

Injection Moulding Training Courses



Progressive, structured and relevant training courses

Introduction

Sumitomo (SHI) Demag UK has developed a range of injection moulding courses to address the skills shortage seen within the plastics industry. We train not only our customers, but also anyone who wishes to further enhance their knowledge of the injection moulding process to make financial gains.

The core training programme delivers high quality process training. The courses are designed to be modular and offer a logical progression from basic setting to advance process engineering. The MMount, TSett, PTech, TShoot and AIM course all have a formal assessment on the last day of the course.

For anyone with existing injection moulding experience who may wish to join the programme at a later stage, please speak to our training department who can advise on the appropriate course level.

Benefits For Your Company

- Reduced skills gap
- Improved quality
- Improved OEE
- Faster cycle times
- Higher profits
- Increased productivity



Introduction to Injection Moulding (IIM)

The IIM course is designed to deliver an understanding of the fundamental principles of the injection moulding process and associated ancillary equipment to ensure safe working practices.

Ideal delegates for attendance

- Injection moulding operators
- Maintenance and toolroom personnel
- Material handlers
- Product designers
- Supervisors and team leaders

Course duration: 3 days

1 day theory, 2 days practical
09:00 to 16:00hrs

Day 1 Theory

- Injection moulding machine and moulding cycle
- Clamp unit functions
- Injection unit functions
- Mould tool technology
- Cold and hot runner technology
- Ejection methods
- Classifying polymers
- Polymer handling, preparation and regrind
- Common injection moulding faults

Day 2 & 3 Practical

- Delegate to enter parameters into the machine from a given parameter setting sheet
- Machine safety checks
- Mould protection understanding
- Adjustments made to the injection, holding and cooling phase
- Formal assessment



Sumitomo
SHI **DEMAG**
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Mould Mounting (MMount)

The MMount course is aimed at individuals new to injection moulding and mould changing with a focus on the potential hazards, safety requirements and responsibilities with mould changing. To demonstrate the critical safety requirements required, delegates will conduct actual mould changes (whilst under tutor guidance) with continuous feeding through the actual mould change process.

Ideal delegates for attendance

- Progression for injection moulding operators new to mould changing
- Any other personnel involved with mould changing as part of production requirements or mould tool trials

Course duration: 3 days

1 day theory, 2 days practical

09:00 to 16:00hrs

Please note: Safety shoes are required during mould changes.

Day 1 Theory

- Items to be considered before a mould change
- The use of lifting equipment and the Safe Working Load (SWL)
- Basic fundamentals of Single Minute Exchange Die (SMED)
- Mould clamping and methods available
- Toggle and direct locking mechanisms
- Basic mould design and mould maintenance procedures
- Sprue bush and nozzle relationship
- Ancillary equipment and fluid services
- Theory of mould protection
- Machine safety checks

Day 2 & 3 Practical

- Preparation checks to ensure mould fitment
- Basic SMED principles before commencement of a mould change
- Run the machine in dry cycle mode with consideration given to:
 - › Mould opening and closing speeds
 - › Ejection
 - › Electrical cables, hydraulic pipework and water pipes are free to move
- Check and optimise mould safety
- Conduct machine safety checks
- Formal assessment



Toolsetting Technology (TSett)

The TSett course is designed to give delegates the fundamental principles involved in the injection moulding environment and safety requirements. Following on from Mould Mounting course (MMount), TSett covers machine, mould and material with theoretical teaching and machine practical exercises. The learning will be measured pre-course and post-course via multiple choice question paper.

Ideal delegates for attendance

- Injection moulding operators
- Maintenance and toolroom personnel
- Material handlers
- Product designers
- Supervisors and team leaders

Course duration: 3 days

1 day theory, 2 days practical
09:00 to 16:00hrs

Please note: Day 2 Introduction to health and safety before machine practical

Day 1 Theory

- Moulding cycle
- Machine technology
- Mould tool technology
- Cold and hot runner technology
- Ejection methods
- Mechanical and hydraulic core movement
- Thermoplastic and thermosetting
- Polymer handling and application
- Regrinding
- Colouring plastics
- Common injection moulding faults

Day 2 & 3 Practical

- Delegate to enter parameters into the machine from a given parameter setting sheet
- Complete safety checks on the machine
- Melt and mould temperature checks
- Optimise mould safety
- Adjustments to injection phase
- Adjustments to holding phase
- Adjustments to cooling phase



Process Technician (PTech)

The PTech course is designed to give delegates in-depth knowledge of the injection moulding process. PTech also involves an end of course assessment.

Following on from TSett course, PTech is designed to provide deeper knowledge and understanding of the machine, mould and material, through theoretical teaching and machine practical exercises. Delegates will gain the ability to set a machine from zero to producing components to a given specification, in an efficient and timely manner.

Ideal delegates for attendance

- Toolsetters who have recently attended TSett course
- Maintenance and toolroom personnel
- Product designers
- Supervisors and team leaders

Course duration: 3 days

1 day theory, 2 days practical
09:00 to 16:00hrs

Day 1 Theory

- Specific pressure and screw relationship
- Structured guide to setting the clamp unit from zero
- Structured guide to setting the injection unit from zero
- Mould design technology
- Plastic materials technology
- Injection moulding process faults

Day 2 & 3 Practical

- Setting of the clamp and injection unit
- Calculate projected area for the specific mould tool being used
- Machine safety checks
- Check and optimise mould safety
- Measure actual values for melt and mould temperature
- Optimise the moulding cycle to achieve a given specification
- Verify optimisation through statistical process control
- Formal assessment



Tool Setter (TSett) / Process Technician (PTech) Practical End Tests

To attend the TSett or PTech Practical End Test the delegate must have attended the prior TSett or PTech course, and passed the Knowledge Theory Test. After successfully passing the course the delegate would be invited to attend a one-day Practical End Test. Attendance for the Practical End Test must be no longer than six months after passing the Knowledge Theory Test.

Delegates who have passed TSett or PTech course, but the 6 month time limit has elapsed will be expected to re-sit the Knowledge Theory Test and the Practical End Test to achieve the full award for theory and practical competence.

Tool Setter (TSett) Practical End Test

- Complete a mould change
- Enter settings from a given setting sheet
- Optimise clamp unit parameters
- Demonstrate safe purging and use of PPE
- Start-up the machine safely and produce components
- Optimise injection unit parameters
- Achieve the given quality specification
- Safely and efficiently shut down the machine
- Complete criteria, in the time set, under exam conditions
- Demonstrate health and safety requirements during the exam

Process Technician (PTech) Practical End Test

- Set-up and optimise the clamp unit parameters
- Set-up the injection unit with initial parameters
- Demonstrate safe purging and use of PPE
- Start-up the machine safely and produce components
- Optimise injection unit parameters
- Achieve the given quality specification
- Safely and efficiently shut down the machine
- Complete criteria, in the time set, under exam conditions
- Demonstrate health and safety requirements during the exam



Troubleshooting (TShoot)

A course designed to give delegates in-depth knowledge and understanding regarding the five variables that are required to control the moulding process and how they interact with each other.

Ideal delegates for attendance

- Technical staff responsible for injection moulding processing and who wish to further enhance their processing knowledge

Course duration: 3 days

1 day theory, 2 days practical
09:00 to 16:00hrs

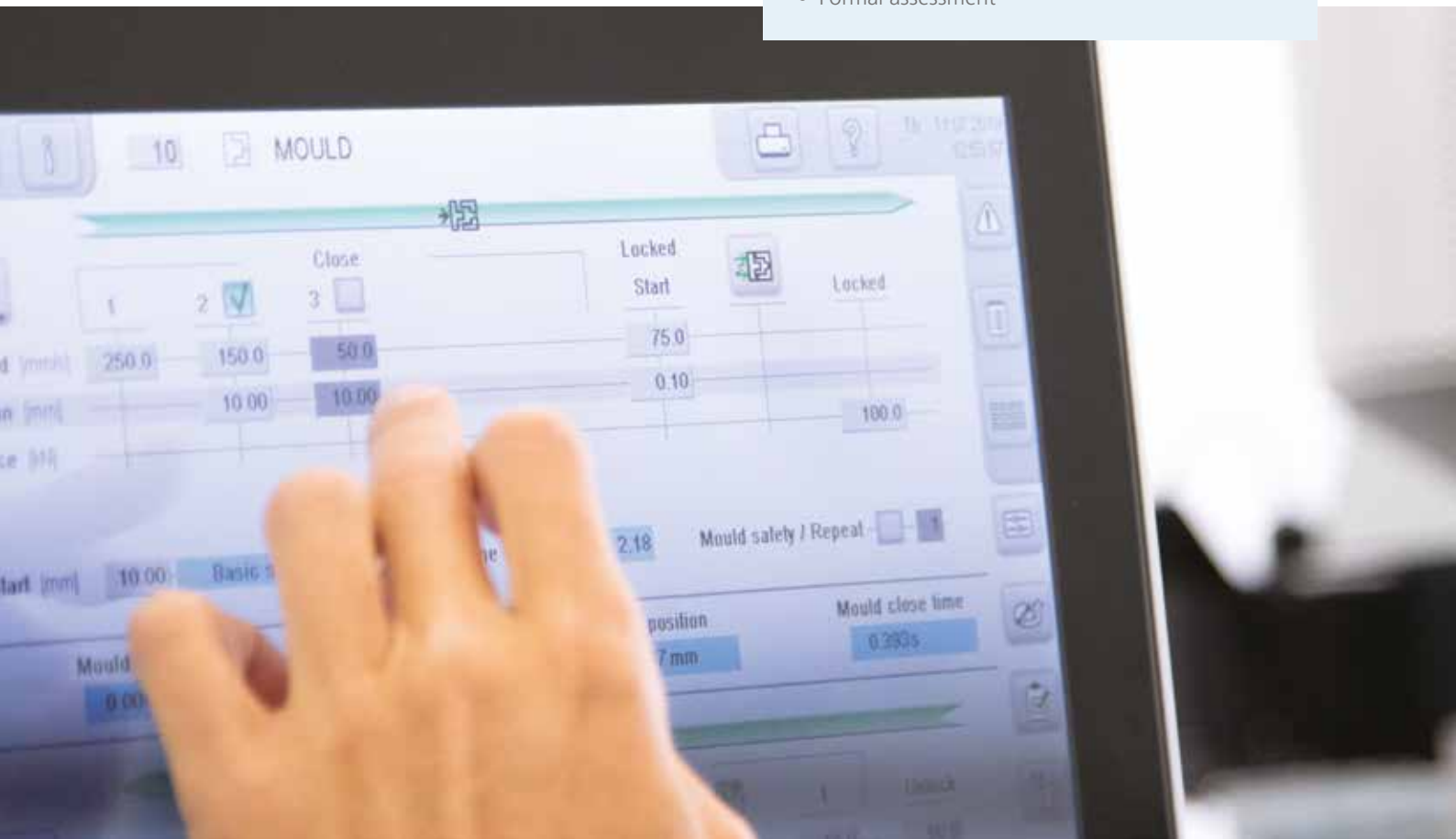
Day 1 Theory & Practical

Theory

- The five variables controlling the process and how they interact with each other
- Deductive reasoning with a systematic approach to rectifying process faults
- Injection moulding process related faults resulting from; material, mould and machine
- Options available to reduce injection moulding process faults before the cutting of mould steel

Day 2 & 3 Practical

- Optimise the clamp and injection unit from initial poorly set parameters
- Calculate projected area
- Diagnose a range of injection moulding faults and rectify them in a logical and systematic manner
- Achieve a given quality specification
- Verify optimisation through statistical process control
- Review practical using tutor observations and delegates findings
- Delegates finalise their findings and present to the rest of the attending delegates
- Formal assessment



Advanced Injection Moulding (AIM)

The AIM course uses computation and scientific principles to optimise the injection moulding process to an advanced level.

Ideal delegates for attendance

- Injection moulding technicians and process engineers

Course duration: 3 days

1 day theory, 2 days practical

09:00 to 16:00hrs

Day 1 Theory

- Theory of polymer materials: Amorphous and Semi Crystalline
- Melt temperature preparation
- Calculate projected area
- Optimise injection phase - rheology study
- Optimise holding phase - profiles and pressure study
- Optimise cooling phase - calculate cooling time
- Metering phase - determine barrel size, dosage stroke and screw surface speed using computation and scientific principles

Day 2 & 3 Practical

- Initial value settings using a structured guide to set the injection unit
- Calculate projected area (complex shapes)
- Optimise the three phases of the moulding cycle using the AIM document
- Optimise the metering phase using screw surface speeds
- Rheology study to identify optimum filling speeds
- Calculate gate shear rate
- Calculate barrel usage, based on 1D to 4D
- Calculate the residence time
- Optimise the cooling phase by calculating the theoretical cooling time
- Verify optimisation through statistical process control
- Formal assessment



Beginner to Advance Level Training Programme (BATP)

The aim of the Beginner to Advance Level Training Programme is to take an Injection Moulding Trainee/Apprentice with zero knowledge to an advanced level of understanding of the injection moulding process and the health and safety requirements over a 42 month period.

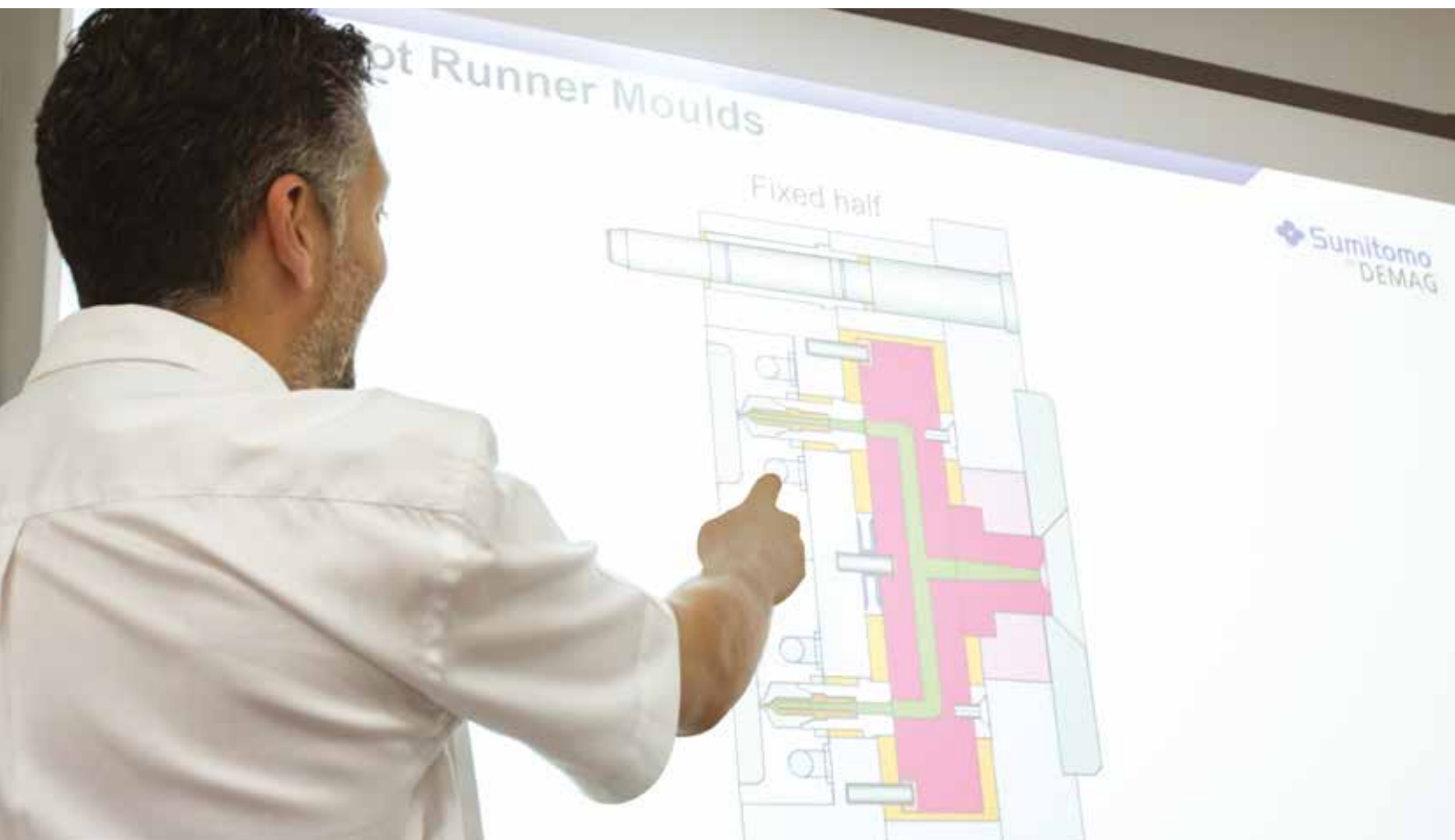
Sumitomo Demag Training Academy have designed a modular set of six injection moulding training courses, which are delivered over a period of 3 days (with the exception of the practical exams), with a blend of theoretical tuition, classroom exercises, handouts and machine practicals to maximise the learning outcome for every course.

The delegate over a 42 month period will sit six knowledge assessments, 2 practical End Tests and one End of Programme Exam. In essence, they will attend all our bespoke courses, as highlighted, in a conducive learning environment with constant testing throughout the 42 months. A discount is available for booking all courses upfront.

All the course lectures cover Machine Design Technology,

Mould Design Technology and Polymer Material Technology, but with increasing level of complexity and difficulty, as the delegate progresses through the programme. With the exception of the AIM course, which focuses on Advanced Machine Parameters, Polymer Material Technology and Process Optimisation, using scientific and mathematical techniques.

Beginner to Advance Level Training Programme	
1	Introduction to Injection Moulding (IIM)
2	Mould Mounting (MMount)
3	Tool Setter (TSett)
3a	Tool Setter (TSett) Practical End Test
4	Process Technician (PTech)
4a	Process Technician (PTech) Practical End Test
5	Troubleshooting (TShoot)
6	Advanced Injection Moulding (AIM)



Injection Moulding for Managers (IMM)

The aim of the Injection Moulding for Managers course is to give the non-technical person a basic introduction to injection moulding and the terminology used to bridge the skills gap between the shop floor and office staff. Suitable for anyone in a supervisory role and who does not have hands on experience, they will gain skills to ask pertinent questions to help the relationship between non-skilled and skilled workers.

Course duration: 2 days

1 day theory, 1 day practical
09:00 to 16:00hrs

Day 1 Theory

Machine

- Injection moulding machine and moulding cycle
- Clamp unit functions
- Injection unit functions
- Calculate projected area

Mould

- Mould tool technology
- Cold and hot runner technology
- Ejection methods
- Mechanical and hydraulic core movement

Material

- Thermoplastic and thermosetting
- Polymer handling, preparation and regrind
- Colouring plastics and why use additives
- Common moulding faults

Health & Safety

- Machine safety checks and guard classification
- Safe purging of an injection moulding machine
- Fire extinguishers
- SWL and checks

Day 2 Practical

- Delegate to enter parameters into the machine from a given parameter setting sheet
- Safety checks completed on the machine
- Melt and mould temperature checks
- Optimise mould safety
- Adjustments made to the injection phase
- Adjustments made to the holding phase
- Adjustments made to the cooling phase



Injection Moulding Refresher (IMR)

The Injection Moulding Refresher course is aimed at experienced technical staff who have been working in injection moulding for a number of years and would like to refresh their skills, as well as part of their Continual Professional Development (CPD).

No formal assessment on this course.

Course duration: 2 days

1 day theory, 1 day practical

09:00 to 16:00hrs

Day 1 Theory

- Theory of polymer materials: Amorphous and Semi Crystalline;
- Calculate projected area of various samples
- Injection phase theory and optimisation
- Holding phase theory and optimisation
- Cooling phase theory and optimisation
- Metering phase theory and optimisation

Day 2 Practical

- Computation of advance process parameters covering;
 - Calculate projected area
 - Calculate dosage stroke
 - Calculate screw surface speed
 - Rheology study to identify optimum injection velocity
 - Calculate barrel usage, based on 1D to 4D
 - Calculate the residence time
 - Calculate the cooling time
 - Determine "Machine Capability" values using C_m and C_{mK}



Maintenance and Fault Finding (Maint NC5)

A course designed to give delegates theoretical and practical fault finding experience on NC5. This course covers hydraulic, electric control and mechanical systems of both the direct and toggle lock machines.

Ideal delegates for attendance

- Maintenance Engineers and Maintenance Technicians with basic maintenance knowledge

Course duration: 2 days

09:00 to 16:00hrs (practical)

Day 1 & 2 Practical

- Differences in direct and toggle lock machines
- Sumitomo Demag numbering code and function chart
- Types and control system
- Basic hydraulics
- Familiarisation and theoretical operation of hydraulic circuitry including symbols
- Further setting of NC5 controls and use of dry cycle as a means of fault finding
- Introduction to Sigmatek processor (types and layout)
- Use of IBED as a maintenance aid
- Hardware layout
- Finding essential voltages
- Fault finding tasks
- Lubrication and general maintenance tasks
- Navigation of electrical diagrams



Course Lecturers



Darren Vater-Hutchison
Process Engineering and Training

Darren's career in plastics started at Link Plastics as a trainee toolsetter, finally progressing to senior technician. From Link Plastics he moved to Plastics Omnium as a technician in the technical department. He then moved to the British Polymer Training Association (BPTA) where he spent 11 years as a technical consultant. Following the close of BPTA he joined Epson, taking a senior position within the injection moulding department. During a period of three years he achieved a high accolade, a 'silver award' in the 37th global Epson injection moulding competition in Japan. Darren was the first British person to enter such competition for Epson since manufacturing began in May 1999.

He then rejoined the Polymer Training Innovation Centre (PTIC, formerly BPTA) in 2012 and completed his Masters in 'Polymer Engineering Design' at the University of Wolverhampton.

Darren has worked within the injection moulding industry for over 30 years with exposure to trade moulding, automotive and IT consumables.



Rob Keers
Maintenance and Fault Finding

Rob has been with Sumitomo (SHI) Demag UK Ltd for over 30 years. During that time he has built up a wealth of practical maintenance experience, covering NCII, NCIII, NC4 as well as our current NC5 product range; Systec, EL-EXIS and IntElect machines.

Before joining the company, he studied engineering then electronics, after which he worked on sound and stage equipment, which took him around the UK and abroad.

Rob visits our factories in Germany on a regular basis to ensure he is fully aware of the latest developments, enabling him to deliver the most up to date training available.

As well as being a Technical Service Engineer, Rob also delivers bespoke training for customers onsite and at our training facility.



Bespoke Courses and Other Services

Sumitomo (SHI) Demag UK is also able to offer bespoke training courses, either at our training centre or onsite. Please call with your requirement and we can tailor a package to suit you.

Other Services

- Polymer Material Appreciation
- Mould Validation
- Mould Trials
- Evaluation of training requirements for individuals

Contact

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