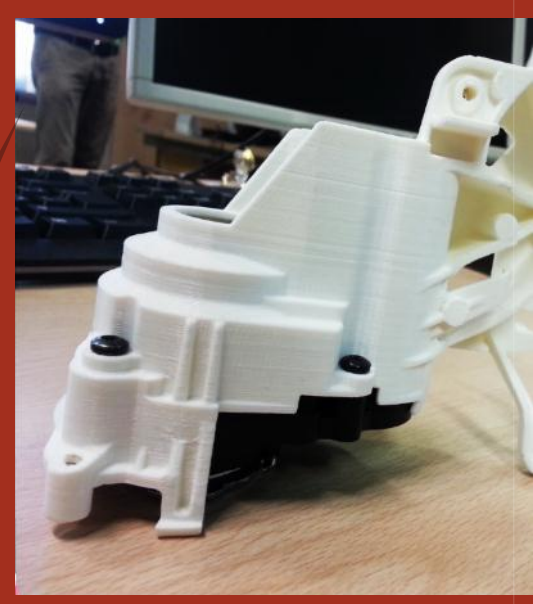
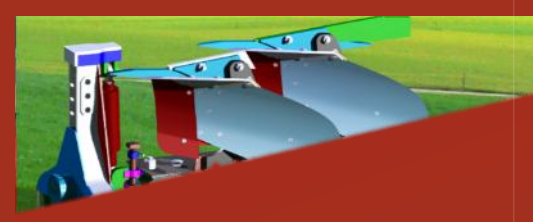
MARCH

2018

DAuto Newsletter

Edition
2018





> *Design engineers turn designs into reality. Without them, a great idea but nothing more than,... well, a great idea.*

February 2018 refresh

- ✓ *Giugiaro's GFG Style reveals Sibylla Concept*
- ✓ *Seequent releases leapfrog works for civil engineering and environmental industries*
- ✓ *Rettew wins award for virtual pipeline project*
- ✓ *The new Volvo V60*
- ✓ *Engineers 3-D print shape-shifting smart gel*
- ✓ *Engineers develop flexible lithium battery for wearable electronics*
- ✓ *Alfa Romeo and Sauber reveal the 2018 Formula 1*

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Honda unveils all-new CR-V

At the upcoming Geneva Show Honda is presenting the next-gen CR-V, the world's best-selling SUV, with an evolved design and gasoline and hybrid powertrains.

The evolutionary exterior design has broader, muscular wheel arches, sharper contours on the hood and rear quarters, as well as the latest Honda family 'face' with its signature headlight graphic.
The all-new CR-V has slightly larger exterior dimensions compared to its predecessor, and the longer wheelbase and wider stance enable a significantly roomier interior.

The car also features a number of solutions for optimizing aerodynamic efficiency, such as the thinner A-pillars, sculpted front and rear bumpers, under-engine and under-floor covers and Active Shutter Grille system, which further improves fuel efficiency.

The new interior design incorporates a horizontal emphasis to the dashboard layout to highlight the more spacious cabin, by accentuating the feeling of width and conveying a sense of strength.

The dashboard features two 7-inch displays, while the layout of controls has been optimized with a simple cluster for air-conditioning management located beneath the central touchscreen.
Among the practical features is the height of the tailgate which, when opened, can be programmed to avoid contact with low ceilings.

The new CR-V will also include the seven seat options for the gasoline versions.
First deliveries of are expected in Fall 2018 with hybrid models following early in 2019.

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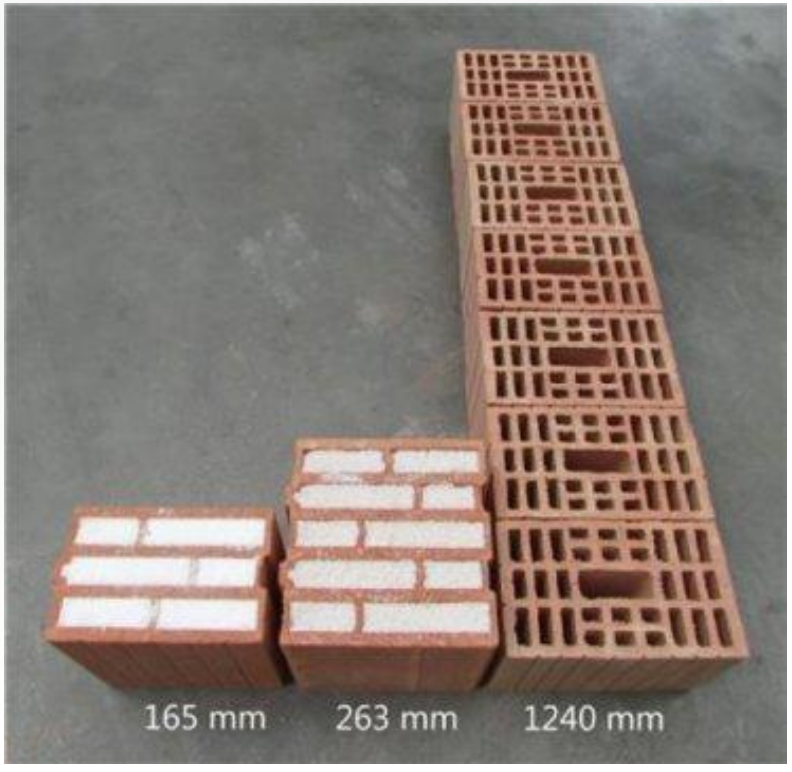
Insulating bricks with microscopic bubbles



In order to achieve the same insulation values as a 165 mm thick wall of aerobricks, a wall of perlite bricks must be 263 mm thick - and a wall of non-insulating bricks even more than one meter!

The calculation is simple: the better a building is insulated, the less heat is lost in winter -- and the less energy is needed to achieve a comfortable room temperature. No wonder, then, that the Swiss Federal Office of Energy (SFOE) regularly raises the requirements for building insulation.

Traditionally, the insulating layers are applied to the finished walls. Increasingly, however, self-insulating bricks are being used -- saving both work steps and costs and opening up new architectural possibilities. Insulating bricks offer a workable compromise between mechanical and thermal properties and are also suited for multi-storey buildings.

They are already available on the market in numerous models: some have multiple air-filled chambers, others have larger cavities filled with insulating materials such as pearlite, mineral wool or polystyrene. Their thermal conductivity values differ depending on the structure and filling material. In order to reach the insulation values of walls with separate insulating layers, the insulating bricks are usually considerably thicker than normal bricks.

Aerogel instead of Perlite

Empa researchers have now replaced Perlite in insulating bricks with Aerogel: a highly porous solid with very high thermal insulation properties that can withstand temperatures of up to 300°C (see box). It is not an novel material for the researchers: they have already used it to develop a high-performance insulating plaster which, among other things, allows historical buildings to be renovated energetically without affecting their appearance.

Together with his colleagues, Empa researcher Jannis Wernery from the research department "Building Energy Materials and Components" has developed a paste-like mixture of aerogel particles to be used as filler material for the brick. "The material can easily be filled into the cavities and then joins with the clay of the bricks," says Wernery. "The aerogel stays in the bricks -- you can work with them as usual." The "Aerobrick" was born.

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Insulating bricks with microscopic bubbles

A comparison in a special measuring device for thermal conductivity at an average temperature of 10 °C shows that the perlite-filled bricks with the same structure and thickness insulate by about a third less than the aerobrick. In other words, in order to achieve the required insulation values, a wall of perlite brick must be about 35% thicker than an aerobrick wall.

Even more impressive is the comparison with ordinary brickwork made of non-insulating bricks: These conduct heat up to eight times better. A conventional wall would therefore have to be almost two metres deep in order to insulate as well as an aerobricks wall of just 20 centimetres in depth. With a measured thermal conductivity of just 59 milliwatts per square meter and Kelvin temperature difference, the Aerobrick is currently the best insulating brick in the world.

But now and in the very near future, no one will probably be able to build a new house from aerobricks -- the filling material is currently still too expensive. Wernery calculates that at today's market price for aerogel, a single square metre of a brick wall would generate additional costs of around 500 francs. However, experts assume that the costs for Aerogel will fall massively in the near to medium term -- then nothing will stand in the way of the use of the new wonder brick.

Info: Aerogel
Aerogels are a relatively new development as insulating materials in the building sector. The base for the material are mostly silicates, but in volume it consists of more than 90% of air-filled pores with sizes in the nano range. This minimizes the energy transfer through the movement of the air molecules -- in other words, aerogels are highly efficient insulating materials. In addition to its thermal properties, aerogels are vapour permeable, absorb almost no moisture, recyclable, non-toxic and non-combustible. This makes it an almost ideal thermal insulation material for buildings.

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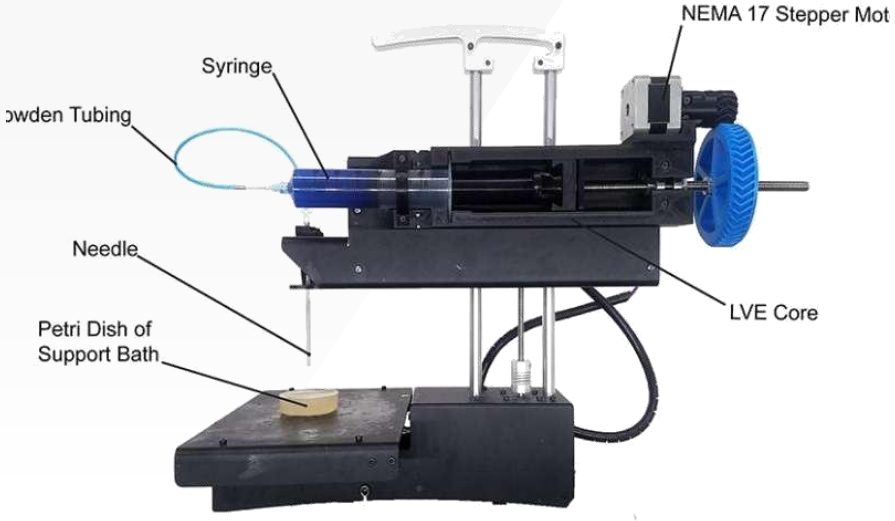
3-DIY: Printing your own bioprinter

Researchers at Carnegie Mellon University have developed a low-cost 3-D bioprinter by modifying a standard desktop 3-D printer, and they have released the breakthrough designs as open source so that anyone can build their own system. The researchers—Materials Science and Engineering (MSE) and Biomedical Engineering (BME) Associate Professor Adam Feinberg, BME postdoctoral fellow TJ Hinton, and Kira Pusch, a recent graduate of the MSE undergraduate program—recently published a paper in the journal HardwareX that contains complete instructions for printing and installing the syringe-based, large volume extruder (LVE) to modify any typical, commercial plastic printer.



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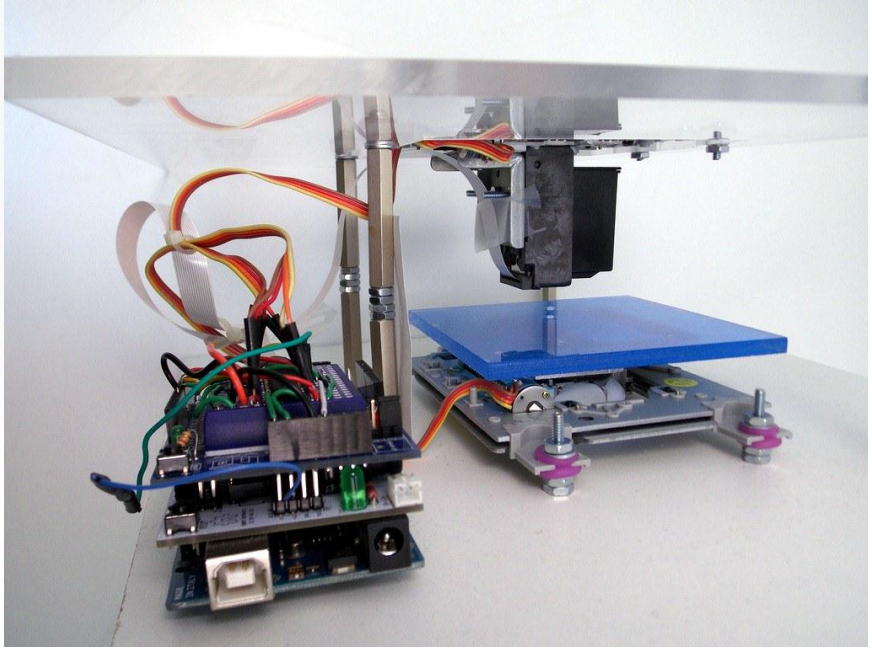
As the researchers explain in their paper, "Large volume syringe pump extruder for desktop 3D printers," most commercial 3-D bioprinters currently on the market range in cost from $10,000 to more than $200,000 and are typically proprietary machines, closed source, and difficult to modify.

"Essentially, we've developed a bioprinter that you can build for under $500, that I would argue is at least on par with many that cost far more money," says Feinberg, who is also a member of the Bioengineered Organs Initiative at Carnegie Mellon. "Most 3-D bioprinters start between $10K and $20K. This is significantly cheaper, and we provide very detailed instructional videos. It's really about democratizing technology and trying to get it into more people's hands."

3-DIY: Printing your own bioprinter



And not only does the LVE cut down on cost, it also allows users to print artificial human tissue on a larger scale and at higher resolution, opening doors for researchers, makers, and professionals to experiment with 3-D printing biomaterials and fluids.

"Usually there's a trade-off," explains Feinberg, "because when the systems dispense smaller amounts of material, we have more control and can print small items with high resolution, but as systems get bigger, various challenges arise. The LVE 3-D bioprinter allows us to print much larger tissue scaffolds, at the scale of an entire human heart, with high quality.“
"Bioprinting has historically been limited in volume," adds Pusch, "so essentially the goal is to just scale up the process without sacrificing detail and quality of the print.“

Pusch, the first author on the paper, was a research assistant in Feinberg's lab for three years during her undergraduate career. During that time, she received an International Summer Undergraduate Research Fellowship (iSURF) to work in the Netherlands, and also interned with General Electric's Center for Additive Technology Advancement. Following her graduation from Carnegie Mellon in December of 2017, she began a spring internship at Formlabs in Boston and has since accepted a second internship position for the summer at Blue Origin in Seattle. Pusch has also co-authored a second paper in ACS Biomaterials Science & Engineering with Hinton, "3D Printing PDMS Elastomer in a Hydrophilic Support Bath via Freeform Reversible Embedding." As a research assistant in Feinberg's lab, Pusch was able to experience real-world application of her research early on in her academic career. When asked about her experience in Feinberg's lab, Pusch emphasizes how grateful she is to have had the opportunity to work with such supportive and brilliant mentors.

In their paper, the researchers demonstrated the system using alginate, a common biomaterial for 3-D printing, and using the lab's signature Freeform Reversible Embedding of Suspended Hydrogels (FRESH) technique.

Feinberg's lab aims to produce open source biomedical research that other researchers can expand upon. By making their research widely accessible, Feinberg's lab hopes to seed innovation widely, to encourage the rapid development of biomedical technologies to save lives.

Edition
March 2018

Telematics technology steering toward smarter EU roads

If we are to have truly smart cities our transport systems will have to be more cost-effective, safer and sustainable. Perhaps most of all they will need to be more integrated, as the EU-funded project MFDS demonstrates.

The stated aim of the EU's 'smart, green and integrated transport' initiative is to build a European transport system that is 'resilient, resource-efficient, climate- and environmentally friendly, safe and seamless for the benefit of all citizens, the economy and society.'

In contribution, the EU-funded MFDS project has developed a versatile and affordable 'Intelligent Transport System' offering several functions including wrong-way driver detection, traffic congestion detection, vehicle counting by vehicle classification and parking accounting. The core innovation of MFDS is the system's ability to perform its functions simultaneously, while remaining low-cost to buy and install, as well as running on minimum power. The project's feasibility study has demonstrated that the system will be of interest to multiple EU markets.

Over and above state-of-the-art alternatives

A standard 'Multi-Functional Detection System' (MFDS) consists of six delineator posts which distribute a secure radio field across the target path, detecting and classifying objects with 100 % precision. The system can be placed at car park entrances and exits or on highways, reporting vehicle details to a web portal in real time. Beyond categorisation, the innovative sensors mean that the system can detect the direction, size and speed of vehicles. This proved the most difficult aspect of MFDS, as project coordinator Mr Dennis Dorn recalls, "The challenge has been developing the novel sensors to be able to detect and classify the traffic accurately enough to pass the required standards and certifications."

The data accrued by MFDS can be viewed centrally through the web portal or redistributed securely via interfaces and the cloud, to motorists or the relevant authorities. Crucially the system can be integrated into existing guide posts or bollards, making installation it more cost-effective and seamless.

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During the recently closed Phase 1 of the project, the team developed a Feasibility Study. The subsequent market study, incorporating customer feedback, has paved the way the creation of a new company (S-Tec GmbH) and for Phase 2. Phase 2 will identify strategic collaborators, scope legislative requirements and plan the technical and commercial groundwork to include finalising the system for multiple scenarios and markets.

Elements of the system have already been assessed on the German Ministry of Transport test tracks. The first MFDS application selected for rollout in late 2018, is the car park accounting (without classification) functionality. Amongst additional features, Phase 2 should see the roll-out of car park accounting classification, alongside wrong-way driving detection. As Mr Dorn explains, "Speaking with the relevant authorities has given us the idea of a multifunctional use of the system, such as including parking and traffic counting." Ultimately the target is for over 6 500 units to be deployed across the EU by 2024.

Benefiting all road users

The system can work across many markets. As Mr Dorn summarises, "The system will benefit all road users, with road safety increased especially on highways, parking spaces better utilised and congestion significantly reduced, by connecting traffic management with municipal parking spaces. Everyone can also use the data to better plan the management of resources, from authorities with the deployment of staff, to lorry drivers planning the timing of their rest breaks." There are also commercial markets, for example with the offer of parking space accounting for stadiums or exhibition spaces.

To make these full benefits tangible there are a number of challenges the team are working to overcome. The system must first be further developed and tested, especially for the public market, which means stress testing the innovative sensor technology – the core of the system – to ensure reliability regardless of weather conditions. This will then lead to the production and assembly of the system.

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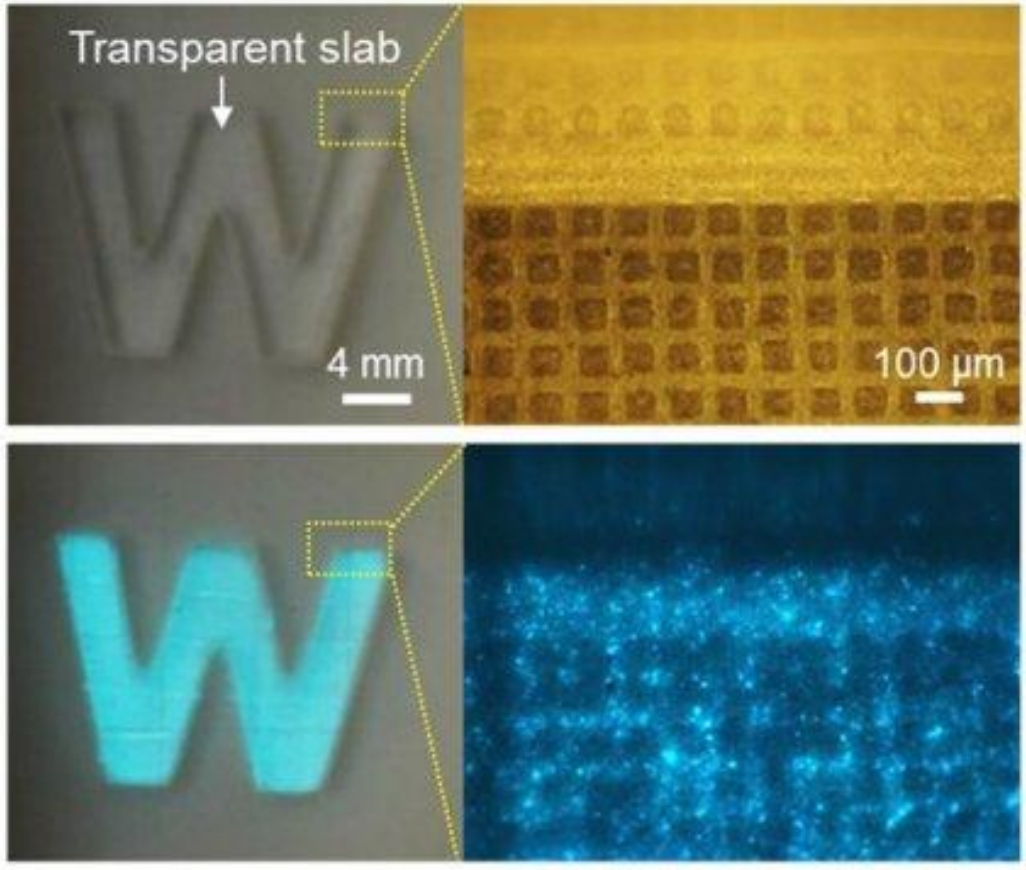
Jellyfish-inspired electronic skin glows when it gets hurt

Electronic-skin technologies for prosthetics and robots can detect the slightest touch or breeze. But oddly, the sensors that make this possible do not respond effectively to a harmful blow. Now researchers report in ACS Applied Materials & Interfaces the development of a jellyfish-inspired electronic skin that glows when the pressure against it is high enough to potentially cause an injury.



An electronic skin glows when a transparent “W” is pressed onto it, and a voltage is applied (bottom).

An electronic skin that can mimic the full range of biological skin's sensitivity has great potential to transform prosthetics and robotics. Current technologies are very sensitive, but only within a narrow range of weak pressures. Under high pressures that could cause damage, the electronic skins' sensitivity fades. To address this shortcoming, Bin Hu and colleagues at the Huazhong University of Science and Technology turned to the Atolla jellyfish for inspiration. This bioluminescent, deep-sea creature can feel changes in environmental pressure and flashes dramatically when it senses danger.

Building on the idea of a visual warning in response to a physical threat, the researchers combined electric and optical systems in a novel electronic skin to detect both slight and high-force pressures. They embedded two layers of stretchy, poly-dimethysiloxane, or PDMS, film with silver nanowires. These layers produce an electrical signal in response to slight pressures, such as those created by a breeze or contact with a leaf. Sandwiched in between the silver nanowire electrodes is a PDMS layer embedded with phosphors. This layer kicks in and glows with growing intensity as the physical force increases. The researchers say this approach more closely copies the wide range of pressures the human skin can feel.

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Exclusive: the Pininfarina HK GT Concept

An exclusive coverage of the HK GT Concept, a futuristic, elegant Gran Turismo designed by Pininfarina that evolves the design DNA of the Hybrid Kinetic Group brand.

Presented today at the 2018 Geneva Motor Show, the latest result of the collaboration between Pininfarina and Hybrid Kinetic was first revealed last week during a private event at Pininfarina's Headquarters in Cambiano, near Turin.

Following the debut of the H600 luxury sedan at last year's Geneva Show, and the two concept SUVs revealed at the Shanghai Show, the fourth concept car co-developed by Pininfarina and Hong Kong-based Hybrid Kinetic Group aims at further defining the formal identity and design language of the emerging brand.

The architecture is based on the Gran Turismo style – a classic in the Italian design history – and this choice is reflected in the car's dimensions and proportions.

Showcasing a length just under 5 meters, the HK GT has an sleek, dynamic stance thanks to a low height of 1,365 mm and a stretched, elegant profile that benefits from the long 2,975 mm wheelbase.

In the Italian design firm's tradition, the surface treatment features clean, sensual volumes with smooth, precise transitions and a limited number of well-refined character lines that give the exterior added interest and elegance without overloading .

The profile of the HK GT is defined by a single, slightly descending line that runs from the long, sculpted hood towards the rear end, with the tailgate that visually rests on the rear wheel – a hint at the classic Gran Turismos of the past.

This feature is underlined by the chrome-finished trim that stretches form the front end and frames the side windows, which represents one of the distinctive styling cues of the Hybrid Kinetic brand, already seen in the previous concept cars.

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Exclusive: the Pininfarina HK GT Concept





Technical Specifications
Dimensions
•Length: 4,980 mm
•Width: 1,998 mm
•Height: 1,365 mm
•Wheelbase: 2,975 mm
•Wight distribution: 48%/52%

Technical Features and Performances
•Aluminum Chassis
•Drivetrain: four in-wheel Permanent Magnet motors with two-speed transmission; range extender with microturbine
•Transmission: All-wheel drive with Torque Vectoring
•Max Output: > 800kW (electric motors)
•Battery: 38kWh
•Range (pure electric): >160 Km
•Range (range extended): > 1,000 Km
•Top Speed: 350 km/h
•0-100 km/h sprint: 2.7 seconds


The front end is a new interpretation of the HK fascia: it features chrome fins, starting from the center logo, open like petals and frame the high-tech LED projectors, lending the car a bold, almost magnetic face.

Interior Design
The 2+2 interior of the HK GT which is revealed by the opening of the spectacular gullwing doors, spanning the full length of the cabin.

While the exterior – except from the doors – was designed with production feasibility in mind, the interior is a pure design exercise that expresses sophistication.

The cabin combines two visual identities: the front area is futuristic and is finished in light, cream-colored leather, while the rear area is more classic and has seats upholstered in a dark grey leather inspired by Harley Davidson jackets. This contrast reflects the double nature of the concept: racing car and luxury GT.

The dualism is also underlined by the availability of two operating mode: “race” which focuses on the driver by giving him all the important driving information, and “cruise” which focuses on comfort, integrates a soft, blue ambient light and allows all passengers to share information on the onboard screens.

The opening in the back of the rear row – a nod to some shooting brakes from the 1960s – enabled the designers to achieve the distinctive concave geometry of the seats.

The floor and carpets are finished in grey boiled wool (lana cotta), which creates an interesting mix of materials blending roughness with sophistication.

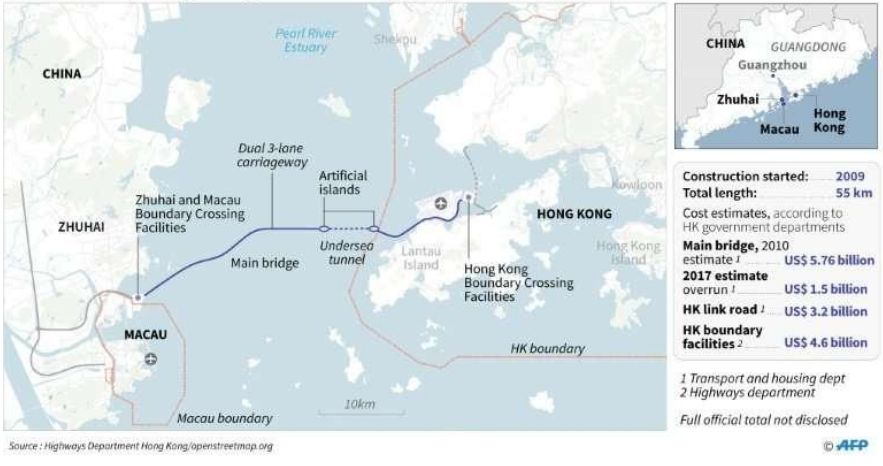
The cabin also showcase a theme based on the idea of floating elements: the front seats appear as suspended from the center tunnel, the rear headrests look like floating above the seats and the layered dashboard is composed of two distinct elements that rest on C-shaped

Edition
March 2018

A bridge so far: China's controversial megaproject

A bridge to somewhere: The project linking Hong Kong, Macau and mainland china is 55 kilometres long and contains enough steel to build 60 Eiffel Towers

The Zhuhai-Hong Kong-Macau bridge project



Touted as an engineering wonder, the world's longest sea bridge, which connects Hong Kong, Macau and mainland China, includes a snaking road crossing and an underwater tunnel and reportedly uses enough steel to build 60 Eiffel Towers.

Nine years after construction began on the 55-kilometre (34-mile) crossing, a preview organised by the Chinese government this week offered a first peek into the megaproject.
The bridge will link Hong Kong to the southern Chinese city of Zhuhai and the gambling enclave of Macau, cutting across the waters of the Pearl River Estuary.
Although the opening date has not been confirmed, officials expect the bridge to be in use for 120 years and say it will boost business by cutting travel time by 60 percent.

The 420,000 tonnes of steel used for the project represent 60 times the amount used in the Eiffel Tower, China's official Xinhua news agency said.

Gao Xinglin, the bridge's project planning manager, said the construction of the 6.7-kilometre underwater tunnel gave him sleepless nights.
"There were many nights where I couldn't fall asleep, because there were too many difficulties during the construction," Gao told reporters Wednesday.
"Linking the 80,000-tonne pipes under the sea with watertight technology was the most challenging," he added.

The total price tag for the project, which includes artificial islands, linked roads and new border-crossing facilities, is unclear but some estimates run to over 100 billion yuan ($15.1 billion), leading critics to slam it as a costly white elephant.
Opponents in Hong Kong say the project is part of Beijing's drive to tighten its grip on the semi-autonomous city.

Dogged by delays, budget overruns, accusations of corruption and the deaths of construction workers, the bridge failed to open by the end of 2017 as hoped.
There have also been safety concerns after 19 lab workers were charged over faking concrete test reports, with one man jailed last December.

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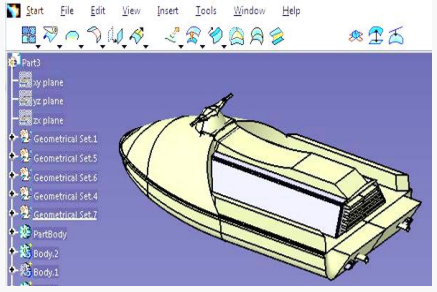
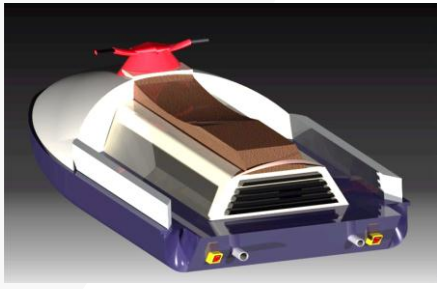
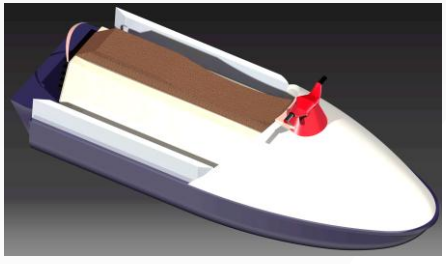
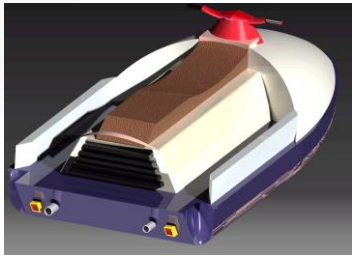
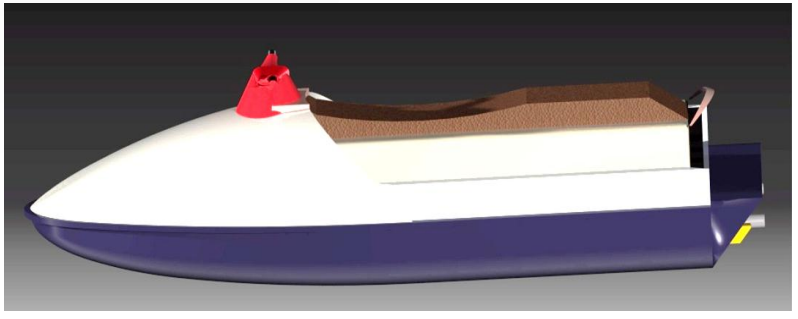
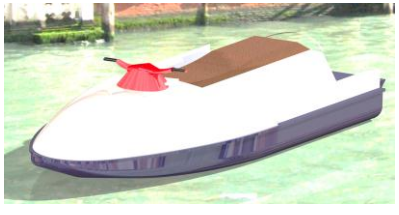
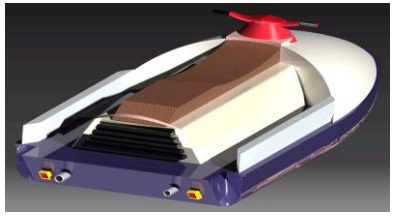
Student's Corner

DAuto Training Yield

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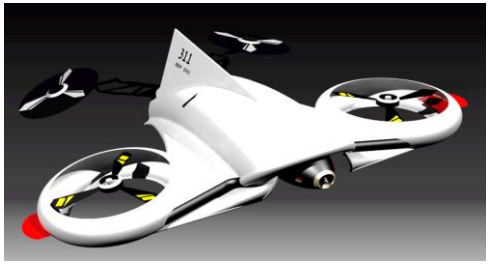
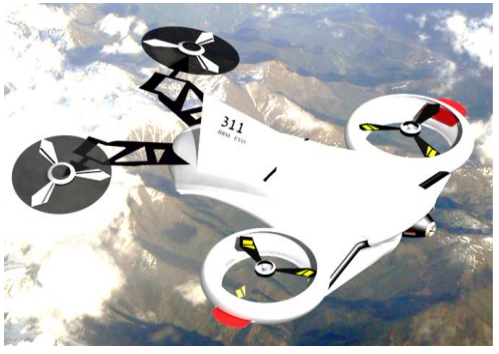
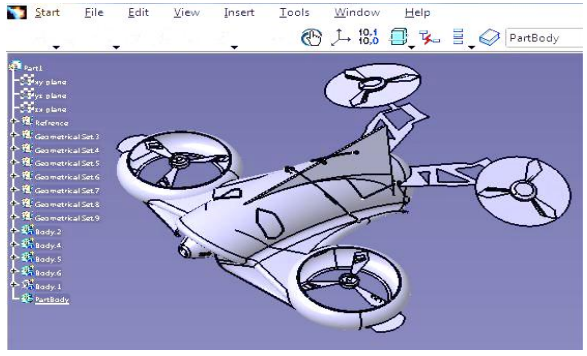
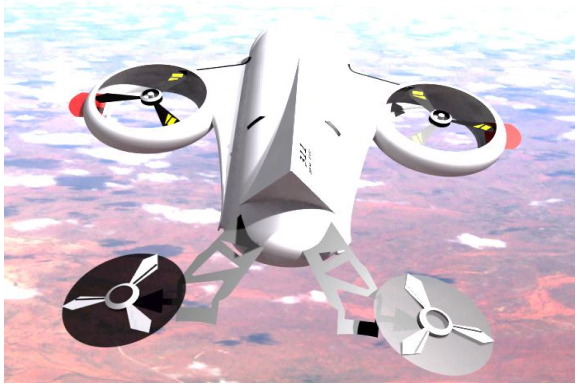


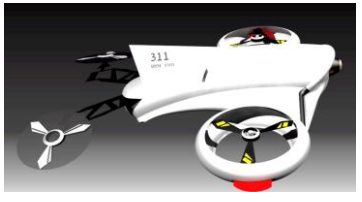

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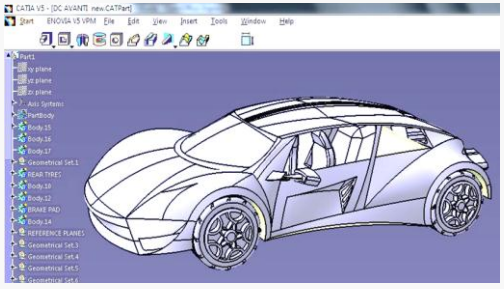
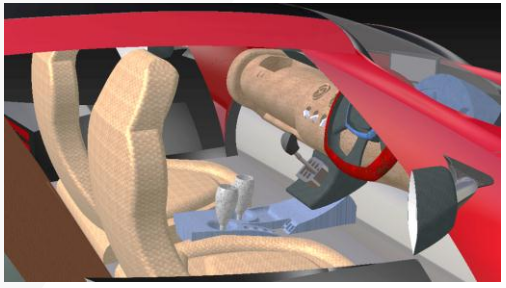

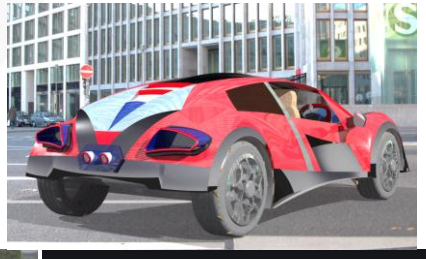

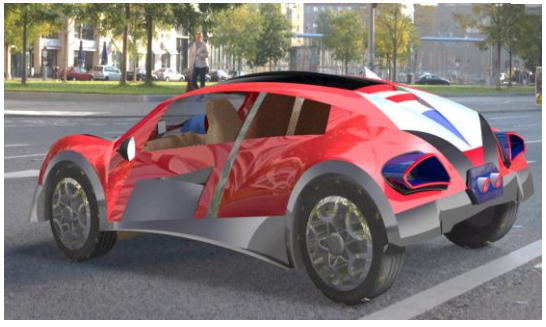

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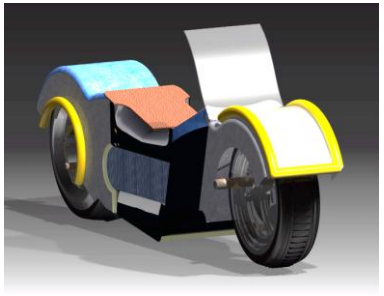
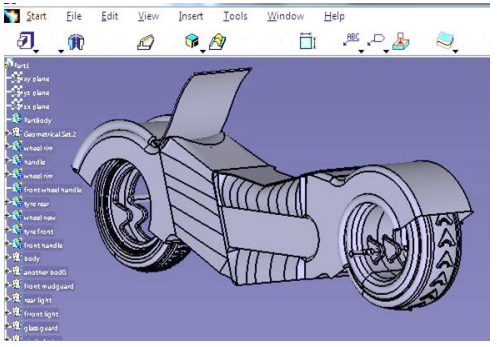
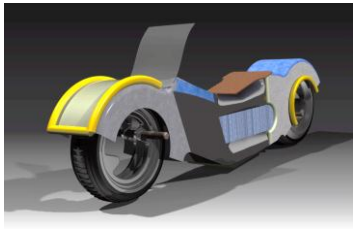
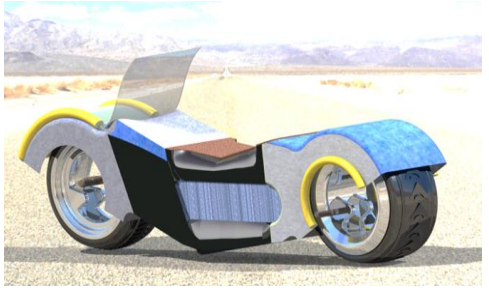
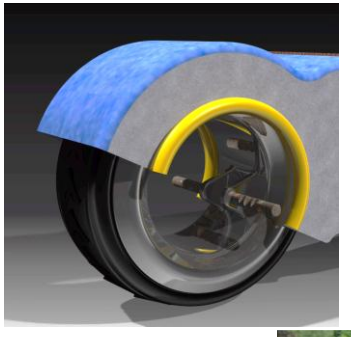
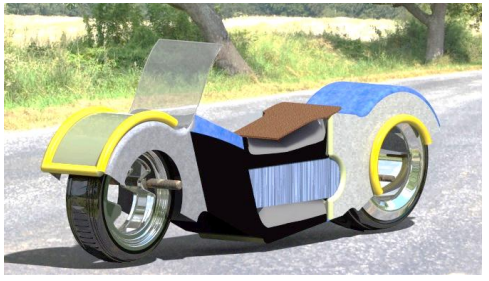
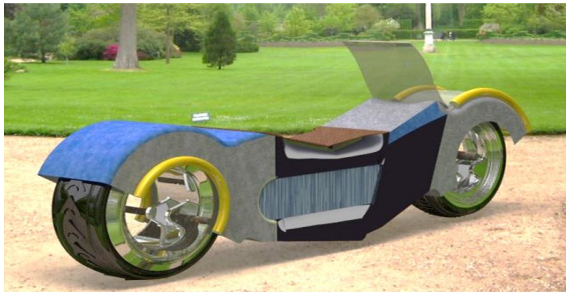

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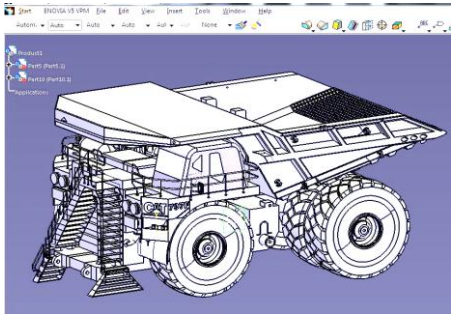

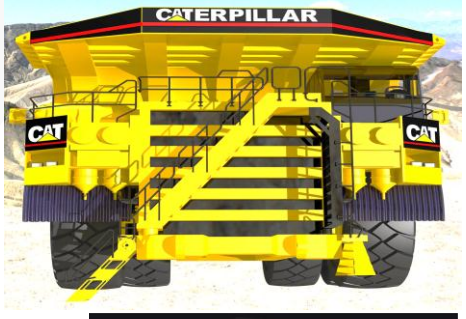

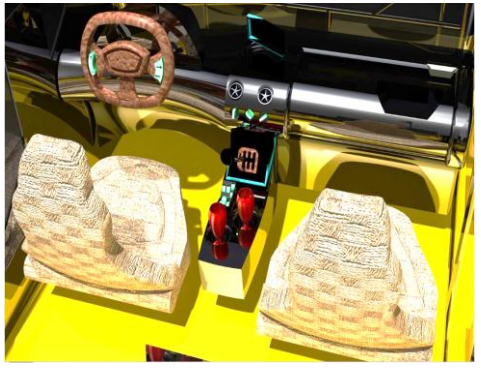

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“Never be satisfied with inaction. Question and redefine your purpose to attain progress”

Jeffrey K. Liker, The Toyota Way

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