

ADVERTISEMENT FEATURE

## Designer chairs choose RTM for quality Finnish

In Finland, Top-Hill Ltd is a pioneer of closed mould technology which began with Kenny Gauffin, Plastech's distributor to Finland, Norway and Sweden assisting them with their first Light RTM production moulds. Two years ago Top-Hill took up a challenge offered by SHL Design (Denmark) through the Finnish company Piironen Furniture. SHL Design was searching for a subcontractor to combine metal with other materials. As a result of the teamwork between these companies, serial production of transparent 'Flakes' chairs and tables of fabricated plastic components, combined with metal began. These furniture pieces were designed by SHL Design for the Danish Århus Art Museum (AROS).

The look of Flakes chairs and tables can be varied by combining them with different, extravagant Finnish Marimekko prints. The Flakes-chair has textiles moulded into the seat-component.

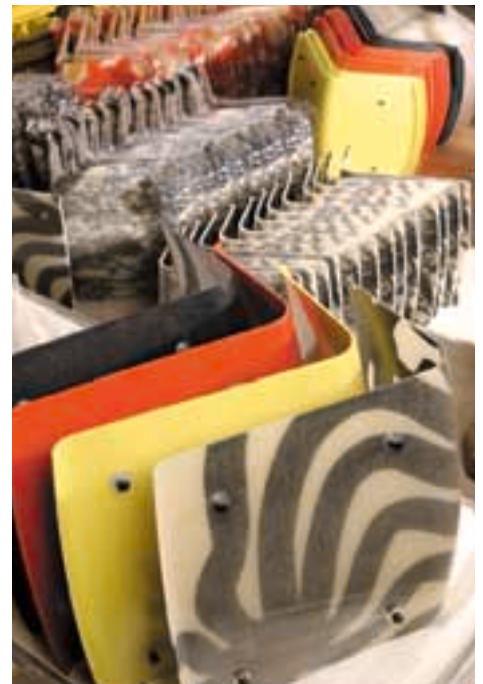
The design of the furniture and the high technical specification demanded that the finished product would require the precise location of inserts for fixing the moulded parts to the chair's frame. These inserts were held in place on the water-heated mould using six pneumatic insert holders. The high dimensional stability required for such a quality product meant that the only possible way to manufacture the chairs was by RTM. From the CNC cut master through to mould build, Plastech's

specification was followed closely, with their mould clamping system and mould accessories used throughout the project. This attention to detail only goes to prove that taking shortcuts when designing and building closed moulds is not a viable option. The finished mould has proved the perfect solution, giving Top-Hill the freedom of choice with matrix and reinforcement allowing 100% control when design change so dictates. The finished seat has a high quality finish on both surfaces, with the final trimming process being carried out by robot.

The transparency required for the Flakes-chair was a real challenge to Top-Hill and the product development team carried out a lot of research trying to find the right mix of resin for the component. The importance of sterile, dust free working conditions is imperative in achieving the perfect transparent product.

Flakes-chairs and tables have proved a success in Finland and abroad. Top-Hill estimates serial production to exceed 10,000 Flakes-chairs per year. The Flakes-collection continues to grow in order to better serve the demands of interior designers worldwide.

Further tooling is currently being made for a wider range of furniture, but Top-Hill are also using the same mould build techniques for the manufacture of high-tech parts for a range of Finnish industries.

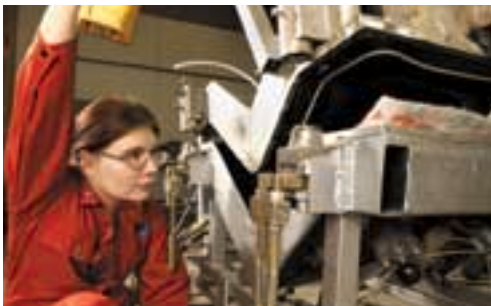


Moulded seats with inserts

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Loading the mould with care



Mouldings trimmed by robot



The Flakes-chair

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# LRTM secrets revealed at Russian seminar



Alan Harper outside the Seminar venue in the cold

The production of composite parts using the LRTM process: The theory, practice, and economics - was the title of the training seminar organized by 'Group of Companies Composite' that took place in Saint-Petersburg, Russia between the 14th and 18th February this year.

The idea for this kind of seminar was conceived long ago as the Russian market has a huge potential requirement for composite products. Composite technologies had already started to develop in Russia during Soviet times, but due to economic reasons this development ceased when the Soviet Union broke up. Many plants in Russia reduced their level of production output, or stopped the whole production process altogether.

Russia now sees a new wave of development throughout the composites industry, but much of the technology that was once widely used has been forgotten by the mass producers and the knowledge and experience prevalent in this field has been lost. The LRTM seminar was just one of the steps being taken to revive and rejuvenate the composites industry in Russia.

The intention of the seminar was to transfer knowledge of the LRTM process to delegates through the expertise and experience of a visiting expert in the field.

The schedule of the seminar was based upon a combination of theory and practical within a relaxed atmosphere and open discussion.

The participants at the seminar were all representatives of large companies

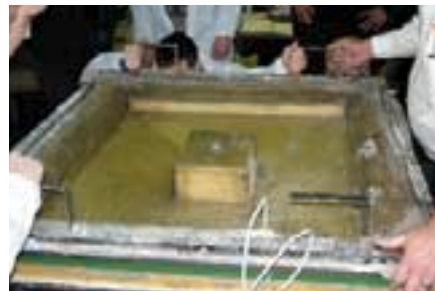
from either Russia, or ex-USSR countries who already had some experience of the production of composite parts, but wanted to optimize the production process.

Alan Harper, the managing director of Plastech TT, a company respected worldwide who specialise in the closed mould process, demonstrated to the participants the 'secrets' of the LRTM process: how to build the moulds; which materials to choose and which equipment and accessories are best used to ensure a successful outcome.



Enthusiastic delegates assist in 1m<sup>2</sup> mould build

With hands-on help from the delegates, a 1m<sup>2</sup> LRTM mould was completed during the course, from the important



calibration stages through to the lamination of the second mould half. Delegates could then see for themselves the details of the LRTM process in practice as Mr. Harper

carried out a live injection using one of Plastech's Megaject Sprinter (SSB) units to inject the 1m<sup>2</sup> mould.



The seminar was organised with the support of such well-known composite materials producers as ASHLAND and AHLSTROM both being experts in FRP materials.

One of the important points discussed during the event was the economic aspect of using LRTM technology. It was considered that one of the reasons why modern technologies are not taken up in Russia more often was that there is a general opinion that these technologies are very expensive and therefore not profitable. Seminar delegates were told that by using the correct materials and the appropriate equipment for the process, material waste is reduced and a constant quality of product is achieved. It also increases production output. In essence this easily justifies the relatively low investment, making LRTM a commercially viable process for Russian producers.

Delegates' comments give confirmation of the high quality of the seminar and how well it was received:

- "During the first day I had already seen how many mistakes we have been making"! "We will be working in a different way from now on".

- "I appreciate Alan's input in the seminar and for his useful and detailed advice, I now see how attention to detail mostly determines the result".

- "As usual, the seminar at 'Composite' company was perfectly organized and Alan Harper's presence made it invaluable".

# TILLETT Racing ahead with carbon fibre automotive components



Tillett Racing seats have been trading since 1986 producing seats for the kart market. In 1994 they decided to produce a range of kart seats by RTM and to this end attended one of Plastech's RTM Tool Training courses which they found extremely informative and provided the company with a springboard into the world of large volume composite moulding. Tilletts currently produce 18,000 kart seats per year.



Three years ago, the company decided to branch out into the mainstream automotive market by producing lightweight composite components for production sports cars. Steve Elliot, Development Manager at

Tillett Racing explained how being exporters of kart seats the company have over the years had to develop a very lean manufacturing ethos to remain competitive. Coming to this market from a rather unique position



*Temperature controlled LRTM carbon fibre wing mould*

flexibility through fibre choice and orientation, allowing us to design carbon components that will not disintegrate into razor-sharp shards in the event of an accident."

"Looking back over the last 11 years and reviewing Tillett Racing's developments in the closed mould process, it is clear that our confidence in Plastech's resin injection machines and the reliability of their tooling accessories has remained constant."

"Long may it continue," concluded Steve.

they have now carried these principles through to a market predominantly occupied by companies who are used to producing small numbers of mouldings using pre-preg.

The use of RTM, RTM light and infusion under semi-rigid back tools removes the need for expensive 'bagging' materials; gives the component two high gloss 'A' sides and improves repeatability whereby the components now produced are of a weight comparable to the pre-preg components they replace.

"As the processes we have adopted use dry reinforcements" said Steve, "we now have a greater degree of

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## Honorary Master of Engineering Degree for Alan Harper

In December 2004, the University of Plymouth awarded Alan Harper an honorary Master of Engineering degree. The formal citation noted that Alan has done much to help the reinforced plastics / composites industry advance from its historically labour-intensive, variable quality technologies, towards automation, improved quality and vastly improved health and safety, which arise from the use of closed moulding technology.

This was in recognition of Plastech's long association with the university's Advanced Composites Manufacturing Centre, through 3 Teaching Company Programmes, student placements and the company's commitment to education and training.



# What's New - Plastec

## Water based flushing system - clears your head completely

It is surely most composite company's dream to find equipment which does not require the use of highly flammable solvent cleaners to flush their meter mix machine heads. The introduction of Plastech's new Non Solvent flushing system, the SP3-NSH model now provides the answer by offering complete control and pre-conditioning of water based cleaners. The new equipment offered by Plastech is specifically designed to efficiently handle Mulder Hardenberg's RST-5, a safe water based cleaner that gives excellent mixing head and Autosprue cleaning after each injection cycle.

Accurate temperature control at 45°C and an efficient, chemically resistant system is necessary if the full benefit of the RST-5 cleaner is to be gained for use in internal mixing head systems.

Faced with these requirements Plastech set about the further development of their successful, non pressurised SP3 solvent tank system. The first task was to completely redesign the submerged 200cc solvent pump in stainless steel, as other ferrous

metals and screws were found to be severely attacked by the environmentally safe RST-5 solution.

The second entailed designing a robust, safe, low wattage electrical tank heating system to bring the cleaner to its most effective working temperature of 45°C. Static submerged heaters were first trialled but gave poor uneven heating of the full 25 litre tank's contents. Various heater options were tested until a compact and elegant solution was found by introducing the heat control externally. This comprised a chemically resistant heating tube through which the cleaner flows with intrinsically safe external heating elements 'printed' on its surface. All that remained was to circulate the cleaner between the tank and the external heated unit.

The cut away illustration of the new SP3-NSH tank shows the submerged, hermetically sealed pump that generates the rapid fluid recirculation required, providing the optimum even operating temperature of the RST-5 cleaner.

A further novel feature of the new system is that it actually creates a hot, pressurised foam from the RST-5 on each 150-200cc shot delivered to the machine's mixing head, but not to the tank. This, it has been determined is more efficient than simply pressurising the liquid alone. The automatic feature of the basic SP3 pump that flushes first with the cleaner then finishes the cycle with clean air to dry out the pipe work and mixing head, provides an ideal sequence of operation when using this water based cleaner.

The complete SP3-NSH system now available is a further step towards the reduction in the levels of hazardous chemicals used in the workplace whilst reducing the cost of cleaners not only through solvent/cleaner price comparison, but also by lowering the costs involved in disposing of the residue after use.

The new safe, effective and economic RST-5 solution handling equipment will be demonstrated on Plastech's JEC stand C20/D35.

## Demand for Resin Catchpots gets bigger

Simple yet obvious best describes Plastech's new range of single and multi channel Resin Vacuum Catchpots. The latter offer the answer to many



moulders' constant wish to have a single resin vacuum reservoir at a realistically low cost. The new device eliminates the use of multiple vacuum catchpots presently used for Light RTM production moulding on large surface area moulds.

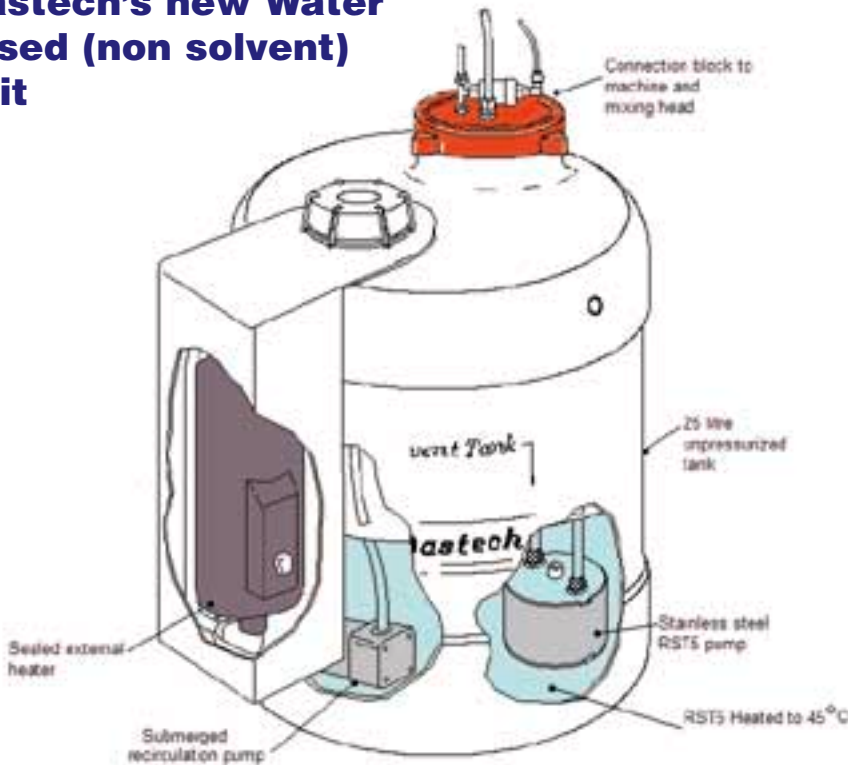
The Multi Channel Large Catchpot offers:

- A glass sealed window allowing observation of internal resin levels whilst the unit is under vacuum offers moulders' a complete answer to replace the unacceptable, transparent plastic lids that last no more than a week before styrene attack renders them useless in terms of clarity.
- Top rim fixed vacuum seal.
- Internally they offer sufficient capacity to accept a conventional, removable/replaceable 10 litre plastic bucket.
- Supplied as standard with four inlet fittings for 6mm bleed pipes, but can accept 10mm bleed pipe fittings. The large Catchpot can be configured for up to 12 channel bleeds upon request.



# h's JEC Showcase

## Plastech's new Water based (non solvent) unit



25 litre RST-5 heat controlled tank

## Microcontrollers provide intelligent security at low cost

Plastech have introduced new microcontroller based systems for their range of resin injection machines. These provide highly reliable intelligent control at a fraction of

the cost of traditional PLC systems.

Plastech's design team has written their own bespoke software enabling the microcontrollers to control a new generation of composite machinery. The new electronic packages are smaller than a box of matches, are rugged and consume very little power. Their application however on the machines' control is staggering in terms of computing power, allowing greater security and reliability at a low cost.

The company's utilisation of these advances in the state of the art electronic technology make it financially feasible to introduce intelligent control to even their lowest cost machine model.

An example of this is their new intelligent system that provides the operator with accurate alarm conditions of resin gel time.

This not only monitors the safe working time of the mixed resin system but also monitors resin flow rate and constantly computes safety margins before switching to different alarm conditions to provide greater machine use security.

These systems run safely on an internal 9 volt battery which automatically powers up when needed. When not in use the system remains in sleep mode conserving energy for months.



# Who says split LRTM tooling is challenging!

It is often necessary to mould components using split sectional moulds due to the product's design having more than one draft axis. This is not ideal for any composite tooling system as it brings with it concerns over tool wear and longevity at split edges. For Vacuum sealed Light RTM moulds it becomes an even more daunting task as further concern is focussed on the integrity of the seals.

Presented with these challenges Plastech has developed tooling philosophies and a seal design which go a long way to eliminate these fears.

NTF (India) Private Company of Manesar, Gurgaon near New Delhi presented Plastech with the most challenging of tooling design requirements when the Maruti Gypsy hardtop had to be re-tooled using the latest technology advances in RTM as their original RTM tooling had worn out. The side mouldings and rear roof section between them, presented 8 draft axes to be designed into the production tooling. - In addition the three components also have a combined total of 6 major foam cores.

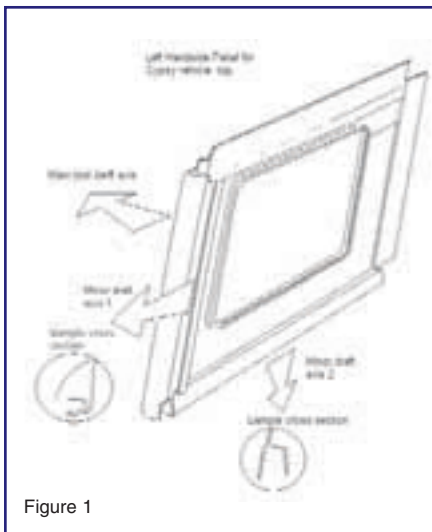


Figure 1

Reviewing the general cross sections for one of the side panels (Figure 1) it is obvious that the two minor sections are in direct opposition to the general tool draft opening axis.

Two removable sectional tools are therefore required to align and seal with the main tool faces as illustrated. From experience it has become our philosophy with Light RTM to contain all side action tooling within the main tool's peripheral vacuum seal zone. This is so that more complex sectional tools do not need to have seals which interfere with, or need to join the main mould's peripheral edge seals. Under such circumstances this provides a far more

reliable and practical solution to production needs.

In order to prevent the resin from penetrating behind the side action sectional tools, a new design of seal is employed. This comprises a silicon section which is sufficiently compliant to follow edge curves yet robust enough to form the moulding surface.



Face mould lower side action tool illustrating seal positioned on complete border

The combination of seal design and philosophy allows complex sectional tooling to work well, and provide exceptional life and seal efficiency within the confines of a LRTM production moulding environment. Each section of the tool is built to carry the seal profile right onto the jointing edge thus providing a soft engagement to the mother mould's surface against which it is clamped. By doing so, no resin can penetrate behind it; it also avoids any vulnerable, sharp edged interface within the composite tool. The sectional tools are either naturally positioned in sockets within the mother mould, or are fixed through the mould face using self sealing clamps for extra



Rear side action tool extraction from part

vacuum security. These are operated from the exterior of the tool where normal atmospheric conditions prevail.

The obvious advantage of flash-less joint lines cannot be underestimated. Use of Plastech's tooling joint line seal development now offers clients the possibility to enhance the product cosmetically on the face side where there is always a desire to mould without the need to de-flash, especially in the case of gel coat finished parts.



Lower side action tool extraction from part

All aspects of Plastech's latest closed mould technology are taught in depth during the theoretical and practical sessions of their 'Closed Mould Manufacture and Technology' courses. Comprehensive notes covering these tool build techniques are issued to all delegates. - The next course will be held in the UK on the 18 -19th May 2005.

NTF (India) Pvt Ltd is India's foremost closed mould manufacturing company, supplying to the mass production automotive, railway, medical and wind energy sectors. Navain Jain, NTF's CEO said that NTF are now fully equipped with a range of Plastech's latest RTM equipment and technology - which include PLC controlled machines and presses and technical staff fully trained in all aspects of composite closed mould building and operation. As a consequence the company feels even stronger and are advancing their expansion programme to meet India's unprecedented demand for composite products. With the composite industrial growth rate currently put at 20% pa. NTF are rapidly becoming a major exporter of composite mouldings.

NTF (India) will be exhibiting at the JEC this year on stand L15 Hall 1.

# NEWS

## SeaRay join an international group of composites' suppliers in providing a Sustainable Relief Initiative for Tsunami fishermen

Along with tremendous loss of life, the decimation of the fishing industry on an unimaginable scale in the Tsunami affected region still demands a response in the form of sustainable aid from world governments and their people.



*Gimbed face mould is calibrated in readiness for second mould half manufacture*

Mindful of these unprecedented horrors, Alan Harper of Plastech contacted friends and colleagues within the composites' industry with the idea of setting up a project that could provide technology to manufacture boats, employment and hope for the fishermen of Sri Lanka. The positive nature and speed of uptake demonstrated by the composite material suppliers was understandable but still remarkable, when in January of this year they joined Plastech in their initiative to form a composite group to respond to the urgent need to provide sustainable relief for the hard hit fishing industry.

From the outset, Plastech never considered that the pledge of 4 resin injection machines, equipment and the start up materials pledged by the group was anything other than sufficient to provide assistance to a small sector of the disaster area's needs. They did however feel that by giving the latest closed mould technology that a truly sustainable form of aid would come to fruition.

Now SeaRay Boats a division of the Brunswick Corporation, USA has offered a pledge of support for mould and master pattern production costs.

Concerns over these additional costs, not previously included in the initiative, have now been allayed.

Pictured is the first demonstrator LRTM mould for the production of a 14.6 foot Dory style craft which it is hoped will be completed by the beginning of April. After initial trial injections at Plastech's Manufacturing and Technology Centre in the UK the first hull will be flown out to Sri Lanka for the local fishermen to trial whilst further work continues in the UK to complete closed moulds for the top and inner deck mouldings.

Regardless of the time and effort put into mould production by a dedicated team, the design of the hull may or may not be fully accepted by all fishermen throughout the different regions affected. The primary objective after the production run of the first 50 boats

manufactured from the pledged tooling and materials is to demonstrate a new technology to the region. Primarily this will provide undisputed proof to an understandably suspicious local fishing community of the superior quality and consistency of product that the new technology brings. In so doing moulders based in Colombo, Sri Lanka and the South Eastern coastal region of India are already keen to take part. Most of the local composite fishing boat requirements are currently made

by hand lay, however when presented with the massive demand for so many new vessels that the Tsunami disaster has brought, they are quick to appreciate the potential of a much higher production rate and higher quality of moulding that closed mould production systems can offer.

As we go to press, Plastech can confirm that they are filing a petition to the European Parliament for additional financial support, as demand on the aid pledged is rapidly outstripping the resources available. According to reports from Brussels week ending 11th March 2005, Tsunami relief and sustainable re-development of the fishing fleets of the Indian Ocean rim countries are firmly on the European Parliament's agenda.

Plastech, on behalf of the Tsunami affected fishing communities, acknowledge and thank the following companies from the composite's community for their pledges.

<b>USA</b>	-	<b>AOC, Axel, Brunswick and Nidacore</b>
<b>UK</b>	-	<b>Scott Bader</b>
<b>France</b>	-	<b>Nord Composites</b>
<b>South Africa</b>	-	<b>Saertex</b>
<b>Sweden</b>	-	<b>Andos/Norac</b>

● Plastech also extend publicly the same statement of thanks to another composite material supplier and pledge provider who wish to remain anonymous.



*The master pattern and mould in Plastech's workshop.*

## Some important dates for your diary ...

Event	Date	Location
JEC Composites Show 2005	5th, 6th & 7th April 2005	Hall 1, Paris Expo, France
Composites Processing 2005	21st April 2005	Stoke-on-Trent, UK www.composites-proc-assoc.co.uk
Plastech Light RTM Training Course	18th & 19th May 2005	Cornwall, UK Contact Kim on Tel: + 44 (0) 1822 832621 kim.harper@plastech.co.uk for details
RP Asia 2005	25th & 26th August 2005	Shangri-La, Bangkok, Thailand www.rpasia.com
Plastech Light RTM Training Course	Autumn/Winter 2005	Cornwall, UK Contact Kim on Tel: + 44 (0) 1822 832621 kim.harper@plastech.co.uk for details

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