RotoTrends

Exploring the potentials of rotational moulding in design

Issue 7

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.

Green Hydrogen Market Outlook

Hydrogen is abundant in the natural world and according to its advocates could power the next generation of appliances cleanly and efficiently.

Today, the prospect of using hydrogen as a propellant to power vehicle engines has gained momentum and interest on a global scale following the 2015 Paris Eco Agreement of common policies and actions to achieve neutral CO2 emissions by 2050 by limiting the global average temperature to <2°.

The only 100% sustainable and commercially viable hydrogen is called with the term "green hydrogen", and its production arises through the electrolysis of water in special electrochemical cells powered by electricity produced from renewable sources.

The development of technologies associated with electrolysis and a massive industrialization effort in this industrial chain are factors capable of lowering the cost of electrolysers and improving their efficiency.

Hydrogen Tank and Vessel Main Characteristics

A hydrogen tank is a container or a vessel used to store hydrogen in its gaseous or liquid form. Sometimes they are also referred to as hydrogen cylinders, cartridges or canisters.

Depending on the pressure and temperature of storage the container must fulfil various tedious physical requirements, and therefore the art and science of designing and manufacturing hydrogen tanks has a long history of innovation.

Hydrogen fuel tanks are used in all kinds of applications involving the use or generation of hydrogen such as fuel cell and electrolyzer systems, rockets and space flight. A hydrogen fuel tank is usually part of a hydrogen storage system.

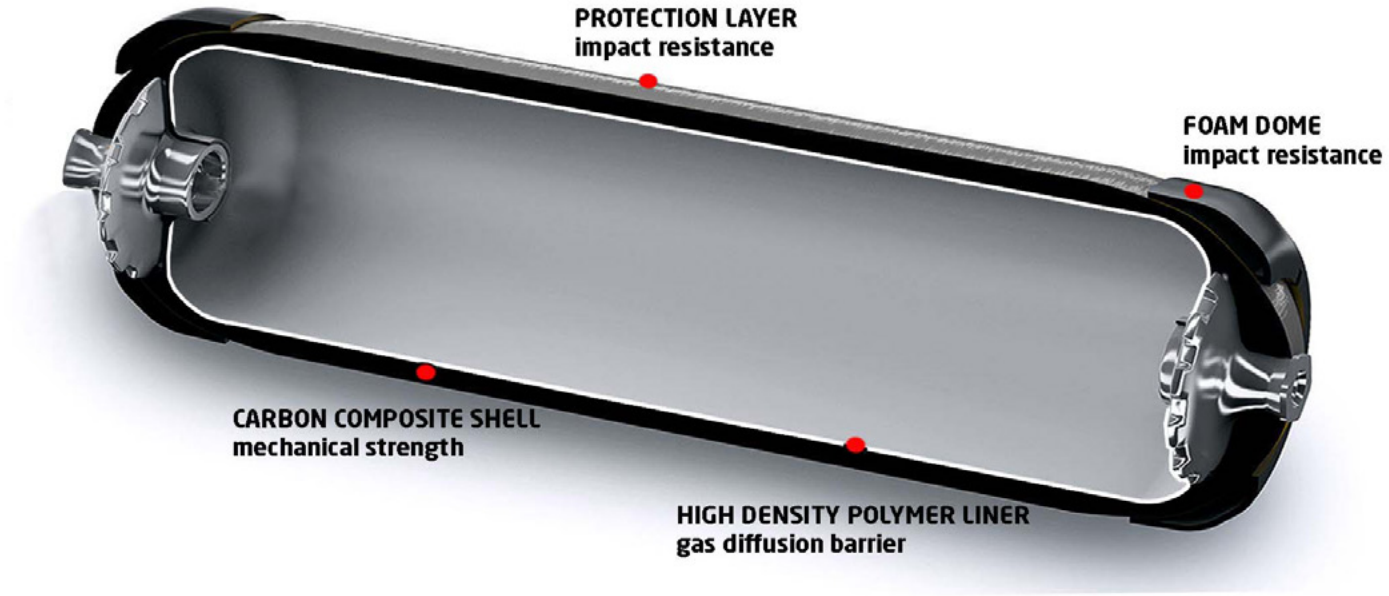
Hydrogen tanks come in different shapes and forms. Spherical forms are used for some liquid hydrogen tanks and any form is appropriate when storing hydrogen pressures near atmospheric pressure however a cylindrical container is the most common form of a hydrogen tank.

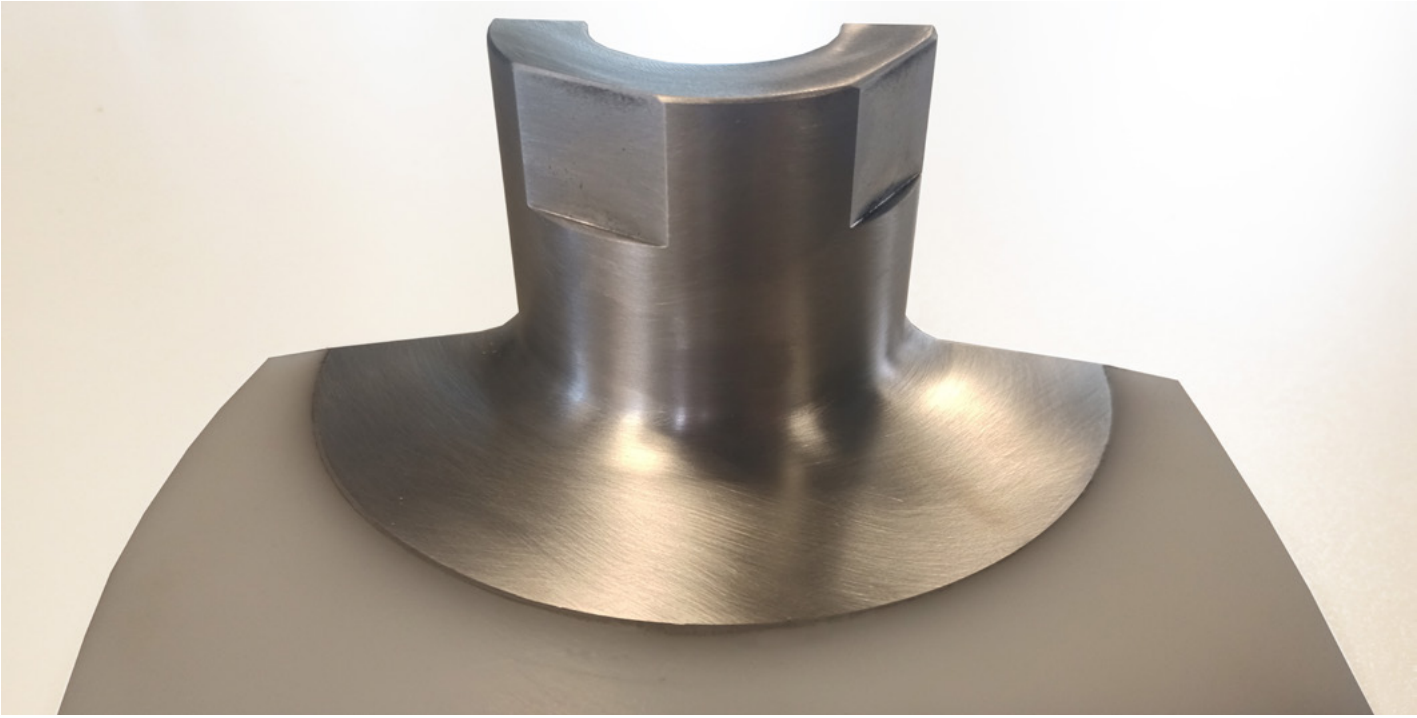
Rotomoulded Liners

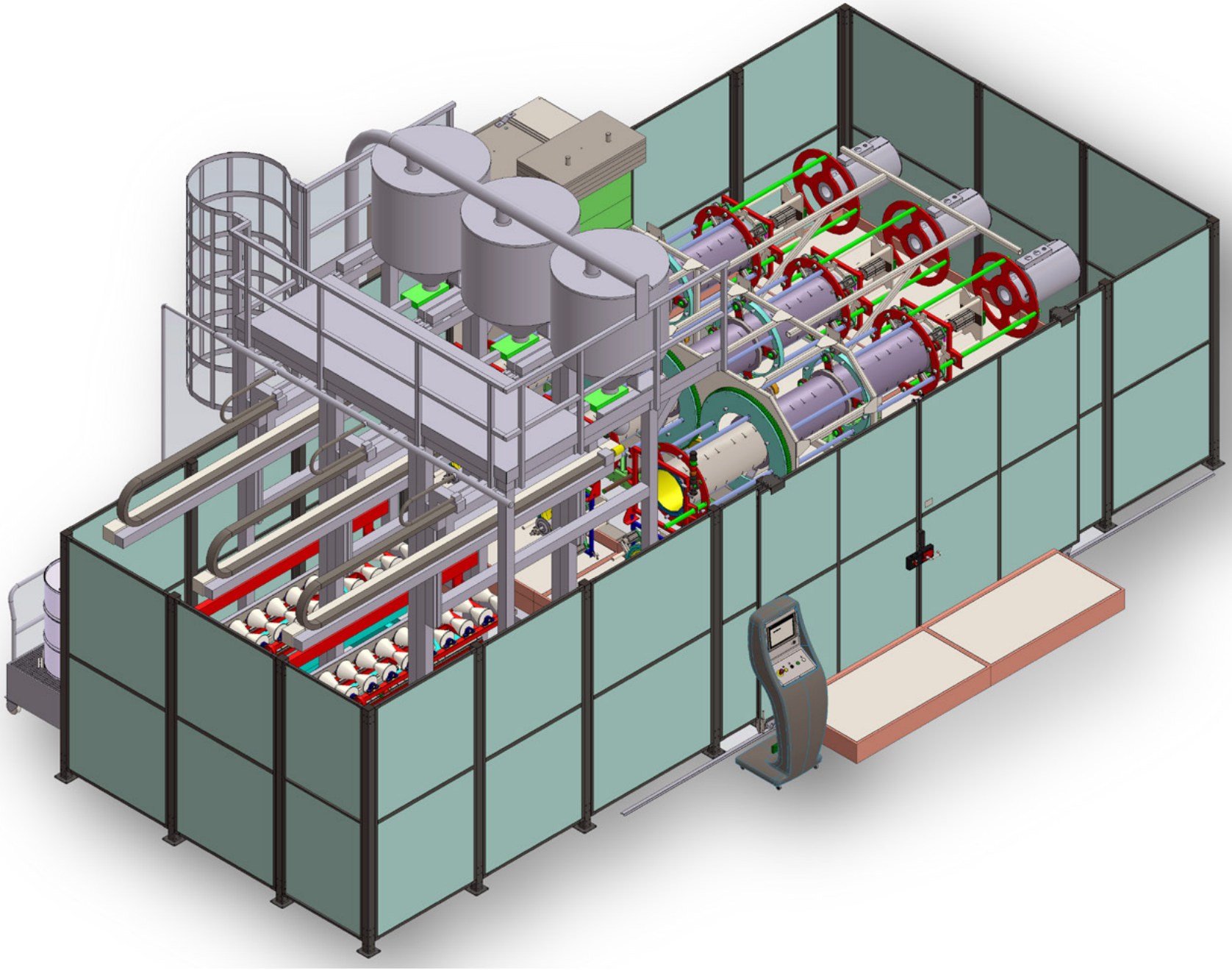
production Persico - Italy

A type IV hydrogen pressure vessel is composed by:
- Polymer liner: The thermoplastic inner liner is gas-tight storage and guarantees a good barrier.
- Composite: by bearing the load, the composite material is the structural part of the composite vessel.
- Bosses: The metal boss serves as the connection between the liner and the filling valve.
- Dome protection: The dome protection shields the carbon fiber against external damage.
Persico has recently developed and delivered several projects to produce liners for high-pressure hydrogen tanks and CNG Cylinders. These projects have included the design and development of the liner, prototyping and delivery of machine and tooling in 'turnkey' production cells.
Using their experience in these projects, Persico has now developed a new generation of 'SMART®' machines (all patent pending) specifically for the production of tank liners:
TRADITIONAL SMART® 2.8 Can be chosen for the manufacturing of small liners and prototype.
'KIT H2®' Starting from the TRADITIONAL SMART® 2.8 machine, KIT H2® is composed by a frame with a dedicated rotation system, able to manage the rock&roll motion for the production of mid-dimension liners.
'SMART® H2' It provides rock and roll motion with independent rolling speeds, specifically for tank liners.

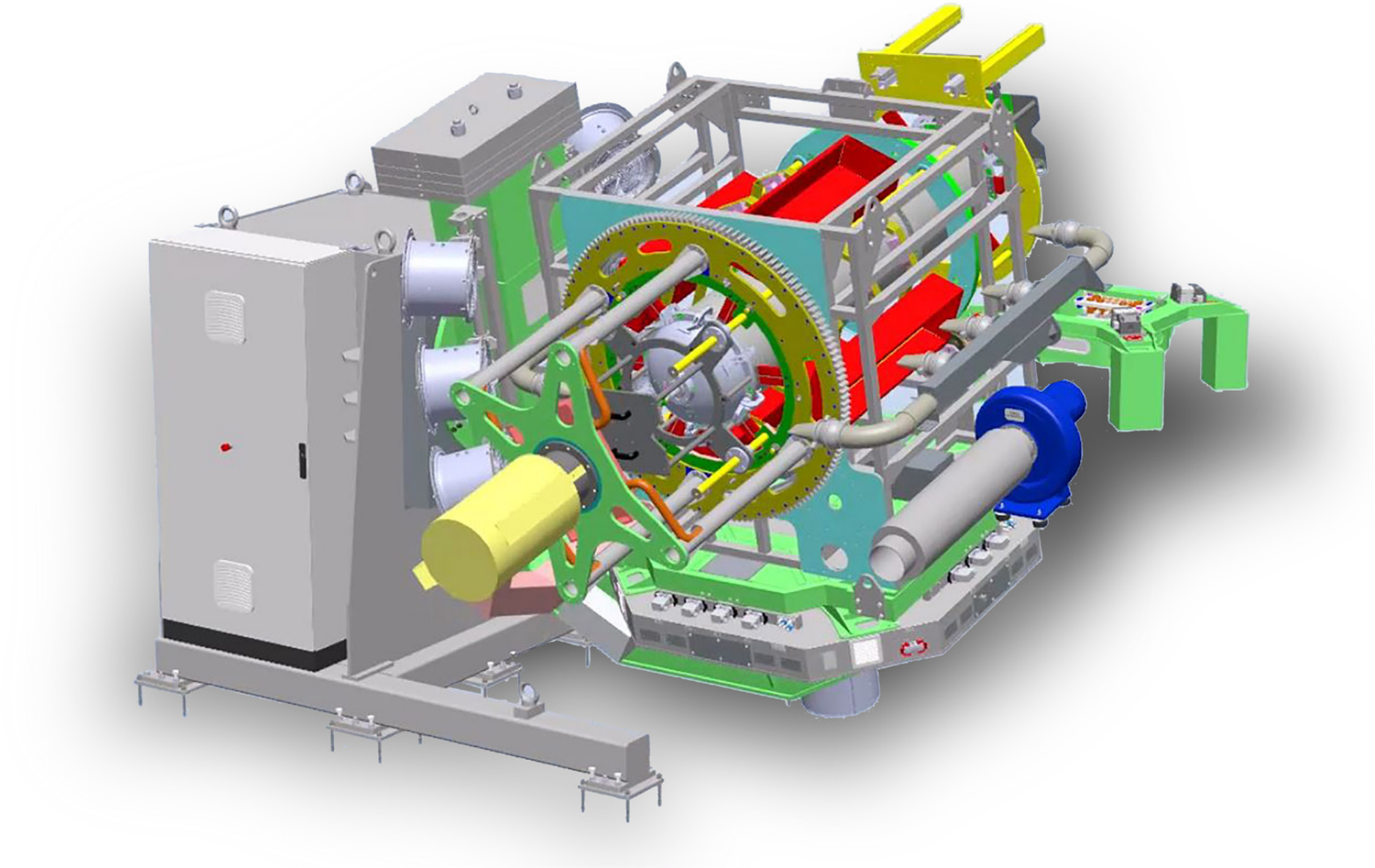
www.persico.com



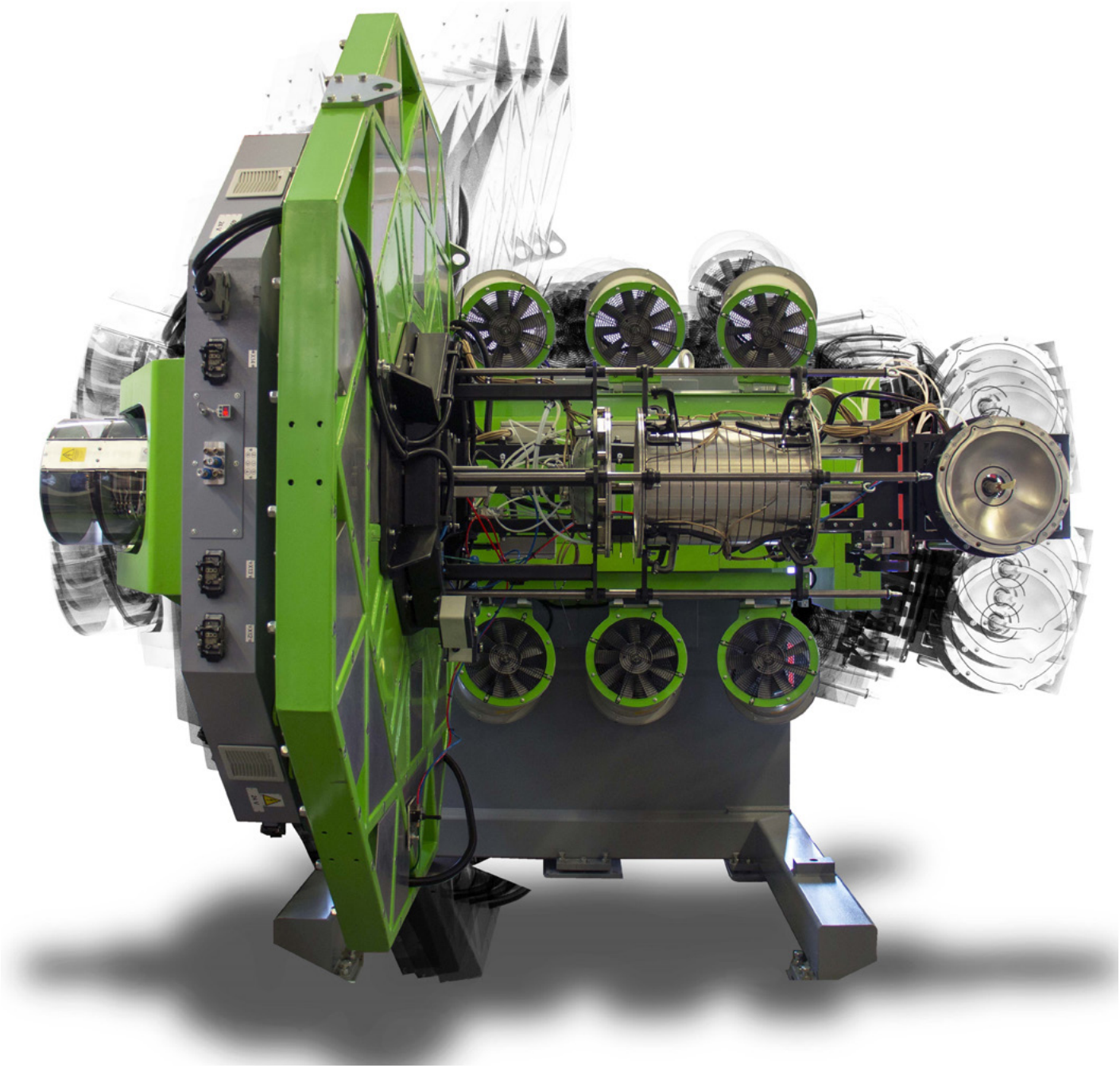


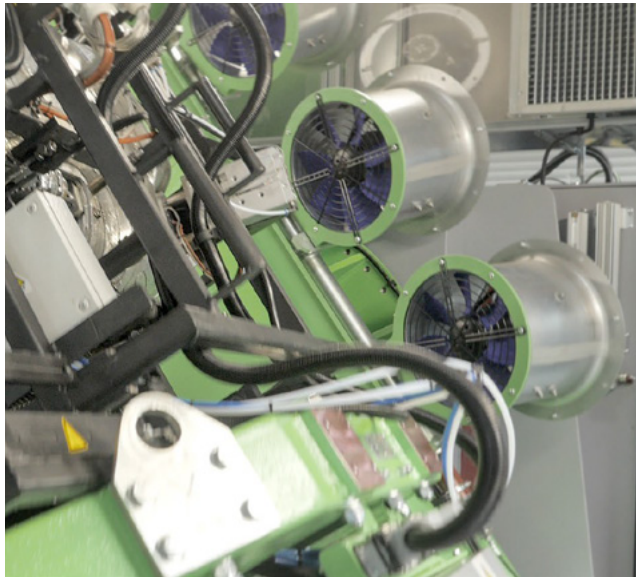


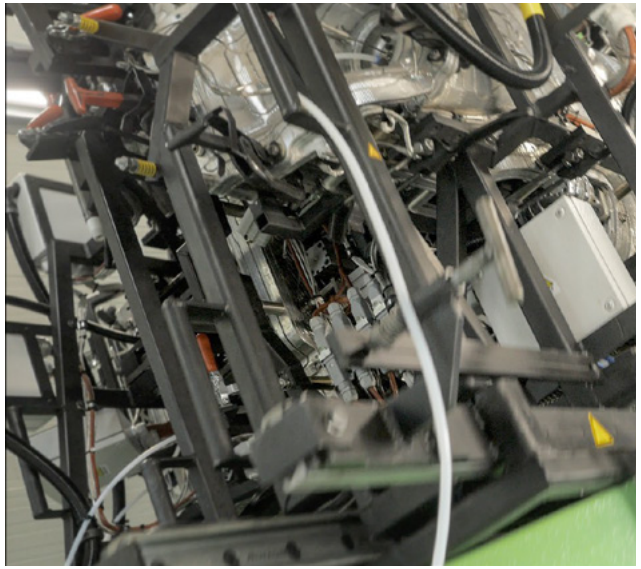
> *SMART® for Hydrogen Tanks can be equipped with different tools simultaneously for high production rates for small, medium and big liners.*



> *SMART® for Hydrogen Tanks provides rock and roll motion with independent rolling speeds, specifically developed for tank liners.*







> 0 *TRADITIONAL SMART® 2.8: all these solutions can be partially or fully automated, including powder loading, insert loading and product unloading.*

Crash Test Dummies
Market Outlook

Automotive crash test dummies are used to simulate the effects of a car crash on a human body. The dummies are designed to accurately represent the size and weight of an average person, and they are equipped with sensors that measure the force of the impact on the body.

Crash test dummies are used in a variety of safety tests, including crashworthiness tests, which measure how well a vehicle protects its occupants in a collision; compatibility tests, which assess how well different vehicles interact with each other in a crash; and sled tests, which evaluate the performance of child safety seats.

In addition to their use in safety testing, automotive crash test dummies have also been used in research to study the biomechanics of car crashes and to develop new safety technologies.

The global Automotive Crash Test Dummies market size is projected to reach multi million by 2028, in comparision to 2021, at unexpected CAGR during 2022-2028.

Key factors
Design Criteria

The design of crash test dummies is an intricate and isolated process limited to government agencies, dummy manufacturers, and customers like automobile manufacturers.

The dummy makers are not responsible for creating their own designs. Instead, they receive drawing packages, sets of construction specifications, and specifications for required testing from the National Traffic Safety Administration (NTSA).

European agencies provide similar sets of documents to dummy manufacturers. Based on their experiences in building dummies, repairing or retrofitting them, and observing their post-accident traumas, manufacturers of dummies, as well as users, do have input into design changes.

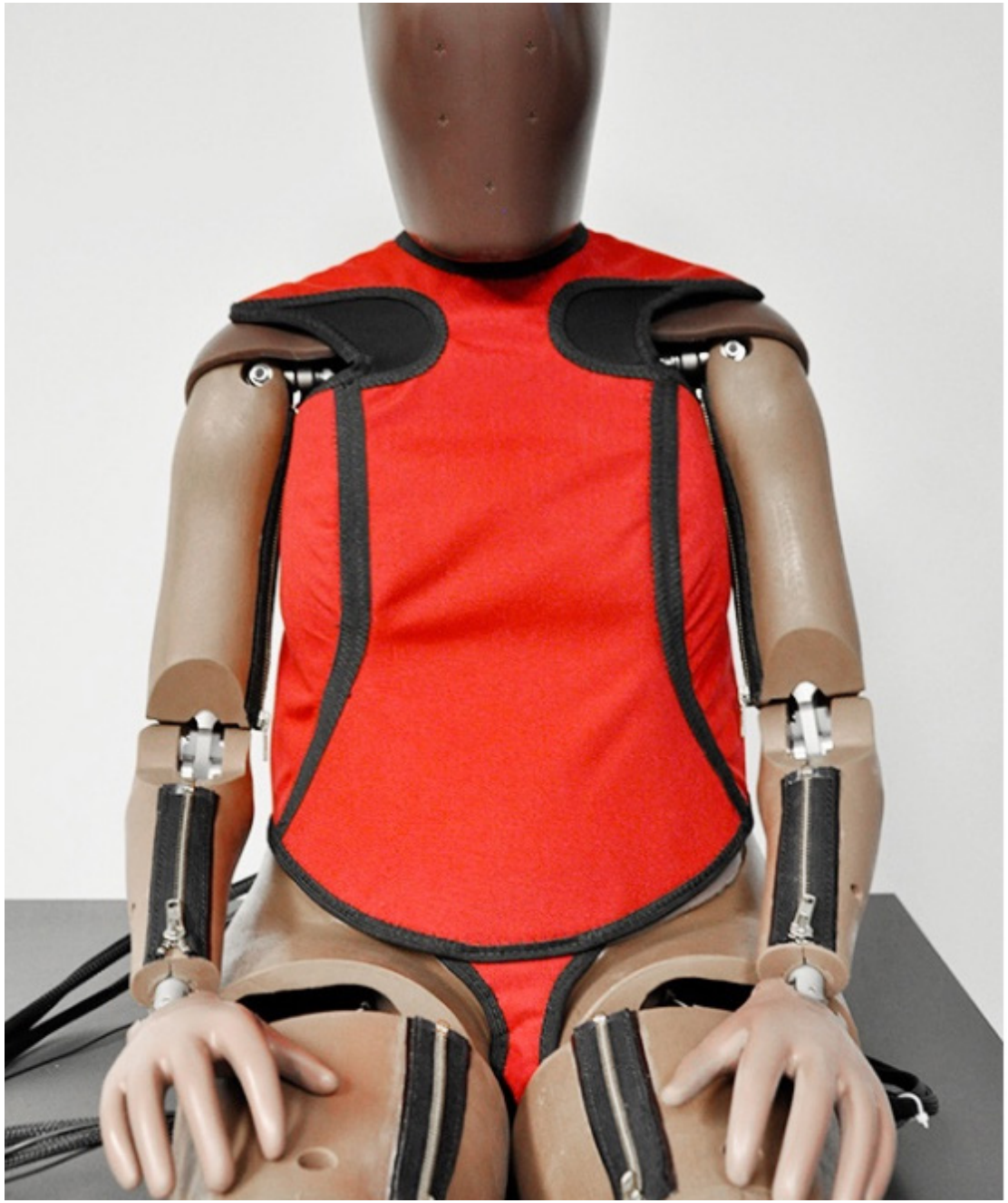
The NTSA bases its designs on a multitude of data including accident reports, location within a vehicle, variations in physique and physical development, autopsies, and simulations.

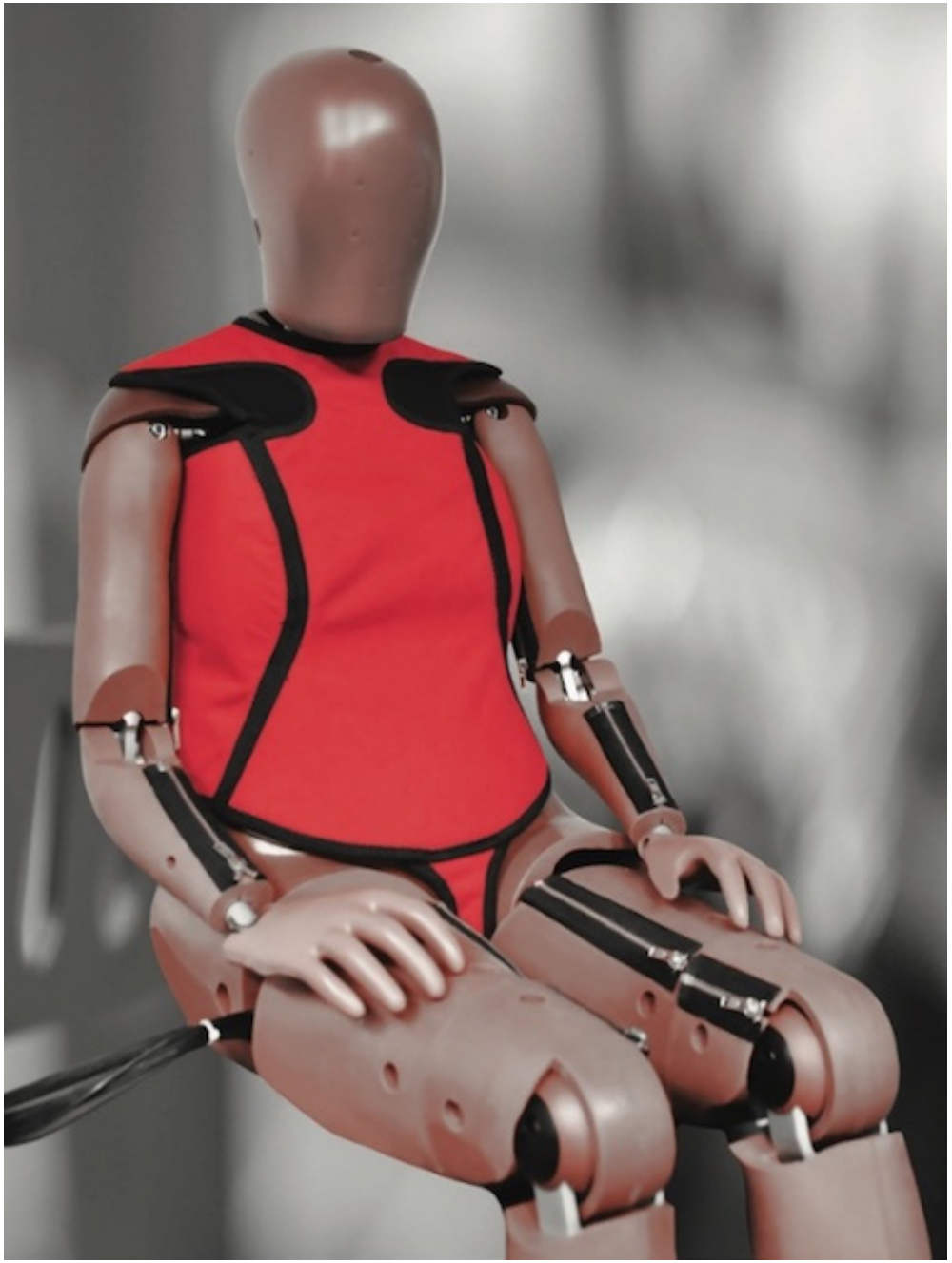
THOR 50M ATD

Producer: Kistler - Switzerland
Moulds: Maus - Germany

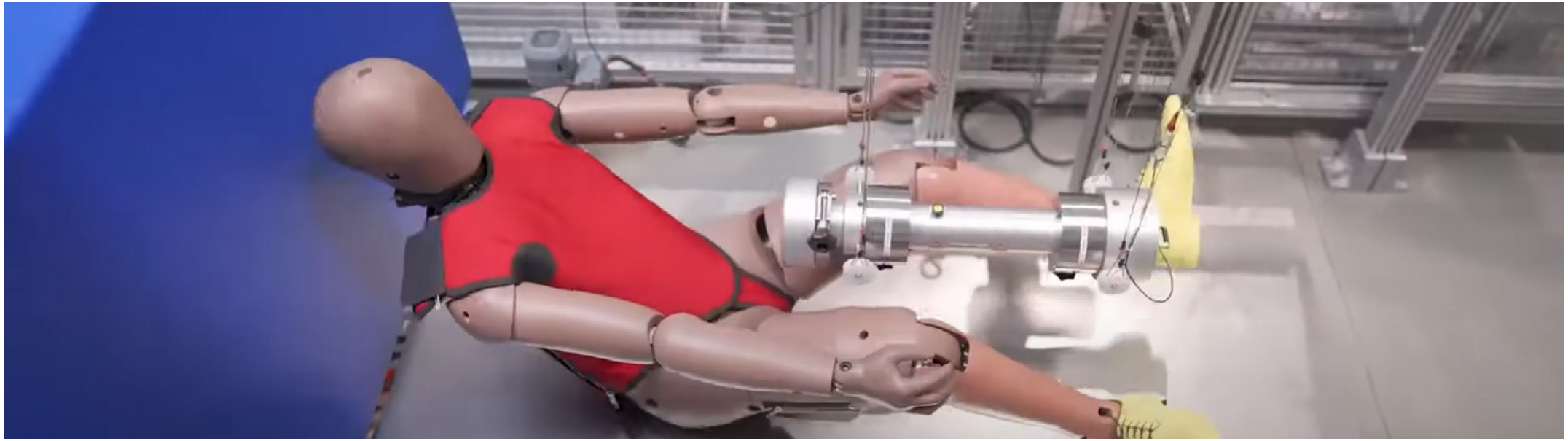
Crash test dummies simulate human response to impacts, accelerations, deflections, forces and moments of inertia generated during a crash. Each dummy is designed to model the form, weight and articulation of a human body. Hundreds of sensors and transducers located within the dummy provide life-saving data to safety test engineers, measuring the precise physical forces exerted on each body part in a crash event.
Kistler, one of the world's leading system providers, supplies solutions based on measurement technology for vehicle safety tests.
THOR-50M ATD (Anthropomorphic Test Device) represents a complete solution, including a crash test dummy and – due to the inbuilt DTI technology – the entire measuring chain. The benefits are high reliability, high-quality data and utmost flexibility.
THOR-50M is rotomoulded using elastic PVC plastisole as needs to present skin like features for this crash test dummy, but also to be able to install all the electric gear and sensors in the body.

www.kistler.com

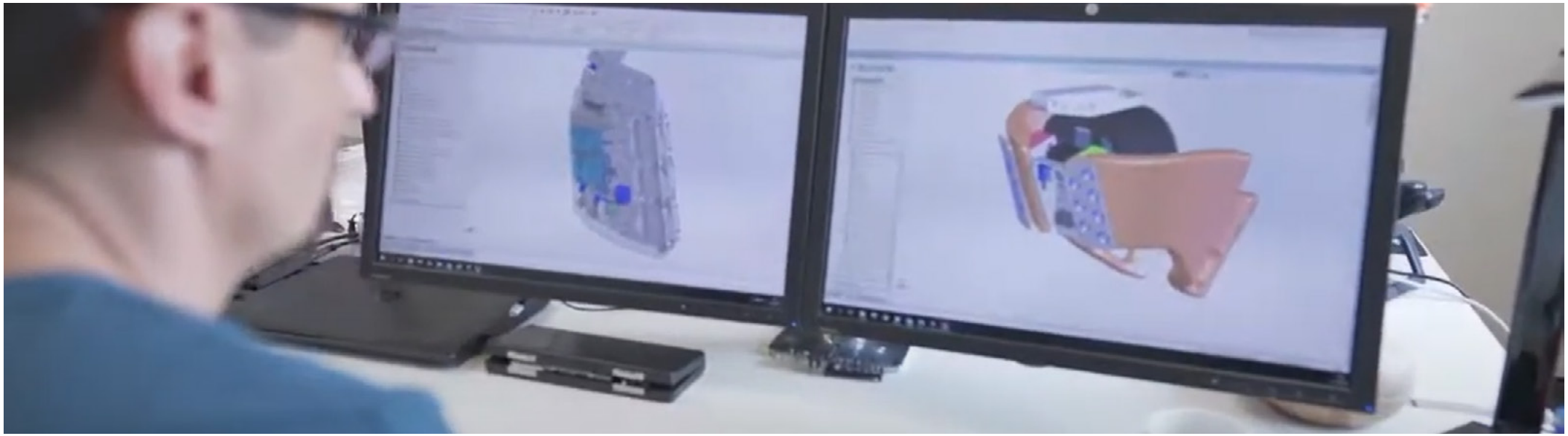


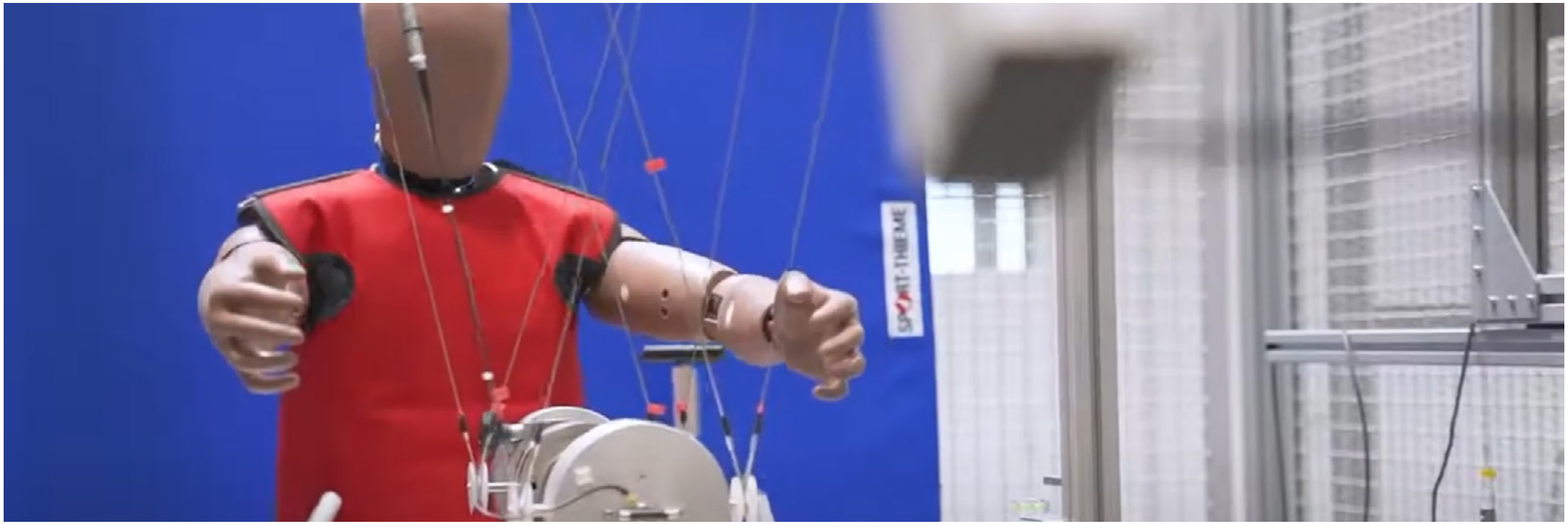


> The THOR-5F head and neck designs shadowed the same concept as the THOR-50M, with a few minor modifications in the neck for better manufacturability.



> *Crash test dummy responses can be correlated to risks of human injury through data modeling based on a variety of data sources.*





> *Crash test dummies are used by automotive manufacturers, safety and interiors suppliers, child car seat manufacturers, and regulators in every region of the world.*

Green Space Management
Main Trends

The world of gardening has progressively evolved in recent years: the care of green areas today represents a complex and articulated challange that develops over the course of all the seasons using multiple technologies.

Furthermore, la concezione of these products must be conducted by focusing on the issue of environmental sustainability which translates into a series of parameters to be respected.

Engine efficiency, low emissions, limited consumption and high resistance over time are some of the key factors that characterize the products for the care of green areas.

Even the structure of the products follows this concept through the ease of disassembling the products at the end of their life and with the use of polymers and recyclable materials.

Design and Production
Key Factors

Green spaces are important reservoirs of urban biodiversity, providing resources, ecosystem services and habitats for species of interest, improving functional and structural connectivity at the urban level.

The design and production of vehicles for the maintenance of green areas must start from a series of key elements.

The safety of the operators is an important factor in allowing each activity to be carried out, greatly reducing the possibility of accidents and damage. Furthermore, the variety of activities that are produced on the territory for the management of green areas requires multifunctional vehicles, which can be used in many ways.

The design of each component must be oriented towards solutions that combine aesthetics with functionality with practical innovations that can be easily managed by operators.

Donky 2.0

production Etesia - France
design Evok - France

Based on its experience with battery ride-on mowers, Etesia has developed equipment for easy transport and handling. With the Donky 2.0 electric wheelbarrow and the bahia VTE electric drive vehicle and mobile power source, you can protect operators while preserving the environment. No more heavy loads to painfully move with arm strength.
The Donky 2.0 is an electric wheelbarrow can serve as a tilting bucket, tool carrier and the machine can be equipped with a snow blade and scarifier rake. The wheelbarrow is electric and draws the power from 4 12-Volts lead-acid gel batteries.
The container that can be used for the transport of various types of goods is rotationally molded and is made up of rotatable side walls and a platform positioned on the vehicle.
The trailer can be coupled to the vehicle and can also be used as a tipping wheelbarrow. In addition to carrying loads, its rotomolded PE hollow body allows it to hold liquids and transform into a reservoir for watering the garden.

www.etesia.com

> *With its electric transmission, it does not require any effort from the user and thus reduces the risk of musculoskeletal disorders.*

> *The carrier is compact and easily manoeuvrable by hooking it to multiple tractors or buckets.*

> *The trailer is composed of a container base with adjustable walls both rotationally molded in PP.*

> *The vehicle can be used in different configurations: compact as a platform for supporting materials or open as an additional container.*

Automated Processes
Market Outlook

Rotational moulding was born as a technology in which the manual work component was and still is important: a substantial part of the operations related to the process are still conducted through operators who carry out manual activities. This approach is valid when it comes to developing diversified and highly personalized production of medium and small quantities.

When, on the other hand, the challenge becomes that of creating industrial production based on large numbers, it is essential to have an automated production process, which significantly reduces the use of manpower while increasing productivity and efficiency.
The competition between rotational moulding and other moulding technologies requires highly efficient and automated systems: thus rotational molding combines its original dimension of medium-small series with a more industrial dimension.

.

Key Factors
Production Criteria

An automated system for rotational molding is based on a series of fundamental criteria:
- Reduce the incidence of manual work
- Increase productivity to obtain production on an industrial scale
- Improve plant efficiency
- Reducing production costs through an increase in the quantities of products that can be produced in a given time frame
-Greater efficiency in energy consumption with consequent savings in production costs
- Shorter heating cycles than in the traditional process
- Less deformation and reduced weight of the moulded parts
- Expand the number of polymers that can be used in the rotomolding process

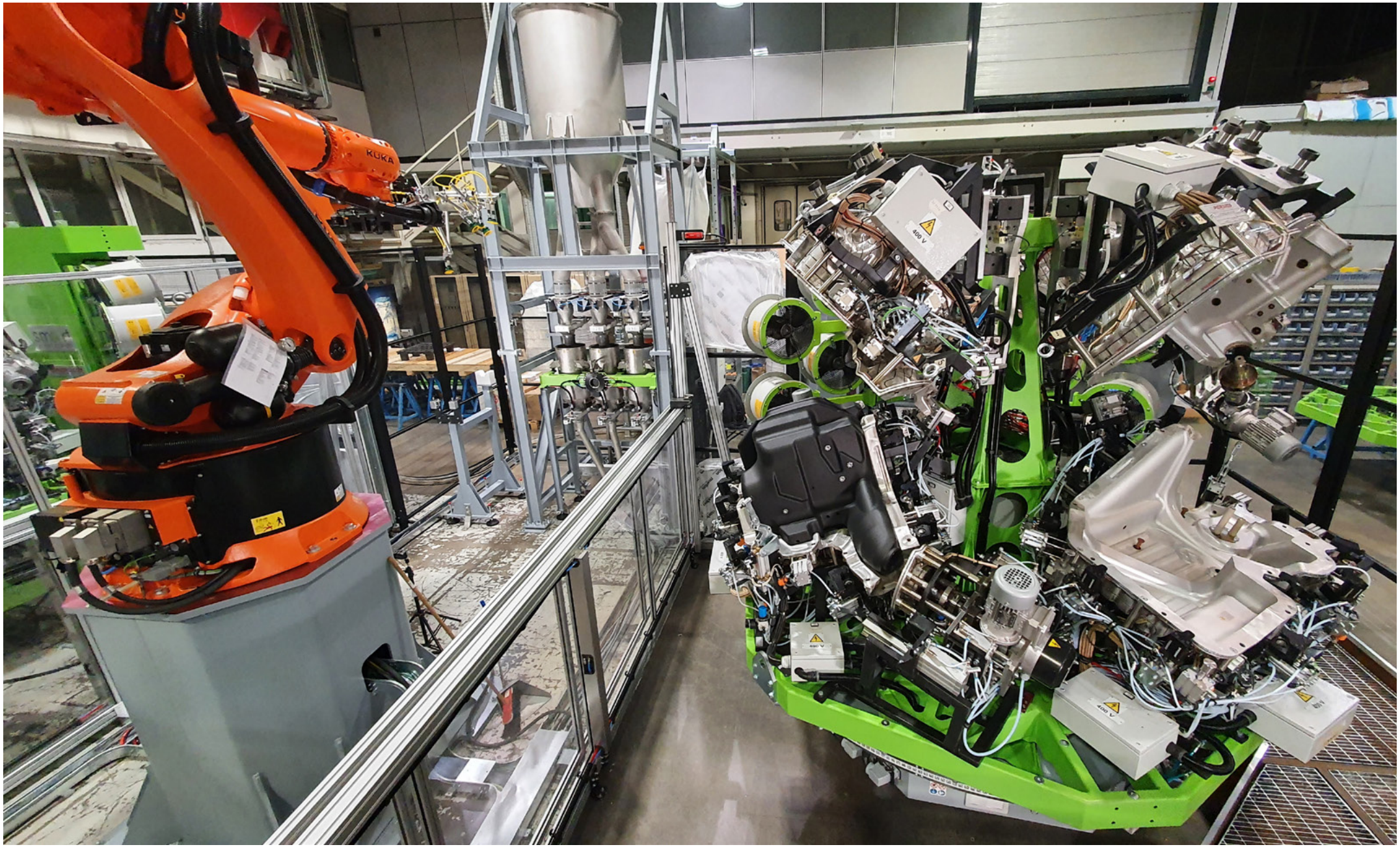
Automation for Rotomoulding: Fuel Tanks

machinery Persico, Italy
production Rototech, Italy

SMART can be specified in a number of versions to suit your product and operation.
Manual: For when your product or operation needs considerable operator input. The process is still programmed and automatic but all loading and unloading operations are manual.
Semi-Automatic: Specification as per the Manual version but with all or some of the operations: Tool opening and closing with Pneumatics, Powder weighing and dosing,
Fully Automated: A single or multiple SMART machines can be combined with one or more Robots to provide a fully automated production cell. This cell can be supplied fully tested and ready for series production.
To reduce energy consumption and material usage with guaranteed quality and traceability.
Rototech, one of Persico's loyal customers, is a well-known Company in the automotive field, that produces parts in rotational technology.
Rototech has chosen a 100% automatic SMART rotomolding solution, composed of 2 SMART machines and a robot: it lets the Company save 20% of energy and 15% of the raw material (compared to traditional machines) guaranteing virtually zero rejects and waste.

www.persico.com *www.leonardosmart.com*

> *Rotomoulded fuel tank made with SMART technology.*



> *Automation SMART for tanks: releasing and ejection of moulding from tool, Insertion and removal of loose pieces and threaded parts into and from tool.*

Electoral Furniture
Situation and Prospects

Electoral consultations involving the citizens of a nation represent a key moment in democratic life. In many countries, the areas destined to host elections are furnished with objects without a particular shape or aesthetics: simple, sometimes banal furnishings which are used to carry out the electoral activity correctly and efficiently, but without a particular aesthetic taste and clear functionality.

In many cases the furnishings for electoral activity are not designed to be used several times, they are disposable or in any case have a short life as they are made with cheap materials.

On the other hand, elections always represent a major media event in every nation: thus investing in beautiful and functional products can help improve the country's image, increasing its positive visibility through the main media.

Design and Production
Key Factors

The world of design and industry has not, up to now, paid particular attention to the furnishings and products needed for election days.
The world of design and industry has not, up to now, paid particular attention to the furnishings and products needed for election day. From this point of view, rotational molding offers a series of potentials to transform these environments into more efficient, beautiful and functional places.

Furthermore, the use of printed products allows you to have objects that last over time, with the possibility of compacting them in special deposits when they are not needed.

The ability to customize the surface part of a rotomoulded object with graphics and stickers allows you to think of products that can be customized with a different image, based on the type of election to be organised.

Votify - Election Day Kit

design Giacomo Uggeri, Italy
Milan Polytechnic, Italy

Votify is a project that explores a typology never considered by rotation moulding, i.e. the kit of elements that allow you to organize polling stations. It is made up of two basic elements, the rotomolded container for inserting the ballot and the voting desk. Votify's shape and size allow it to be stacked when not in use to save space in the storage area.
The ballot box is designed with the same idea of stackability and space saving. The shape of the ballot box allows multiple boxes to be stacked on top of each other reducing the overall footprint.
Votify's cab is rotomolded on the top and its one-piece design allows for easy and cost-effective molding, while the legs on the bottom are made of metal.
Both the Votify booth and box have recesses on the side faces to ensure greater structural strength and to frame a space for customizable graphics that can be modified at each election or referendum with stickers or logos.

www.design.polimi.it

> *The four legs are screwed to the rotomolded structure and can be compacted when not in use.*

> *The top has a recess where to place the pencil to vote while the four screw connections for the legs are positioned on the bottom.*

The Evolution of the Vehicular Mobility

While the world is confronted with the problems deriving from the energy crisis and environmental balances, the countries of the world have begun to look for alternative ways for vehicular mobility.

Light electric cars with low energy consumption values are seen as one of the strongest candidates for mobility in the near future. Like the smaller versions of road vehicles, microcars are fully adapted to electric vehicle technology, with minimal energy consumption values thanks to their minimalist design.

These microcars reduce energy consumption values when they also save the redundant dimensions of conventional personal vehicles. Therefore, they are also considered an alternative solution to the growing traffic jams in major cities.

Design and Production Key Factors

The body design of an electric vehicle is also of great importance as its weight reduction directly affects the driving range of the vehicle.

The vehicle body is a larger design domain for mass optimization than other parts. Methods for the design and optimization of a microcar body are introduced in the following case, which apply to weight reduction by removing materials from unloaded or relatively less loaded regions and optimizing mass and stiffness.

Comparisons are also made between materials that could be and are currently used in microcar bodies in terms of strength, weight and price. Rotational molding allows the production of components for micro cars characterized by a high resistance to physical-mechanical stress and by a wide freedom in the possible forms and constructive solutions.

Birò O2 Car

production Estrima, Italy
design Mandalaki Studio, Italy

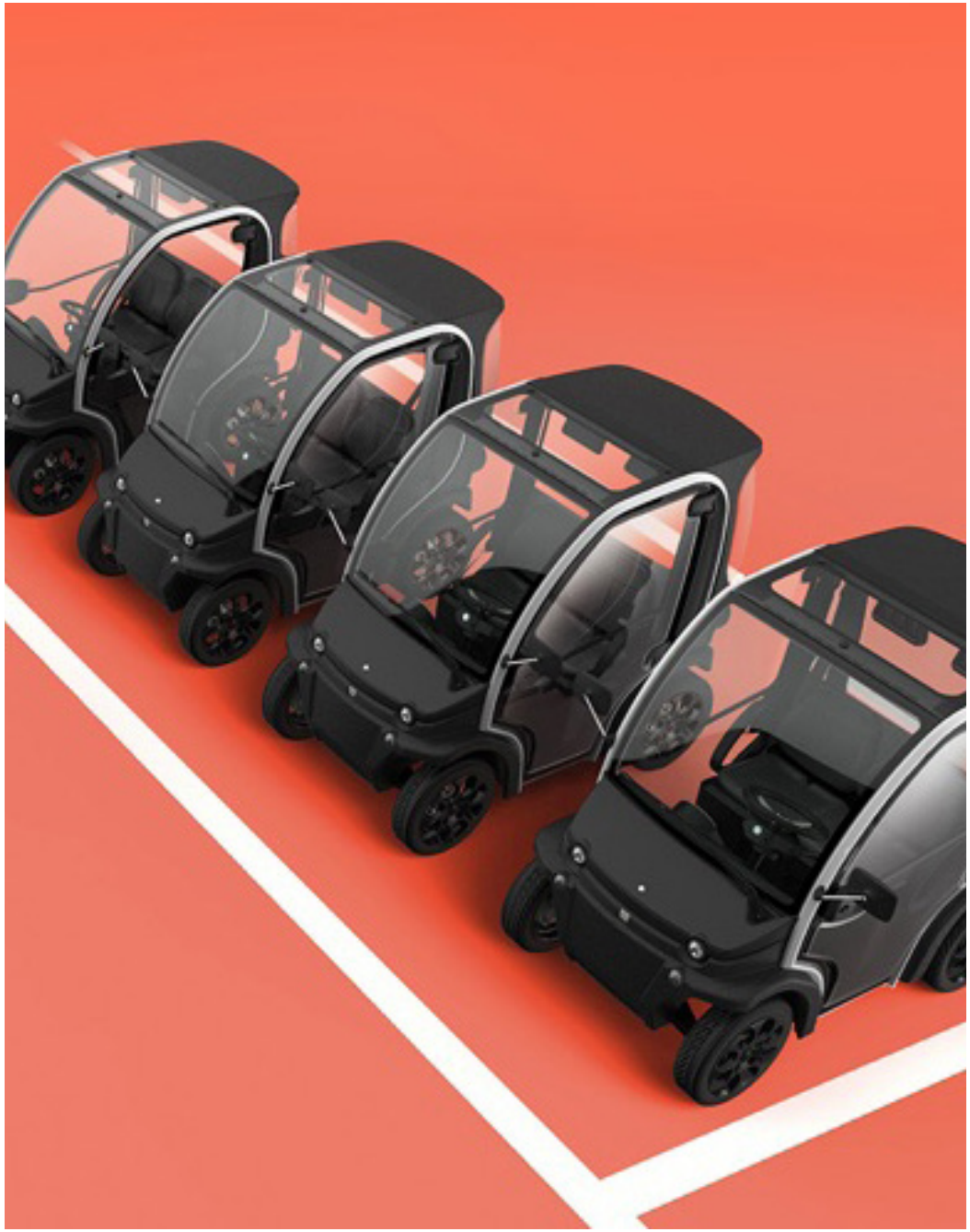
Mandalaki Studio teamed up with Italian car company Estrima to design the "first" electric concept car made from 80 per cent recycled plastics.
The O2 model is an electric car made with a higher percentage of recycled plastic than any other vehicle on the market. The O2 concept is based on the original Birò car – a fully electric vehicle designed for commuting in the city, which is compact enough to be parked in scooter spaces and features a removable battery.
Instead of the thick, high-density ABS plastic used for the main body of the original model, Mandalaki's Birò O2 gives waste plastics a new life by recycling them into a non-polluting vehicle.
After discovering the large amount of waste left by road maintenance, such as cones and signboards, Mandalaki began working with suppliers to see which of these elements they could recycle.
These plastic waste elements were ground into a fine powder and put through a rotational moulding process to form the structural parts of the vehicle, including the front and rear components and the rear hatch.
All other elements of the car, such as the seats, the tachometer, steering wheel and doors, have been produced from various types of non-recycled plastic, chiefly thermo-formed PVC.

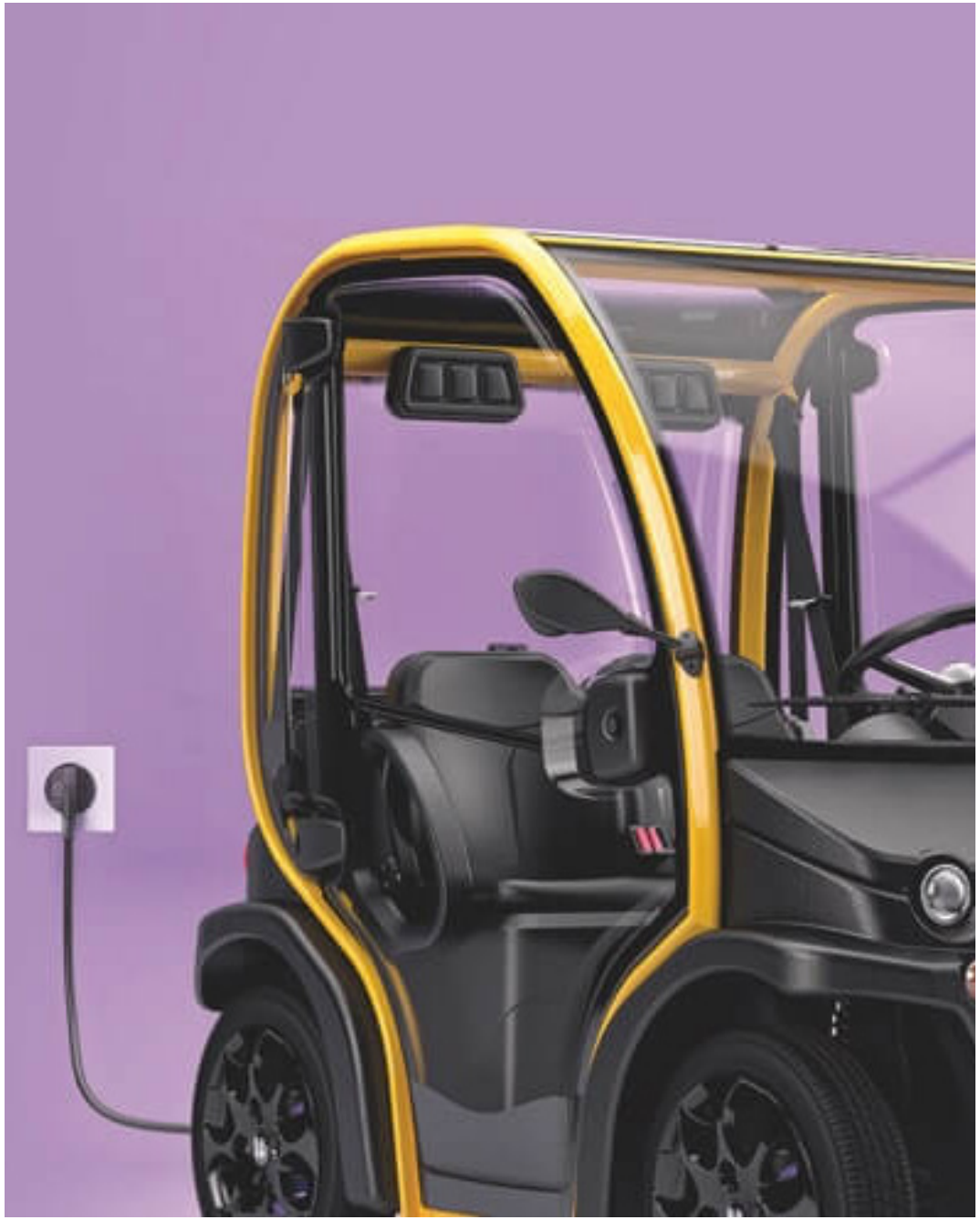
www.estrima.com

> *The vehicle has a removable battery in a case with wheels and a telescoping handle so owners can easily pull the battery into home or office for recharging.*

> *The platform and the door of the compartment positioned on the rear of the vehicle are rotomolded and completed by some metal accessories.*

> *Thanks to its small footprint, the car is easily parked in many small spaces in the city.*





> *Thanks to its small footprint, the car is easily parked in many small spaces in the city.*

> *The high-density rotomolded ABS structures ensure durability and high impact absorption, all while travelling comfortably and safely thanks to 3-point safety belts.*

> *Four disc brakes and a non-deformable frame in tubular steel protect passengers.*

> *Birò O2 is designed for all drivers who need a multifunctional and modular trunk to carry everything at any time of the day: boxes, clothes, documents or bulky volumes.*

> *Estrima uses heavy-density ABS plastic for the same components in the current Birò O2.*

The Evolution of Spaces for Events

The environments dedicated to hosting events such as conferences, award ceremonies and shows are constantly evolving.

The trend is to develop these spaces through ever more flexible elements, capable of creating different configurations, of adapting to different situations.

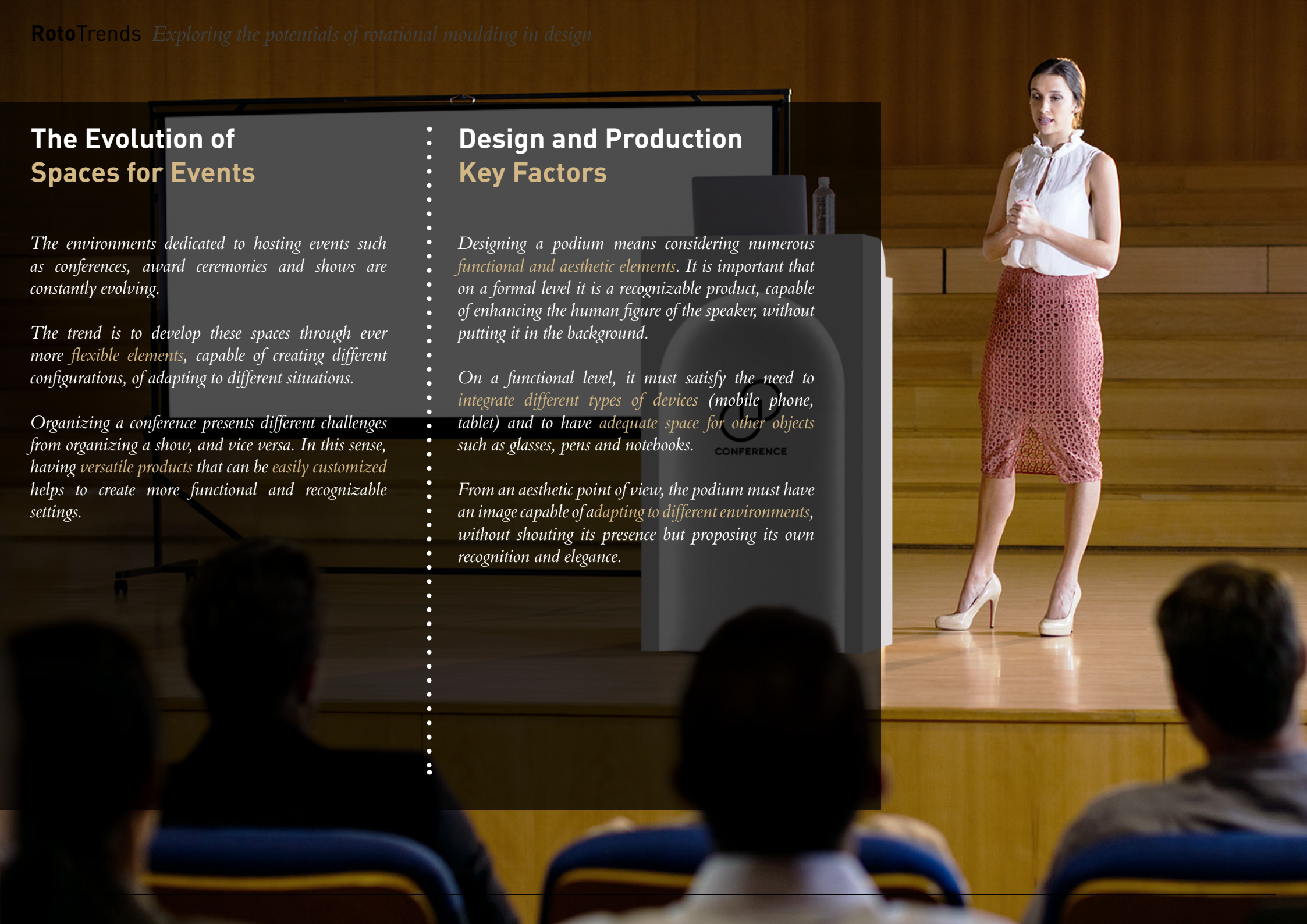
Organizing a conference presents different challenges from organizing a show, and vice versa. In this sense, having versatile products that can be easily customized helps to create more functional and recognizable settings.

Design and Production Key Factors

Designing a podium means considering numerous functional and aesthetic elements. It is important that on a formal level it is a recognizable product, capable of enhancing the human figure of the speaker, without putting it in the background.

On a functional level, it must satisfy the need to integrate different types of devices (mobile phone, tablet) and to have adequate space for other objects such as glasses, pens and notebooks.

From an aesthetic point of view, the podium must have an image capable of adapting to different environments, without shouting its presence but proposing its own recognition and elegance.

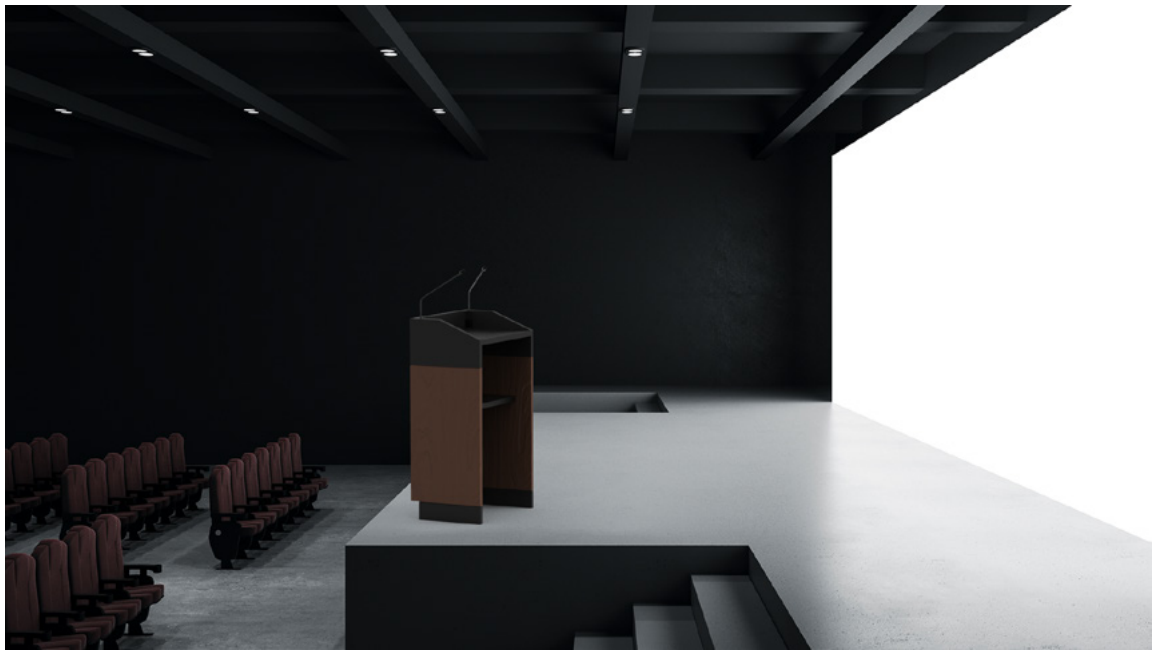


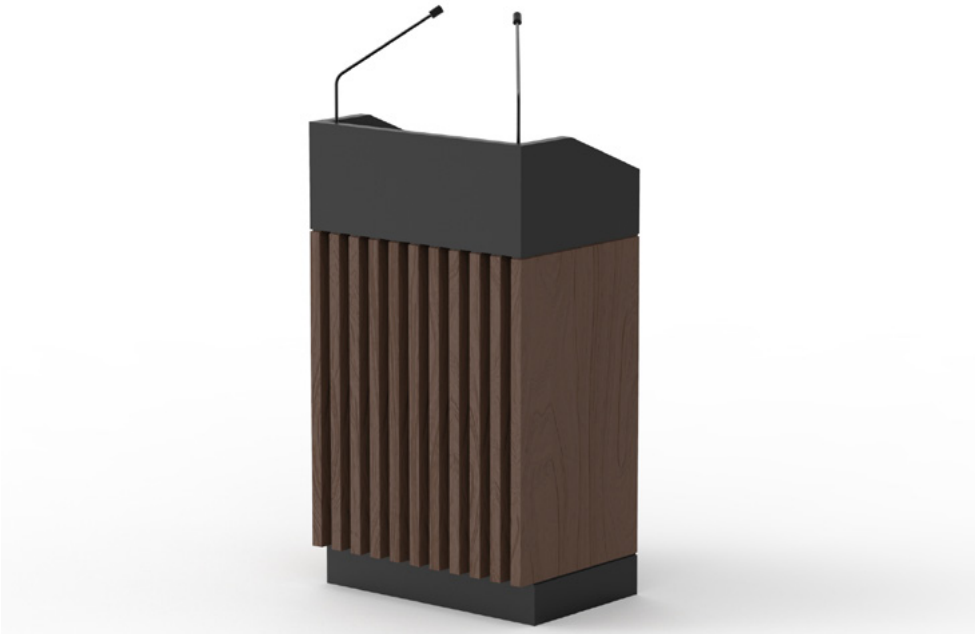
Yoop, Podium for Conferences

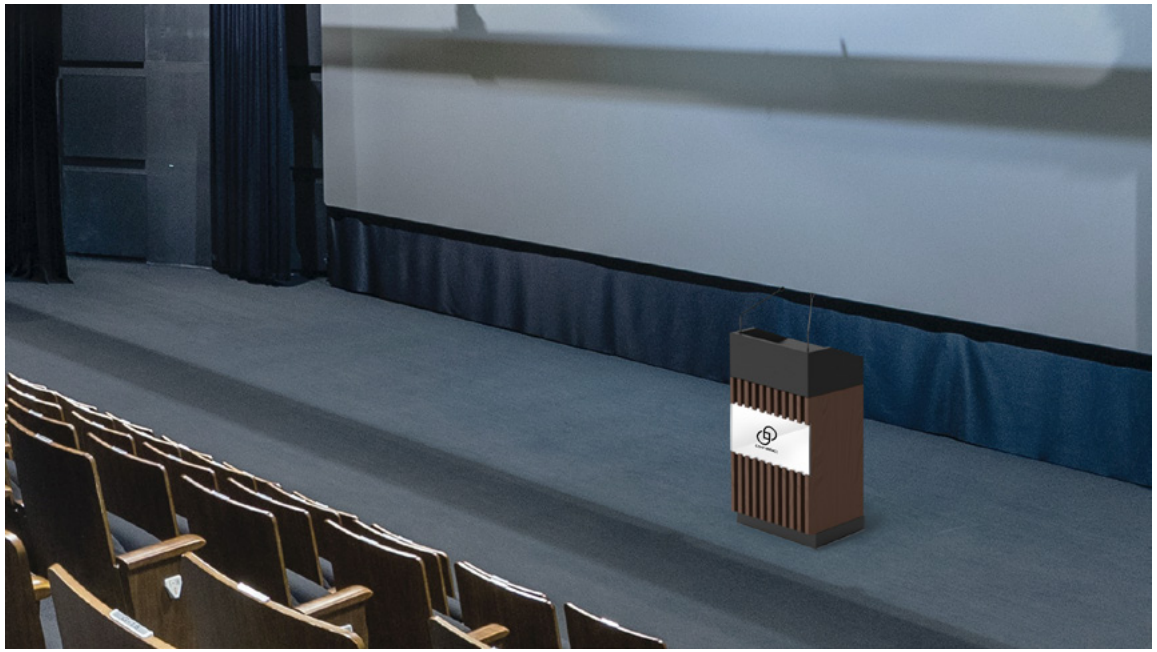
design Jy-Youn Woo, Seoul University
Industrial Design, South Korea

The project was born from considering a typology little explored by the world of design, namely the podium used for conferences and presentations.
In this case the structure consists of a single rotomolded element which incorporates both the vertical part and the support surface.
On the front there is the possibility of inserting personalized graphics with the logo of the conference or of the place hosting the event. Thanks to the low weight due to the rotational technology, the podium can be easily moved and transported from one place to another.
The upper part has a double surface, the lower one can be used to contain a device or the speaker's notes, while the upper surface includes the possibility of being wired with the insertion of the microphone.

www.art.snu.ac.kr







> *The project develops through two rotomolded parts: the front one with a vertical design in relief and the upper part for the speaker.*

New Performances for Earthmoving Machinery

Earthmoving equipment is heavy equipment, typically heavy-duty vehicles designed for construction operations which involve earthworks. They are used to move large amounts of earth, to dig foundations for landscaping and so on. Earthmoving equipment may also be referred to as; heavy trucks, heavy machines, construction equipment, engineering equipment, heavy vehicles and heavy hydraulics. Most earthmoving equipment uses hydraulic drives as the primary source of motion.

On the bases of operation, earthmoving equipment categorised as:

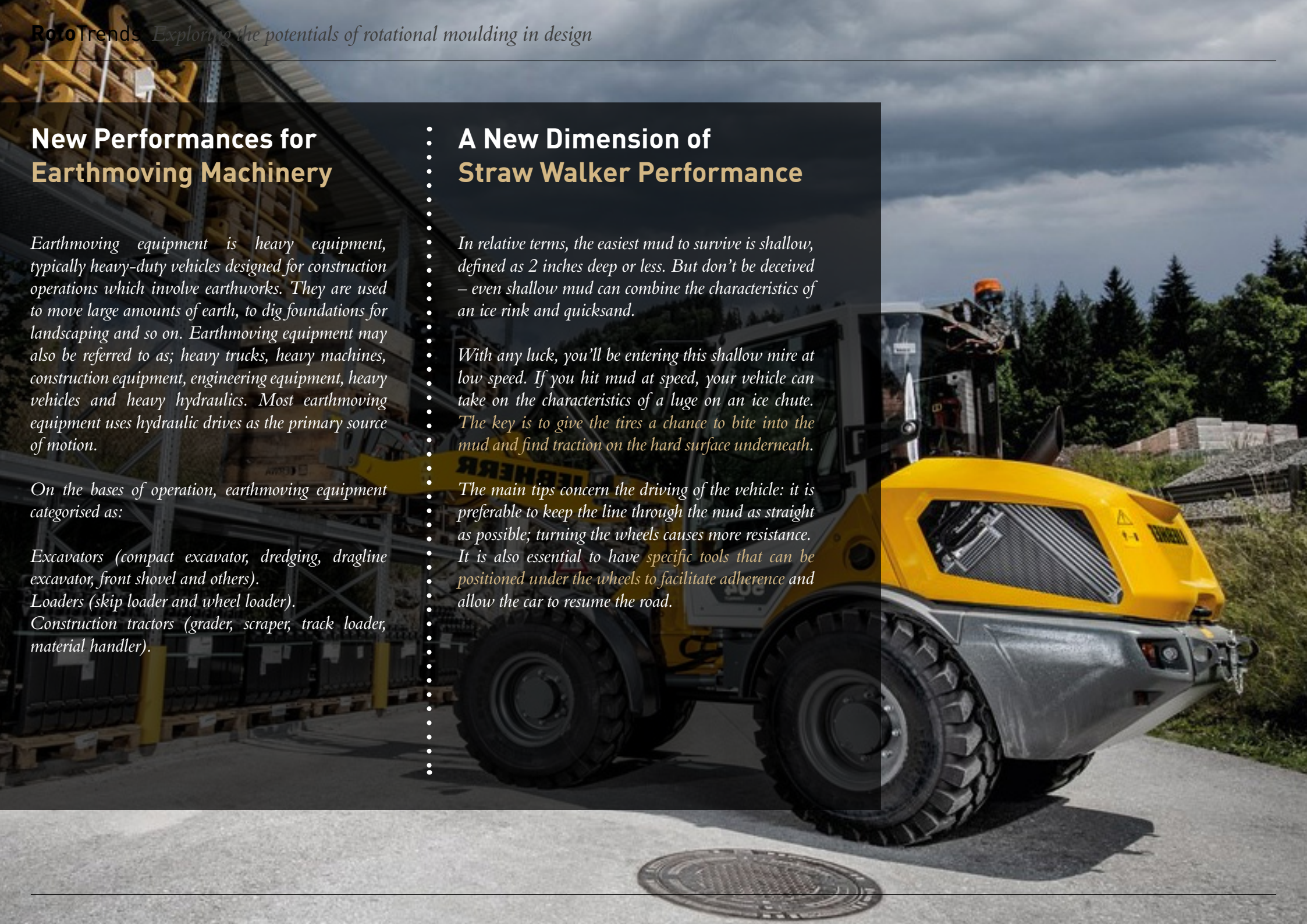
Excavators (compact excavator, dredging, dragline excavator, front shovel and others).
Loaders (skip loader and wheel loader).
Construction tractors (grader, scraper, track loader, material handler).

A New Dimension of Straw Walker Performance

In relative terms, the easiest mud to survive is shallow, defined as 2 inches deep or less. But don't be deceived – even shallow mud can combine the characteristics of an ice rink and quicksand.

With any luck, you'll be entering this shallow mire at low speed. If you hit mud at speed, your vehicle can take on the characteristics of a luge on an ice chute. The key is to give the tires a chance to bite into the mud and find traction on the hard surface underneath.

The main tips concern the driving of the vehicle: it is preferable to keep the line through the mud as straight as possible; turning the wheels causes more resistance. It is also essential to have specific tools that can be positioned under the wheels to facilitate adherence and allow the car to resume the road.



L 504 Compact

production Liebherr, Germany

L 504 Compact represents an innovative machine ideal for applications of every kind, such as road construction, municipal services and construction sites. Thanks to a compact and low-line structure, the compact loader boasts exceptional flexibility and guarantees you unbeatable stability in all respects. Ease of operation and optimised all-round visibility from the cabin are also key features allowing safer and more productive work.
The engine compartment is protected by a large cover with open side parts that connect to the rear bumper, both rotomoulded.
Thanks to the low overall height, even the narrowest passages are no obstacle. A wide range of hydraulic and mechanical attachments can be changed fully automatically, safely and without any oil leaks direct from the cab in a matter of seconds by pressing a button.

www.liebherr.com

> *The powerful lift arms significantly increase the compact loaders' performance and open up opportunities for new uses.*

> *The agile machines have impressive levels of operational efficiency and cost-effectiveness on all construction sites, in municipal services, or in road construction.*

A New Dimension of Straw Walker Performance

Constant technological research and the evolution of design set new standards for the threshing and separation performance of straw-walker combine harvesters.

The all-new threshing units features pre-accelerator drums, threshing drum with more rasp bars and additional separator drums with a diameter ahead of the impeller.

The new straw-walker models are equipped with particular cleaning systems. These systems work with six or eight turbine fans, depending on the model.

Dual ventilated steps performs intensive pre-cleaning. With the modern 3D functions, the cleaning system can actively compensate for side slopes of up to 20 %. With grain tank volumes of between 9,000 and 13,500 litres, the new machines can be equipped optimally for every application. The grain tanks can be accessed easily and safely from the rear.

Product Design Features

The new cab design provides the operator with a state-of-the-art workplace with more space and improved sound insulation.

The most important functions are designed to be integrated in the armrest where they are clearly laid out. The operator is at the center of the whole design and he has potentially many ways of adjusting the machine settings.

In the new projects many functions, such as the speed reduction for the threshing drum or the straw chopper, are designed to be actuated from the cab.

Rotational molding plays a fundamental role in the production of tanks and the external covering structure of the vehicle. From this point of view, the design follows criteria of maximum functionality combined with a coordinated and recognizable aesthetic form. Tanks and lids are designed to be easily accessible for maintenance and cleaning.

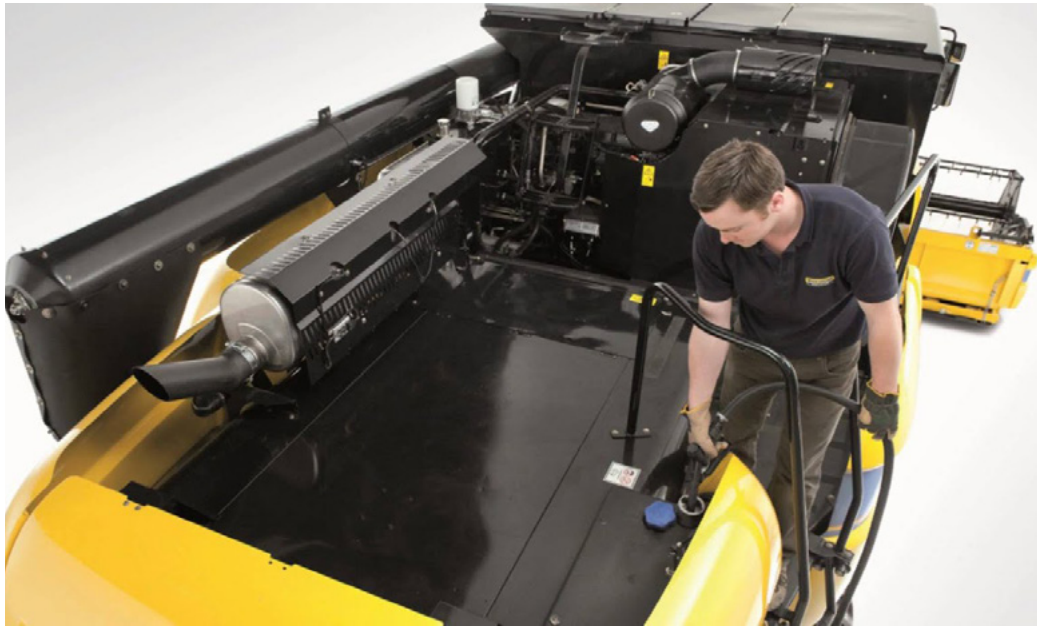
CX5 CX6 Strawwalker

production New Holland, Poland

The four-model New Holland CX5 and CX6 strawwalker combine series offers a specification choice to exactly match specific end user demands. Available with 600mm diameter, 4 drum threshing technology, these five and six-straw walker combines benefit from a host of developments to boost productivity in more demanding terrain. Innovative technology Opti-Speed automatically adjusts the speed of the strawwalkers both up and down slopes to deliver productivity improvements of up to 10% in hilly areas.
New Holland CX5 and CX6 match stylish looks with practical features to ease maintenance, enhance visibility and make cleaning and storage easier. The CX range has been designed to spend more time working and less time in the yard.
All service points are easy to access and long service intervals mean they will spend more time in the field. The rotomolded fuel tanks are conveniently placed side by side to facilitate simultaneous filling. The rotomolded shield sidewall ensures wide access to all drives and service points.

www.newholland.com

> *The advanced threshing design and cleaning mechanism provides superior throughput allowing impressive forward speeds and daily output.*



> *The CX5 and CX6 feed elevator features four chains with connecting slats for improved, continuous crop flow.*

Road Sweepers
A New Design Concept

Road sweepers are vehicles that are used to keep roads, pavements and other hard surfaces clean and free from debris. Road sweepers either clean with brushes or with air.

Conventional road sweepers use jets underneath the vehicle body to spray water onto the road surface. This helps to loosen particles and reduce airborne dust.

Brushes then scrub the dirt off the surface, while a cylindrical broom-like brush sweeps the debris onto a conveyor belt which leads to a storage container, or hopper, inside the vehicle. Alternatively, a vacuum mechanism may suck up the debris.

Key Factors
Goals

Typically, the brushes are capable of spinning at around 4,000 revolutions per minute (rpm).
Regenerative road sweepers use a hydraulic system that forces air into a swirling effect inside a contained sweeping head. A negative pressure on the suction side is then used to suck the debris into the hopper. The truck is fitted with filters that use centrifugal separation to clean the air of the debris, allowing the air to be reused.

These road sweepers are often noisier than conventional sweepers, as an extra engine is required to power the vacuum pump.
Many modern road sweepers are PM10 certified, which means they are capable of collecting and holding particulate matter as small as 10 µm (micrometres), which is often a leading cause of stormwater pollution.

Meteor R-Activ

production: Evrard, France
design Evok - France

Meteor R-Activ represents a range of 4 innovative models from 4200 to 7200 liters designed to guarantee an excellent quality of application and crop protection, guaranteeing a very high level of comfort and safety for the user.
The new chassis architecture has been designed to improve the operator's visibility and maneuverability of the vehicle. The rotomoulded design of the tank and side parts allows for the elimination of unused volumes, compacting the structure and improving machine performance.
In vegetable crops, it is essential to intervene at the right time. The Meteor R-Activ retains this unique robustness thanks to an integral suspension of the frame, ensuring comfort for the operator and protection of the mechanical components.
The coil spring combined with the shock absorber provides great flexibility during the transport and field work phases.
The design of the METEOR allows it to turn with a significant steering angle of 54°. Combined with the gyroscope and the inclinometer, this automatically corrects wheel steering on slopes.

www.evrard.com

> *The air pressure regulator regulates the pressure in the spray line and achieves an extremely precise spray result.*

> *Rotomoulded body has been designed to be robust. The anti-shear connecting rods with their 3 holding rods guarantee the frame and its ramp unparalleled stability.*

A New Concept for Filling Stations

The refueling stations on the roads and highways are affected by a large evolution that arises from the epochal sampling due to the progressive abandonment of combustion cars for hybrid or electric traction cars.

This revolution will change many things in the concept of the filling station. It is an evolution that will affect both the internal environments of the station and also the organization of the external areas.

Not only will the basic elements that make up the traditional station change, but also the ways of using these areas will be different.

The longer times to recharge the batteries will require extended rest areas for travellers, furnished with greater comfort than the current ones.

Key Factors Feature

Designing and manufacturing the new service areas for the new generation of electric vehicles is a large and complex challenge.

The elimination of conventional fuels will allow for a cleaner, safer environment: more similar to a railway station than a mechanical workshop.

The experience inside the station will change and become richer in alternatives: the longer times to get a full recharge will give travelers the possibility to use the reception spaces in a different way.

Plastic, whose presence has been very limited in stations for combustion vehicles due to its flammability, has the potential to acquire a central role in the production of furnishings and accessory elements in a more aseptic environment.

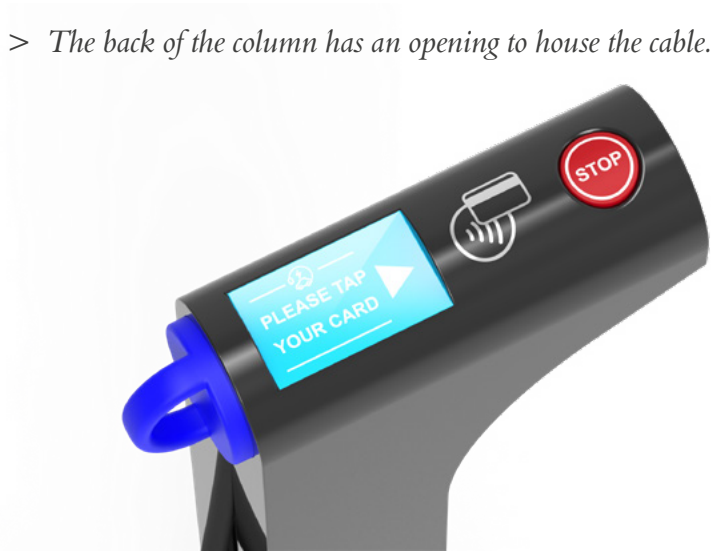
Car Terminal for Electric Charging

design Begum Onder,
Bahçesehir University, Turkey

The transition to electric motors offers new perspectives from a design point of view: the elimination of fuels makes the refueling space safer and less prone to fire risks. This makes it possible to redesign the refueling columns through a rotomolded structure that replaces the classic metal frame.
Thanks to the formal possibilities allowed by rotational technology, the column takes on a more articulated shape than a classic metal parallelepiped: an object with a new aesthetic where the plastic integrates with electronic sensors and displays.

www.bau.edu.tr

> *The back of the column has an opening to house the cable.*



> *The top of the filling nozzle integrates the electronic display to monitor the battery charge level.*

credits

Estrima, *Italy*
Etesia, *France*
Evrard, *France*
Evok, *France*
Kistler, *Switzerland*
Liebherr, *Germany*
Maus, *Germany*
New Holland, *Poland*
Persico, *Italy*
Rototech, *Italy*

Cover Pictures
courtesy Euro3Plast, *Italy*

Projects
Bahçesehir University, *Turkey*
Ecal, *France*
Istituto Europeo Design, *Spain*
UDK, *Germany*
Politecnico di Milano, *Italy*
SJB-Institute of Technology, *India*
Seoul University, *South Korea*

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