



# Chatsworth●Hall

*“Strategies for the Continuous Pursuit of Knowledge”*

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

Kuala Lumpur Convention Centre  
Kuala Lumpur City Centre, Malaysia

Wednesday, July 21<sup>st</sup> 2010

**Presented by:**

**Dr Phil Adams**



**NB: Previous Courses run by Chatsworth Hall have received full support from the Malaysian HRDB**

**Supported by:**



The Plastics and Rubber Institute of Malaysia



The Plastics and Rubber Institute of Singapore

# “Theory & Practice of Injection Moulding”

## ***Introduction:***

This is the seventh in a series of training courses run in SE Asia, taking a fundamental approach to the injection moulding process. In addition to the basics of polymer physics and chemistry, and the injection moulding machine and mould, this course takes an 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.

It 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 CEO of The Chatsworth Group, a group of companies engaged in market research, conference / training course organization and executive recruitment, focused on the plastics industry in Asia. He has 35 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 technology throughout SE Asia.

# Course Outline:

**Wednesday, July 21<sup>st</sup> 2010**

08:30 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
  - Fluid (Viscous) Properties
  - Viscoelastic 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
- ❖ New Developments in Injection Moulding Technology and Processes
  - Novel Processes
  - Multi-component Injection Moulding
- ❖ Injection Moulding of Thermoset Materials

## SESSION 3 - Injection Mould:

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

# Course Outline *(cont)*:

## 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<sup>®</sup>” Concept

## 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 - Trouble Shooting and Common Moulding Faults

# Chatsworth•Hall Pte Ltd

Chatsworth•Hall Pte Ltd is a consulting company engaged in all aspects of training and technology transfer related to advanced materials and process technology. Chatsworth•Hall 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 60 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 with plastics.

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.

## Course Details & Fees:

- Date & Time:** Wednesday, July 21<sup>st</sup>, 2010  
Registration: 8:00am - 9:00am  
Course: 9:00am - 5:00pm
- Venue:** Meeting Room 404  
Kuala Lumpur Convention Centre, KL City Centre,  
50088 Kuala Lumpur, Malaysia  
Tel: +603 2333 2888 :: Fax: +603 2333 2800
- Enquiries:** Dr Philip Adams, Singapore  
Tel: +65 6743 6149 :: Fax: +65 6743 6158  
e-mail: padams@chatsworth-group.com
- Course Fee:** S\$480.00 includes lunch, refreshments and concise presentation notes.

**NB: Previous Courses run by Chatsworth Hall have received full support from the Malaysian HRDB**

# Registration Form

(Malaysia IM Course 7 – July 21<sup>st</sup> 2010)

*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 course; otherwise **CH** reserves the right to withdraw registrant. Please send cheques / bank drafts, **payable in Sing\$** to 'Chatsworth Hall Pte Ltd', together with the registration form, to the following address:

**Chatsworth Hall 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 Hall Pte Ltd**  
**Account Number : 027-020052-4**  
**Swift Code: DBSSSGSG**

**Refund:** 50% refund will be given if requests for cancellation in writing are received by June 28<sup>th</sup>. Thereafter, fees paid are not refundable although the person registered can send a substitute. However **CH** must be informed of such substitution by July 12<sup>th</sup>.

**Cancellation:** CH reserves the right of cancellation. Full refund will be given to the registrant if the course is cancelled.