

# SIMPOE sets its sights on mainstream moulding

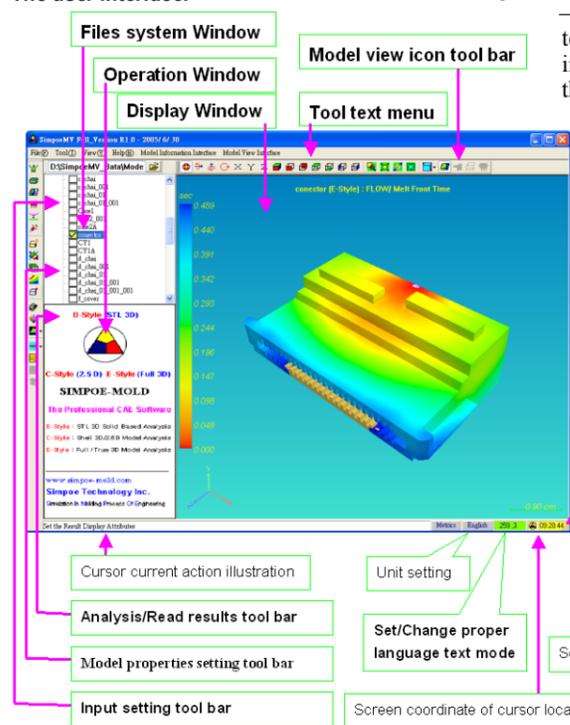
ART deals with imponderables; things we sense or feel but can't quite define. Moulding on the other hand, is about specifics, about the unambiguous. Specific shapes and sizes, specific material characteristics, specific temperature regimes. This is the territory of science and engineering. If there is any remaining tendency to think of moulding as an art, it is only because the science has not fully broken through into industrial practice.

The decline of moulding art has been a gradual process. It had to be. It depended on advances in many different fields. On new mathematical methods, on better and standardised property testing, on improved understanding of the very complex behaviour of plastics, and on cheap and commonplace computing.

The writing was on the wall for moulding art from the moment, nearly 30 years ago now, that computer simulation of the moulding process arrived. From that moment, the challenge was to calculate rather than intuit, to simulate instead of experiment. Then it was controversial, now it is not. Many thousands of moulded parts have been designed and manufactured this way the world over. The track record puts the value of computer moulding simulation – virtual moulding – beyond reasonable dispute.

And yet there is a paradox. Although acceptance is widespread, use is not universal. Far from it, in fact. There are no published figures for the market penetration of moulding

### The user interface.



Clive Maier tries out a full-facility moulding simulator from Taiwan via Paris that sets out to make moulding simulation a tool for everybody.

simulation but most estimates put the figure very low, at probably less than 10 per cent. So simulation has yet to be democratised. For the most part, it is the domain of the bigger and more sophisticated companies. Many others who make use of simulation, do it at one remove. They rely on suppliers, consultants, universities and even OEMs to do the work. It is expedient but it is insecure. Many are uncomfortably aware that it is core business and they should be in control of it. Add to that the realisation that unsophisticated operations can no longer make money in developed high-wage economies, and you have a case for change.

### Democratise virtual moulding

It is that case, that market opportunity that has drawn in the latest player in moulding simulation software. It is the avowed aim of the French company SIMPOE to democratise virtual moulding; to make it something that almost every plastics player does. The SIMPOE-MOLD software itself is not new but it has not been commercialised worldwide before. SIMPOE – the name stands for simulation in moulding processes of engineering – was founded in 1995 and grew out of work by Dr Shiao-Yuh Chiou and his development team at the Hang Shing National University in Taiwan.

The software made its mark in Asia, particularly among automotive suppliers but has been virtually unknown in Europe. The catalyst was Alain Dubois, a French citizen with Asian origins. Dubois has a mission to democratise – to convert software from elite technique to industrial tool. He was instrumental in the development of the Cosmos mechanical analysis and EFD Labs computational fluid dynamics systems, and saw an opportunity in SIMPOE to create an easy-to-use and affordable moulding simulator for the mainstream market.

### The essentials

SIMPOE-MOLD is an injection moulding simulation software package for optimising parts, moulds and processes. The aim is to get the project as nearly right as possible first time, at the lowest cost and in the shortest time, by trialling and troubleshooting early in the computer instead of late on the shop floor. The program runs in 2½D and 3D, and handles filling, packing, cooling and warping.

The modular structure means that the program is available in four packages of varying capabilities. SIMPOE-MOLD Engineer handles filling and packing, using the 2½D B-Style model that is suitable for 95 per cent of projects. Capabilities include fibre orientation and co-injection.

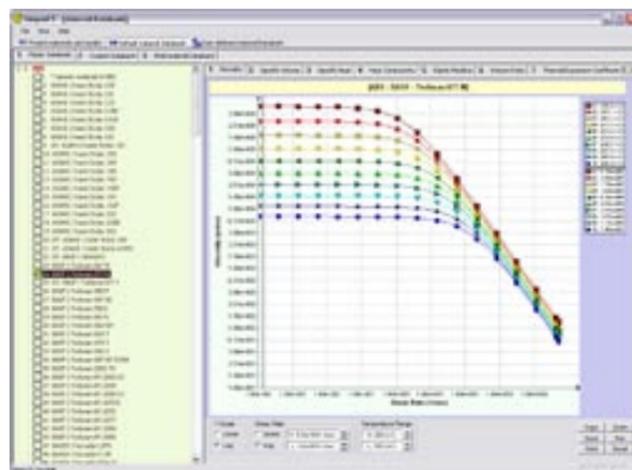
SIMPOE-MOLD Engineer has a list price of €12,000 but is currently on offer at an introductory price of €9,000. The SIMPOE-MOLD Professional package includes all the functions of Engineer and adds cooling analysis. Professional costs €20,000. SIMPOE-MOLD Advanced includes everything in the Professional version plus warpage analysis. The price is €25,000. The total package is SIMPOE-MOLD Platinum. This includes filling, packing, cooling and warpage analysis in 2½D and 3D, using C-Style mid-planes and E-Style solid meshes in addition to B-Style models. SIMPOE-MOLD Platinum costs €35,000.

SIMPOE-MOLD runs under Microsoft Windows 2000 and XP operating systems. It needs 200 Mb of hard disc space for installation and at least 256 Mb of RAM.

[www.simpoe.com](http://www.simpoe.com)

Together with Thierry Leroy who played a leading role in developing Parametric Technology worldwide, Dubois and Chiou set up SIMPOE headquarters in France towards the end of 2004.

SIMPOE-MOLD itself is a modular soft-



ware package capable of handling co-injection, gas-assist and reactive injection as well as conventional injection moulding. It can deal with filling, packing, cooling and warping. It includes an extensive data bank of plastics materials and has its own built-in automatic mesh generators. The mesh depends on the way in which the moulding geometry is represented, and there are three ways or 'styles' of working with SIMPOE-MOLD.

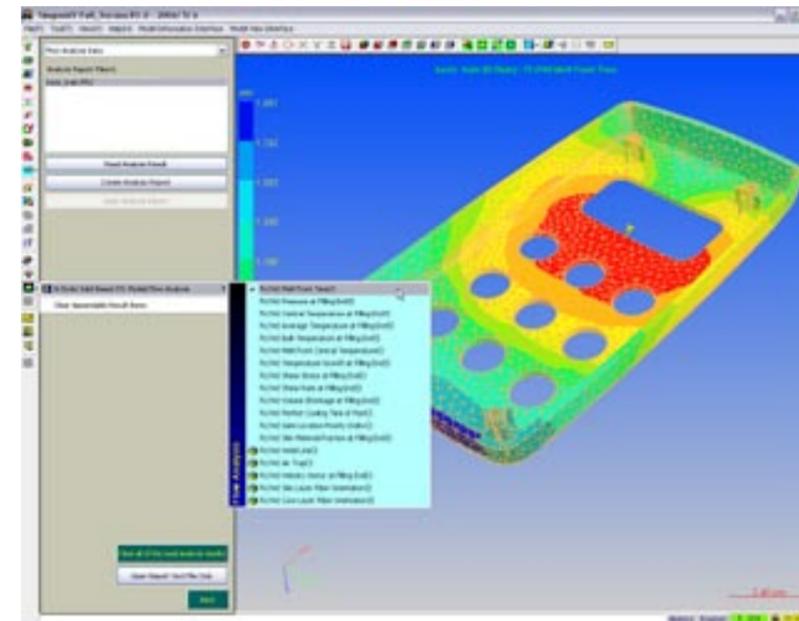
E-Style is for full 3D analysis. It is a solid model mesh of tetrahedrons. C-Style is for 2½D working. It represents a notional neutral mid-plane between the inner and outer surfaces of a moulded part. This is a legacy of the time when 2½D analysis first collided with 3D CAD models. Mid-plane models are no longer popular but SIMPOE-MOLD includes the technique to give users the widest choice of working methods.

The third option – B-Style – is expected to be the preferred method for 95 per cent of all moulding projects. B-Style works with 3D CAD models, typically in STL format, and uses proprietary SIMPOE technology to mesh both the inner and outer surfaces of the model. The meshes do not have to be matched but are integrated by mapping between nodes. It is a 2½D method that works well with relatively thin 'shell' mouldings having a large aspect ratio. Most mouldings are designed this way. B-Style does away with any need to work on the model geometry. Users can take the part designer's CAD model and get straight into meshing and analysis. Let's see how that works.

### Start with STL

The first step is to import the CAD geometry by reading in an STL file. SIMPOE-MOLD can also accept geometries in NASTRAN, ANSYS and ProE formats. This brings up a mesh generation dialogue where you can accept default parameters or set your own values for memory size, and maximum and minimum mesh size. As always, you have to set the units for the dimension-less STL file. A geometric approximation value controls meshing in curved regions, and is easily set by a fine-to-coarse slider. Finite element correction is available to avoid over-constrained elements but it is not normally needed and defaults to 'off'. Then just click a button to generate the mesh automatically.

The next thing you will see is the imported meshed model displayed within the SIMPOE-MOLD graphical user interface. If software is to be simple and intuitive to use, the interface is all important so it is worth spending some



Displaying the results.

time on this. Most of the screen is taken up by a display window where the model can be panned, zoomed, rotated, auto-rotated, or set to a variety of standard views. The model can be shown shaded, meshed, outlined or as combinations of these. Mould elements like the cavity, runner and cooling channels can be toggled in and out of visibility. These functions are accessed by a tool bar above the display window.

To the left are two further windows for managing files and operations. The boundary between the display and management windows cannot be re-sized by dragging but the ratio of space allocated to each can be toggled between two settings by double-clicking in the display window. At the bottom of the screen is a multi-purpose status bar, and at the far left are the all-important tool bars for setting the inputs, running the analysis and displaying the results. The meanings of the tool bar icons are fairly clear and any doubt is dispelled by mouse-over tool tips. To set up a simulation, all you have to do is work down the tool bar icons in sequence.

The first step is to select your moulding material. The database includes generics as well as some 5,000 specific grades. Narrow the range by selecting a generic first, then pick a specific grade from a drop-down list. Click the 'Update' button to confirm that material in the input conditions. Next, select the coolant and the mould material. Again, there are databases and defaults, and you can also define your own materials.

With the materials selected, you now have the opportunity to review and adjust the settings for flow and pack analysis. The options are extensive but all are supplied with default values. You may want to change the maximum pressure and flow rate figures to suit a specific machine. You can also change temperature and fill time values, and toggle options like co-injection and fibre orientation in and out with a click of the mouse. You can also define

injection velocity and pressure profiles by entering co-ordinates in a table or using the mouse to drop points on a graph.

Cooling conditions are handled in the same way. Candidates for change include coolant temperature and flow rate, and the mould open time. Now choose one or more injection points by clicking on the model. The point will snap to the nearest node on the mesh. Gates can be valved or open. You have already done enough for a basic analysis or you can go on at this point to model feed systems and cooling channels using beam elements.

Running the analysis is just a matter of clicking an icon and selecting the type

– flow/pack, cool or warp. You can analyse a single project or batch a number of projects to run overnight or at the weekend for example. When the analysis runs, a DOS-style window opens to show the progress through the various stages. This window closes automatically when analysis is complete. Now read in the results file, and the display defaults to a colour-shaded plot of time at the melt front. As before, you can rotate, pan and zoom to examine every aspect of the part. And if you want to use it, you have a great deal of control over lighting, colours and shading. You can also animate the displays or freeze them at any intermediate stage by means of a slider control.

### Extensive results

The result set is extensive. For flow analysis the plots include times, temperatures (mid, average, bulk, melt front, increase), pressures, shear stresses and rates, volume shrinkage and cooling time. A gate location priority index suggests an optimum injection position and the plots can be overlaid with indicators for weld lines, air traps, velocity vectors, and fibre orientations in the skin and core regions.

Finally you will want to record your results and share them with clients and partners in the project development chain. SIMPOE-MOLD includes a basic report generator that combines the analysis log file with your preamble and comments, plus your own selection of the available graphs and results plots. Choosing these is just a matter of clicking the appropriate selection boxes. The report is output in HTML format which means that it can be read by anyone who has a web browser.

To fulfil its mission to democratise moulding simulation, SIMPOE-MOLD must be easy for plastics-savvy people to learn and use. I found I was able to get results straight out of the box, and with barely a glance at the user manual. I would have had to put in more work though, before I could model feed systems and cooling

## SOFTWARE DIRECTORY

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Fax: 01386 792154  
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Web site: www.selteksolutions.co.uk  
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channels, or fully understand all the parameters and options.

The software passed the usability test but I would not recommend my test approach for industrial use. Optimising moulds and mouldings is mission-critical work and it makes sense to invest a little time and effort in learning the finer points of the software. To help with that, SIMPOE-MOLD comes with sample models and meshes, a basic animated browser-based tutorial, and a 142 page user manual that is certainly serviceable but could perhaps

benefit from further development and a tidying up of the text.

The SIMPOE company is a little over a year old and is based in the eastern suburbs of Paris, near Marne-la-Vallée and EuroDisney. It also has offices in Taiwan and Italy, and is setting up networks of value-added resellers. Further support will come from certified training centres and consulting partners. SIMPOE is not currently represented in the UK but is open to approaches and in the meantime, what could be better than a little training in Paris?

**What's New on the Web by Clive Maier (cmaier@btconnect.com)****Distrupol**

Polymer distributor Distrupol has upgraded and enhanced its web site to provide more practical design information with faster and more intuitive navigation. The existing Product Information Centre has now been augmented by three new centres. The Processing Centre provides detailed processing information, along with simple guides on such topics as injection moulding troubleshooting and machine selection. The Quality Centre offers information down loads on environmental, quality, and health and safety policies and ISO certificates. And from the Training Centre, Distrupol offers a wide range of training programmes. Topics include polymer performance, material selection, designing with plastics, production optimisation, industry requirements, and much more. Other site content includes down loadable presentations and 'useful stuff' for engineers and designers.

[www.distrupol.com](http://www.distrupol.com)

**DSM Akulon PA6 Technical Center**

DSM Engineering Plastics has set up a technical centre for its Akulon Polyamide 6 materials on the Omnexus website platform. The PA6 Technical Center focuses on creative solutions, innovative designs and productivity opportunities that Akulon polyamide 6 offers in the industrial and consumer goods sectors, particularly in the automotive, electrical and electronic, and sports and leisure areas. Among the tools for designers and engineers is an interactive part cost optimisation simulator. Other features include an extensive application gallery, case study solution data sheets, design innovation insights, and on-line design and technical assistance.

<http://omnexus.com/tc/pa6-injection/index.aspx>

**Mason Pinder Toolmakers**

The new site is driven by a content management system which ensures easy and instant updating whenever there is new or changed material to be added. Site visitors can find the latest

news about the company's products and services, learn about the techniques of automation, down load literature, specifications, capacity details and newsletters, and access a variety of information about all types of tool making services. New services featured on the site include global tool sourcing, automation engineering services and plastics process management consultancy. The web site includes case histories in packaging and automotive engineering, and details about cutting production costs, tool suite management, and methods of reducing lead times. The site also covers Mason Pinder's maintenance, refurbishment and modification services. The company's secure FTP site for managing customer data continues unchanged.

[www.masonpinder.co.uk](http://www.masonpinder.co.uk)

**ICS Cool Energy**

Industrial cooling company ICS Cool Energy, formed last July by the merger of ICS and Cool Energy, has a rebuilt web site to reflect the changes. Site visitors can view and select chillers on-line as well as down load technical information and receive advice directly from company engineers. The site will be updated frequently with monthly chiller bulletins, used equipment listings, rental products and industry news. Future plans include video down loads of product demonstrations and on-line ordering.

[www.industrialcooling.co.uk](http://www.industrialcooling.co.uk)

**Mold-Masters**

Mold-Masters has completely redesigned its web site but you will need to install the Macromedia Flash Player 8 before you use it. Using the URL of the Mold-Masters news page announcing the new site, it proved impossible to get in without the latest Flash player. It is difficult to imagine a more unwelcoming experience. Key site sections include product solutions, case studies and the customer support centre. Tools include the Merlin on-line design and ordering system and the Quote Assistant. Product CAD drawings can be down loaded in 2D and 3D formats, and you can also access the Mold-Masters Design Bulletin.

[www.en.moldmasters.com](http://www.en.moldmasters.com)

## PMMDA and BPF to set up support group for small processors

LAST year the PMMDA announced its intention to offer small processing companies the opportunity to benefit from being a member of an industry organisation. The aim was to attract small companies who were not already members of other plastics organisations and who believed they were too small or too busy to consider membership of such an organisation – or that the membership subscriptions were too expensive.

At the time the British Plastics Federation expressed concern over this action as it saw itself as the representative of UK processors. To eliminate any confusion the PMMDA has been working with the BPF to move this idea forward with the creation of a Small Processor Group through collaboration

from both organisations. The target membership of this group will be processing companies with a turnover of less than £1 million. The services offered and subscription levels have been set to reflect this.

The group will be run by the BPF and supported by the PMMDA with the PMMDA providing Small Processor Group members with information and support on machinery, health and safety, energy efficiency etc. The PMMDA will also offer updates of an informal nature on machinery-related issues which may affect or concern processors.

The BPF will be offering a range

### It's a risky business, but you can manage it

MANAGING risk is becoming an increasingly important discipline for businesses. Risk has always been a part of business. Whether making an investment in a new technology or taking on a new supplier, there is an element of risk in more or less every business decision. Standards have traditionally been used as part of the tool kit to reduce risk. ISO 14001, for example, helps companies manage environmental risks, while BS ISO/IEC 27001 (formerly BS 7799) offers business a clear way to mitigate risks in information security.

However, with a year like last year that saw the London terrorist bombings, hurricanes Katrina and Wilma and a major oil depot explosion just north of London, it's hardly surprising that the broad subjects of risk management, disaster recovery and business continuity management moved back on to the business pages of the nation's media. Despite this heightened awareness, businesses are still putting themselves at unnecessary risk by failing to prepare thoroughly for IT or supply chain failure, according to a recent study commissioned by BSI in the UK.

Research shows that many busi-

nesses know that having standards could help, but fail to act accordingly: 87 per cent of senior business decision makers agreed that, with increased reliance on out-sourcing, standards are more important than ever because they enable businesses to have confidence in the way sub-contractors work.

Even business-disrupting events do not necessarily provoke an urgent response. According to a recent survey from the Business Continuity Institute, only 40 per cent of City-based firms in London invoked a business continuity plan as a result of the attacks of July 7, 2005.

Are you ready? For more information on BSI's work in risk management, visit [www.bsi-global.com/Risk](http://www.bsi-global.com/Risk), where you can download a copy of *The Risk Management Universe: A Guided Tour*, an information leaflet describing a new book that brings together leading experts from various risk management fields, to describe current best practice and point to future developments. This article has been reproduced by kind permission of BSI Group. To read it in full please visit [www.BusinessStandards.com](http://www.BusinessStandards.com).

Businesses know that having standards could help, but fail to act accordingly: 87 per cent of senior business decision makers agreed that, with increased reliance on out-sourcing, standards are more important than ever because they enable businesses to have confidence in the way sub-contractors work.

To view all the free leaflets available for the Plastics Industry visit [www.hse.gov.uk/pubns/plasindx.htm](http://www.hse.gov.uk/pubns/plasindx.htm).

### Managing machinery safety in small plastics factories

The Health & Safety Executive in consultation with the Plastics Processors Health & Safety Liaison Committee, of which the PMMDA is a member, publishes a number of information sheets to help guide plastics industry producers in better health and safety management. One such publication is *Managing Machinery Safety in Small Plastics Factories*. The publication outlines the necessity to actively manage safety to prevent accidents, and describes a simple system for doing so. Use of such a system complies with regulations 5 and 6 of the Provision and Use of Work Equipment Regulations 1998 (PUWER 98) which related to the maintenance and inspection of machinery safeguards.

The Processing Fact Sheet covers why accidents happen when using plastics machinery as well as what you need to do to protect your work force. Since 1992 all machinery supplied into the UK market should comply with the Machinery Directive and have sufficient safeguarding facilities in place to protect the user. The information sheet gives clear details on how you can prevent accidents in your own factory by assessing risks – possibly created by your own work force.

All this may sound daunting for a small company without the benefit of specialist staff, but the 15 sheets available from the HSE provide the conclusions of generic risk assessments. They detail acceptable safeguarding requirements, contain checklists and describe safe setting procedures where relevant.

To view all the free leaflets available for the Plastics Industry visit [www.hse.gov.uk/pubns/plasindx.htm](http://www.hse.gov.uk/pubns/plasindx.htm).

### Service engineers' safe working procedures

This publication was created and adopted by a working group of injection moulding machinery suppliers – Arburg, Demag Hamilton, Engel, Krauss Maffei, Negri Bossi and Boy – with a view to providing an industry standard by which service engineers conduct themselves.

The guide outlines health and safety policy on working hours, driver fatigue and mobile phone use in vehicles. It covers site arrival and departure procedures including risk assessment and reporting procedures while on site.

Risk assessment for service operations, personal protection and control of hazards and work at heights are also important issues covered.

Although created by injection moulding machinery suppliers, all PMMDA members have been encouraged to adopt the practices outlined in the document, thereby setting a standard for the industry as a whole.

Other service providers and processors may also benefit from the knowledge and guidelines.

The 13 page guide is available on-line at [www.pmmda.org.uk](http://www.pmmda.org.uk) or in hard copy by contacting the PMMDA on 0870 241 1474.

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