FAST & FURIOUS™

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Build the Legendary
DODGE CHARGER R/T



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FAST & FURIOUS

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FACE TO FACE

Few franchises in the history of the cinema had managed to last for more than six movies. And hardly any of them had built up a rolling snowball of popularity that would see them continuing to gain new fans and break box-office records with each new movie. But the phenomenon that is *Fast & Furious*, Universal Pictures' most profitable and long-lasting franchise, was about to demonstrate with its seventh production that it still had a lot more gas in the tank.

When the preparations for *Furious 7* got underway, it had been 15 years since the popular series began. Back then nobody imagined that this story would become one of the most popular and enduring film franchises of all time.

With the theme of the family always at the heart of its plotlines, the *Fast & Furious* franchise has become a cornerstone in the lives of the moviegoers who follow these characters whose experiences continue to arouse deeply embedded emotions and reveal new ones. And then there is the fact that each film has enabled us to witness their almost impossible exploits in fantastic cars, speeding through countries as different as Japan, Mexico, Brazil, the Canary Islands and Great Britain. But with *Furious 7* it was time to take it even further – the popular team of drivers were sent on a journey all over the world, involved in the boldest and most exciting adventure yet.

A NEW DRIVER AT THE WHEEL

After a long close relationship with the franchise, director Justin Lin announced that after *Fast & Furious 6* he would be taking a temporary break from the franchise (however, in 2021 he will be back as the director of *Fast & Furious 9*). This meant that a new director had to be found to continue the success with the seventh movie. The choice fell on James Wan, even though his name was more closely associated with horror rather than action films. Nevertheless, he had an undeniable ability to helm

The enormous interest aroused by the previous six editions of the *Fast & Furious* saga had fans watching the social media pages for news of the forthcoming film.



Better known for his links to terror and horror movies, director James Wan changed course to take over as director for the seventh edition of the *Fast & Furious* saga.

a major production, which would involve having to film with several crews at once while keeping his finger on the pulse of the main story at all times. Wan was thrilled that they had thought of him to direct the movie.

"First and foremost, I'm a real fan of the *Fast & Furious* franchise," he said. "But it was also exciting for me to take a break from the genre in which I have gained most prestige, horror films, and to tackle a new chapter in a franchise that is so great and well-loved by moviegoers. My main goal when agreeing to direct *Furious 7* was to push myself to the limit and show I could do something a bit different. The idea of playing in such a spectacular and familiar arena could not be more fascinating."

Given his association with horror movies, like *Insidious* and *The Conjuring*, Wan was certain that the fans of the series would be keeping a close eye on the way he shot action scenes. This was a real challenge for him. As the director remembers:

"I wanted to film the action in the fights, letting the actors do their thing without too many cuts, and allowing my camera to follow their every move. Moreover, I am a great fan of fireworks in my camerawork, so I also wanted to bring something of the aesthetic that I've used in suspense thrillers to the big action sequences and fuse the styles."

BUILDING FROM THE NETWORKS

Another important challenge was the one faced by the screenwriter Chris Morgan. What could he write about this time, when our heroes' adventures seemed to have come to an end? The writer had to put his thinking cap on, but he had the determined support of the fans. This is another of the characteristics that make the *Fast & Furious* franchise unique, having an interactive team that is very active on the social networks. Right from the start it allowed the fans of the franchise to enjoy unprecedented access to the actors and to exclusive material, something that over the years has fostered a dialogue and a symbiotic relationship. Due to the nature of the social networks, this is something that has grown exponentially with each release. And the fans themselves have become the best way of gauging opinions about the development of the story, the characters, and even the vehicles that ought to appear in the films, contributions that are rewarded with first-hand information about the movies in real time.

It was this direct contact with the fans that, for example, brought Letty Ortiz back to the franchise. Now, for the seventh movie the fans wanted the attention to focus on Dom and Letty's relationship, as she gradually recovered from the amnesia that had kept her away from the man who was undoubtedly the most important in her life.

"I think one of the mainstays of *Furious 7* is actually Dom and Letty's relationship," says actress Michelle Rodriguez. "It's something that you hardly find in couples nowadays. It's this strange loyalty that you only saw in married couples in the past, an unusual degree of fidelity and commitment, and in this case with a touch of the *Bonny & Clyde* about it. You see how these characters develop and you see the romantic fidelity that grows between them. I think it's very beautiful, because it's also something that we would all like to have."

A NEW ENEMY

But if anybody was thinking that *Furious 7* was going to be a simple love story, they were totally wrong. The action resumes a year after Dom and his team have returned to Los Angeles with their rap sheets wiped clean. Toretto is trying to find the way to make Letty remember everything that they had together, Brian and Mia are enjoying their new life as a family, and Tej and Roman are living it up in style.

"After fighting so hard to get back home, our heroes have finally made it, but then they realise that maybe it's not the life they were looking forward to," James Wan says. "The adventures they've been through together have made them different people, and living a normal life is no longer enough for them."

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JAMES WAN

Besides being considered one of the most creative film directors of his generation, James Wan has revolutionised movies in different genres, due both to his directing and to the productions promoted by his company Atomic Monster. Born in Kuching in Malaysia, on February 26, 1977, he grew up and went to school in Australia, before beginning his career in Hollywood. His enormous gift for horror films was clearly seen in his debut release, *Saw* (2004), which paved the way for a hugely successful series. After trying his luck in thrillers, with the story about revenge *Death Sentence* (2007), starring Kevin Bacon, he returned to horror, creating two more incredibly stunning franchises, *Insidious* (2010) and *The Conjuring* (2013). At the height of his success, he was given the job of directing the seventh movie in the *Fast & Furious* franchise, which garnered praise from fans of the franchise and critics alike. After reviving the legendary TV series *MacGyver* (2016), he broke box-office records with a superhero movie, *Aquaman* (2018). As a producer, Wan has been behind some of the most popular horror films in recent years, like *Annabelle* (2014) and *The Nun* (2018).

And they won't be allowed to either, because, as we saw in the explosive post-credits scene in *Fast & Furious 6*, a new figure was about to go into action: the cold and implacable Deckard Shaw, who is determined to hunt down Toretto's team to avenge what they did to his younger brother Owen. And to achieve this, he is not going to let anybody or anything get in his way.

In anticipation of this titanic clash, James Wan developed a style that visually expresses the action and acrobatics for which the franchise is known to perfection, taking the stars from the streets of Los Angeles to exotic places like Azerbaijan and Abu Dhabi.

"*Furious 7* is about the classic theme of revenge," James Wan concludes, "payback, and the consequences it entails. I really love this theme in movies and I believe it has allowed me to bring a rather darker and more disturbing quality to this franchise. The film is based on very strong genuine emotion."

With the idea of helping Letty to completely recover her memory, Dom decided to take her back to the Race Wars event, where she would compete again, just as she had done years before.





DODGE HORNET CONCEPT CAR

Presented in 2006 as a future B-segment model for young customers, and clearly aimed at the European market, which the Dodge brand had entered in those years, the Dodge Hornet concept car never got beyond the prototype stage due to the restructuring of the Chrysler Corporation in 2010, which entailed it quitting the Old Continent.

The name Dodge Hornet had a long history in the USA. It originated with the Hudson brand, the rights to which the Chrysler Corporation received when it took over American Motors.

In 2007, when it began its expansion in Europe, the Dodge brand had the Dodge Caliber and Dodge Nitro SUV's and the Dodge Avenger saloon. The Chrysler Corporation was looking to compete in the general European market and to do that it had to enter the B market, the most successful one on the continent. To hasten its entry, a year before that it unveiled the prototype Dodge Hornet, a small crossover (it looked like an SUV and had a spacious, functional interior, like that of a minivan) which, in theory, would be launched in 2008 or 2009.



The design of the interior, quite different from what was usual in a concept car, shows that the idea of manufacturing the car with this same look was at a very advanced stage.

The Dodge Hornet, with its robust lines and a large front grille, had a very cubic silhouette and, as a concession to its concept car status, doors without a B pillar that opened like those of a wardrobe, something very hard to mass-produce. With a supercharged 1.6-litre engine, it developed 170hp and, according to the brand, it could reach a top speed of 215km/h. The company was banking on finding a technological partner in order to use an existing platform (Volkswagen and Mitsubishi were mentioned). However, the project was halted when the Dodge brand announced its withdrawal from the European market, and after the Chrysler Corporation's merger with Fiat, a project based on the platform of the Alfa Romeo MiTo did not come to fruition.

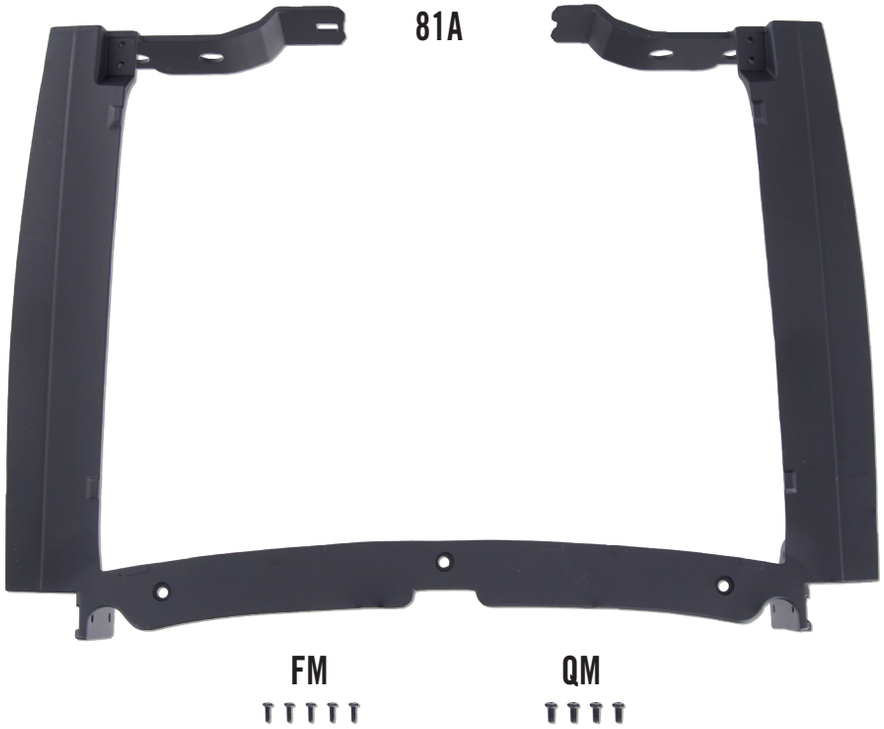
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THE ENGINE BAY FRAME

In this assembly session we will show you how to attach the front section to the part of the body you have already assembled. Please follow our assembly instructions and the accompanying illustrations carefully.

PIECES FOR THIS STAGE



81A Engine bay frame

FM Screws 2 x 5mm (x 5)*

QM Screws 2.3 x 5mm (x 4)*

*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

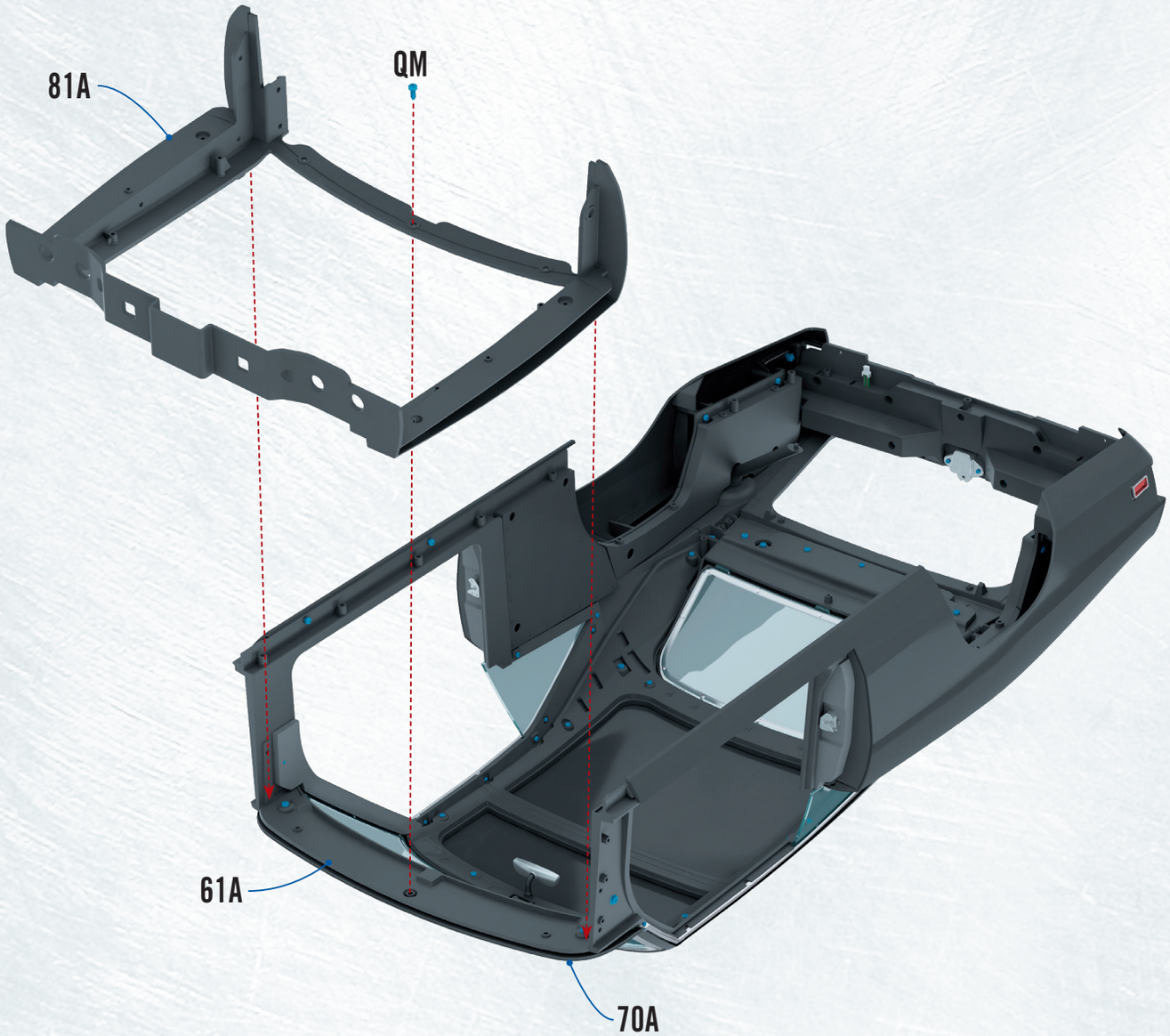


CAR BODY

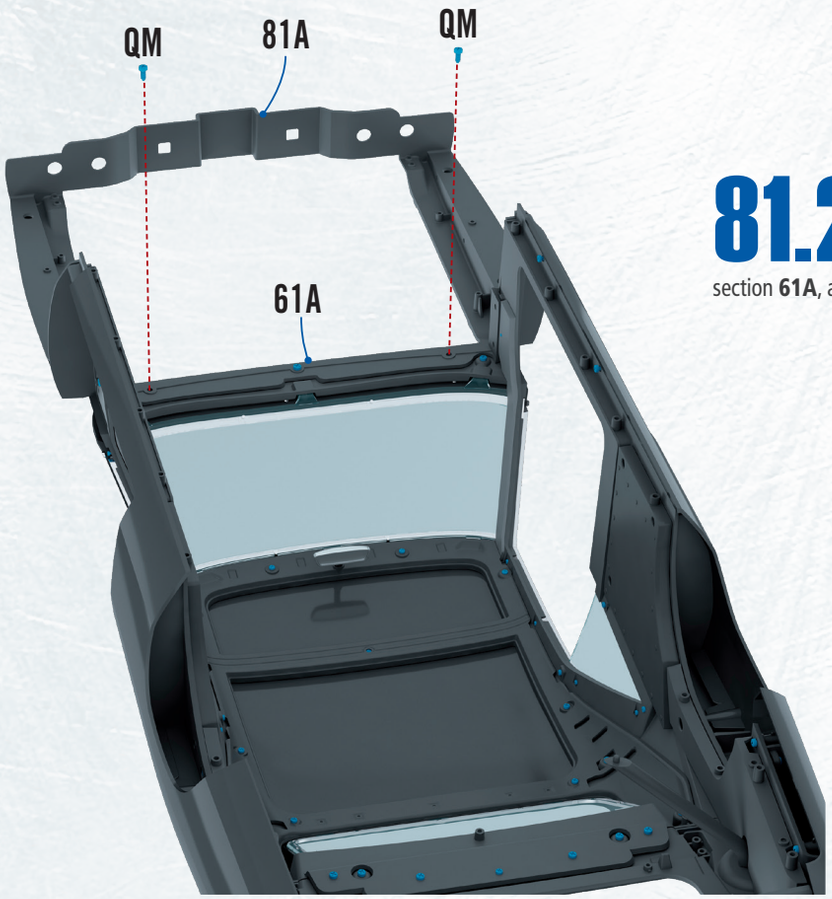
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The engine bay frame

81.1 **TURN OVER** he part of the body you have already assembled. Align the front section **81A**, attached to this issue, with the front of the roof **70A**. Attach it to the middle section of the body **61A** by inserting a **QM** screw into the hole in the centre of the piece, as shown in the illustration. ▼

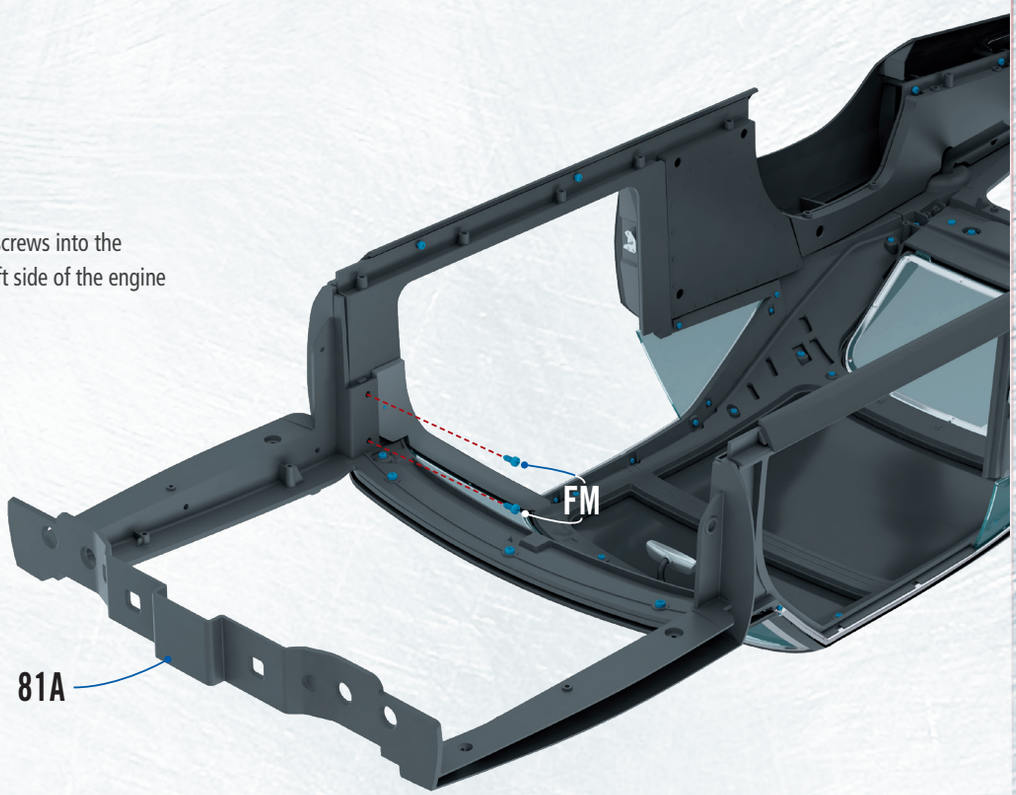


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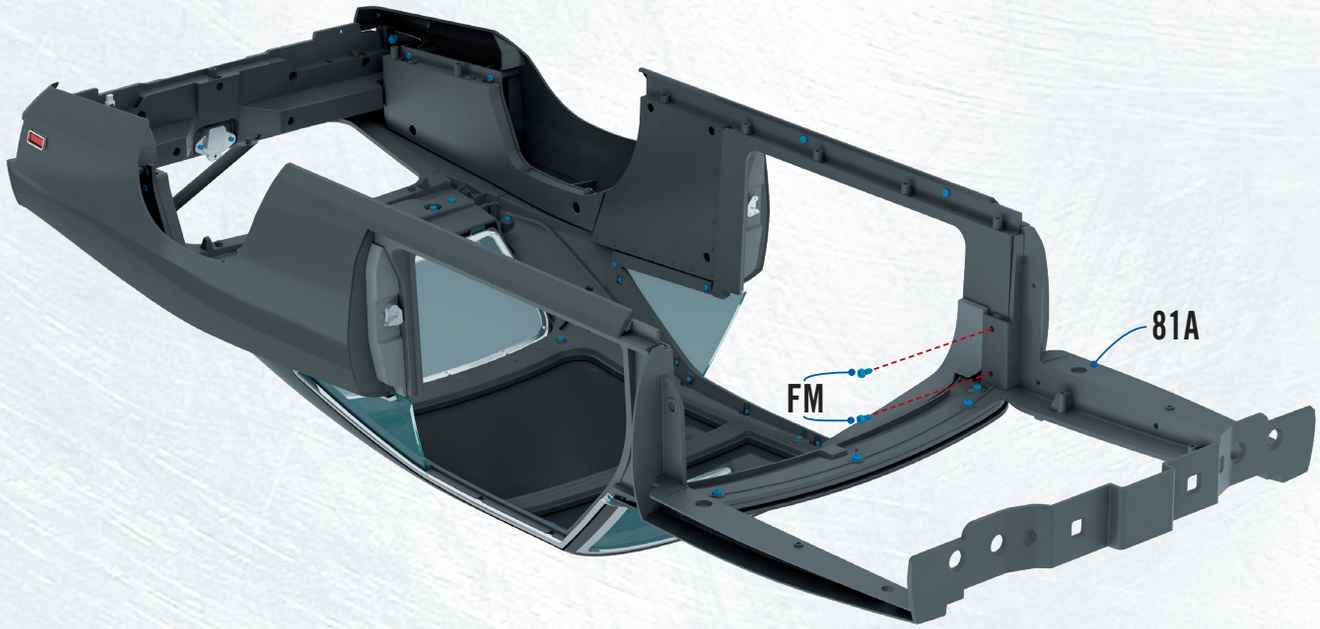
81.2 **CONTINUE SECURING** the front section **81A** by inserting two more **QM** screws into the holes in the middle section **61A**, as shown in the illustration. ◀

81.3 **INSERT** two **FM** screws into the two holes in the left side of the engine bay frame **81A**. ▶



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The engine bay frame



81.4 **FINALLY,** insert two more screws into the holes in the right side of the engine bay frame **81A**. ▲

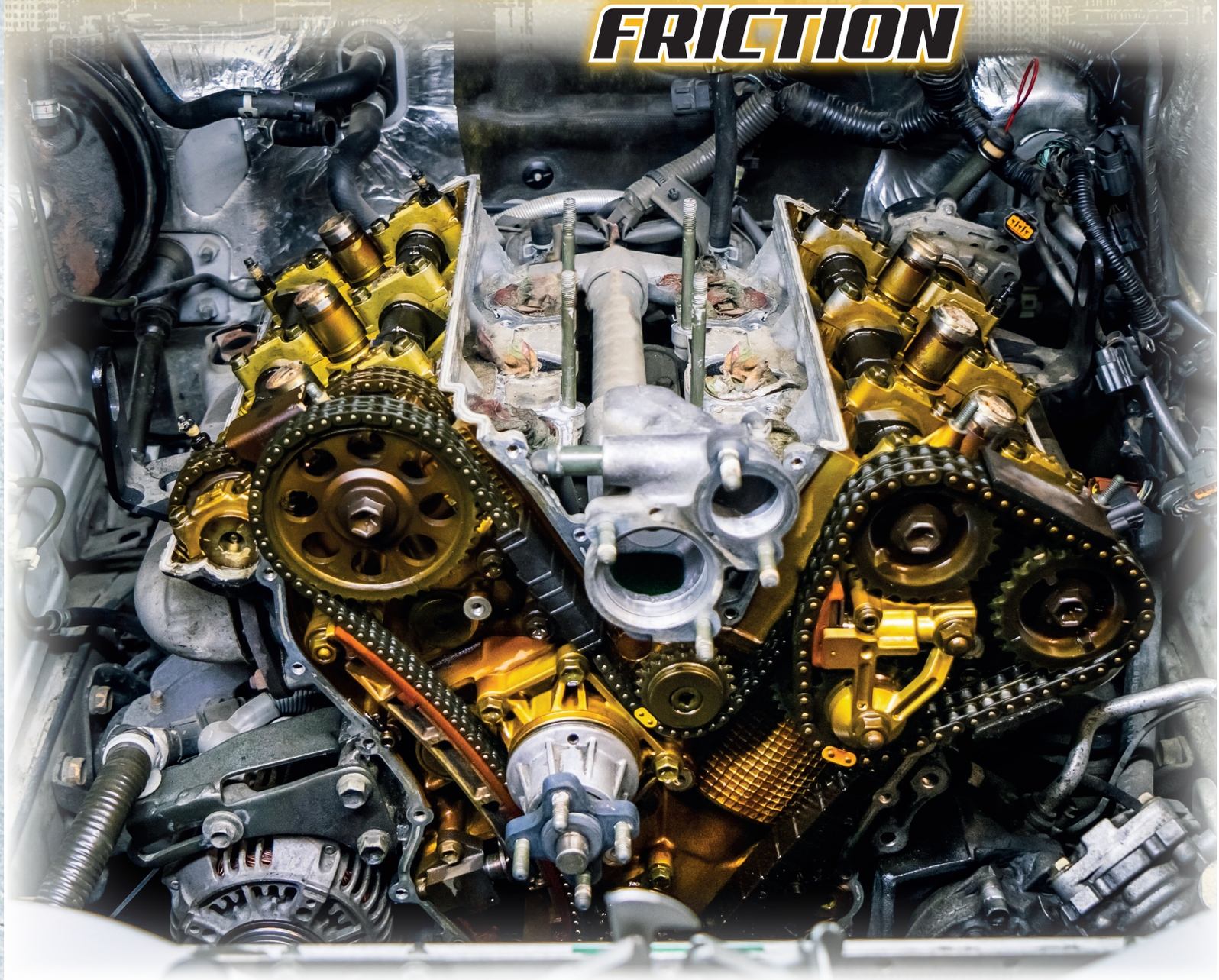
RESULTS OF STAGE 81



You have now attached the front section of the car body.

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HOW TO REDUCE FRICTION



Friction is prejudicial to an engine and to all the components of the transmission. It wastes energy that could otherwise be used to power the car efficiently. Let us see how engineers and mechanics are able to reduce it to a minimum.

It is not difficult to imagine how friction can be a real enemy inside an engine by reducing performance and wearing out components. These negative effects are amplified as the engine accelerates, because the mechanical losses increase exponentially as the rotation speed increases.

FROM SHAFT TO PISTON

Particularly critical is the cylinder-piston-piston rings group, which can be responsible for up to 40% of the total friction losses. In order to perform their function, which is to create a seal that prevents the escape of gases and oil, the piston rings must be a near perfect fit

Friction inside the engine is the worst enemy of performance, as well as being dangerous for all the components most at risk, such as pistons. That is why engine oil plays a vital role.

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against the walls of the cylinder. In order to avoid rapid wear of the components and damage to the surfaces (and avoid seizing), there must be no direct metal-to-metal contact between them. For this reason, a very thin film of oil is used to separate them. The thickness can even be as small as a molecule on the first ring. The situation is particularly critical at TDC (i.e. the highest point reached by the piston of the first cylinder of the engine during the compression phase), where lubrication is at its lowest. To the stress due to the flexing of the rings is added a radial load due to the pressure of the gases. Fortunately, modern piston rings are very flexible and very thin, both of which help to reduce friction.

SCRAPE, FLOAT OR ROLL

The main journal bearings and the connecting rod bearings are an important part of the engine where mechanical losses can occur. On production cars, engineers have usually opted for bushings (plain bearings) rather than roller bearings. These were initially thick anti-friction bushings but later evolved into the well-known thin-shell versions.

However, even on production cars there have been several important examples of the use of rolling bearings, i.e. bearings consisting of an outer and an inner ring, between which a series of rolling elements is interposed. These can be balls or rollers. They are usually separated from each other and are held in place by a cage. They are more com-

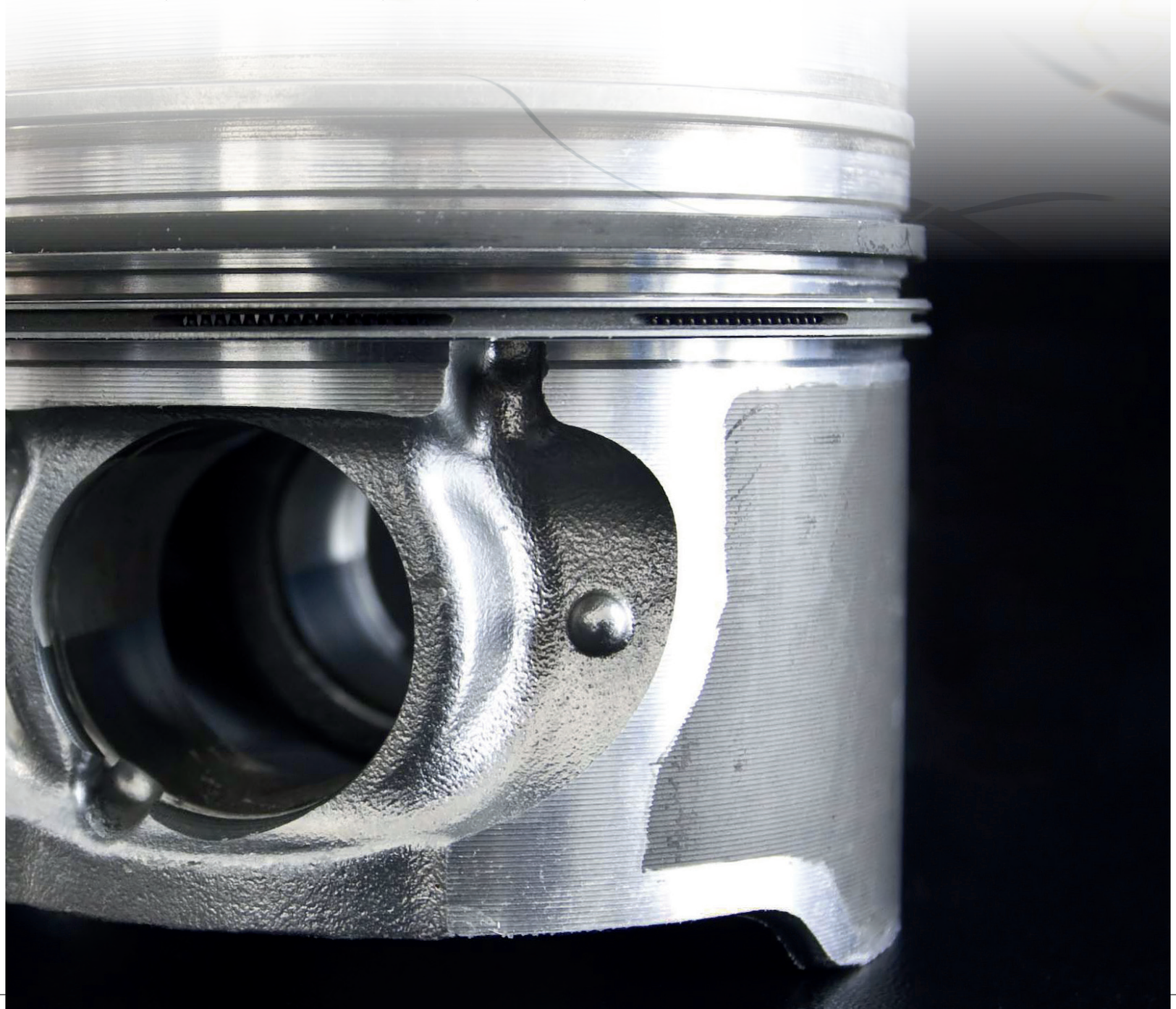


mon in motorcycles, in particular on two-stroke and four-stroke single-cylinder engines. Motorcycles with two-cylinders or higher, mostly use bushings, with the sole exception of the twin-cylinder engines of a well-known American manufacturer that are air-cooled. The bikes are authentic dinosaurs from a technical point of view, but they have extraordinary charm. In these cases, it might seem that it is a simple matter of choosing between rolling and sliding friction. The situation is, in fact, more complex, and considerations are not only related to the type of friction, but also to the complexity of the construction, to the technical advisability, to the cost, and to the noise levels. According to some technicians, switching from bearing shells to roller bearings could result in power increases of the order of 3-4%. However, it is not worth the effort. In other words, the cost of changing the bearings is greater than the advantages gained.

WHAT HAPPENS IN THE HEAD?

When the distribution components are in motion, they can absorb a considerable amount of power. It can vary considerably from case to case, but in mass-produced engines, they are of the order of approximately 6-12% of the total losses due to friction at high speeds. The percentage value tends to be considerably higher at lower rotational speeds. Formula 1 engines run at around 18,000rpm and follow par-

The piston skirt of the most advanced engines is coated with special materials designed to reduce wear and noise, as well as friction. In some cases, it is composed of a resin reinforced with metal oxide, which also incorporates particles of solid lubricant.



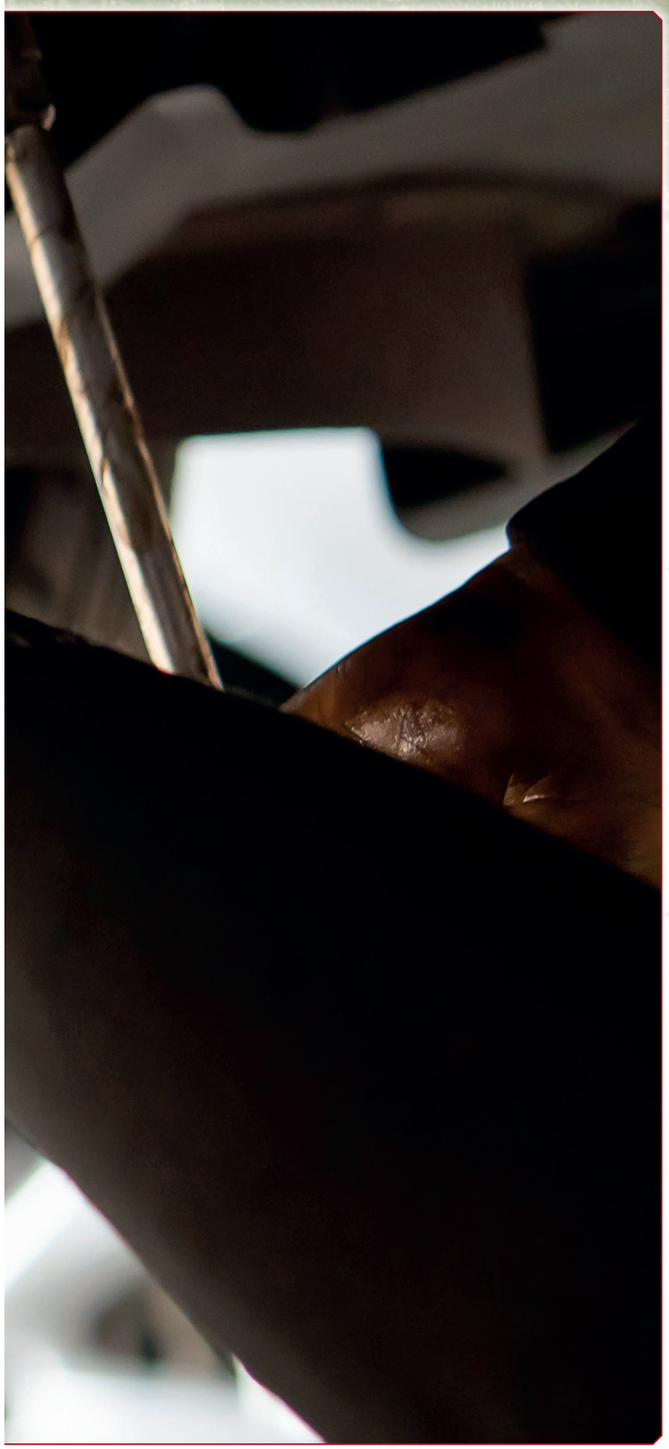


Gearbox oil has a dual function: First of all, to reduce friction between the various components in motion, and secondly, to dissipate heat. In the past, it was necessary to replace it regularly, but the quality of the oil used by the manufacturers is now so high, that it is normally only replaced every four years.

ticularly radical laws of motion, with cam lifts of about 16mm and perhaps even more. In these engines, the loss is appreciably higher. A similar argument applies to MotoGP motorcycles. The contact pressures between the cam and the followers are very high, and for these racing engines (and in those of some super sports bikes), the use of surface coatings capable of withstanding the concentrated stresses is essential, because the bushing sliding action that takes place does not allow the establishment of a hydrodynamic lubrication regime.

For some years, in many production car engines, traditional cup tappets have been replaced by finger rockers fitted with a roller. These are generally mounted on hydraulic supports. The advantage, in terms of power absorption, is quite high, because the sliding friction is replaced by rolling friction. In practice, the benefits are more apparent

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at low engine speeds, where the reduction in friction can be even higher than 40%. These benefits are progressively reduced as the speed of rotation increases. For this reason, the solution is not suitable for racing engines.

MECHANICAL PERFORMANCE

Each of the different components used to transmit motion absorbs a certain amount of power while carrying out its task. In other words, belts, chains and gears have their own mechanical requirements that must be taken into account in the design phase. Therefore, it is not only the components housed in the cylinder head that subtract mechanical energy, but also the camshaft drive system itself.

In diesel engines, as a rule, the same components that activate the distribution also control the injection pump, which also absorbs a certain amount of power. It is worth remembering that by reducing as much as possible the load on the valve springs, which is possible by fitting lighter titanium valves, the power absorption of the distribution assembly becomes lower. The ideal solution is to always mount springs with the lowest possible load, as long as they are compatible with the requirements of the engine. Less power absorbed inside the engine equates to more horsepower sent to the wheels!

It is time for the numbers to do the talking:

The efficiency of a roller chain drive in conditions of optimal tension and lubrication is of the order of 96-98%, while the silent chains, i.e. Morse type, can reach 97-99%. As far as toothed belts are concerned, the value is in the 96-98% range. It is therefore at the same level as roller chains. For spur gears with straight teeth and a rounded finish, efficiency can be 98-99%. If, on the other hand, the teeth are not rounded, it drops to approximately 96%. Therefore, there are no notable differences between these parts, and the choice is generally made based on other considerations.

TRANSMITTING POWER

Once leaving the engine, the drive must be sent to the wheels, (front or rear depending on the type of car). Along the way, additional power absorption occurs, always due to friction. Here, in addition to the gearbox, the universal joints and the differential, the action of the bearings and the oil seals, which also offer slight resistance to the motion, must be taken into account.

The gearbox can have a mechanical efficiency of the order of 92%. The differential is very efficient, with a figure of around 99%. As far as the final drive components are concerned, in the case of two cylindrical gear wheels, as already seen, the efficiency is 98-99% if they are machined and 96%, if they are not. If, on the other hand, the two gear wheels are conical (as happens when the motor is arranged longitudinally), the efficiency is slightly lower, at 97-98% for machined teeth.

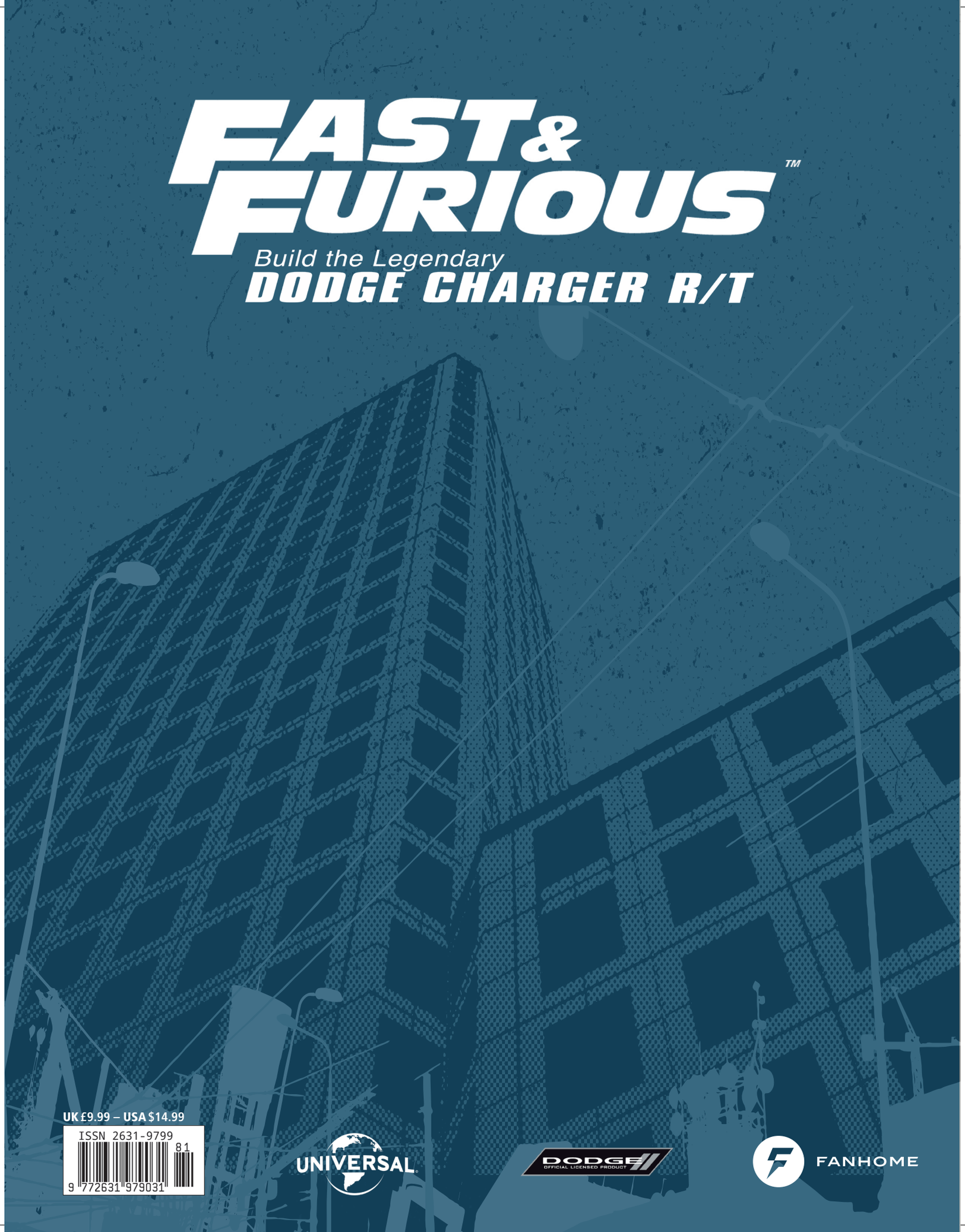
At the end of the day, taking into account the very slight losses due to the bearings, the clutch, and so on, the overall mechanical efficiency of the transmission of a modern car is around 91-95% if the engine is positioned transversely and 88-92%, if the engine is longitudinally front-mounted with traction at the rear.

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