

DESIGN INNOVATION IN ROTATIONAL MOULDING

Wednesday 19th May 2010



Design Innovation in Rotational Moulding At PDM10 Exhibition

Wednesday 19th May 2010
Telford International Centre, Telford, Shropshire

SEMINAR PROGRAMME

- 10.25** **Chairman Introduction:** Martin Spencer, Rototek
- 10.30** **Overview of Rotational Moulding**
Nick Henwood – 493K
- Design Consideration
 - Process Control
 - Repeatability of Process
- 11.00** **Materials available to the Rotomoulder**
John Steele – ICO Polymers
- Most commonly used materials
 - Comparative Properties
 - Alternative materials used by progressive Rotomoulders
- 11.30** **Design bugs out.....**
Ian Thompson – Kinneir Dufort
- 12.00** **Coffee Break**
- 12.15** **Adding value by innovative design in rotomoulding**
Aldo Quaratino – Matrix Polymers
- 12.45** **New Surface Treatments**
Matteo Cortesi – Persico
- 13.05** **Moulding Graphics**
Peter Clark – MIG
- 13.25** **Recycling and Rotomoulding**
Mark Roberts – Linpac Recycling
- Availability of Raw materials
- 13.45** **Discussion**
- 14.00** **Close of Seminar**

Delegate List

Design Innovation in Rotational Moulding At PDM10 Exhibition

Wednesday 19th May 2010

Telford International Centre, Telford, Shropshire

Name	Company
Mr Darren Beevor	Polypipe Building Products
Mr Tony Bunting	Amber Plastics Ltd
Mr Fabricio Castilho	Omya International
Mr Peter Clark	Mould in Graphics
Mr Colin Clements	Caledonian Industries Ltd
Mr Jonathan Concannon	JFC Manufacturing
Mr Matteo Cortesi	Persico
Mr Mark Del Canto	Industrial Plastics Limited
Mr Rod Dix	Orchid Plastics Ltd
Mrs Karen Drinkwater	JSC Rotational Ltd
Mr Mark Drinkwater	JSC Rotational Ltd
Mr Sean Dunleavy	JFC Manufacturing
Mr Paul Eustace	Lucite International
Mr Tom Fleming	Corilla Plastics
Mr Colin Gausden	Angal Ltd
Mr Graham Goodwin	Amber Plastics Ltd
Mr Roger Hardy	Amberol Ltd
Mr Nick Henwood	493K International
Mr Jason Hinch	Francis Ward
Miss Beth Holden	WSP Group
Mr Rob Johnston	Alliance Tooling
Mr Henry Jones	Jonesco (Preston) Ltd
Mr Dhrupal Joshi	British Plastics Federation
Miss Judith N Kipling	Nottingham Trent University
Mr Gavin Lewis	Omya International
Mr Peter Luxford	493K International
Mr Graham Mackereth	Pyranha Mouldings Ltd
Mr Peter Mackereth	Pyranha Mouldings Ltd
Mr Matt Miles	London Associates
Mr Brian O'Rourke	Matrix Polymers
Mr Mark Perry	JFC Manufacturing
Mr Aldo Quaratino	Matrix Polymers

Mr Mark Roberts	Linpac Recycling
Mr Alan Rolf	Angal Ltd
Mr George Ross	Balmoral Tanks Ltd
Mr Luca Sacchi	Polivinil Rotomachinery Group
Mr Paul Shipton	Plastics Consultancy Services
Mr Ray Simpson	Matrix Polymers
Mrs Sandra Smith	
Mr Stephen Smith	JFC Manufacturing
Mr Martin Spencer	Rototek
Mr John Steele	ICO Polymers
Mr Richard Taylor	Pyranha Mouldings Ltd
Mr Ian Thompson	Kinneir Dufort
Mr Richard Venables	Rapra Ltd
Mr Mike Woolley	Grolman Ltd
Mr Stuart Wright	Rototek
Mr Jonathan Wurr	Francis Ward

Delegate List as at 17th May 2010

Overview of Rotational Moulding

Nick Henwood, 493K

Presentation slides not available at time of going to print




Design Innovation in Rotational Moulding

Wednesday 19th May, 2010

“Materials available to the Rotomoulder”





The 19th Leading Plastics Trade Event
Print or Present | www.bpf.co.uk





Sections

1. Rotomoulding - a zero shear process
2. Most common materials used
3. Alternative materials used by innovative moulders
4. Comparative properties
5. Application examples

The 19th Leading Plastics Trade Event
Print or Present | www.bpf.co.uk





[HOME](#)
[COMPANY](#)
[QUALITY](#)
[SOLUTIONS](#)
[CAREER](#)
[CONTACT](#)
[SOLUTIONS](#)
[SOLUTIONS](#)

YOUR REGION & PRODUCT FAMILY
Please select a region & product family from the list below to continue.

Asia/Europe
[Engineering Plastics](#)
[Automotive](#)
[Packaging](#)

Europe
[Engineering Plastics](#)
[Automotive](#)
[Packaging](#)

Latin America
[Engineering Plastics](#)
[Automotive](#)
[Packaging](#)



TECHNICAL COMPETENCE...

to manufacture films, sheets, containers, components and more.

LEARN MORE





STRATEGY
A clear and concise vision for the future of the company.

INSPIRED
A clear and concise vision for the future of the company.

ACQUISITION
A clear and concise vision for the future of the company.

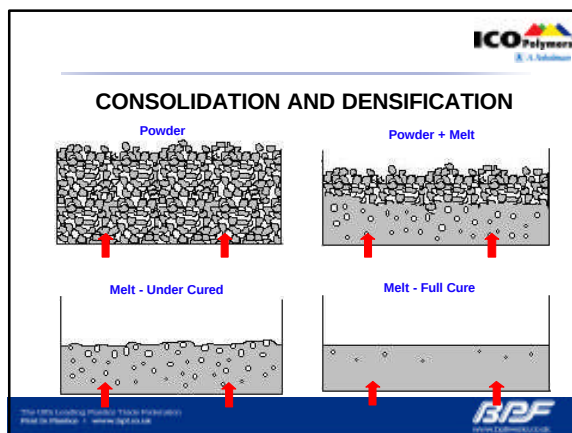
A. Schulman, Inc. All Rights Reserved
[Privacy Policy](#) | [Terms of Use](#) | [Contact Us](#)

Inspired by your vision.



Rotomoulding - a zero shear process

- Video inside tool
- Powder sintering process
- Ductile polymeric end products





Undercured - High Porosity
Brittle Failure

**-40C Impact
Performance**



Well Cured - Low Porosity
Ductile Failure

The 100% Low Density Polyethylene (LDPE) Plastic Processed
Printed in Plastic - www.bpf.co.uk

BPF
www.bpf.co.uk

Most common materials used



The 100% Low Density Polyethylene (LDPE) Plastic Processed
Printed in Plastic - www.bpf.co.uk

BPF
www.bpf.co.uk

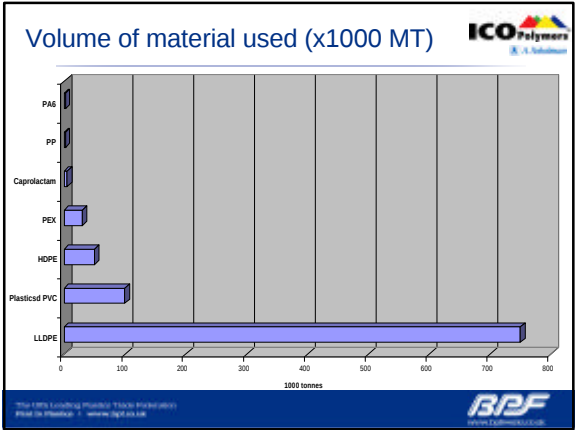
Most commonly used materials...

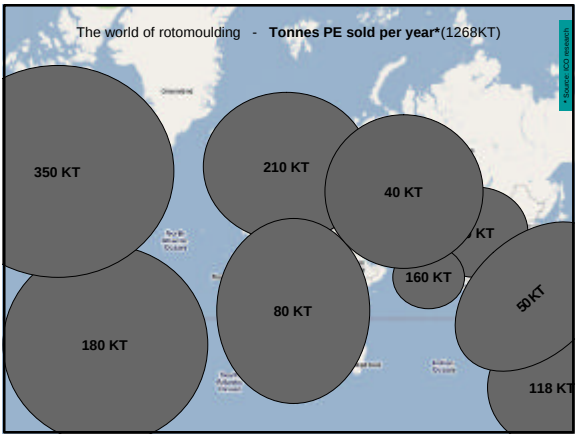


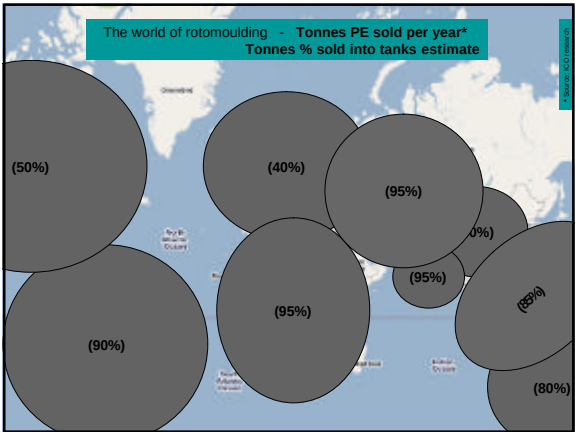
- There are many different types of plastic in the world but generally only **semi-crystalline** types are useful in rotomoulding. Why? Because rotomoulding has a very severe HEAT degradation effect on polymers and rotomoulding needs the plastic to quickly coalesce under ZERO SHEAR (no external applied pressure).

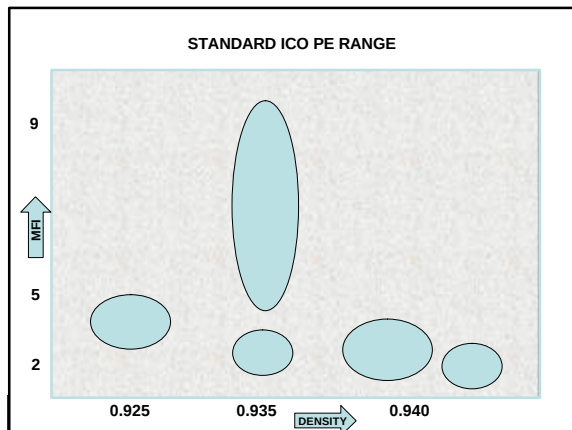
The 100% Low Density Polyethylene (LDPE) Plastic Processed
Printed in Plastic - www.bpf.co.uk

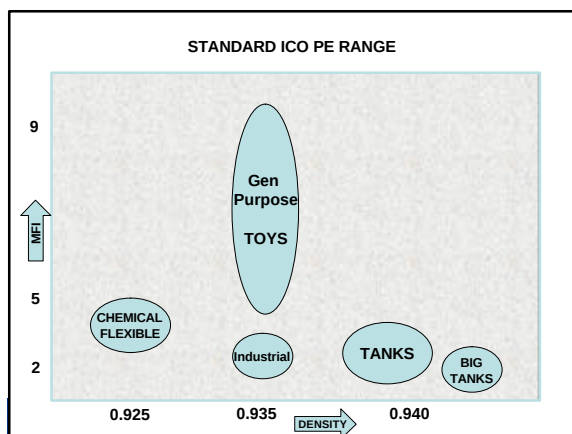
BPF
www.bpf.co.uk

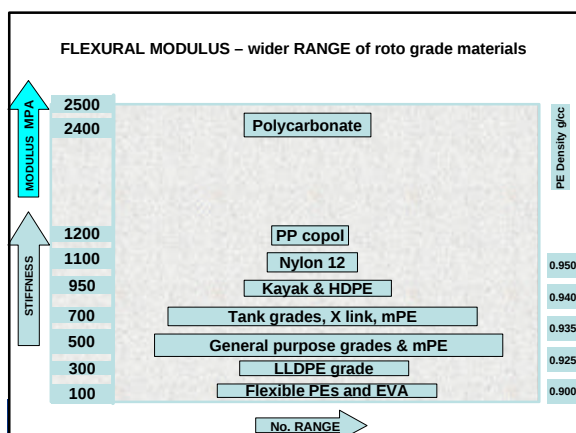


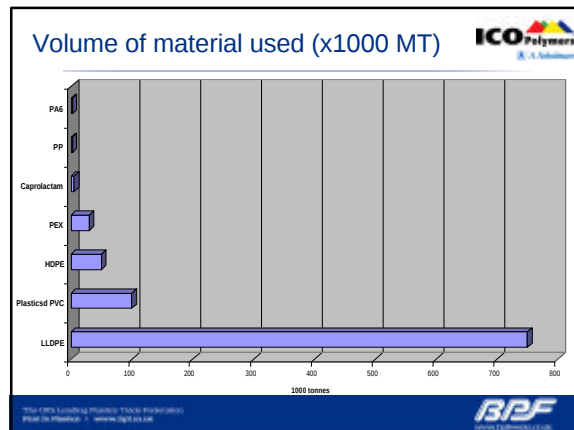












All of the roto-materials we know...			
			
Material*	Typical market	Tonnes PA Global	
LLDPE	bars, small tanks, POP	750 000	
HDPE	tanks and kayaks	50 000	
XLPE	fuel tanks	30 000	
PP copol	hydraulic tanks	2000	
PP homo	hydraulic tanks	10	
Nylon 6	fuel & oil tanks	5000	
Nylon11	automotive tanks	2000	
Nylon 12	automotive tanks	150	
PC	lighting glasses	100	
EVA -38% VA	flexible road products	1000	
EVA - 9% VA	flexible road products	500	
POP	flexible road products	1000	
PVC flex	auto, toys, medical	100 000	
PU-set	flexible diaphragms	1+	
TPU	dashboards (plush)	1000	
TPEE	hydraulic tanks	200	
Silicone-set	medical & implants	1+	

Alternative materials used by innovative moulders

Materials not used

Amorphous materials:

- ABS
- PS
- HIPS
- hPP
- PET
- TPE, EPDM
- PMMA




The BPF Loading Process Trade Publication
Printed in England • www.bpf.co.uk

Speciality Materials also used:

Small quantities of low viscosity grades:

- EVA
- PC (low viscosity)
- POM
- PBT
- CAB
- Flexible TPEE
- ECTFE




The BPF Loading Process Trade Publication
Printed in England • www.bpf.co.uk

Speciality Materials also used:

Liquid systems used

- Plasticised PVC
- Two part PU
- Silicone




The BPF Loading Process Trade Publication
Printed in England • www.bpf.co.uk

Comparative properties



The 100% Low-Density Polyethylene (LDPE) Handbook
Print or Download - www.igfa.co.uk



Comparative properties



Everything compares to PE

- PE is inexpensive
- PE is very stable to degradation & is tough
- PE melts fast but forms a gel not liquid

The 100% Low-Density Polyethylene (LDPE) Handbook
Print or Download - www.igfa.co.uk



Comparative properties



Other materials are used for:

- Higher stiffness & temperature resistance
- Better scratch resistance and gloss
- Clarity
- Chemical resistance eg gasoline
- Paint ability
- Flex fatigue resistance
- Long term creep

The 100% Low-Density Polyethylene (LDPE) Handbook
Print or Download - www.igfa.co.uk



Comparative properties



Moulders find that they are more difficult than PE:

- More expensive to buy and grind
- More difficult to get perfect powders
- Less stable, prone to degradation/lower toughness
- Melts and trap more air during sintering
- Different shrinkage rates

The 1976 Lonsdale Plastic Tackle Federation
Printed in England • www.bpf.co.uk



Table of properties for reference



Natural	into process		Dep. C°	deg C°	hot	Outdoor	Resist	fuel	dry?	shrink	%	
Colour	Heat stability	Melt? C°	HDY	Op temp	water?	UV ?	Acid?	resist	FR?	shrink		Material*
white	excellent	125	60	45	no	excellent	good	poor	no	no	3.0	LLDPE
white	excellent	130	75	50	short time	excellent	good	poor	no	no	3.5	HDPE
straw	excellent	none	66	75	short time	excellent	average	poor	no	no	3.5	XLPE
white	good	150	90	80	yes	good	good	poor	no	no	2.0	PP copol
white	good	165	120	90	yes	good	good	poor	no	no	2.0	PP homo
off white	average	225	175	100	no	average	poor	excellent	yes	no	1.5	Nylon 6
white	good	185	125	100	short time	average	poor	excellent	no	no	2.5	Nylon 11
white	good	175	135	100	short time	average	poor	excellent	no	no	2.5	Nylon 12
clear	good	235	130	100	yes	average	poor	average	yes	yes	1.0	PC
white	average	80	30	40	no	excellent	average	poor	no	no	1.5	EVA - 18% VA
white	average	96	35	40	no	excellent	average	poor	no	no	1.5	EVA - 9% VA
white	excellent	95	30	40	no	excellent	good	poor	no	no	1.5	POP
clear	average	150	na	50	no	good	good	poor	no	yes	1.5	PVC flex
clear	excellent	none	na	50	no	good	good	poor	yes	no	<1	PU-set
clear	excellent	150	na	90	short time	excellent	good	good	yes	no	<1	TPU
white	good	170	tba	100	yes	excellent	tba	excellent	yes	no	<1	TPPE-flex
clear	excellent	none	na	250+	yes	excellent	good	tba	no	yes	<1	Silicone-set

The 1976 Lonsdale Plastic Tackle Federation
Printed in England • www.bpf.co.uk



Table of properties for reference



white	good	160	tba	60	no	excellent	poor	average	no	yes	<1	PVC rigid
white	average	165	>100	105	no	excellent	poor	excellent	no	no	2.3	POM
white	average	95	tba	tba	no	good	tba	poor	no	no	1.5	EAA
tba	good	200+	50	90	no	poor	poor	good	yes	yes	1.5	Ionomer
off white	excellent	none	110	120	yes	good	good	good	yes	no	0.9	PU-set
off white	excellent	285	>200	240+	yes	excellent	good	excellent	no	yes	0.6	PPS
off white	excellent	tba	210	180	yes	excellent	good	excellent	no	yes	0.6	PES
clear	average	170+	75	60	no	excellent	poor	good	yes	no	0.5	CAB
off white	average	230	150	110	no	average	good	excellent	yes	no	3.0	PBT
off white	average	165	150	110	no	average	good	excellent	yes	no	3.0	Cyclic PBT
off white	excellent	222	175	110	yes	average	poor	excellent	yes	no	2.0	Cast Nylon
off white	poor	softens	85	85	no	poor	good	poor	yes	no	0.5	ABS
white	poor	softens	tba	65	no	poor	poor	poor	no	no	0.5	HPS
white	excellent	165	tba	125	yes	excellent	excellent	excellent	no	yes	2.5	PVDF
white	excellent	240	90	150	yes	excellent	good	excellent	no	yes	tba	ECTFE

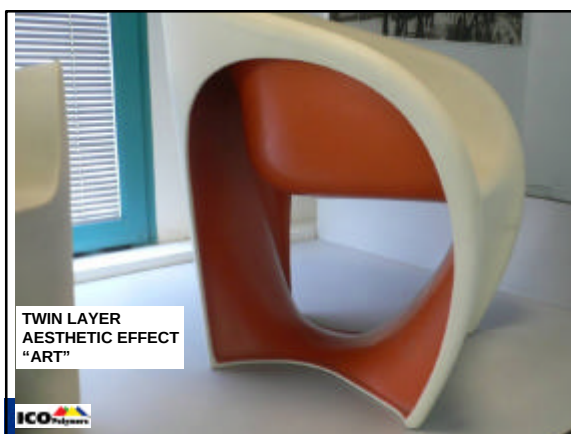
The 1976 Lonsdale Plastic Tackle Federation
Printed in England • www.bpf.co.uk



ICO Polymers
A. A. Solutions

- From all around the world

THE FIRST LEADING PRACTICE TRUCK FIRM IN THE
WORLD IN 2004. www.tyco-usa.com



**TWIN LAYER
AESTHETIC EFFECT
"ART"**



Features: multiple Fuel Tanks



Slab Fuel Tank
Material: XLPE
Size: 132 Liters
(35 Gallons)

Primary Fuel Tank
Material: XLPE
Size: 605 Liters
(160 gallons)

THE 2015 LANSING MICHIGAN TRUCK MEETINGS
WILL BE HELD ON: **SEPTEMBER 2-4, 2015** IN LANSING

KTM Plastic Fuel tanks

Rotomoulded Fuel tanks Multilayer




- Multilayer Tanks Outside in PE inside in PA11 to pass the Permeation Regulation in USA
- big Wall thickness because of 2 Layers
- Expansive in Production



References/thanks



ICO North America
 ICO Asia
 ICO Brasil
 Persico Italy
 Mark Kearns Queens University Belfast
 Prof R Crawford Waikato University
 RotoWorld Magazine
 Rototek UK, Solar Plastics USA
 ICO customers






Design Innovation in Rotational Moulding

Wednesday 19th May, 2010

design bugs out....





Plastic Chairs & Loading Platforms - Plastic Enclosures
 Plastic Jerrycans - www.bpf.co.uk



The story of 'design bugs out'....
 Patient Bedside Cabinet design.

Ian Thompson
 Innovation and Design Consultant



thinkdifferently

ian thompson

Who are we?



We are an independent innovation and design company with a global client base and global projects.

Our innovation and design facility in Bristol

1,200 square meters of studios providing dedicated research, innovation, design and prototyping facilities



- Innovation & research specialists
- Concept development
- Brand & product strategy
- Product designers
- Production engineering
- Model making & rapid prototyping

Research



kanneer dufort

Design



kanneer dufort

Prototyping



kanner dufort

Packaging Design



kanner dufort

Product design



kanner dufort

Who do we work with?



What's our focus?

we are innovators
in the human
experience...

kanner dufort

So what's the story?

early 2009
design bugs out..

kanner dufort





Challenging top designers to help control the risk of Healthcare Associated Infections by making hospital furniture and equipment easier and quicker to clean.





The starting point...





What's happening on the hospital ward?





Patients can't store their belongings..

kannerdufort



Impossible to clean effectively?

kannerdufort



Research insights...

kannerdufort



Creative thinking based on insight...



kanner dufort

Turning design thinking into product...



kanner dufort

Product design and experience sketching...



kanner dufort

Assessing ideas and building concepts...



kanner dufort

Concept direction...



kanner dufort

Manufacturing considerations?



kanner dufort

Manufacturing collaboration...



Working at 1:1 scale...



Presenting, testing and developing concepts..



UK registration of design - 4033624
EU registration of design - 00125465-0001
Patent pending application - GB0906666.3

Full scale test rigs..



kanner dufort



kanner dufort

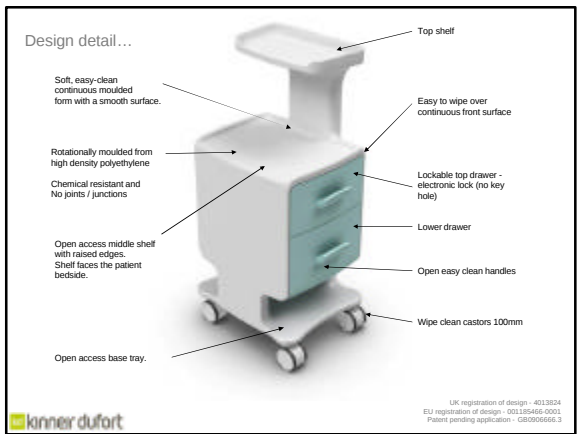
Nembro, Italy

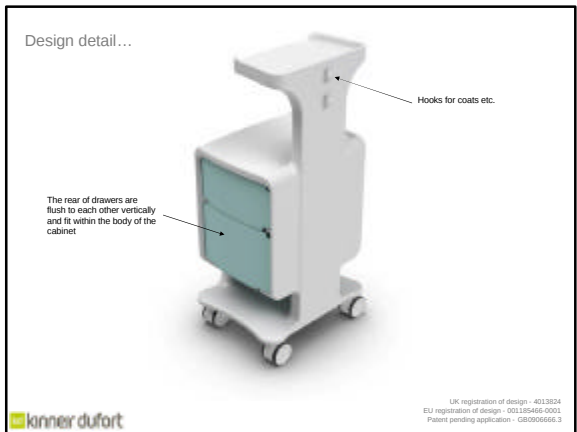
Look and feel prototype..

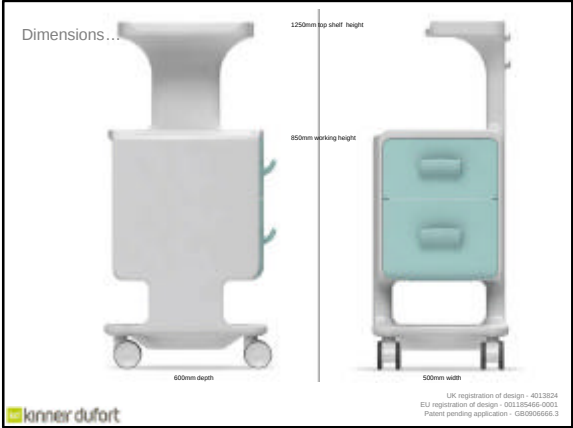


kanner dufort







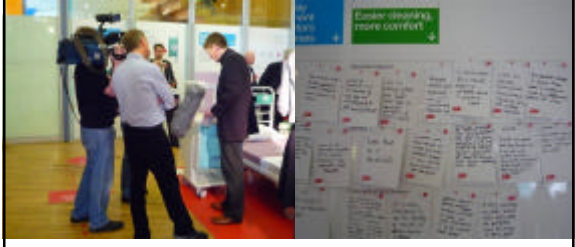






UK tour...

Bristol Maid DH Department of Health



kinneir dufort

Product launched - April 2010



kinneir dufort Bristol Maid

UK registration of design - 4013824
EU registration of design - 00135466-0001
Patent pending application - GB0906666.3



kinneir dufort

Ian Thompson
Kinner Dufort
5, West Street
Bristol
BS1 5BJ

+44 (0) 117 921 4000
ian.thompson@kinneirdufort.com
www.kinneirdufort.com

thanks for listening



Adding value by innovative design in rotomoulding

Design Innovation in Rotational Moulding
PDM – Wednesday 19th May, 2010
Aldo Quarantino

5/17/2010

Consistently delivering value

1



Rotomoulding



Consistently delivering value



Adding value – why?

- Penetrate new market
- Consolidate and protect the existing one
- Resolve a technical problem
- Improve margin
- Survive

Consistently delivering value



How?

- Using design to drive innovation
 - To enhance product quality
 - To extend life expectancy
 - To reduce cost
 - To differentiate your offer
 - To launch a new product
 - To re-brand
 - ...

Consistently delivering value



Thermal insulation system



- Protects water pipes and meter from freezing
- Needs extra stiffness without increasing the overall weight
- Durability
- Remove after moulding operations - PU foaming

Consistently delivering value



Solutions in practice

- Revolve M-532
- PE foam technology
- Provide extra stiffness without compromising the overall weight of the product
- Thermal insulation
- Cheaper than PU foam and no delamination problems
- No post moulding process needed



Consistently delivering value



Motorbike Fuel Tank



Courtesy of Gordon Ellis

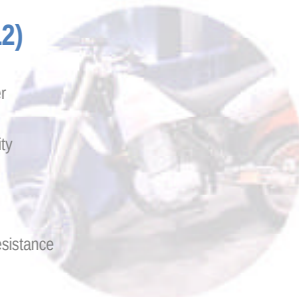


Consistently delivering value



Polyamide 12 (PA12)

- Excellent hydrocarbons barrier
 - Ideal for petrol tanks
- Excellent chemical compatibility
- Good impact resistance
- Paintable
- High stiffness
- High operating temperature resistance
 - Ideal for hydraulic tanks



Consistently delivering value



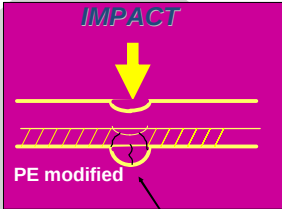
Explore Technology

- Explore CT PA12
 - Dual layer system based on PA12 (outer) and PE (inner)
- Combine benefits of two materials PA12 and a PE modified
- Generate a chemical bond between layers during rotomoulding
- Enhance the impact performance at low temperature
- Paintable
- How does it work?

Consistently delivering value



How does it work?

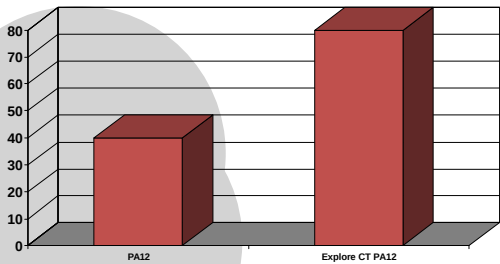


- Two-shot system
 - Easy to process
- Rilsan PA12 outer layer
 - Paintable
- PE modified inner layer
 - Ductile layer where propagation starts
 - Provides a chemical bond during rotomoulding

Consistently delivering value



ARM Impact (J) at -40 °C



Material	ARM Impact (J) at -40 °C
PA12	~45
Explore CT PA12	~80

Consistently delivering value



Demon Lamp

- www.demonlamp.com
- High surface definition
- high flow resin
- Bright colour
- Heavy metal pigments free



Courtesy of Gordon Ellis

Consistently delivering value



Details





Wood effect

- High flow resin
- Heavy metal free
- Food contact
- Heat stability
- Durability
- High surface definition





Vase

- Designed by Philips Starck for Kartell
- Polycarbonate
- Weather-resistant
- Durable
- Transparent
- Height 164 mm
- Diameter 57 mm
- 13 kg



Kimere

- Designed by Omar Ronda
- PE painted
- Durable
- Weather resistant



Consistently delivering value

Final comments

- R-M is a flexible process with endless potential
- The boundaries are set only by your creativity
- Wide choice of materials is today available

FOR YOUR NEXT PROJECT THINK ROTO!!!



Adding value by innovative design in
rotomoulding

Thanks!!!

aldo.quaratino@matrixpolymers.com
www.matrixpolymers.com




Design Innovation in Rotational Moulding

Wednesday 19th May, 2010

Persico S.p.A. "New surface treatments"



The 19th Leading Plastics Trade Fair in Italy
Print on Demand - www.bpf.it




Our Company Structure



- Manpower : 288
- Turnover: 55 Mln€

The 19th Leading Plastics Trade Fair in Italy
Print on Demand - www.bpf.it




Research&Development

Know-how influential, among one of the most qualified in the world in its field, at customer's disposal

- assess the feasibility of the project;
- to define the ideal moulding capability.

Persico can help its customers making small preproductions directly



The 19th Leading Plastics Trade Fair in Italy
Print on Demand - www.bpf.it





• A New Era in Rotational Moulding

Occupied space
The machine looks like a compact production cell where all operations heating, cooling, loading and unloading take place in the same place

Automatic opening and closing of the mould
Eliminating direct interaction with the operator, the quality of manufactured goods is therefore constant over time

Production
The raw material is automatically introduced into the mould. Accurate distribution inside the mould, as well as a reduction in the powder dispersion around the mould

Automatic demoulding of the piece

Manpower reduced to machine set up




The 100% Loading Plastic 11000 (10000) Prod. in 1100000 - www.bpf.co.uk





Rotational Division - Services





DELIVERY CODESIGN

CAST ALUMINIUM MOLDS

3D CNC MOLDS





PROTOTYPING

SPECIAL TREATMENTS

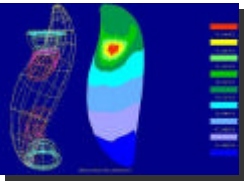
STEEL MOLDS

The 100% Loading Plastic 11000 (10000) Prod. in 1100000 - www.bpf.co.uk





Design & Codesign



PERSICO can create and modify 3D files, thanks to last generation Software (Omnicad 6.11, Catia V5, Alias 12 e Solidworks 2006)

The 100% Loading Plastic 11000 (10000) Prod. in 1100000 - www.bpf.co.uk





Design & Codesign



Element supplied by the customer

Cabin with all components produced with Rotational Molding

The 1976 Loading Platform "Tractor" (1976)

Prod. in Pinerolo - www.bpf.it





Cast Aluminium Molds



Cast Aluminum mold for engine boat 204x98x40 inches (5200x2500x 1250mm)

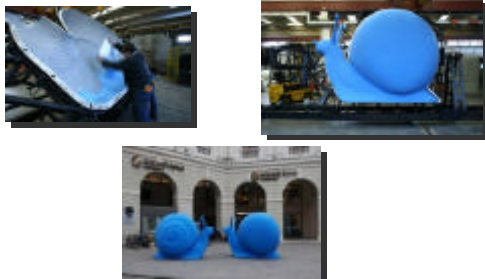
The 1976 Loading Platform "Tractor" (1976)

Prod. in Pinerolo - www.bpf.it





Cast Aluminium Molds



Waiting for the Milan Expo 2015 - REgeneration: 12 coloured snails walking around the world.

The 1976 Loading Platform "Tractor" (1976)

Prod. in Pinerolo - www.bpf.it











Cast Aluminium Molds

- "Bouchon d'amour" of Qui est Paul?

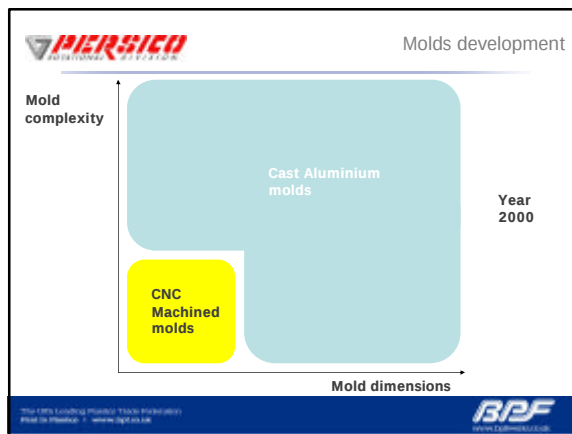


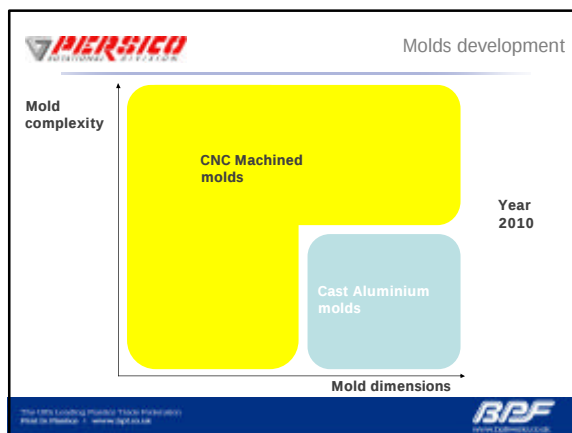
It's a **chair created with recycled plastic bottle stoppers reduced in little pieces before**. Bottle stoppers are the 70% of the end product. Everything is blended with polyethylene (30%) (polyethylene is completely recyclable and very resistant material) and then moulded thanks to the **rotational moulding technology**.

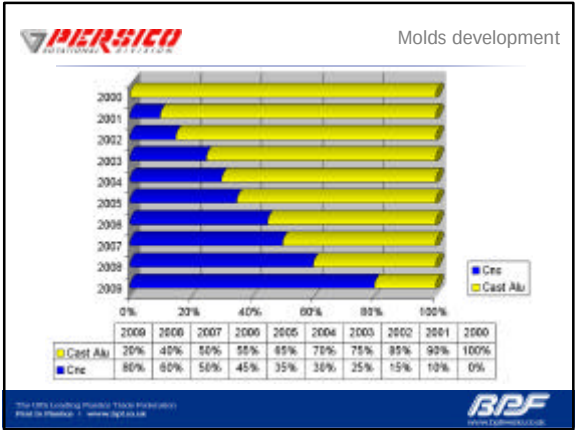


The 1980s Launching Persico Trade Promotion
Printed in Persico - www.persico.it









PERSICO
AUTOMATIC EXTRUSION

CNC Molds advantages

- Delivery time
- Flange Assembly | Internal profile
- Aluminium quality
- Tolerances
- Easier modifications
- Texture finishing
- Reduced maintenance
- Time to order > prototypes

The 100% Loading Plastic Trade Fair 2010
Print on Demand - www.digitals.com

BPF
Bouffon & Pichon

PERSICO
AUTOMATIC EXTRUSION

CNC Molds examples

Details of mold 3D file development

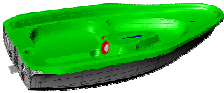
➤ CNC Machined Mold in 4 Pieces
(a total of 35 aluminium parts joined together) for Offshore Buoyancy Module 95x50x36 inches (2421x1270x916mm)
Courtesy of Remcon Plastics Inc.

The 100% Loading Plastic Trade Fair 2010
Print on Demand - www.digitals.com

BPF
Bouffon & Pichon



CNC Molds examples



➤ CNC Machined Mold for a Sailing Boat 102x39x23 inches (2600x1000x600mm)

The 100% Loading Platform - Trade Fair 2011
Print on Demand - www.3dprint.com





CNC Molds examples



HER – FABIO NOVEMBRE - CASAMANIA

The 100% Loading Platform - Trade Fair 2011
Print on Demand - www.3dprint.com





CNC Molds examples



The 100% Loading Platform - Trade Fair 2011
Print on Demand - www.3dprint.com



Surface Finish / Mould Texture

Standard finishing mould

- 1) Smooth (gr. 120-200-400-800 mirror)
- 2) Shot Peened
- 3) Sand Blasted or Grit Blasted



Standard finishing mould

- POLISHING SURFACE
- Aesthetics requirements
- Allow better release
- More expensive .





Standard finishing mould

- SHOT PEENED
- High scratch resistance .
- Aesthetical (furniture products)





The PERSICO Group Plastic Injection Moulding Division
 Plast. In. Persico - www.persico.it





Standard finishing mould

- SAND BLASTED
- Matt effect
- Low Scratch resistance.




The PERSICO Group Plastic Injection Moulding Division
 Plast. In. Persico - www.persico.it





Shining treatment




- SHINING TREATMENT
- Mechanical treatment
- Increased hardness
- No release agent




The PERSICO Group Plastic Injection Moulding Division
 Plast. In. Persico - www.persico.it





Strongest Treatment

- STRONGEST

High technological coating, which provides an exceptional mould hardness (350 HB), in addition to the release effect. The treatment is carried out on the entire mould surface, and it is followed by internal and external cleaning, which guarantees an optimal thermal conductivity.



STANDARD ALU HARDNESS	90HB
ALU + STRONGEST	350HB

The 1976 Leading Plastic Trade Fair award
Printed in Portugal - www.bpf.pt





Flange Hardening & Coating

- FLANGE HARDENING

Persico offers the possibility of an electrochemical hardening, which can remarkably increase the flange hardness (600 HB). Moreover, this treatment makes the flange anti-scratch and prevents the polyethylene powder or other material adhesion on the flange.



STANDARD ALU HARDNESS	90HB
HARDENED ALU	600HB

The 1976 Leading Plastic Trade Fair award
Printed in Portugal - www.bpf.pt





Permanent Coating



The 1976 Leading Plastic Trade Fair award
Printed in Portugal - www.bpf.pt





Texture Finishing

- CNC mould Surface






The 100% Leading Plastics Trade Publication
Print or Online - www.bpf.co.uk





Rotational Moulding

Bringing your design to reality!





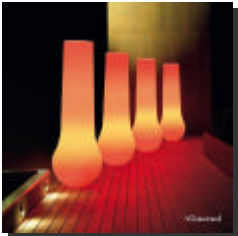
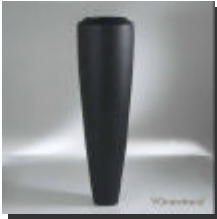
The 100% Leading Plastics Trade Publication
Print or Online - www.bpf.co.uk





Rotational Moulding

Bringing your design to reality!

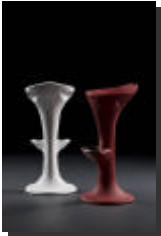



The 100% Leading Plastics Trade Publication
Print or Online - www.bpf.co.uk




Rotational Moulding

Bringing your design to reality!

The 1976 Leading Plastic Trade Fair award
Printed in Portugal - www.bpf.co.uk



Rotational Moulding

Bringing your design to reality!






The 1976 Leading Plastic Trade Fair award
Printed in Portugal - www.bpf.co.uk



Rotational Moulding

Bringing your design to reality!







The 1976 Leading Plastic Trade Fair award
Printed in Portugal - www.bpf.co.uk




Rotational Moulding

Thank you for your attention !!!

The 1976 Leading Plastics Trade Fair in Italy
Printed in France - www.bpf.it






Design Innovation in Rotational Moulding

Wednesday 19th May, 2010

Moulding Graphics

Peter Clark
Mold In Graphic Systems®





The 1985 Loading Plastic Tank (Ford 1985)
Print in Plastic - www.bpf.co.uk



The Present and Future of Colour & Graphics in Rotational Moulding







Mold In Graphic Systems® Corporate Headquarters and Manufacturing Facilities – Clarkdale, Arizona

Our Objective

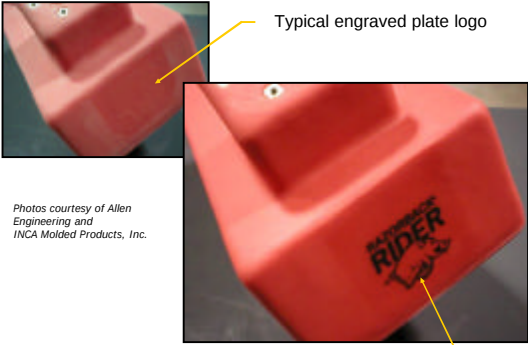
To provide permanent decoration and enhancement solutions for manufacturers and marketers of polyolefin plastic products.

Fact:

Nearly 95% of all rotomoulded products are cast from virtually impossible-to-decorate polyolefin materials that are often utilized in harsh environments and extreme conditions.



Typical Results of Vinyl Stickers on PE



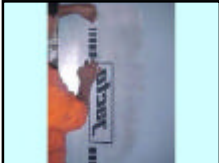
Typical engraved plate logo

Photos courtesy of Allen Engineering and INCA Molded Products, Inc.

Colourful Mold In Graphics® add value and visibility



Spray MIGS® Adhesive onto the mould



Burnish the graphic onto mould and add resin



De-mould part



Permanent graphics every time



Football "tailgating" cooler boxes can be customized with any bright and colourful Mold In Graphic®



Photos courtesy of L.B. International, Inc.
Tupelo, Mississippi

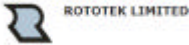
K&N Performance Filters



Moulded by Primetime Products, Inc.



Photos courtesy of
Rototek Limited
Technical rotational mouldings in the UK



Photos courtesy of
Rototek Limited
Technical rotational mouldings in the UK

Mold In Graphic® Video





Clean part surface with
Mold Release Remover

Spray Mold On Graphics®
Adhesive onto the graphic

Burnish graphic onto the
part



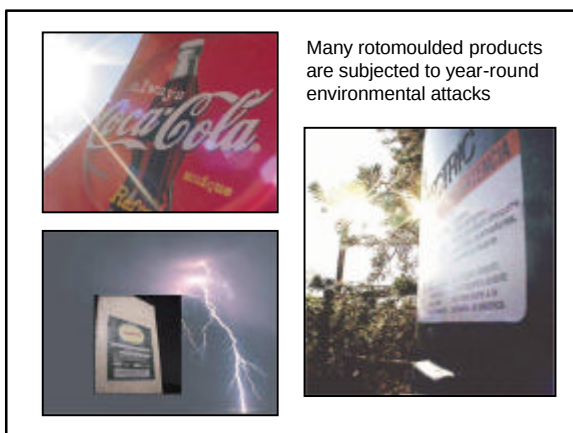
Remove backing

Heat the graphic

Permanent graphics
every time







Many rotomoulded products are subjected to year-round environmental attacks







Rotomoulded water tanks



Photo courtesy of Fylost

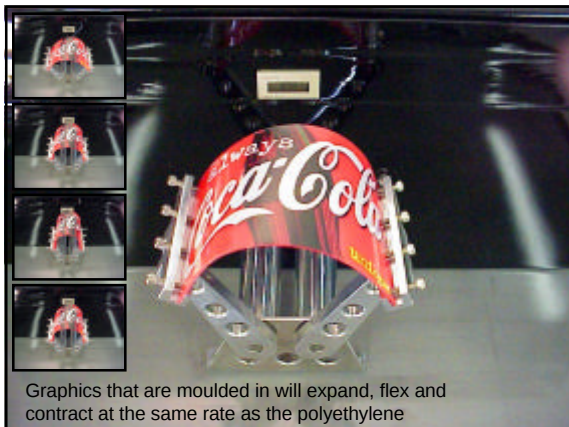


Photos courtesy of Ozpoly



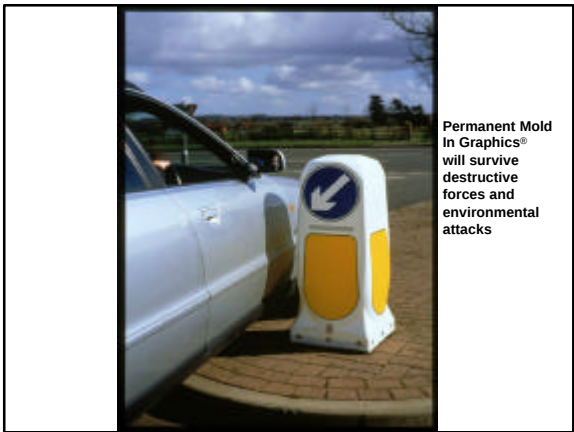


Photos courtesy of
Confluence Watersports Company
Trinity, North Carolina



Graphics that are moulded in will expand, flex and contract at the same rate as the polyethylene







Photos courtesy of Oceanwalker



Photos courtesy of EZdock



Photos courtesy of Fluid

Photos courtesy of Wilderness Kayaks

Photos courtesy of Calmfloats



Commercial Pool Filtering System

Photo courtesy of Arch Chemicals, moulded by Gregstrom, MA, USA

Rotomoulded products using
Mold In Graphics®



Golf Kiosk
Product courtesy of Gregstrom, MA, USA



Floor Care Blower
Photo courtesy of Clarke Blowers,
Alto, div. of Hellmuth MHI, USA

Rotomoulded products using
Mold In Graphics®



News Rack
Photo courtesy of gotajob.com, USA



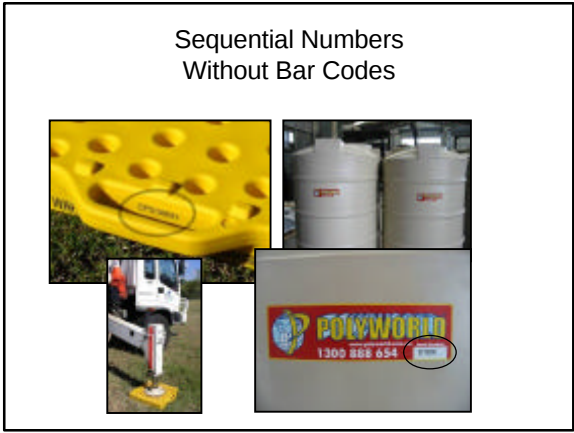
Spineboard
Photo courtesy of Rapid Deployment Products,
PA, USA

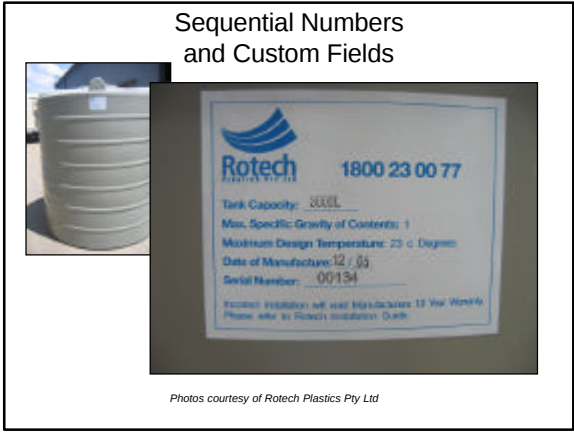
Sequential Bar Codes for
Rotomoulding

- **Rotomoulding:** alphanumeric codes 128 and 39 with rotating sequential number
- **Code 128:** encode large quantity of data in small space
- **Code 39 (3 of 9):** common (mfg, military, health apps?)





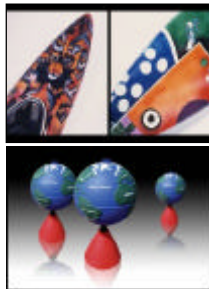






MIGS® Color In Systems® & Color On Systems®

- Available in standard or custom colours.
- Embed directly into plastic resin surface, making new custom design permanent, resistant to attack by chemicals, solvents or extreme weather conditions.



Kayak featuring permanent airbrushed MIGS® Colors

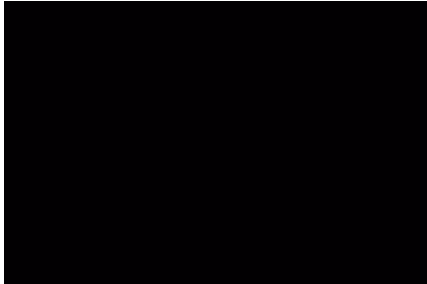








Mold On Graphic® Video

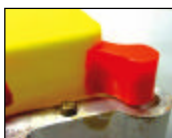


RMC³® Rotational Molding Compound

RMC³®

Three-Dimensional RMC³® Rotational Molding Compound is a tool for creating:

- Perfect, Solid Threads
- Solid Protrusions
- Mounting Tabs
- Flanges
- Solid Moulded-in Feet
- Internal Bosses
- Reinforced Inserts and Hinge Pins
- Solid Moulded-in Handles
- RMC³® immediately corrects flow issues.






Featured in
Rotation Magazine



Comes in easy-to-use, easy-to form, pliable material



Position the RMC³ into designated areas of mould or you can "cookie-cut" RMC³ to fit your needs

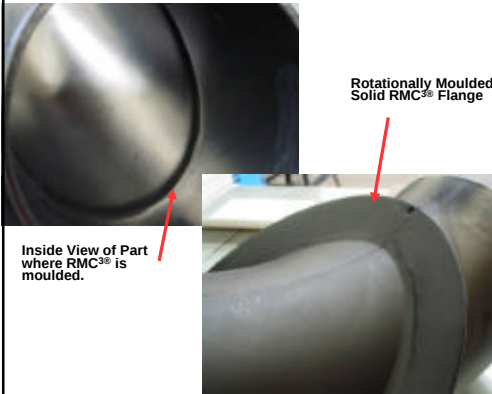


Remove excess RMC³, then load polyethylene resin charge into hollow mould and begin rotomoulding



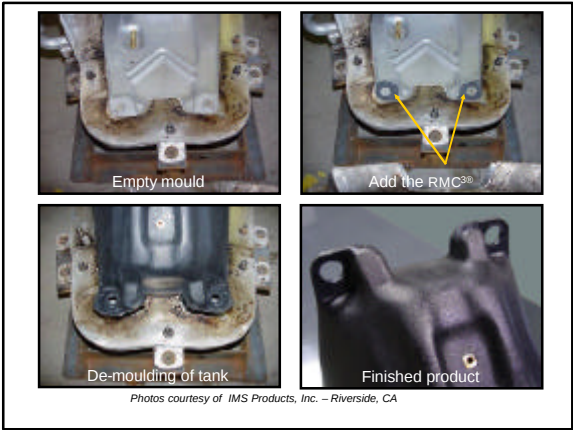
Hollow part now features solid, moulded-in flanges for drilling and wall mounting

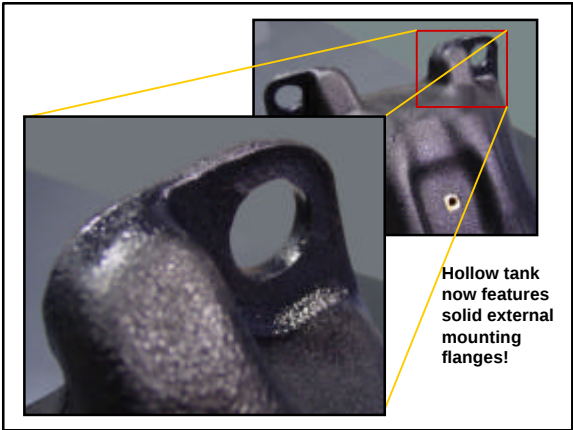
RMC³ adds value to your rotomoulded products

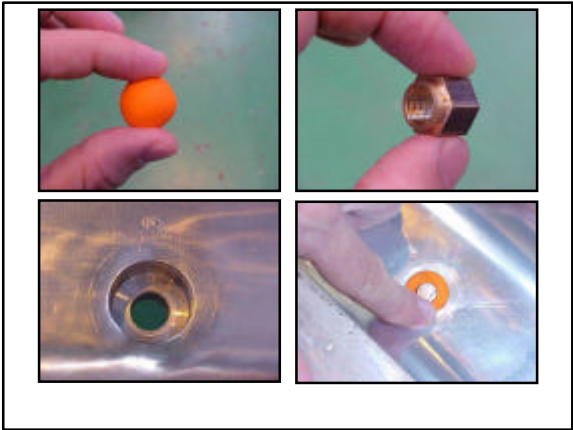


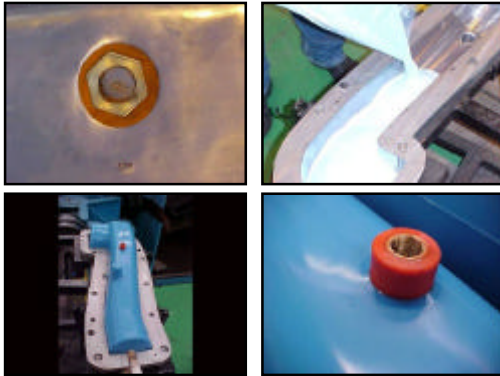
Inside View of Part where RMC³ is moulded.

Rotationally Moulded Solid RMC³ Flange









Automotive Air Intake Duct
Product courtesy of Scania Trucks, Sao Paulo Brazil

New Graphic Technologies for Specialized Applications and Materials

Nylon Graphic System

Nylon-compatible Mold In Graphics® transfer onto moulds from 32 - 54° C to your nylon resin products.

Used in automotive, marine, airline, heavy duty trucking equipment and more.



Nylon Graphic System

Mold In Graphic Systems®
Nylon Graphics have been
successfully moulded into Nylon 11
and Nylon 12.

Vivid, permanent graphics every time.



MIGS® Vinyl Graphic System



Applications:
automotive, marine, toys, athletic,
medical and many more.

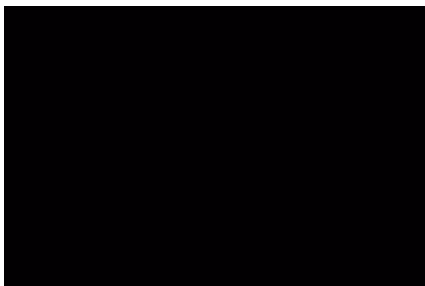
Compatible with several
temperature ranges.

MIGS® **G3 Adhesive** is used with
our **Vinyl Graphics**. It is ozone
friendly and is compatible with
rotational moulding.



Permanent graphics every time.

iMIG Graphic System for Injection Moulding



Thank you.

Mold In Graphic Systems®

www.moldinggraphics.com




Design Innovation in Rotational Moulding

Wednesday 19th May, 2010

Recycling and Rotomoulding





The 19th Leading Plastics Trade Event 2010
Print or Podcast - www.bpf.co.uk



www.linpackaging.com



// We've got it totally covered

Recycled Material in Rotomoulding

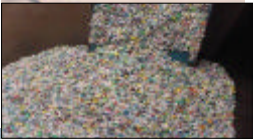
Mark Roberts - Plastics Recycling Division





Overview

- Why consider Recycled Materials?
- The Recycling Process
- Rotomoulding Challenges
- Design for Recycling
- Closed-Loop Opportunities
- Alternative Options to use Recycled Materials in Rotomoulding



A passion for profitable growth....

Why consider Recycled Materials?

- Conservation of non-renewable fuels sources
- Recycling of plastics as compared with the production of virgin polymer, will reduced emissions of CO₂, sulphur dioxide and nitrogen oxide
- Recycled polymer consumes only a third of the energy that would be used to produce virgin polymer
- Reduce the amount of waste going into landfill
- **Cost?**

passion for profitable growth...

The Recycling Process

Waste plastic materials are brought to our Allerton Bywater site by road transport and stored until ready to use.

passion for profitable growth...

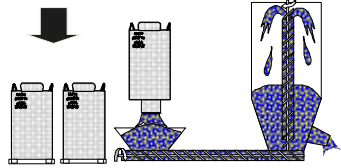
Washing & Granulation

The waste plastic is then chopped or granulated into small pieces prior to passing through the washing and drying process. The resultant clean regrinds are then stored in intermediate bulk prior to further processing.

passion for profitable growth...



Blending of Materials



The different grades of plastic can then be passed through a blending process. This ensures that both uniformity of product and the precise specification required by our customers can be met.



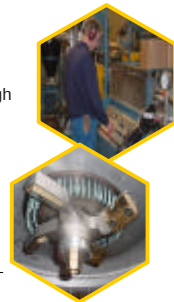
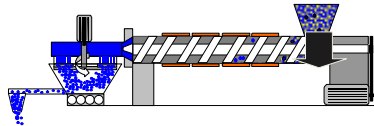
A passion for profitable growth...



The Extrusion Process

Material from the fountain blender is then run through an extruder. Masterbatch can also be added at this stage.

Material is gradually heated and passed through de-gassing and melt filtering stages before finally being chopped into pellets at the die.



A passion for profitable growth...



Finished Product



The pellets are then packaged to customer requirements and dispatched by road transport.



ISO 9001:2008
Cert No. PB 70200



www.linpacrecycling.co.uk



A passion for profitable growth...



Rotomoulding Challenges

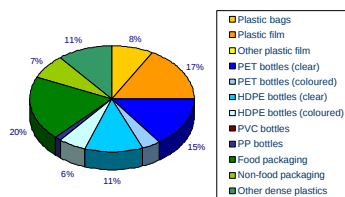
- Small Market Share
- Consumer Waste not an option



passion for profitable growth...



Composition of house hold plastics



Source: Waste Research Limited – Feb 2006



passion for profitable growth...



Rotomoulding Challenges

- Small Market Share
- + • Consumer Waste not an option
- + • Specialist Materials
- + • Lack of Separation
- = • Raw Material in short supply!



passion for profitable growth...



Design for Recycling

- Single Polymer Construction
- Avoid mixing polymers within a unit
- Clips / Rivets / Labels all increase recovery costs
- Keep life-cycle in mind
- Collection Schemes?



passion for profitable growth...



Closed Loop Systems

- Win – Win opportunity
- Case Study
 - Wheelie Bins
 - Collected Domestically
 - Recovered by LINPAC
 - Replacements made from same polymer
 - Cost Savings > £30k
 - 20MT CO₂ saved



passion for profitable growth...



Other Options

- Work with customers to secure scrap
- Partnership agreements with Suppliers, like LINPAC Recycling
- Use regular streams mixed with prime
 - 25% Prime Grade still offers cost savings
 - Ask your representative for samples!



passion for profitable growth...



**LINPAC Packaging
Plastics Recycling Division**

Thank You



passion for profitable growth...



MAUS MOULD SERVICES THE ONE STOP SHOP FOR THE ROTATIONAL
MOULDING INDUSTRY.

BMC TM Coatings:



Maus Mould Services Ltd, Unit 10, Polydon Park Ind Est, Milethorne Lane,
Doncaster, DN1 2SU.

Tel /Fax 01302 327999



**The British Plastics Federation
5 - 6 Bath Place
Rivington Street
London EC2A 3JE**

**Tel: 020 7457 5000
Fax: 020 7457 5045
Web: www.bpf.co.uk**

