

RotoTrends

*Exploring the potentials of
rotational moulding in design*

Issue 2



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 for Tank Tractors

For years metal fuel tanks were of regular shape – cube or rectangular. With plastic it became possible to move to more complex shapes, thus increasing the volume capacity of the tank and optimizing layout.

Today, more than 70% of new cars produced worldwide are equipped with a plastic fuel system. Rotational moulded based plastic fuel system technology offers a good balance between safety, weight and cost for automotive fuel applications.

The use of plastics for fuel systems allows for:

- Weight reduction, thus better fuel economy and lower CO2 emissions: an average plastic tank weighs one-third less than an average steel tank.*
- Tank durability and biofuels compatibility: plastic fuel tanks made of high-density polyethylene (HDPE) are corrosion-resistant without any need of special coatings, making it also compatible with all kinds of bio-fuels.*
- In addition, HDPE can help dissipate electrostatic charge and prevent igniting fuel. Also, several studies demonstrated the superiority of plastics in terms of Life Cycle Assessment.*

Key factors Details

- 1. Design freedom allowing space economy: Thanks to the flexibility of this material, fuel tank systems made of plastics can be designed to fit the exact given space on the car chassis, thus increasing fuel storage capacity.*
- 2. Noise attenuation: insulating properties of plastics allow to reduce fuel system related noises and offer innovative and efficient solutions to control the fuel behavior and soften the slosh impact.*
- 3. Low permeability: thanks to advanced composite structures and functional component integration allowed by plastics, combined with efficient process innovations.*
- 4. Crash worthiness: through high impact performance.*
- 5. Cost effectiveness achieved through the combination of great design and manufacturing flexibility for complex shapes, mechanical and chemical resistance, and quantity of material to be used. Besides, plastics can be processed at lower temperatures than steel or glass.*

Tank for Arbos Tractors

production Rototech - Italy

For years metal fuel tanks were of regular shape – cube or rectangular. With plastic it became possible to move to more complex shapes, thus increasing the volume capacity of the tank and optimizing layout.

Tandem© tank for truck and other application means a duo of tanks: diesel and DEF. The project was designed by Rototech for a producer of agricultural machines. Rototech engineering team studied and used every inch available on a vehicle including the space between a wheel and a body.

Features of the tandem tank:

- tandem is composed of a fuel (140l) and a DEF tank (25l).
- steps and a handle integration in the body of the fuel tank
- fuel tank is shaped to accommodate and support a DEF tank without extra fixing brackets
- comfortable refilling for final user from one side of a vehicle
- filler neck and level sensor integration

Advantages:

- increase of useful capacity of the tank
- reduction of a number of components
- no rusting

Serial production started in 2018, supplying both EU and in Chinese markets.

www.arbos.com



Cleaning the Garbage Paths

Over 5 trillion pieces of plastic currently litter the ocean. Trash accumulates in five ocean garbage patches, the largest one being the Great Pacific Garbage Patch, located between Hawaii and California.

If left to circulate, the plastic will impact our ecosystems, health, and economies.

Solving it requires a combination of closing the source, and cleaning up what has already accumulated in the ocean.

The ocean is big. Cleaning up the Great Pacific Garbage Patch using conventional methods – vessels and nets – would take thousands of years and tens of billions of dollars to complete.

New passive systems are estimated to remove 50% of the Great Pacific Garbage patch in just five years, and at a fraction of the cost.

Key factors Details

1. The challenge of cleaning up the gyres is that plastic pollution is spread across millions of square kilometers and travels in all directions.

2. Cleanup technology must be designed to do the hard job of concentrating the plastic first, before it can be effectively removed from the ocean.

3. The system consists of a long floater that sits at the surface of the water and skirt that hangs beneath it.

4. The floater provides buoyancy to the entire system, while the skirt prevents debris from escaping underneath and leads it into the retention system, or cod end. A cork line above the skirt prevents overtopping and keeps the skirt afloat.



Vertical Garden

project Sean McKenna - RCA England

Rubbish accumulates in ocean patches across the world, and one of the largest is located off the coast of California and Hawaii and is known as the Great Pacific Garbage Patch.

If this problem is not solved, then ecosystems and humans' lives will be at risk, along with large areas of polluted sea water. The biggest problem is large pieces of rubbish which begin to break up into smaller pieces and therefore are harder to collect.

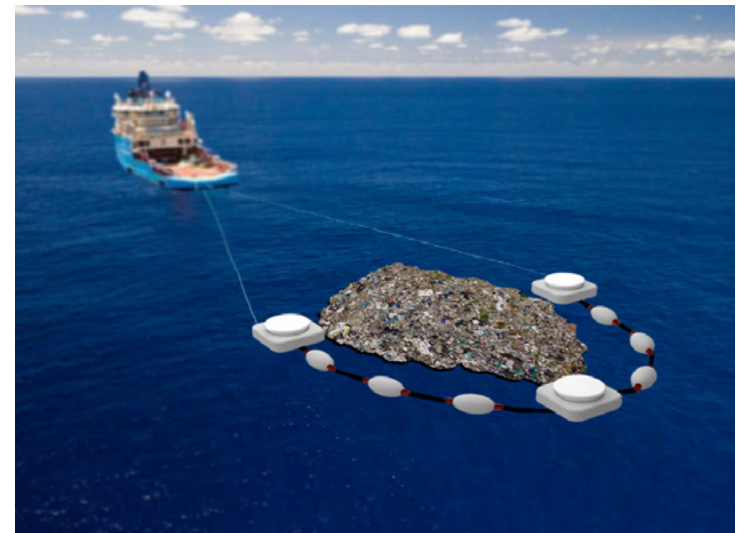
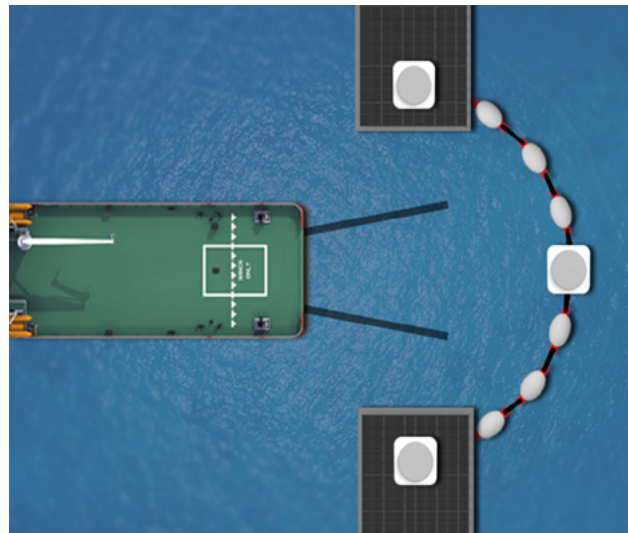
One solution involves using rotomoulded buoys to round up the collection of rubbish in the oceans and then taking it back to shore to be recycled, making the process sustainable.

These plastic buoys are assembled out at sea on platforms and are connected using ropes and nets and are then pulled along by a tug boat, collecting rubbish as it moves along.

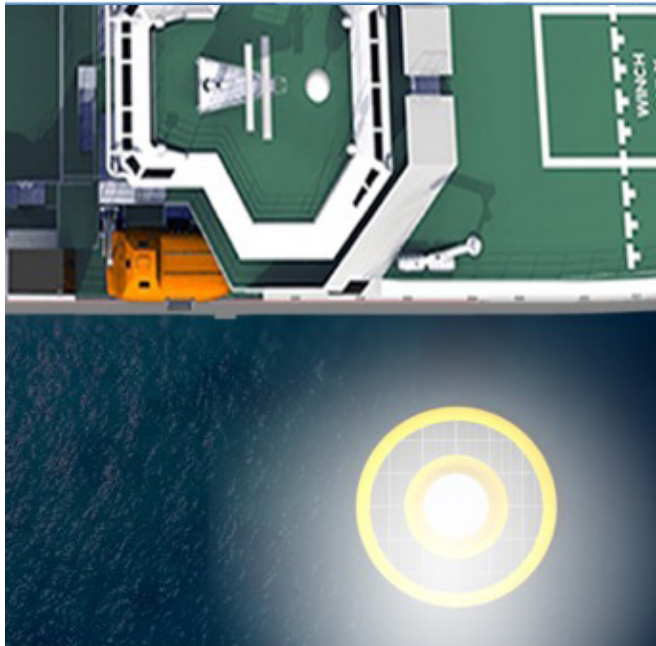
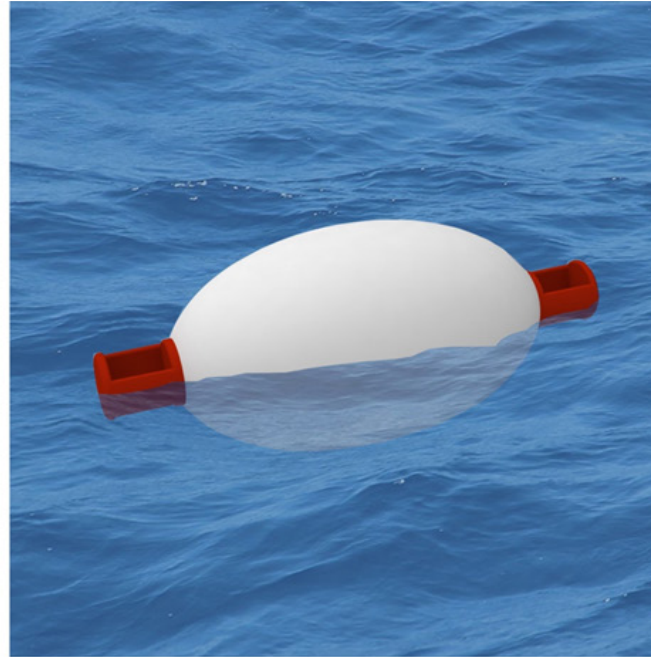
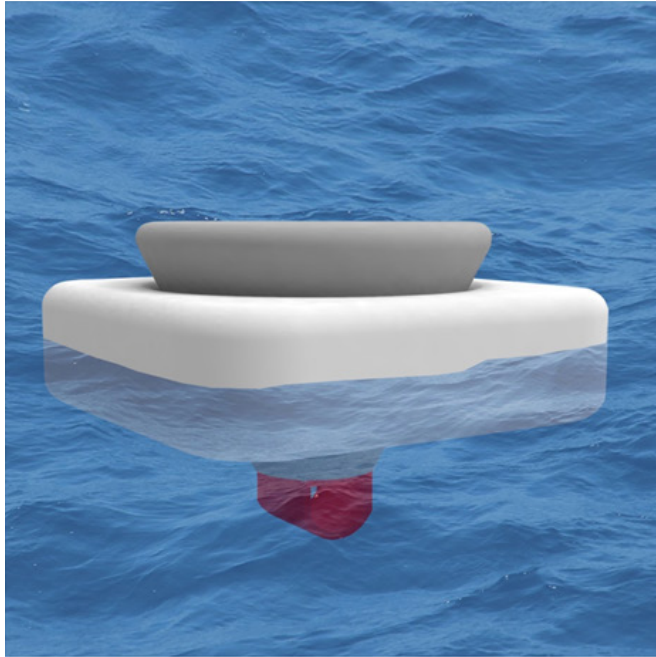
The introduction of rotomoulded light beacons will also help boats to follow correct shipping lanes in poor lighting conditions.



> *Rotomoulded buoys to round up the collection of rubbish*







Designing a new stadium experience

The design of a new plastic chair for a stadium must responds to the demands of the modern football fan by delivering an *increased variety of offers*.

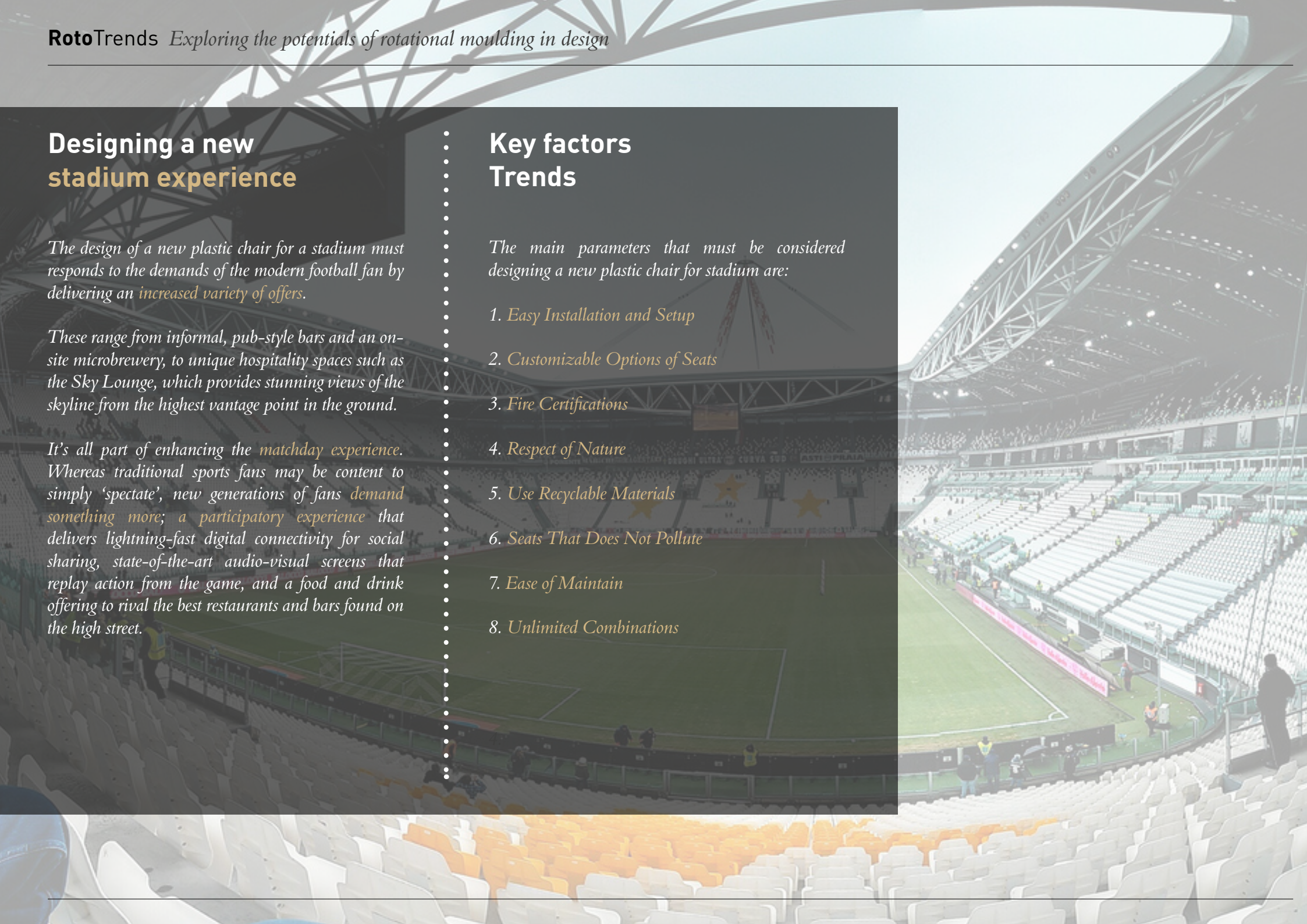
These range from informal, pub-style bars and an on-site microbrewery, to unique hospitality spaces such as the Sky Lounge, which provides stunning views of the skyline from the highest vantage point in the ground.

It's all part of enhancing the *matchday experience*. Whereas traditional sports fans may be content to simply 'spectate', new generations of fans *demand something more*; a *participatory experience* that delivers lightning-fast digital connectivity for social sharing, state-of-the-art audio-visual screens that replay action from the game, and a food and drink offering to rival the best restaurants and bars found on the high street.

Key factors Trends

The main parameters that must be considered designing a new plastic chair for stadium are:

1. *Easy Installation and Setup*
2. *Customizable Options of Seats*
3. *Fire Certifications*
4. *Respect of Nature*
5. *Use Recyclable Materials*
6. *Seats That Does Not Pollute*
7. *Ease of Maintain*
8. *Unlimited Combinations*



My Pleasure Chair

production LinoSonego Seating - Italy

The chair is the result of a successful cooperation between designer and producer: based on a concept of Italian designer Francesco Ragazzi it is produced by Lino Sonego, international brand for high quality seating, in cooperation with Acerbis and Radiomarconi.

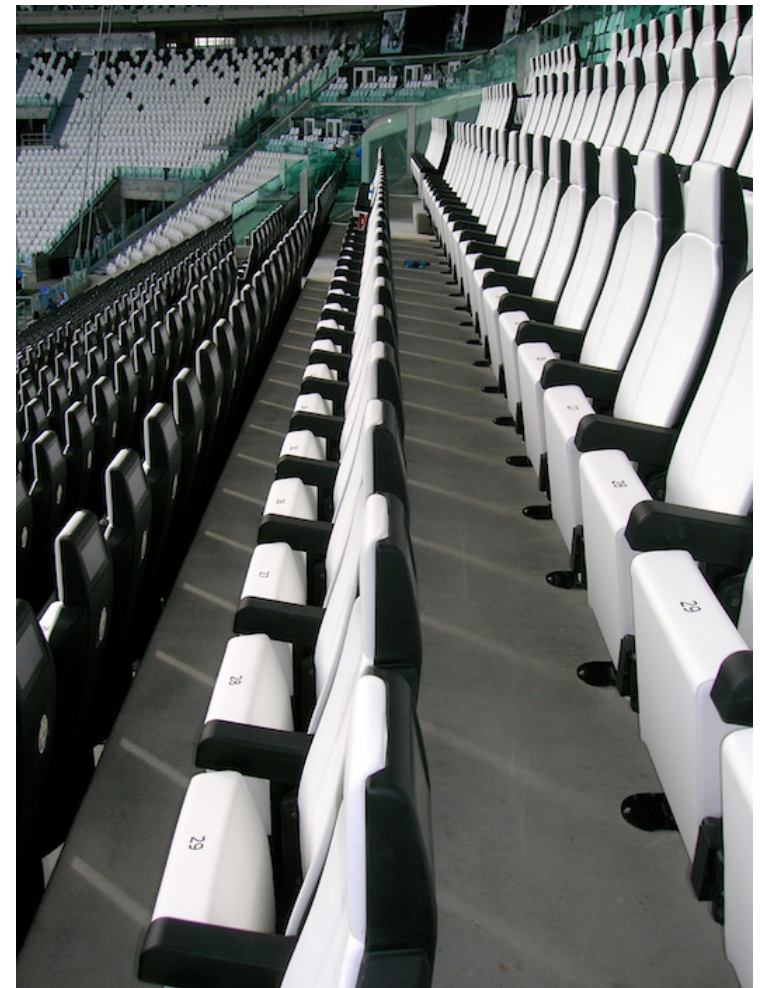
The chair is the first example of a seat conceived for the VIP stands of stadia and sport facilities, with an integrated LCD screen in the headrest and a carbon heating system integrated in the backrest.

The ABS seat structure, printed by Acerbis using the rotational technique, is designed with an ergonomic shape to fit in every different type of stadium and finished with a very resistant technical leather. The headrest contains a 7" LCD screen especially conceived by Radiomarconi for this project and the backrest is equipped with a special carbon heating system, adjustable by the user.

The chair has been installed for the VIP stands in Turin at Juventus Stadium.

Lino Sonego is the foremost Italian manufacturer of Cinemas, Stadium, Theatres and Institutions seating.

www.linosonego.it



> Backrest structure in PE linear polyethylene in black colour, moulded with rotational system





Transporting Water as Resource

A key logistics issue that many African isolated communities face is with transportation of water from communal wells back to residential homes.

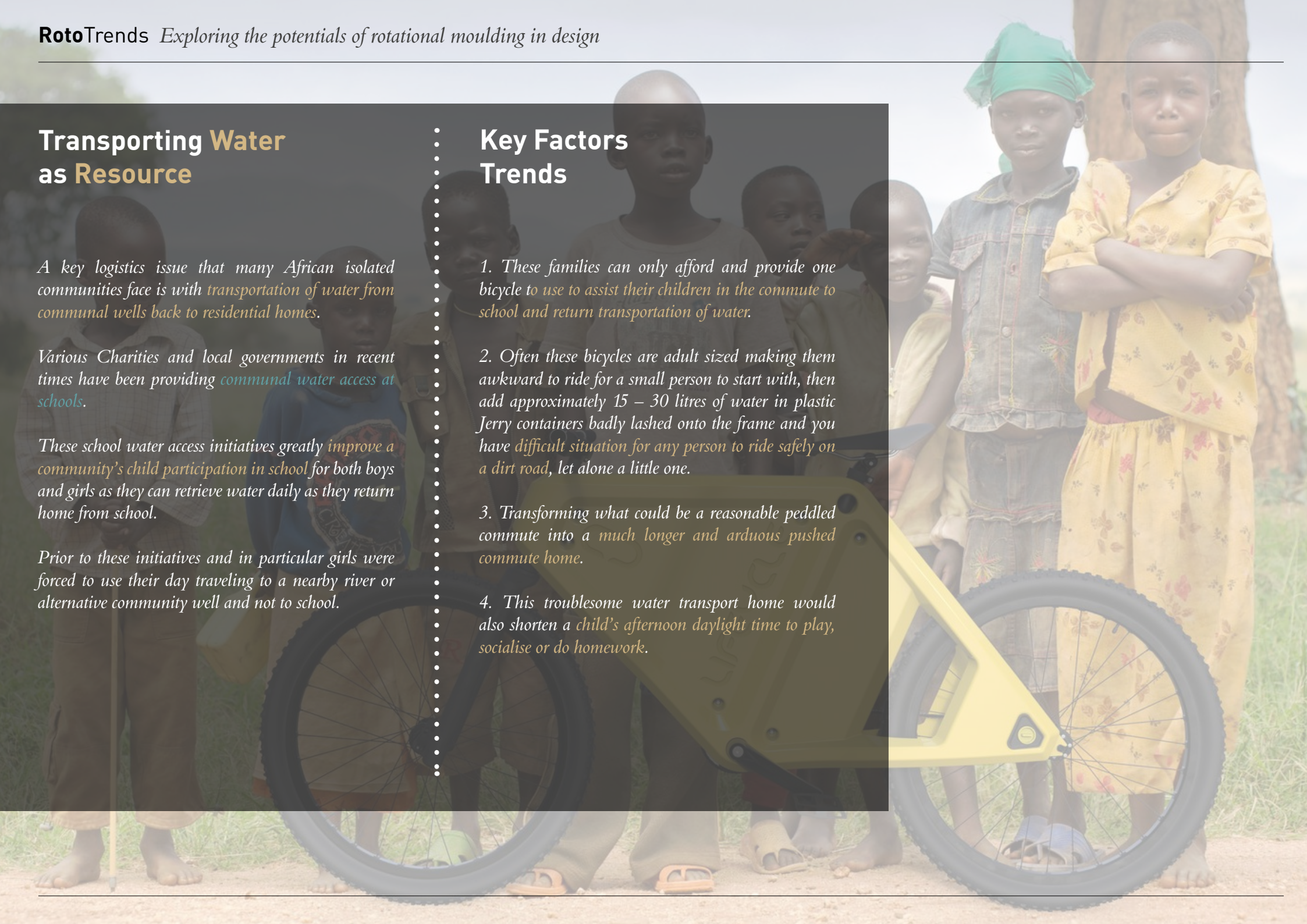
Various Charities and local governments in recent times have been providing communal water access at schools.

These school water access initiatives greatly improve a community's child participation in school for both boys and girls as they can retrieve water daily as they return home from school.

Prior to these initiatives and in particular girls were forced to use their day traveling to a nearby river or alternative community well and not to school.

Key Factors Trends

- 1. These families can only afford and provide one bicycle to use to assist their children in the commute to school and return transportation of water.*
- 2. Often these bicycles are adult sized making them awkward to ride for a small person to start with, then add approximately 15 – 30 litres of water in plastic Jerry containers badly lashed onto the frame and you have difficult situation for any person to ride safely on a dirt road, let alone a little one.*
- 3. Transforming what could be a reasonable peddled commute into a much longer and arduous pushed commute home.*
- 4. This troublesome water transport home would also shorten a child's afternoon daylight time to play, socialise or do homework.*



LC1 Water Bike

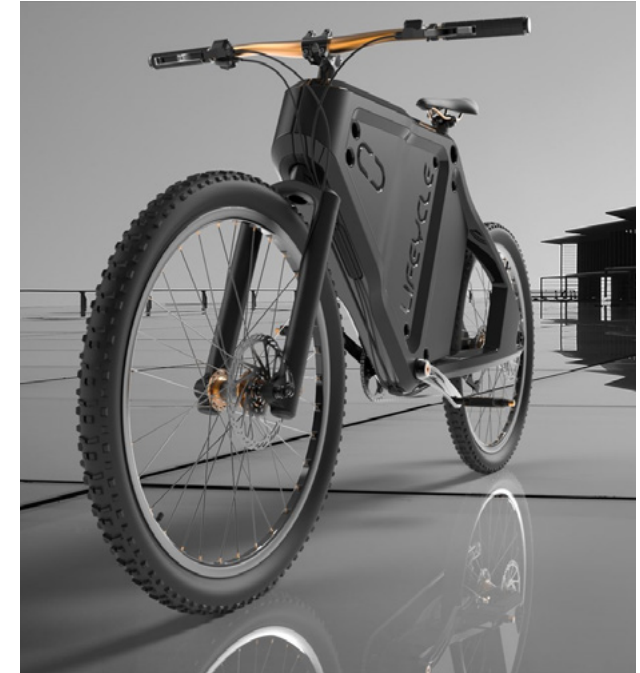
design Clandestine Design Group -
Australia

The LC1's frame is primarily constructed from two identical polymer frame halves that are bolted tother around a Seat / Crank Post and the Head Set Support bracket. These Frame Halves are designed to be rotationally moulded from plastic with composite fibres and minerals added for structural and thermal integrity.

By innovatively designing a hollow moulded twin shell frame, CDG has created a large capacity yet structural reservoir which facilitates the convenient transportation of ~15 litres (kids frame) to ~30 litres (adult frame) of water.

Regardless if western customers use the LC1's water carrying capacity they will still benefit from the bicycles unique style, lightweight and supple ride comfort.

www.clandestinedesigngroup.com



> *A hollow rotomoulded twin shell frame*

> *Transportation of ~15 litres (kids frame) to ~30 litres (adult frame) of water*



Innovative Plastic Architecture

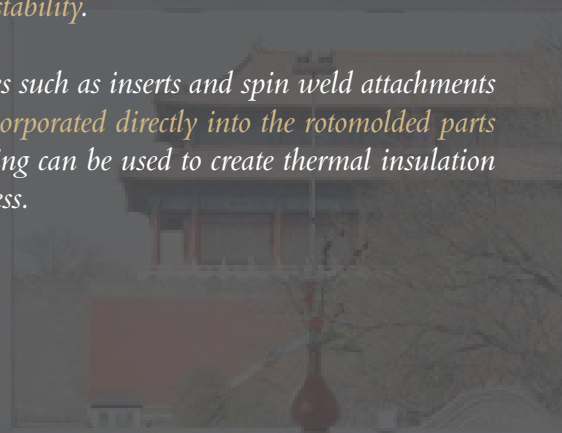
Over time, an endless spectrum of materials has become available for use within the realm of architecture.

*However, one material that seems underrepresented is plastic and, most of all, rotomoulded plastic, a **versatile and malleable compound** that can be used for a wide variety of purposes.*

*The lightweight rotomoulded plastic structures can be a **primary source of light** in the evening for an house or pavilion, as inset fittings cause its translucent surfaces to illuminate in all directions.*

Key factors Advantages

- 1. The advantages of using rotomoulded plastic in construction are that it is **lightweight yet strong** which makes it easier to transport and manoeuvre around sites.*
- 2. It is also **resistant to rot and corrosion** and has strong **weatherability** due to it being capable of achieving tight seals.*
- 3. Rotomolding can be used for architectural parts that require **high-quality finishes, uniform wall thicknesses, and high stability**.*
- 4. Features such as inserts and spin weld attachments can be **incorporated directly into the rotomolded parts** and foaming can be used to create thermal insulation and stiffness.*



Beijing Tea House

design Kengo Kuma Associates, Japan

Japanese architect Kengo Kuma has arranged translucent rotomoulded plastic blocks in a brick-like formation to create new walls for a Beijing tea house overlooking the Forbidden City.

The architect used polyethylene plastic batons to create an elaborate grid across the ceiling and walls of each room of the private member's club, which is simply named Beijing Tea House.

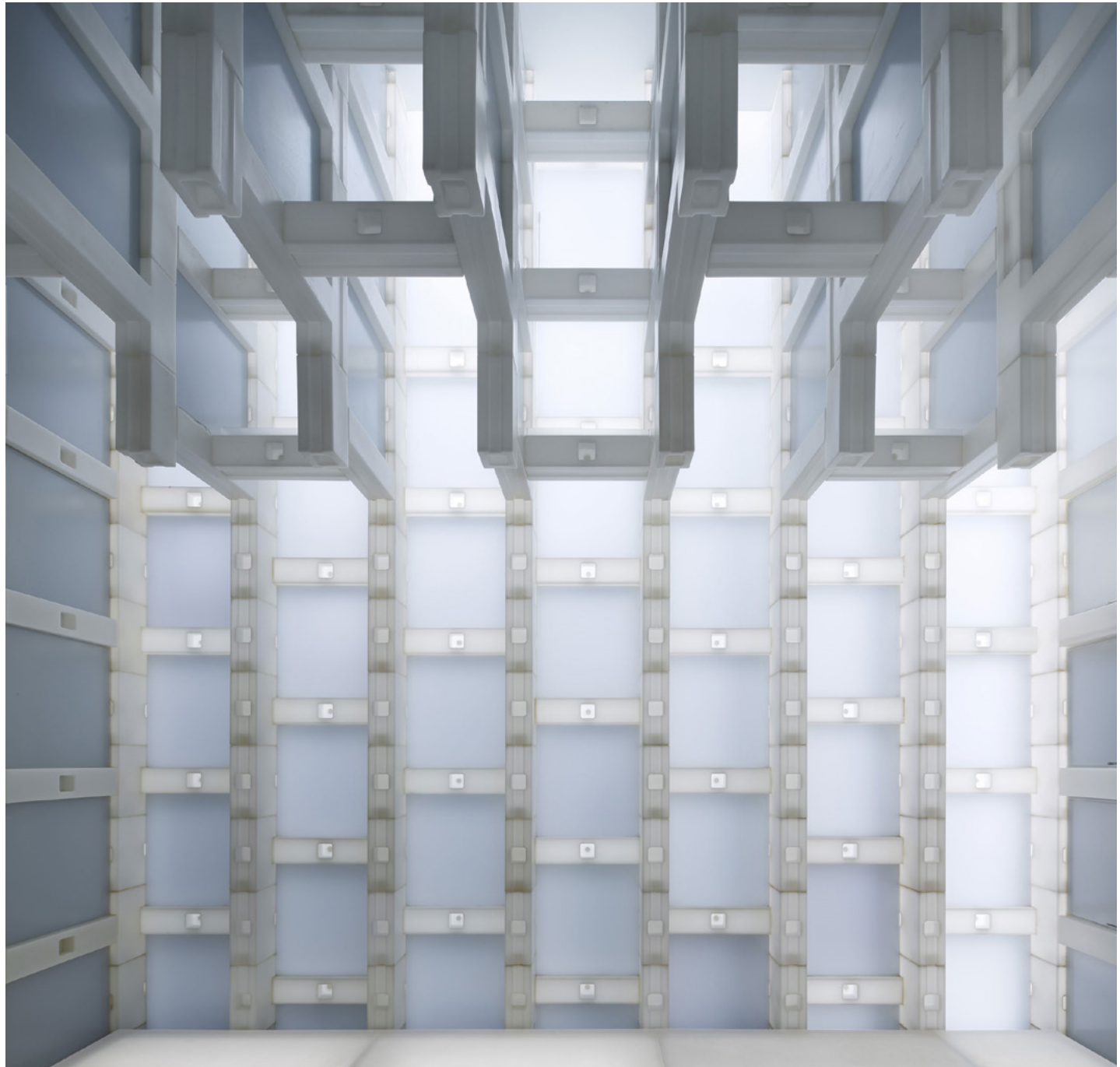
These new rotomoulded walls allow light to filter gently into the building from all sides. They also rise above the tea house's traditional tiled roof to enclose a terrace overlooking the Forbidden City – Beijing's former imperial palace, and one of the city's biggest tourist attractions.

The staggered arrangement of the new walls is reminiscent of the city's traditional brick architecture – which the firm also referenced for a Beijing clothing boutique enclosed with walls of latticed aluminium.

Slotted together in varying formations, the blocks create display nooks in the interior walls, and also hang down from the ceiling of each room.

Four types of blocks were produced by rotational moulding to be joined and stuck up, as the structure of the extended part.

www.kkaa.co.jp







Prospects for Modern Trucks

Modern trucks for long distance have become a surrogate of home and office to professionals, who operate them. A cabin is now designed to facilitate the drivers' working hours behind the wheel and create a comfortable environment for recreation.

Nowadays it is not uncommon to see a fridge, a TV set, a sink, a microwave and other appliances on board. Special equipment is present on board to maintain a constant temperature inside a cabin in severe weather conditions.

To deliver a vehicle that meets every requirement of a contemporary customer, “smart” use of space, available on cabin body, is absolutely crucial during the design phase.

Key factors Trends

The advantages of passing to rotomolding are:

- 1. weight reduction (allows to reduce fuel consumption and increase load capacity)*
- 2. acoustic and odour isolation*
- 3. reduction of a number of components*
- 4. pace saving for better layout*



Storage boxes for Kamaz truck cabin

production Rototech, Italy

In the past storage boxes were made of a combination of steel and plastic. Rototech was engaged by a client to develop monolithic storage boxes in rotational moulding and managed not only to maintain and improve functionality, but also to deliver high quality aesthetic surfaces and ergonomomy.

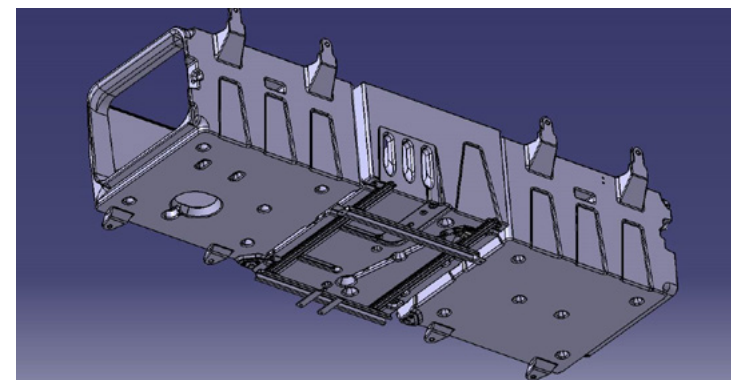
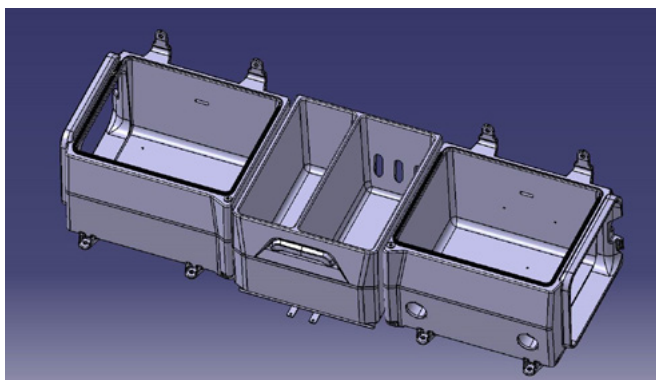
Storage (or tool) boxes for truck cabin are composed of left and right boxes, accessible from the outside of the cabin and a central box, equipped with a sliding system.

The have multiple functions:

- *they are designed for storage and convenient placement of tools and components (such as fire extinguisher or warning triangle) and personal belongings*
- *central storage box can also accommodate a fridge*
- *they serve to support a sleeping berth and withstand heavy loads*
- *there is an integrated internal lighting system*
- *an autonomous heater is mounted in a left storage box to guarantee the most comfortable temperature during parking hours*

This project was developed for a Russian OEM in 2017, the main truck-maker in the market. Serial production started in 2019.

www.rototech.it



How can we **protect our cities** from terror attacks?

Violence has changed. Since World War II interstate violence has declined, replaced frequently by civil wars and terrorism. Between 1993 and 2000, for instance, the number of terrorist attacks in cities more than doubled. The city became what the airplane had been in the 1980s: the *target of choice for accessibility, numbers, and propaganda.*

We are seeing an almost unprecedented impact from terrorism. At the UN, more than 100 countries are directly affected. On the issue of urbanization, two trends are very worrying for those involved in counterterrorism. The first is terrorist organizations' direct interest in and threat to urban spaces. ISIL and Al Qaeda have found a weak spot: civilian or soft targets that are not heavily protected, and that probably could not be so without changing our way of life.

They're trying to hit such targets. In Barcelona, in Berlin, in London, in New York City and in Paris. Some cities have taken steps to mitigate the consequences of truck attacks or to *make it more difficult for terrorists to reach those targets.*

Key factors Trends

1. This is not a phenomenon that is likely to disappear. The new normal will probably be that we have to protect our cities from attacks that can happen anywhere. The question is *whether you can do it in a design that does not interfere with your way of life.*

2. There are many ways in which we can integrate the protection of civilian and soft targets from attack, without creating a fortress environment, in which everywhere you walk in the city you feel like you are being watched. Without everywhere you enter having heavy security like in airports.

3. Cities have already developed some creative ideas. Planting trees, for example, which is also good for the environment. You can mitigate the risk of incidents by planting trees in certain points. The whole world is very much promoting the resilience of cities and of societies in general.

Anti Terrorism Barriers

design Christophe Bardot, Ecal, France

Recent terrorist attacks in Europe brought to the fore the need to adopt effective measures to protect public spaces, such as anti-terror barriers which prevent cars and trucks being driven in key public areas.

These anti-terrorism measures include, among other things, the identification of new check points, in order to carry out regular checks on people.

In addition to concrete blocks, it is necessary to find aesthetically pleasing solutions which are able to protect the most sensitive areas of our cities without sacrificing their historic beauty and identity, such as “green barriers” and anti-terrorist planters, which can operate as elements of urban furniture.

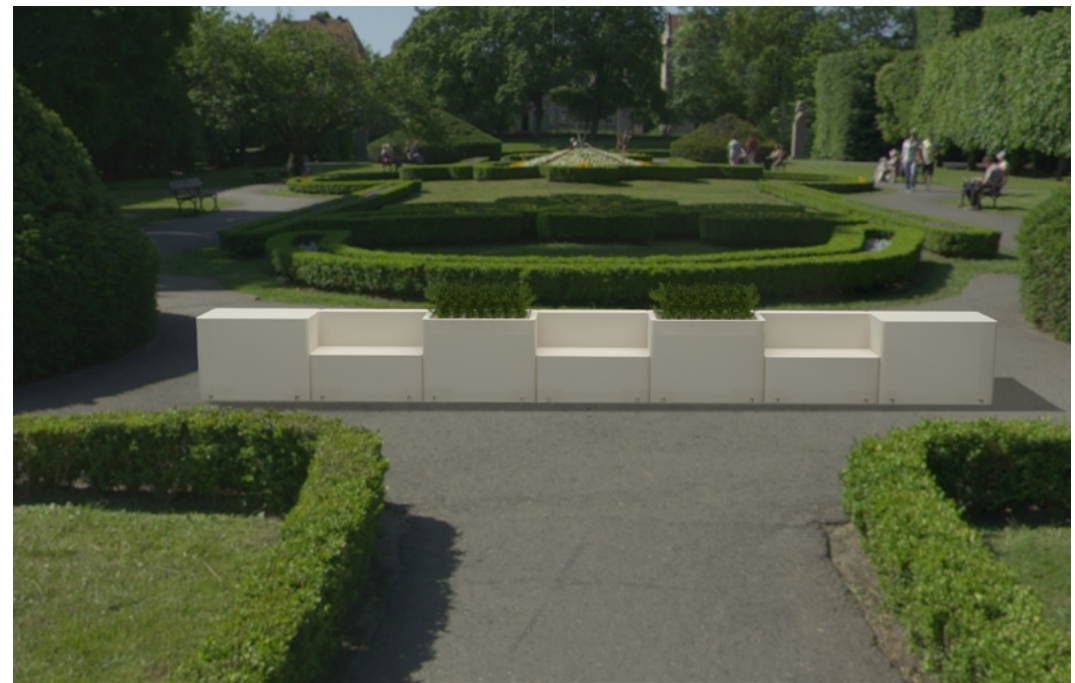
This solution consists of rotomoulded modular barriers that are completed with sand or water inside. The modular system is inspired by platforms where the goal is to form the original large square by using all available pieces. Similarly, the modular system comprises seven elements which can be arranged differently to suit all street furniture needs.

The modular system can effectively function as anti-terror barrier by creating flower beds which prevent vehicles from accessing restricted areas or divert traffic from local streets to highways. Since it can be easily displaced without removing the soil or uprooting any plant, this piece of furniture is especially suitable for big events, providing a practical and flexible solution which enhances and enriches the urban landscape.



> Examples of anti terrorism concrete, plastic and metal barriers installed in different cities around the world





BICYCLE STAND



BENCH



BLOCK



POT



CONCRETE WEIGHT



> *The rotomoulded modules are supported by heavy concrete blocks*

Power to the Pedal

Among many uses cases, micromobility services increase access to public transportation, reduce the amount of cars on the road, lower our environmental footprint, and provide a convenient methods of transportation for short trips — all while being cost effective.

If micromobility can play a big role in the coming years, cities and investors plan ahead to avoid recent shortcomings.

To avoid polluting bike cemeteries, cities should start providing designated spaces for dockless parking. This would fit well with the trend of managing the curb as a city-wide resource that could provide income to public administrations.

To manage this multipurpose physical space, there could be a corresponding unique digital platform – granting us the freedom to choose between cycling, scootering, walking, taking an on-demand vehicle, using the subway or train and hitching a ride with friends.

Key factors Trends

1. Cities around the world are *quickly growing in size and population*. In fact, projections show that by 2050, an additional 2.5B people will reside in urban areas globally. With most cities already dealing with dangerous levels of pollution and gridlocked streets, micromobility could solve a handful of problems.
2. Among many uses cases, micromobility services increase access to public transportation, reduce the amount of cars on the road developing *a more efficient methods of transportation for short urban trips*.
3. *Electric bikes can also be more efficient than other modes of transport*. One kilowatt hour of energy can only get a gasoline-powered car to travel 0.8 miles- An electric car can travel 4.1 miles under the same conditions. However, an electric bike can travel 82.8 miles using the same amount of energy.

Dolly Cargo Bike

production Dolly Bikes - Netherlands

Designing the Dolly Family was not an easy task: a two-wheel cargo bike with a design that stands out in the current bicycle market. The result is a cargo bike with a modern, new and trendy design which can be customized by the numerous colour combinations to make it even more personal.

In addition to the design, a lot of attention was paid to the geometry of the frame and the dimensioning of the box. This enabled us to give the Dolly not only a beautiful look and excellent final assembly but also outstanding cycling qualities and a practical, usable box.

Unique is also the material and shape of the box. The slightly slanting shape of the box extending over the head tube gives the Dolly its unique look. The box is made of polyethylene and is made by means of rotational moulding. The roto technology produces a double-walled box which is strong, sustainable, light and recyclable.

www.dolly-bikes.com



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







How to Design a New Generation of Cinemas?

To distinguish their offer in a competitive market, cinema operators need to offer something extra to moviegoers, and they are increasingly seeing luxury cinema experiences being created to attract wealthier customers or people who want to make their cinema trip a special day.

The new trend offer the most innovative cinema experience available anywhere in the world, with comfortable and moveable seats, food and drink served to cinemagoers at their seats and relaxing lounge areas instead of traditional seats.

All these developments prove, once again, that people still want to go the cinema as a form of entertainment. Cinema operators are incurring huge expense to bring all these offers to the customer, and it's encouraging to see that cinema attendance is still steadily rising.

Key factors Trends

- 1. A key design goal is to provide an **F&B** environment in which people can meet, talk and socialise as part of an all-day, all-evening experience.*
- 2. To encourage people to dwell and to turn cinema venues into all-day experiences, the seats offer has to be comfortable, varied and attractive.*
- 3. Efficiency of operation and circulation does not really impress the cinema-goer. It is taken for granted that the journey from entrance to seat be efficient and logical. It is the visual element, the aesthetics of what is seen on that journey, which will 'wow' the customer.*

Cinema RotoSeat

design Theo Walmurz - Switzerland

The VIP Bed room at the Pathé cinema complex in Spreitenbach, Switzerland, embodies an evolution of what movie theaters have always been about : creating an experience.

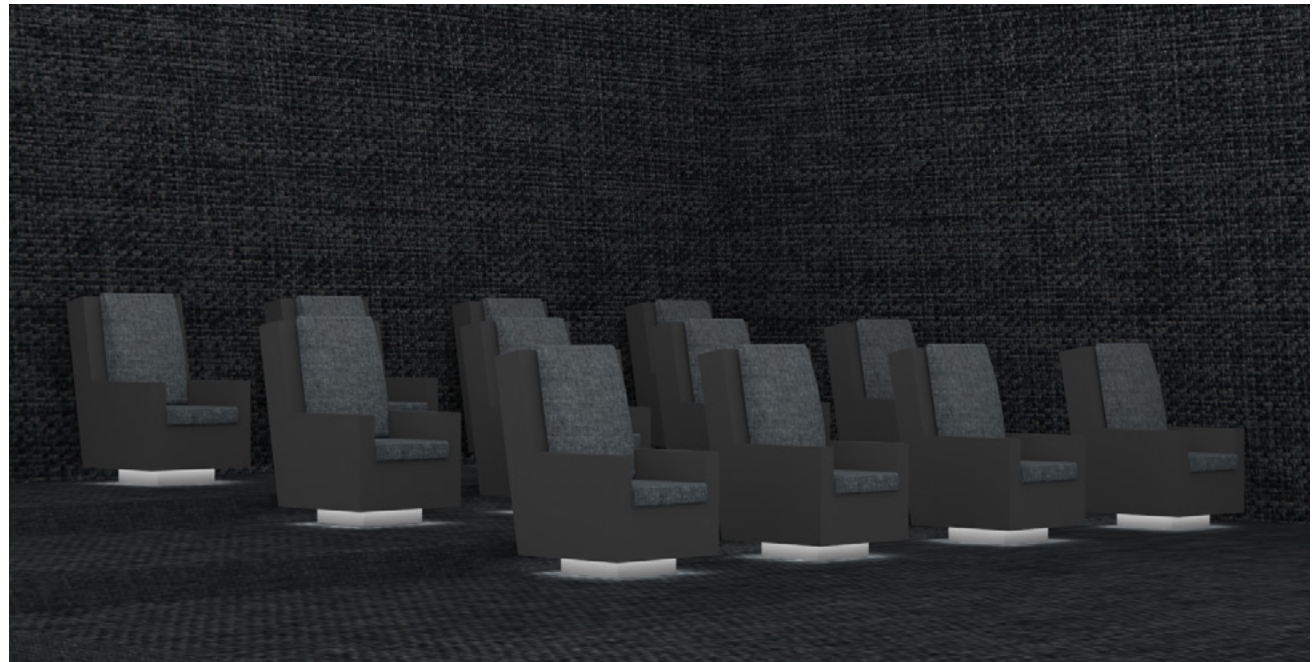
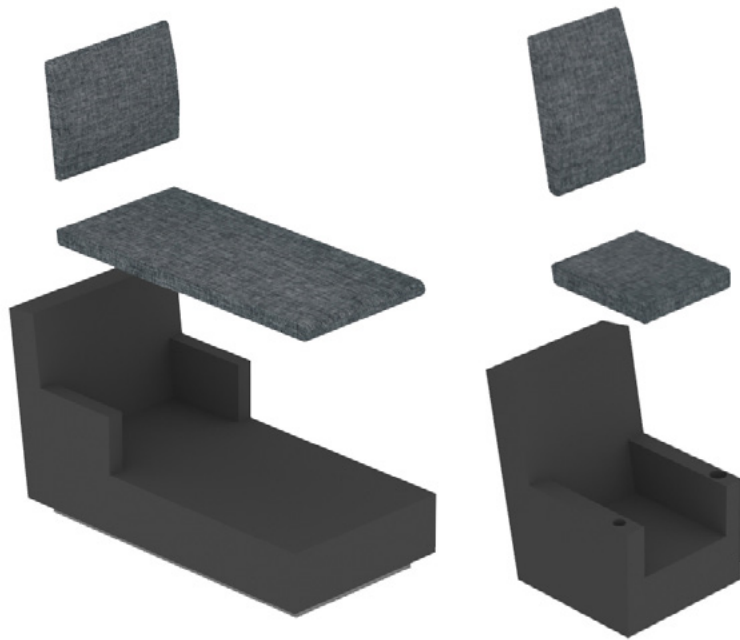
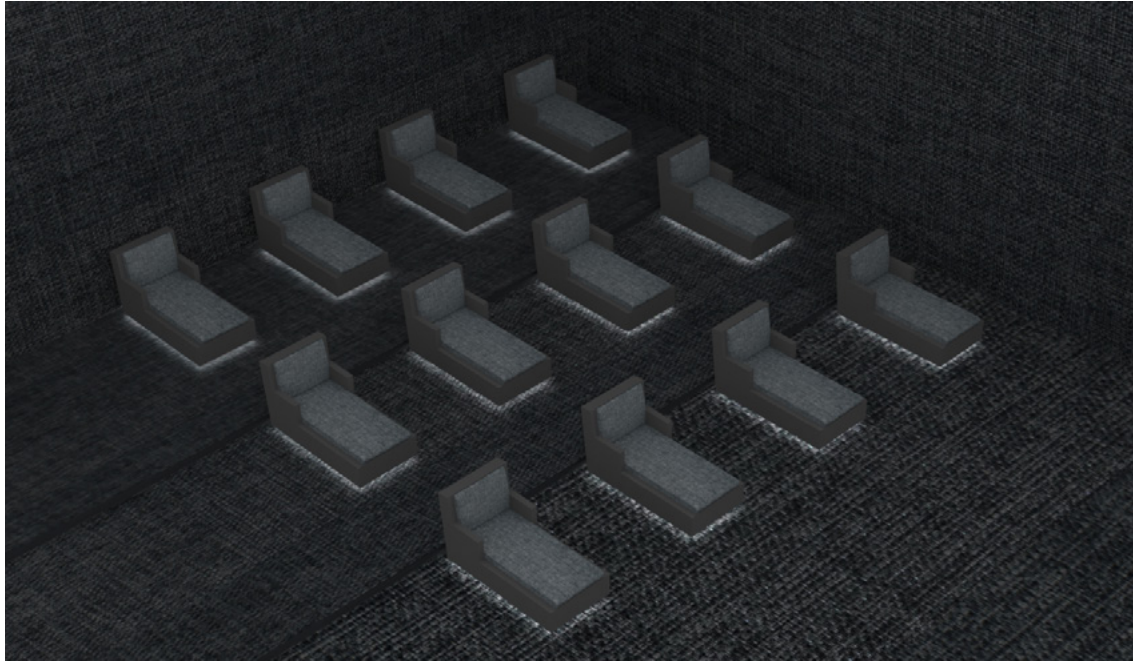
The viewer enters a theater in which velvety materials are eloquently weaved together with walnut wood and dimmed ambient lighting mixed with translucent marble. The thoughtful use of these classic design components set the mood for a luxurious experience never seen before in a cinema, yet very familiar in its theatrical layout.

The new project consists of a family of rotomoulded elements as easychairs and bed for an innovative and comfortable experience at the cinema. As the viewer discovers the double bed alcoves, they can settle in by leaving their belongings in the side table compartments and recline on the mattress in a manner that is half way between the comfort of a bedroom and the exclusivity of an airline's First Class section.

The beds consist of a rotomoulded frame that can individually recline at different levels to adjust to everyone's comfort, and the cocooning shape of the headboard provides a welcoming sense of intimacy. All these rotomoulded elements combined, create a unique cinema experience; completed with state-of-the-art sound and video systems give a new and exciting dimension to the special feeling of enjoying movies at the cinema.







Tanks for Electric Vehicles

The automotive industry is the *third most important consuming sector of polymers* after packaging and building & construction.

Therefore, changes in the material usage can have major implications on polymer demand and the financial performance of polymer producers.

The role of plastic in the design and manufacturing of automotive vehicles has never been more essential, with stringent regulations and changing consumer habits driving demand for *more affordable, lightweight, and fuel-efficient vehicles*.

Fuel efficiency has become one of the most important features in automotive vehicle design due to the rising fuel prices and stricter environmental regulations. This, combined with high demand for automotive electric vehicles as well as rising disposable income in emerging economies will continue to drive demand for plastics in the automotive industry.

Key factors Trends

While some materials may win from recent changes in the automotive industry, others will find themselves on the losing side, spelling serious implications for plastic producers globally.

Currently, there are about 30,000 parts in a vehicle, out of which 1/3 are made of plastic. Plastic has become one of the key materials required for the structure, performance, and safety of automobiles in recent years, with growth in plastic consumption being driven by light weighting trends for fuel efficiency and consequently lower greenhouse gas emissions.

The high absorption properties of plastics also allow the vehicle to meet stricter safety standards, while the use of engineering plastics allows for minimization of the mass of parts used in vehicles as they offer more design freedom compared to metals.



Fuel tank for Renault Kangoo Electric Vehicle Z.E.

production Rototech, Italy

It seems a contradiction that an actual electric van has a fuel tank, doesn't it? It serves not for extra mileage, but to power an independent small engine used for heating of a cabin during cold weather. It has to be powered separately from the main electric engine in case of vehicle failure. This optional feature became highly requested in Northern countries.

During the design phase Rototech team faced several challenges:

- the space on the body was extremely limited between the floor and rear axle*
- the goal to optimize tank capacity and reach 15l volume to guarantee a normal use during one week period without refilling*
- Liquid sloshing noise from fuel tank was a disruption during frequent accelerating and decelerating of the EV. Rototech has introduced sponges inside the tank for noise reduction.*

The van is in production since 2011.

www.rototech.it



Solutions to Beach Erosion

Beach erosion has become a headline issue as it continues to be a growing problem on coastlines around the world.

Whether the shore is sheltered or exposed, elements like currents, waves, and sea level changes play significant roles in causing erosion.

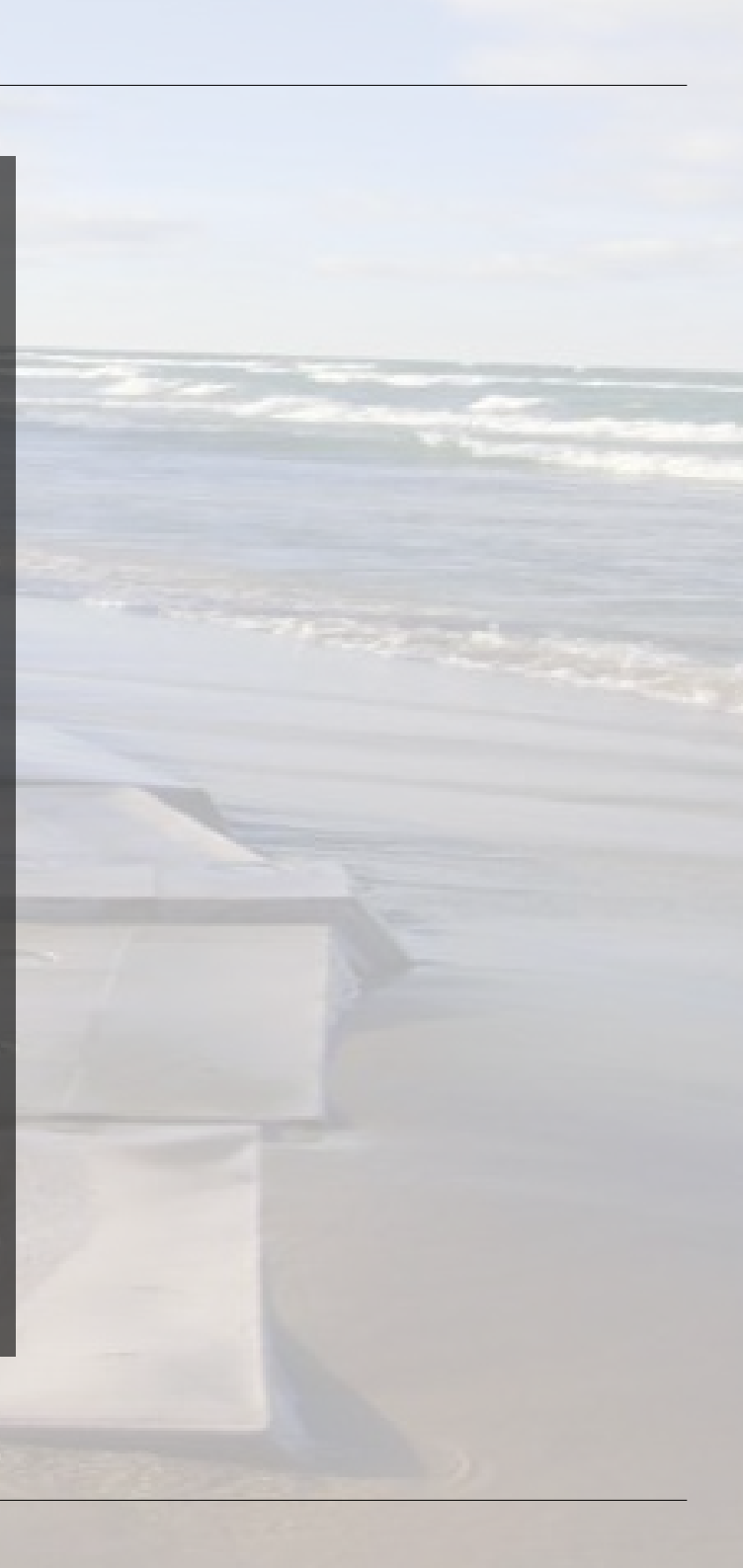
Industry offers several different solutions to help control coastline erosion and prevent further deterioration along your shores.

Key factors Trends

The technique of re-nourishment drastically reduces the cost of beach re-nourishment, based on simple conservative economics that show the modules can be used on either a semi permanent to permanent basis, contingent upon the scope of the re-nourishment project.

With rotational moulded partitions, modules work in two ways; First by breaking down the energy of the wave, thus reducing erosion. Second, by allowing the wave, which contains sand, to pass thru the tapered holes and onto the beach surface.

When the tide or water retreats, it has to pass back through the smaller portion of the tapered end of the module, allowing the sand time to settle onto the beach and not back into the surf, thus building beach.



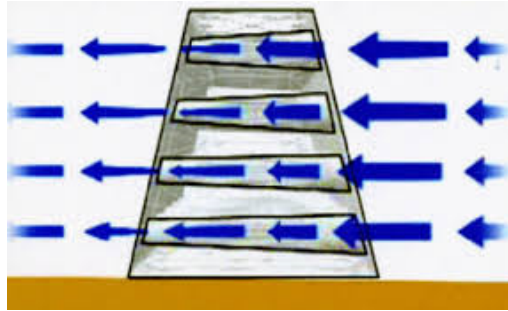
SandSaver Beach Erosion

production Granger Plastics - USA

The Sandsaver is quickly becoming one of the most sought after natural solutions to beach erosion. The sandsaver drastically reduces the costs of beach re-nourishment, via using the energy and wave activity of the water. Based on simple conservative economics, that show the modules can be used on a temporary or permanent basis contingent upon the breadth of the given re-nourishment project. With recent proven success, the Sandsaver continues to garner immense international interest as a viable replacement to traditional, less effective methods, ranging from beach dredging, or re-nourishment and other hardened structures such as coastal armoring, sea walls and more.

The Sandsaver is an improved, innovative technology based on past proven technology that was readily used in multiple locations spanning multiple decades, called "The Sandgrabber". The Sandgrabber technology worked in multiple installation locations across the United States, including Hawaii, New Jersey and Louisiana.

www.sandsaver.com









credits

Rototech, *Italy*
Lino Sonogo *Italy*
CDG, *Australia*
OceanCleanUp, *USA*
Granger Industries, *USA*
Kidscab, *Belgium*
Renault Group, *France*
Kamaz Group, *Russia*
Pathè Cinema, *Switzerland*
Dolly Bikes, *Netherlands*
Kengo Kuma Associates, *Japan*
Juventus Football Club, *Italy*
Vessel, *Germany*
KGP, *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