

RotoTrends

*Exploring the potentials
of rotational moulding
in design*



ARMO
ASSOCIATION OF ROTATIONAL MOULDING ORGANISATIONS

Introduction

The evolution that has distinguished rotational moulding in recent decades is intimately related to the development of awareness of rotomoulding in the design world.

In other words, as the potential of rotomoulding becomes “common knowledge” amongst designers and producers the sophistication of their projects using our technology for industrial applications grows. RotoTrends explores the different potentials of rotational moulding showing case-histories where the roto technology is able to open new markets, developing innovative products and working successfully in new niches.

The projects developed in partnership with international design institutes, and the selected industrial products produced a faithful portrait of an industry constantly hungry for new ideas, eager to experiment with new shapes and new materials, sensitive to the international richness of globalization.

Rotomoulding is strategically placed as one of the key technologies for rethinking the industry according to today's needs for technology and performance.

Prospects of the modular sofas

Enhancing functionality, improving quality, maintaining design language, and reducing production costs – these are the specifications for the model series development in the field of sofa systems.

Rotational moulding offers a new chance on improving the sofas significantly by increasing their quality, and thus, raising the value of the products and minimizing the material and production costs at the same time.

Rotational moulding offers a great deal of freedom in sofa design and has fewer restrictions than other processes used for the manufacture of plastic parts. It can be used to produce open or closed internal components with variable dimensions.

Key factors Details

1. The frame of a sofa is *made most often wood*, though newer options include steel, plastic, and laminated boards or a combination of the above. Kiln-dried maple wood deemed free of knots, bark, and compromising defects is used under the upholstery.
2. Padding is primarily made from polyurethane foam and polyester fiberfill wrap.
3. A single sofa takes up *a lot of hours of skilled labor to make*. Even small companies and individuals avail themselves of power saws and other motorized machinery, yet specialized hand tools are still applied to detail work.
4. The production is *mainly manual* and every piece is a bit different from another one.



Platforma

production Felicerossi - Netherlands

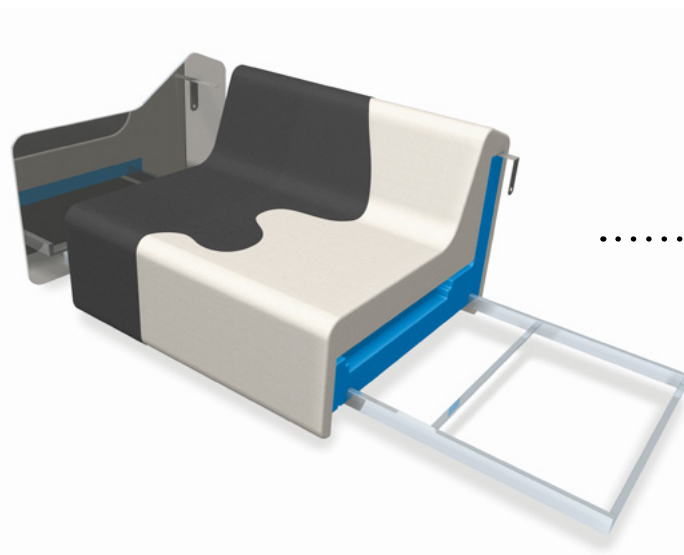
Felicerossi has developed a standard system to product a new generation of sofas using a rotational molded platform. On this new Platforma, the enterprise has invited international designers as Matali Crasset, Karim Rashid, Khoidi Feiz, Marko Macura, Maarten Kusters, Roberto Sartorio to project new solutions.

Starting from the same rotomoulded component with elastic bands, every designer has developed a different typology as single seat sofa, modular sofa, rocking easy chair.

Platform looks as a rich platform inviting to “do nothing”: the armrests are, in some cases, disappearing and give space to a hollow place that allows the arms to set down completely.

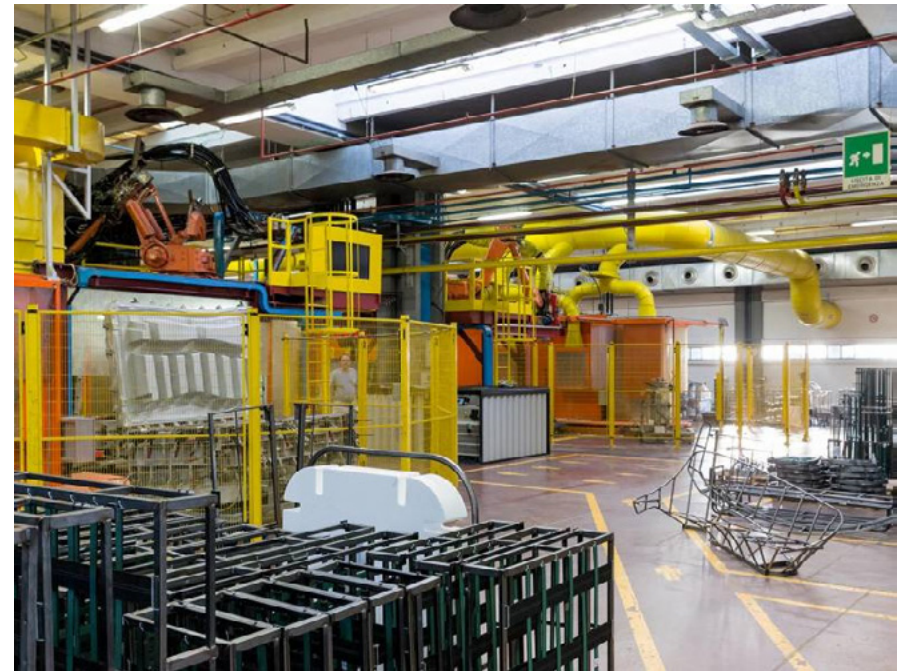
The final covering can be realized in all the fabrics of our range while the holes in the seat and back are made with a stretch fabric thermoformed with polyethylene.

www.felicerossi.com





> *The change from making handmade wood frames to machine-made frames to increase the productivity*



Fat Fat

design Patricia Urquiola
production B&B Italia - Italy

The Fat-Fat & Lady-Fat units recall the ashtrays of yesteryear, or Moroccan ottomans: an ideal surface for placing objects or for storage – once you lift the metal tray. The outside cover in synthetic fabric, felt, leather or pony skin conceals a frame made in orange polyethylene (created through rotational moulding), and a composite of polyurethane with flakes of regenerated pet that determines the shape of the piece.

www.bebitalia.com



> Inspired by the once popular sand-filled ash trays, hence the creation of tray/tables with built in storage

> The internal rotomoulded compartment can be used as a container by lifting the trays





Mod-ule

design Gabriella Nasrallah, Lebanon,
Ecal

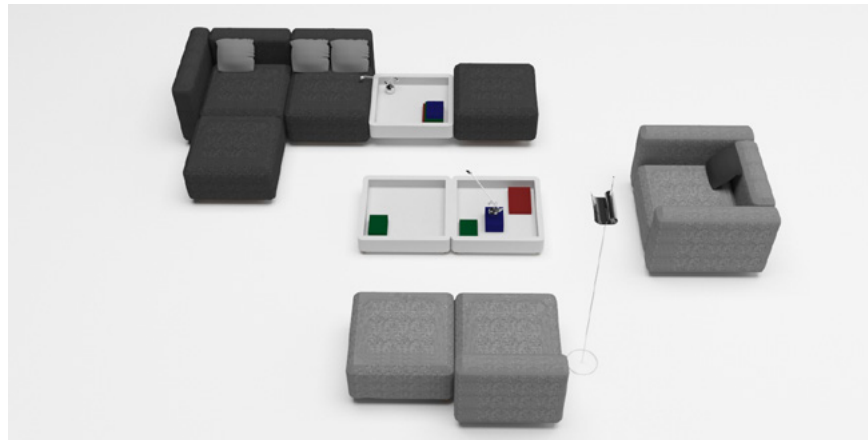
Mod-ule is a modular sofa with soft and welcoming curves that can be composed in a playful way. Its characteristic shape features a rounded armrest that directly meets the backrest which then emerges beyond the seat units. Square and rectangular shapes alternate dynamically to create a play of volumes and a graphic silhouette.

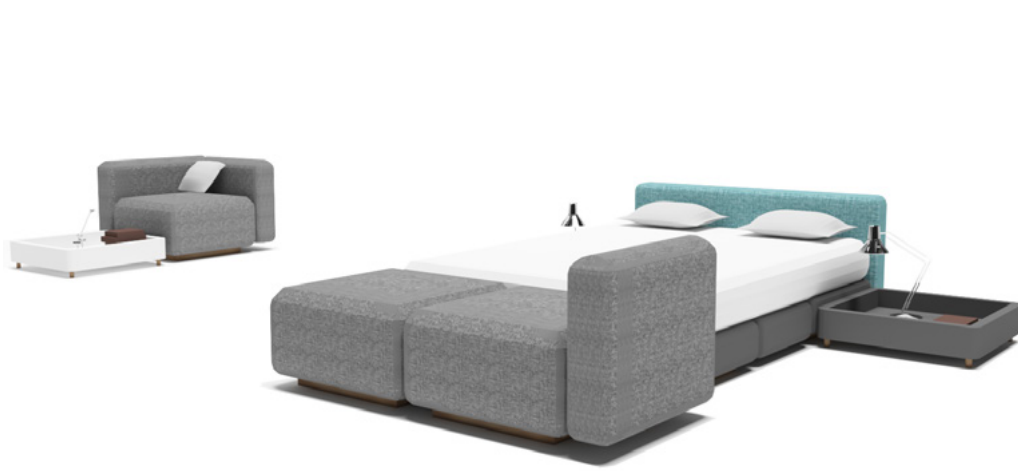
Mod-ule is a ground sofa, almost monolithic, and is made up of individual rotomoulded modules with various types of backrests and seats that have been conceived as sculptural pieces to be used either alone or in a wide range of compositions.

It's also available as double or single bed with additional bench and lateral bed tables.

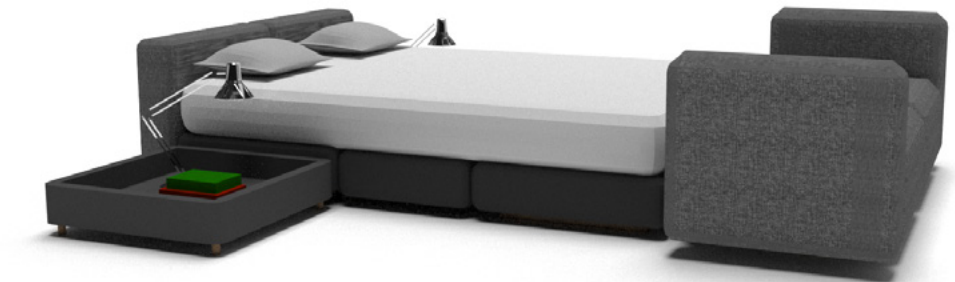


> *Square and rectangular rotomoulded platforms alternate dynamically*





> Available as double or single bed with additional bench and lateral bed tables



The Rising Trend of Vertical Gardens

As real estate trends lean towards smaller yards, it becomes increasingly important to maximize every square inch of space. One of the best ways to create a lush garden without cannibalizing patio and lawn space is to go vertical.

This latest trend in outdoor gardening adds dimension to your outdoor spaces, allows for a great deal of creativity, and won't affect the ability to maintain your lawn care.

A vertical garden can take several forms and is basically any vegetation that exists on a plane other than a flat horizontal surface. It can be as simple as a tier of stacked planters or as intricate as a high-rise wall completely covered in vegetation.

Classic forms of vertical gardens include those created with trellises and arbors, but today's modern vertical gardens have grown to incorporate a variety of ideas, techniques, and materials.

Key factors Details

- 1. Wherever there is a blank wall or a bare fence, there is the potential for a vertical garden.*
- 2. There are companies that sell pre-made pockets and planters that are specifically designed to attach to walls or fence boards, and specialized books are full of ideas for creating homemade versions.*
- 3. Rotational moulding offers an excellent way to create a durable vertical garden that won't deteriorate or require maintenance.*



Vertical Garden

production Rotax - France

The lack of vegetation in urbanized areas, as result of human establishments, directly affects the quality of life, from physical and aesthetical point of view. The construction of vertical gardens is recommended both in interiors and in the exterior of buildings.

By applying these technologies, any kind of area can be used at its maximum capacity, obtaining esthetic valences, benefic for environment and human health. This rotomoulded vertical garden can be installed in almost any domestic and outdoor location and as a living material. It gives an even distribution of water over the surface and provides mechanical support for the plants as they grow.

www.rotaxindustrie.com



> *Vertical rotomoulded garden can take several forms and sizes*





Prospects of the store shopping

When shoppers are relaxed and have ample cart room they stay in the store longer and buy more per visit.

Brick-and-mortar stores aren't going extinct, they're evolving into a more sophisticated model.

After fighting it for years, many retailers have embraced the showroom concept, where shoppers test and try products before making their purchase online.

For example, in grocery, retailers could showcase cooking demos, fresh produce and center store products, then direct shoppers to buy online. An inventory-free model similar to China's Hema market could have an impact on the grocery sector by shifting the focus from the transaction to customer experience

Key factors Trends

1. Store shopping is evolving at a rapid clip. It's a shopper's market, and consumers are demanding new, innovative experiences from check-out free shopping to home delivery, curbside pickup and meal kits.

2. Some argue that online store is over-hyped, given that many consumers want to touch, feel and select their food for freshness.

3. The reality is consumer preferences are changing. To compete in the Amazon era, stores need to evolve their omnichannel strategies to ensure they are not only meeting customer expectations but also differentiating themselves in the market while building efficiencies to drive sales and margins.

4.

Shop-Along®

production Safe Strap - USA

The Shop-Along line provides seating for shopping carts and accommodates the widest range of retail customers: small children, older children and adults, delivering the best value.

The Shop-Along from Safe-Strap offers a comfortable and secure seating area that can accommodate adults and children, and the large storage area under the seat is perfect for bulk merchandise purchases like paper products or soft drinks.

Accommodates children, adults and bulk merchandise purchases.

Large storage area under the seat for bulk merchandise purchases like paper products or soft drinks.

Footrest for greater comfort.

Handy storage area next to handle is great for holding coupons or other small items.

Shop-Along accommodates all ages from two to adult. 95% of total retail customers.

www.safestrap.com





> *This rotational moulded accessory offers a comfortable and secure seating area that can accommodate adults and children*



Prospects of the air cargo industry

It's impossible to imagine an air exchange without cargo. Actually, every moment there are about 6 million containers flying in all over the world! That is because air cargo services are considered much faster transportation than trucks or freights .

The growth in air cargo market size is attributed to the rise in global e-commerce business and a need for instant shipment and delivery, as retailers are increasingly preferring the option of air cargo shipment for quick deliveries and enhanced consumer satisfaction.

Additionally, rising demand from just-in-time manufacturers, who manufacture goods just before the loading of cargo onto the trucks, is another major growth factor for the air cargo market.

Air cargo are mainly made with metal frames now; rotational moulding has large margins for development even in countries with a high output.

Key factors Trends

1. The global air cargo ULD market was valued at US\$ 289.4 million in 2018 and is likely to grow at a healthy CAGR of 5.4% over the next five years to reach US\$ 382.3 million in 2022.
2. Growing world cargo traffic (freight tonne kilometers) owing to accelerating urbanization and increasing disposable income, increasing deliveries of commercial aircraft, increasing demand for lightweight ULD, large ULD fleet size, and an advancement in the technology are some of the major growth drivers of the market.
3. Cargo is an essential part of the airline business today. It contributed roughly 9% of the airlines' revenue which is more than twice the revenues from the first-class segment.
4. The biggest benefit of air cargo ULD is that it allows bundling a large quantity of cargo into a single unit. This helps to minimize the airlines' operational cost by saving the ground crew time and efforts.

4.

Air Cargo Container

production Granger Industries - USA

Granger Aerospace Products ULD Containers are the only Air Cargo Container produced from a combination of aluminum and durable, rotationally molded LLDPE (Linear Low Density Polyethylene). The body of Granger's Air Cargo Containers is produced via the rotational molding process. With the body being molded from certified, prime virgin polyethylene, the body of the container is capable of withstanding the most vile of weather elements and the roughest of ground handling operations.

The body's of the containers can be molded in virtually any color, allowing any client to enhance their corporate branding, marketing and recognition.

The extremely specialized contents of these custom air cargo containers is remarkably susceptible to damage or malfunction if the product being container experiences too much motion or the slightest of impact. At times, the contents of these shipping containers could exceed a value of \$10,000,000 US Dollars, so there is no margin for error. These containers are manufactured to extremely stringent requirements & demands. A large portion of these containers are equipped with RFID chips or GPS monitoring devices to make certain of the security and safe delivery of the container and its contents to the necessary location.

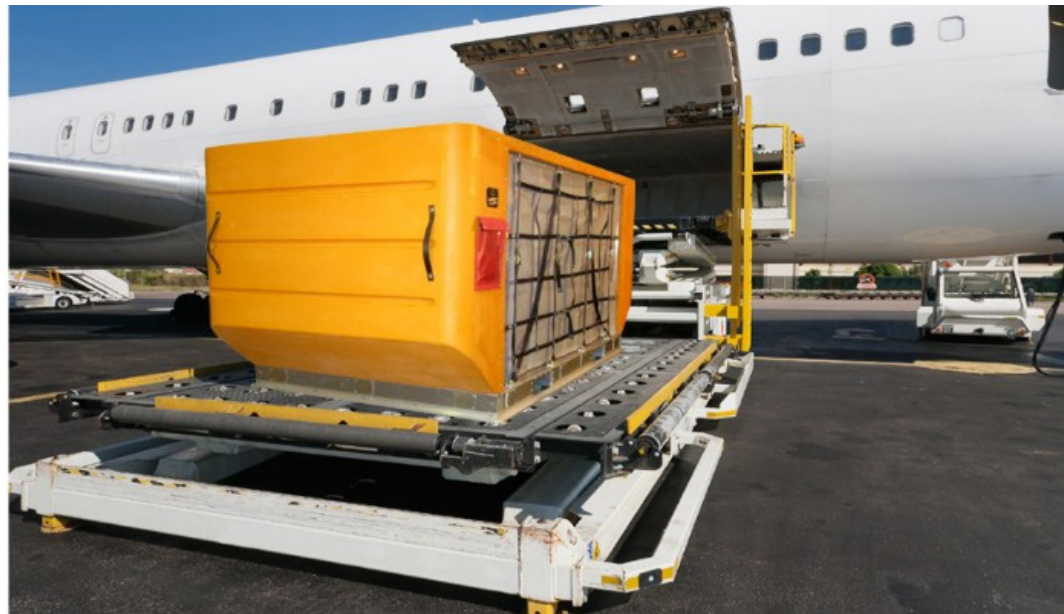
www.grangerindustries.com



> *The body of the moulded container is capable of withstanding the most vile of weather elements*



> *Equipped with RFID chips or GPS monitoring devices to make certain of the security and safe delivery*



Prospects of the storm shelters

Storm shelters come in several varieties but the most are fixed and come in two main types: *above ground* and *below ground*.

Each alternative has advantages. *Below ground shelters* usually consist of steel, concrete or fiberglass capsules buried just below the surface. Surrounded by earth, they may provide extra shelter from flying objects. However, people taking refuge below ground can be vulnerable to water pooling from heavy rains, as well as chemical spills.

Above ground shelters, also called safe rooms, typically consist of prefabricated steel boxes anchored to a concrete slab. These can be used in more applications and may be less costly when retrofitting. They offer ease of access, even for the wheelchair-bound. For most storms, they offer about as much protection as below ground shelters.

Key factors Trends

1. Recent global trends in temperature have provoked questions about *the impact on frequency, intensity, timing, and location of tornadoes*.
2. There has also been a *measurable shift in the annual timing of tornado season*, mainly due to *rising global temperatures*.
3. Most recent studies show *increased tornado frequency* in the United States, Europe, China and India.
4. For people that live in critical areas storm shelters of all types are *a growing demand among homeowners*. The need for protection is often being resolved with a prefabricated tornado shelter installed in the foundation of the home, often masked by an interior room.
5. Proper shelter from deadly weather conditions is an essential requirement in some real estate markets today as more potential homeowners are considering that to be a required feature. Many specifically request an *in-ground tornado shelter* for the greatest level of protection.

ISS Tornado Shelter

production Granger Plastics, USA

When thinking about buying a tornado shelter, the type, size, material and installation are several main considerations. Finding a tornado shelter manufacturer that can be trusted and will be available for their customers should also be high on the priority list. It is essential to research and trust the company making this life saving product for your family.

The Granger ISS is a rotationally molded tornado shelter made almost entirely of polyethylene. This shelter has a double wall design which is foam filled for extra rigidity and strength. The foam also acts as an insulator making the interior of the shelter more comfortable. The Granger ISS has a reverse taper design which does not require the unit to have an anchoring system. This means a faster easier installation and that it can be installed in many areas other underground shelters would have issues. Regardless of soil condition, water tables or almost any space construction, this shelter installs in 4 hours or less, seats six or more, has a number of additional safety features and comes with a lifetime warranty against material deterioration including cracking, leaking, rotting or rusting.

www.grangerindustries.com



> The shelter has a double wall design which is foam filled for extra rigidity and strength.



Prospects of floating photovoltaic technology

Many regions around the globe have *extreme difficulties in accessing portable water and a stable energy supply*. Some areas are covered with arid soil and salty water, while others have power transmission problems.

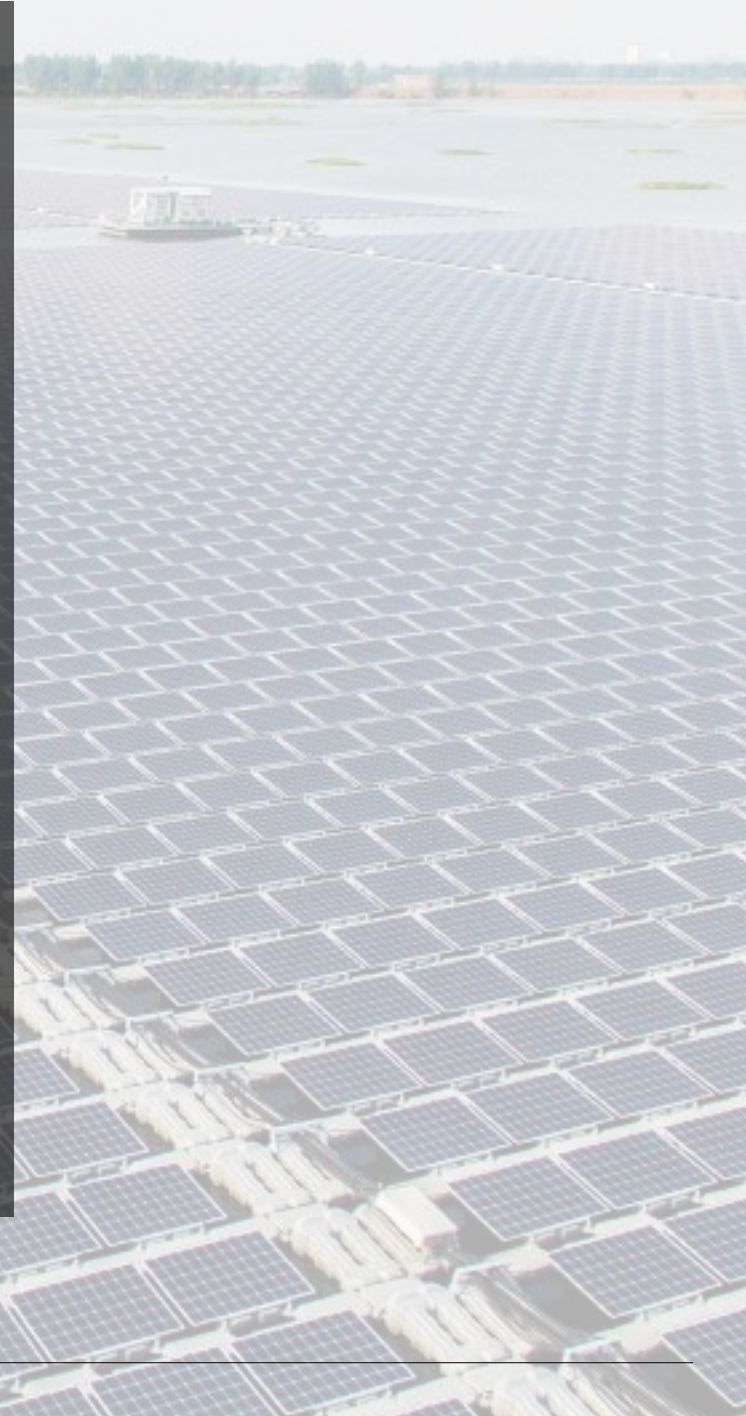
Water evaporation from reservoirs is also another problem during high temperatures, thereby posing additional energy and water demands.

This technology will prove to be *highly feasible* as it is an environment friendly and cost efficient and will help in *reducing evaporation, achieving sustainable water supply and clean energy production and reducing greenhouse gas emissions*.

There is very *minimal work done on floating solar technology using rotational moulding instead of other technologies*; thus, there is immense need to explore and research on this technology on every level through information sharing.

Key factors Trends

1. *Floating solar or FPV* (Floating photovoltaic), refers to an array of solar panels on a structure that floats on a body of water, typically an artificial basin or a lake.
2. Factors like growing energy crisis, high rate of carbon emissions, and rising concerns about environmental protection are stimulating *the need for sustainable power generation, globally*.
3. Additionally, *growing number of renewable energy pacts*, especially focusing on solar projects, across the world, is supporting the increased installation of solar panels or PV modules, which, in turn, is driving the floating solar panels market.
4. The growing global floating solar panels market is *expected to reach USD 2.70 billion by 2025*, according to different international reports.
5. The *main technology for floating solar docks is blow moulding now while rotational moulding is used mainly for pontoons*.



Photovoltaic Floating System

production
Celemin Energy, Alicante, Spain

A new photovoltaic floating cover system for water reservoirs developed jointly by the Spanish company Celemin Energy and the Universidad Politécnica de Valencia. The system consists of rotomoulded polyethylene floating modules which, with the use of tension producing elements and elastic fasteners, are able to adapt to varying reservoir water levels.

A full-scale plant located near Alicante (Spain) was built in an agriculture reservoir to study the behaviour of the system. The top of the reservoir has a surface area of 4700 m² and the system also minimizes evaporation losses from water reservoirs.

The floating module's geometry was designed taking into account two main issues. First, the dimensions of the module must be adapted to commercial photovoltaic panels. Second, the modules must cover the maximum possible water surface to prevent water evaporation. This photovoltaic floating system in Alicante is one of the first rotomoulded examples in the world.

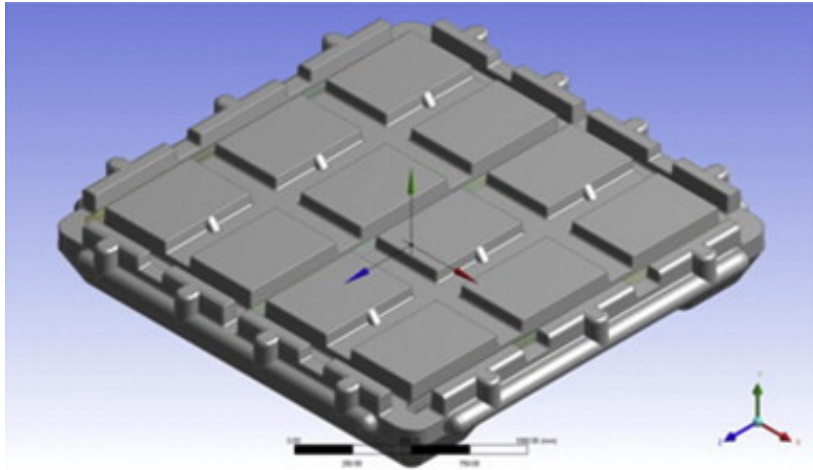
The pontoon is the key element of the system. It has to ensure the stability and buoyancy of the system and it is the basis of the photovoltaic plant. After considering several alternatives, the material selected was medium density polyethylene made by rotomoulding.

www.upv.es



> *Rotomoulded polyethylene floating modules with the use of tension producing elements and elastic fasteners*





> *The rotomoulded modules must cover the maximum possible water surface to prevent water evaporation*



Prospects of the diary farming

Worldwide, annual consumption of *dairy products* (fresh milk equivalent basis, not including butter) currently averages about 87kg per person and is expected to increase to 119kg per person worldwide by 2067.

Increased consumption of dairy products coupled with increased growth in population translates into a need for approximately 600 billion kilograms more milk in 2067 than is produced today.

To produce this volume, an average dairy cow on the globe would need to double its annual yield from 2,405kg to 4,531kg. This seems unlikely to occur because many countries with lowest annual production per cow have the most cows

Key factors Trends

1. The future proof farm is a *profitable one and profitability of dairy farms* will be the key to their sustainability.

2. Profitability of dairy farms is influenced primarily by value of milk in the marketplace, cost of feed, and average fixed cost per cow or unit of milk sold.

3. Dairy farms will become *more automated and will utilise products, sensors and technologies to improve sustainability*, particularly associated with soil and crop health, water quality, and emissions.

4. In 50 years from now, the farms will also have much more *specialisation in managing cattle of different ages and stages of production*. This is called *lateral integration*, where farmers share resources and specialise in managing specific animal units.

Dairy Lane Systems

production Jourdain - France

Jourdain, a family business for more than the last 100 years, turned towards the conception and production of tubular cattle equipment at the start of the 1960s. The 70 patents applied for by the company are proof of its aim for continuous innovation.

Product conception is the fruit of years of experience and paying attention to the evolving needs of livestock producers. Furthermore by having a close relationship with subcontractors (both in the Loiret and regional) and its European suppliers of raw materials, the company has very tight control over its product quality.

The integration of an internal design department has reinforced Jourdain's capacity for innovation as well as its reactivity. It has led to the creation of complete new ranges of equipment and penetration into new markets such as the equine market in 2012 or the cattle handling market in 2014.

www.jourdain-group.com



> *A complete new ranges of rotomoulded equipment open new markets*



Prospects for Kids Furniture

In a bid to raise children's awareness of plastic waste, recycling and sustainability, one of the main challenges for the industry is transforming unwanted plastic toys into kids' furniture.

Today 80% of plastic toys end up in landfill or incinerators, while 90% have a lifespan of just six months.

In response, Ecobirdy has developed a system that encompasses the collection and recycling of unwanted plastic toys, right through to the design and production of furniture pieces.

To introduce kids to the circular economy and raise awareness of plastic recycling, a storybook and school programme have been designed to accompany the process. Children are then invited to donate unwanted toys and are informed when their items have been recycled into new furniture.

Key factors Trends

- 1. The leading players are focusing on technological advancements to improve kids furniture quality. The long term development for this market can be attained by continuing the ongoing process improvements, demand generation, making the technology affordable and investing in the best industrial practices.*
- 2. The pieces of the ecoBirdy collection are made out of Ecothylene – a new material developed by Ecobirdy that's 100% recycled plastic.*
- 3. The plastic toys are separated by colour, cleaned and grinded, resulting in pure, chemical-free flakes ready for moulding.*
- 4. The speckled finish of each item aims to help children recognise a recycled material, with the colours from their toys still being visible.*
- 5. Ecobirdy hopes that increasing children's consciousness of plastic waste will help them contribute to a sustainable future.*



ecoBirdy

production ecoBirdy - Belgium

Plastic pollution – a global issue affecting all of us – is no secret to anyone, and as we keep consuming plastic there is one industry that we try to ignore: kids' toys. Maybe it's because the small ones love them, or because we love giving them, but these inexpensive objects – with short lifespans – are becoming a big problem. This is why Antwerp-based designers have launched ecoBirdy, a new brand that creates furniture from 100% recycled plastic waste. best part of it all? it can be recycled again.

Following an in-depth two-year study period exploring how to sustainably recycle plastic toys, ecoBirdy creates rotomoulded pieces that are 100% made of recycled plastic waste. The process starts by collecting, sorting, cleaning and grinding old and unused toys. Once separated into colors, the flakes are transformed into a single item with a speckled look. Rounded edges and a smooth silky surface result in furniture pieces that are pleasant to touch and easy to clean.

www.ecobirdy.com





Prospects of Application for Sound Barriers

In the modern world, noise pollution continues to be a major problem that impairs people's health, and road traffic is a primary contributor to noise emissions.

Noise pollution is an issue related to human beings and the environment. It may have impacts on general health.

Compressors, generators, transports and pipe handling are the sources of noise. Ambient noise is different during day or night and in rural and urban area.

One of the best features of sound wall panels is the elimination of noise rather than reflecting it in a different direction.

Key factors Trends

1. Rotationally moulded plastic noise walls have benefits in terms of *avoiding the need heavy lifting, and for removal of vegetation* when constructing as they can be carefully inserted into a vegetated environment with *minimal disturbance, graffiti removal, repeatability of different textures, weight and manoeuvrability*.

2. There are specific issues that need to be considered in designing this rotomoulded product. It is not possible to *achieve a flat surface* – the panels need to incorporate a texture or bowing (pillow) effect to provide rigidity and this may not be desirable.

3. The expansion or shrinkage of the plastic due to temperature changes requires *a gap between the panels*, the details of which may be difficult to control.

4. *Maintenance of fixings* also need to be considered in terms of the expansion of the material in extremes of temperature.



Poly Panels

production Aus Group Alliance - Australia

Aus Group Alliance is an Australian company that design, manufacture and install noise walls and protective screens for applications on freeways, bridges, industrial sites, shopping complexes, housing estates and landscape projects.

AGA's polyethylene noise panels are a heavy-duty rotary moulded plastic, designed to diffuse noise as it passes through the material. The panels have a design life of more than 40 years, and are easy to replace. The revolutionary rotomoulded 'poly panels' offer many benefits in comparison to traditional concrete noise barriers:

- *They are lightweight, weighing in at 60kg per panel, compared to a traditional concrete panel which weighs 250kg, making them quick to install and easy to transport.*
- *They are cost effective to produce and cost effective to install given reduced machinery needs, labour requirements and assembly time.*
- *They improve safety in the event of a collision, absorbing impact.*
- *They are environmentally friendly with a lower overall carbon footprint to manufacture than concrete panels and offering 100% recyclability.*
- *They are corrosion and graffiti resistant.*

www.ausg.com.au



> The panels have a design life of more than 40 years, and are easy to replace





Domestic Sound

design Tushar Mallikarjuna - India

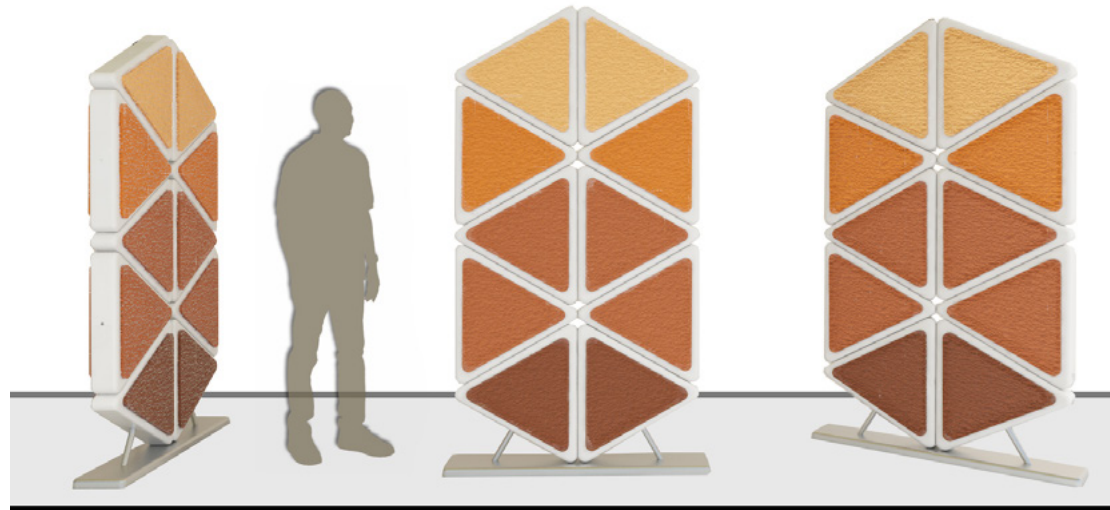
The design of a quiet and peaceful home requires taking some important noise management measures. These include controlling the noise that enters the home from the exterior, the noise between rooms and spaces or between floors, the noise within a room itself, and the noise caused by mechanical systems.

Controlling indoor sound quality (ISQ) is a vital component of creating a quality indoor environment that is both comfortable and enjoyable. Implementing these five secrets for controlling noise in your house will certainly lead to a more calm and quiet home.

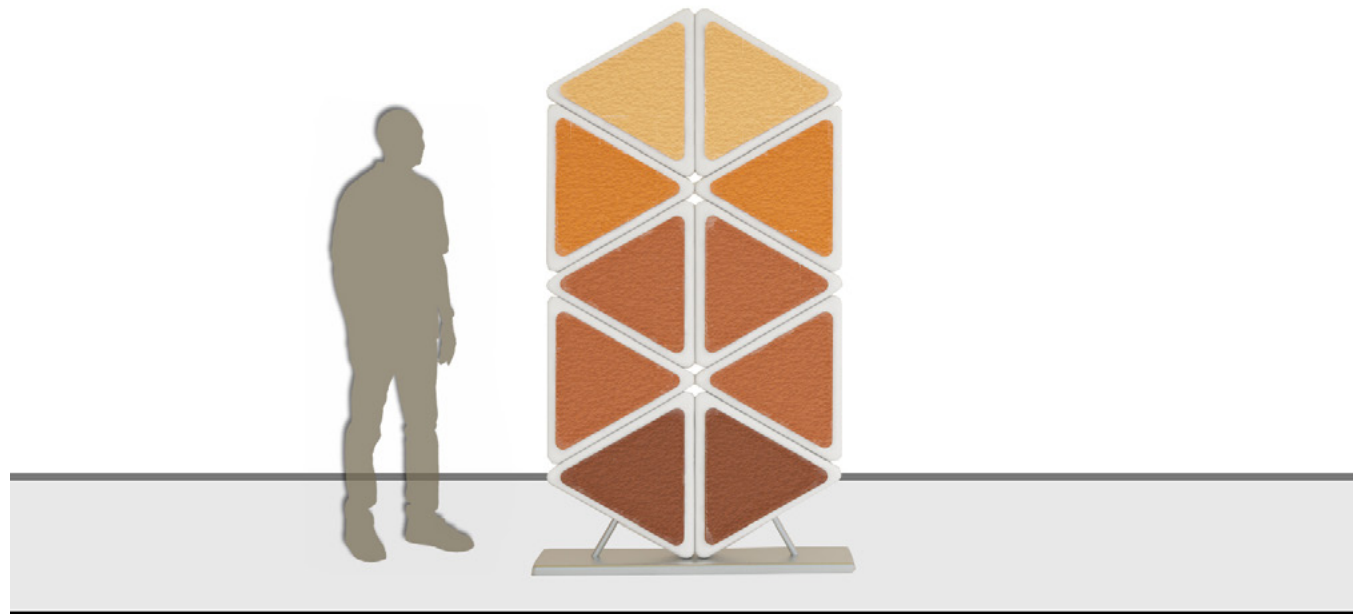
Domestic Sound is a project that explores the potential of rotational moulding making soem componible modules that can be joint together.

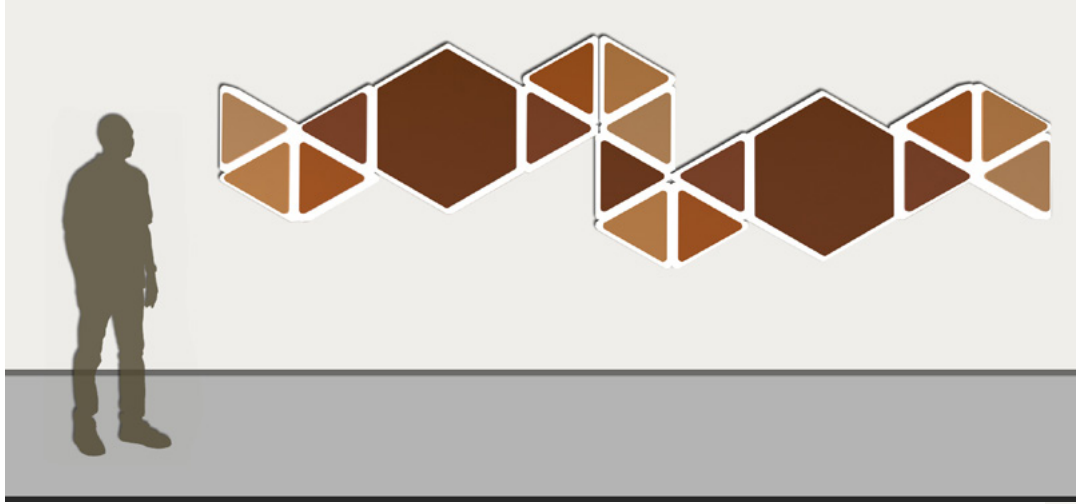
Every module is made with a rotomoulded base and a sound-proof flexible polyurethane panel. Different typologies are available starting from the same module: floor version, wall partitions and as hanging lamp.

*SJB-Institute of Technology, Visvesvaraya
Technological University (VTU), Bangalore, India*

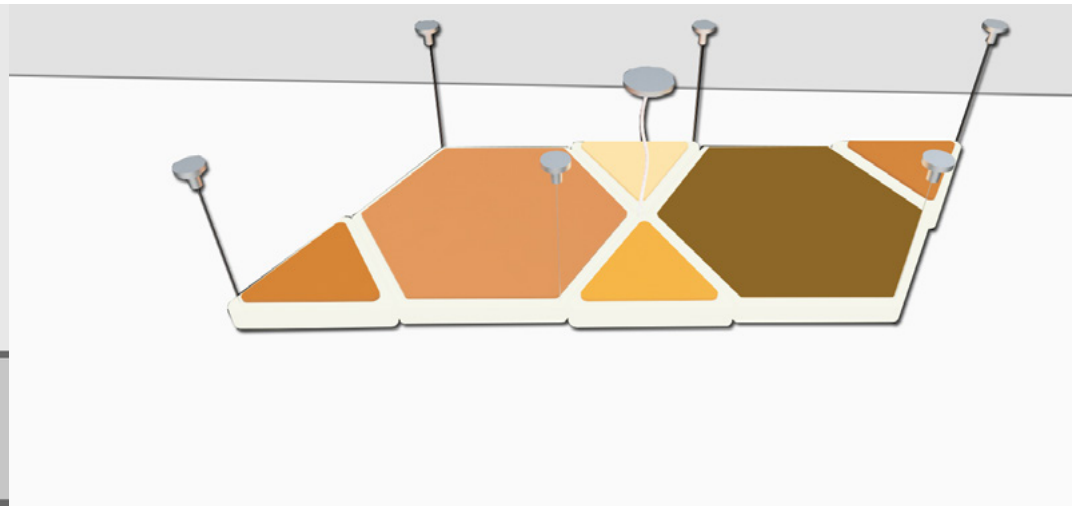
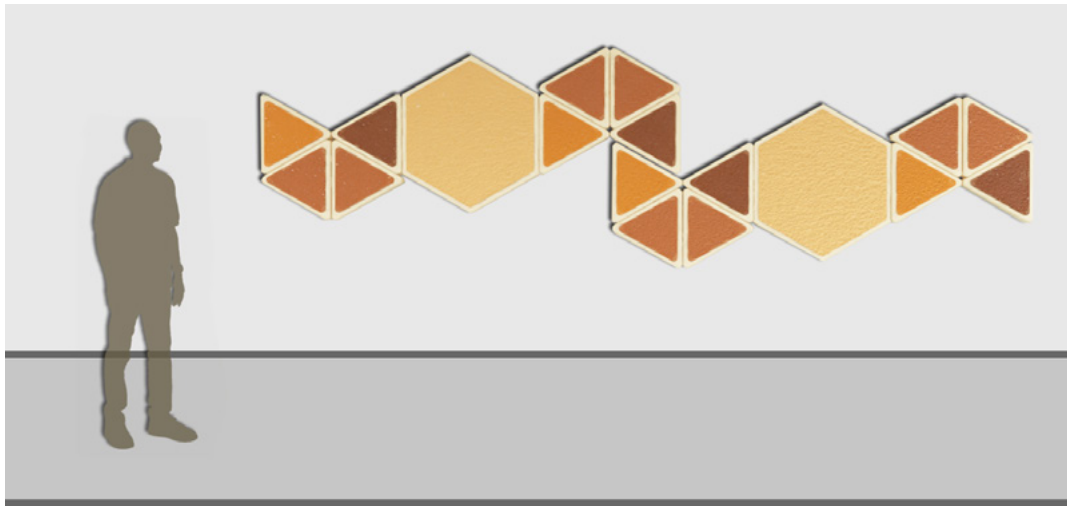


> *Controlling indoor sound quality (ISQ) is a vital component of creating a quality indoor environment*





> *Controlling indoor sound quality (ISQ) is a vital component of creating a quality indoor environment*



Prospects of Application for Rain Barrels

The increasing scarcity of water in various regions across the globe is supporting the demand for rain barrels.

Rain barrels help in reducing peak domestic water demands generally during the summer.

Apart from dealing with water scarcity problem, the rain barrels assist in controlling local flood problems by collecting water.

The high volume holding capacity of rain barrels helps in collecting lots of water with less number of units. These factors are projected to drive the growth of the global rain barrels market during the forecast period.

Incidentally, installing rain barrels also protects streams and rivers from erosion and prevents loss of soil. Rain barrels prevent pollutants from roads and paved areas from entering into the water bodies.

Key factors Trends

1. Installing rainwater is an easy technique to save water and reduce costs spent on the water bill and other related utilities.

2. Also, rain barrels are highly durable as they can last for up to 20 years if maintained properly. These factors are supposed to drive the demand for rain barrels during the forecast period.

3. The cost of traditional rain barrels is quite high. This might hamper the growth of the global rain barrels market.

4. Though some producers are looking to new technologies as rotational moulding to make rain barrels at reduced prices and with additional and innovative shapes and functions.



Pure RainDrop

production Elho - Netherlands

The beauty of nature along with modern-day architecture have been the source of inspiration in creating the stunning rotomoulded Pure collection. They are then carefully finished by hand to achieve the desired end result.

The use of polyethylene combined with the rotational technology ensures that the Pure products are strong, lightweight, unbreakable and frost and uv resistant. Not only does the pure rain barrel have an eyecatching and trendy design, it is also a functional product for the garden. The rain barrel has a 70-litre capacity, is easily installed between the drainpipes and that is how it collects rain water. Any excess water flows away through the drain.

The system includes a watering can with a 5-litre capacity which can be easily placed under the tap. The garden hose can also be attached to the tap to quickly water the entire garden. The rain barrel can be placed in full sun, its UV-filter makes it colourfast. Moreover, it can withstand temperatures down to -20 degrees. However, during periods of frost, the tap should be opened so that water can drain out.

www.elho.com



> The garden hose can be attached to the tap to quickly water the entire garden



> The rain barrel has a 70-litre capacity and it is easily installed between the drainpipes





Prospects for Urban Furniture

New urban models, pragmatic modes of transportation, and modern forms of community and connection create unconventional solutions for an ideal urban living space.

The very definition of the term 'urban furniture' reveals a desire for harmony, heterogeneity and belonging. Creating useful objects that make the lives of citizen easier and more beautiful.

The rotational molding process can provide high quality parts, high-performance and competitive costs in the urban sector.

Rotomolding can now take its rightful place in urban furnishing alongside other processes such as extrusion, blow molding, sheet metal, thermoforming, and injection molding.

Key factors Trends

1. World population will increasingly concentrate in urban areas and this trend is spreading all over the world. As a consequence of this movement to the cities, new generations increasingly appreciate well-designed urban furniture in all its forms.

2. Street furniture is quickly taken into account so that it can become an integral element that helps structure and enhance than project rather than being an afterthought. When the line between furniture and architecture or furniture and the ground is blurred, furniture is no longer really an object.

3. Street furniture has a functional role, but is also a vehicle for conveying identity. Today, furniture in public places is subject to high expectations in terms of quality as it is considered to be an effective tool for urban planning.



Enzos

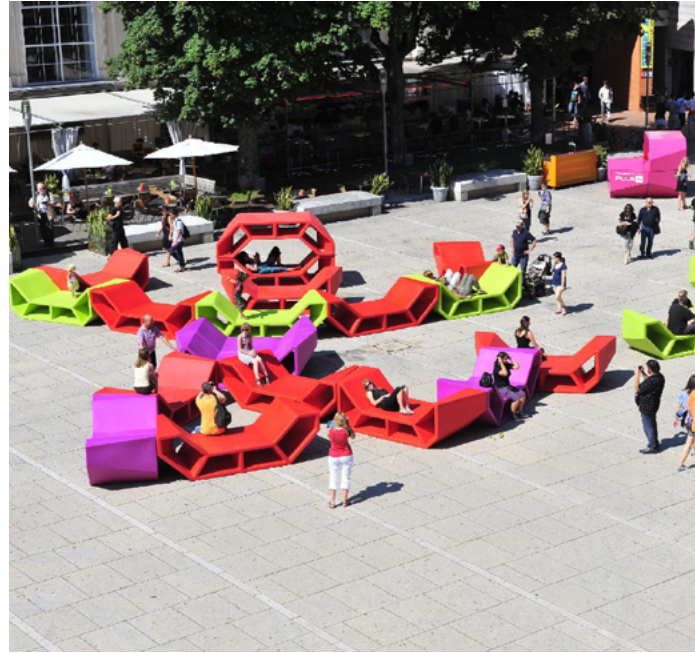
design *Anna Popelka and Georg Poduschka,
Austria*

The architects Anna Popelka and Georg Poduschka, with contributions from the designers Margarita Navarro and Ludwig Slezak, created the Enzos: abstract forms that are open to a variety of interpretations by their users; robust, washable objects that can be combined in endless variations to form new and always different structures.

These pieces stand in the courtyard of Vienna's MuseumsQuartier.

During the summer, the Enzos become lounge chairs of an extravagant shape and colour, which can be hooked up to each other and laid out in various ways. During the winter, they are stacked up vertically to form igloos or booths selling hot punch, "cinemas in the cold", ice labyrinths or fences.

www.prodomowien.at



> During the summer, the Enzos become lounge chairs and they can be hooked up to each other

> During the winter, they are stacked up vertically to form igloos or booths



Prospects for Camping Tents

*Tents architecture and design surveys temporary spaces from around the globe, looking at contemporary projects and the **diverse materials, technologies and unconventional forms** employed in their construction.*

Adventure and comfort must be combined in a great design. Tents are made out of high quality materials and they are made to last.

Key factors Trends

1. In recent years, the development of the tent industry has been increasingly restricted by links in supply chain, it is limited in research design and market prices, that is why more companies are gradually exploring the direction of tent development.

*2. Summer music festivals and outdoor events tend to create recurring, **short-term demand for accommodations.***

3. Camping at mass events as concerts can be a soggy and uncomfortable affair, and tents often get dumped at the festival's end, sending them to landfills.



myhab

production myhab, Great Britain

myhab is a company based in London, and was formed when its founders saw a business opportunity in the increasing number of ditched tents after popular events, such as the Glastonbury Music Festivals.

Designer James Dunlop believes his myhab disposable habitats will help curb the huge number of tents left behind at crowded functions, such as music festivals. At a glance, myhab might look like a glorified cardboard box, but check this out.

Your very own rotomoulded myhab with room for two will be erected as well as dismantled for you, and contains a cushioned pad to sleep on, a locker secured by a PIN, lighting and the option to personalize your myhab with your name.

www.myhab.com



> myhab helps curb the huge number of tents left behind at crowded functions





> myhab contains different accessories as cushioned pad to sleep on, a locker and lighting



Prospects for Outdoor Toilets

Community facilities enhance the lives of residents in numerous ways. Parks provide green space and room to move for people in crowded city neighborhoods.

A community with good parks and other facilities is a pleasant and sociable place to live, with a lively outdoor and cultural life.

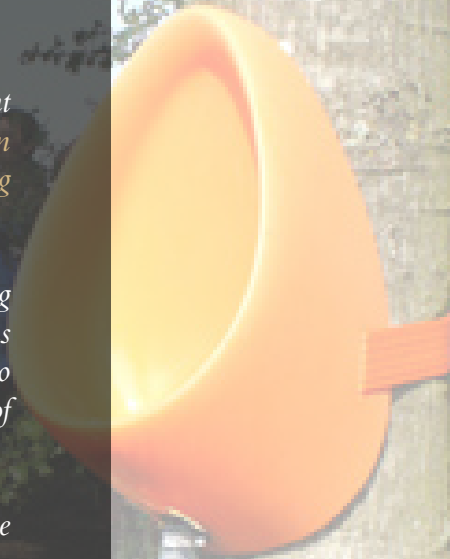
*To make the portable toilets more pleasant to the sight and to harmonize them with any urban and natural landscape, producers has introduced the portable toilets decoration with **natural and educational thematic**.*

Residents spend more time in the community, and therefore are more familiar with one another, and contribute to a sense of community.

*Park regulations help to **create and maintain a safe and healthy environment** in all parks and facilities during the main maiss events as concerts, festivals and parades.*

Key factors Trends

- 1. There are many factors that combine to make this environment **pleasant and safe during a mass event**.*
- 2. Rotomoulded temporary toilets and urinals represent an authentic advancement in the **portable sanitation industry** and are the result of years of manufacturing experience.*
- 3. The use of the most sophisticated and hardwearing materials transformed by high-tech production systems is combined with an engineering project that aims to **reduce the maintenance costs** related to the service of portable toilets and increase safety for the operator.*
- 4. The design must be specifically developed to achieve **ultra-smooth surfaces** which are therefore easy to wash; the assembly of the walls with overlapping systems means that the rivets can be concealed, making **cleaning more practical** and safer and the inside of the cabin more refined and stylish.*



P-Tree Urinal

production *Aandeboom, Netherlands*

The P-Tree is a temporary tree-friendly urinal that can be fixed on every tree using straps and lashings. Unable to prevent revellers urinating against their trees, Roskilde Rock Festival in Denmark installed tree-mounted urinals by Dutch designers Aandeboom. The urinals are made of rotational-moulded plastic and can either connect to the main sewage system or a tank with a pump.

The P-Tree gives a feeling of freedom. The P-Tree can be hooked up to a central sewage system or connected to a tank with a pump.

www.aandeboom.nl





> Its practical application may be questionable, but it is a refreshing approach to what can be a pressing problem



Prospects for Nautical Furniture

The rotomolding in the nautical sector isn't successful by chance. This manufacturing process allows to create an infinity of plastic products.

From water sports objects to large projects such as docks or even boats and motor boats, the rotomolding process offers the entrepreneur a great opportunity to produce and innovate in a global market and has great potential to grow.

In addition to the versatility in production, other characteristics are increasingly favoring the growth of this industry.

The production cost of the parts is lower than the traditional processes, such as fiberglass, metal or wood, also impacting the product final price to the consumer. In addition, the plastic factor allows more possibilities with regard to design and a lasting product life.

Key factors Trends

- 1. The parts made by the rotational moulding process are light and, at the same time, have high mechanical resistance.*
- 2. They are also suitable for use outdoors, resisting contact with water, weather and temperature conditions variation.*
- 3. The ease of hygiene is another factor that takes advantage over other materials. In the near future, it is expected that all these advantages will lead producers to increasingly use rotomoulded plastic, including large parts such as some of the following product.*

AM Nautic Chaise Longue

production *Azimut Yachts, Italy*

This chaise longue is a day bed created with an innovative and revolutionary seating concept.

Its perfect ergonomics and smooth lines inspired by the dynamics of a body at rest, recall feelings of serenity and well-being, perfectly embracing its forms.

The possibility to change its angle of inclination, allows you to enjoy of total relaxation, making it an object of unique and exclusive design.

Functionality and stability are guaranteed by HD polyethylene, produced with rotational molding, making it suitable for any type of environment, professional and private yachhts.

Changing the legs or using the chaise longue directly in its ground position, you get four different versions, without varying its functions.

Light and handy, it is easily movable for any subsequent relocation and is simple to sanitize with the most common household products.

www.azimutyachts.com





Prospects for Air Customer Delivery

In the FAA Modernization and Reform Act of 2012, Congress issued the Federal Aviation Administration a deadline of September 30, 2015 to accomplish a “safe integration of civil unmanned aircraft systems into the national airspace system.” In August 2016 commercial use of UAV technology was legalized by the United States Congress.

In April 2015, the FAA allowed Amazon to begin testing current models. In the interim, Amazon had begun testing at a Canadian site close to the United States border.

Current U.S. regulations required drones fly no higher than 400 ft (122 m), no faster than 100 mph (161 km/h), and remain within the pilot’s line of sight.

Amazon has stated it intends to move towards operating above 200 ft (61 m) and beneath 500 ft (152 m). Amazon has stated it plans to fly drones weighing up to 55 lb (25 kg) within a 10 mi (16 km) radius of its warehouses, at speeds of up to 50 mph (80.5 km/h) with packages weighing up to 5 lb (2.26 kg) in town.

Key factors Trends

- 1. On December 7, 2016, Amazon successfully delivered a Prime Air parcel to Cambridge, England. Amazon had built a **Prime Air fulfillment center** in the Cambridge area.*
- 2. Amazon has patented a **beehive-like structure** to house delivery drones in cities, allowing Amazon to move from large single-story warehouses that temporarily store packages before they are shipped.*
- 3. **Fulfillment centres** designed to accommodate drone deliveries and operations within a certain radius are currently required.*



Amazon Prime Air

concept design *Maheshika Gayathri,
Sri Lanka , Domus Academy*

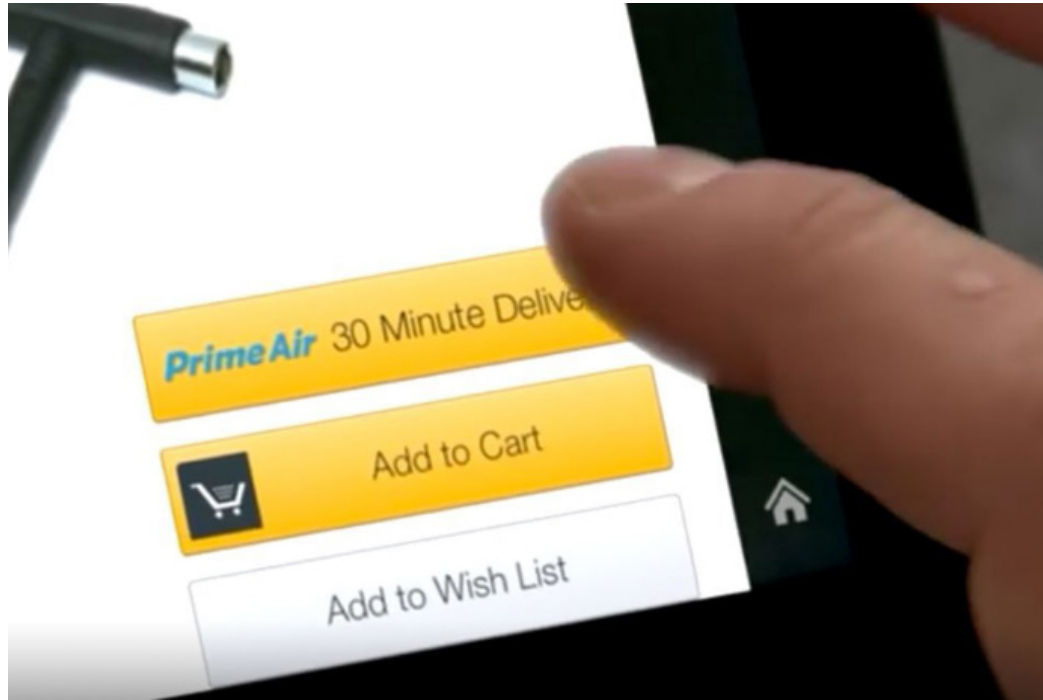
Amazon Prime Air is a delivery system from Amazon designed to safely get packages to customers in 30 minutes or less using unmanned aerial vehicles, also called drones.

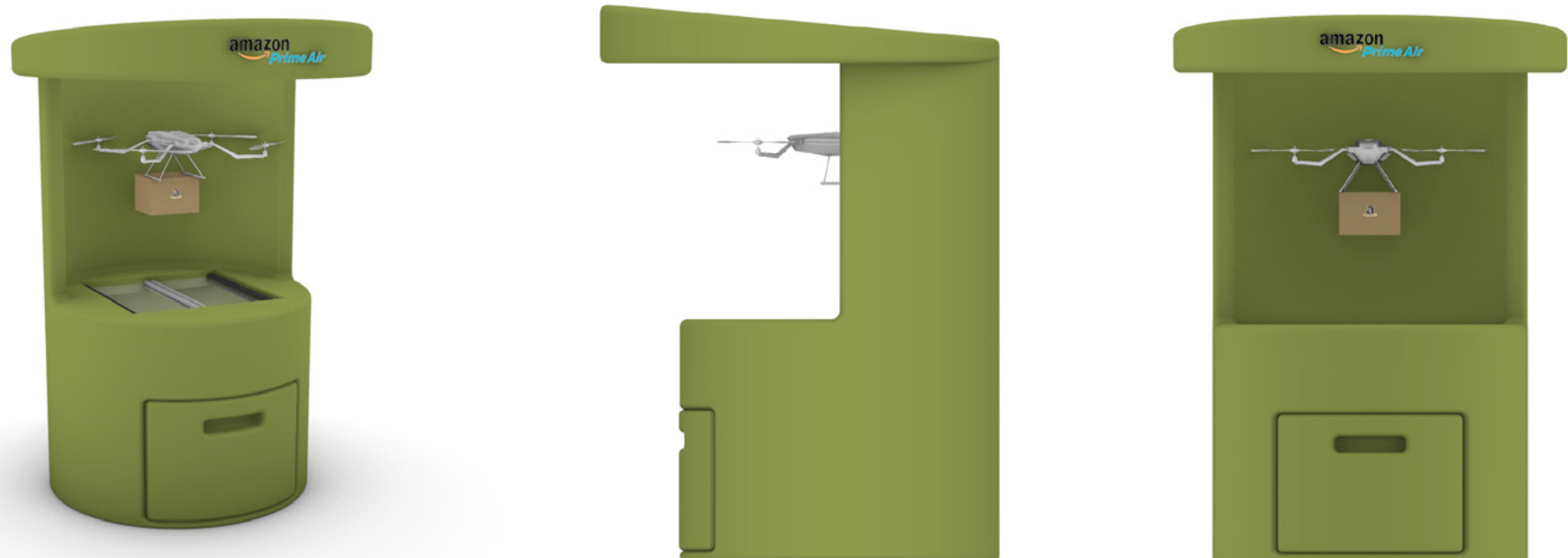
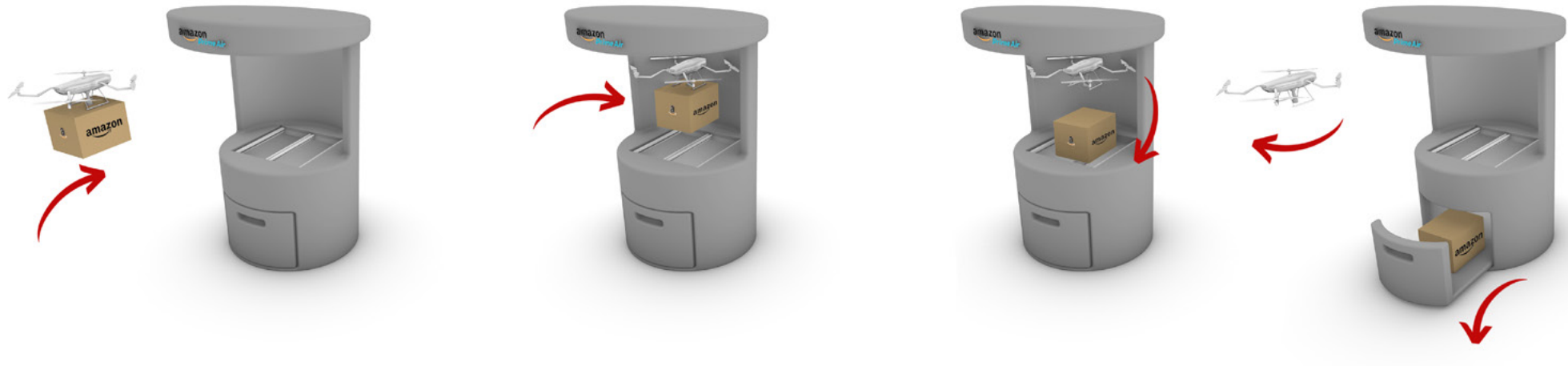
Prime Air has great potential to enhance the services they already provide to millions of customers by providing rapid parcel delivery that will also increase the overall safety and efficiency of the transportation system.

The Prime Air Hub is a rotomoulded container that works as an hub for domestic deliveries. It can be placed everywhere outdoor, in the garden or in the balcony. It's mainly made with two parts: the main body with a large roof and the central drawer.

www.amazon.com









credits

Felicerossi, *Italy*

B&B Italia *Italy*

Rotax Industrie, *France*

Safe Strap, *USA*

Granger Industries, *USA*

Celemin Energy, *Spain*

Jourdain Group, *France*

ecoBirdy, *Belgium*

Aus Group Alliance, *Australia*

Elho, *Netherlands*

myHab, *Great Britain*

Aandeboom, *Netherlands*

Azimut Yachts, *Italy*

Amazon, *USA*

Cover Pictures

courtesy Euro3Plast, *Italy*

Projects

Domus Academy, *Italy*

Ecal, *France*

Istituto Europeo Design, *Spain*

UDK, *Germany*

Politecnico di Milano, *Italy*

SJB-Institute of Technology, *India*

St. Martins School, *Great Britain*

Concept

Studio Giovanetti, *Italy*

affiliates



AFR - Association
Francophone du Rotomoulage



ARM - Association of
Rotational Molders



ARMA - Association of
Rotational Moulders Australasia



ANIPAC - The Mexican Plastic
Association



ARMSA - Association of Rotational
Moulders Southern Africa



ARM-CE - Association of Rotational
Moulders Central Europe



StAR - Society of Asian
Rotomoulders



Nordic ARM - Nordic Association
of Rotational Moulders



BPF - Rotational Moulders
Group



IT-RO - Italia Rotazionale



RPC-CPPIA



Rotopol Association