Post-Moulding Factors
 - Drying
 - Shrinkage and Stress Factors
 - Environmental Factors
 - Regrind Material
- ❖ Typical Processing Parameters

SESSION 6. - **Process Measurement and Analysis.**

- ❖ Temperature Measurements
- ❖ Pressure Measurements
- ❖ Process Control

SESSION 7. - **New Developments in Injection Moulding Technology**

- ❖ Multi-Component Injection Moulding
- ❖ Novel Processes e.g.
 - Fluid-assisted Moulding
 - “Weldless” Technology
 - Micro-moulding / Hybrid Moulding

SESSION 8. - **Trouble Shooting and Common Moulding Faults.**

Chatsworth•Associates Pte Ltd

Chatsworth Associates Pte Ltd is a consulting company engaged in all aspects of training and technology transfer related to advanced materials and process technology. Chatsworth Associates is dedicated to assisting companies acquire the latest knowledge and cutting-edge expertise from leading R&D establishments and international companies from around the globe, in order for them to develop new products, processes and market leadership – this is through the organisation of specialized training courses, dedicated workshops and international conferences. The principals of the company have wide academic and industrial experience in the materials, chemical, petrochemical, polymer and electronics sectors, with a combined total of over 70 years.

This course aims at:

- ❖ providing a basic understanding of the injection moulding process, considering it from plastic material concepts;
- ❖ broadening the perspective of technical personnel working within the injection moulding and related industries;
- ❖ providing a refresher course to improve the skills of relevant personnel working within IM.

This training course is therefore suitable for:

- ❖ Process, Engineering, R&D Managers and Technical Personnel;
- ❖ Procurement, Manufacturing and Process Managers and Engineers new to injection moulding;
- ❖ Sales and Marketing personnel.

Previous participants have come from such companies as: Borouge; Dou Yee; BD Medical; Moulding Industries; Dyson Manufacturing; Emico; ExxonMobil Asia Pacific; First Engineering Plastics; GF Technology; Hicom Teck See; Juken Technology; Mattel (Malaysia); Sanwa-Intec; Prestige Dynamics; PT Epson; Siemens Medical; Xyratex Malaysia; Zeito Plastic Components; DSO National Labs; Total Petrochemicals.

Course Details & Fees:

Date & Time:	Wednesday, April 11 th , 2012 Registration: 8:00am - 9:00am Course: 9:00am - 5:00pm
Venue:	Monet Room, 1 st Floor, Pan Pacific Orchard Hotel, 10 Claymore Road, Singapore 229540 Contact: Zulkifli Abdullah Tel: +65 6831 6614; Fax: +65 6831 6617; zabdullah@panpacific.com
Enquiries:	Dr Philip Adams, Singapore Tel: +65 6743 6149 :: Fax: +65 6743 6158 e-mail: padams@chatsworth-group.com
Course Fee:	SGD\$ 480.00 includes lunch, refreshments and concise presentation notes. Discount of 10% if registration received before March 16 th 2012 Discount of 15% for 3 or more participants from the same company Discount of 15% to members of PRIS and PRIM

Registration Form (IM11) – April 11th, 2012

Please photocopy if more space required.

Name (s): _____

Name (s): _____

Name (s): _____

Company: _____

Address: _____

Contact person: _____

Tel: _____ Fax: _____ e-mail: _____

For faster response and to reserve your seat, please fax in the form to (+65) 6743-6158 or e-mail to padams@chatsworth-group.com.

Payment: All payments must be received prior to the course, otherwise **CA** reserves the right to withdraw registrant. Please send cheques / bank drafts, **payable in SGD\$** to 'Chatsworth Associates Pte Ltd', together with the registration form, to the following address:

***Chatsworth Associates Pte Ltd.
Blk. 109, #03-271,
Lengkong Tiga,
Singapore 410109***

Alternatively, payment by TT, **to include all appropriate bank charges**, should be sent direct to:

***Development Bank of Singapore,
Parkway Parade Branch
Account Name: Chatsworth Associates Pte Ltd
Account Number : 027-900825-3
Swift Code: DBSSSGSG***

Refund: Delegates are encouraged to register and pay early to secure their seats and numbers can be confirmed for venue, printing, F & B, logistics arrangements. On confirmation of registration, all payments must be received by March 30th, otherwise the organisers reserve the right to withdraw registrant. Full refund will be given (less 20% handling charge) if requests for cancellation are received, in writing, by April 2nd. Thereafter, fees paid are not refundable although the person registered can send a substitute. However the organisers must be informed of such substitution by April 4th. The organisers reserve the right to alter published programme, and of cancellation. Full refund will be given to the registrant if the course is cancelled.