MOTORPRO

HEY IMI! WE'RE TAKING OVER THE MAGAZINE

ACCELERATE YOUR CAREER IN AUTOMOTIVE
JAN/FEB 2020

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How to... Tune up accident repair_Get MOT testers interested in CPD_Boost team morale

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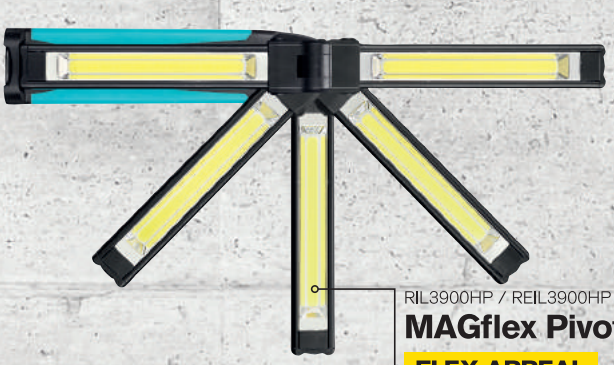
INSTITUTE OF THE MOTOR INDUSTRY

DRIVING FORCE

The past 100 years have brought rapid change to the industry, and there's a lot more of that on the horizon.

It doesn't matter if you're sales- or repair-focused, just beginning your career or settled in the industry, it's time to prepare for autonomous technologies, connectivity, alternative fuels, changing ownership models and environmental pressures.

As it enters its centenary year, the IMI is gearing up to be a crucial part of that future, helping the industry to evolve, adapt and succeed over the next 100 years. There are lots of plans in the pipeline for the coming months, from important campaigns to new events and offers, giving members the opportunity to get involved, celebrate and help define the shape of things to come.



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Welcome

I'd like to thank Steve Nash and the IMI for handing over the front section of the magazine for this very special Talent Takeover edition. We're here to celebrate some up-and-coming automotive leaders and shine a spotlight on some of the big trends reshaping the industry.

01 TALENT TAKEOVER

In this issue, you'll hear from inspiring individuals from across the different sectors of the automotive industry, each telling their own story and highlighting the trends affecting their future and the prospects of generations yet to come.

I have been working in the industry for eight years, starting out as a Light Vehicle Apprentice, then becoming a Customer Service Adviser at Volkswagen and most recently establishing the UK market for Electude and bringing its eLearning resources to automotive students. In that time, these key topics have followed me, and their relevance has only intensified...

02 TECHNOLOGY

The automotive industry across all sectors has been hit by a tidal wave of new technology. In some areas, we were unprepared and are still picking up the pieces, but I believe that we can learn from this and use it as an opportunity to develop and reinvent our industry for the better.

The IMI is doing great work on our behalf on topics such as EV and hybrid safety standards, plus much more behind the scenes to make it all happen.

03 STEREOTYPES

We are all affected by stereotypes around gender, race, religion and even the clothes we wear or the music we listen to. It can be exhausting to break down these barriers.

The stereotype we all have in common surrounds our industry as a whole. If you do a Google Images search for the word 'mechanic', you're immediately given an honest representation of how the world views us, and that includes potential students, their parents and prospective customers. We may know different, but that stereotype is extremely damaging when it comes to engaging young people considering a career in the automotive industry.

04 DIVERSITY

The lack of diversity in the automotive industry is a topic I can speak about personally. As a female technician, I have been a minority from day one of my career.

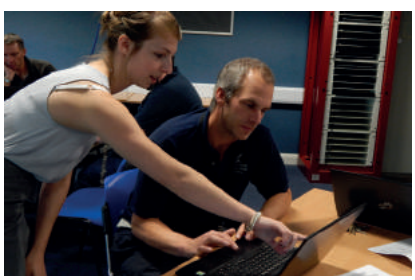
If we want change, we have to stop doing things the way they have always been done. Diversity really is the key to solving a lot of the challenges facing our industry.

05 CHANGE

All the topics here are about change, and that's no coincidence. I believe that change is a great thing because it challenges our preconceptions.

I also believe that these topics can work together to uncover their own solutions. New technology can change stereotypes and public perception. That in turn can improve diversity in recruitment, which will then help us get to grips with new, rapidly evolving technologies.

I know that it's the next generation that will be changing the industry, making it more advanced, innovative and diverse.



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Cat Treanor is Electude's UK Business Development Manager and the winner of the 2019 Contribution to the Work of the IMI Award

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-£

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Day 1

Fit Module

Unable To Program

Day 1

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Day 2

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STEVE NASH, IMI CEO
ONLINE

Q&A

He may have given up his leader column this issue, but Steve isn't escaping that easily. He gets a grilling on the future of the industry from some of its young stars

BEN EATON
Where do you predict the motor industry will be in 20 years' time?

We're heading towards a zero-emission future; that's already baked into vehicle manufacturers' product plans. What's more of an open question is whether it will be battery-electric vehicles or hydrogen fuel cell technology. The second part of that future is the concept of mobility as a service. We've already moved away from buying cars to people buying the use of cars, and there are now organisations offering full subscription services. Then there's the question of shared mobility. The younger generation is less attached to the idea of owning vehicles; many are already using Uber and similar services to meet their needs, and there's an expectation that this will happen to an even greater extent in the future.

MATTHEW McKEOWN
Will Brexit affect the timescale for the introduction of new technologies such as electrification?

The industry is global and is being driven by things bigger than Brexit. The next wave of EU emission standards means that the industry will soon have to reach an average of 90g of CO_2 per kilometre, with further significant reductions required by 2025 and 2030. Brexit presents plenty of potential challenges, but the factors driving the adoption of new technologies such as electrification will be unaffected.

DARYL HEAD
How do you think autonomous vehicles will affect the crash repair sector?

The move to fully autonomous vehicles will take much longer than people may realise. There are currently more than 30 million cars on UK roads, and if you consider the average lifespan of each car, it'll be a gradual change rather than an instant switch. As firms develop more complex advanced driver-assistance systems (ADAS), the building blocks of autonomous functionality, the number of crashes will undoubtedly reduce. However, the complexity of repairs will probably increase because of the technology integrated on vehicles. We'll therefore see continued consolidation, but there will still be a healthy crash repair industry.

MICHAEL MASSEY
What will bodyshops look like in 20 years' time, and is it possible for them to be fully waste-free?

When you compare the bodyshops of today to those of 30 years ago, the differences brought about by more demanding environmental regulations and more advanced materials have been huge. That trend is set to continue. The effects of the End-of-Life Vehicle Regulations from 2003 and the ongoing pressure to reduce the whole-life impact of vehicles means you can expect further change in terms of the materials used in manufacturing. That has a knock-on effect on repair processes. It's fair to say that the self-sufficient and waste-free bodyshop has to be the aim, and it should be achievable within the next 20 years.

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"MANUFACTURERS AND SUPPLIERS REALLY NEED TO HAVE REPAIRABILITY ON THEIR RADAR FROM THE START WHEN THEY'RE DESIGNING THESE SYSTEMS"

The challenges of repairing modern vehicles (page 39)

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How to...

MOTORPRO

The IMI
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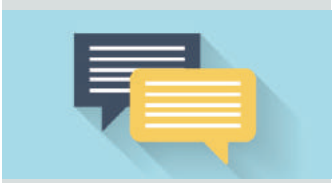
MAKE THE MOST OF YOUR IMI MEMBERSHIP

UPCOMING MEMBER ASSOCIATION EVENTS

Organised by IMI members, Member Association (MA) events include lectures, practical demonstrations and product updates held at a local level to support individuals working in or training to enter the automotive industry.
–
They're a fantastic opportunity to meet your peers, network with others in the industry and hear about the latest technological developments.
–
If you would like to reserve a place for an MA event, head to theimi.org.uk/upcoming-ma-events



GET IN TOUCH

Have questions about MA events, want to set up your own or become a speaker? Please contact our Member Network and Events Officer, Georgia Foley, at georgiaf@theimi.org.uk, or call her on 01992 511521

OLDBURY MA
IMI & AA CPD event with talks on ADAS, TPMS & DPF efficiency and workshop appraisals
Sat 25 January 2020
Start: 10:00
Venue: Swallowfield One, Wolverhampton Road, Oldbury, B69 2AG
RSVP: Vaughan Pilmore AMIMI vaughan.pilmore@theaa.com
07738 798279

BIRMINGHAM MA
An update from TMD Friction UK with Scott Irwin MIMI, Head of Technical Training
Tues 11 February 2020
Start: 19:30
Venue: South and City College, Bordesley Green Campus, Birmingham, B9 5NA
RSVP: Paul Jarvis AMIMI birminghamimi@aol.com
07905 276244

NORTH LONDON MA
Legislation update with Es Shepherd, Road Transport Consultant
Weds 5 February 2020
Start: 19:30
Venue: Jolly Farmers Pub, Enfield, EN2 7QS
RSVP: Paul Arber IEng FSOE FIRTE irtenorthlondon@soe.org.uk
07747 116264

NORTHAMPTON MA
Air-con servicing – as simple as just regassing? With Jamie Chancellor, Autoclimate Ltd
Tues 11 February 2020
Start: 19:00
Venue: Northampton College, Booth Lane, Northampton, NN3 3RF
RSVP: Colin Parker AAE MIMI cparke27@yahoo.co.uk
07587 707605

SUSSEX MA
Looking to the future with Renault Cars
Thurs 20 February 2020
Start: 19:45
Venue: Plumpton College, East Sussex, BN7 3AE
RSVP: Douglas Wragg AAE MIMI dgwragg@gmail.com 01444 811349

KENT JOINT REGION
Please register your attendance via the CILT (01536 740104 or membership@ciltuk.org.uk)

Gaining traction – the story of the restoration of the GKE 68 and a history of tram and bus services in the Medway towns
Weds 4 March 2020
Start: 18:30
Venue: DHA Planning, Sittingbourne Road, Maidstone, ME14 3EN

SUFFOLK MA
Ever-increasing energy with Rick Kerry Motor Racing
Weds 18 March 2020
Start: 19:30
Venue: Best Western Ipswich Hotel, London Road, Copdock, IP8 3JD
RSVP: Trevor Whiting MIMI trevorwhiting@btinternet.com 07504 831761


Rick Kerry

THE IMI CENTENARY DINNER
Weds 11 March 2020
InterContinental London Park Lane
Park Lane, London, W1J 7QY
Don't miss out on the opportunity to join us for our unforgettable 2020 dinner. Be part of our 100th birthday celebrations, offering a wonderful opportunity to celebrate with colleagues and network in style. We will be recognising the incredible talent, commitment and passion that are needed to develop the sector in the form of the IMI Awards for Outstanding Achievement. The evening will include special guests as well as after-dinner entertainment.

For individual ticket and table options, visit: theimi.org.uk/landing/annual-dinner

IMI MEMBER BENEFITS

EVERYTHING WE DO, WE DO IT FOR YOU...

We maintain standards. The IMI offers skills benchmarks and high-quality specialist qualifications. Members can access these through our network of approved centres.

We develop people and careers. The IMI is an end-point assessment organisation for a number of apprenticeships. In this way, we provide robust career pathways for ambitious individuals working in the automotive sector.

We run a nationwide membership community. As an IMI member, you're part of a vibrant community of automotive professionals and have access to an exclusive package of career support, CPD, content and networking benefits.

We assess and accredit individuals operating in the sector. We do this across technical, customer-facing and management roles. The IMI's Professional Register is the gold standard for individual excellence in the industry.

We campaign and build public confidence in the sector. Every day, our team of specialists advises the government and the relevant authorities on the skills and technical standards that the sector needs. We are particularly committed to issues of safety and maintaining the automotive sector's position as a great place to work.

To find out more about taking advantage of your IMI membership, visit theimi.org.uk/membership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WHAT IF...

We'll let you know when the album drops. Left to right: Daryl Head AMIMI, Cat Treanor MIMI CAE, Kieran Leyland and Michael Massey AMIMI

PORTRAITS_WILL AMLOT

...we handed the keys to the industry to the next generation – right now? What kind of automotive sector would they create? Which bits of the current mix would they keep, and what would they get rid of?

That future is closer than you think, and at *MotorPro* we're all for looking ahead. For this special edition, we gathered a group of rising stars at WorldSkills UK Live in Birmingham to set the agenda for the industry. Their answers provide a glimpse of a positive, sustainable, diverse and inventive future.

So without further ado, here are six ways they expect the motor industry to innovate and evolve.

01 FASTER REPAIRS, SHORTER TURNAROUND TIMES

Don't shoot! Right: Michael Massey AMIMI Below: Daryl Head AMIMI

PEOPLE DON'T WANT to be without transport for long, so repairs must be made faster than ever before, according to two rising stars of the repair sector.

"There is a huge push right now when it comes to how quickly a vehicle can be turned around – from the collision on the road, to a bodyshop and then back to the customer," says Michael Massey AMIMI, an Application Engineer at 3M. "It has become a priority to get the customer back on the road as quickly and as safely as possible."

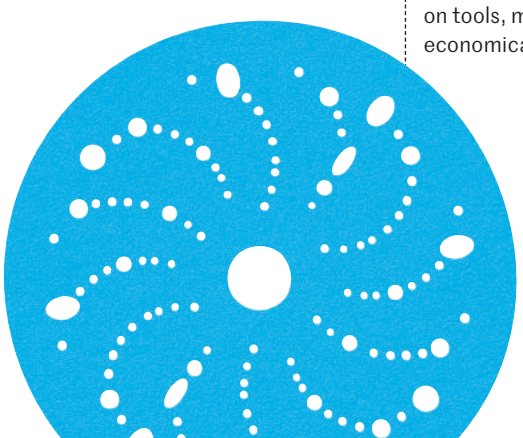
That means using the very latest technologies. Massey has noticed a big increase in smart repair centres and all-in-one bodyshops across the UK and Ireland. In these businesses, technicians will be tasked with completing small repairs that take minimal time: small scuffs, stone chips, car-park prangs and alloy-wheel refurbs. "They're all tasks that can be undertaken without stripping the vehicle down and taking on huge repairs with fillers, painting the whole side of a car or replacing panels with new ones."

Smart repair technicians and booths can help to take the pressure off standard bodyshops, resulting in fewer vehicles on site to cause bottlenecks in the shops, says Massey. "These solutions also free up technicians to take on the bigger jobs," he explains.

Daryl Head is another speed merchant. The 23-year-old Paint Technician at Nationwide Accident Repair says: "The repair industry is changing as people want things done more quickly, so cycle times need to be reduced. There has been a lot of UV technology coming in, which is drastically reducing bake and application times.

"It's quite a new technology but it won't be the last. There's a lot more to come in the future."

SIX TECHNIQUES SPEEDING UP REPAIR AND REFINISHING



01 Ceramic abrasives provide a quicker cut and benefit from a longer life. The technology reduces sanding time and wear on tools, making it more economical too.

02 UV curing lights reduce the time it takes to cure panels before they're sent to the next stage of the process by up to 80%, meaning work can be carried out faster – and without a reduction in quality.

03 Flexible foam abrasive discs combine an aluminium oxide abrasive with a soft foam to provide versatile blending. They benefit from a long life, meaning bodyshops need to buy far fewer of them.

04 Trizact™ discs have a microscopic 3D mineral structure that provides a fine finish, meaning less time spent polishing and less product being used.

05 Fast-drying products have helped to reduce the time it takes to cure body filler and primer, meaning work can begin sooner. Rather than a 20-minute curing time, plus the time it takes for the panel to dry after force-drying, UV friendly paints can speed up the process by more than 80%.

06 Clear coats can be ready for refinishing in less than ten minutes from the bake cycle. The same can be said about consumables, Massey explains: "Quicker-cutting abrasives, the speed of cut in a polishing compound and even how quickly you can mix the paints and hook up the gun all play an important part in an efficient workshop."

Saturday 25th January

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Bring your workshop up to speed at our next FREE IMI approved training day.

At Schaeffler, we believe that all garages can enjoy a successful and prosperous future, IF they keep up with new vehicle technologies AND invest time and effort in learning how to diagnose, repair and replace them. As a world leading OE supplier of these latest components and systems, Schaeffler is ideally placed to help. So, in partnership with the IMI, we are hosting a series of free training days designed for professional workshop technicians. Every event will be held at an IMI approved training venue, and includes technical and business masterclasses from our own experts - plus special guests such as Andy Savva - The Garage Inspector.

The next event takes place on **Saturday 25th January at Basingstoke CoT**. Places are limited, so make sure you reserve your space early by visiting: **www.repxpert.co.uk** or **www.theimi.org.uk**.

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"The more technologies that are included on cars, the greater the need to be able to explain them to customers"

02 TECHNICIANS ON THE FRONT LINE

JASON RATCLIFFE (left) is a Master Technician at Rybrook Volvo in Warrington. Having been through the apprenticeship programme, completed the Level 3 diagnostics course and then taken on hybrid diagnostics, the final piece of the development jigsaw was gaining Master Technician status. That came with an extra challenge: becoming confident enough to speak to customers face-to-face.

"Many people think they can stay away from the public in the safety of the workshop, but the more technologies that are included on cars, the greater the need to be able to explain those systems and products to customers," says Ratcliffe.

"Autonomous systems, connectivity and electrification have made a huge difference since I started my career, but in my opinion, the biggest change in the industry is customer interface."

Gone are the days of customers dropping off their vehicle, it disappearing into the garage and them not seeing it again until it comes out fixed. Now customers want to see what's happening and have it explained to them. "A lot of my job at the moment isn't hands-on, getting my hands greasy," says Ratcliffe. "It's making sure the customer is aware of how the car is supposed to work and making sure they're using the functions correctly.

"As the three pillars of electrification, connectivity and autonomous functionality become more prevalent, we need to be on top form all the time and up to date in our knowledge so we can explain the technology to our customers."

03 MOTORSPORT FOR ALL

JIANE VANE AND AMI-MAY WOOLMER are both students at Chelmsford College and members of the Crazy Diamond Racing Team. The team has designed, built and raced an electric car at a number of Greenpower Challenge events, all leading towards the IET Formula 24+ Championship. The competition is geared towards sixth forms, colleges, universities and apprentices with the aim of boosting participants' career opportunities in science, maths, technology and engineering.

Vane looks forward to a time when women are competing at the pinnacle of racing: Formula One. "It would be so much nicer for girls watching F1 to see a female driver on the track. It would be really inspirational – especially for female drivers, but also for engineers. Only 9% of engineers in the UK are female. Just to be a part of that 9% would be great, but trying to expand it would be a real honour."

MOTORPRO ASKED VANE AND WOOLMER ABOUT THEIR FUTURE PLANS...

***MotorPro*: Is motorsport your ultimate goal?**

Ami-May Woolmer: Yes, definitely. We want to try and be part of a racing team in F1.

—

Jiane Vane: There aren't many women who have driven for F1 teams, but we've been researching and looking at apprenticeships and other routes in. The W Series, which is just starting, is looking for female drivers, so we're hoping to contact them and see if we can qualify for one of its teams.

Shine on, you crazy diamonds. Above: Jiane Vane Left: Ami-May Woolmer

What could F1, the FIA or the IMI do to help make the industry more appealing and less challenging to get into?
AMW: There could definitely be more colleges involved in motorsport, and apprenticeships could help to get young people involved in the teams so they aren't just on the sidelines. Apart from that, they should be trying to get women involved! The industry needs to be more equal.
—
JV: It's amazing to see women actually being recognised for what they're doing, but increasing the spread of women in engineering and motorsport would be a really big plus. To have someone say to us one day, 'Oh, I've been watching you since I was little and that's why I've gone into motorsport', that would honestly make me so happy.

> "It's amazing to see women actually being recognised for what they're doing, but increasing the spread of women in engineering and motorsport would be a really big plus"

How did the Crazy Diamond Racing Team come about?
JV: Our tutor was the one who started it all. He came to us asking if we'd like to drive for Crazy Diamond as part of the Greenpower Challenge, and we both said yes. That's when the fun began, because we had to make the car first with the two other team members. Every team gets the same motors and batteries, but then you have to decide on the shell and the aerodynamics – and then finally, we got it on the track.

How did your first race go?
AMW: Our first race was at Goodwood. We were hoping to get into the top ten but we weren't really pushing to finish in any particular spot. We just wanted to see how the car ran, how it handled on the track and whether we could actually make it to the end of the race. But we ended up doing quite well and finished fifth.
—
JV: We'd never really tested the car on a track, and finishing fifth really got us some recognition.

Has the success continued?
AMW: We went to the Bedford Autodrome for our second race and came second. It was a really difficult race to begin with. There were cars being pulled off because their batteries became too hot, but we were able to get out there and push the car to its full potential. We had a little downturn after that, but even though we've had problems – a tyre blowing, for example – we always get back out there and continue to race.

04 THE ALTERNATIVE FUEL REVOLUTION

Truck drivers will still have to answer the call of nature though. Right: Kieran Leyland

A COMMERCIAL VEHICLE will rack up hundreds of thousands of miles over its lifetime. In order to minimise the financial drain on the businesses that run them, they need to use as little fuel as possible. It may not sound sexy, but fuel economy is – and will remain – king.

The other big deal in commercial vehicles is emissions. This really began to bite with the introduction of the Euro VI emissions regulations in 2013 to tackle NO_x, particulate matter and hydrocarbons. And the emissions issue will escalate even more when the Euro VII regulations are eventually introduced...

"Moving forward, we'll see a lot more alternative fuels taking over from diesel – compressed natural gas and possibly hydrogen. Whatever comes next, it'll mean a lot of new training"

How will Euro VII change the industry?

Whenever it arrives, the seventh iteration of the European directive on harmful pollutants looks set to focus on overall efficiency, which would mean targeting CO_2 emissions and, more generally, fuel economy. The combined focus on all emissions between Euro VI and VII could be the catalyst for the introduction of alternative fuels and powertrains as manufacturers look to meet these more stringent targets.

Kieran Leyland is a Master Technician at Ryder. For him, the challenge around emissions is as much about skills as the underlying technologies.

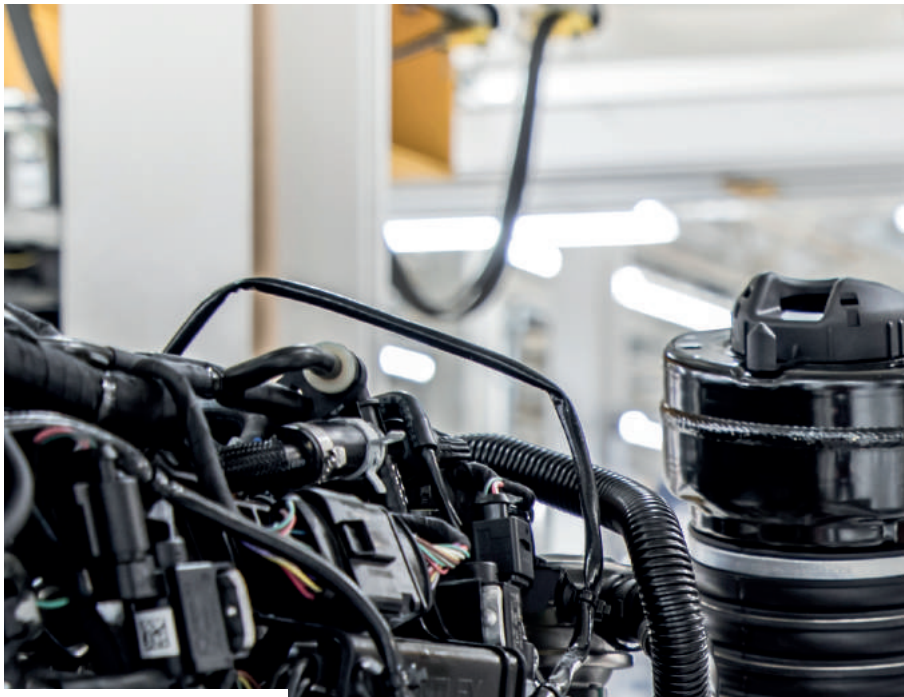
"The introduction of diesel particulate filters and exhaust-gas recirculation has made vehicles more complex. It has meant using far more diagnostic tools," he explains.

"So when you're looking at a truck's engine or transmission, it has become a lot more involved. There are more components to check and systems to make sure are working correctly.

"Moving forward, we'll see a lot more alternative fuels taking over from diesel – compressed natural gas (CNG) and possibly hydrogen. Whatever comes next, it'll mean a lot of new training. CNG vehicles are very different to what most technicians are used to. There are lots of safety aspects when it comes to handling CNG, especially as the fuel is stored at high pressure in the tanks, meaning you need to have special detectors in the workshop. And because of the nature of the fuel, if you want to do any welding or hot work around the vehicle, you have to take specific precautions.

"People will have to specialise in specific areas in order to be able to keep up with the newest technologies. The principle of how a diesel engine works hasn't changed for a long time, but moving to alternative fuels feels completely different, and it's something that no one has really dealt with before," Leyland explains.

05 GIRLS WITH SKILLS



"I'M NOT ONE of the typical people you see in the automotive industry," says Cat Treanor MIMI CAE. "At the first garage I worked in, I was one of just four employees, and the only woman. At college, I was one woman among 17 men. At my last dealership, I was one of three women out of 40 staff members. And at many automotive events, I'm one out of maybe five or six women in a room of 70 or more."

HOW WOULD THE INDUSTRY BENEFIT FROM BEING MORE DIVERSE? OVER TO YOU, CAT...

01 **It'll plug the skills gap.** Companies continuously develop their best vehicles, evolving individual components over the years. If they didn't, they'd be left behind. The motor industry has typically recruited in the same way and targeted the same people again and again, which means achieving the same results. But there's a skills gap to fill and women are a large untapped resource.

02 **It'll promote innovation.** Women alone won't solve the lack of talent coming into the industry, but they will improve it in other ways. Having both women and men in a team means you benefit from the different points of view and approaches that come from different life experiences. Those perspectives can inspire creativity, promote innovation and help organisations find and seize new opportunities. It changes the dynamic for the better.

03 **It's already happening.** Take a look at the 'Girls with Skills' fast-track work experience programme from Arnold Clark. This is aimed specifically at young girls, and it has led to an increase in the number of female apprentices. The firm has even created guides for schools and parents to encourage their children to go into the trade.


BENTLEY

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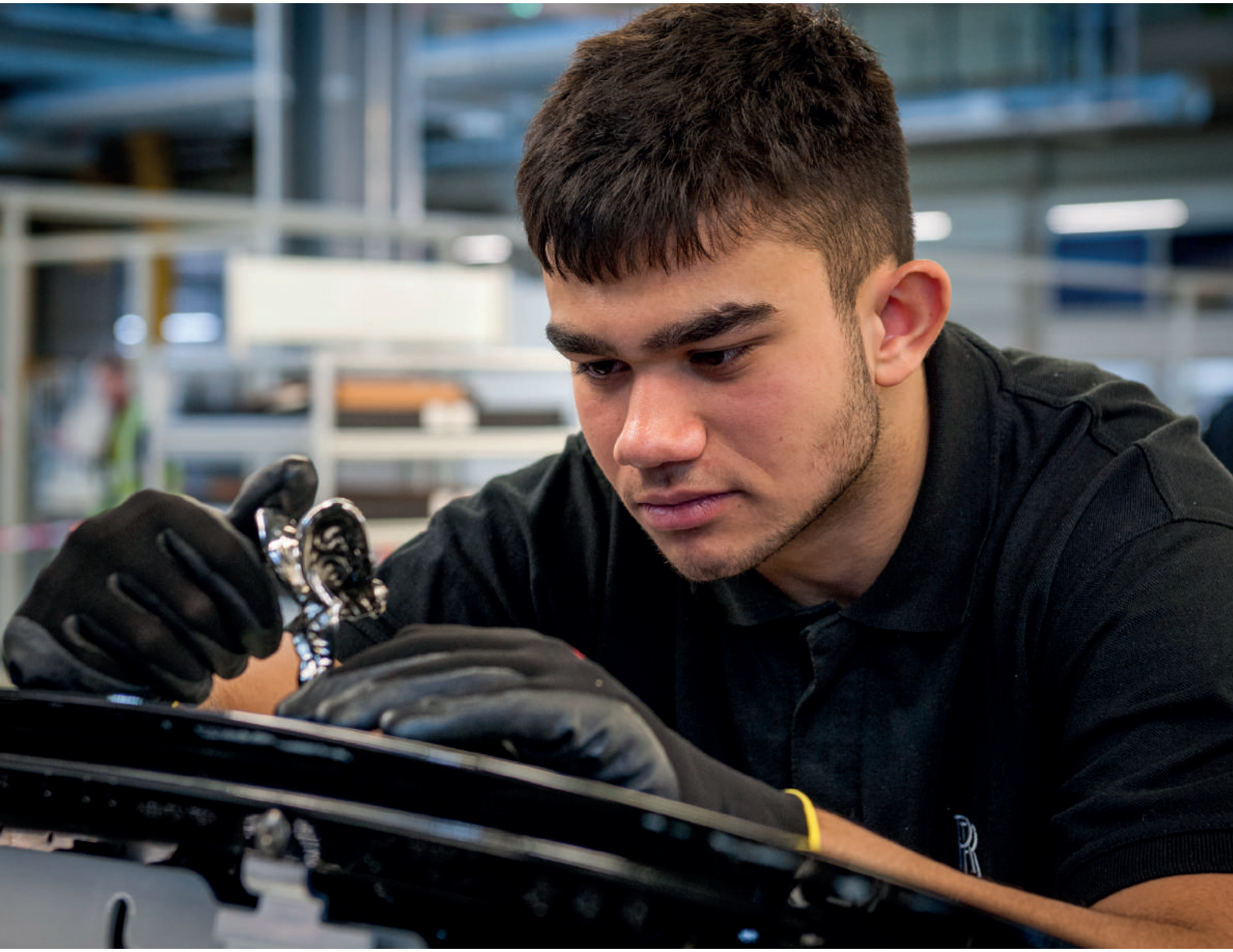


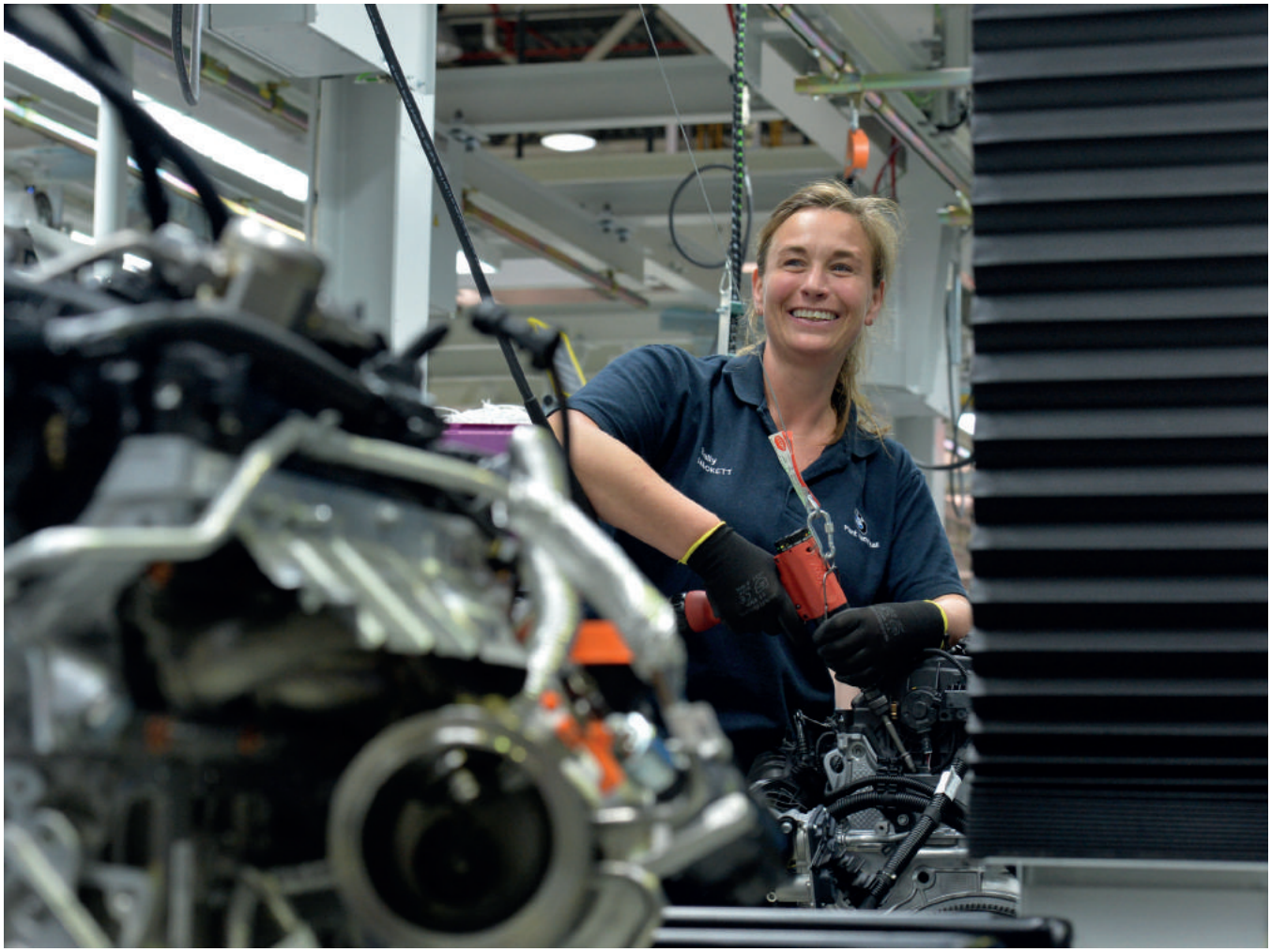
06 REBOOT THE BRAND

THE MOTOR INDUSTRY has a real image problem. Some careers advisers give out inappropriate advice, and the media tends to repeat unhelpful stereotypes about technicians. These are then taken on board by parents and teachers, which makes the battle to convince young people that they could have a successful, rewarding career in the motor industry even tougher.

So how do we change perceptions about the automotive sector, especially among school-leavers? Who better to ask than Matthew McKeown (right), an inspirational lecturer from South West College, Northern Ireland?

PREPARE STUDENTS FOR THE REAL WORLD

"The industry isn't the same as the books that students are taught from. When you're working on a car, you won't be looking for a man-made fault, you'll be looking for something more random. In class or during a competition, a fuse might have been cut to induce a fault, but you won't see that in real life. You have to apply a mixture of your mechanical skills, common sense and a logical approach to fault-finding." >



USE A VARIETY OF TEACHING METHODS

"Students aren't always enthusiastic about learning, but there are ways to get them interested. As well as the usual classroom material, I use different approaches such as video calls to walk students around vehicles and show them different parts that might be interesting. In my business, I'm lucky to work with high-performance vehicles – BMWs, AMGs, Evos and Skylines – so I sometimes bring them in and show the students around the vehicles. Everybody wants to see the cool stuff!"

GO RIGHT TO THE SOURCE

"The number of people applying to be mechanics has been going down over the past three years. We're getting fewer students through the door. There have been a number of campaigns to try and encourage more people to fill the existing positions in the industry, but what you have to do is go to the schools, talk to the pupils and then bring them to the college. Give them a taster of what they could be doing after school. It's about making the industry look appealing, exciting and interesting."

GET THEM ENTHUSIASTIC ABOUT WHAT'S COMING

"When I was growing up, I had a favourite car, and when I speak to students I always ask them what their favourite car is. Nobody ever says an EV, a Tesla or a Nissan Leaf. Why? We all know that electric and hybrid vehicles are the future, but sometimes these things put people off. They shouldn't. If we can get school students to realise that there's no problem working on these vehicles, we could bring them over to the electric side of things. We also need to challenge the ideas that EVs are noiseless and slow. I've used YouTube videos to show a V8 face off with an electric car, and the students have been astounded that the EV won."

TALK ABOUT BUSINESS SKILLS

"Working in the motor industry isn't just about being able to fix cars. It's also about how we manage our businesses, how we advertise and of course how you keep customers coming back. You might have been a mechanic for 40 or 50 years but if you don't know how to bring in new work, and if you aren't open to new training and learning new stuff, you'll find it difficult to succeed.

"We must deliver more business-oriented information to the young people joining the industry; firstly, because it's an important part of anyone's career, and secondly because we're going to have fewer technical things to do as cars develop and the component count drops."

To find out more about how the IMI is supporting schools, teachers and parents to inform young people about careers in the motor industry, visit theimi.org.uk/autocity

YOUR GUIDES TO THE FUTURE

Cat Treanor MIMI CAE
UK Business Development Manager, Electude
Sector: Light vehicles
Age: 25

Kieran Leyland
Master Technician, Ryder
Sector: Heavy vehicles
Age: 22

Michael Massey AMIMI
Application Engineer, 3M
Sector: Repair
Age: 29

Daryl Head AMIMI
Paint Technician, Nationwide Accident Repair
Sector: Refinishing
Age: 23

Ami-May Woolmer and Jiane Vane
Students, Chelmsford College
Sector: Motorsport
Ages: 17 and 18

Jason Ratcliffe
Master Technician, Rybrook Volvo
Sector: Light vehicles
Age: 24

Matthew McKeown (left)
Lecturer, South West College
Sector: Education
Age: 31

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WHERE THE RUBBER MEETS THE ROAD

WORDS_REBECCA CHAPLIN **IMAGES**_WILL AMLOT

Taking a classic approach to tyres has helped this MOT centre keep the wheels turning

Mark Wilderspin has spent 15 years building up the tyre business at Biggleswade MOT Centre

WITHOUT MISSING a beat, Mark Wilderspin answers my questions and those of his colleagues at the same time, throwing out short responses to keep everything running smoothly. He may well be the calmest man I've ever met, and as Manager of Biggleswade MOT Centre, he's the one keeping all the plates spinning.

The site, just off the A1 near Bedford, does exactly what it says on the tin – it's an MOT centre in Biggleswade – but the business's core values shine through in everything it does, from servicing and repairs through to tyres.

The independent garage was set up in 1983 by owner Colin Waldock. Nearly 40 years on, the business shows no signs of slowing down. In an average week, Biggleswade MOT Centre welcomes around 300 customers through its doors, and, as Wilderspin explains, not even recessions have been able to dent this level of trade. With his steady hand on the wheel, it's no wonder the team is able to focus on delivering quality work.

Constantly adapting has been a key factor in this success. When Wilderspin joined 15 years ago, he was tasked with introducing what has since become a flourishing tyre business. That specialism has now grown to become one of the strongest parts of the garage.

Adapting again, the business has recently found itself a new niche in the local area, opening up a useful pool of customers. There are a number of classic-car clubs nearby, and the classics scene has a growing problem: the tyre sizes that these cars were originally fitted with are becoming harder to source. How often do you see tyres to match the 10" wheels found on a classic Mini?

This is where Biggleswade MOT Centre's focus on customer service has paid off. The team tries to go the extra mile to help these drivers out, keeping their classic cars on the road with modern equivalents of the original tyres.

It's not just a question of finding the right size though, as many classic-car customers are concerned about getting the right look too. Wilderspin even goes as far as to offer consultations on the different aesthetic options for his customers, resulting in rave reviews that spread through the classics community and keep customers coming back year after year.

The proof is in the numbers too. Although the business stocks most brands of tyres, last year it was named one of Falken Tyres' top retailers in the UK. Speaking to *MotorPro*, Wilderspin explains exactly how the business reached where it is today...

MotorPro: How has Biggleswade MOT Centre changed over the years?

In the last 15 years, we've moved to selling a lot more tyres. As the demand grew, we decided to set up our own tyre-fitting bay.

I used to run the tyre and exhaust centre up the road, and then Colin asked me to come and set up a tyre and exhaust section for him here. We now have one bay with three tyre fitters in there, an MOT bay and about ten lifts.

In an average week, we're seeing about 300 customers. We get about 10 to 15 MOTs a day, and the tyre bay at the front sees about 15 to 20 cars a day. Then, we've got the mechanical side, which handles about another 20 cars a day.

Have the customers changed over time?

No, not really. The biggest change we've seen is the size and price of the tyres. Going back a few years, the average tyre was £40 to £50. Now, we're getting up to £100 or £120 a tyre for most cars.

How does that go down with customers?

They don't really seem to mind. Tyres have become a lot bigger over the years, as have wheels. When we started, normal tyres were 13" or 14", but now they've moved up and most of the cars are on 17", 18" or 19" tyres.

Has that meant you've had to adapt the business over the years?

We've needed to get new machines, and we have invested in two new HPA-Faip

Ben Large examines the garage's extensive range of tyres

Dave Woods (left) and Richard McGinn (below) get to work on customers' cars

machines, a tyre balancer and a tyre fitter, and we've also bought new Snap-on and John Bean tyre-fitting machines too.

For the bigger tyres and the run-flats, we have to make sure we've got the latest equipment. The machines are an added cost for the business but it's not something we've ever passed on to the customer.

It's not all about bigger tyres on new cars though, is it?

We've got a few car clubs around here, and we get a lot of their members calling up and asking for tyres. We'll either sort out the tyres they want or, if we can't get the size, we'll sit down with them and explain that a certain tyre is the closest we can get to it and recommend that they should go that way.

The problem they have is that you can't get a lot of the older tyre sizes now, so you have to work it out, go to a new tyre and make sure they're still going to work on the car for them.

How do you work that out?

To find the sizes, I look it up on the internet using tyre-size calculators. We put the old tyres in and it tells you the choice of new sizes you can go to. That will sometimes give us a couple of options to choose from.

Is it difficult to find a tyre that looks right?

Classic-car customers really want to go for the look of the tyres. Very few of the new tyres look like the classics – they're ribbed unlike the old ones, which were like blocks. However, most of the time, we're able to come up with something that gives the customer something close to the look they want. We usually come up with a choice of four or five, show them the pictures and they choose from there.

We try to keep them happy and make sure they get the right tyre for them. Once you've got classic-car customers on board, they've probably got another two or three cars in their household and you end up getting the business for them as well.

Does this mean you get a lot of referrals?

Yes, we had a customer the other day who had seen us in a magazine. He came to us for a full set of tyres, having travelled from about an hour and a half away. He called me up on the phone, and I went through a few choices with him, directing him to different websites for the right tyres. Then he called me back to say, "I'll go with that one".

How do you go about looking for new ways to serve customers?

We're always buying new machines and equipment. We just bought another recovery truck, and we try our best to always keep up to date with the latest things that are released. The next big thing will be MOT changes, but we're prepared for that too. ■

—

Mark Wilderspin was speaking to Rebecca Chaplin

IMI's Professional Register is an industry-wide database of professional individuals recognised for maintaining their knowledge, skills and competency. Visit theimi.org.uk

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For a full list of the IMI's accreditations – which provide individuals with proof of current competence for their automotive abilities, using skills- and knowledge-based assessments – search 'IMI accreditation'

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READING THE ROAD

The Audi A8 is one of the most advanced cars on the market, bristling with cutting-edge ADAS technology. *MotorPro*'s James Scoltock is given an up-close tour of the top-of-the-line saloon

WORDS_ JAMES SCOLTOCK / **IMAGES_** BEN WRIGHT

THE FUTURE, we are constantly told, is vehicles that drive themselves. No matter where you are or what you're doing, the car you get into will be able to take you wherever you need to go.

It's a future that may not seem all that close at hand when you look at the frustrated faces trapped behind steering wheels up and down the country. Even so, vehicle manufacturers are working hard to develop the technologies that will eventually make self-driving cars a reality.

Audi, for example, has invested a significant chunk of its R&D budget in self-driving technology and has already taken driverless cars onto racetracks and public roads. It may not have put a self-driving car on the market yet, but it has used its existing knowledge to make some of its current fleet of vehicles as comfortable, convenient and safe to drive as possible. It's all thanks to an array of advanced driver-assistance systems (ADAS) – the basis for most self-driving technology.

"You just stand in front of the car, James. I'll hop in and start the engine..."

The A8 saloon is the pinnacle of the brand's achievement in this regard. Its 24 onboard sensors monitor its surroundings and keep both vehicle and occupants out of harm's way. That includes 12 ultrasonic sensors on the front, sides and rear; 360° cameras at the front, the rear and on the exterior mirrors; a front-facing camera on the windscreen; a mid-range radar sensor on each corner; a long-range radar sensor at the front; a front-facing laser scanner; and an infrared camera.

To learn more about the task of fixing and maintaining these complex vehicles, I took a closer look at this tech-laden motor with Audi's A8 Master Technician, Neil Barnes. >

FIXING THE FUTURE

Audi A8 Master Technician Neil Barnes explains the intricacies and processes of working on cars with ADAS

01 Do a visual check

"If there's damage to the bumpers or the windscreen, for example, it's a warning that there could be something wrong, so conduct a thorough visual check of the vehicle.

"Look at the condition of the laser scanner, make sure the parking sensors haven't been scuffed or damaged and that the windscreen doesn't have any cracks in it.

"It's about being vigilant when the vehicle comes in to the dealership and you're walking around it, inspecting the various exterior sensors and making sure that everything is in order."

Eyes front... and rear... and sides. The A8 features a huge array of sensors

02 Use your diagnostic tools

"These cars are computers on wheels, so without the correct diagnostic tools you can only do so much. A lot of the faults that could possibly occur will be highlighted on the vehicle's dashboard, and then when the customer brings the vehicle to the dealership we can run the diagnostics software.

"We look at measuring value blocks, where we're looking at live data that gives some feedback that allows us to see what the specific problem is."

03 Get the right training

"It isn't like working on high-voltage systems, where you need specific training before you can work on them. But with ADAS, you need to understand how they work and the different set-ups available.

"A lot of the technicians at dealerships will go on special courses, which are usually quite hands-on, to help them understand the latest technologies involved."

04 Recalibrate carefully

"Although anyone could do the recalibration of the systems, you need to understand how it works, because if you do it incorrectly it could mean the system won't work properly.

"And it isn't always simple to do that, as specific equipment is used to recalibrate the sensors. The laser scanner and radar positioned at the front of the vehicle need to be in alignment with the wheels. There are special backboards, lasers and radars that will send a pulse out and back again to check the system is set up correctly.

"It's essentially about making sure that the vehicle is square."

No need to boast, Neil...

05 Track down the right replacements

"You can buy replacement radar sensors and laser scanners, and they're a few hundred pounds, but then you need to spend money recalibrating them once they're installed. The sensors will also need to be coded to the vehicle."

Sensory overload

Each sensor on the vehicle plays a part in providing information to the onboard computer systems about its surroundings and what's happening at the front, side and rear of the vehicle at any given time.

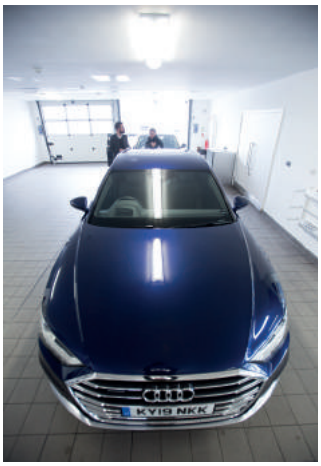
"The laser scanner at the front constantly monitors what's going on ahead. It's looking for objects such as other vehicles and pedestrians," Barnes says.

The laser forms part of the A8's adaptive cruise assist, lane assist and traffic jam assist functions. The system can maintain the A8's speed between zero and 155.3mph (not that that speed would ever be possible on public roads in the UK) and keep it in the correct lane.

The system also uses radar sensors and camera technology. "The centre camera is mapping the road ahead, looking at the road and what's coming up, predicting if you're coming to a crossroads, a roundabout or a corner, and telling the car to back off the power so you can glide nicely through the obstacle," Barnes explains.

The A8 also has a system called constriction assist that can guide it through roadworks, and the front camera is programmed to be able to recognise traffic signs.

The sheer amount of technology on the A8 becomes increasingly apparent as Barnes walks me around the car. Every corner of the vehicle seems to have a sensor of some sort, either on display or hidden away behind one of the panels. You can see the laser scanner, the camera and the ultrasonic sensors, which all work together to offer drivers the reassurance of technologies such as emergency assist, bringing the car to a standstill if the driver is no longer able to do so in time.



Expand your knowledge base

Get up to date with the latest developments in ADAS requirements, including why calibration is so important, with the IMI's Advanced Driver Assistance System course. Visit theimi.org.uk/landing/adas

Meanwhile, Audi's Pre-Sense front safety system helps the A8 to avoid front-end collisions and minimise the severity should the worst happen. It incorporates a warning and braking function should a vehicle, pedestrian or cyclist appear in the road ahead.

Add to this the turn assist and collision-avoidance assist functions, which monitor the lane of oncoming traffic when you're turning across it, and the technology is able to help avoid collisions with oncoming vehicles too. The opposite is also true, as the sensors can detect other cars turning across the lane you're in as well.

"And at the rear of the vehicle are two lane-departure radars behind the bumper on either side, so as you go to change lanes, you'll be warned if there's an obstruction," Barnes adds.

That's only the start of the car's functionality. The list seems endless, and it highlights what we can expect from vehicles in the future as the latest technology trickles down to other segments and manufacturers. We're certainly moving closer to an autonomous future, even if it does seem a long way off. ■

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Christopher Ward

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As vehicles get more complicated, repairing them after accidents will keep getting trickier. Thatcham Research's top technical brain gives us the lowdown

WORDS_ANDREW EVANS

CRASH COURSE

CARS AS WE KNOW them are changing fast. Manufacturers and legislators alike are pushing for huge reductions in NO_x, CO_2 and particulate emissions, while also aiming to improve safety for vehicle occupants and other road users.

Both are laudable goals. However, manufacturers' solutions to these problems invariably make vehicles more complex. For example, the sensors and computers required to operate advanced driver-assistance systems (ADAS) – including autonomous emergency braking, blind-spot monitors and cruise control – add a layer of technology that was almost totally alien a decade ago.

Likewise, passive crash-safety features require new and more complex structures, which can add weight. Manufacturers are therefore turning to advanced and exotic materials to compensate. Even powertrains are becoming more complex, ranging from highly developed combustion engines to battery-powered EVs and hybrid systems combining the two.

All these additional facets have an enormous knock-on effect on accident repair specialists, particularly those in independent garages. So what do repair technicians need to know? Richard Billyeald, Chief Technical Officer at Thatcham Research, takes us inside the problem and shares his advice. >

"Manufacturers and suppliers really need to have repairability on their radar from the start when they're designing these systems"

DON'T BE A CRASH REPAIR DUMMY

GET OVER YOURSELF

Adapting to new technologies is nothing... well, new. Even old technologies such as electrically adjustable door mirrors and heated windscreens increased repair costs when they first appeared.

—

"There is an element of inevitability to this," Thatcham's Billyeald says. "The more technology is applied to cars, the more complex it all becomes, and the more parts are required. That's always going to have an effect on insurance claims costs – especially in the early days of that technology."

POBODY'S NERFECT (SO DON'T WORRY ABOUT THE WORK DRYING UP)

ADAS may reduce the number of crashes, but accident repair isn't going away any time soon. Human error will continue to be a factor on the roads.

—

"The increased use of sensors for ADAS technologies, and how we've seen them go from parking sensors and cameras to active safety systems, offers fantastic support for drivers and is really helpful in raising the lowest common denominator in terms of driver skill," Billyeald explains. "Although the technologies reduce the number of crashes, accidents do still happen."

FIGURE OUT WHAT YOU'RE LOOKING AT

Given the whole range of different sensors and technologies that could be installed on vehicles coming in for repair, what should technicians be doing? Thatcham's approach is effectively a three-stage feedback loop, starting with the proper identification of the vehicle.

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"One Volkswagen Golf looks very much like another, but one might have no ADAS and another could have every box ticked. As a repairer, how do you know what's fitted to that vehicle and what to do with it when you've identified it?" Billyeald asks.

LEARN MORE

Once you've established what you're handling, you'll need to draw upon some knowledge of the model and the specific technologies on board. Guidance from manufacturers may well be the answer, as they have the power to advise the repair industry on what can and can't be repaired, and how.

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"What we want manufacturers to provide are the methods for fixing

High-tech autonomous cars may roll off the production line looking perfect, but accidents still happen...

As Chief Technical Officer at Thatcham Research, Richard Billyeald is responsible for all of the organisation's engineering functions, supporting research into crash safety, physical and cyber security, and repair technologies.

Look on the bright side

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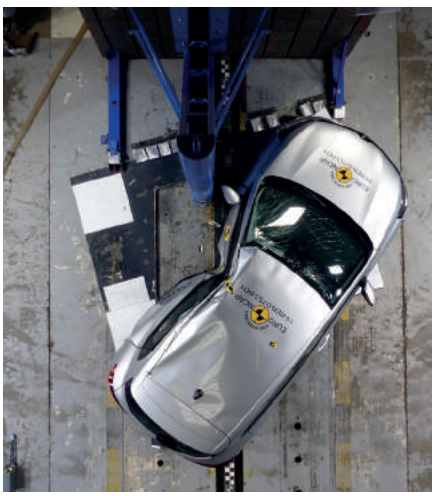
Billyeald recognises that these new challenges tend to provoke resistance to change among repair technicians, but he contends that we should think of this as an exciting time for the sector.

"We sometimes hear from some elements of the industry that these changes are a thing to be feared, but they're not," he says. "Technology is great in general, especially in terms of safety, new powertrain technologies and electrification. These are all good things, but they do present challenges. They're all very new and the industry needs to respond.

"That's what we're here for – to help people understand those technologies, the impact on them and how they can change their approaches and their businesses to cope with it all."



those systems," Billyeald explains. "In what scenario do you need to replace a sensor and recalibrate the system? And remember, in many cases, vehicle manufacturers are mandating that those calibrations must be done with their bespoke equipment or specify that they use their network."

THINK ABOUT THE KNOCK-ON PROBLEMS

The complexity of these new technologies also adds extra time and costs to the repairs process. It's something independent garages will need to bear in mind.

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"Time is money in the claims industry," Billyeald says. "As soon as something takes longer, it costs more money. All of that time, the customer is without their car, potentially driving a courtesy car, which also costs money. There's a financial impact for the repairer and the insurer, but inevitably the impact is also on the consumer. These things affect the efficiency of the insurance claims. If it's not possible to identify that cost at the beginning of a claim, it can have a huge effect, and it's more time the consumer is without their car."

GO BEYOND THE GADGETS

The repair work of the future won't just be about sensor technologies and ADAS. Technicians also need to be aware of the raw materials used in the construction of the latest vehicles.

–

"High-tensile, heat-treated steels – with one-piece structures and challenging joins and joining techniques – are a challenge," Billyeald says. "At first glance, that car's made of steel, but actually it's not a steel you can section or join easily, and it isn't appropriate for repair. A lot of what we're doing is helping repairers understand that and identify the high- and ultra-high-strength steels fitted to cars. In certain cases, they're not repairable and repairs shouldn't even be attempted."

THE BALL'S NOT ALWAYS IN YOUR COURT

Manufacturers also need to make sure they're designing cars with long-term repairs in mind.

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"Repairability cannot be added in at the end," Billyeald notes. "It's got to be designed from the start. Manufacturers and suppliers really need to have repairability on their radar from the start when they're designing these systems, and they need to think about systems for the whole life of the car. If it reduces the total cost of ownership of their vehicles, it will have an impact on their sales to consumers, and fleets in particular. These technologies are great, and there are huge safety benefits there, but they need to be seen across the life of the vehicle, not just at the point it comes off the production line. Those safety benefits need to be sustained and maintained."

TEN IN TEN

THE STORIES YOU CAN'T AFFORD TO MISS

WORDS_ JAMES SCOLTOCK

Electric Mustangs

01 Ford is taking its muscle-car heritage in a surprising direction, and there's no V8 engine in sight. The Mach-E is its first battery-electric SUV and comes to Europe at the end of 2020. It promises 0-62mph in less than five seconds, powered by a 465PS/830Nm all-electric powertrain. As well as speed, Ford is aiming for a range of 370 miles.

01

03

Standard-bearer

02 The IMI is pushing the envelope when it comes to standards in accident repair. Its Accident Repair Sector Advisory Group, which has already held its inaugural meeting, will provide a forum to examine the current skills standards and how they need to adapt to automotive technologies of the future.

Efficient flights

03 Bosch is heading up a research consortium to improve efficiency in the chips that enable autonomous flights and driving. It's part of the Ocean 12 project, a pan-European collaboration with 27 partners developing energy-efficient components to collect and process data from vehicles' surroundings. That data can then be used for braking or steering the car or controlling the propulsion of a flying taxi.

Tilt test

04 ZF is helping riders get on and off tilting three-wheeled scooters with its Tilt Lock system. The technology is being put into mass production on an as yet unnamed manufacturer's Maxiscooter, meaning the three-wheeler can be stopped and locked in an inclined position, making it easier to get on and off when parked.

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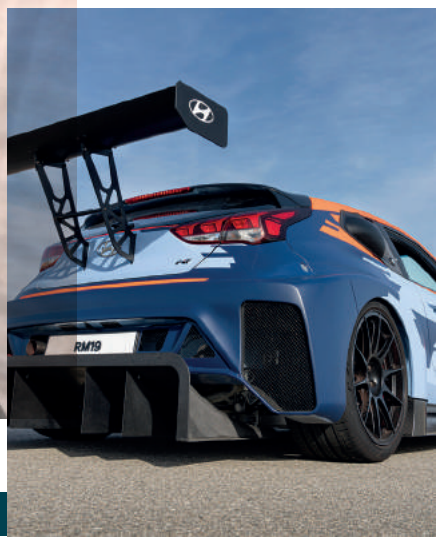

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08 One of the UK's most iconic brands has joined the SUV club. Aston Martin has unveiled its DBX model, the first high-riding car in its 106-year history. With a twin-turbo V8 heart giving it a top speed of 181mph, the vehicle also includes a 48V electronic chassis system to give the 2,245kg SUV better dynamics in the corners.

Speed stoppers

09 Kwik-Fit research reveals that sending heavy-footed drivers on speed-awareness courses is the best way to stop them speeding a second time. These courses reduce the reoffending rate to 40%, compared with a rate of 58% for drivers given a verbal warning by police, 55% for those receiving three penalty points and a fine, and an astonishing 90% among those given six points and a fine.

Racing tips

10 Hyundai's latest prototype is a bit of a rocket ship. The RM19 Racing Midship Sport Car uses perhaps one of the most powerful 2.0-litre, turbocharged, direct-injection engines ever made, producing 390 horsepower. The car will be used as a test bed for the latest high-performance technologies, which could soon feed into Hyundai's N-brand models.

—

For more of the latest stories and developments from the industry, visit *MotorPro*'s online home: magazine.theimi.org.uk

SEAT goes the last mile

05 SEAT is taking up the mantle of urban mobility from the Volkswagen family by releasing an electric motorcycle, the e-Scooter. The vehicle will be equivalent to a traditional 125cc scooter but will be 100% electric. It's due to hit the market sometime in 2020.

Government backing

06 The IMI's TechSafe™ standards for those working on EVs have been endorsed by the Office for Low Emission Vehicles. The standards will be crucial in giving car buyers confidence that their EV can be serviced, maintained and repaired by a technician with the right skills, removing a key barrier to EV adoption.

Noisy buggers

07 According to research by Venson Automotive Solutions, UK road users want EVs to sound like regular cars. Legislation introduced in July 2019 means that all new hybrid and electric vehicles must have an acoustic vehicle alert system, but consumers don't want to hear anything different: 43% of drivers would prefer a noise that mimics a diesel or petrol engine.

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Town planners want to rid our roads of cars, but public transport isn't always convenient. To bridge the gap, we need last-mile mobility solutions that can take us from the nearest station direct to our destination

WORDS_ED WISEMAN

WALKING SUCKS. WHY CAN'T WE DRIVE?

PEOPLE DON'T LIKE WALKING. Or at least they don't like the new, modern, urban experience of walking. It's nice to have a stroll on a picturesque footpath, from the comfort of home to the log fire of a country pub. It isn't quite so nice to half-jog from a greasy railway station to a poorly signposted office along an unlit, litter-strewn pavement.

Our towns and cities are so inhospitable to pedestrian traffic that short trips to and from transport hubs have become a chore to cover on foot. So what are our alternatives?

Bus, train and tram services in your city may be perfect, but the overall door-to-door journey can be ruined by the short last-mile gaps at the start and end of the procedure.

The phrase 'last-mile' is, of course, metaphorical; the distance doesn't have to be a mile, and it doesn't have to be at the end of a journey. It could be the half-mile walk to the tube that a commuter makes first thing every morning, or the awkward 1.5-mile gap between a railway station and a specific shop that you stop off at once in a lifetime. In the most basic sense, a last-mile journey is a trip a person takes to get from their starting point onto public transport, or from public transport to their destination. People might make several last-mile trips in a day, or none for a year.

And while the main journey between transit stations or hubs might be routine, predictable and planned, no two last-mile journeys are ever the same. Even the ostensibly routine trips of a daily commute will change at either end of the timetabled services in question. You might be slightly late to leave the house, or a little bit early; a sudden bout of seasonal *joie de vivre* might prompt you to divert to a friend's house on the way home. Last-mile mobility solutions must take into account these whims and fluctuations in habit.

The obvious solution is the car. You can park your car outside your house, drive it to your place of work, leave it there all day, and then drive it home again. If you want to alter your routine in any way, you can do so, because you're literally in the driver's seat. If you commute by train, then that's fine too, because outside the station will be a row of taxis waiting to give you the full car experience for a one-off fee. Cars offer unparalleled flexibility of a kind that may not be emulated by other mobility solutions in our lifetimes, or indeed ever.

But cars aren't particularly good for the environment, and the sheer volume of vehicles on the road means they aren't particularly time-efficient either. The last-mile problem is as much about finding a replacement for the automobile as it is about patching the gaps in public transport provision. >

WHAT DO WE HAVE SO FAR?

If we assume that the answer to the last-mile mobility problem is vehicular, then we already have half a dozen contenders vying for supremacy...

THE BICYCLE

The bicycle remains one of the most compelling solutions, in that it's an easy and straightforward way for people to get between their homes and the nearest rail or tube stations without burning fossil fuels. However, many of the same things that discourage people from walking – the weather, poor infrastructure, distance, hills – also apply to cycling, and in almost any situation apart from a dedicated cycle lane, the risk (and perceived risk) of being struck by a motor vehicle is high. Add to that the difficulties in transporting bikes on trains (commuter services generally prohibit unfolded bikes) and the regularity with which they get stolen from even 'secure' cycle racks, and you have an offputtingly unergonomic experience that caters to a relatively small number of travellers.

THE E-BIKE

Removing some of the more obvious obstacles is the e-bike, which uses a small battery and electric motor to boost a cyclist's efforts. This means that a casual rider can travel further on their bike and cover more challenging terrain than if they were on a traditional pedal bicycle. Unlike electric cars, no specific charging infrastructure is required beyond a three-pin plug and a bit of desk space to charge the battery. It's this burgeoning area of mobility innovation that arguably represents the bridge between bike and car, although the risk of being run over (or simply falling off) remains similar whether your bicycle is electrically assisted or not.

"These small, single-rider, electric-powered two-wheelers are difficult to operate lawfully in the UK – you aren't allowed to ride them on the road or the pavement"

THE E-SCOOTER

At the very bottom of the e-mobility tree is the electric scooter. These small, single-rider, electric-powered two-wheelers are difficult to operate lawfully in the UK – you aren't allowed to ride them on the road or the pavement – but they're showing promise in cities such as Paris, where they're almost universally hated. That's because while bikes and e-bikes are normally owned by their riders and spend most of their time chained up outside homes and workplaces, e-scooters tend to operate under 'floating' hire schemes, which means they're left dotted around, almost at random, for riders to pick up and set down as their journey requires.

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PODS

Everything we've discussed so far – bicycles, e-bikes and e-scooters – will be susceptible to the weather. This matters far less in places such as San Francisco, which gets about twice as much sun as we do, but the rain in the UK is a significant factor in people's transport choices and will continue to inform mobility strategy even as we relinquish our obsession with the automobile.

Driverless pods, which have been the go-to solution touted by unimaginative car manufacturers for decades, come closest to offering last-mile mobility in urban environments. These small, enclosed, zero-emission, on-demand vehicles running passengers efficiently between transport hubs and their destinations could be precisely the kind of pseudo-infrastructure we urgently need, especially in rapidly expanding cities where urban growth outpaces the provision of conventional transit infrastructure.

Of course, this doesn't exist yet. Nobody has come close to producing a viable driverless pod, let alone the dozens or hundreds of pods that would be needed to serve even a small area. And having hundreds of pods on overcrowded streets feels a lot like another failure in urban planning; more congestion, more energy consumption, and further marginalisation of pedestrians as key users of public space.

DEMAND-RESPONSIVE TRANSPORT

One further solution that is yet to be effectively realised in the UK (thanks in part to rules and regulations pertaining to how bus routes can be managed) is demand-responsive transit. This covers a broad range of ideas from ultra-informal shared taxis such as the 'jeepneys' on the streets of the Philippines to services such as UberPool in Europe and North America. On-demand responsive transport has been undergoing constant experimentation for around three decades now. The idea of a small minibus plotting an ad-hoc route to suit demand might seem primitive, but this model offers efficiencies not yet found in other 'mobility as a service' solutions.

HIRE SCHEMES

Dockless hire networks using road-legal bicycles have been a feature in the UK for a few years now. Transport for London's own cycle hire scheme, which has some 11,500 bikes across the city, is difficult to describe as a last-mile solution, as the 750 docking stations effectively become yet more hubs that travellers must walk to and from. Dockless bikes, meanwhile, can be ridden from your starting point to your destination and simply left outside for someone else to collect.

Obviously, this causes logistical problems. For example, while ad-hoc bike rides around your local park on a sunny day can start or end anywhere nearby, last-mile journeys between hubs, offices and homes are typically far more linear. That means riders will tend to travel in broadly the same direction at broadly the same time, forcing operators to redistribute their vehicles constantly if they want to provide consistent cover.

WILL ONE SIZE FIT ALL?

North Greenwich underground station in south-east London handles around 75,000 passengers on an average day, or roughly 28 million people per year. Serving the O2 Arena, a school, a college, the cable-car connection to the ExCeL Exhibition Centre, thousands of homes in a growing residential area, a hotel, and bus and riverboat services, it's one of the busiest single-line tube stations in the capital. Everybody arrives here on their way to somewhere else; some will be going to a gig, some will be going home, some will be drunk. No two last-mile journeys here are alike.

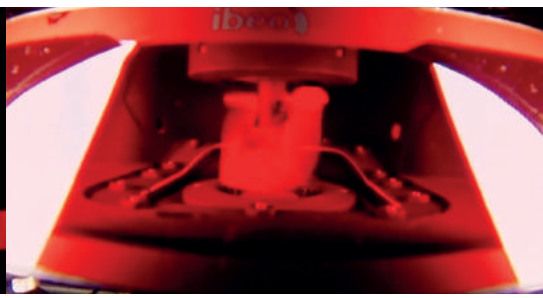
Fundamentally, there cannot be a one-size-fits-all solution to this. Last-mile mobility solutions vary from individual to individual and from site to site. What works within the specific transport ecosystem of North Greenwich would not work at, say, Bristol Temple Meads or Birmingham New Street. Each station on a timetabled transport service has its own unique set of passenger patterns, which is what makes last-mile transport so difficult to get right.

In a sense, the last-mile problem is one we've created for ourselves, by making cities and built-up areas so difficult and unpleasant to navigate on foot. A well-designed urban area shouldn't need a third or fourth layer of transit to cover such tiny distances. This could be seen as a failure of town planning rather than an opportunity to insert yet more vehicles into a world ostensibly designed for people.

This brings us back to the idea on which the last-mile problem is based: that we don't like walking. Humans demonstrably do like walking. What we don't like is getting rained on, breathing polluted air, or the mild sense of peril that comes from sharing the roads with motor vehicles. The answer to last-mile mobility might therefore be to put fewer vehicles in our public spaces, rather than more. ■





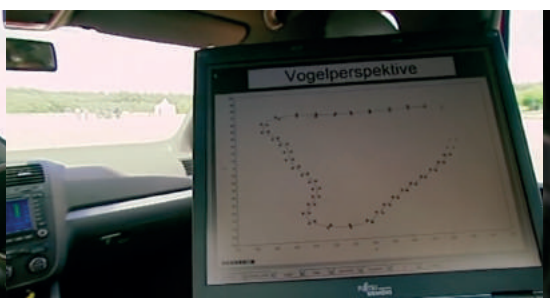

THE DAY I...

LET A VW GOLF TAKE THE WHEEL







WORDS_JON BENTLEY

I'VE BEEN LUCKY to spend my working life immersed in two of my biggest childhood passions – cars and technology. One consequence is that I often find myself being asked two questions: what's your favourite car, and what's the best gadget you've ever tested? I find them both almost impossible to answer.

The truthful response to the first question is that you would probably want a whole range of cars, all maintained perfectly and ready to go. That would include, say, a Range Rover for luxurious off-road picnics, design classics such as a '59 Cadillac or a Citroën 2CV, and a Lotus Elise or Porsche Cayman for when tactile satisfaction is the priority.

Deciding upon the drive of my life is a similarly difficult conundrum. Despite TV shows and recreational tour organisers thinking nothing of sending people to blast around Madagascar, the Himalayas or South America, I haven't actually completed any epically long drives in exotic places. Even so, I do have a few possibilities to choose from.

For example, a 1,700-mile drive I made in 1993, retracing the route of the 1913 Alpine Trial on its 80th anniversary, is a strong candidate. Who wouldn't want to be part of a convoy of 40 Rolls-Royce Ghosts driving through spectacular scenery and witnessing the venerable cars being driven with enthusiasm up unsurfaced Alpine passes?

Equally, I could choose a sprint down an Autobahn near Stuttgart at 190mph in a Porsche 959 back in 1986, the first time I drove a Ferrari, or the occasion, much more recently, when *The Gadget Show* and the Alfa Romeo Owners Club arranged for me to drive an Alfa Romeo SZ, a car I'd long admired but never actually sampled.

All of those drives were brilliantly enjoyable, but somehow they don't quite feel significant enough.

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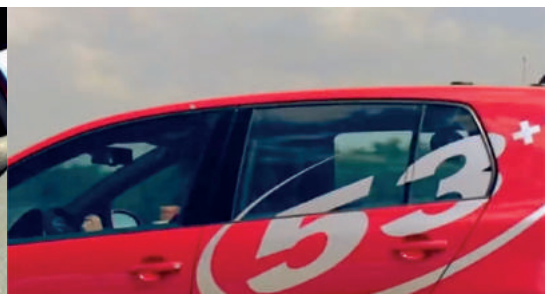

"For me, the demonstration also exposed one of the biggest weaknesses of partial autonomy – remembering what's automated and what's not"

The drive of my life so far, then, is one where I wasn't actually driving. In fact, nobody was. It was 2006, I was a presenter on *Fifth Gear*, and Paul Buckett, then the PR boss of Volkswagen in the UK, called up and said he'd seen something in Wolfsburg that we really must film: a VW Golf that drove itself. So I set off with producer James Woodroffe to Volkswagen's rather austere company town in northern Germany and reported for filming at the nearby Ehra-Lessien test track.

This was nearly a decade before self-driving cars became part of mainstream conversation, and I have to admit my expectations weren't very high. We were invited to lay out a course of our choice with cones, and the car would apparently follow it. We then watched as a bright red Golf GTI inched its way around the course, learning our chosen route. Then came the surprise...

The engineer, Gregor, invited me into the car, started it up and pressed go. The car launched itself at the course with total commitment and absolutely flat out, right at the very limits of its grip. It was like being driven by a phantom world-class rally driver; throttle, steering wheel and brakes all coordinating themselves as if by magic. A big red button could abort things if absolutely necessary, but it wasn't. It was a breathtaking ride that inspired total confidence.

In retrospect, maybe I shouldn't have been so surprised. Stanford University had used super accurate GPS, laser scanners and a boot full of computers, all fitted to the Golf, to great success the previous year. The same team had won the DARPA Grand Challenge, the US Department of Defense-funded autonomous vehicle competition, with a kitted-out VW Touareg called Stanley.

Recent changes in car design had helped too. The drive-by-wire throttle, electro-hydraulic power steering, electronic stability control and a dual-clutch transmission had made converting the Golf much easier.

At the time, VW didn't envisage the car taking to the public roads. There wasn't enough artificial intelligence on board to attempt that. Instead, the firm saw it more as a way of enabling autonomous endurance testing without the need for human test drivers.

But, in a way, that drive was strangely prescient. The kinds of autonomous cars that are succeeding now seem to have much in common with that Golf. They do best in controlled areas, whether that means slow-moving pods on university campuses or faster vehicles on racetracks. Artificial intelligence is still struggling to make sense of the chaotically complex task that is real-world driving.

For me, the demonstration also exposed one of the biggest weaknesses of partial autonomy – remembering what's automated and what's not. At the same event, VW was demonstrating a self-parking Touran and, still in awe of the Golf, I hadn't quite realised that the system didn't brake for itself at the end of steering you into a parallel parking space. I therefore sailed merrily into the car behind, fortunately at too low a speed to do any damage, but still fast enough to be thoroughly embarrassing.

My subsequent autonomous experiences haven't really matched it. Cars intended for the public roads are necessarily slower and more cautious. Even the dedicated autonomous racers usually appear somehow less dramatic. For its commitment, excitement and understated technological prowess, Wolfsburg 2006 is top of my list. ■

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HOW TO...

Make the next generation 😍 automotive

Customers are constantly demanding more from the automotive industry. Here's how to get ahead of the curve with fresh talent

WORDS_GAVIN WHITE

It's no longer just about getting from A to B. Instead, vehicles are powerful digital devices, and consumers increasingly expect their highly personalised cars to suit their always-on lifestyles.

Likewise, as manufacturers try to keep up with the latest environmental and technological developments, it's critical that the industry attracts a new pool of talent to manage the inevitable servicing and repairs of these high-tech vehicles.

This need for fresh talent has never been greater. Reports suggest that the UK's automotive aftermarket industry is now set to expand significantly, adding a further 400,000 roles by 2022. The digitalisation of the automotive industry could also add as much as £8.6 billion to the UK economy per year from now until 2035. You're going to want a piece of that. As such, we need to look at cultivating talent and building a pipeline to see us through the years ahead.

Start 'em young...

As a result, companies throughout the industry need to engage with schools as early as possible to educate and inspire young people about the breadth of opportunities available.

In particular, the next generation of vehicle technicians will need strong engineering and technological abilities to excel. It's the school- or college-leaving generation – with its online culture and constantly evolving communication habits – that will play an integral role as vehicles go digital. What's more, with autonomous vehicles expected to replace standard cars within the next decade, a very specific skill set will be required.

However, these and other similar skills will be in demand elsewhere too. The likes of gaming and computing hold a significant allure for young people and will increasingly compete against the motor industry to acquire talent. Demonstrating the current and future technical advancements of the latest vehicles will be critical when it comes to winning over the next generation.

At the forefront of this is the work that needs to be done to dispel the various misconceptions about what working within the automotive industry today is really like. Some still perceive it as an old-fashioned trade, but if the sector is to thrive, this view has to change. A career as a vehicle technician needs to become an attractive option to ensure future generations are enthusiastic and willing to learn the necessary skills.

...and train 'em up!

Education should also be at the heart of efforts to boost the number of vehicle technicians. While much is now being done to attract school-leavers into the industry through recognised qualifications and apprenticeship programmes, two decades of underinvestment in the development of skills, coupled with the severe narrowing of the curriculum offering, have led to a major skills shortage. Unless action is taken now, and the automotive industry does what it can to showcase its evolution and highlight the career opportunities it can offer, we will be faced with a severe lack of new talent, which will act as a drag on future economic growth.

Of course, creating a pipeline of future talent is important, but we also need to be mindful of the current crop of talent within the industry. Creating provision for ongoing training will not only ensure that the present workforce remains proficient, but that existing staff members can mentor the newcomers and become ambassadors for the industry.

Ultimately, to succeed, we have to raise the profile of the career paths, apprenticeship programmes and ongoing training courses available. This starts with the educational facilities, ensuring they deliver the right information in the right way. Only then will we boost the number of people entering the industry.

—

Gavin White is Managing Director of Autotech Recruit

HOW TO...

Steer MOT testers through CPD

Ongoing training isn't just a box-ticking exercise – it's an important part of becoming a better tester and business owner

WORDS_PAUL CHARLWOOD MIMI CAE

I recently asked a technician if he had completed his MOT CPD yet, and he replied that he thought CPD was a waste of time and just a box-ticking exercise. The garage proprietor, who is also a tester, agreed.

And while they were adamant that it wasn't worth their time, I couldn't help but notice how little work was booked in. In fact, the garage was falling behind its local rivals. Having a proper CPD plan in place would have helped it compete, but the culture there was simply one of muddling through.

I asked them how they used the headlight tester, and what lines they test on. Their answers revealed that they were still testing to the pre-2016 requirements. That's far from ideal.

Of course, the tester was partly right – we do need to tick the CPD box. But it's actually an incredibly important box to tick: how can you stay professional in this industry if your skills are outdated?

When you originally trained at the start of your career, you were just a beginner, an amateur. You developed your skills, moving from unskilled to semi-skilled and then to professional status, but, like a ball tossed in the air, you'll inevitably start to fall back down unless you continuously push yourself. That means updating your knowledge.

All change

Over the past five years, we've had some major changes to the MOT scheme. There are new standards too, electric and hybrid vehicles are now commonplace, we have a new inspection manual, the General Data Protection Regulation has implications for the way we treat customers' information... I could go on. And whether you're a business owner or a tester, these are areas that you need to stay on top of.

How you approach CPD is entirely up to you, and there are various avenues available, so make sure you choose the approach that suits you best:

- **Take it upon yourself** to read the various sections in the inspection manual and other information sources and then take an assessment. It's a bit of a DIY route, but it's one that can suit some.
- **Online training packs** are available from different providers, with an assessment at the end. The IMI can help if you think this is the approach for you.
- **Classroom-based training** is also an option. You go to a training centre (or in some cases trainers will come to your garage) and then you get assessed at the end of the programme of lessons.

Whichever route you choose, you'll need to record all the training you do so that you can easily demonstrate everything you have done. Again, this isn't a particularly difficult thing to do, and it could pay dividends later on in your career. The easiest way to record the training is to use the DVSA's template and include the following:

- the training year you completed your CPD programme in (we are currently in April 2019-March 2020);
- the date of the training;
- the amount of time you spent on the training;
- the topics you covered;
- notes on what you did;
- the vehicle groups you covered during the training;
- your name; and
- your MOT testing service user ID (usually four letters and four numbers).

MOT guru Paul Charlwood MIMI CAE has 20 years of experience as a Vehicle Examiner at the DVSA and is now a consultant to the motor trade

Cheap isn't always cheerful

Some testers and garages opt for the cheapest option and take a completely DIY approach to CPD training. They assume that if the DVSA gives them the option of doing it this way, then it must be OK. I don't agree with this.

Nowadays, the government is far less involved in helping you run your business than it used to be, and that means it expects you to do more yourself instead. MOT testing and CPD training are good examples of this trend.

For many years, the DVSA would visit a garage twice a year to give advice and training. As a result, every MOT garage that wanted to do Class 5 testing could get that training free of charge, and you could get a free refresher course every five years too.

Now, though, business owners and testers need to take greater responsibility. The DVSA doesn't exist to run your business or make your business decisions. If you select the wrong equipment and it's nothing but trouble, it's your problem. Likewise, if your training is poor, then the DVSA may give you a higher risk score on your Red, Amber, Green (RAG) status. The automotive world has changed, and so must your approach to CPD.

Timing your training

Most of us do it at the last minute, but that's probably not the best way. Part of what the DVSA is looking at in the RAG score is how early or late CPD is conducted. And if you're late taking the CPD training, you may be missing out on valuable testing.

The IMI offers a range of training and assessment options that can prove invaluable to MOT testers and business owners. The online training is a combination of videos and question-and-answer sessions, which should provide you with the training you need to stay up to date and to keep you testing to the right standards. Just don't forget to make a record of what you have done. Don't leave it too late: every year, the DVSA automatically suspends some testers' licences to test when they fail to complete the CPD training on time, and it's a pain to win that licence back.

Fail and you'll have to take and pass both the previous year's CPD and the current year's and then book a demonstration test with the DVSA before you get the green light to test again.

CPD is important for the whole industry, but as a MOT tester or business owner, it's a critical part of your development and the success of your career or business. It's definitely not just a box-ticking exercise.

Interested in what the IMI can offer? Head to: theimi.org.uk/mot-quals

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To find out more from the DVSA about MOT tester training, visit: gov.uk/mot-tester-training-assessments/training

—

Find the DVSA's MOT CPD template at: gov.uk/government/publications/mot-tester-annual-training-record

"BUSINESS OWNERS AND TESTERS NEED TO TAKE GREATER RESPONSIBILITY. THE DVSA DOESN'T EXIST TO RUN YOUR BUSINESS OR MAKE YOUR BUSINESS DECISIONS"

HOW TO...

Boost staff morale (in five easy steps)

Keep your business on track with a happy and productive team

WORDS_KARL DAVIS FIMI

Motivation is crucial to the success of any business. An unhappy team means you're probably heading for trouble, but keep everyone happy and eager to succeed and that can only mean good things.

But motivating staff can be tricky. What works for one team won't necessarily work elsewhere. Here are five things leaders should be doing to field a more motivated team in challenging times.

01_Face the facts

Efficiency, absenteeism, timekeeping, employee surveys and staff churn are all useful indicators of the reality in your team. Pay close attention to them.

Communicate with your team about what you want to achieve, and surround yourself with people who share your ambitions. The best way to improve the level of motivation within your team is to fill it with self-motivated people and then do your best not to demotivate them. Remember, there's a big difference between compliance and genuine commitment.

02_Actively seek diversity

However, it's also important to recognise the merits of *not* surrounding yourself with people exactly like you. A team with different characters, levels of experience, abilities, interests and needs will have so many opportunities to do things differently (and better).

The most consistent performers are those whose teams can flex and change to meet different situations, and this is made easier by being able to field people with a wide variety of reference points. For me, helping clients find ways to bring more part-time workers into roles is hugely satisfying, as this not only promotes their brand as an employer but also gives access to some of the best talent.

03_Be crystal clear

Most leaders know where they want to get to, but so often team members don't fully understand the rationale – or the consequences of them not understanding. Being absolutely clear about where you're heading empowers the team to influence exactly how you're going to get there.

This can sometimes be a scary concept, and it might even be a dangerous one if the empowerment is not aligned with the competence of those creating the road map, so balancing fresh thinking with pragmatism is essential. The key thing is to create an environment where colleagues are given every opportunity to step up. Remember, finding new ways forward often means that the most senior leaders need to talk less and listen more.

04_Promote mistakes

Creating a culture in which colleagues are allowed to make mistakes will foster a sense of trust, more innovative thinking, calculated risk-taking and then ultimately positive change. Yes, you'll need some ground rules and parameters that colleagues are expected to work within, but so often I come across overly conservative and risk-averse cultures that stifle creativity and dampen enthusiasm.

By turning failure into a moment of reflection and realisation, you create a lasting and valuable learning experience that can be harnessed for future reference. Anyone who failed their driving test, as I did, will remember that the next lesson started with an analysis of errors, confidence-building and renewed practice. In fact, I remember being congratulated on doing the "longest rear-wheel skid without falling off" that my motorcycle instructor had ever seen.

05_Hire slow, fire fast

Nothing demotivates a team more than continual staff churn and the increased workload and underperformance that it often generates. However, some employers continue to disregard this and ultimately disrespect their colleagues and customers alike.

More enlightened employers have recognised that it costs far less to slow down the process of making a job offer (and get it right first time) than it does to make a rushed and ill-considered appointment. More and more clients are hiring us to create simplified job and person specifications and then set up assessment centres – even if there's only one preferred candidate.

Even so, it's important to remember that not all risk can be removed here, and sometimes difficult decisions need to be made. Because while mistakes can be tolerated, incompetence cannot – so fire fast if it's evident that all efforts have been exhausted and your commitment to the colleague is not being reciprocated.

—

Karl Davis FIMI is Managing Director at automotive consultancy Coachworks

—

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HOW TO...

Rev up your staff training

Whether your business is big or small, sales- or technician-focused, offering the right training will be the key to growth

WORDS_JAMES SCOLTOCK

Many businesses in this industry have diverse workforces, ranging from sales staff to technicians with expertise in a number of areas.

But no matter how big your company may be or how many different roles it encompasses, staff need to receive the best training possible. Without it, individuals won't develop and the business won't reach its full potential.

To find out how Sytner Group keeps its training humming along, *MotorPro* spoke to its Head of Learning and Development, Sue Sansome.

How do you make sure everyone receives the right training at the right time?

We have introduced new systems at the recruitment stage to identify the appropriate eLearning and training pathways. Role-specific and internally designed Sytner eLearning is released to new starters during their first days in the job via an automated process. Managers are responsible for ensuring that this is completed, and we achieve a success rate of more than 95% within 90 days of release.

Also, as part of the new recruits' one-to-one discussions with line managers, local HR managers and regional coaches, training courses are identified and booked via our Learning and Development Support team. We have development pathways and training for all roles, some mandatory and some more developmental.

As part of inductions and regular probation reviews with their line managers, all colleagues have time to discuss their training needs. Mentors and buddies also support initial training, and this is especially vital for apprentices. Quality one-to-one time is spent creating a training plan for the mandatory courses, while also discussing other personal development opportunities.

How much emphasis should be placed on individuals taking positive steps towards training?

It's key for everyone to recognise early on that their own development is important. In the past few years, we have really changed our focus on this. It was such a big driver that we designed the new Sytner 1-2-1 review platform. Reviews are now driven by the colleague not the manager, and the review templates are no longer just about performance but also welfare, career aspirations, training, development and any extra support required to help them achieve those goals.

With so many learning options out there, how can companies decide what's useful and what's not?

Any training should start with the end result in mind. What do you want individuals or teams to do differently?

'Training needs analysis' can help identify gaps in colleagues' learning, but it's more important to work with the sharp end of the business to understand the skills that need developing.

What's the right balance between internal and external training?

Over the past five years, we have moved more and more towards internal training. This enables us to provide exactly what our colleagues and managers need. This training is then supported by regional coaches to ensure the learning is embedded.

Of course, we do still use manufacturer academy training for technical matters and apprenticeships though. Why wouldn't we use that vast range of expertise?

What tips do you have for firms wanting to keep staff trained and their skills up to date?

Managers play the most important role, in my view. Everyone needs to feel supported and encouraged. Communication is key, and so is understanding your team.

Ensure you have a varied and engaging portfolio of training events, but make sure that is supported back in the workplace with regular opportunities for review and extra on-the-job training.

Finally, never stand still. The automotive retail industry is constantly changing. As managers and training professionals, we have to embrace this and keep looking for ways to offer development and to support people to become the best they can be.

—

Discover how the IMI could help you deliver training at: theimi.org.uk/learning-and-development

"MANAGERS PLAY THE MOST IMPORTANT ROLE, IN MY VIEW. EVERYONE NEEDS TO FEEL SUPPORTED AND ENCOURAGED"

Sue Sansome
Head of Learning and Development, Sytner Group

HOW TO...

Plug and play with OBD scanners

There's more to onboard diagnostics than just plugging in and waiting for a reading. You need the right device and the skills to interpret what it finds

WORDS_TOM DENTON, AUTHOR OF *ADVANCED AUTOMOTIVE FAULT DIAGNOSIS*

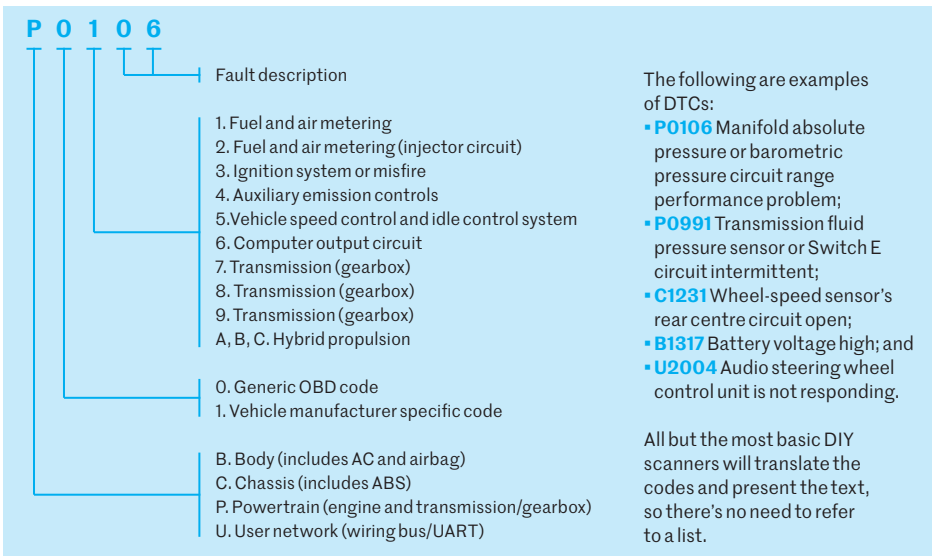
'Onboard diagnostics' (OBD) is a generic term referring to a vehicle's self-diagnostic and reporting system.

The amount of diagnostic information available via OBD has varied considerably since the introduction of this technology in the early 1980s. The earliest versions would simply trigger a malfunction indicator light when a problem was detected, but they wouldn't provide any information about the problem.

The current versions are called OBDII and, in Europe, EOBDII. These two standards are quite similar and use a standardised port to provide real-time data, in addition to a standardised series of diagnostic trouble codes (DTCs).

Since 1996, all new vehicles hitting the market have been compatible with OBDII. However, the number of DTCs in play depends on the specific OBDII protocol of the vehicle.

Under the original OBDII specification, up to 36 DTCs were available, but newer vehicles that support the CAN bus protocol have up to 100 DTCs. This includes fault codes for systems such as the ABS, the transmission and the airbags. Most modern OBD scanners can access information via both CAN and the OBD.



01 ONBOARD DTCs

Dig the DTCs

DTCs are stored within an onboard diagnostic computer. These fault codes are triggered when, for example, a sensor in the car produces a reading that is outside its expected range.

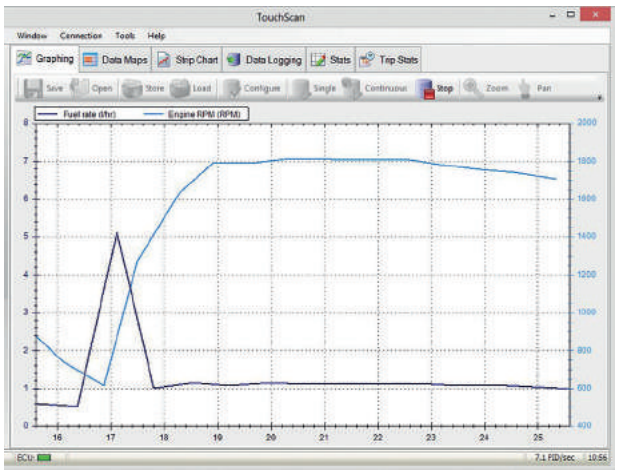
The DTCs identify a specific problem area and are a guide as to where a fault might be occurring in the vehicle. Parts or components should not be replaced with reference only to a DTC. No matter what some customers may think, the computer does not tell us exactly what is wrong.

For example, if a DTC reports a sensor fault, replacing the sensor is unlikely to resolve the underlying problem. The fault is more likely to be caused by the systems that the sensor is monitoring, but it could also be caused by the wiring to the sensor.

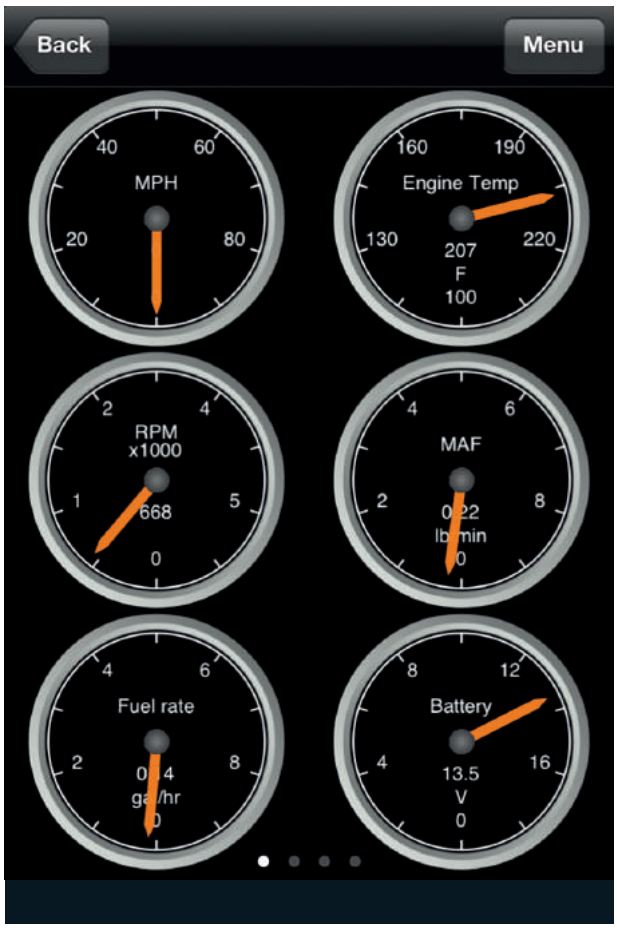
DTCs may also be triggered by faults earlier in the operating process. For example, a dirty mass air-flow (MAF) sensor might cause the car to overcompensate its fuel-trim adjustments. As a result, an oxygen sensor fault may be triggered, as well as a MAF sensor code. (Figure 01 above shows how to interpret OBDII codes).

"PARTS OR COMPONENTS SHOULD NOT BE REPLACED WITH REFERENCE ONLY TO A DTC. NO MATTER WHAT SOME CUSTOMERS MAY THINK, THE COMPUTER DOES NOT TELL US EXACTLY WHAT IS WRONG"

02 MAXISCAN MS300 DTC READER 03 OBD BLUETOOTH ADAPTER



04 LOGGING DATA ON TOUCHSCAN



05 OBD FUSION'S CUSTOMISABLE DISPLAY

Scanning your options

There's a huge selection of OBD scanners on the market, with prices ranging from a few pounds to several thousand.

One example of a very basic DIY scanner is the MaxiScan MS300 (Figure 02). At the time of writing, it costs less than £20, but it can read fault codes and reset the warning light in OBDII and EOBDII vehicles. The codes are given numerically, so they will need to be looked up in a supplied list. It's quite an impressive tool for the money.

A very useful development in OBD tools was being able to use a Bluetooth- or wifi-enabled device to connect to any computer, smartphone or tablet with the suitable software. USB-connected devices are still in use (and may be recommended for reprogramming), but a wireless connection is very convenient. The actual connection method doesn't affect the results, but a wireless vehicle communication interface (VCI) can save time and allows the computer terminal to be positioned somewhere more convenient.

One software application for connecting a laptop to a vehicle using the wireless VCI is TouchScan. It can carry out fault-code scans, monitor tests, the logging of data and more. It's generally limited to OBDII functions, but it only costs about £35, so it's very good value. Figure 04 shows an example of live data plotted as a graph using this system, in this case comparing fuel rate to engine speed.

For a quick overview, I also use an iPhone to run an app called OBD Fusion, which costs less than £10. It supports ELM327, which is a common protocol for connecting wireless devices. Figure 05 is an example of the data that can be shown via OBD Fusion. Of course, there is now a very wide range of phone apps to choose from.

A simple interface and a smartphone app for quick diagnosis at the roadside can be very useful. Some systems are more expensive than the ones listed here and require dedicated adapters. However, because of this low cost, more customers will buy the equipment and apps to scan their vehicle for faults before bringing it in for repair. We therefore need to understand how these systems work in even more detail so we can explain that reading a fault code is just the first step in the diagnostic process.

There are a number of brand-specific options available too. VCDS, for example, is a

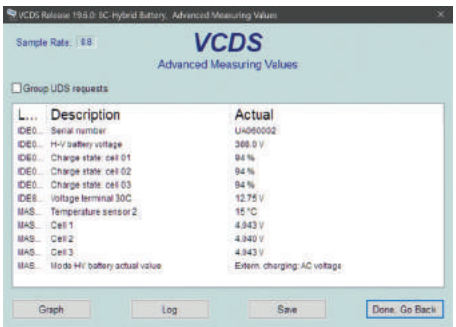
HOW TO...
Plug and play with OBD scanners

professional system designed specifically for Volkswagen, Audi, Seat and Skoda cars. It also benefits from regular software updates.

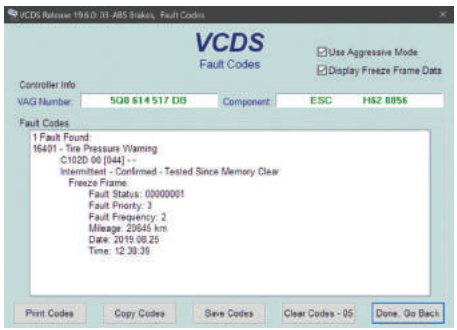
Like all scanners, it has a VCI that plugs into the diagnostic socket on the car. It can then be connected by USB or wirelessly to a Windows PC running the VCDS software.

VCDS can scan for faults as well as reading and logging live data, resetting service interval warnings and much more. It costs a fraction of the price of a top-of-the-line system, but of course the vehicle coverage is restricted.

Using VCDS, I scanned for faults on a vehicle and found the tyre-pressure warning as shown in Figure 08. The fault priority is listed as a three.



06 VCDS SHOWING DATA FROM THE HIGH-VOLTAGE BATTERY ON A PLUG-IN HYBRID VEHICLE



08 VCDS SHOWING A TYRE-PRESSURE FAULT CODE

07 VCDS VCI

09 ARTIPAD CONNECTED TO A GOLF GTE

VCDS DTC priority numbers

Number	Meaning
0	Undefined by manufacturer.
1	The fault has a strong influence on drivability, immediate stop is required.
2	The fault requires an immediate service appointment.
3	The fault doesn't require an immediate service appointment, but it should be corrected with the next service appointment.
4	The fault recommends an action to be taken, otherwise drivability might be affected.
5	The fault has no influence on drivability.
6	The fault has a long-term influence on drivability.
7	The fault has an influence on the comfort functions, but doesn't influence the car's drivability.
8	General note.

Finally, the TopDon ArtiPad (Figure 09) is an example of a comprehensive professional-level scanner, and in my experience it's a very powerful tool for the price.

Based on the Android operating system, it will show fault codes from a very wide range of vehicles and the associated live data. It's also capable of engine control unit programming for Mercedes-Benz, BMW, VW, Audi and Ford. The device itself is very well packaged and robust – as is the software, which is updated regularly. The battery life is excellent, and the screen is easy to read.

Summary

Notwithstanding claims by some manufacturers, it isn't possible to buy one scanner that will cover the entire range of vehicles. All will read E/OBDII data, but when it comes to digging deeper, every device has some gaps in its capabilities (for example, when coding a newly fitted component or resetting the service intervals).

Most of the professional-level scanners cover a significant range of vehicles, but the consensus in the real world is that you need three different devices to be certain of covering everything. Some excellent scanners (and many of them include lots of other features, such as pass-through, data access, scopes and multimeters) are available from companies such as Autel, Autologic, Bosch, Delphi, Hella, Launch and Snap-on.

As for which is the best, it's hard to say, but it's probably the scanner that covers the greatest proportion of the vehicles you work on. Also, and perhaps more importantly, it's the one you're familiar with and are comfortable using.

I've said it before, but I don't think you can overemphasise the fact that automotive diagnostics is a complex business and becomes more so every day. A scanner is an essential tool for diagnosing complex faults, but so is the ability to use it correctly.

—

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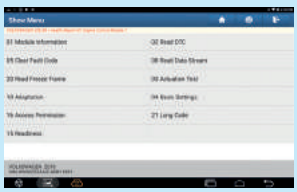
HOW TO...

Plug and play with OBD scanners

Live fuel trim data

In addition to OBD codes, most scanners now communicate with all the electronic modules on the data bus to display appropriate DTCs and live data. The following images, taken using a TopDon ArtiPad, show examples of the scanning process and the live data that can be accessed using professional-level scanners.



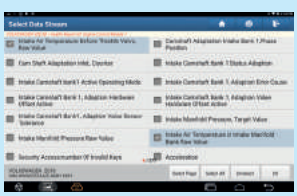
After connecting the scanner to the car via the VCI, the scanner reads the VIN and automatically selects the vehicle. After this, the menu shown here is displayed.

The two menu items of interest for now are the options '02 Read DTC', and '08 Read Data Stream', which shows the live data.

After selecting option '02' on the touch screen, the scanner takes a minute or so to cycle through all the connected modules and display either 'No Fault Code' or 'Find Fault Code'. The number next to those outputs indicates how many codes are stored.

Selecting the '03 Brakes 1' option revealed this manufacturer-specific DTC.This is a passive code, and as I know that a slow puncture caused the tyre-pressure warning to show just a few days ago, this DTC will soon erase itself. If not, I will erase it.

Selecting the '01 Engine Control Module 1' option revealed this OBDII DTC. The code P0113 suggests that the powertrain control module (PCM) has received a high-voltage signal (5V or more) from the intake air temperature sensor (IAT). This may indicate a problem between the IAT and the PCM, but here it's described as 'passive/abiogenesis', which means that this is probably an anomalous reading and has therefore not triggered the check engine warning light. Abiogenesis refers to the theory that life on Earth came out of nowhere, so it's a bit of an odd turn of phrase here!



Nonetheless, I decided to check the sensor further by looking at the live data ('08 Read Data Stream' from the first menu). You can see here that there are up to 377 different parameters that can be displayed, and I have selected just four of them for now.

After hitting OK, the live readings are shown. This is an inline four-cylinder engine, and only 'Charge Air Temperature Sensor Bank 1, Sensor 1' is installed.

It is reading 13°C, and as the engine was cold, this is largely what you would expect. This again suggests that the DTC may not be an issue and will probably delete itself soon.

The 215°C figures are irrelevant as these sensors are not fitted.

One point that's important to mention here is that live data of short-term (STFT) and long-term (LFTT) fuel trim on spark-ignition engines can be very useful for diagnosing faults in the fuel system. STFT and LTFT are expressed as a percentage by the scanner. Ideal readings are usually between -5% and 5%.

Higher percentages mean that the engine control unit is attempting to make a lean mixture richer. Lots of faults can cause this, but a manifold vacuum leak or a blocked injector would be possibilities. Low fuel trim, on the other hand, means that the control unit is attempting to make the fuel mixture leaner. Again, there are lots of possible causes, including high fuel pressure or a leaking fuel injector.

Here, I have set the scanner to plot LTFT (left) and STFT (right) as graphs. In most cases, the STFT reading should shift rapidly between rich and lean, as shown here. The LTFT should indicate a more stable percentage.

Fuel trim should ideally be checked in three states: idling, 1,500 rpm and 2,500 rpm. In this example, I compared coolant temperature, engine speed, LTFT and STFT. The engine was still warming up, but it's all looking good so far.

HOW IT WORKS...

Volkswagen's direct-shift gearbox

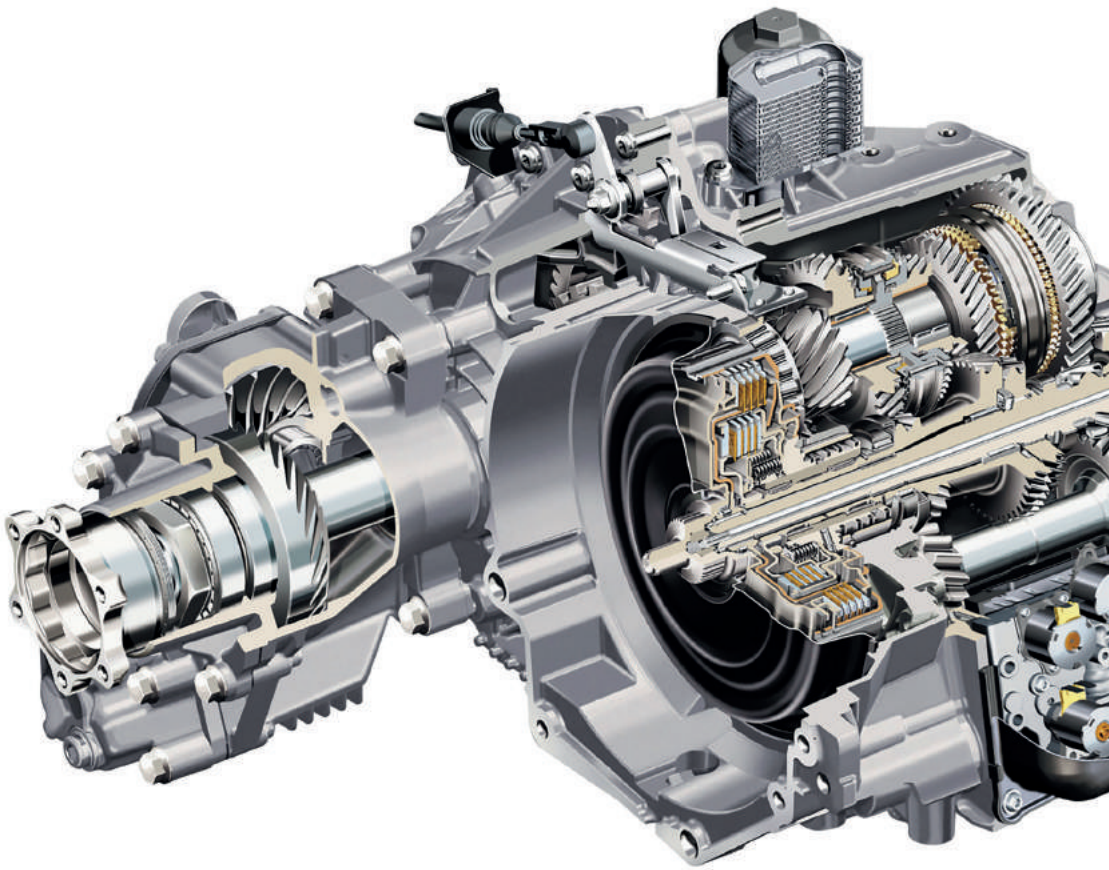
WORDS_TOM DENTON FIMI

European markets haven't always embraced automatic transmissions. Some of that is down to their perceived unreliability, but it's also a question of driveability.

Even so, automatic systems have received a huge amount of investment. For example, Volkswagen has been working on some significant improvements, especially with its direct-shift gearbox (DSG) system.

The DSG dual-clutch transmission is quite different from a conventional automatic transmission. Two independent gearboxes are connected to the engine via two separate driveshafts. Which gearbox is under load depends on the current gear, and an output shaft assigned to each gearbox applies the torque to the drive wheels via the differential gear. Six- and seven-speed versions are also available.

The clutches and gear selectors are operated hydraulically by the gearbox mechatronics. The electronic transmission control unit, sensors and the hydraulic control unit form one compact component. The control unit uses information such as engine speed, road speed, accelerator position and driving mode to select the optimum gear and to identify the ideal shift point. The control unit then implements the shift commands in a sequence of precisely coordinated actions.



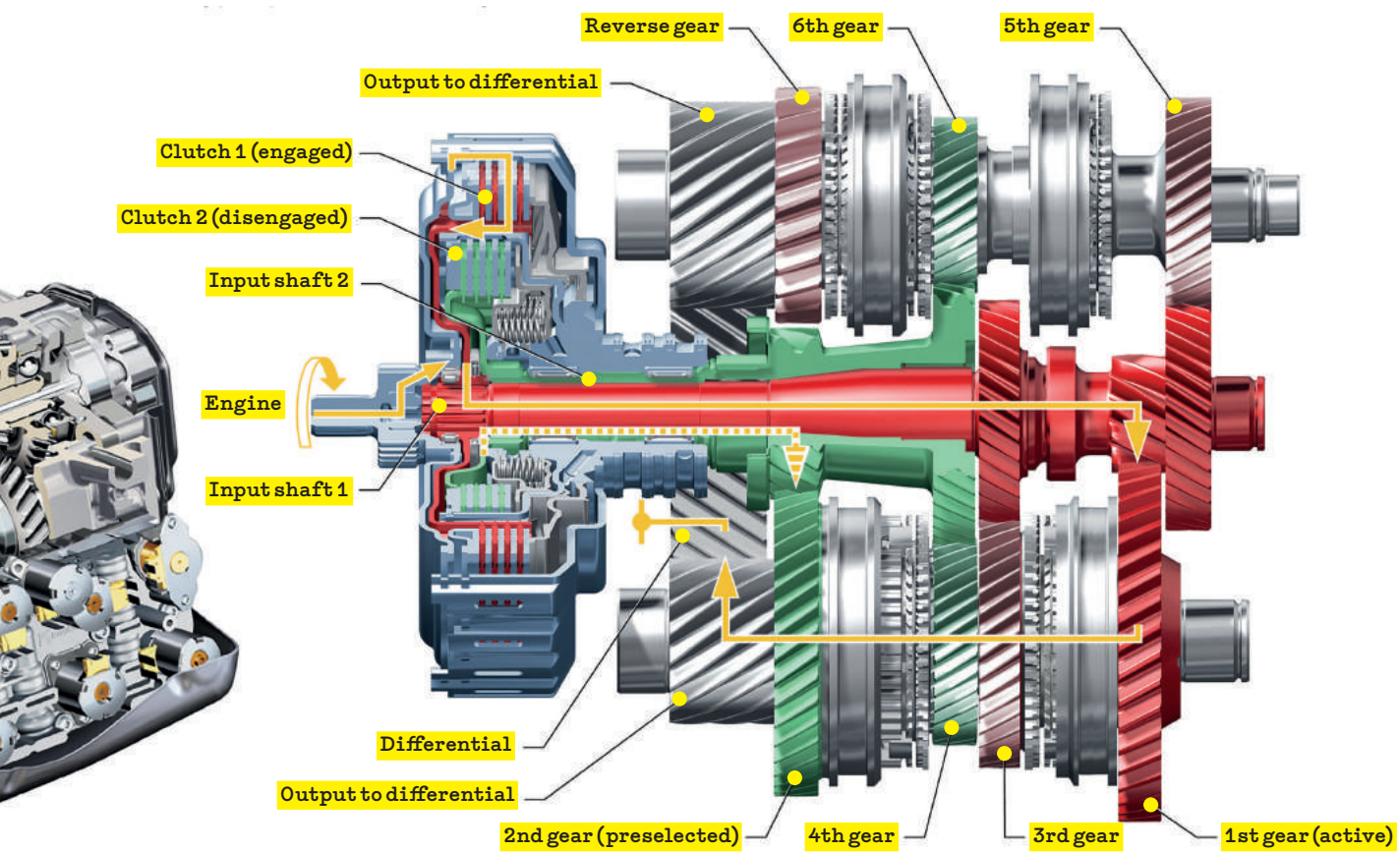
01 DSG transmission as fitted to the Audi TT 3.2-litre V6 Quattro 4WD (Source: VW/Audi)

The six-speed version shown here (Figure 01) can be considered as two gearboxes in one. It uses two clutches: the first drives the input shaft to the first, third, fifth and reverse synchronisers, while the second drives the input to the second, fourth and sixth synchronisers. The odd- and even-geared output shafts both drive the differential gear.

The operating principle is that while an odd-numbered gear ratio is being driven by clutch one, the next even-numbered gear ratio is being preselected by clutch two. When ready, this is engaged by clutch two and the previous gear is disengaged by clutch one. This operation is similar for all upshifts and downshifts. Each change takes less than 0.04 seconds.

"THE GEARSHIFTS ARE MUCH FASTER THAN A MANUAL GEARBOX AND SMOOTHER THAN THE CONVENTIONAL TORQUE CONVERTER IN MOST AUTOMATICS"

Industry expert Tom Denton has penned numerous automotive books, including *Electric and Hybrid Vehicles*. Visit tomdenton.org for more details



02 DSG showing first- and second-gear power flows (Source: VW/Audi)

The gears can be selected manually via a gear lever or steering-wheel-mounted paddle shifters.

The gearshifts are much faster than a manual gearbox and smoother than the conventional torque converter in most automatics. This is because an almost continuous power flow is achieved during shifting as the clutches are modulated. The two clutches run in oil, reducing wear compared with a normal dry clutch. This also keeps temperature under control.

The sequence of operation when accelerating from rest is as follows: first gear is engaged and clutch one takes up the drive, while second gear is preselected. Clutch two engages at the required shift point and clutch one is released. At the same time that first gear disengages, third gear is preselected. At the next shift point, clutch one re-engages to select third gear as clutch two releases. Fourth gear is then preselected, and the process continues like this until sixth gear is reached. If the driver slows down, or the conditions change, the process works in the same way to shift up or down to suit.

Automatic transmissions may not be the go-to technology for many people, but they are improving all the time, and the market is growing – helped, in part, by systems such as VW's DSG. And a technology that has been used in high-performance vehicles such as the Audi TT 3.2-litre V6 Quattro must have some benefits over the competition.

WHAT'S HAPPENING AT YOUR IMI?

The IMI shines a spotlight on apprenticeships and the support on offer for the next generation

TAKING THE HONOURS AT WORLDSKILLS UK LIVE

IN NOVEMBER, THOUSANDS of attendees walked through the doors of the NEC in Birmingham to discover the breadth and diversity of skills a career in the motor industry can offer.

WorldSkills UK Live is the country's largest experiential skills and careers event, spread over an area the size of nine football pitches. It is fast becoming an arena for leading employers to offer hands-on demonstrations and to talk to young people about what's important to them and what the industry is doing.

At the core of the event is the National Final of the WorldSkills UK competition, where young professionals compete against their peers for a chance to win medals for their skills and the possibility of representing the UK on the international stage.

There were four automotive competitions taking place: heavy and light vehicles, body repair and refinishing.

IMI

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AND THE WINNERS ARE...

Body Repair
Gold: Matthew Sutton – Training 2000 and Abbotts Car Repair
Silver: Connor Davison – Riverpark Training
Bronze: Graeme Nevin – Riverpark Training

—

Heavy Vehicle
Gold: Matthew Hands – Skillnet and Brian Currie Bedford
Silver: Claire Weller – Skillnet and Adams Morey Portsmouth
Bronze: David Bodie – Stephenson College and Hartshorne Motors

—

Light Vehicle Technology
Gold: Robert Pallent-Bright – Skillnet and Lookers Ford
Silver: Christopher Wright – ProVQ and RRG Toyota Stockport
Bronze: Harry Chaundy – GTG Training and Arnold Clark

—

Refinishing
Gold: Craig Kennedy – Riverpark Training
Silver: Nathan Palfrey – Babcock and Cooper BMW York
Bronze: Jack Groves – NPTC Group and Sturgess Bodycraft

THE IMI GETS TOUGH ON MENTAL WELLBEING

The IMI has partnered with global consultancy firm Positive Action, designating it an Approved Centre and giving it Quality Assured Programme status to provide training on mental toughness, wellbeing and resilience.

This is an important step towards the IMI's aim of providing professional and personal support to those working in the industry, as set out in its Campaigns for Change manifesto.

Positive Action, working with Williams Talent Management Consulting, will provide three day-long courses, developed by Positive Action founder and CEO Gilda Scarfe and Williams Talent Management Consulting.

The courses will help attendees understand the importance of personal resilience and engaging at work, as well as using strategies founded in positive psychology, among other skills, to improve their mental toughness.

Left: David Bodie collects his bronze medal at WorldSkills UK Live

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Robert Bytheway
MIMI, Clwyd, aged 83

Derek Emms
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Raymond Hadaway
MIMI, Hampshire, aged 70

Leslie Hill
AMIMI, Derbyshire, aged 90

Joseph Nethercott
FIMI, South Wales, aged 98

Richard Smart
MIMI, Warwickshire, aged 77

Sam Sowden
MIMI, Lincolnshire, aged 71

Philip Stone
AMIMI, Staffordshire, aged 48

"The motor retail sector remains one of the strongest advocates of apprenticeships. As motoring technology evolves, with demand growing for lower emissions, connected vehicles and alternative fuel vehicles, the skills gap continues to widen. It is therefore vital that we continue to champion the best of the new talent coming into the sector through competitions like WorldSkills"

MARK ARMITAGE, HEAD OF MEMBERSHIP PRODUCTS AND SERVICES AT THE IMI

Ben Eaton

This young star explains how his career went from starting grid to pole position (and title-winning glory)

Who or what first got you interested in the automotive industry?
I never really looked up to anyone in the industry, but I always had an interest in cars and vehicles growing up. If it had wheels, I wanted a go in it!

I also loved all the car programmes on TV – the restoration shows and the overhauling shows and even *Pimp My Ride* – and when I got towards the end of my time at school, I realised that there were lots of jobs available in the motor industry.

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How did you decide which career path to take? How did you make it happen?
When I left school at 16, I didn't want to carry on with classroom studies at college or university. I wanted a more hands-on experience where I could learn a skill and earn money too, so an apprenticeship seemed like the right way forward for me. After thinking about the interests I had at the time – technology, art and cars – I decided to enrol on a car-painting apprenticeship with BMW at Sytner Sheffield.

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How has your career developed so far, and what are your goals for the future?
I completed my four-year apprenticeship with BMW and was named Apprentice of the Year when I graduated. I then won the National Painter of the Year competition, which led to me entering the WorldSkills competition.

I became part of Team UK and represented my country at WorldSkills London 2011, where I won the bronze medal, beating competitors from all over the world. After that success, I joined the Mercedes-AMG Petronas F1 team and painted Michael Schumacher's car in my first year. Since then, I have gone on to paint cars for Nico Rosberg, Valtteri Bottas and Lewis Hamilton. The team has been great – and we've won six world titles!

I'm still enjoying the motorsport side of the industry for now, but who knows what the future will hold and where my career will take me.

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Is there anything you would have done differently with the benefit of hindsight?
Looking back, I think I did everything to the best of my ability. I don't think there was any opportunity I didn't take, so no, I don't think I would have done anything differently.

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What advice would you give to someone who wants to work in the motor industry?
I would say that if you have a passion for cars or any part of the motor industry, go ahead and check out the different types of apprenticeships and apprenticeship providers out there, as well as the relevant courses in further education.

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What would be your advice for someone who wanted to work in motorsport specifically?
There are so many different roles involved in motorsport, so always check out the companies' websites for job opportunities. You have to go out there to get them – they won't come to you.

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Ben Eaton is a Composite Paint Technician at the Mercedes-AMG Petronas F1 team

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Who are your motoring heroes and inspirations? Let us know and you could feature in our next edition. Email james.scoltock@thinkpublishing.co.uk

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