FERCHAU

MOBILITY WORLD

1/25

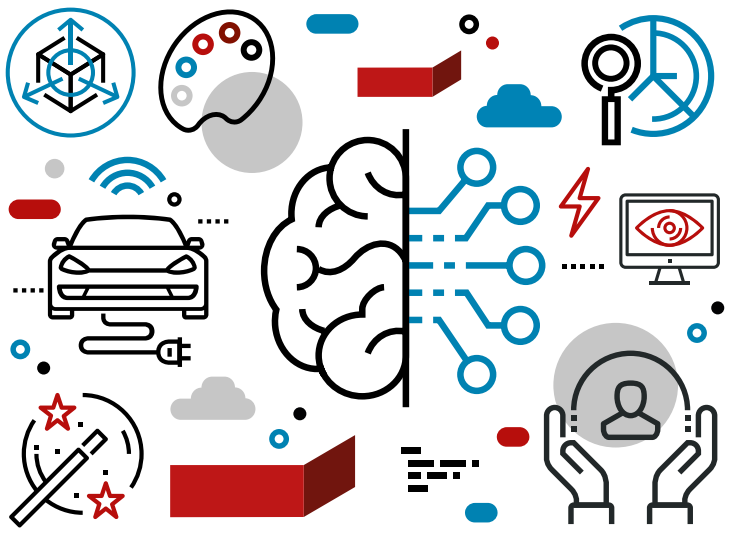
The FERCHAU Automotive magazine

The new intelligence

Artificially intelligent software is taking over our lives. Are super-smart algorithms becoming a danger for we humans? Or rather, will we soon all have a virtual best friend, a digital girlfriend who only wants the best for us?

From page 4

Contents



COVER STORY

The new intelligence

Competence: from the company

FERCHAU INSIDE

Transformation: from the industry

Legal notice

MOBILITY WORLD
Issue 01/2025
Circulation 900
4th year of publication

Publisher:
FERCHAU Automotive GmbH
Headquarters FERCHAU Automotive
Oskar-Schindler-Straße 3
50769 Cologne
zentrale-automotive@ferchau.com

Responsible for the content:
Bernd Gilgen

External editorial office:
Büro 504, buero504.de

Editorial management:
Martina Gebhardt

Realisation and design:
grafish GmbH, grafish.de

Image sources: p. 5 Ai-Da Robot Studios, ai-darobot.com – p. 6 The Palmer Group – p. 7 Brian Storm – p. 10 all except bottom right: Porsche AG – p. 11 bottom, p. 12–13: Peter Hildebrandt, working-image.de – p. 14–15 Polestar – p. 16 l. from top to bottom: Renault; Apple Original Films/Warner Bros. Pictures – right: Škoda Auto – p. 18–19 top: Mercedes-Benz AG – p. 18 centre: LG – p. 19 centre bottom: Continental AG; centre left: BMW AG – p. 20 Wolfgang Wilhelm for Mercedes-Benz AG – p. 21 top right: Alfa Romeo/Stellantis; Audi AG – p. 22 top: Tesla; bottom from left to right: Mercedes-Benz AG; Continental AG – p. 23 from top to bottom/ left to right: Stellantis, RB Leipzig, private, DBT/Ingo Haar, Mercuri Urval

I'm ready to talk...

Dear readers,

I am a great friend of good conversation. I like to exchange ideas a lot, and I like to do it with commitment – my wife and daughter will testify to that. I particularly value dialogue at work, with customers, with experts from partner companies in exciting development projects and, of course, with our employees. ***I learn something new in every conversation and broaden my horizons – and perhaps also those of the person I'm talking with.*** What did Christian Morgenstern, the famous German poet, say? »A conversation is mutual distanced contact.« This is where our future lies, especially in economically and politically turbulent times: in committed, lively dialogue with one another. Not against one another.

In this light, I recommend that you read the current issue of MOBILITY WORLD. In it, you will find two fascinating interviews that have at least broadened my horizons a little. Our editorial team spoke exclusively and in detail with Lutz Stiegler, Chief Technology Office of the Swedish electric car brand Polestar: about battery technologies, sales strategies – and about his many years of experience as the manager responsible for powertrain development at a large German engineering service provider. That one thing in particular is exciting: ***To be able to view the current situation in the engineering business from two perspectives, as a client and as a contractor.***

This is where our future lies, especially in economically and politically turbulent times: in committed, lively dialogue with one another.

And then I just read the second, also very interesting interview in this MOBILITY WORLD: an interview with Shelly Palmer, a world-renowned expert in artificial intelligence. ***I find his answer here to the question of whether AI should not teach us all to fear very enlightening.*** But read for yourself...

Have fun reading.

Yours
sincerely,

Bernd Gilgen
Managing Director FERCHAU Automotive

MAY THE FORCE...

... be with us. Artificial intelligence is conquering life – but will super-smart algorithms at some point become a subversive threat to we humans? Or will we soon all have a virtual best friend, a digital girlfriend who only wants the best for us?

Ai-Da is a humanoid robot – and an AI artist: *she can draw and paint and answer simple questions with the help of cameras in her eyes and bionic hands. Here is Ai-Da in front of the work »A.I. God. Portrait of Alan Turing«.*

The artist can be seen in a photo from Sotheby's auction house in front of her work, a life-sized portrait of the British mathematician Alan Turing. She wears a casual T-shirt with dark dungarees, just as if she had been standing in front of the canvas in her studio. Her face is framed by a flawless bob hairstyle. Ai-Da, as is her stage name, nevertheless appears distanced. Although her painting »A.I. God. Portrait of Alan Turing« was sold to a bidder from the USA for a sensational 1.1 million dollars. But Ai-Da can't get excited about this. She is a robot. An artificial intelligence that has only been taught one thing: to paint pictures. However, Ai-Da managed to do this frighteningly well – she painted the most expensive work of art ever created by an algorithm.

But is the portrait »A.I. God. Portrait of Alan Turing« art at all? The work of an AI in a machine body, which shows the human AI pioneer, the computer scientist Alan Turing, who died in 1954? Or rather an artificial flash in the pan? An inkling of what is to come: a world in which it is no longer possible to tell what is real and what is artificial, what is original and what is »fake«? In which »original« and »artificial« have to be redefined? Is a glorious future awaiting we humans in which intelligent robots like Ai-Da make our lives easier? Or is the end of the world driven by machines as in »Terminator« imminent? That's the dilemma with artificial intelligence: many questions, even more answers piling up.

Economists, computer scientists and philosophers all argue about the opportunities and risks of artificially intelligent systems. US technology expert Shelly Palmer, for example, sees AI as a »capability booster« in an interview with MOBILITY WORLD (see next page). As a tool that will »amplify the power of the human spirit a million times over«.

Others are more cautious in their enthusiasm for self-learning software. Daniel Kehlmann, for example. The writer (»Measuring the World«) and cultural philosopher explained in a much-noticed speech at the Federal Chancellery in the summer that »something is coming at us for which we have no adequate instinct«. Our minds may be able to understand the principle of AI, but our spirits cannot: »We don't feel what we know.« Panic would be more appropriate than the relaxed calm »with which we face this tsunami«. In particular, Kehlmann is worried about AI entering everyday life and people's social lives. For example, Sam Altman, founder of OpenAI, recently introduced a new voice from ChatGPT that »laughed, flirted, giggled and sweetly submissively followed the instructions of two young male engineers«. Kehlmann believes that the biggest growth market for AI will be artificial life companions. Dystopia might then loom: when digital confidants with artificial empathy give you tips on what music to listen to, what car to drive – and which party to vote for.

We are not there yet. Assistance systems such as Alexa, Siri or ChatGPT are still only used as everyday assistants. However, development is progressing rapidly. »Artificial intelligence is moving into all areas of life and changing them,« says Prof Henner Gimpel from the University of Hohenheim. In the future, AI will »increasingly take over activities to a large extent or even completely«.

Mobile people should also benefit from this: according to a study by the European Institute of Innovation and Technology (EIT), urban mobility is an important field for AI. AI will optimise traffic management, public transport, carpooling and the protection of pedestrians and cyclists.

And, very importantly, the purchase of a car. »Virtual assistants have the potential to revolutionise the automotive industry. In future, they will guide customers through the configuration of their perfect vehicle, seamlessly manage services and offer hyper-personalised user experiences from the initial contact with the manufacturer to the resale of the car,« explains Jonas Wagner from the corporate consultancy Berylls. There are hardly any limits to AI tools.

»Hardly any limits«, »hyper-personalised user experiences« – perspectives like these are calling admonishers onto the stage. »People need to be able to check the results of AI systems for accuracy and credibility,« explains AI professor Henner Gimpel. He leaves it open as to how this should work in practice. However, the researcher – somewhat reminiscent of the science fiction spectacle »Star Wars« – is also relying on another, ancient power alongside the rapid evolution of artificial intelligence: natural intelligence. ***»Due to the ›black box‹ nature of many AI systems,« says Gimpel, »critical human thinking will become increasingly important.«*** Or, in the words of Hollywood philosopher Yoda: »May the Force be with us.« ***//***

»People are magical. AI is not.«

Shelly Palmer *is one of the world's most sought-after experts on artificial intelligence, Professor of Advanced Media at Syracuse University in the US state of New York and CEO of technology consulting firm The Palmer Group. Palmer was named »Top Voice in the Technology Industry« by LinkedIn, he is a regular commentator on CNN and writes a popular daily AI blog. The multi-talented artist is also an award-winning composer, having created the work »Anthem« for the famous dance company »Parsons Dance« – and even conducted the London Symphony Orchestra himself for this.*

The end of the world – or the salvation of mankind:
Opinions differ on the opportunities and risks of artificial intelligence. We asked the renowned AI expert Shelly Palmer: shouldn't smart algorithms scare us?

Mr Palmer, you are a sought-after expert on the subject of artificial intelligence. But if you had to explain what AI is in a kindergarten, how would you put it?
Quite simply: computers that learn by doing.

And if a five-year-old child asked: »Is your smartphone smarter than you?«, what would your answer be?
No – it's just a device that helps you talk to people who are far away, take photos of friends, send them the photos, watch videos and so on.

Where do you currently see the greatest potential for AI?
In the short term, AI will be used as super automation. It is a capability amplifier. If power tools amplify the strength of human muscles millions of times over, AI will amplify the human mind millions of times over.

In the automotive industry, you will not see a keynote speech, a CEO interview, that does not emphasise the importance of AI. Is that appropriate?
Yes. AI will be irreplaceable for safe, autonomous vehicles in the future. It should be the focus of every mobility company. There is no alternative.

In a way, the car is developing into a kind of robot. To a machine that learns, that serves us, that makes important decisions...
Cars are already computers on wheels. They will continue to develop into autonomous machines, »robots«, as you say. After all, that is the declared aim of every manufacturer of autonomous vehicles.

Tesla got to the heart of the matter with the introduction of the »Optimus« robot: a human-looking machine built by a car manufacturer. Clever marketing – or a serious technological leap?
There is a very good argument in favour of humanoid forms in machines. Our world is built and optimised for people. A useful robot would have to be humanoid in order to navigate stairs, doors or chairs. We have adapted the world to our needs – so humanoid robots clearly make sense.

Critics argue that even the experts who develop AI systems no longer understand the evolving algorithms. For many, this is a frightening dystopia.
I am not afraid of artificial intelligence. I am afraid of artificial control. AI will continue to develop, and although it brings with it a number of ethical problems, these are problems that can be solved. But artificial control is frightening. One example would be Waze, the navigation app for smartphones. We assume that Waze will show us the shortest and safest route to our destination. Is that really the case? Or are there other motivations? We have handed over control to an artificial system that may not have our best interests at heart. So let's better ask ourselves ›Who or what is controlling my life?‹ Because that's scary.

AI is turning the world of art and music on its head: John Lennon sings again with Paul McCartney, Frank Sinatra sings »Shake it Off« by Taylor Swift. You are a composer yourself: how do you feel when machines create art?
The problem with your question is that people equate creativity with execution. AI can perform at a very high level. For example, you will never be able to add a column of numbers faster than a computer. People are magical. People create. AI does not. Software cannot create anything. For the time being, we will not be extracting any new ideas from an AI system. Will there ever be such a thing as artificial creativity? Maybe one day. At the moment, the ability to write 150 words per minute does not mean that a system can write a novel.

How can we ensure that John Lennon can rest in peace?
AI is a natural part of human evolution. The question is: ›Are we training the AI or will it train us?‹ Jared Diamond asks a similar question in his book »Guns, Germs, and Steel«: ›Have humans domesticated wheat or has wheat domesticated humans?‹ Wheat became the most successful grain in the world because we learnt to grow it. First we invented fences, then villages, then towns to protect the wheat. Every new technology – cars, aeroplanes, telephones, computers, the internet – has changed the world. AI will do the same.

Toothbrush with IQ

In the hospital, in the cinema and in the fridge: ***artificial intelligence is omnipresent*** – and meanwhile has even reached the German music charts.

Sinatra sings Swift

What would it sound like if »Mr Ol' Blue Eyes« Frank Sinatra sang a song by Taylor Swift, currently the most successful female singer on the planet? If country legend Johnny Cash, known for his incomparable »Ring of Fire« bass voice, intones the colourful pop song »Barbie Girl«? Difficult, because both legends are already deceased. And yet they still sing – thanks to ***Song generators with built-in AI*** (e.g. on suno.com or udio.com), which enable the most absurd genre and time leaps. In summer 2024, an AI song (Butterbro with »Verknallt in einen Talahon«) even landed in the German singles charts for the first time.

The toaster thinks for itself

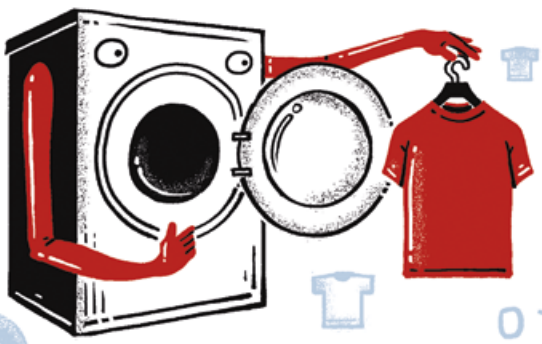
AI is already a constant ***companion in everyday life:*** For example, with the – often only partially intelligent – auto-correct function on smartphones, Google searches or purchase suggestions on Amazon. And AI is spreading rapidly: The smart alarm clock »Alarmi«, for example, learns which alarm sounds are most effective for waking people up. The »Genius X« toothbrush programmed with AI analyses brushing behaviour and helps to clean teeth even more intensively. The »Toasty One« toaster recognises types of bread and toasts them accordingly. Smart fridges scan food, indicate expiry dates and suggest recipes that match the contents of the fridge. And don't worry if you spill while eating: intelligent washing machines know which detergent and washing program is best for removing each stain effectively.

Roll the film!

Hollywood has depicted how life on Earth could be changed by artificially intelligent software for years. In the science fiction film »Her«, for example, a lonely man, played by Joaquin Phoenix, falls in love with the voice of an AI, voiced by Scarlett Johansson. In the dark, dystopian »Terminator« series starring Arnold Schwarzenegger, the artificially intelligent »Skynet« system fights humanity, and robots also want to take over in the blockbuster »I, Robot« with Will Smith. In real Hollywood life, actors such as Robert Downey Jr., who fought against the AI ›Ultron‹ as ›Iron Man‹ on the big screen, are now arming themselves against too much algorithmic power. Downey Jr. recently announced that he and his descendants would sue anyone who digitally clones his face without asking – even after his death.

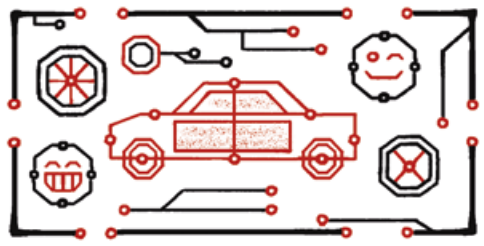
AI for the heart

77 per cent of 16 to 29-year-olds in Germany use ***Online dating platforms***. Around nine million people are currently registered on dating portals – and AI is diligently helping them to get together. The flirting apps »Bumble« and »Tinder« are among the most popular ways of meeting people and already suggest people to their users that an AI has identified as particularly suitable. The AI also helps to create the first message to a potential sweetheart. In addition, photos on dating portals are edited by an AI so that candidates seeking love appear even more attractive. But it remains to be seen how AI can help when it comes to a first date in the real world without inbuilt soft focus...



Dr Robot

Anyone who is ill goes to Dr Robi. At least if you go to the Charité in Berlin. Robi is a 1.20 metre tall robot with round googly eyes that rolls around on three wheels: In future, he will work at the Berlin clinic undertaking ***Activities of assistant doctors***, conduct the admission interview and measure blood pressure and body temperature. Many medical facilities are currently testing the use of AI. At the »Klinikum rechts der Isar« hospital in Munich, for example, assistant robot Aurora independently fetches the surgical material required from the warehouse. And at the hospital in Frankfurt/Oder, Navel the robot tells jokes to patients in the geriatric ward – and gives gardening tips.



Auto-correct

AI travels with you: Intelligent algorithms play a key role in ***Automotive production*** in the design of vehicles and, above all, in communication between the driver and the vehicle. Audi, for example, uses the AI-based FelGAN software to generate new wheel designs. BMW has an AI system at the Regensburg plant detect disruptive factors in assembly so that a poorly legible barcode, for example, does not cause production to stop. VW, like other manufacturers, integrated the ChatGPT chatbot into the voice assistance system. French supplier Forvia, on the other hand, is developing a new »Emotion AI« technology: A quasi-empathic system adapts the interior ambience to the occupants' emotional state. But will everyone get out of the car in a good mood at the end?

It's alive!

FERCHAU Automotive specialises in a crucial step in automotive engineering: commissioning development vehicles. This calls for a wide range of skills, from installing new components to validating, flashing and installing software. The experts often have to play Sherlock Holmes – when a vehicle just won't start.

Axel Breusch

They have just had another such case: a »research project«, as Axel Breusch laughingly calls it. A new electric saloon was to be put into operation for a premium manufacturer. An important model in the brand's portfolio, which is set to go into series production in the near future. The special challenge here: the on-board power supply was switched from 400 to 800 volts. Axel Breusch, Team Leader Workshop and Testing at the Stuttgart South branch of FERCHAU Automotive, and his colleagues specialise in complex projects like this: the commissioning of development vehicles for new models, some of which are not fully mature. **To »bring them to life«, as the automotive engineering discipline with the long name is also called: Complete vehicle commissioning**. What that actually means is harmonising all hardware and software components from vehicles that are often at an early stage of development or replacing them with new generations of components. »Flashing« control units, in other words equipping them with the latest software version. To make the interfaces in the electrical and electronic architecture capable of communication. In short: bringing all new systems together in harmony. So that the car drives.

There was a problem with this specific project. The new electric saloon could still be driven into the secure workshop hall of FERCHAU Automotive – work on prototypes is top secret – without any problems on delivery. However, after all the modifications, updates, validations, installations and diagnostic runs described in the specifications, one thing then happened: the car did not work. »Basically, nothing was working, the vehicle was dead,« explains Axel Breusch. And that after a highly complex remodelling, »an almost complete dismantling«: **Among other things, the on-board electrical system was replaced, including all the components that are crucial for the conversion to the new 800-volt system: battery, refrigerant compressor, wiring harnesses...** **»A fascinating project,«** says Breusch. **»All our skills were needed here, from automotive mechatronics expertise to experience in handling high-voltage wiring harnesses and software expertise.«**

Vehicle commissioning is one of the disciplines in automotive engineering that is currently undergoing some of the greatest changes. The reason: the car is becoming a »software-defined vehicle«. To the vehicle, which is characterised by its software – the bits and bytes make the music, not the hardware. There is more computing power in a modern car than NASA engineers had for the first manned flight to the moon – and it is quickly becoming more. The average car today contains between 100 and 150 million lines of programming, while the comparable figure for an Airbus is 10 to 15 million. Autonomous cars will be controlled by well over a billion lines of programming. »The individual systems in vehicles are becoming increasingly complex – for semi-automated driving functions, for new assistance systems, for all kinds of digital features,« explains Holger Schramm, Head of Vehicle Development at FERCHAU Automotive. »The commissioning of these systems is correspondingly demanding.«

Holger Schramm

The special thing about the commissioning discipline: while the car is becoming a digitally characterised software device and many development steps are being shifted to virtual environments and the cloud, commissioning is primarily anchored in the real, physical world. »The trend in the industry is clearly pointing in the other direction,« says Holger Schramm. Testing, validation and diagnostic procedures are increasingly being carried out digitally and virtually. Virtual prototypes are replacing physical test vehicles. **»But this one, decisive step cannot be shifted to virtual worlds,«** adds Schramm. »At some point during the development of new systems,

»The individual systems in vehicles are becoming increasingly complex – for semi-automated driving functions, for new assistance systems, for all kinds of digital features.«

Holger Schramm
Head of Vehicle Development at FERCHAU Automotive

of new vehicle generations, the button has to be pressed, a real, physical ignition has to be started. We check: are the systems talking to each other? Are all interfaces active? Are the signals arriving? This is what FERCHAU Automotive specialises in. We benefit from the fact that we are also involved in many other development stages of the manufacturers. We are familiar with all hardware and software components, with complex on-board networks and also with the latest virtual validation processes.«

And because the topic is so important for the industry, commissioning expertise at FERCHAU Automotive is distributed across all locations. In addition to Stuttgart, the Cologne branch, the Ingolstadt branch with its Neuburg site and the Wolfsburg branch, for example, are also popular partners for customers. While Cologne specialises primarily in the commissioning of software systems, Neuburg and Wolfsburg concentrate on complete vehicle commissioning in connection with crash tests. And this is where the process starts in reverse: a vehicle is first »almost completely dismantled«, explains Klaus Fischill, Division Manager Safeguarding at the Neuburg site. **»All desired modifications are carried out on the hardware and software side according to individual guidelines from the respective manufacturer and sensors are placed at all relevant points for the crash test.«** To do this, it must be ensured that the development vehicle, whose technological inner workings are not yet at the later mature series production level, is »fully functional«, says Fischill. This means above all: all safety-relevant functions must work perfectly, including the airbag and seatbelt tensioners with their control units, pedestrian protection systems and the activation of the e-call in the event of an accident.

But the real challenge begins with the crashes, or rather after the first crash, usually the front crash. »Most customers order the usual package of two to three crashes, one from the left and one from the right in addition to the front crash, or alternatively a rear crash,« explains Fischill. »All with the same vehicle. For us, this means that the vehicle's electronics have to function even after the front-end crash. **We have to make the system, which has just suffered a total loss, believe that everything is OK for the next crash.«** This can only be achieved with many years of experience with crash-penetrating hardware and software. »We could drive a vehicle model into the wall 50 times under exactly the same conditions – the effects of the enormous forces acting on it would be different every time.« In other words: a lot of creativity is needed to put a freshly crashed vehicle back into operation for further tests – that is, to bring it back to life.

Klaus Fischill

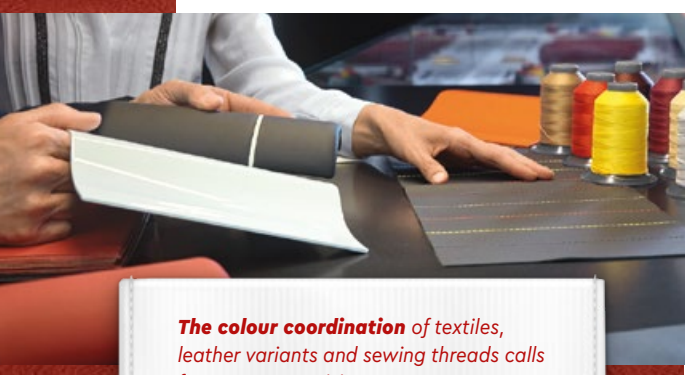
Creativity, automotive workshop expertise and versatile software skills – this was also needed in Stuttgart for the commissioning of the new electric saloon, which was to be made roadworthy for the manufacturer's internal test drives. And above all, initially also: self-reflection and the detective qualities that go with it. **If a vehicle no longer responds after meticulously working through the specifications, a critical review of the company's own work is required first.** »Sherlock Holmes research«, as Axel Breusch puts it. Many hours of diagnostic work later, it was clear: the work had been done properly. The battery was the culprit. There was a disharmony between battery, control unit and reprogrammed software. The solution was very simple though: »We reinstalled the old software. The electric vehicle responded immediately and all the systems were working,« explains Axel Breusch. »We were finally able to say: It's alive!« //

It's all a question of colour

The Weissach branch of FERCHAU Automotive looks colourful: A team of design and material experts works on the colour coordination of interior components for the customer Porsche. An important discipline in which one thing counts above all: a good eye.

You have to get used to the language first. Not the charming accent. As »Interior Semi-Finished Product Coordination Representative« at the Weissach branch of FERCHAU Automotive for the original Swabian customer Porsche, the charming final »le« syllable and lots of soft »sch« are simply part of the Baden-Württemberg native's sentence structure. There are words like **»Semi-finished product coordination«**. Terms like **»Microfibre perimeters«**, **»Composite seams«** and **»Colour target«**. »Yes, we do speak a special vocabulary,« says Pascale Amann with a giggle. And she doesn't mean the special paint colour names from sports car manufacturer Porsche such as »Racing yellow«, »Shark blue« or »Frozenberry metallic«. No, this somewhat unwieldy technical vocabulary has a single goal as its purpose: all components in the vehicle interior in perfect colour coordination.

Together with project coordinator Daniela Müller, Pascale Amann forms an expert team to ensure that all the colours in the interior of every Porsche look perfect. FERCHAU Automotive manages the entire colour and material management process. Floor coverings, A-pillar, dashboard, sun visors right through to the headlining – a whole host of interior components have to be matched to a specific colour. This process is more complex than it sounds, especially for a premium manufacturer of highly customised vehicles. For example, all textiles, leather variants and sewing threads – the raw »semi-finished products« – must have the same colour tone in the end. And that in every lighting situation, whether in daylight or in the garage, and over the entire lifetime of the vehicle.



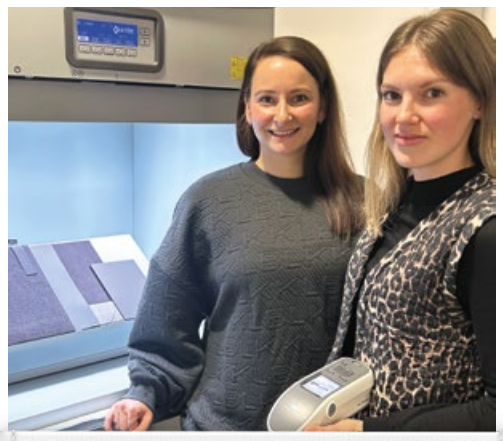
***The colour coordination** of textiles, leather variants and sewing threads calls for extreme precision.*

This calls for a colourful portfolio of skills: Project management skills, a particularly good eye and experience in handling a wide variety of semi-finished products. Up to 25 different outer fabrics in various colours are used in a Porsche interior, depending on the vehicle and equipment variant. This quickly results in a bouquet of up to 150 individual projects needing to be coordinated for a new vehicle. According to Pascale Amann, she and her team brief, supervise and coordinate the relevant material suppliers up to a year before the start of a model's series production to ensure that all the relevant components end up in exactly the same colour »creating a harmonious sense of well-being« for the car's occupants.

To this end, the manufacturer, Porsche, defines a colour target at the start of the process, which is used as a reference point for all interior materials. An approximation process begins over several colour correction loops until the colour tone desired is finally achieved. The goal: a master sample of the semi-finished product to be installed in the future in Porsche colour quality, which is used for comparison in series production. »The challenge is that all suppliers, some of whom have different dyeing and finishing processes, produce exactly the same colour,« explains Daniela Müller. »Colour pigments and formulations must be perfectly matched to the different materials which are mainly polyester and polyamide.«

This is why colour management mainly takes place in the analogue world. The FERCHAU Automotive team also complements visual

colour assessment by using digitally supported tools such as a portable spectrophotometer with integrated gloss level measurement to precisely match a colour tone. The individual outer fabrics are scrutinised for the visual assessment in a table-top light booth in Weissach under different angles and types of light. A fully equipped vehicle model is then driven into a kind of light garage at the customer's premises, a high-tech colour matching booth in which the colour harmony of all interior components is finally confirmed and ensured in the installed state. But at the end of the day, one thing counts above all: visual inspection. »It's simply not possible to reproduce the finest colour nuances on a computer,« says Pascale Amann. »We have to take a very close look ourselves.« //



***Pascale Amann** and **Daniela Müller** are colour and material experts at the Weissach branch of FERCHAU Automotive. Together with Textile Engineer Müller and Project Manager Elias Cello, Industrial Engineer Amann has been coordinating the interior material suppliers for the customer Porsche for several years. The goal: a harmonious overall colour scheme in the vehicle interior.*

THE A-TEAM

FERCHAU Automotive specialises in everything to do with software – and in supporting its customers in product development according to ASPICE criteria. These industry standards are the basis for every software-based system. Traditional SMEs and young start-ups alike benefit from the technology service provider's expertise.

»Times are changing,« says Frank Sartoris and leans back. Sartoris is Project Manager ASPICE Process at FERCHAU Automotive and one of the company's most knowledgeable experts on the growing importance of software in automotive engineering. He tells of project scopes that call for in-depth IT know-how, software expertise and »constant interdisciplinary thinking«; of the **»software-defined vehicle«**, the industry buzzword that describes the transformation of the automobile into an always-connected, algorithm-driven »mobility device« – and the effects of this on development processes in the automotive industry. And Sartoris talks about new customers: medium-sized companies that are realigning their product portfolio. About start-ups that develop »incredibly exciting technology solutions« – but lack one essential factor: »The expertise to bring clever concepts to the road in line with automotive standards.« And that's where the pivotal keyword comes in: **ASPICE**.

ASPICE is the abbreviation for an industry standard set of rules for developing embedded automotive systems, without which no technology solution, no matter how clever, will ever roll off the production line. ASPICE is also the basis for meeting manufacturers' requirements for the security of software systems, for development processes that are traceable at all times and, above all, for obtaining traceable work results and transparent proof that these have been created in accordance with the process. All of this is crucial for the two essential qualities of automotive software: functional safety and cyber security. »Modern vehicles are increasingly defined by source codes, algorithms and interfaces. We follow a development process based on ASPICE criteria, extensive hazard and risk analyses and the definition of specific security objectives to create the conditions to ensure that each software module harmonises with others, that the underlying function runs smoothly and that the system is secure against external hacks,« explains Frank Sartoris.

ASPICE originally stood for »Automotive Software Process Improvement and Capability Determination« with the second letter from »Determination« rather conveniently extracted in preference to the first. **In the meantime, however, the word »software« has been replaced by »systems«** – symbolic of a »critical transformation«, as Sartoris explains. **The increasing fuzzying of the boundaries between software and hardware in developing technologies requires »systemic thinking and developing«**: »Every software package, every compute module, every component in the car is now part of the bigger picture,« says Sartoris.

Although ASPICE has been automotive industry standard for some time, many newer competitors are finding it difficult to achieve the minimum »Level 2« that car manufacturers or large Tier 1 suppliers, for example, now require from software providers they work with. FERCHAU Automotive has developed into an experienced cooperation partner for such customers and has built up a good deal of expertise within the company in recent years. **»We not only advise on setting up a coherent ASPICE strategy, we also help our customers to implement the processes, methods and tools needed – and, if required, we can also develop crucial software packages at the same time,«** explains Usha Rani Yashwanth Kumar, software expert in the Cologne branch of the technology service provider.

Most recently, for example, the ASPICE team supported a customer that had to expand their portfolio as part of an important tender for development of a powertrain for electric cars and had »not yet properly aligned its development processes with ASPICE requirements«, says Sartoris. E-mobility in particular requires many companies to reorganise their processes, as not only is almost every component managed by software, but the system must also communicate securely with the outside world – i.e. the charging infrastructure. FERCHAU Automotive was able to support the customer in three ways: Firstly, new software development processes were established and a gap analysis was carried out to identify potential weaknesses at an early stage. In a second step, improvement measures were immediately introduced in order to set the project on a direct route to success. And thirdly, the team took on a complete »embedded software« development package for the inverter in the drive train; a battery-electric system cannot work without the inverter. The practice-orientated advice and support paid off: the company won the order from the OEM and the drive train is about to go into series production. //

Usha Rani Yashwanth Kumar *is a software expert at the technology service provider.*

Frank Sartoris *is »Project Manager ASPICE Process«, the interface between FERCHAU Automotive and its customers in implementating software development processes compliant with the necessary Automotive SPICE standards.*

Bastian Ottinger *(photo: left) is Team Manager Component Testing at the Ingolstadt branch of FERCHAU Automotive. A team of around ten people – including validation expert* ***Johannes Schwarz*** *(photo: right) – tests all kinds of components here for possible weak points – from glove compartment lids to door handles – on behalf of OEMs and their suppliers. The site's core expertise includes testing complex windscreen wiper systems.*

Kneipp therapy for components

The Ingolstadt branch of FERCHAU Automotive specialises in testing components. The core expertise of the experienced test team includes ***working with windscreen wiper systems*** under even the most extreme climatic conditions.

And then Christoph Appel says a phrase that you will rarely hear: »The wiper system has always been part of my life.« You can't help but give a little smile at these words, which in turn sparks a little irritation in Christoph Appel. But then he listens to his own turn of phrase – and can't help but smile himself. And also qualify it a little: the wiper system has only been an essential part of his job for around ten years. As Division Manager for System and Component Development at the Ingolstadt branch of FERCHAU Automotive, Appel, together with Team Manager Bastian Ottinger, is responsible for an important and long-standing contract: testing all wiper systems for a major German car manufacturer. Working closely with the OEM's supplier, the wiper systems and their functionalities are put to the most extensive load and long-term tests to ensure one thing: optimum visibility on the road, even in rain or snow.

Of course, this is too narrow a job profile description that in no way does justice to the actual scope of testing activities in Ingolstadt. Appel, Ottinger and their team of around ten experienced engineers, technicians, mechanical engineers and master car mechanics are also responsible for all kinds of other components in component testing: locks, doors, boot lids, glove box lids, centre armrests... This list doesn't come even clost to including all 10,000 individual parts go into assembling an average car. »But quite a lot,« says Bastian Ottinger, Team Manager Component Testing. Accordingly, FERCHAU Automotive's customer and component portfolio is growing every year. **»Component testing is a discipline that takes a lot of experience, expertise and a good dose of creativity,«** explains Ottinger. »Each component has its own particular challenges and needs an individual approach, essentially well-grounded expertise in dealing with the respective technology and its potential weak points.«

However, the »core competence« includes the wiper system – a crucial component that even the most modern, software-driven, networked vehicles with all their high-tech displays cannot do without. **While the whole world is talking about the 'software-defined vehicle', »classic components such as the wiper system lose none of their importance,«** explains Christoph Appel. Their performance is being tested for a premium manufacturer in collaboration with one of the world's leading original equipment manufacturers for windscreen cleaning systems.

A state-of-the-art 26-cubic-metre capacity climate chamber was one of the facilities set up for this purpose. Each wiper system is subjected to intensive testing here to ensure that all functions and sub-components are reliable. As well as testing the linkage and motor, the forces acting on them and the electrical currents are also measured: a winter wipe test at minus 20 degrees Celsius, during which a wiper system runs up to 200,000 load cycles – a load cycle being the wiper arm moving once across the windscreen.

After every 10,000 load cycles the system is manually blocked at a precisely defined angle, just as if annoying piles of snow had formed on the windscreen. »This is the stress test for the wiper motor,« explains Ottinger. »It has to run perfectly under even the most extreme conditions and in the event of unexpected blockages.« The system is subjected to a further endurance test, with around 1.5 million load cycles – the system runs for six weeks with a constant sprinkling of artificial rain, interrupted only by actively induced blockages.

At the end of the test cycle, things become particularly extreme: each wiping system has to prove itself for 24 hours at minus 40 degrees Celsius and then 24 hours at 90 degrees Celsius during the temperature resistance test. The hot-cold cure for the technology is not just a challenge for the wiper system component. It also promotes good health in the Ingolstadt testing team, one of whom has to keep an eye on things from time to time in desert or arctic temperatures: »In fact, all of us in the team hardly ever catch a cold,« says Christoph Appel with a laugh. In this respect, the wiper system really is an important aspect of his not only job, but also of his life. //

»You have to be able to have a say«

***Lutz Stiegler**, 57, has been Chief Technology Officer (CTO) at electric car manufacturer Polestar for around a year. Stiegler came from the parent company Volvo, where he was responsible for the development of electric drivetrains. He previously worked for IAV, the German engineering service provider, for almost twenty years, most recently as Vice President Powertrain Development. Polestar is majority-owned by the Chinese car manufacturer Geely, but sees itself as a Swedish company. After years as a single-model brand, Polestar 3 and Polestar 4 were launched last year, following on from Polestar 2. Polestar 5, a four-door Grand Tourer, is due to follow soon. Polestar has had a new boss since October 2024 in Michael Lohscheller, who succeeded Thomas Ingenlath.*

The product portfolio tripled in one fell swoop – Polestar on the offensive. The Swedish e-brand recently launched two new models, supported by an investment from the Chinese company Geely. As Chief Technology Officer at Polestar, Lutz Stiegler is one of the industry's leading experts in electromobility. In an interview with MOBILITY WORLD, Stiegler explains the challenges facing the young manufacturer, why he does not appreciate the term »super battery« – and the prospects he sees for engineering service providers in these volatile times.

***The Polestar 4**, an SUV coupe, has no rear window; instead, there is a rear camera.*

Mr Ziegler, Polestar recently replaced its CEO, with Michael Lohscheller taking over from Thomas Ingenlath in October. Did this cause a temporary decision-making vacuum in difficult times? Established manufacturers are stuttering, one Chinese competitor after another is encroaching into Europe...
No, we didn't have a decision-making vacuum. But you're right, we live in challenging times. You never get bored as a decision-maker, that's true. But we have a tightly-knit executive management team, so all key decisions could always be made. And, quite honestly, in a major industry like the automotive industry, there is never a good moment for a change at the top of a company.

This is not the only area where there have recently been personnel changes in your company: Philipp Römers was appointed as the new Head of Design at the end of August, and new managers were also appointed for many important markets: Head of North America, UK, Norway...
A new chapter is also beginning for Polestar. We have just gone from being a single-model brand to a manufacturer of three electric cars. This calls for reorganisation in many areas.

You are now counted as an old hand at the company, having been there for just under a year. What have been the defining images for you over the past few months?
Well, there are still a few older hands among us... (laughs). It's been an exciting year. Technical development of Polestar 3 and Polestar 4 was largely complete when I joined. My defining moments as Head of Research and Development have more to do with Polestar 5, which is due to be launched in 2025. It was an absolute highlight for me to see the first units.

This is the Year of the Dragon in China, which is considered a prosperous time and a period of business success. This is one reason why Chinese manufacturers are so agile. Are you now proclaiming the Year of the moose?
(laughs) Great analogy! If we can agree that the moose could also symbolise economic success, I'm more than happy to go along with that. A moose also walks more than it runs. It knows what the way forward is and where it wants to go, and it doesn't like anything to get in its way. It's about looking ahead with confidence for us. To successfully establish our new models in vehicle segments that are new ground to us.

*The electric SUV **Polestar 3** has a vehicle length of 4.90 metres.*

The Polestar 3 is now our luxury model, while the Polestar 4 is the family-orientated model with plenty of space.

Since we've brought the moose up, we have to address it: to put it bluntly, are they even Swedish? Or are they Chinese? Polestar, a subsidiary of Volvo, is majority-owned by the Chinese company Geely. However, »Gothenburg« appears as the place mark of all press releases.
Geely's commitment is extremely important for us, after all, it is our financial backbone. But Polestar is a Swedish brand and our headquarters are in Gothenburg. The vehicles include European engineering and Swedish design in every detail. Our models are technologically based on the Volvo platform. The advantage we have is that, as part of the large Geely Group, we can take our pick of the available technologies, but also that we develop in Europe and manufacture European products.

But you also produce in China.
Part of Polestar's recipe for success is that we have production in the plants of other brands in the holding company, including in China and in the US state of South Carolina. Polestar 4 will also be produced in South Korea from 2025 – using European technology.

You cooperate intensively with Chinese innovation leaders, for example with smartphone manufacturer Meizu in software production.
For the Chinese market, yes. Product specifications for China are completely different to those in Europe. Connectivity and digital features in the interior are much more pronounced in China than they are on the European market. In China, it is not the comfort of the driver's seat that counts, but the user experience of the person in the right-hand rear seat. On the other hand, western markets have many requirements, including regulatory ones, that are simply not relevant in China. It is essential to deliver customised products for each market. This can only be achieved through suitable collaborations.

»It's about looking ahead with confidence for us.
To successfully establish our new models in vehicle segments that are new ground to us.«

You are now working with the Israeli start-up StoreDot on battery technology. The media talk is about a new »super battery«.
I refuse to use such superlatives. A new »super battery« has been heralded so often, but none has ever made the breakthrough. No, our vehicles are currently fitted with batteries from CATL, the market leader from China. It currently offers the ultimate in battery technology. But we are looking ahead. StoreDot has developed a unique technology. The first step is to build a prototype. To show what the battery is capable of.

What can it do?
It is simply unbeatable when it comes to fast charging. It can charge from 10 to 80 per cent capacity in ten minutes. The technological approach behind it is brand new. The idea is to operate the anodes with a very high silicon content because this allows them to absorb more anions. This significantly increases the battery's conductivity, service life and performance. In my opinion, what makes the difference is not the absolute range of a battery, but how many kilometres I can recharge per minute. So that in the end, a charging stop takes no longer than you would expect to take with a combustion engine.

We have come to realise that when you talk to managers at car manufacturers, the conversation usually quickly turns to battery technology. William Li, founder of the Chinese company NIO, recently spoke in MOBILITY WORLD about the benefits of battery exchange stations. Would that also be an option for you?
No. I have already run the numbers on this many times and have not yet come to a result that wins me over. A technology like this has to be rolled out across the board, and I don't see that happening. I can only imagine what it would be like during the holiday season when all users want to switch to a particularly powerful battery. How many heavy batteries do you need to keep in stock? I'm happy to be convinced otherwise; I don't claim to be a prophet. But that is not our chosen way.

Not a prophet maybe – but you are an insider: what is the industry missing for the final breakthrough in electromobility? Could it be the prices? A Polestar 3 with dual engine starts at 85,000 euros..
We are not a mass manufacturer. We don't aim to produce three or four million vehicles a year in the long term, but perhaps 200,000. We are not making an electric replacement for the VW Polo or Opel Corsa. Our business model is different. The technologies we use simply cost too much. We are a sports-orientated brand. This, for example, rules out the lower-priced battery technology that could have been chosen. Small, affordable, plenty of space for the family and enough range for summer holidays – such a product will never exist in this form.

That sounds sobering.
Don't get me wrong, of course there will be small, affordable electric cars, and that makes sense. But these will be city-oriented models from volume manufacturers, with a range of perhaps 300 kilometres. And always with an eye on keeping the basic costs of production as low as possible. If you want to drive a family-friendly, high-quality performance vehicle with excellent charging technology, look at the portfolio of manufacturers such as Polestar. We are clearly positioning ourselves in the premium segment.

Before joining Volvo, you were responsible for powertrain development at the engineering service provider IAV, which is also one of FERCHAU Automotive's co-operation partners. What prospects do you see for development service providers in challenging times?
I'm afraid it won't get any easier in the short term. Many large OEMs are currently implementing far-reaching cost-cutting programmes. And unfortunately, it is the case that the quickest way to make savings is to start with the procurement budgets.

They know both sides, as client and contractor. How do you have to position yourself as a development service provider today if you are to stay in the game?
A good question. Because even when times are difficult, manufacturers will not be able to move forward without agile development partners. It will be crucial to be close to the technology leader in key technologies. Tapping into new competences. At the moment, it's also about niche disciplines. Areas that are small enough not to catch the eye of the OEM, but which therefore promise genuine outsourcing projects.

An example?
Everyone is talking about batteries – you have to be able to have a say. Perhaps not exactly in cell chemistry, but as an interface between battery supplier and manufacturer, development service providers can play an important role in integration issues. I see another perspective in the operation of test benches. An efficient and market-orientated diagnostics, validation and testing infrastructure is an important consideration for future orders. Of course I know the challenges. Volatile customer behaviour does not make things any easier for engineering service providers. Unfortunately, we don't live in a perfect world.

What would that even look like?
In a practical world, all manufacturers would join forces and jointly outsource large development projects so that, for example, the developing basic software for assistance systems, including safeguarding basic technologies, is ensured effectively and cost-effectively for all involved. Development service providers could take over and then distribute this to everyone, generating customised, brand-specific products. Unfortunately, the world doesn't think that way. Too much is being pushed forward in parallel by everyone in areas that are not at all different as regards competition. It's a shame – but this at the moment is the real world. //

TALK of TOWN

Hello again

Don't I know you? Anyone looking at the latest car models may experience one déjà vu after another. Ford Capri, Renault 5, Opel Frontera, Alfa Romeo Junior: these models are actually long gone. But now the old names are being resurrected. This time for new models with electric drive. It's a favourite trick that the industry uses to try and breathe life into electromobility, which otherwise has little emotion associated with it. **Retro – now oh so fashionable in the car industry.** Volkswagen is even relaunching a former brand in the USA with the SUV brand Scout. This is fully 45 years after the once popular International Harvester Scout off-road vehicle was discontinued. And retro goes beyond names too. **Renault, for example, commissioned the paint manufacturer BASF to develop five »pop colours« for the new Renault electric compact car**: five bright 70s colours designed to revive the charm of days gone by.

Return of the buttons

Touchscreens have long since become the central operating unit of modern cars (see Report p. 18). However, the ever-larger screens also carry high potential for distraction. The Euro NCAP vehicle safety organisation has also recognised this. For this reason, starting in 2026, the full five-star rating will only be awarded to a vehicle if **classic, analogue controls** are available for certain functions: for the indicator, hazard warning lights, horn, windscreen wipers and activation of the eCall system, in other words, the emergency call via an integrated SIM card. Some manufacturers have already gone back to using more buttons and dials. Hyundai has added a new button in the Ioniq 5 electric SUV's facelift, for example, to activate the seat heating without having to navigate through the touchscreen menu. **And Škoda has developed »Smart Dials«, three multifunctional knobs for controlling various functions**. The US brand Tesla, on the other hand, the pioneer of touchscreen operation, is sticking to the buttonless approach. Even the glove compartment can only be opened via voice command or touch control.

Pitt-stop

Formula 1 has always been Hollywood-ready. The spectacular duels between James Hunt and Niki Lauda in the 70s, Michael Schumacher's first world championship triumph thanks to a provoked accident in the final race of 1994 – or Max Verstappen's first title win thanks to an overtaking manoeuvre against direct rival Lewis Hamilton on the last lap of the final race of the 2021 season. **Formula 1 is now coming to the big screen. »F1« will be shown from 26 June in cinemas**.

Hollywood icon Brad Pitt plays a Formula 1 veteran who returns from retirement to mentor an underdog racing team and its young talent. The film should be spectacular. It was filmed on real racetracks, with real racing cars – and in the setting of actual Formula 1 races. The director is Josef Kosinski, who also put »Top Gun: Maverick« in the limelight. Kosinski also brought seven-time Formula 1 world champion Lewis Hamilton onto the team as a producer – for the authentic F1 credentials.

The power of images

Faster, more brilliant, wider – development for displays in cars is currently only going in one direction. The next generation of vehicles will boast giant screens. But more discreet alternatives are already being developed for the future.

Bright green letters and numbers on a dark background. This is what the first digital cockpit in the automotive world, around 15 centimetres wide and 10 centimetres high, looked like. Visitors to the London Motor Show at Earls Court crowded around the Aston Martin Lagonda on display there on 12 October 1976 to catch a glimpse of the display. Never before had there been LED displays in a car – the car must have seemed to have been teleported down from the future. However, only 645 units of the »most advanced car of its time« were ever built – partly because the electronics proved to be highly unreliable and the word »error« flickered all too often over the screen. Today we can confidently say that the Aston Martin Lagonda presented a technology almost fifty years ago without which modern cars would be unimaginable.

»Displays are the central human-machine interface in the vehicle,« says Philipp von Hirschheydt, Member of the Executive Board for the automotive sector at Continental. The term ***»screenification«*** is the talk of the industry. On the one hand, screens are getting bigger and bigger, and on the other hand, the number of screens in cars is increasing. Both trends were taken up by ***Mercedes-Benz*** from 2021 with the ***EQS electric saloon***. The car introduced what they termed the Hyperscreen, a continuous glass panel across the entire dashboard, under which three monitors in all were installed. The Cadillac Escalade IQ electric SUV set the most recent screen record last summer; its giant monitor has a screen diagonal of 55 inches (1.40 metres).

It will not stop there though. The South Korean electronics group LG presented the largest automotive screen to date at CES 2024 in Las Vegas: The »57-inch Pillar-to-Pillar LCD«, i.e. a display with a screen diagonal of 1.45 metres that extends from the left to the right A-pillar.

LG, which claims to be the global market leader for automotive displays, has also announced that it will begin mass production of ultra-large screens from 2026.

The largest automotive display to date *comes from LG and has a screen diagonal of 1.45 metres.*

In general, the Asian market constantly demands new, ever-more innovative displays – and customers in China, for example, are considered true digital natives with very different requirements for vehicle interiors. BYD, for example, offers screens in all models that can be rotated from landscape to portrait format to optimise the display of navigation or gaming functions.

Nobody even contemplated such extremes when a screen first became the visually dominant element in a vehicle and the centre of the dashboard design. »We were the first to come up with a screen – which was still small at the time – free-standing on the dashboard with the third-generation Mercedes A-Class from 2012,« says Hartmut Sinkwitz, Director Interior Design at Mercedes-Benz, in an interview with MOBILITY WORLD. In the same year, 2012, the Tesla Model S also rolled onto the roads for the first time. The electric car also featured a central, free-standing screen. But other than that, there were only two steering column levers and six buttons on the steering wheel. This was revolutionary in that it not only radically changed the interior's look, but also focussed operation almost exclusively on the touchscreen.

A veritable flood of screens then followed in the Honda e small electric car, which was sold from 2020 to 2024. The car boasted up to six screens: a digital cockpit, two touchscreens and, on the far left and right, a display for the images from the exterior mirror cameras. The five screens formed a digital band across the dashboard. There was also an interior mirror display that showed images from a camera filming the traffic behind the car. Cars with multiple screens are now the norm. And even if the steering wheel and pedals will remain the essential control elements for a car for the foreseeable future, everything else will be controlled via touchscreens: navigation, climate control, entertainment, communication, ambient lighting, driving modes, battery information, weather forecast and video streams. The screens and their technical parameters – image sharpness, reaction speed, colour brilliance – as well as the graphic design and logical structure of the content presented are fundamental to the overall user experience.

What used to be a three-dimensional operating landscape, a topography of buttons, sliders, knobs, levers and switches, is now a functional surface, a smooth, glassy plane. ***»Screens are both an opportunity and a challenge for us interior designers,«*** explains Mercedes-Benz interior designer Sinkwitz. »Because when the screens get bigger, there is less space for the sculptural design of the interior. Our main task then becomes to combine the displays and the interior to create an iconic overall aesthetic.« For example, the outer air vents were integrated into the glass surface in the ***Mercedes EQS*** hyperscreen. This not only looks harmonious, it also improves crash safety, as it incorporates invisible predetermined breaking points that

*The **»Superscreen«** in the **Mercedes Concept CLA Class** spans the dashboard and enables personalisation with real-time graphics.*

prevent the glass surface from splintering in the event of a side impact. The new Mercedes CLA, which will be arriving at dealerships in early summer, is a perfect example of how aesthetics and functionality can be harmoniously combined. Ford, on the other hand, combines the touchscreen and the traditional volume control in the Mustang Mach-E electric model by integrating the rotary knob into the screen surface.

Such solutions could become more common in the future, as the screen format will continue to grow in many vehicles. The Mercedes EQXX study indicates what this could look like with a curved, continuous screen. Designer Sinkwitz sees this as a logical development. »Our customers appreciate our screens with their large, clear information and images. A central display with a large screen diagonal will therefore be standard in the future. And there will be optional interior architectures with maximum full-surface screens for people who like even more infotainment in their vehicle.«

In the Chinese market – where a car functions not merely as a means of transport, but above all as a »digital cave«, a digital, personalised retreat – individually configurable screens for all occupants are expected as a matter of course. Mercedes-Benz with the EQS, Audi with the Q6 e-tron, Ferrari with the Purosangue and Porsche with the Taycan and Macan models already offer separate screens in front of the passenger seat. However, the driver cannot view their contents.

This is because distraction is a problem that is increasing alongside the growth in the size of the digital surfaces in the cockpit. It starts with simple operating steps. Because when you make a setting using the touchscreen, you usually have to look twice: first to fixate the correct touch point and then, after tapping, to take a second glance to check whether the desired function has been triggered. This means that fiddling around on the screen is almost always more distracting than reaching for a control dial or pressing a clearly tactile button. Some operating menus and graphic displays also turn out to be more confusing than helpful.

Manufacturers and suppliers are working on the next display innovations to counter this. ***Continental***, for example, has developed what they term a ***»ShyTech Display«***. This is a screen that is hidden behind a surface and only appears when it is needed. Until then, the surface looks like a decorative wooden panel, but the operating options become recognisable as soon as a hand approaches. The »ShyTech Display« is set to be used in series production by a car manufacturer before the end of this year.

***Continental ShyTech Display:** operating options only become recognisable when a hand approaches.*

At ***BMW*** in turn – also during the course of the year – a technology called ***»Panoramic Vision«*** will go into series production in the first model of the ›Neue Klasse‹ vehicles. This is a new head-up display that is shown in the lower section of the windscreen and across its entire width. BMW Board Member for Development Frank Weber explains: »The windscreen becomes a single large display with our new BMW Panoramic Vision that opens up completely new possibilities for designing our vehicles.« Drivers can decide which information they only want to display in their own field of vision and which should be visible to all occupants. »The revolutionary projection and much clearer cockpit create an impressive new spatial and driving experience,« says Weber.

***»Panoramic Vision«:** the new head-up display from BMW*

However, some experts doubt whether screen dependency in the car will actually endure. They argue that voice control based on AI technology that understands every word could make some touch functions superfluous in the future, thus reducing the size of screens again. After all, in a survey commissioned by the TÜV association in July last year, around half of all car owners surveyed in Germany stated that they felt too distracted by operating digital functions while driving. //

Pure adrenalin on wheels: the racing car ***from Mercedez-AMG Petronas.***

75 years of Formula 1

Title, types, technology

The premier motorsport class celebrates its 75th anniversary. Even though Formula 1 has changed radically since the first Grand Prix in May 1950, the global fascination of this high-performance sport testing the limits of physics – and the subsequent transfer of technology to production cars – persists.

10 teams, 20 drivers, 24 races and a single goal: to win! Formula 1 will turn the lights green on the new season on 16 March 2025 with the opening race in Melbourne, Australia. However, the grandiose party to celebrate the 75th anniversary of the premier motorsport class took place a few weeks earlier, on 18 February in London, featuring world stars and show acts. For the first time in F1 history, all the teams presented their new racing cars together. »For the very first time, we bring together our fans, all 20 superstars of our sport and some very special guests to officially open our new season and celebrate our 75th year in motor racing,« said Formula 1 Managing Director Stefano Domenicali in the build-up to the race. Formula 1 has long been much more than first-class motorsport, it is also a mega show and mega business. Experts estimate the current enterprise value of the Formula One Group, which has been owned by US group Liberty Media since 2016, at 17.1 billion dollars.

75 years ago, when Formula 1 launched its first season, nobody dared even dreamed of such sums. The first race of the newly created World Automobile Championship took place on 13 May 1950 at the Silverstone race circuit in England. This actually took place on a sunny Saturday, because the English King George VI, who was present to watch the race along with around 200,000 other spectators, did not want to sacrifice his Sunday rest for the full-throttle spectacle. The inaugural race was won by Italian racing driver Giuseppe »Nino« Farina in an Alfa Romeo, and Farina, 43 years old at the time, also became the first Formula 1 world champion.

Ferrari did not even take part at Silverstone due to the cumbersome journey to the British Isles, but only entered the new racing series at the second round of the World Championship in Monaco. Unthinkable today. Just as so many things were that happened in the early years. Like at the Monaco Grand Prix in 1955, when Alberto Ascari, the 1952 and 1953 world champion, crashed through the track barriers during the race in Monte Carlo, plunging his car into the harbour basin – and somehow escaping with nothing worse than bruises. Or Juan Manuel Fangio, who was so exhausted after winning his home Grand Prix in Buenos Aires at 44 degrees Celsius outside temperature in 1955 that he had to accept the winner's trophy sitting down. Or later, at the 1984 Grand Prix in Dallas, when Nigel Mansell tried to push his car, which had broken down on the last lap due to a gearbox failure, across the finish line and collapsed in complete exhaustion. Or the most expensive crash, in 1998 in Spa, Belgium, when twelve racing cars were involved in an accident – the equivalent of around 11 million euros in damage.

***The legendary Alfa Romeo Tipo 158**, the 1950 world champion car.*

Last season was dominated by the duel between McLaren driver Lando Norris and Red Bull driver Max Verstappen; in the end, the Dutchman dominated and secured his fourth title.

The Argentinian Juan Manuel Fangio won the title five times in the early years. This record was first surpassed by Michael Schumacher, who won a total of seven world championship titles. He won five of them in a Ferrari and sparked an unprecedented boom in Formula 1 in Germany. Britain's Lewis Hamilton has now also won seven drivers' world championships – one in a McLaren and six in a Mercedes. In the season now beginning, Hamilton, now competing for the first time for Ferrari, could become the outright record holder with his eighth title. Excitement is guaranteed in any case – the new world champion has only been decided in the final race in 29 seasons so far.

Triumph and tragedy go hand in hand in Formula 1; it's all about characters, titles and temperaments. And as far as the teams are concerned, it's always about technology. The racing series is often referred to as the »fastest development laboratory in the world«. Components that were originally developed for racing and subsequently went on to be used in production cars include disc brakes and turbochargers, paddle shifters on the steering wheel, the idea of downsizing and hybrid technologies that combine combustion engines with electric power. Aluminium and carbon composite material were initially used in racing cars to reduce weight and increase strength at the same time, but they have long been used in car construction as well. Formula 1 is also considered a pioneer in the field of aerodynamics, for example with completely smooth underbodies. These findings are now also being used to increase the efficiency of production vehicles and also the range of electric vehicles. Many processes are now also being developed in Formula 1 teams around data management, digital engineering, virtual test procedures and innovative production methods, which are later destined to be used in the automotive industry.

The race for the best, fastest and most efficient technological solutions continues. New Formula 1 regulations will come into force in 2026, which will once again present the teams with challenges and leave them no choice but to innovate. Cars will become smaller, the wheelbase permitted will shrink from 3.60 metres to 3.40 metres, and the vehicle width will have to be reduced by ten centimetres to 1.90 metres. Active aerodynamics, in other words wings and spoilers that can be adjusted during the race, will also be permitted for the first time. And performance is also being improved: in future, the combustion engine will only be allowed to generate 400 kW (540 hp), but the battery output will be increased from the current 150 to 350 kW (475 hp).

Maximum speed is therefore still guaranteed. And the utmost suspense, especially from a German perspective. Because Audi will make its debut in Formula 1 competition in 2026. The Ingolstadt-based team has taken over the Swiss Sauber team, with German driver Nico Hülkenberg and Brazilian Gabriel Bortoleto on the grid for Audi. Even after the anniversary season, Formula 1 is likely to offer a spectacular show and fast-paced surprises. //

***Audi will compete in Formula 1 in 2026**, shown here: the show car.*

FORMULA STUDENT

The race of the top talents

***An international design competition for young engineers – known as Formula Student, which has been taking place since 2006 and is organised under the auspices of the Association of German Engineers (VDI).** The challenge: to work as a team to design, build and test a single-seater formula racing car and bring it to the starting line at the grand finale every year in late summer at the Hockenheimring race track. The racing series is not only an excellent opportunity for the participating students to gain practical experience, but also for companies to scout talented young professionals. **For this reason, the Weissach, Stuttgart-Süd and Stuttgart-Nord branches of FERCHAU Automotive and the FERCHAU branch in Kiel have sponsored Formula Student for many years.** The Weissach branch supports the Esslingen racing team (Esslingen University of Applied Sciences) as a »platinum sponsor«; a commitment that has already led, among other things, to Formula Student team members being recruited as employees after their graduation. The Kiel branch in turn is an active sponsor of the Raceyard team (Kiel University of Applied Sciences), thereby also raising its own profile among this group of highly motivated young designers.*

*The Tesla Cybercab is designed to **bring its passengers** to their chosen destination fully automatically.*

AI learns to drive a car

Artificial intelligence will help give new impetus to the ***development of autonomous driving***. However, the systems must function with »at least 99.9 per cent« accuracy.

It was a spectacular show. In October, on the grounds of the Warner Bros. film studios in Hollywood, US electric car manufacturer Tesla unveiled the robotaxi it had been teasing for years. Tesla boss Elon Musk was chauffeured onto the stage by the so-called Cybercab. The matt gold two-seater looks dashing, has gullwing doors but no steering wheel or pedals. It is designed to take passengers to their chosen destination fully automatically. Musk said at the premiere that the Cybercab will cost »less than 30,000 dollars« and that production is »expected to start in 2026«.

As elaborate as the staging of the Cybercab was, other companies have now left Tesla in the slow lane when it comes to autonomous driving. Waymo, for example, the Google subsidiary which operates a fleet of 250 robotaxis in San Francisco. GM, on the other hand, recently discontinued its own robotaxi service, Cruise, and is now concentrating on semi-autonomous assistance systems in cars. Just like Mercedes-Benz in Germany. The Swabian manufacturer offers the S-Class and EQS models with »Drive Pilot«, which steers the car in a highly automated way (Level 3) under certain circumstances in normal road traffic.

The sensors were trained with an artificial neural network, in other words, an AI, to ensure that it works reliably. The software learnt what pedestrians, traffic signs and road markings look like in millions of different scenarios. »A key area in applying artificial intelligence in vehicles is autonomous driving, which could not be possible at all without the use of AI,« says Markus Lienkamp, Professor of Automotive Engineering at the Technical University of Munich and an expert in automotive applications of AI.

*Left: **Drive Pilot from Mercedes enables autonomous driving** at level 3 up to a speed of 95 km/h from this spring.*
*Right: The supplier **Continental uses AI to train autonomous driving systems**.*

The fact that the development of autonomous driving is progressing more slowly than predicted is due not only to the complex and expensive technology, but above all to the fact that the systems must function as safely and reliably as possible. On the one hand, legislators insist on this, on the other hand, it is also a fundamental criterion for automotive companies. Because if a technology failure results in an accident during active driving functions at level 3, the manufacturer is liable.

The companies are striving for maximum functional reliability of the autonomous driving functions. »Statistical algorithms are 95 per cent correct. That's impressive, but it's far from perfect,« explains Lienkamp. »Mistakes still happen – even in systems that initially seem convincing. This is a problem, especially when it comes to safety-relevant functions or autonomous driving, as accuracy of well over 99.9 per cent must be targeted in these areas.«

The systems must be trained in real operation to be able to attain such an infallible technology. This is why there is a plethora of pilot projects on public roads – always with a safety driver on board to be able to intervene if the technology fails. This applies to Deutsche Bahn's KIRA project with self-driving vehicles in Darmstadt and Offenbach, as well as the autonomous shuttle service to the BMW plant in Leipzig, or the one in Heilbronn between the main railway station and the »experimenta« science centre. In Hamburg and Munich too, Volkswagen is testing ID. Buzz AD automated electric vans.

Development of autonomous driving functions can be accelerated through the use of AI. But the key technology still has its pitfalls. One example is a case from the USA in which the AI was confused by a sticker on a stop sign during a test. The system interpreted the traffic sign not as a prompt to stop, but as a speed limit – an incorrect decision that could have had fatal consequences in real road traffic. Because reality holds countless such scenarios, it is crucial to detect AI systems' »blind spots«.

Suitable procedures for AI protection have been developed in recent years in a project led by Volkswagen and the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS. Methods were developed by 25 project partners to make the safety of AI systems in cars verifiable, for example, through standard tests that every AI system should pass: recognising pedestrians bending down at the side of the road and also recognising them if they are partially obscured by a billboard or parked car. The results were incorporated into the ISO/PAS 8800 safety standard, which provides a guideline for the development of AI software. Another important milestone towards autonomous driving. //

What are the employee competences that in ten years will be particularly in demand?

We asked HR managers from a range of sectors.

Ralph Wangemann *(54)*

Managing Director Human Resources and Labour Director at Opel Automobile

»At Opel, we will continue to drive the transformation in the future. *This includes the willingness to challenge the status quo, to continuously develop and to acquire new skills. Because the industrial environment is in a state of constant change. Our mindset can be summarised well with ›ForeverForward‹. This goes hand in hand with a high degree of flexibility and creativity as well as the curiosity to learn and apply new things. In ten years' time, this will include digitalisation and artificial intelligence even more than it does today, which will increasingly be with us all in our day-to-day work and promote our efficiency.«*

Max Herwig *(42)*

HR Director at Bundesliga football club RB Leipzig

»A highly developed competitive mindset will be essential to survive in the global competition for the best ideas and sustainable success. *In ten years' time, skills such as multilingualism, an understanding of digital transformation, flexibility and, above all, a constant willingness to adapt and learn will be even more important than they are today. Working with top athletes and proficiently trained specialists in a top international club shows us very clearly how important it is for individuals to strive for the maximum and to orientate themselves towards the best in highly dynamic scientific fields. All this in an attractive working environment that is geared towards top performance and will continue to ›give young talent wings‹ in ten years' time.«*

Kerstin Schniers *(37)*

Head of Recruitment and Retention Management Technical Staff at FERCHAU Automotive

»A saying that also applies to the world of work is: Nothing is more constant than change. *One skill that will therefore be crucial for employees in ten years' time is adaptability. Because the influence of artificial intelligence, the importance of machine learning, the ongoing digital transformation – all of this is already changing everyday working life. In future, we will have to react even faster and more flexibly to this change and the resulting challenges. But despite all this technological progress, there is one thing we must not lose sight of: our humanity. Empathy, consideration and togetherness are ultimately the skills that set us apart from AI and make us irreplaceable in our interactions.«*

Dr Michael Schäfer *(63)*

Director at the German Bundestag

»The Bundestag administration is a service provider for parliament and MPs. *›Making democracy possible‹ is our mission. We are simplifying work processes with digitalisation and we foresee the use of AI in various areas. However, the characteristic feature of our administration will remain: the interaction of very different trades under the constantly dynamic demands of parliamentary business. All of this will continue to require analytical thinking, good judgement, a great deal of commitment and a high degree of flexibility and team spirit from all employees.«*

Klaus Steinmann *(59)*

Partner and Global Head Automotive at Mercuri Urval

»2035 will be a very important year for the automotive industry. *From then on, the only vehicles to be allowed into the EU market are zero-emission ones. I expect that the industry will have emerged from the transformation stronger than before and that individual mobility will continue to be of extremely important. What this means for employees is that they must be particularly adaptable. In the automotive sector, this is also linked to the issue of technological openness. Agility and speed are skills that will be particularly in demand in the future. In turn, it will be crucial for the management levels of companies to be able to inspire employees for the upcoming transformation.«*

FERCHAU

FERCHAU Automotive

Towards the future – all inclusive

The transformation of mobility is placing high demands on the ability of manufacturers to innovate. Complex future issues, such as digitalisation, electrification and networking of vehicles, make it necessary to combine automotive and IT expertise. That is where FERCHAU Automotive comes in: with a business model precisely tailored to the demands of the industry. We are living in the age of disruption: This necessitates the supply of technological innovations, the definition of parameters and the wholesale rethinking of processes.

ferchau.com/go/en/automotive

Connecting People and Technologies for the Next Level