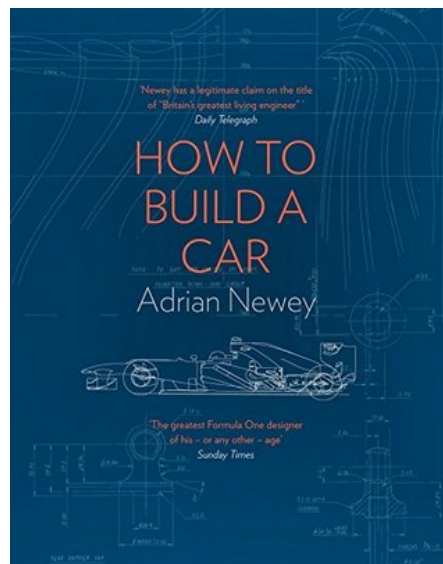




How to Build a Car: The Autobiography of the World's Greatest Formula 1 Designer

Adrian Newey

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'Adrian has a unique gift for understanding drivers and racing cars. He is ultra competitive but never forgets to have fun. An immensely likeable man.' **Damon Hill**

The world's foremost designer in Formula One, Adrian Newey OBE is arguably one of Britain's greatest engineers and this is his fascinating, powerful memoir.

How to Build a Car explores the story of Adrian's unrivalled 35-year career in Formula One through the prism of the cars he has designed, the drivers he has worked alongside and the races in which he's been involved.

A true engineering genius, even in adolescence Adrian's thoughts naturally emerged in shape and form – he began sketching his own car designs at the age of 12 and took a welding course in his school summer holidays. From his early career in IndyCar racing and on to his unparalleled success in Formula One, we learn in comprehensive, engaging and highly entertaining detail how a car actually works. Adrian has designed for the likes of Mario Andretti, Nigel Mansell, Alain Prost, Damon Hill, David Coulthard, Mika Hakkinen, Mark Webber and Sebastian Vettel, always with a shark-like purity of purpose: to make the car go faster. And while his career has been marked by unbelievable triumphs, there have also been deep tragedies; most notably Ayrton Senna's death during his time at Williams in 1994.

Beautifully illustrated with never-before-seen drawings, *How to Build a Car* encapsulates, through Adrian's remarkable life story, precisely what makes Formula One so thrilling – its potential for the total synchronicity of man and machine, the perfect combination of style, efficiency and speed.

How to Build a Car: The Autobiography of the World's Greatest Formula 1 Designer Details

Date : Published November 2nd 2017 by HarperCollins

ISBN : 9780008196806

Author : Adrian Newey

Format : Hardcover 400 pages

Genre : Nonfiction, Biography, Science, Engineering



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Formula 1 Designer Adrian Newey**

From Reader Review How to Build a Car: The Autobiography of the World's Greatest Formula 1 Designer for online ebook

Rahul Ponodath says

Very interesting view of a sport i have adored for so long but never got into the details of!
Enjoyed it heaps!!

Luke Ryan says

Really fascinating insight into the complexities of designing racing cars, particularly the level of detail required for aerodynamics. Also interesting to hear the issues encountered in troubleshooting which are common to many industries.

Chad Cruickshank says

Really enjoyed some of the anecdotes Newey was able to share. For someone who enjoys Formula One on both a sporting and technical perspective this was well worth the read.

BranBran says

Really insightful, and interesting to hear Adrian's perspective on different shifts and stories in F1. I thoroughly enjoyed this read.

Jaap Grolleman says

'How to build a car' is a fascinating read that starts with a hard-to-educate boy hobbying in the shed with his dad, who picks up a study in aerodynamics. Much of Newey's approach lays in these formative years, en route to becoming one of the most dominant car designers of Formula One. It's interesting to read about the design processes for his cars, on solving challenges within the regulations, or diagnosing performance issues in the cars. The reader is taken through balancing mechanical and aerodynamical grip, for instance by moving a component to another place, which heightens the centre of gravity (detrimental) to improve the airflow (beneficial).

At the centre is a very holistic approach to unlocking performance, developing a car with continuity from front to back. Newey also points out examples of not doing this, such as the McLaren of early 2010s, which kept changing its approach and ended up copying bits of several teams that didn't fit within a cohesive concept, and as a result the car was slow.

To his credit, Newey doesn't avoid topics like his crashes in classic cars, marriage problems, and the fateful 1994 San Marino Grand Prix in which Ayrton Senna died — and he doesn't skim over details such as the

controversial steering column. There are all there, in the open (something Jenson Button doesn't do in his biography, simply saying "It'd take far too long to go into the ins and outs of it").

At times, Newey is a grumpy old guy. He takes pride in finding loopholes in the rulebook, but when others do it he finds it unsportsmanlike. This is particularly visible in his rivalry with Ross Brawn and Michael Schumacher, but also the double diffuser controversy of 2009. Had Newey invented this, he would have probably patted himself on the back, but now he labels it illegal. Couple it with his salary demands, and Newey just comes across as unwarmhearted person.

Obviously, the book has lots of repetition on building cars through new regulations. If that's not your thing, don't get this book. What Newey can be blamed for is that the writing gets sloppy at the end, perhaps due increased complexity in the designs — or perhaps the writer's motivation is trailing off. It's these chapters that are packed with technical terms and as a result what Newey tries to describe becomes hard to visualise. Despite, 'How to build a car' is a great book, not just inspirational on designing cars, but how to design anything.

Mike Spear says

The first half is informative and entertaining. I had no idea how much American motorsports was influenced by today's de facto automotive engineer / aerodynamicist. The back half was less informative for those that have followed F1 for the past couple decades. Reminiscent and repetitive but an enjoyable read. Great insight to some of motorsports happiest and saddest moments.

Valeriu says

When you look at a Formula 1 race today, you are flooded with information: real time display of drivers' input, cockpit transmissions, 3D graphics overlaid on the halo. Anything and beyond to keep one seated in front of the screen. What could a book offer then? Basically, everything else you don't see in the two hours of TV coverage.

Adrian is used to expressing himself mostly through the design of his cars: the Williamses from the beginning of the 90's that made world champions of Nigel Mansell, Alain Prost and Damon Hill, the McLarens from the late 90's that delayed Michael Schumacher the first title for Ferrari and the Red Bulls that propelled Sebastian Vettel to four consecutive driver championships. Even a mediocre driver like Jacques Villeneuve became world champion for the sole reason that Adrian Newey had designed his car. And when you think about the fact that Adrian was standing next to Daniel Ricciardo a week ago, at the last Monaco GP festivities, you realize this guy has been in the business of winning in F1 for almost 30 years. And to top it all, he was a double Indy Car series winning constructor even before joining F1.

The book is both inspirational and confirmatory. On one side is the Bildungsroman of a young man with a passion for improving racing cars, who makes it to the highest level through absolute dedication, clever career choices and brilliant creativity. On the other, it substantiates the ingredients of success: the necessary hard working hours that have to be clocked in order to excel in a field, unabated focus, self-confidence. And luck.

In a sport full of entitled rich kids and showbiz prima donnas, Adrian is a genuine superstar whom regular folks can relate to. How many engineers haven't felt their career was on the line when the answer to the

question "Why the hell isn't this working?" eluded them for months? Furthermore, the language of the book is accessible (even the technical bits), full of witty, politically incorrect humour, unfiltered thoughts and detailed conversations. And you'll also discover what a diffuser can do for you.

Shems says

One lovely evening near Ladoga lake in Leningrad region, we were talking with groupmates and enjoying the scenery, and at one point the discussion got technical and I couldn't answer to my groupmate on question about differences of two and four stroke engine, this question changed my life drastically for upcoming decade.

After this talk I started reading and learning about mechanics and engineering of cars, moreover I started following F1 since it is the most technically advanced motorsport, this happened right at those years when Adrians efforts resulted in first double win of Constructors and Drivers championships. It was a great pleasure to learn more about the processes and challenges of F1 engineering because ultimately this is why I started following it.

Its INHO a must read to anyone who is interested in motorsport or engineering.

Tony Hisgett says

Adrian's F1 story starts with him as a young boy playing with his Scalextric and I must admit that my own fascination with Formula one started with my own Scalextric set, back in the early sixties. This is an interesting story from one of the great racing car designers of all time. I am more interested in the mechanical systems than aerodynamics and I did skip read a few bits, but it was an enjoyable read. At times I found his style a bit disjointed and I had to re-read a few bits, as he occasionally jumps around and a few times I confused myself.

Patrick says

I don't know if there have not been many books written by engineers/designers, or whether it is simply that I have not been much inclined to go looking for them, but I found this an interesting insight into the day-to-day business of solving engineering problems, though I'm not going to pretend that I really understood his descriptions of how he went about solving problems relating to 'stalling' or the 'airflow becoming detached' in the latter part of the book (I don't think you have to be able to understand it to get something from this book, either).

Maybe I was won over by the fact that it is revealed on the very first page that he owed his existence to a sickly Pyrenean Mountain Dog or maybe it is that, while his interest in race car design was sparked in part by building a 1/12 Tamiya Lotus 49 at the age of 12, at a similar age, the very first Tamiya kit I built was the rather beautiful Leyton House March 881 (talking of which, £60,000 for the real thing? I reckon that's a good long-term investment, and if I had the money, it would make the mother of all wall decorations...), which was the first race car Newey designed from the ground up but the period in which he first came to prominence as a race car designer coincides with the time I was paying attention. Between 1992 and 2004,

every single Formula 1 driver's championship was either won by a car designed by Newey or driven by Michael Schumacher (they never worked together, and there are fairly persistent hints in the book that he was not Schumacher's greatest fan.)

I have to admit that it is only in the early part of the book that the engineering problems he is describing are simple enough that I (for the most part) could understand what it was that he was actually trying to solve. And even then, I'm not quite sure I entirely followed his description of how the Lotus 77's 'ground effect' design was based on reversing the principle by which a swan takes off from water.

Perhaps it is a reflection of the extent to which the sport has increasingly become about ruthless optimisation of aerodynamic efficiency using computational fluid dynamics modelling and super-computers that an awful lot of the latter part of the book, or at least that bit of it which is dedicated to describing the job he was doing, rather than the people he was working with or competing against, was a little difficult to follow, and I wasn't quite sure I was really understanding what he was saying. But that shouldn't put you off, both because it is only one part of the book. Much of the interest comes from what he has to say about those he worked with, some of which rather runs against received wisdom. He is slightly critical of what he regarded as the 'hobbyist' attitude of the owners of the Williams team, with whom he won his first four titles as a designer. On the other hand, pretty much everyone who ever worked with Nigel Mansell seemed to find him insufferable, but Newey appears to be something of an exception, perhaps forgiving him the whinging because he got results, and seeing a dry humour where others saw boorishness:

"If he was in the lead, he'd start singing nursery rhymes over the radio. 'Humpty Dumpty sat on a wall...' or '...we all went out to a swanky fish restaurant and Nigel asked for ketchup to go with his sole. The waiter cast him a sideways look 'Ah Monsieur, you are so funny.'
'Well, thank you very much' said Nigel, and then, as the waiter turned to go, he added 'but where's my tomato ketchup?'
'Monsieur, seriously?'
'Yeah, seriously.'"

More seriously, there is his take on what caused Ayrton Senna's death at the wheel of a car he had designed. I'm not in any position to judge whether his belief that it was down to tyre pressures, or possibly simply a driver error, rather than a failure of a hastily re-engineered steering column, as Italian prosecutors alleged, is motivated reasoning, but on the other hand, I am prepared to believe him when he suggests that the court judge certainly wasn't in any better position to arrive at a judgment on that matter. And more fundamentally, that a law court was not the place to attempt to settle such a question in the face of so many unknowns.

There is no doubting that he is a man not unaware of his own abilities, and others might find what could be described as arrogance off-putting. There is a section where he describes how he was hired by fizzy-drinks magnate Dietrich Mateschitz to turn his team around where he talks about his salary negotiations:

"I wasn't even part of the discussion when the figure I was asking for came up, but apparently it wasn't well received. The words 'send him home' were uttered, either by Dietrich or Dr Marko...the Austrians took some persuading that I was worth the price tag. Apparently Dietrich rang Gerhard Berger. Gerhard recalls the conversation: 'Gerhard, we have Adrian Newey here in Salzburg, but he is very expensive, what should we do?' Gerhard: 'Well, it depends on the value you put on a second a lap.'"

But on the other hand, if you have designed ten different world championship winning cars, I guess you have earned the right to a certain regard for your own abilities. Some of the material about how, at Red Bull, he decided that if the team was to succeed, he was going to have to step beyond his remit, not simply to be the designer, but to ensure that the whole way the team was run changed was interesting to anyone who has worked in a large organisation and has come across the difficulties of effecting such changes were interesting to read about. Though I can't help but think that having the 'halo effect' of having so many championships to

his name probably made it that bit easier for him than it would have been for someone else.

Paul says

Adrian Newey has been living and breathing cars since he first started sketching them at the age of 12. The roots of this love were seeing his father pottering around in the garage on some project or other. Drawing them was one thing, what he really wanted to do was build them, so a welding course followed one summer holiday. He tried racing karts, having saved to buy one, but even though he enjoyed it, it was not his thing. He worked hard to get into Southampton to do a degree in mechanical engineering, however, the maths was a struggle. Leaving with a 1st, he wrote to Brabham and a lot of the other teams but nothing seemed to be offered until a chance call from Fittipaldi and his interview consisted of a nervous wait while Harvey Postlethwaite took his Ducati for a test ride. He was in the door.

The first car that he was involved with, Newey ended up redesigning the aerodynamics to meet the latest change in regulations. The team folded after the money ran out and he was offered a position at March working on the 83G as well as working on the car for the Daytona 24 hour race. Success in that meant he was seconded to Truesports to help with another Indycar. Then the opportunity beckoned for a place in a Formula 1 team, and he joined Leyton House where he had the chance to design a car from scratch. Other teams noticed his success and soon he was working for Williams on their FW14 to FW18 cars before being poached again by McLaren. Leaving there under a little bit of a cloud, he ended up with the newest team in the paddock, Red Bull. The owner wanted to make a serious investment in the sport to promote the brand and the drink and so began a new era and four world championships.

People are well aware of the drivers who wrestle these cars at 200 mph around some of the fastest circuits in the calendar. There are a few team heads that people can name, but most of the designers, engineers and aerodynamicists are completely unknown. But there is one who is almost a household name, Adrian Newey. To put it frankly he is an engineering genius. He has worked with almost all the big teams, using his wide experience in creating a car that just goes very very fast. These cars have, in the right hands, give some of the best drivers in the world race wins and world championships. I have been an F1 fan since the age of 8. I grew up in Woking, and McLaren has always been my number one team, though their performance in the past few years has not done them any favours. There is plenty of fascinating detail in this book, as Newey writes about some of his personal life as well as lots of information about the cars that he designed and how he solved the particular problems that the constant changes in regulation through up. Definitely a books for the die hard F1 fan.

Gem ~ Bee says

I've spent this weekend thoroughly engrossed in this account of the infamous Adrian Newey's life with cars. It spans from his earliest childhood memories to his current Formula One career with Redbull Racing / Redbull Advanced Technologies; charting both personal and professional insights with his likeable, firm but fair style.

As a Formula One fan since childhood I was delighted to receive a review copy from the publisher to be able

to compare to the many F1 autobiographies and history books I've read across the years; I have to say this is one of my personal favourites as Newey is such an innovator of the sport and has such breadth and history amongst the pivotal teams in the sport that it is packed with detail and such a unique insight. From the early days of Fittipaldi, the internal politics at Williams, Senna's tragic Imola crash, the regulation changes in the sport over the years, highs and lows at McLaren and the evolution of Redbull Racing, the story of Newey's career is told in a clever concept that charts the chapters by each one of his historic car design concepts from the March 83G to the RB8 and formats them as a race track (his early years are "On the Grid", then his career moves are each divided in to "turns" as a track is designed). This concept is inspired; helpful as a historical guide across modern F1 history and good for quick reference if you prefer to dip in and out of the book.

This book would make an ideal purchase for anyone with a love of motorsport, but also any interested in engineering/aerodynamic concepts or design. The illustrations provided for each car are just fantastic and provide such detail about key features, specifically regulation change innovations. There is a lot of technical terminology used but most important concepts are explained within each discussion and there is a handy glossary at the back if anything needs further explanation.

There is so much to love about this book and I have been raving about it to several fellow F1 fans. I found it provided some important opinion on a lot of key issues within the sport that have been talked about over the years (diffusers, KERS, team fallouts) ; to hear Newey's opinion and take on such matters (as he's not typically one of the outspoken people within the sport) was very interesting, and amongst other autobiographies such as Mark Webber's Aussie Grit etc you see a broad picture of what was often left unexplained or given a media spin at the time. I found it fascinating how despite being such an innovator of modern car technology Newey prefers old school drawing by hand to any technical computerised drawings; having an old drawing board that has literally followed him from each role. It is telling how Newey seems discontent with the current state of the sport, a feeling echoed by many fans, and perhaps clearly indicates the divide of direction that has crept up over the past decade.

K.S.Loganathan says

The Racer's Edge

How to Build a Car by Adrian Newey
Harper Collins Publishers, 2017

Review:

With all the hoopla surrounding F1 racing, in print, visual and interactive media, not to mention official websites, guides, statistics, props and paraphernalia – what more do you need to know about this hyper-competitive sport?

Plenty, it would seem, reading the autobiography of F1 veteran chassis designer, Adrian Newey, OBE. In a career spanning 35 years, he has been making the cars go faster, winning 10 F1 constructors' titles and helping some of the driving legends like Damon Hill, Mika Hakkinen and Sebastian Vettel, win over 150 Grands Prix races in 27 countries. Newey provides a pit-stop view of the races, paddock personalities and their power plays, quirks, and gamesmanship, as well as insights into the organisation of the sport.

Born in 1958 in the British Midlands, the cradle of the sport with a rich automobile tradition such as factories producing the iconic Morris Marina, Austin Allegro, and Norton Commando, Fort Dunlop and Pirelli Burton

tires, Newey was always attracted to the circuit. After lacklustre schooling, he obtained an aeronautics and astronautics degree from Southampton University in 1980. His final year project was 'ground effect aerodynamics as applied to a sportscar', the subject of his passion and something he could show to prospective employers. Harvey Postlethwaite of Fittipaldi Automotive engaged him, just as the sport was waking up to the possibilities of wind-tunnel model simulations in racing chassis design.

If you thought that F1 race cars are designed from the ground up or for that matter, front to back, you are mistaken. Specifications issued by F1 Association aimed to ensure that all teams build on the same foundation, and use contractual tires supplied by a single tire company (Now Pirelli for both 60% model wind-tunnel and racing circuit front and rear tires.) In order to ensure a level playing field between the grandee teams such as Ferrari, Lotus, Alfa Romeo, Honda etc. who built both the chassis and the engine, and the 'garagistes' like Fittipaldi, FOA was formed in the 1970s. BC Ecclestone employed collective bargaining methods with owners, teams etc. only to run it as a personal fiefdom until recently. Newey's life work has been an extended, though modified college project, given engine, tires, and driver to conform to association regulations on a tight budget and time frame. Effectively, this means chassis development within the loophole of the law, in particular, to maintain tire contact with the ground part, even through braking and cornering at 4.5 g.

Teams guard their technology, trying to make it impossible for others to touch and feel the parts and though it gives them a headstart, rivals copy it all the time if a competitive advantage is perceived. Apparently, there are no enforceable intellectual property rights.

In Formula 1 car design, the engine has to be located in an ideal position, and a monocoque has to be of a certain size and shape to accommodate the driver. The cars are always designed as light as possible, so that ballast to make up to the specification weight can be put in a convenient place to obtain the desired weight distribution between the front and rear axles. Aerodynamic shaping of the car must ensure that it generates as little drag and as much downforce (negative lift) as possible in a balanced manner through cornering. The wing acts in a converse manner to that in an aeroplane, pressing the car into the ground and hence, allowing the tires to generate more grip. The vortex of air around the tires, as well as the ride height, form a key part of the aerodynamics. After that, it is all about trying to find the right setup parameters for the car, the driver, and circuit linking together the sequence of corners that are unique to each racing track. Much of Newey's book is taken up with the ongoing battle between designer and regulator on the effect of active (electronic controlled) and passive suspensions and regulations on diffusers, restriction of g forces and impact damage. Newey is in full flow and in the zone when engaged in race car aerodynamics. Newey's experience with IndyCar racing registering three winners in the 1980s stood him in good stead as he progressed with his career.

Today, wind-tunnel facilities comprise a large part of a racing team's operational expenditure, even as computational fluid dynamics modelling and all the other characteristics observed during empirical testing are analysed with a whole suite of customised software for the engineers to check every aspect of the vehicle's handling. Materials research is not racing's strong suit although new materials developed elsewhere are adopted.

F1 in the 1990s tended to be a battle for supremacy between McLaren and Williams. In 1996, McLaren chief Ron Dennis shrewdly poached Williams' designer, Newey, who after a gardening leave was finally unleashed, along with Neil Oatley to produce the 1998 champion car McLaren MP4-13. With Newey's usual focus on aerodynamic efficiency and a very clean aero look all round, the result was an ultra-compact race car.

When Ford sold its holdings in the Jaguar team to Red Bull, the energy drinks company, Newey was appointed by the latter as designer and he helped them win many world titles and build their brand reputation worldwide.

Newey loses his mojo during his winless tenure at LeytonHouse, two divorces, an Ayrton Senna's death in 1994. The tragedy arose from an aerodynamically unstable Williams' car in which Ayrton attempted to do things the car was not capable of doing.

Newey's inner voice only pops up when Ayrton Senna's death happens and again, towards the end of the book, where he feels that the spectator sport has become mainly that of competing for drivers' and constructors' titles. The developments on the racetrack do not benefit the general public shuffling about in family sedans. He applies his magic to design a road-going sportscar sold for a cool two million pounds each for a limited edition of Aston Martin hypercar.

My Views:

Newey is no Da Vinci. And while his ambition and mastery are achieved along with cult status, the lack of purpose in the service of something more enduring and meaningful must be frustrating. His purpose in life is an obsessive level of achievement-orientation, with F1 racing as an end in itself rewarding materially, but extracting a price.

The book should have been titled 'Memoirs of an F1 Racing Car Chassis Designer' as it is essentially a warts-and-all memoir laced with quintessentially British humour. Newey's diagrams and photographs, which are presented in blue and black give a 'period feel'.

A glossary of technical terms is included, without engine and tire related terms such as fuel efficiency, rolling resistance coefficient or wet traction. There are no book or website references. A table of F1 world champion drivers and constructors and basic circuit information with layout diagrams and the technical specifications of the models described would add value to the book.

After reading the book, I thought: With Ecclestone gone and a new dispensation at the helm, and having reached the pinnacle of success, how can F1 racing be technologically relevant in the age of AI, IoT, and autonomous navigation? The general public is an interested party, and FOA must look beyond the financial lure of the business, the image and the brand building of its sponsors to achieve beneficial outcomes in the sports aesthetic and environmental impact.

Neil says

I received a free copy via Netgalley in exchange for a honest review.

This is a must read for anyone interested in Formula One.
Absolutely brilliant.

Bjoern Rochel says

Brilliant book for people that are interested in the technical side of formula one
