Car boots: layers & drawers

Boxes instead of seats

The car boot of practically any car appears to be pretty low on the list of items the manufacturer considers important. The world of glossy, state of the art and high-tech design seems to come to a halt behind the rear seat. Designers at Audi, the German car manufacturers, were well aware that this part of the car had been neglected and that it could be put to much better use. Visique, a team of students at the TU Delft faculty of Industrial Design, were asked to develop an innovative concept.

by Joost van Kasteren

Headlight to rear light, roof rail to alloy wheel, every part has been given serious thought. Even under the hood you'll find that the modern car has been given the treatment by designers and stylists. The entire car? No, not quite. One part appears to have escaped the designers' attention, and that is the boot, that out-of-the-way hiding place of odds and ends. But things are about to change. Car manufacturers Audi have asked six students at the faculty of Industrial Design Engineering at Delft University of Technology to design a new car boot concept. The designers have come up with something a bit like a chest of drawers. The delicate and smart stuff goes at the top, and the dirty bits go at the bottom. Audi will use the concept for the development of future models.

In Hollywood productions it is the customary hiding place for dead bodies, or a load of machineguns. If you take your car across the Channel, you have to open the boot to show you haven't got a stowaway on board. The

car boot plays a major role in crime, both on the screen and in real life because its contents can be hidden from view. For most people however, it is simply the place where the paraphernalia of motoring accumulate: jumper leads, tool set, pocket torch, engine oil, jack, umbrella, plastic carrier bags, and all the other bits and pieces you might conceivably find yourself in need of in the event of a breakdown. It's not just the contents we tend to forget about. The boot itself has managed to escape the attention of car designers, manufacturers, and buyers for a long time. Its sole selling point appears to be how much space it offers. Can you put a wide-screen television set or an electric piano in it? Even an extended flat floor with the rear seats tilted forward will attract buyers. Ir. Menno Veefkind of the Design Engineering section: 'There is in fact no proper concept of a car boot. People simply haven't a clue how to make the boot more functional, and as a result it has been relegated to the bottom of the list in the design process. The only criterion is the number of suitcases that will fit into it.'According to Veefkind, who together with Ir. Ruud van Heur supervised the students of the Design 6 course, things are slowly beginning to change. Cars are becoming more multi-functional. Business drivers also use their car for pleasure trips and holidays, and as a result the space behind the rear seats is starting to excite interest.'Things are still moving very slowly', says Ir. Wouter Kets, designer at Audi in Ingolstadt (Germany), who graduated at the Delft faculty of Industrial Design Engineering some years ago. 'The design of a car interior usually starts at the dashboard, with the boot left till last. Growing mpv sales has drawn attention to the process of loading and unloading luggage, but the effect on the design of the car boot has been minimal.'

VIP ¶

To tackle the Audi design brief, a team was formed of students in their fourth and fifth years at TU Delft, who were asked to take on the assignment as part of the Design 6 class. The team consisted of Bertineke de Lange, Boudewijn Soetens, Julien Latul, Klemens Karssen, Lieke Ypma, and Pieter Kool. Together, they called themselves Visique, and in that capacity they spent a period of six months rethinking, discussing, and sketching car boot concepts, using the VIP method. VIP, which stands for Vision In Product development, was developed by Prof. Dr Paul Hekkert at the faculty of Industrial Design Engineering. In a nutshell, the method consists of «virtually» taking apart (destructuring) the product. In other words, looking at the interaction between the user and the product in the current context. The next step is to look at the changes that are taking place, or will be taking place. These changes can be technical or of a social-economic or cultural nature. The vision comes in when the designer visualizes the user/product interaction in the new context. Using this as a basis, he or she can then start to devise new concepts to incorporate the new interaction. 'The VIP method is eminently suited to the development of car concepts', supervisor Veefkind says, 'since a car is an evolutionary product, with changes — in technology as well as styling — taking place in small

As part of an initial analysis phase, Visique gave several test subjects a disposable camera to record the way they handle luggage in their cars. The subjects were also asked to complete a questionnaire.

To gain insight into various ways of using car boots, different user scenarios were visualized.

Shopping: From the supermarket shelves to the home; repeated loading and unloading, often involving several loose items.

Business: Good appearance and luggage protection; business suit and notebook computer.

steps. You cannot simply turn around a car's image in one go. If you did, you'd have no buyers left. vip enables you to push these gradual changes in the right direction.'

Understated sports image ¶
In practice, this meant that the students started by analysing the car boot and its functions. By looking through glossy folders and visiting car dealers, they tried to get an idea of the Audi design concept. The special focus was on the Audi Avant, an estate model.'We also took a wider look at luggage transport', Karssen adds. 'One thing we did was to compare the car and its boot with luxury yachts and caravans, since they involve the same kind of problem, albeit from a different angle. We also looked at the way people handle luggage.'Soetens: 'We gave a number of test subjects a disposable camera, and asked them to take pictures of their car and its boot. This was very useful for identifying different types of users. At one end of the spectrum you have very tidy people who keep a tidy car boot, and at the other end you have people who really turn it into a mess.'Armed with impressions and reports, the students sat down to their task of developing their vision of the user/product interaction in a new context. A major event was the visit to the Audi design team in Ingolstadt, Germany, where the students were given a presentation of the Audi designers' vision for the present and the near future. 'It showed us,' de Lange says, 'that Audi intend to shift to a slightly more sporty image, without affecting their position as a manufacturer of cars for business and executive use. You can see the same kind of thing in their commercials. There is one with a group of friends playing tennis in the snow. Even so, the sporty image is to remain properly understated, so no bulging spoilers or rows of headlights.'

Status is time ¶
During their brainstorming sessions about the user/ product interaction the trainee industrial design engineers used lots of images and keywords. 'Contrary to usual practice, design sketches are not called for at this stage of the proceedings,' Latul says, handling a large billboard. Having managed to manoeuvre the thing onto a chair without hitting any persons in the audience, he demonstrates what he means by this. The board presents a vision by means of a series of images and keywords. Or rather, some unusual word combinations, including «refreshing concentration», «status is time» and «physically clear». 'The «refreshing concentration» combination is intended to express the idea that although people are looking for a sporty ride in their car, they also want to be able to relax in it', Latul explains. 'It's a bit like a brisk walk. It is physically tiring, but mentally refreshing. Driving your car should also be mentally refreshing.' To achieve this, according to the industrial design students, a product must be «physically clear». This concept is illustrated by a picture of a shoehorn. Karssen: 'The purpose of a shoehorn is immediately clear. The same might be expected from a product like a car. So no endless rows

Leisure & sports: Large objects, such as a mountain bike; splattered with dirt and mud.

Home & garden: Again, transport of larger objects involving; soil and moisture, but also such items as IKEA furniture in flat packs.

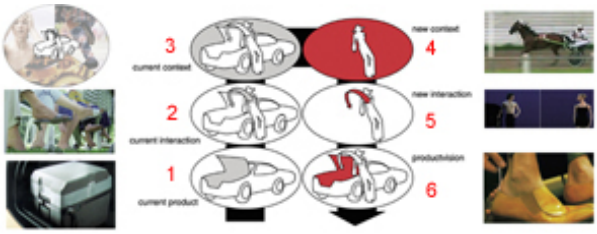
Holidays: The moment of the year when a car has to carry lots of people and lots of luggage (perhaps including the dog).

of buttons you keep having to look up in the manual, but straightforward, noiseless communication between man and machine.' Finally, «status is time» goes with a picture of a relaxed person taking a walk. According to de Lange, this expresses that 'in the future, your status will depend less and less on the amount of money and possessions you have, and more and more on the extent to which you can call your time your own, to do with as you please.'

The trend: individualisation ¶
To bring the vision to life, the students used the images and keywords in a short film which they showed to the Audi designers. 'The presentation was a huge success', Soetens says, 'especially the image of a horse and sulky captioned «people drive alone». Our association in this case was individualisation, the trend that people increasingly tend to rely on themselves. However, to some of the Audi designers, the combination conjured up images of sport, speed, and a sense of purpose. That does not make our presentation a failure, far from it, since the images and keywords sparked off a lively discussion, which was the whole object of the exercise.' It was decided that a number of different concepts would be developed. The next step was to gather together a dozen people, all designers with experience in the automotive sector or within or near the TU Delft. The brainstorming session was led professionally by industrial designer Guy Hafkamp, founder of the Creativity Company. 'During that meeting,' Soetens recalls, 'we managed in a short time span to translate a vision into a number of idea sketches.' These ideas were then clustered according to the degree in which they would affect the existing interior and exterior of the car. The less they affected these, the more useful the ideas would be to Audi. In addition a number of scenarios were developed for using the car boot. The Lange: 'A businessman for example wants to tuck his lap-top computer and his raincoat safely away in the car, adding perhaps a clean shirt. Someone using the car for recreational purposes wants to put away his trainers, or a sweaty T-shirt after a game of squash. If you take the car out to do your shopping, you need a place to stow all those bags, and come Christmas you might want to carry a tree. These are all very different functions, even in an emotional sense, and the car boot as we know it does not provide the right solutions.'

Concepts ¶
What struck them was that the bringing together of product ideas and scenarios hardly led to any discussions within the design group. According to Karssen this was because the students went through the process of vision development together. 'Normally, you would put together a programme of requirements that your design is expected to meet', Karssen explains. 'This applies to buildings and bridges as much as to products. The programme of requirements and the filling in of its details often are the subject of tough battles. We on the other hand started by developing a vision, and as a result we all had roughly the same idea of the direction we wanted to go in. Whereas the

After an extensive analysis of the Audi company, lifestyles and trends, the interiors of other car makes, and more, Visique used the VIP method developed at TU Delft to develop their own vision of luggage handling in future Audi models. The VIP method follows six steps to lift the current situation to a higher level of abstraction leading to the development of a new vision of the future.



1 Describe the current product in qualitative terms, e.g. «incoherent», «non-distinctive». 2 Describe the interaction with the current product in associative terms, e.g. «respectfully firm», «reserved». 3 Describe the context (environmental factors) for the current user/product relationship as it appeared at the time the product was created. 4 Visique developed a new context for luggage transport in 2009 by extrapolating social trends, design directions indicated by Audi themselves, and Visique's own vision. The result was expressed in one-liners such as 'People drive Alone' and 'Status is Time'. 5 From the new context a new interaction was developed. This was also expressed by means of illustrated statements such as 'Refreshing Concentration' and 'Noiseless'. 6 A new product vision was then developed, expressed in properties such as 'Equipment rather than Solutions' and 'Physically Clear'. These point in the direction the newly developed product should take.

Concept 1

For each of the concepts a number of images were shown evoking associations with certain lifestyles. The 'Delicate business vs Dirty Sports' concept was developed for the business use/sports combination. The luggage compartment requirements vary considerably. The challenge lay in integrating these applications in a single car boot.

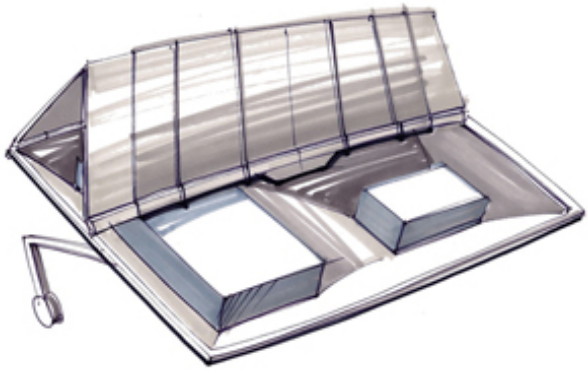
purpose of the programme of requirements is mainly to keep the design process in check — are you still on the right track? — a vision is more of a direction control mechanism. A programme of requirements stimulates the bean counter's mind; a vision stimulates creative processes.' The clusters of product ideas and the scenarios were then combined to form the basis for three design concepts: 'Delicate business versus dirty sports', 'Useful volume', and 'Dynamic driving, flexible layout'. In the latter concept, luggage is stowed in a box that can switch places with any of the passenger seats. The layout of the car has been made flexible through the use of rails along which the seats and the luggage box can be moved through the car's interior. Latul: 'The idea is that since most people travel alone in their car, you could shift the front passenger seat along its rails to the rear, and move the luggage box to the front to sit alongside the driver, who would then have everything he needs close at hand.' This design didn't make it to the next stage, mainly because sliding the seats to the rear would mean having to raise the roof line, which would make the car look too much like an mpv, which is not what you want when you're looking for an understated sporty image. The second design concept, 'Useful volume', involved making maximum use of the space in the car boot. Besides maximizing the luggage capacity, the hatchback door is as large as possible. By incorporating the rear lights in the hatchback, the loading aperture is large enough to admit even a washing machine. To prevent luggage and shopping rolling about in the back, collapsible semi-transparent screens can be pulled up from slots in the boot floor. This concept did not make it either, because, as de Lange explains, maximizing boot volume in a car is not what Audi is associated with. What's more, the extended hatchback would have its impact on the car's exterior.

The design comprises four layers: clean at the top, dirty at the bottom.

Business sports ¶

The concept the Audi designers considered most suitable for further development was the first on the list, 'Delicate business, dirty sports'. The great thing about this concept is that both the business and the sports image that Audi wants to convey, are expressed in the car boot concept, which separates the different types of luggage, from clean shirt to dirty trainers, into different layers. The result is that you can take a lap-top computer or a file folder from the car boot without having your groceries or sports kit in full view. With its horizontally separated layers, the car boot is a bit like a chest of drawers. The top drawer or box is attached to the roof with an ingenious system. Pressing your elbow against a frame causes the rear window to open upwards so you can take out the drawer. It is not a thick layer, for it must not block the driver's view through the rear window, but it will easily take a clean shirt or a raincoat. The second drawer is the protective layer, with room for a lap-top computer, a camera, or an apple, i.e. all the objects most motorists leave lying about on the rear shelf. The protective layer has a flexible bottom and a hard top shell. The shell presses the contents into the

The top layer is formed by a removable suitcase that can carry a business suit and clean shirts in.

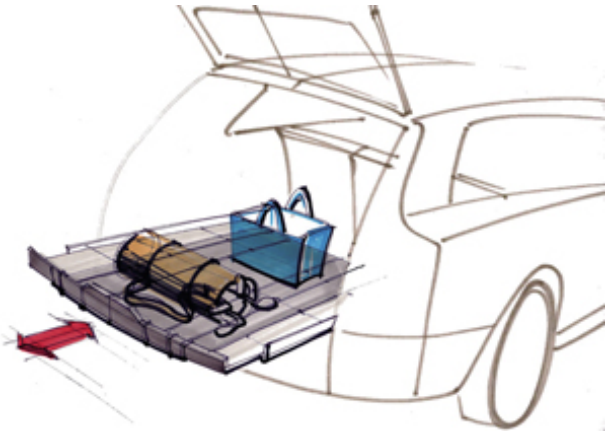


flexible layer without damaging them, so they cannot slide around. The shell opens upwards to make the contents accessible through the rear window. If necessary, the entire protective layer can disappear into the back rest of the rear seats. Provided it is empty, of course.

Fix ¶
The entire hatchback door can be opened by pressing your hip against a pressure strip, the way a waiter carrying a stack of places opens the door to the kitchen. Behind the hatchback door is the bulk layer, which is simply the normal car boot in which groceries, children's seats, and other stuff can be stored. The floor can be extended to make it easier to put things in the boot. The original idea was to have the floor folds back to create a single large volume together with the bottom layer. As the details of the concept were worked out however, the students decided to have the floor panels fold sideways. Another difference between the concept and the detailed design is that the floor of the bulk drawer contains the flexible screens from the «useful volume» concept that can be used to stop items of shopping rolling about in the back. De Lange: 'The people at Audi thought this was such a good idea that they asked us to include it in this concept.'

Goodbye, spare wheel ¶
Right at the bottom of the new car boot is the dirty layer for muddy football boots, sweaty T-shirts, and things like skid chains, jumper leads, engine oil, and coolant, insofar as these are still required in a modern car. The drawer is made from rigid plastic and aluminium. As a nice detail, the bottom contains drainage holes so you can hose it down. In countries that still require a spare wheel to be carried, this object can also find a place inside the dirty layer. However, the industrial design students expect the spare wheel to be on its way out, to be replaced by so-called run-flat tyres that will let you drive on for another few hundred kilometres, and vulcanising sprays that can be used to repair punctures. The dirty layer slides out when you kick one of the pressure strips integrated into the rear bumper. 'The different ways of opening the layers, using the hand or elbow for the upper two, and the hip and foot for the lower two, emphasise the different uses of the various layers', Soetens says. 'Clean up top and dirty down below.'All the layers can swing away to create a single large carrying space for things like a Christmas tree. Take one with a root ball if you like; the dirty layer can simply be hosed down afterwards. According to Wouter Kets, Audi found the approach of the students very refreshing. 'Several components of the car boot concept are certain to find their way into the new Audi models,' he surmises, 'although introducing the entire concept in one go might be taking things a bit far. If it happens, it will be in a concept (prototype??) car for us to let our imagination run wild with.' Audi clearly enjoyed the way the industrial design students entered into the collaboration. 'They did things very professionally, both in managing the project and in setting up their presentation. The added bonus is that they brought a

The second layer is the protective layer, which accommodates such things as a notebook computer, camera, packed lunch, umbrella, etc.



The extensible luggage floor forms the third layer, which is intended for groceries, golf clubs, etc.

The bottom layer consists of a hard-wearing rigid plastic shell in which dirty sports kit, hiking boots, as well as skid chains and engine oil can be stored.

Concept 2

fresh way of looking at things, which is good as it forces us to look at our own work with a different mind set.'

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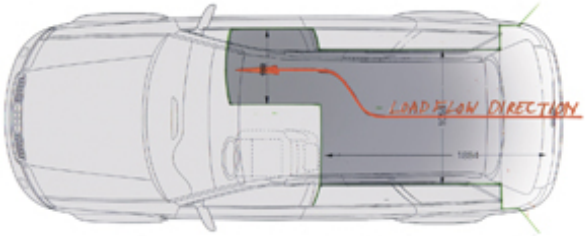
The 'Useful Volume' concept was developed primarily with shopping and leisure activities in mind. The aim was to create the largest possible luggage space («largest diagonal») by «designing out» all unnecessary elements in the boot space.

The fully stripped car boot, finished in hard-wearing rubber and aluminium strips that continue up the back rest of the rear set. Semi-transparent collapsible screens extend from these aluminium strips to separate the items in the boot and hold them in place.

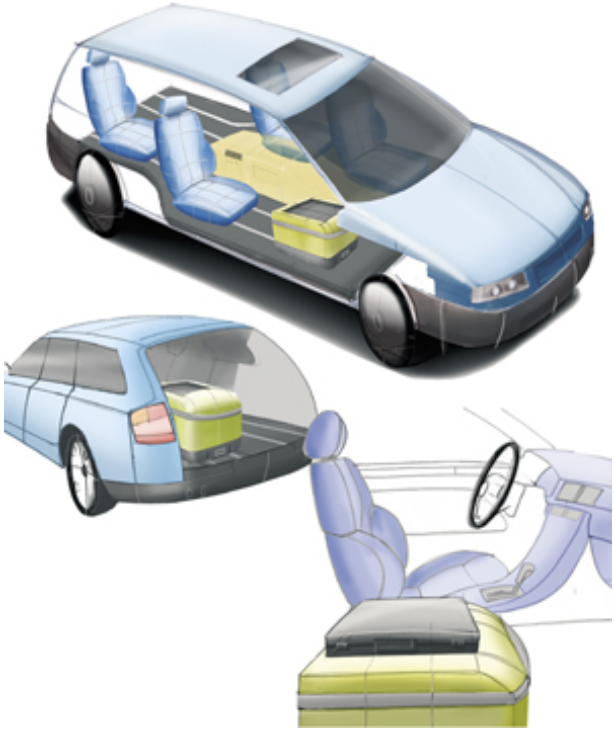
The rearmost section of the boot floor can be dropped to create space for even larger objects. The rear lights have been incorporated into the hatchback door to maximize the loading aperture.



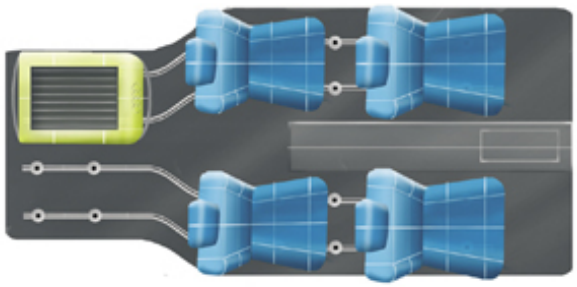
The front passenger seat folds down to provide room for long objects.

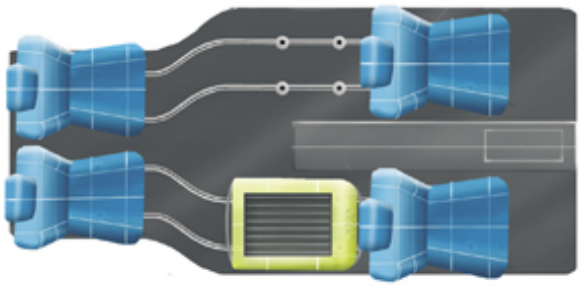
Concept 3

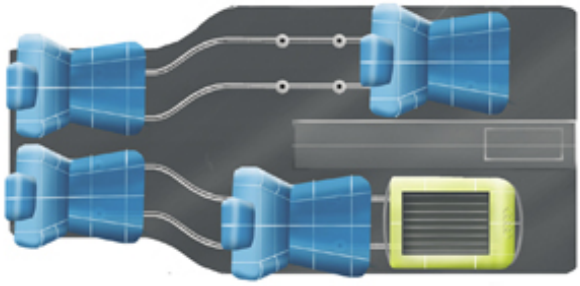
The ‘Dynamic Driving, Flexible Layout’ concept focuses on the knowledge that most people travel alone in their car. At the same time, it should be flexible enough to make it suitable for other user scenarios.



The concept features a flexible interior with movable seats and a luggage box than can slide around to any of several positions inside the car, including next to the driver.



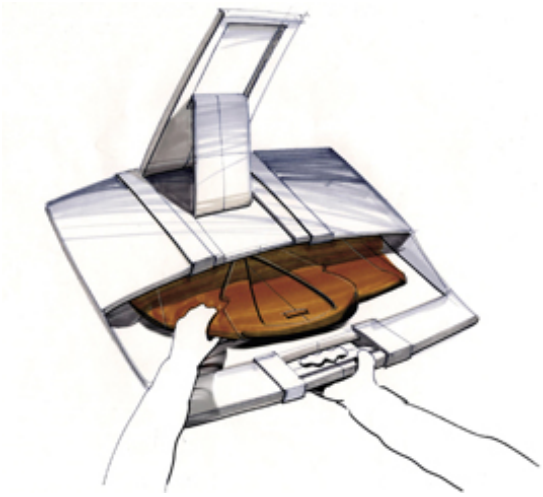


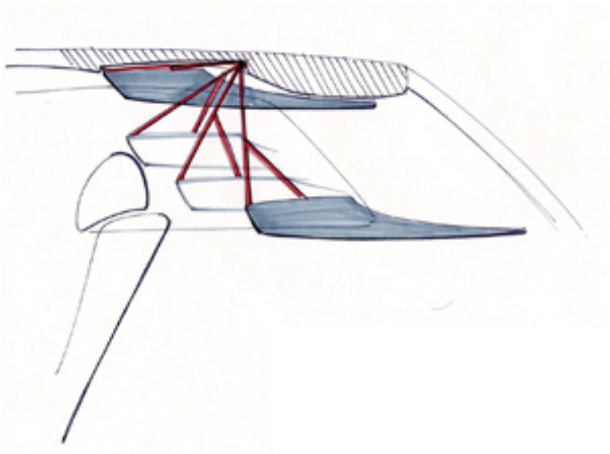


The seats and a removable luggage box can move around on rails to make the car suitable for entirely different scenarios, from family holidays to chauffeur-driven back seat office.

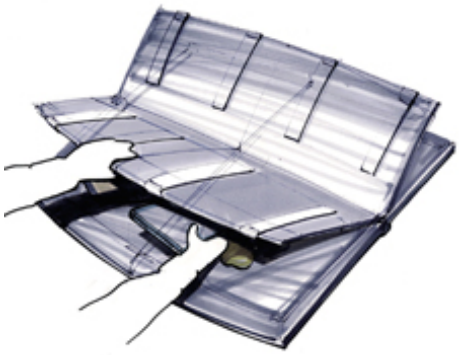
Detailing of concept 1

The supervisors in Ingolstadt really went for the first concept, which they thought fitted in well with Audi's own developments. So this concept was developed further during the last stage of the project.



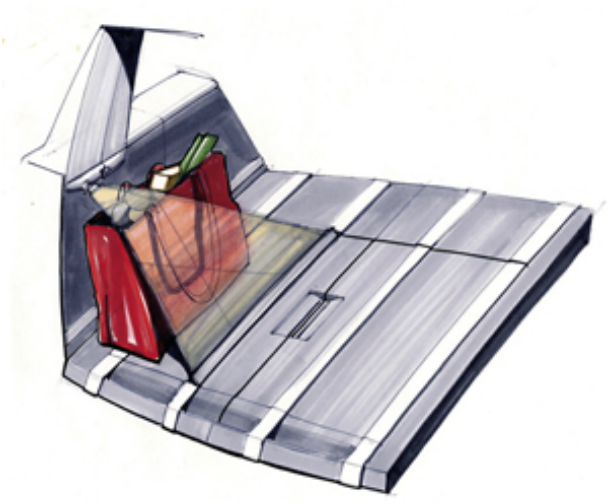


The original concept of a removable suitcase was developed into a semi-open storage space. An ingenious mechanism allows this wrinkle-free zone to swing down so that things can be loaded into the boot. The system is no longer removable, since this was considered a non-essential addition.



The protective layer consists of a rigid top shell over an elastic bottom layer, with the luggage held in place between the two. If the layer is in the way, it can be folded away into the back of the rear seat.

If the dirt-proof drawer space is needed for larger objects, the protective layer can be folded into the rear set, and the extensible floor folded sideways. A small consumer survey at the Amsterdam Motor Show conformed Visique's suspicion that flexibility was high on the list of the proposed target group.



The Audi designers thought the collapsible luggage screens from the 'Useful Volume' concept were useful enough to have them integrated in the extensible luggage floor of this concept.

The design of the dirt-proof drawer had to work around the space restrictions imposed by mechanical systems such as the exhaust and four-wheel drive systems.

Visique also thought about how to access all that boot space. The rear window, the hatchback door, and the dirt-proof drawer can be opened by simply pushing against the relevant body part when the car is unlocked.

Za P P W aR K