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STUNT PERFORMERS

The best action and adventure movies are successful thanks to the work of highly trained men and women who are prepared to take enormous risks to create spectacular scenes. And, as you might expect, in the *Fast & Furious* franchise these professionals play an outstanding role. It's time to take a closer look at the incredible work of the stunt performers.

Right at the start of *The Fast and the Furious*, the director Rob Cohen surprises us with a thrilling sequence in which a group of sports cars surround a heavy truck. One of the people in the car at the front of the unusual convoy shoots a kind of harpoon at the truck's windshield and jumps inside the cab as all the vehicles speed down the highway. The images of this robbery on wheels tell us that we are about to enter a hugely exciting world.

Shooting this kind of scene requires the participation of people highly qualified to take such considerable risks. The star of a film may be fit and drive very well, but no director would ever allow them to shoot a scene as risky as the one just described, as an accident could endanger the lives of the crew and cause delays in the shooting schedule, and even its cancellation.

JUMPING FROM A MOVING VEHICLE

For this reason, to make *The Fast and the Furious*, the director wanted to surround himself with some of the best stunt performers in Hollywood action movies. As team coordinator and second unit manager (the one that usually shoots the action sequences) he hired Mic Rodgers, a legend in this profession, who was then already well known for having taken part in a whole host of movies. A long list of professionals joined his team. More than 50 men and women worked as stunt performers during the filming. Thanks to their skill and enormous courage, the results of the action scenes were simply spectacular.

There can be no doubt that the car races in the streets became one of the central themes of the franchise. Of course, the trickiest moments in these races were performed by stuntmen and women, capable of doing turns and very

Jumping from a moving vehicle or racing along the edges of vertigo-inducing precipices: the stunt performers of *Fast & Furious* never cease to surprise us due to their infinite recklessness.

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The female characters in the franchise are no slouches when it comes to performing very dangerous action scenes. In the picture, Gal Gadot hanging from the outside of an SUV.

risky maneuvers at top speed. Their presence was also essential for that incredible moment when Dom and Brian – in their respective cars, the legendary Dodge Charger R/T and the Toyota Supra – try to catch up with Johnny Tran's motorcycle riders who have shot Jesse. Some of the steepest hills in Los Angeles allowed the cars to literally fly.

Despite the fact that both the races and the chases in *The Fast and the Furious* leave you breathless, there is a sequence in the film to make even the most courageous person's hair stand on end. It is the last truck heist carried out by Toretto's gang. As usual, the burly Vince is given the job of jumping from Dom's car into the cab of the truck that has been targeted. But this time, it turns out that the truck driver is armed with a shotgun and he begins to attack. To protect himself, Vince tries to hide behind one of the doors of the cab, but the harpoon wire leaves him attached by the wrist to the wing mirror. The situation could not be more thrilling: as the cars hurtle down highway 86, the truck driver shoots again and again at Vince, who has literally been left hanging.

THE RESCUE OPERATION

Dominic Toretto brings his car alongside the truck to enable Vince to jump, but as he is trapped by the wire he can't escape. Letty tries to do something at the wheel of her own vehicle, but she crashes off the road spectacularly. When Toretto's vehicle is also knocked out, Brian, who was trying to stop the heist, eventually comes to the rescue accompanied by Mia.

After placing his car next to the truck door where Vince is hanging, and removing the roof, Brian asks Mia to take the wheel. In this way, he gets out of the car and jumps riskily on to the truck. Dodging the bullets from the driver's shotgun, Brian manages to free Vince.

Explosions, extreme chases, incredible acrobatics … Despite the fact that the actors perform many action scenes themselves, the franchise demands the presence of qualified stunt performers.



Debbie Evans

She is virtually a permanent presence in the *Fast & Furious* franchise and she has shown that a woman can go as far as a man in a tough job like being a stunt performer. Born in Lakewood, California, she learned to ride motorbikes aged just six and it was not long before she was being mentioned as one of the best riders in the USA. After a long career as a professional racer, she entered the world of the movies and TV, taking part in legendary series such as *Charlie's Angels and Knight Rider*. Rob Cohen hired her to act as Letty's double in *The Fast & and the Furious*, where she stood out more than anything for the very dangerous maneuver in which she passes underneath a moving truck in a sports car. After that, she became a key part of the franchise, working in six of the eight feature-length movies released to date. Despite her proven skill with motor vehicles, Debbie never tires of warning us of the risks involved with cars. "The most important thing is to be aware that you are driving and to be ready to make a split-second decision."

THE MIC RIG

When the sequence ends the audience is electrified. The tension could not be greater because it is obvious that the images were filmed for real, without using digital trickery of any kind. But how? The death defying stunts that the franchise has become known for are thanks in part to the skill of the team of stunt performers, led by Mike Justus and Chris Tuck. A large part was also due to the inventiveness of the stunt coordinator Mic Rodgers, who even made an interesting contribution to the film industry in order to make it possible to film this entire sequence in the safest possible way: a ground-breaking device designed by him and nicknamed the Mic Rig. This ingenious invention allowed the actors themselves to do many of the action scenes without running any risks. They really loved the idea of being able to get personally involved in these sequences and they followed the instructions given by the team of stunt coordinators to the letter at all times.

In the movies, action scenes involving moving cars were traditionally filmed using vehicles that had a crane attached with a mounting for the camera and which offered very limited maneuvering capability. On the other hand, the Mic Rig was designed so that the main car could compete with a fast car in both speed and maneuverability. "The Mic Rig is a great advance for film directors," says Rodgers, "it's basically a long truck with a platform on which the car that appears in the shot is mounted. This platform is placed much lower down than that of the vehicles that were used traditionally, which means that the car being filmed really does seem to have its wheels on the ground."

PRIZE-WINNING RISK

When *The Fast and the Furious* was released, everybody agreed immediately about the movie's outstanding action scenes. For this reason, no one was surprised when Rob Cohen's film became the big winner on the night at the second edition of the World Stunt Awards, a prestigious awards ceremony aimed at highlighting the work of the stunt performers. It won a total of four awards: the best work with a vehicle, the best driving, the best action scene performed by a stuntman and the best action scene performed by a stuntwoman.

The bar was placed very high and paved the way for the following movies in the franchise, which always tried to surprise the audience again with something "even more difficult". However, back then not even the boldest fan could have imagined the extraordinary acrobatics that we would be seeing in the *Fast & Furious* franchise.

Along with his buddies, Ludacris, in his role as Tej Parker, took part in an amazing car chase over the snow and ice of Iceland.





THE EVOLUTION OF THE LOGO

The logo is one of the most important aspects of a brand. It allows its customers to identify its products and, as it is present on both the vehicles and the advertising material, it consolidates the firm's image. Throughout the company's history, Dodge vehicles have used several logos - all very different.

Evolution of the brand's logo from the first one to the current one.

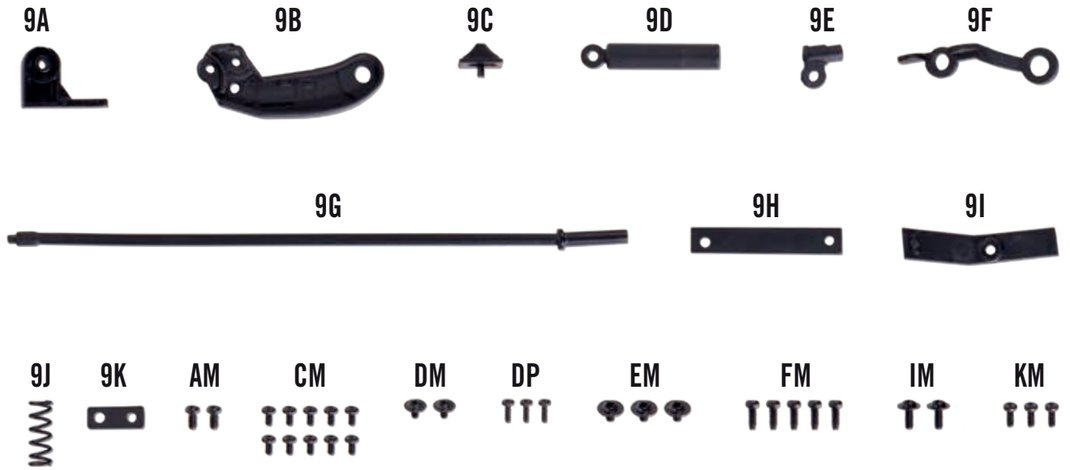
The first Dodge automobiles had a round badge with a three-pointed star on top of the radiator, which contained the initials DB (Dodge Brothers), until 1939. Before that, in 1932, the sculpture of a ram about to charge had appeared as the radiator cap. This animal would become a Dodge icon. After 1941 a coat of arms was adopted, in theory of the surname Dodge, with black and gold horizontal bars crossed by a vertical red stripe on which the name of the marque appeared and, in other cases, just a letter O. Until the 1980s, it existed along with one in the form of a double boomerang and another with three arrows forming a three-pointed star. They all disappeared in 1982, when the brands in the Chrysler Group (Chrysler, Plymouth and Dodge) adopted a five-pointed star inside a pentagon. To distinguish itself from Chrysler and Plymouth, whose badge was blue, Dodge brand used red. A decade later, the ram's head reappeared on a new badge. The Dodge company used it until the subsidiary RAM left, which took it along with the pick-up trucks and vans. The current Dodge logo is the name of the brand with two diagonal red stripes at the end.



FRONT RIGHT SUSPENSION AND THE CHASSIS

In this stage you will continue to assemble the front right suspension and the elements that make up the front section of the chassis.

PIECES FOR THIS STAGE



9A	Torsion bar bushing	9H	Cover plate (1) front right chassis strut	DP	Screw 1,5 × 4 mm, (x 3)*
9B	Front right suspension arm	9I	Cover plate (2) front right chassis strut	EM	Screw 2 × 3 × 6 mm, (x 3)*
9C	Shock absorber travel limiter	9J	Spring	FM	Screw 2 × 5 mm, (x 5)*
9D	Shock absorber piston	9K	Right engine support	IM	Screw 2 × 5 × 5 mm, (x 2)*
9E	King-pin	AM	Screw 2 × 4 mm, (x 2)*	KM	Screw 1,7 × 4 mm, (x 3)*
9F	Front right knuckle arm	CM	Screw 1,7 × 3 mm, (x 10)*		
9G	Front suspension torsion bar	DM	Screw 1,7 × 3 × 5 mm, (x 2)*		

* Some of the parts are spares.

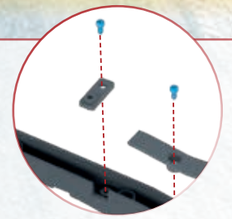
Editor's note: The parts shown here may differ slightly from the parts supplied with this issue. This does not affect the quality or the assembly instructions in any way.

ASSEMBLY AREA

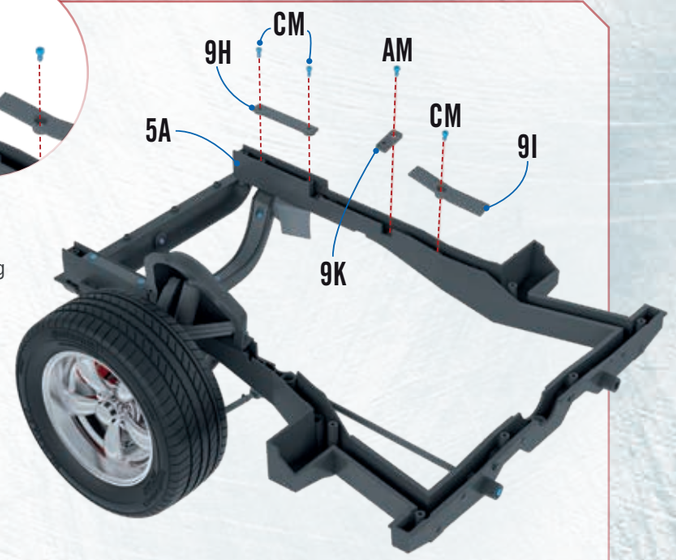


BRAKE AND FRONT RIGHT SUSPENSION

Front right suspension and the chassis

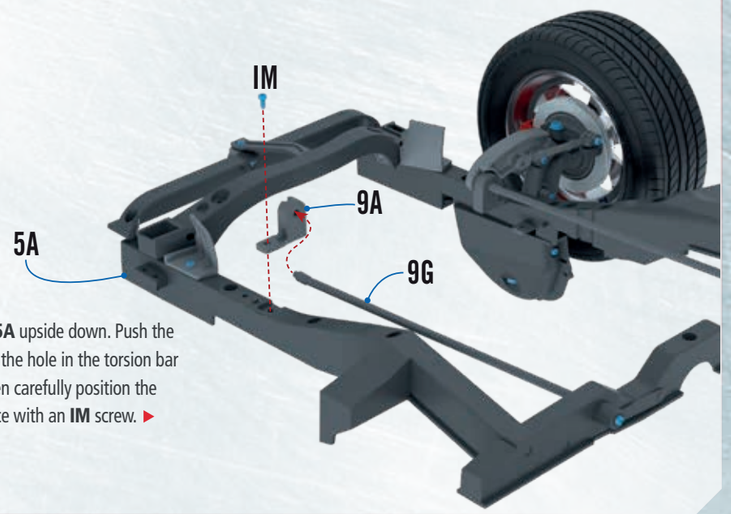


9.1 **TAKE** the front section of the chassis and position cover plate (1) **9H** on the front right strut of the chassis **5A**, with the smooth side of the cover plate facing upwards. Attach the cover plate to the holes provided, using two **CM** screws. On the same side of the chassis **5A**, locate the the engine support plate **9K** into the rectangular recess in the strut. The hole with the flange must be facing upwards, as shown in the illustration. Attach the piece with an **AM** screw. Position cover plate (2) **9I** onto the chassis, with the smooth side facing upwards, and fix the piece in place with a **CM** screw. ▶



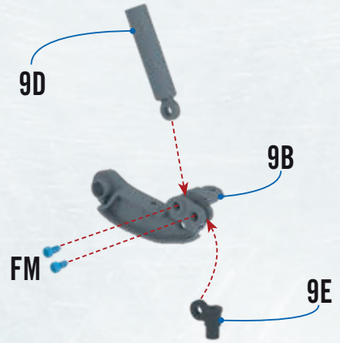


9.2 **CAREFULLY** insert the wide end of the torsion bar **9G** into the hole in the right side of the crossbeam of the chassis **5A**. Attach the torsion bar with a **DM** screw through the crossbeam and into the end of the bar. ◀

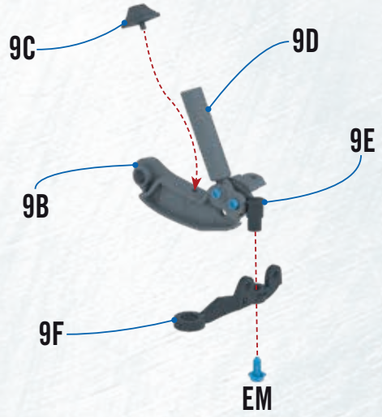


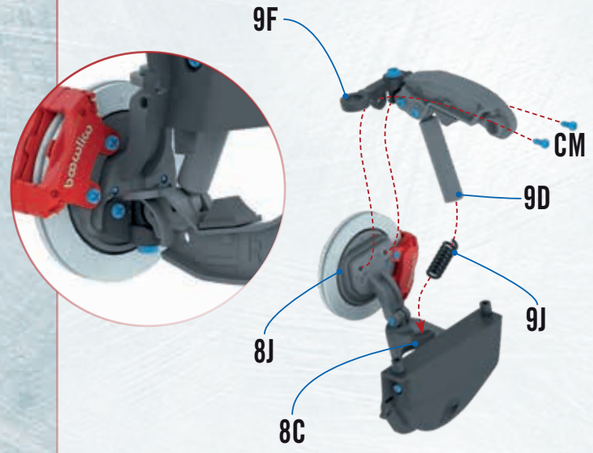
9.3 **TURN** the front section of the chassis **5A** upside down. Push the other end of the torsion bar **9G** through the hole in the torsion bar bushing **9A**, as shown in the picture. Then carefully position the bushing **9A** over the slot in the chassis and fix it in place with an **IM** screw. ▶

9.4 **POSITION** the king-pin **9E** mounting ring between the jaws of the front right suspension arm **9B**, as shown, and fix it in place with an **FM** screw. Then insert the mounting ring of the shock-absorber piston between the jaws and fix it in place with another **FM** screw. ▼



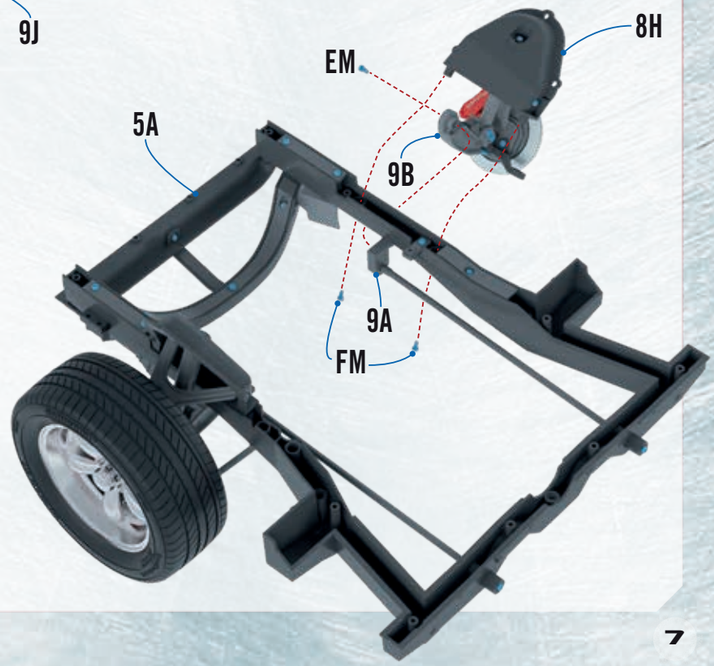
9.5 **INSERT** the pin on the travel limiter **9C** into the hole on the upper part of the suspension arm **9B**. Put the king-pin **9E** into the smaller hole in the front-right knuckle arm, and fix in place with an **EM** screw. Take special care to copy the position shown in the picture. ▼



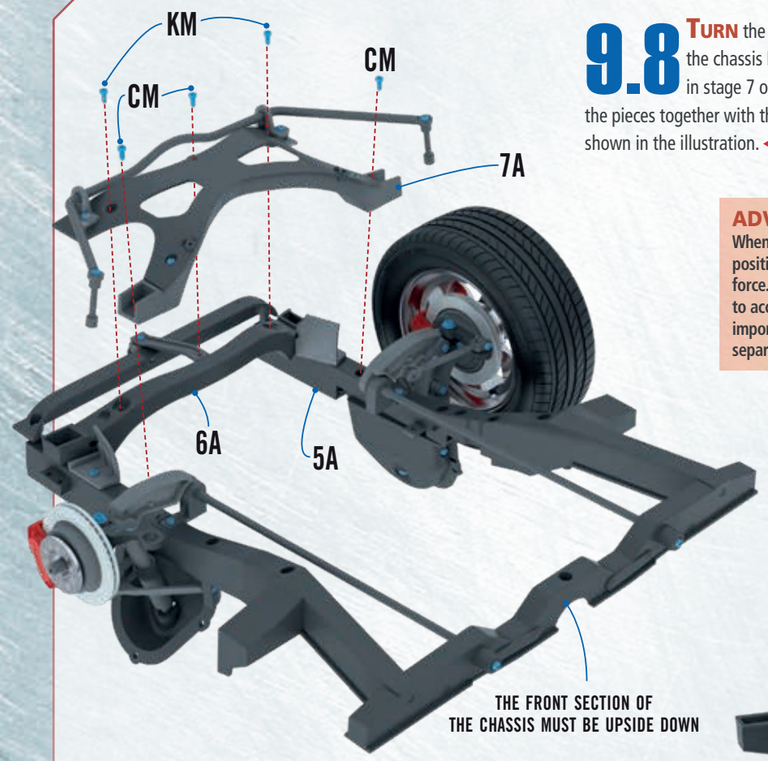


9.6 **GET** the pieces you assembled in stage 8. Insert the spring **9J** into the shock absorber cylinder **8C**, followed by the shock absorber piston **9D**. Then align the two small holes on the knuckle arm **9F** with the corresponding holes on the spindle plate **8J** and join them with two **CM** screws. ◀

9.7 **MOUNT** the assembled right suspension onto the right side of the front section of the chassis **5A**, inserting the locating pins on the spring mount **8H** into the holes in the middle of the strut. Attach the assembly to the chassis with two **FM** screws, inserting them from underneath. Align the front right suspension arm **9B** with the torsion bar bushing **9A** and fix them in place with an **EM** screw into the end of the torsion bar. ▶



Front right suspension and the chassis

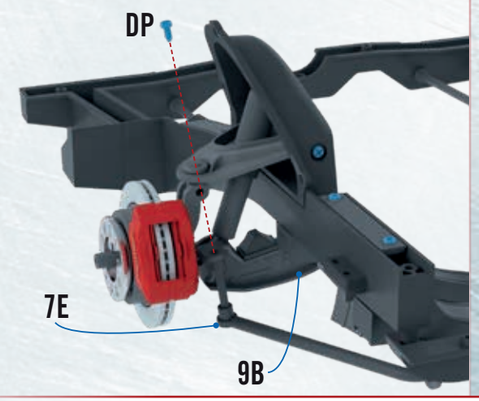


THE FRONT SECTION OF THE CHASSIS MUST BE UPSIDE DOWN

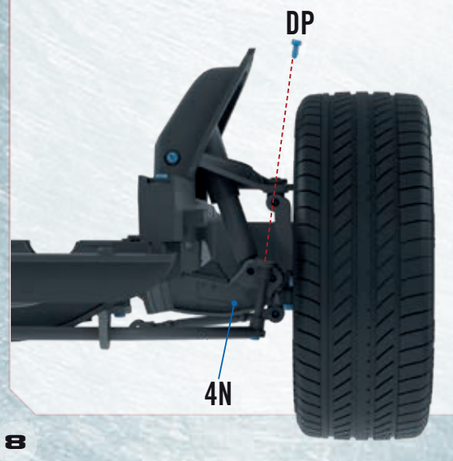
9.8 **TURN** the front section of the chassis **5A** upside down. Position the chassis K-member **7A** and the anti-roll bar **7D** you assembled in stage 7 onto the front crossmember **6A**. Align the holes and join the pieces together with three **CM** screws and two **KM** screws, using the holes shown in the illustration. ◄

ADVICE FROM THE MODEL MAKER:
When assembling the parts, try not to rush the work. Initially, just position them lightly, and observe how they fit together without force. By presenting the parts carefully first, you will find it easier to accurately screw the assembly together later. This is especially important for the press-on parts which will be more difficult to separate if they are assembled incorrectly.

9.9 **TURN** the chassis back over and, on the right side, align the end of the anti-roll bar link **7E** with the free hole in the suspension arm **9B**. Join the pieces together with a **DP** screw. ▼



9.10 **REPEAT** the procedure illustrated in step 9 for the left side of the chassis. Attach the anti-roll bar link **7E** to the suspension arm **4N**, using a **DP** screw. ▼



STAGE 9 FINAL RESULT

This illustration shows the various parts attached to the front section of the chassis: the suspension units, the anti-roll bar and the chassis K-member.



WHEELMANIA: ALL THE SECRETS OF ALLOY WHEEL RIMS



When speaking about tuning, it is impossible to overlook alloy wheel rims. Since they are the easiest and fastest way to change the look of a car, they are the first step taken when customising any model.

There are many makers of alloy wheel rims on the market offering a virtually infinite number of models with a wide variety of designs: concave, black, multi-radius, five-spoke, mesh, with rim grooves … It's really hard to decide! They are not chosen just for reasons of personal taste, however, certain technical characteristics also have to be borne in mind.

There are basically two kinds of wheel rims: monoblock, which consist of a single piece obtained by casting or forging aluminium alloy, and modular wheels that, as their name says, are made up of different components that are bolted together.

TOUGH AND LIGHTWEIGHT

Forged rims are made from a solid alloy block that is heated, pressed, and machine-sculpted, to create the rims. Cast rims, on the other hand, are made from aluminium that is melted and poured into moulds.

A car's wheel rims are probably one of the key elements when it comes to design and attractiveness.

Wheelmania: all the secrets of alloy wheel rims



An elegant alloy wheel rim manufactured in Germany.

Casting is unquestionably the cheaper of the two methods of production (and, therefore, these wheels are less expensive), but forging, which is much more costly, makes it possible to obtain lighter and stronger alloy wheel rims, something that improves the dynamics of driving and reduces the danger of deforming or damaging the wheel. Forged rims can weigh 25% less than cast rims of the same size, and improve handling by reducing unsprung mass, thus improving grip and reducing fuel consumption. A more open wheel design can help dissipate heat from the brakes, improving braking performance in demanding driving conditions, and reducing diminished brake performance or even failure due to overheating. Although, of course, everything depends on the style of driving.

There are also aesthetic advantages as a result of the type of production: forged pieces lack porosity – a phenomenon caused by the cooling of the aluminium or of the alloy – and they allow the weight to be distributed perfectly at every part of the wheel.

With these advantages, should cast rims be sidelined? Not completely: their price means everyone can afford them. Each one costs about 100 euros on average – five times less than a forged one – and they offer a good performance in both cars for everyday use and those used in sporting events. Forged alloy wheel rims are made for top-of-the-range supersports models, like Ferrari, Porsche and Lamborghini, or special versions like the BMW M series Motorsport or the Mercedes-Benz AMG.

INTERPRETING THE CODES

As you can imagine, not all alloy wheel rims are alike, nor can they be fitted to any car. The abbreviations printed on them are very helpful when it comes to understanding their characteristics. The most important ones are rim width, outside diameter, wheel rim compensation, or offset (ET), the number of wheel stud holes, and the diameter of the circumference traced by the centres of these holes (PCD).

Sizes are usually expressed in inches. Thus, rim width (the distance between the two sides) may oscillate between 5 and 12.5 inches, equivalent to 127 and 318 mm respectively. This size determines the type of tyre that can be fitted onto it. For example, on a 6.5-inch wheel rim, tyres measuring 195 to 205 mm wide (215 maximum) should ideally be fitted.

The diameter of the wheel rim is also measured in inches and affects the look, the performance and comfort. Low profile tyres give the car a sportier look, they make it look more striking. They entail certain disadvantages, however, such as considerable rigidity on uneven roads because the distance between the road surface and the wheel rims is smaller. This is why all-terrain vehicles usually have tyres with a heavier tread.

Another basic factor that affects the aesthetic appearance is wheel compensation, also called offset, or ET (the initials ET come from the German word 'Einpresstiefe'), which marks the distance from the centreline of the wheel to the mounting surface. A wheel can have three types of offset: zero, positive and negative. In the first case, the

This customised Lamborghini Huracán, painted such an unusual green, has 20-inch front wheel rims and 21-inch rear ones.

Wheelmania: all the secrets of alloy wheel rims

centreline of the wheel and the hub are perfectly aligned; in the second, the centreline is set back with respect to the hub; in the third, it sticks out. In practice, with a wheel of the same width, high offset reduces the outward bulge, while, on the contrary, low offset increases it.

There is one more detail, PCD, which indicates the diameter of the imaginary circle that passes through the centres of all the wheel stud holes. If your car has wheel rims with five stud holes, you cannot fit rims with four holes.

All these elements must be borne in mind when buying an alloy wheel rim. Thus, the expression 9x21 ET 35 5/112 indicates that the wheel is 9 inches wide (about 229 mm) and 21 inches in diameter (533 mm); the axis is displaced 35 mm with respect to the hub; the wheel rim has 5 stud holes and a PCD of 112 mm. After these explanations, alloy wheel rims will hold no more secrets for someone who knows how to



How an alloy wheel is forged

1) Forging

It all starts with an aluminium ingot that takes on a cylindrical shape under an 8,000-ton press. During this process, the material is stretched in the same direction, which makes it tougher. Next, the piece is subjected to a thermal treatment to recover the mechanical characteristics of the alloy.

2) The design

After preparing various sketches on paper, the parameters are transferred to a computer application that generates corresponding 3D files. Then, this design is analysed with a special program (Finite Element Analysis, FEM) that simulates the wheel rim's resistance to fatigue. The colours identify the critical points that are subjected to greater stress and run the risk of breaking. This process makes it possible to make the necessary corrections while still at the design stage.

3) Mechanical processing

Next, the ingot is profiled with computer numerically controlled (CNC) lathes and milling cutters. The outside gutter and the wheel hub are made using the lathe. Then, by milling, the final design is reproduced and the excess aluminium is eliminated. This technique allows for a perfect distribution of the weight at each point of the wheel.

4) Abrasive blasting and controls

At the end of the mechanical process, the wheel undergoes a micro-blasting treatment, which consists of bombarding the surface with tiny metal spheres. This process increases the material's toughness and resistance, and on the outside of the wheel rim it provides a shiny finish that brings out the volume and the shapes. Lastly, various controls are carried out to check that the size, the circumference and the concentricity are correct.

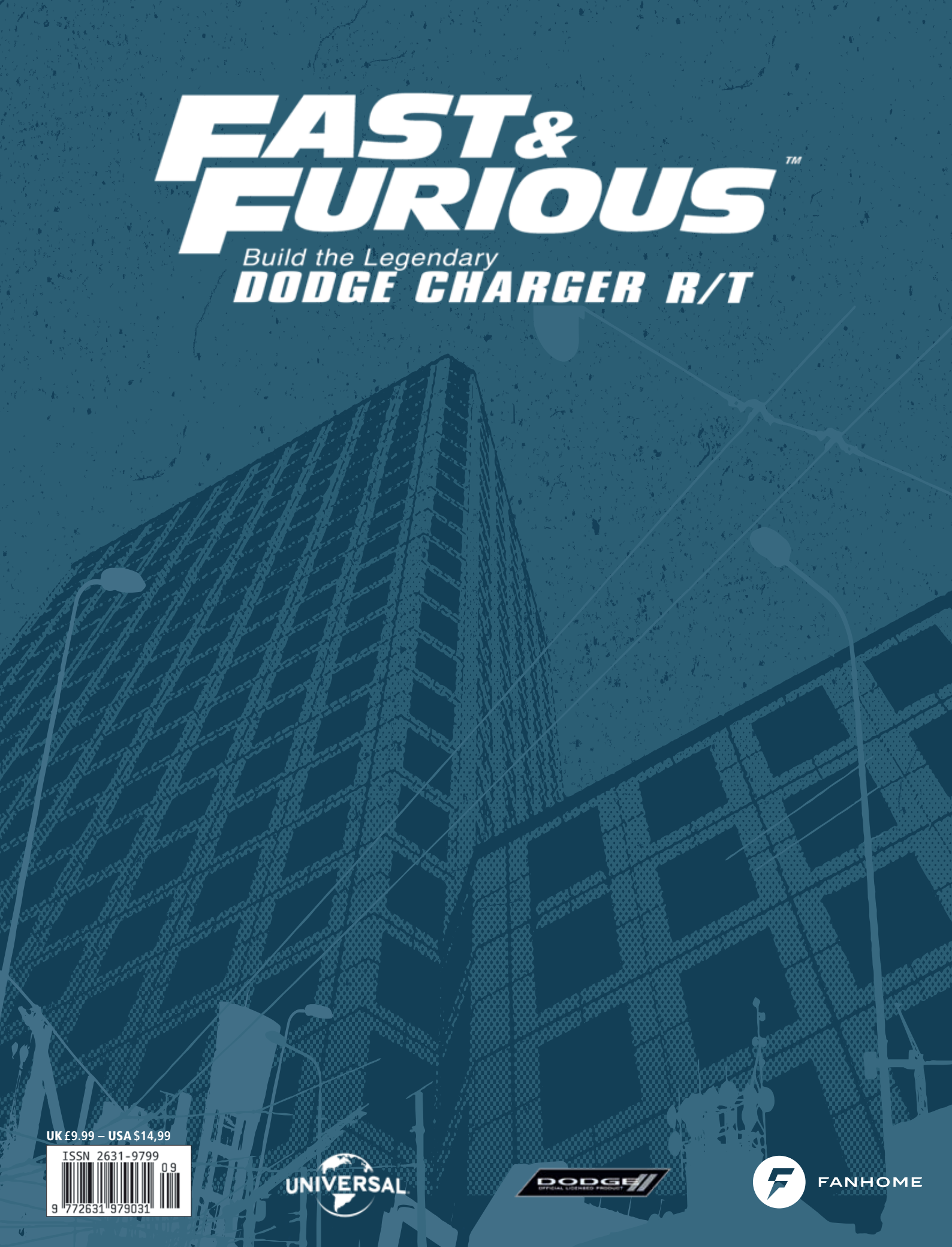
5) The finish

Many manufacturers offer the possibility of choosing different types of finishes, whether chromed, opaque matt or matt in different colours. Among the most common is the three-coat paint system. First it is given a coat of hot dust; then, another of liquid metal paint, and, lastly, a transparent protective coat is applied that provides a shine and protects the wheel against corrosion.



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