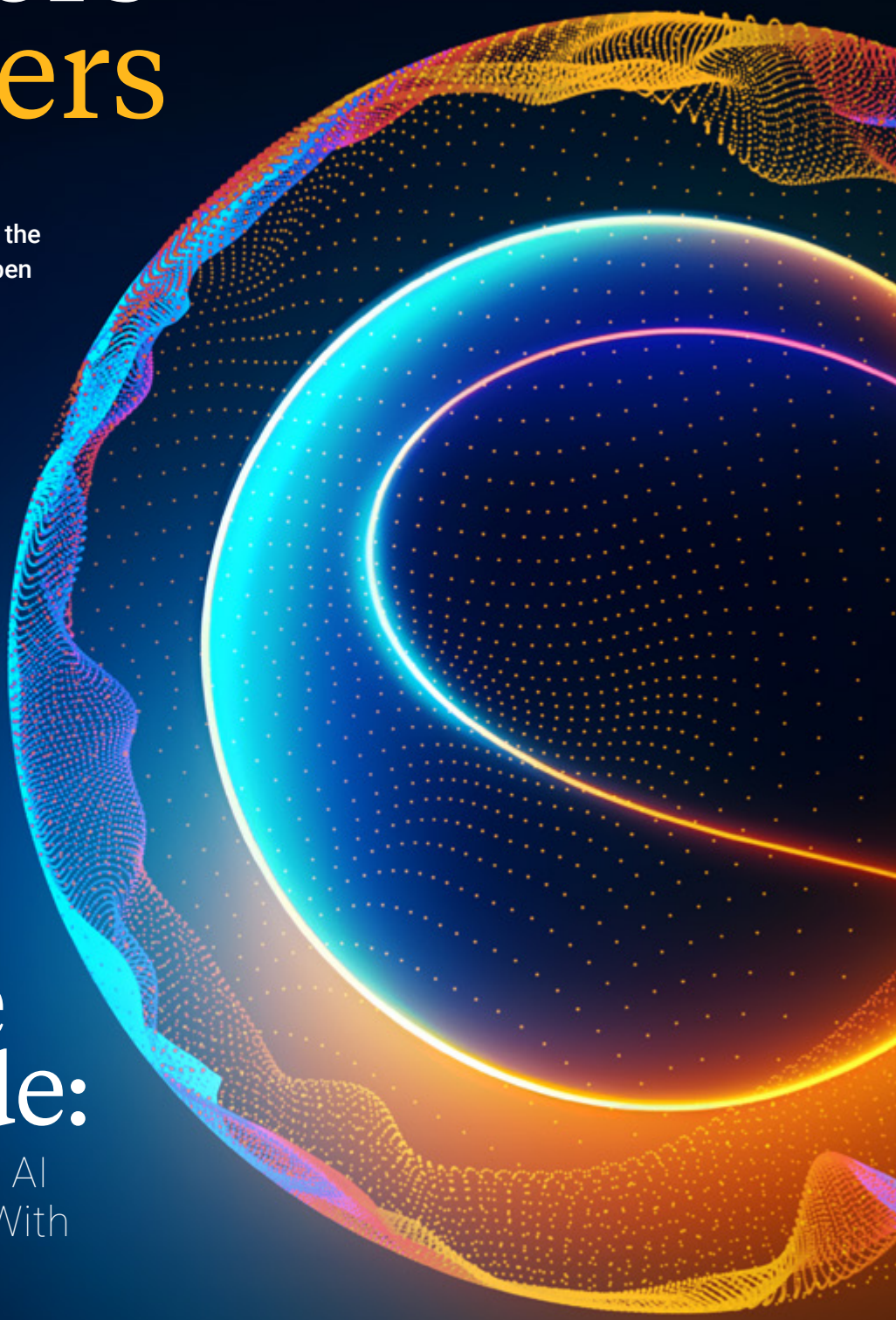
| VOL.1 2025

AKKODiS

Thinkers & Makers

A Smart Industry tech magazine, sharing insights and stories from the people who make incredible happen through their ideas and actions.



No Code Low Code:

Building of Complex AI Agents Made Easy With Cybermate

From Lab to Fab:
Streamlining Nanoelectronics Production

Top of the Class:
How AI Agents Can Lighten Teachers' Lesson-Planning Load

Make Incredible Happen

Welcome to Thinkers & Makers, the Smart Industry Tech Magazine

Thinkers & Makers is an inclusive concept that humanizes the approach to engineering and technology. It encompasses the breadth of our people and how we identify and solve problems at Akkodis. We are Thinkers who stretch outside their comfort zones to drive innovation, and Makers who team up with clients and partners to turn those innovations into tangible solutions. Together, we enable a smarter, more sustainable tomorrow. This is the 'Smart' in Smart Industry…and it will be brought to life over and over again in this, and every issue of Thinkers & Makers magazine.

Innovation at the Intersection of Technology and Sustainability

Editorial

Welcome to our latest issue of Thinkers & Makers – the Smart Industry tech magazine brought to you by Akkodis.

In today's rapidly evolving and ever-changing world, technology is more than a tool for progress—it is a catalyst for sustainability, efficiency, and resilience. Across industries, organizations are leveraging innovation to address pressing global challenges, from reducing carbon emissions to revolutionizing processes with artificial intelligence. Whether in manufacturing, education, automotive engineering, or semiconductor development, these advancements are shaping a smarter, more adaptable future.

This issue brings together six compelling stories that showcase how cutting-edge technology is being applied to solve real-world problems and reshape industries. The Akkodis Cybermate platform is making AI accessible to non-coders, enabling rapid prototyping and cross-disciplinary problem-solving. In education, AI is supporting teachers in one of the world's most linguistically diverse regions, automating lesson planning and resource development to save time and address workforce shortages. These solutions reflect the growing democratization of AI, allowing people to focus on creativity, strategy, and problem-solving.

In the cement industry, a groundbreaking carbon capture and storage (CCS) project is demonstrating how industrial sustainability can be achieved at scale. Supported by the European Union, this initiative is setting a precedent for energy-intensive sectors looking to reduce emissions while maintaining operational efficiency.

In addition, Europe's push to strengthen its semiconductor industry underscores the need for technological independence. The NanoIC Pilot Line project, advancing 2nm system-on-chip technology, bridges the gap between research and large-scale chip fabrication. With strong public and private backing, this initiative highlights the role of advanced technology in ensuring long-term global competitiveness.

Finally, the automotive industry is undergoing its own transformation. While Formula 1 and commercial vehicles serve different purposes, they both share influences from data science and sustainability. Racing technology has long shaped road cars, and today's advancements in precision engineering and continue to benefit everyday drivers. Meanwhile, engineers are developing solutions for extreme conditions, such as a safety override switch that keeps vehicles operational in critical scenarios—proving innovation is about adaptability as much as performance.

Together, these stories point to a future where innovation doesn't just push boundaries—it solves real problems. But true innovation isn't just about ideas; it's about execution. Behind each of these breakthroughs, our Akkodis Thinkers & Makers are driving innovation—collaborating across industries, applying best practices, and transferring knowledge from one sector to another.

The value of an engineering consultancy lies in its ability to bring concepts to life, from an initial sketch on a napkin to a fully realized product, ready for series production. Our tech experts embody this entire process, combining creativity, engineering expertise, and hands-on execution to turn vision into reality.

As we continue to navigate this rapidly changing landscape, one thing is clear: innovation isn't just about the next big breakthrough—it's about Engineering a Smarter (and more Sustainable) Future Together.

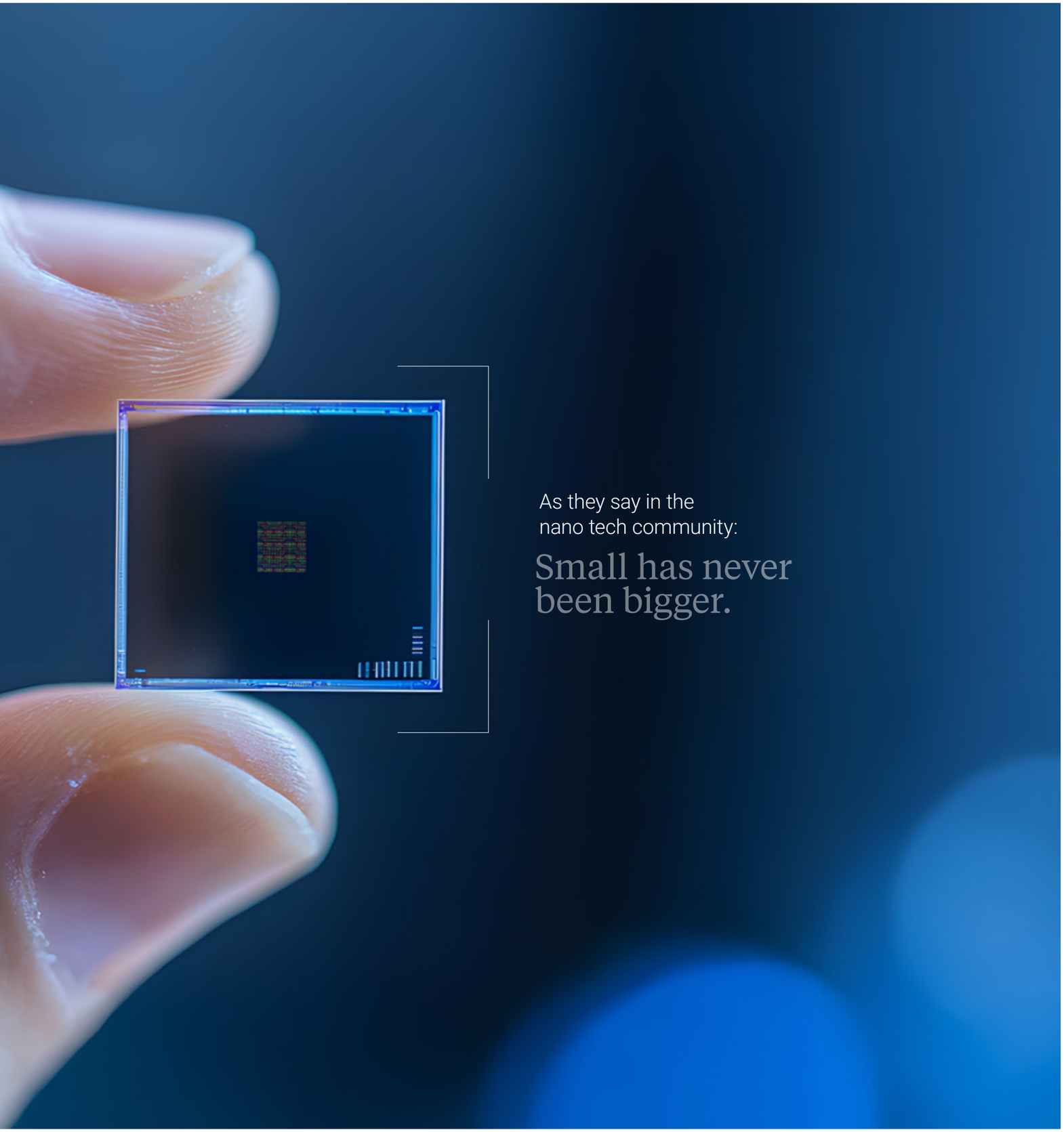
Enjoy reading

From Lab to Fab:

Streamlining Nanoelectronics Production

Manufacturing & Operations

Selected by one of the leading research centers in nanoelectronics and digital technology to help streamline its OT and IT, Akkodis is contributing to the development of computer chips smaller and more powerful than ever before. But first, all the clocks must be set to the right time.



The semiconductors inside mobile phones, computers, cars and more are getting smaller, integrating an ever-growing number of transistors on a single chip. Looking to the future, they will have even more work to do, running more and more complex new applications such as machine learning, virtual reality, personalized medicine and 6G communication.

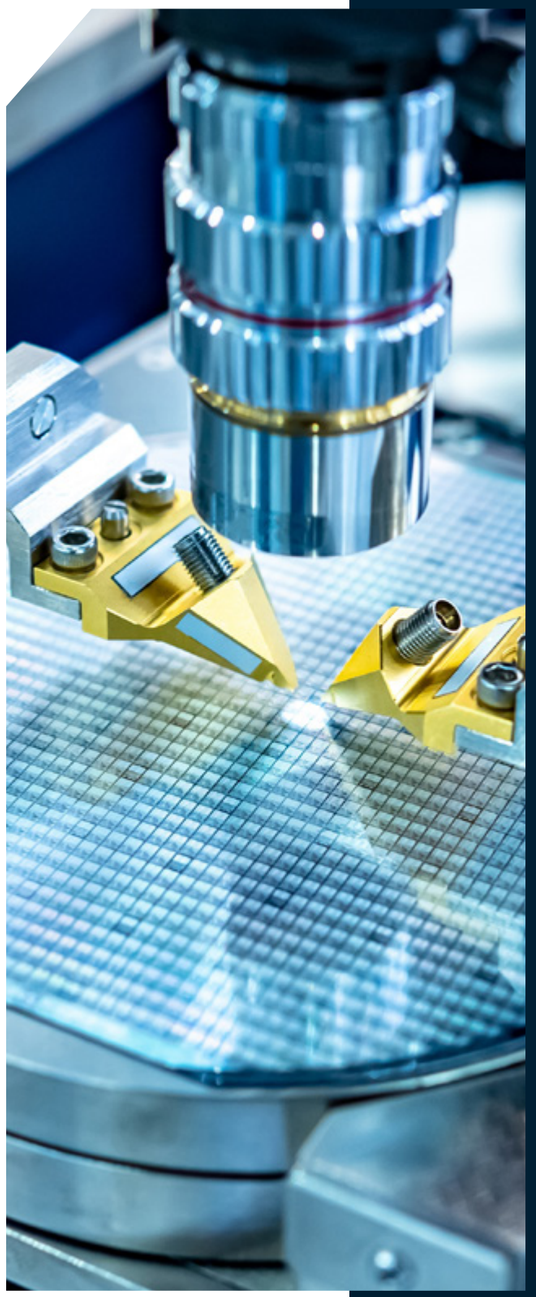
This intensifying demand puts pressure on scientists and chip producers to find new ways to optimize semiconductors, making them smaller and faster and more energy efficient too.

From Research to Production

In the race to develop smaller and more powerful nanoelectronics, the distance between research and production must be made as short as possible.

One of the world's leading independent research centers in nanoelectronics and digital technology, based in the Benelux region, is in high demand. Part academic research facility, part test lab for new manufacturing techniques, part factory producing small-series semiconductors before the transition to high-volume production–it has everything.

And now, in a drive to become even more efficient, the center has launched a new initiative to streamline its OT and IT using the principles of Industry 4.0. The initiative comes alongside a big investment in a new pilot line that will further extend its technical infrastructure, enabling research and industry to go even smaller and explore beyond-2nm system-on-chip technologies.



Automation and Big Data

The research center has chosen Akkodis as one of a select few technical service providers on the project, and Akkodis' competencies in automation, Industry 4.0, big data platforms and data management will come into play in the coming years.

Although it is operating at probably the smallest level imaginable in industrial manufacturing, the research center is facing similar challenges to those of many other companies on their Industry 4.0 journey.

Increased efficiency through automation and use of manufacturing data requires connecting production equipment to a digital infrastructure. That infrastructure must not only be put in place, the data it contains must also be processed and meet certain requirements to be accessible both to humans and machine learning algorithms.

New data platforms are essential to increasing efficiency through the automation of manual tasks and to allowing researchers better and faster access to data.

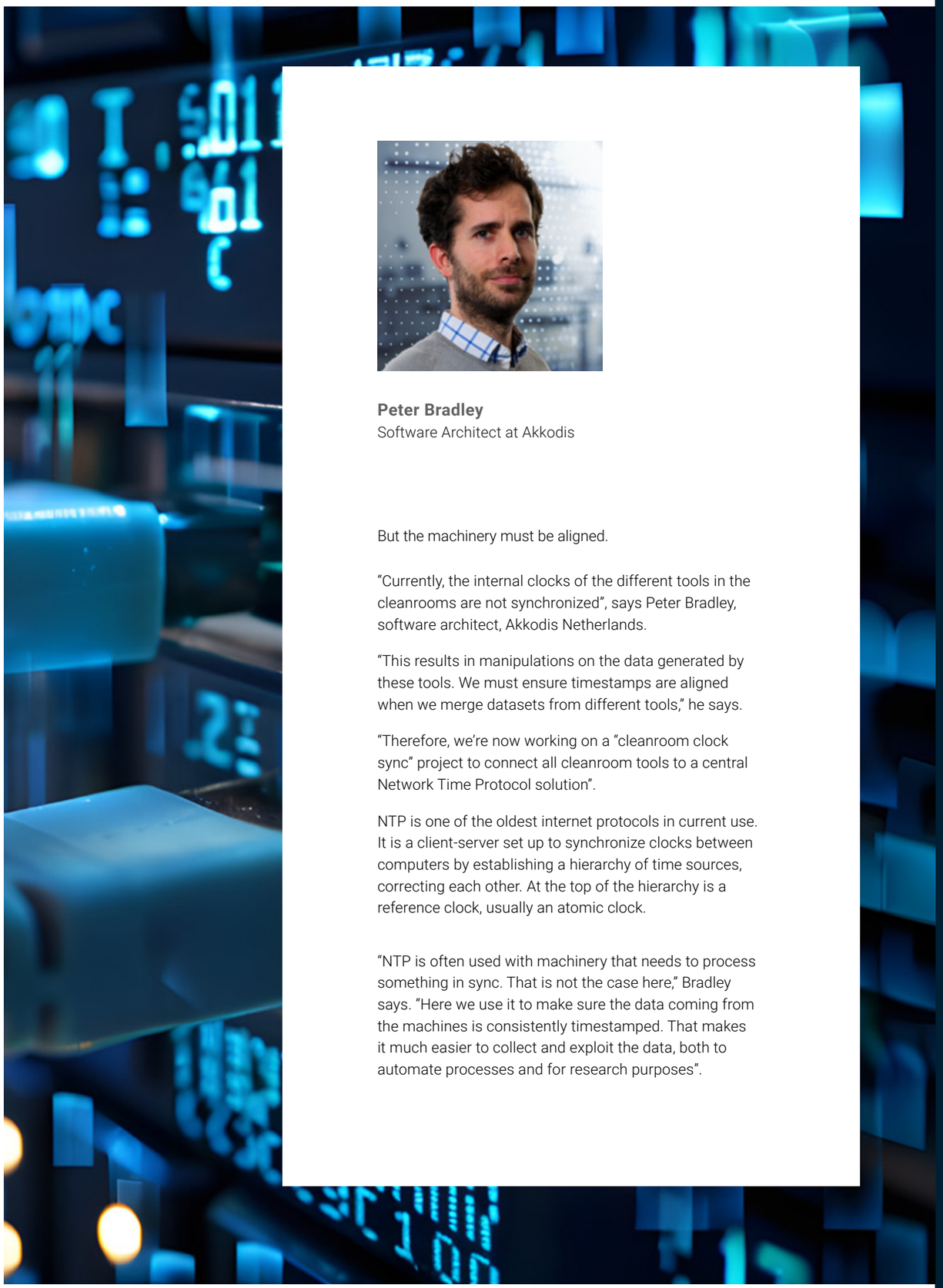
At the very foundation of such an effort lies something that is complex, even if it may sound trivial: Getting all machines to agree on what time it is.

Akkodis experts are working on getting all production equipment, large and small, in line–or more precisely, implementing a protocol to make sure the factory's 200+ machines are synchronized within an accuracy of 50 milliseconds.

Time to Align

The research center is made up of 12,000 m² of cleanrooms and state-of-the-art labs, hosting complex machinery worth billions.

During production, silicon wafers travel from machine to machine and are covered with hundreds of CPU chips containing billions of transistors and multiple layers of microscopic wires. Producing a semiconductor is a little like building a city, with buildings, roads, and bridges, only at nanometer scale. At the end of the journey, an integrated circuit is produced.



Peter Bradley
Software Architect at Akkodis

But the machinery must be aligned.

“Currently, the internal clocks of the different tools in the cleanrooms are not synchronized”, says Peter Bradley, software architect, Akkodis Netherlands.

“This results in manipulations on the data generated by these tools. We must ensure timestamps are aligned when we merge datasets from different tools,” he says.

“Therefore, we’re now working on a “cleanroom clock sync” project to connect all cleanroom tools to a central Network Time Protocol solution”.

NTP is one of the oldest internet protocols in current use. It is a client-server set up to synchronize clocks between computers by establishing a hierarchy of time sources, correcting each other. At the top of the hierarchy is a reference clock, usually an atomic clock.

“NTP is often used with machinery that needs to process something in sync. That is not the case here,” Bradley says. “Here we use it to make sure the data coming from the machines is consistently timestamped. That makes it much easier to collect and exploit the data, both to automate processes and for research purposes”.

Stefan Portev
Software Architect at Akkodis

> It is a big thing to be part of something that small.

Small is Big

Vital as they are, it is not just about the correct timestamps. Akkodis expects to contribute a lot more to the OT and IT streamlining initiative. Storing the data to make it easily accessible both for humans and for AI algorithms is also key and this is where Stefan Portev, software architect at Akkodis Bulgaria comes in, with experience gained from different sectors which can be transferred to the world of chips.

“We have extensive experience in building platforms for big data. For instance, we’ve built a fleet management platform, analyzing data from hundreds of thousands of trucks, presenting the data in a user-friendly way. This allows people to create detailed reports about each truck and its trailer, its movements, when it was loaded and unloaded etc.”

Gathering and storing the data and transforming it in a useable way is important, as is formatting the data in ways that enable machine learning algorithms to analyze it, and to find anomalies and detect problems as early as possible, Portev says.

“We can contribute significantly to the Industry 4.0 journey of the research center and we are looking forward to exploiting the opportunities in this cutting-edge project,” Portev says. “It is a big thing to be part of something that small.”

Get in touch with our Manufacturing & Operations Experts

Top of the Class:

How AI Agents Can Lighten Teachers' Lesson-Planning Load

Teaching is an exceptionally complex undertaking. Even more so in Australia, where huge distances, isolated schools and a large number of languages make for a unique and challenging teaching environment. The Akkodis AI Platform for Education uses AI-powered agents to simplify lesson planning and free up time for teachers to engage directly with students.

Data Analytics & AI

The Akkodis AI Platform for Education is based on generative AI, consisting of a number of agents tailor-made for specific tasks, with the overall goal of streamlining administrative tasks for teachers, including lesson planning.

The administrative tasks are broken down into manageable chunks (a specific piece or segment of data). Just like a human being, the AI system can much more easily provide an answer to a simple and precisely defined request, than to a more general, vague query.

"The Akkodis AI Platform for Education is a network of interacting agents", explains Stuart Ball, director of innovation, Akkodis in Perth.

"For example, one is an information agent. Its job is just to provide information to the process agents. Another one is a user agent, which acts on behalf of the user and communicates between the user and the other agents."

AI agents and 'agentic' workflows have the potential to quickly evolve from simple 'productivity assistants' to sophisticated and interconnected knowledge-based products and solutions, across all industry verticals.

A semi-autonomous or autonomous software program that is equipped with a knowledge base, a defined task (or set of) and tools to interact with its environment, an artificial intelligence 'agent' can collect data from systems or even people to meet these pre-determined goals. While humans decide what the goals are, exactly what tasks are needed to meet these goals can be up to the agent to decide.

"In the context of the Akkodis AI Platform for Education we have a user agent, which acts on behalf of the user—in this case the teacher—and communicates between the user and the other agents, while an information agent is responsible for providing information to the process agents," explains Ball.

"Different distinct process-centric agents do specific things across a range of specialties. One creates visual learning materials; another creates interactive activities and insightful presentations."

Ball continues, "One agent creates lesson plans. And we have another agent that helps with lesson differentiation requirements. For example, a teacher may have students that are neurodiverse or have other special learning requirements. The agent can create personalized lesson plans tailored to the individual student."

Easing the Pressure

“There are far more demands on teachers' time than there are hours in a day”, says Ball. “We’re trying to ease that pressure. If we can help teachers streamline lesson planning, then they have more time to provide direct instruction, engage with students, and support the differentiated learning requirements of their pupils”.

In any jurisdiction where there are a large number of teachers, saving small amounts of their time will amount to very large overall time savings which can be used for other productive activities.

This could be just the beginning—research from Ending the Lesson Lottery: How to Improve Curriculum Planning in Schools (Grattan Institute, 2022) suggests that generative AI-powered lesson planning could save as much as three hours per teacher per week.

Ball recognizes the benefits for teachers go beyond the initial time and financial savings. “By providing tailored lesson planning the Akkodis AI Platform for Education can lighten the load on teachers—which includes not just their lesson planning workload, but the cognitive and emotional pressures of the job—therefore supporting teachers to deliver better learning outcomes for their students.”

As the platform evolves, Ball believes it will deliver other innovative ways that can make teachers’ lives easier, potentially making a significant impact on education worldwide. According to UNESCO, the global education sector will require an additional 44 million teachers by 2030, so the long-term potential for AI-enabled solutions in education is significant.

Stuart Ball
Director of Innovation at Akkodis

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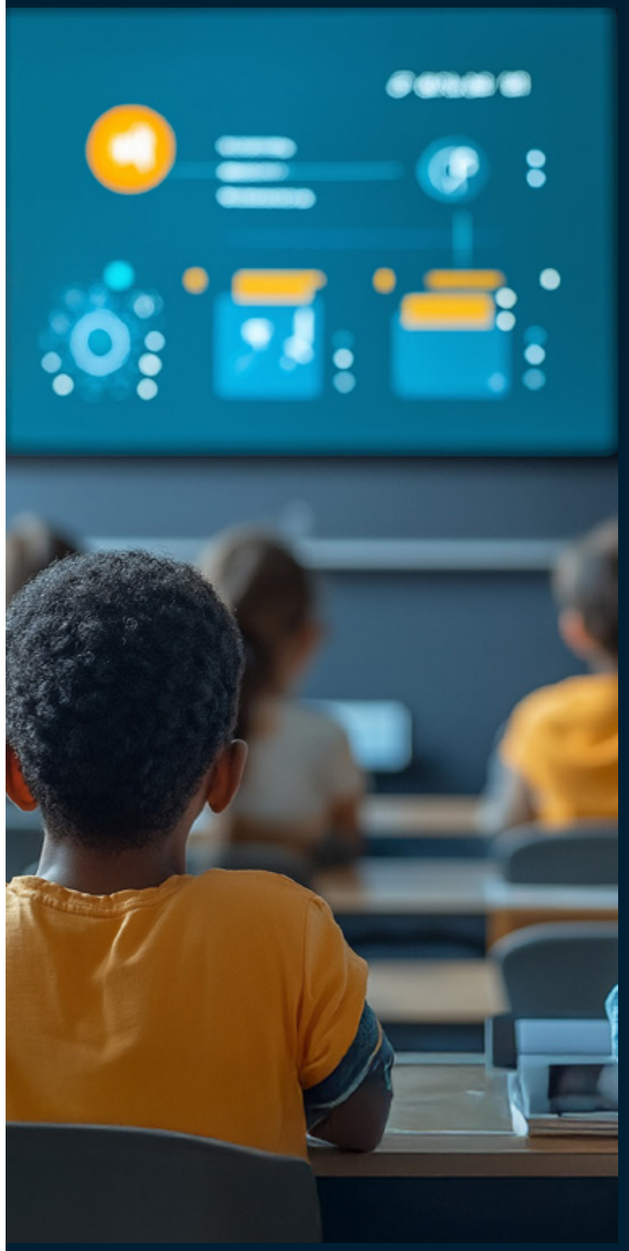


Connecting to the System

At the start of the 2025 school year, eight schools and about 100 users in an Australian education jurisdiction were connected to the Akkodis AI Platform for Education. The goal is for all 50,000 teachers in the state to be connected to the system by the end of the first semester.

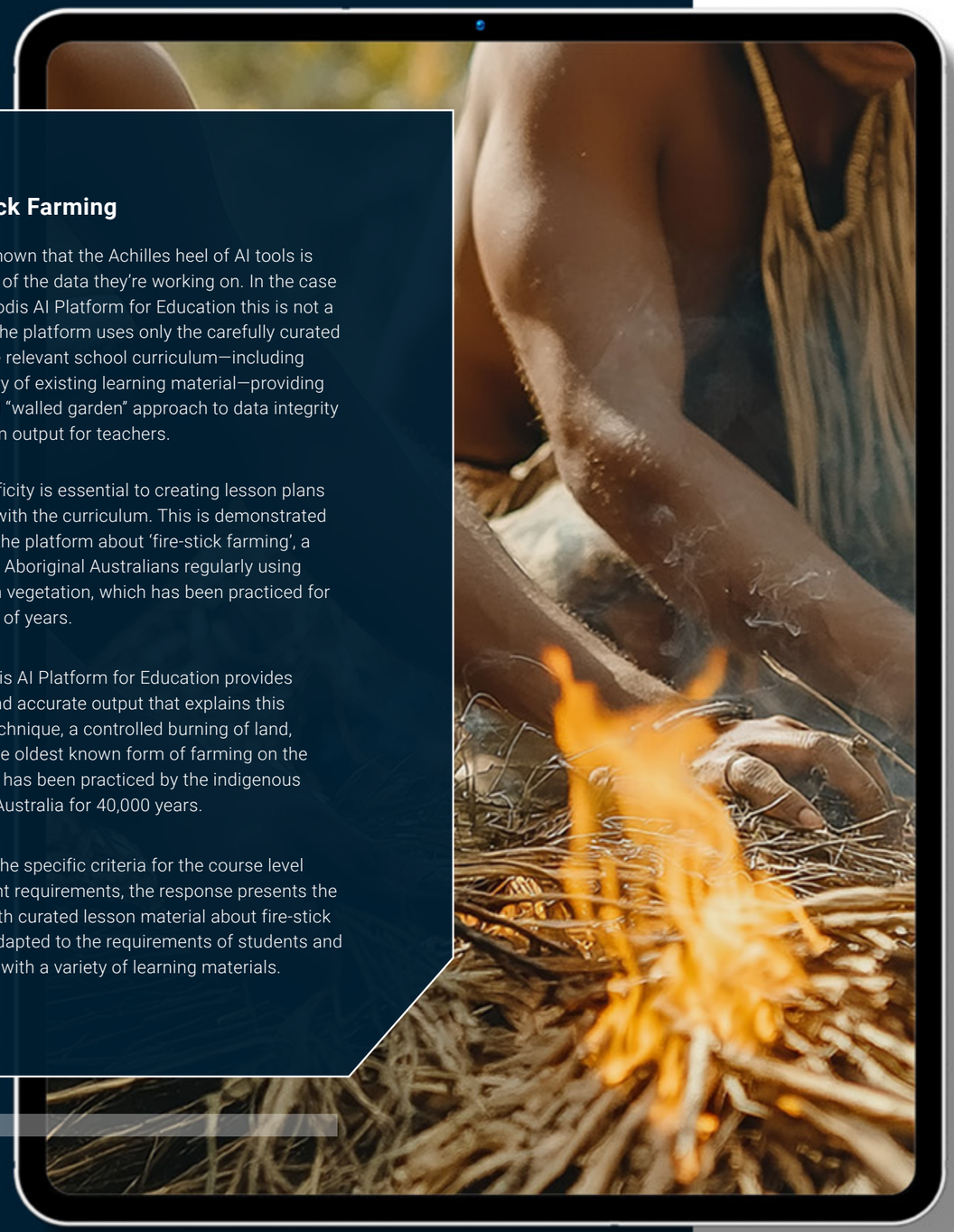
“Initial feedback from teachers is very positive,” says Ball. “We will continue to gather data from this cohort of uses to better understand the benefits across a range of specific use cases.”

“You might think the technical components would be the most challenging part of this project. But in fact, it is user involvement that is the key to success,” says Ball. “We need to ensure we have the right resources in place to capture feedback from users to ensure we are refining and improving the model to adapt to the needs and use cases of teachers.”

The Akkodis team’s work this school year will focus on giving the Akkodis AI Platform agents enough guidance and useful information that they can produce an output that truly helps teachers to deliver better teaching outcomes and support their workload and wellbeing.

“We're now further validating the degree to which AI reduces teachers’ workloads and provides benefits for students,” continues Ball.

“By ensuring the rigor of the lesson planning process and by ensuring the integrity of the information sources within the system, AI can safely and ethically assist teachers to generate lesson plans and learning resources that are aligned with the curriculum. Our goal is to support teachers to deliver better educational outcomes for their students. That is the real test of the system.”



Fire-stick Farming

It is well known that the Achilles heel of AI tools is the quality of the data they're working on. In the case of the Akkodis AI Platform for Education this is not a concern. The platform uses only the carefully curated data of the relevant school curriculum—including a repository of existing learning material—providing a so-called "walled garden" approach to data integrity and system output for teachers.

This specificity is essential to creating lesson plans that align with the curriculum. This is demonstrated by asking the platform about 'fire-stick farming', a practice of Aboriginal Australians regularly using fire to burn vegetation, which has been practiced for thousands of years.

The Akkodis AI Platform for Education provides detailed and accurate output that explains this farming technique, a controlled burning of land, which is the oldest known form of farming on the planet and has been practiced by the indigenous people of Australia for 40,000 years.

Based on the specific criteria for the course level and student requirements, the response presents the teacher with curated lesson material about fire-stick farming, adapted to the requirements of students and supported with a variety of learning materials.

Narrowing the Scope

For now, the Akkodis AI Platform for Education system includes about half a dozen agents, but more will come. For the agents to be good at their job, the scope of what they do must be narrowed down into small pieces. When tasked with a job the platform can work through a defined process, with each agent handing off to the next.

The concept is already paying off and should improve over the school year as more teachers engage with the system. Ball is confident the team will reach its initial target of saving 30 minutes per teacher per week.

"That would be a great success, with the potential for more benefits over time. Ultimately, if we can help reduce the administrative burdens of teachers and support them to engage with their students in the classroom then the platform would have truly made a difference," Ball says.

Back to Basics:

Switching Off for Automotive Safety

Akkodis engineers have designed a vehicle feature very much out of the ordinary: A switch that transports a modern, state-of-the-art vehicle back to the automotive stone age, bypassing the vast number of sensors that typically protect the car and its systems from breaking down.

Automotive
& Transportation

The automotive industry has spent many years making vehicles ever more sophisticated, connected and high performing.

Part of that work has involved the development of monitoring technology that can protect a vehicle in the case of a problem, so that instead of breaking down it will go into “limp home” mode or stop entirely, to protect it from complete breakdown.

But now, an important development is taking emergency technology in the opposite direction.

In an increasingly connected world, a vehicle safety switch that overrides all systems sounds like a short-cut back to the stone age.

But in an emergency, it could mean the difference between life and death for those on board.

Daniel Karner
Automotive Systems Engineer
at Akkodis

Out of Danger

If a military or emergency vehicle is damaged, by enemy fire or outside conditions, alarms from its sensors can automatically send it into emergency mode to protect itself and its engine.

But that can be risky for those on board, who just need to get out of danger as quickly as possible. Instead of automatically switching to “limp home” mode, they want the vehicle to get them out of harm’s way at all costs, even if that means it breaks down completely later.

In this case, a switch that overrides all the sophisticated safety features can mean the difference between life and death for passengers.

A major manufacturer of off-road vehicles asked Akkodis to look into developing such a feature for its vehicles, designed for use by the military and emergency services. Was it technically possible, and could it be done within a reasonable time frame and budget?

“It was an interesting question, although there was a bit of a paradox in it,” says Daniel Karner, an automotive systems engineer at Akkodis Austria, and the team manager of the project.

“The purpose of all these modern monitoring technologies and safety features is to make the vehicle safe and reliable, and to protect it. They asked us to do the exact opposite, but of course for all the right reasons.”

That journey back to the automotive stone age turned out to be something of a technical challenge for a modern vehicle. An automotive control system is so complex, with various interdependent subsystems, that a hazard switch function that simply overrode safety features and sensors would require a whole new set of wiring.

Cheating the System

Instead, Akkodis engineers chose a more feasible, but also technically complex solution that involved cheating the vehicle’s control system. They built a small box packed with electronics designed to tell the vehicle’s control system that everything was in order, although its sensors signaled the exact opposite. The idea was that end-customers for the vehicles, such as army or search and rescue units, could then choose this as an option.

“The box was to work as a gatekeeper between the sensors and the control system,” Karner explains.

“It would receive the measurements from the sensors, and if the values reached a level that would normally trigger a safety feature, it would block them and deliver fake values to the control system instead, pretending everything was normal.”

Oil or coolant temperature might be going through the roof, but that information would never reach the control system. Instead, a special relay, originally developed for medical devices, would shut off the sensor and activate a microcontroller telling the control system the oil temperature was only 90 degrees, and everything was fine.

The same would go for sensors measuring turbocharger pressure, fuel level and all other monitoring systems that under normal circumstances would trigger protective functions restricting the vehicle’s ability to get out of harm’s way as quickly as possible.

“Obviously, at some point, when the fuel runs out, there is nothing you can do anymore. But before that happens, the vehicle will keep going beyond what its safety functions normally would allow,” Karner says.

Defining the Features, Building the Prototype

The project involved close collaboration between Akkodis automotive engineers with different areas of expertise, based in both Linz, Austria and Fellbach, Germany.

They worked closely with the manufacturer to define the features of the emergency box, which was designed not only to bypass the vehicle's safety systems but also to allow the driver to start the vehicle without having to press the brake pedal, in case of a leg injury, and to control the speed of the vehicle via its gear lever.

Then work began on building a prototype from off-the-shelf components.

"We took a vehicle and just cut through the cables and put all the electronics in the trunk. It was a complete mess of cables and boxes, but everything worked as required," Karner says.

After initial tests and the green light from the customer, the team began shrinking all the components to fit the installation space. "There was very little room. The end goal was to have a tiny 10x15 cm box that could be easily fitted into the vehicle."

Six-layer Circuit board

The engineering team got to work, writing software compliant with the customer's requirements, and squeezing relays and circuit boards into an extremely confined space. The end result was a six-layer circuit board handling 50 inputs and just as many outputs.

Then the testing phase began. At first the box was tested in a virtual vehicle, using a Hardware-in-the-Loop (HIL) test bench. Then physical testing began under extreme conditions in the North African desert and above the Artic Circle. Simultaneously, the Akkodis team developed the box for series production.

"This box is so special and purpose-built, that we needed a huge amount of very specific automotive engineering knowledge, together with the ability to combine competences from different people, to pull the project off, Karner says.

"So, now our client can present this new and unique feature to its military and search and rescue customers. You flip the sealed switch inside the cabin of your vehicle, and it will carry you out of danger, no matter what."

From Concept to Series Production

If the value of an engineering partner lies in its ability to realize a concept from start to finish, from a sketch on a napkin, through prototype, validation and verification, and on to the final product, ready for series production –then the hazard switch project highlights Akkodis's skills in taking ideas all the way.

"We feel at home in complex projects that require specialist skills in electronics and software. We're especially excited by projects that are a bit out of the ordinary and that require us to collaborate across different Akkodis competence areas", says Friedrich Nachtmann, managing director, Akkodis Austria.

"In fact, we believe this kind of full-service engineering is where we deliver the most value to our customers."

The automotive sector is one of the main focal points of the Austrian engineering team, with many development projects carried out in close collaboration between Akkodis teams based in Graz, Linz, and Vienna, and those based in Germany, but those teams also cater to other sectors too.

"Typically, this concept to series production approach is favored by industries focusing on innovation and fast development cycles, for instance consumer electronics," Nachtmann says. Our specialty is combining electronics and software, and often tasks a bit more complicated than a run-of-the-mill project. That's where we feel comfortable."

Get in touch with our Automotive & Transportation Experts

No Code Low Code:

Building of Complex AI Agents Made Easy with Cybermate

Coding skills not needed - just drag and drop and the system builds you an AI tool tailor made to your specific task. A cross-disciplinary Akkodis team is designing a generative AI platform making precision engineering of AI agents more accessible.

Data Analytics & AI

A team of Akkodis artificial intelligence (AI) engineers headed by R&D program manager Manuel Reis Monteiro is bridging the gap between generic AI and the needs of technical specialists, by developing a platform offering AI precision tools to every corner of the Akkodis organization.

"There is a gap between AI agents made for general consumption, and the needs of technical domain experts working in organizations like Akkodis", Reis Monteiro says.

Manual Reis Monteiro
AI Tech Lead at Akkodis

Precision Tools

General purpose agents in the form of chatbots try to do as many tasks as possible, but they don't do them particularly well—or at least not to the standard required in an engineering consultancy such as Akkodis. Precision tools are needed.

If an Akkodis engineer is tasked with quality assessment of a specific process in the pharmaceutical industry, a chatbot might provide some answers. But that knowledge needs to be checked, augmented and refined. Only experts with deep domain knowledge can do that.

This is where the new generative AI platform, named Cybermate, comes in. It enables Akkodis staff to design their own AI tools and workflows, with limited to no involvement of AI experts.

The platform allows users to drag and drop components to create AI agents within minutes as well as to create a web front-end that fits their specific needs, together with automation workflows, linking agents together.

And it's all in one place: Cybermate is an entire end-to-end stack, facilitating design, development, execution, deployment and testing.

A Matter of Minutes

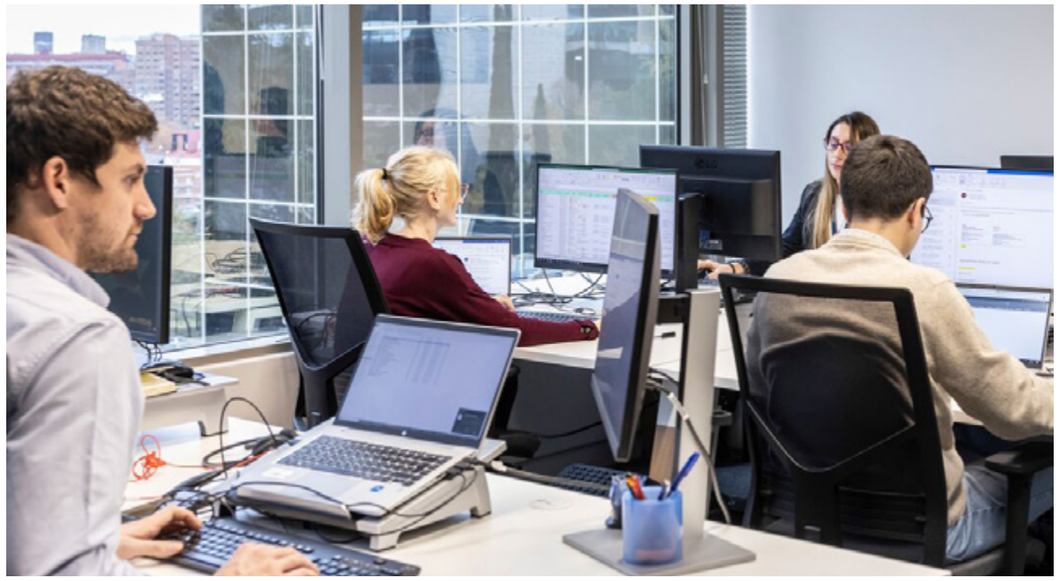
Instead of tasking specialized programmers to launch a process that could take weeks, in a matter of minutes, Akkodis employees can create bespoke AI agents for different tasks as well as setting up agentic workflows, lining up specialized agents and making them work together.

Cybermate enables people to carry out rapid prototyping and to test the AI-powered assistants they've built themselves, using their own domain-specific knowledge, overcoming one limit of generative AI (GenAI), according to Zivorad Krstic, VP digital IT services Germany.

"When it comes to building agentic workflows supporting the work of technical experts, you need the experts to test them," Krstic says.

"With Cybermate we've been trying to take our domain experts and train them in building AI to support their work, and to make their new AI tools fit into their daily work routines in the best way."

> Cybermate is an entire end-to-end stack, facilitating design, development, execution, deploy-ment and testing.



Empowering AI Experts

The Cybermate GenAI platform is based on best-in-class open-source frameworks, which allow for rapid prototyping, opening up possibilities not only for no/low coders, but for programmers as well.

Exemplifying this, Trinidad Tapia, AI specialist in the Cybermate development team, created different agents to solve the same task using various approaches. She then designed another agent to oversee and evaluate the results of these agents, allowing her to test different configurations in parallel and conduct a systematic performance comparison at the same time, within the same platform.

She was able to significantly streamline the process of identifying the best large language model (LLM) architecture. This is often a daunting task, requiring extensive testing and reliance on external tools. With Cybermate, it can be achieved without a single line of code being written.

Further demonstrating its potential for both AI specialists and domain experts alike, Cybermate empowers users to rapidly expand the testing scope by increasing the number of scenarios under consideration or enriching the performance comparison criteria at their discretion.

Transforming Client Workflows

Beyond the clear benefit Cybermate brings to Akkodis employees, many within the organization believe its ability to transform client workflows offers even more potential.

“Harnessing GenAI for deep technical competencies like ours improves the quality of our work and increases our efficiency,” says Peter Mehrle, CEO of Akkodis Germany. “That benefits our customers in several ways. Not only can we boost our services and become more competitive, but we can also help our customers grow their own expertise in integrating AI in their own workflows”.

With Cybermate available for delivery as a service, one big advantage is that it is not pegged to any specific system.

“It can be deployed anywhere, and it can use external LLMs as well as internal data bases,” Mehrle says. “That means Akkodis is completely self-sufficient in terms of capabilities, which gives clients the possibility to work on their own confidential data and allows Akkodis to maintain its chain of trust with clients. This is essential in the engineering consultancy business.”

George Afoakwa, Group SVP IT & digital, sees the use of open source tools, and their integration into Cybermate, as a big step forward. “This will enable it to remain current, relevant and take the headache away from clients. The next step is to package this into a ‘shrink-wrapped’ go-to-market offering,” Afoakwa says.

> “It can be deployed anywhere, and it can use external LLMs as well as internal data bases.

Integrating AI into Artifacts

Looking to the future, Reis Monteiro would like to enhance the text-based world of LLMs and bring visualization tools into play, a useful step for Akkodis engineers working with 3D models.

“It would be great to be able to create a ‘dialect’ that AI agents can understand and then translate answers back to the user, integrated into the tool they are working in,” Reis Monteiro says.

“We’ve taken the first huge step of reducing coding to a minimum. The point we want to get to, is to build applications that are extremely close to what people do.”

That could mean doing away with a chat window altogether. “Just interacting with the artifact, such as a 3D model or a diagram, would be sufficient for the AI system to understand your intent, execute and provide the proposals you were looking for.”

Get in touch with our Data Analytics & AI Experts

Building a Greener Future:

How Carbon Capture Can Cut Cement Emissions

The global cement sector is vital, but polluting. Akkodis engineers are working with an industry giant to explore the role carbon capture and storage technology can play in reducing the sector's environmental impact.

One of the largest cement plants in Southeast Europe, will soon be demonstrating how the cement industry can reduce its emissions, through advanced carbon capture and storage (CCS) technology, helped by a diverse team of Akkodis experts.

Finding and implementing new ways to cut the cement industry's environmental footprint is an urgent global challenge.

Cement production is an energy-intensive process, which involves heating limestone to produce lime, releasing CO_2. It accounts for around 8% of world-wide CO_2 emissions, according to World Economic Forum figures.

But at the same time, cement is a vital material, used in the construction of everything from roads to ports, hospitals to homes—reducing emissions from the sector while maintaining the necessary levels of production to meet demand will be a real challenge.

Rommel Eduardo Quiñones Silva
Senior Consultant at Akkodis

> Cement is one of mankind's must-have materials. This is an industry that must be tackled, from an emissions point of view.

Must-have material

"Cement is one of mankind's must-have materials," says Rommel Quiñones, a senior consultant at Akkodis, who is based in Madrid and has been working as part of a multidisciplinary team made up of experts from the cement manufacturer, Akkodis and other specialized companies, on this CCS project. "This is an industry that must be tackled, from an emissions point of view."

The project is supported by the European Union, where carbon reduction goals are ambitious, including a 30% reduction in CO_2 emissions related to cement production (and a 50% reduction through the value chain) by 2030, a milestone on the road to achieving carbon neutral cement production in Europe by 2050.

The project's experts, including mechanical, chemical, and civil engineers, hope that demonstrating that the technology can work at the current site, and highlighting the CO_2 reductions it should be able to achieve, will have broader implications for the cement and construction industry worldwide.

The team's big achievement will be in demonstrating that a high-stakes, expensive technology can be put into operation in a real-life scenario, paving the way for broader adoption. That should help enable CCS technology to play a big role in reducing the industry's CO_2 impact beyond Europe's borders.

The initiative is expected to capture 597,280 tonnes of CO_2 per year and store a total of 6 million tonnes in the first 10 years of operation.

"One of the main problems with this technology is that it requires a lot of initial investment," says Quiñones. "Even big companies don't want to take the risk of making that initial investment if they won't get a profit from it."

Energy obstacle

Another obstacle to getting CCS technology in use is the large amount of energy required, and the team is making use of a solution, known as waste heat recovery units, that will use the heat generated as a by-product of the cement-making process to power the CCS system.

"The unique point about this project, is not only the carbon capture, it is that the energy required for the carbon capture is very high. We're going to produce our energy ourselves," Quiñones says. "One stream of the heat from the cement production process is going to be used for a turbine. This turbine will generate the electricity to feed the carbon capture unit."

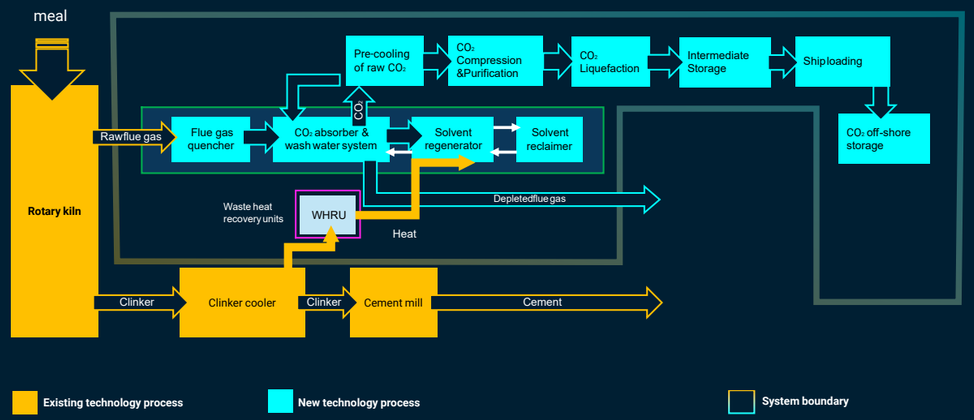
The CCS process works in several stages.

First, the cement kiln flue gases are cooled and filtered in a cooling tower, to remove impurities such as particulates and unwanted contaminants.

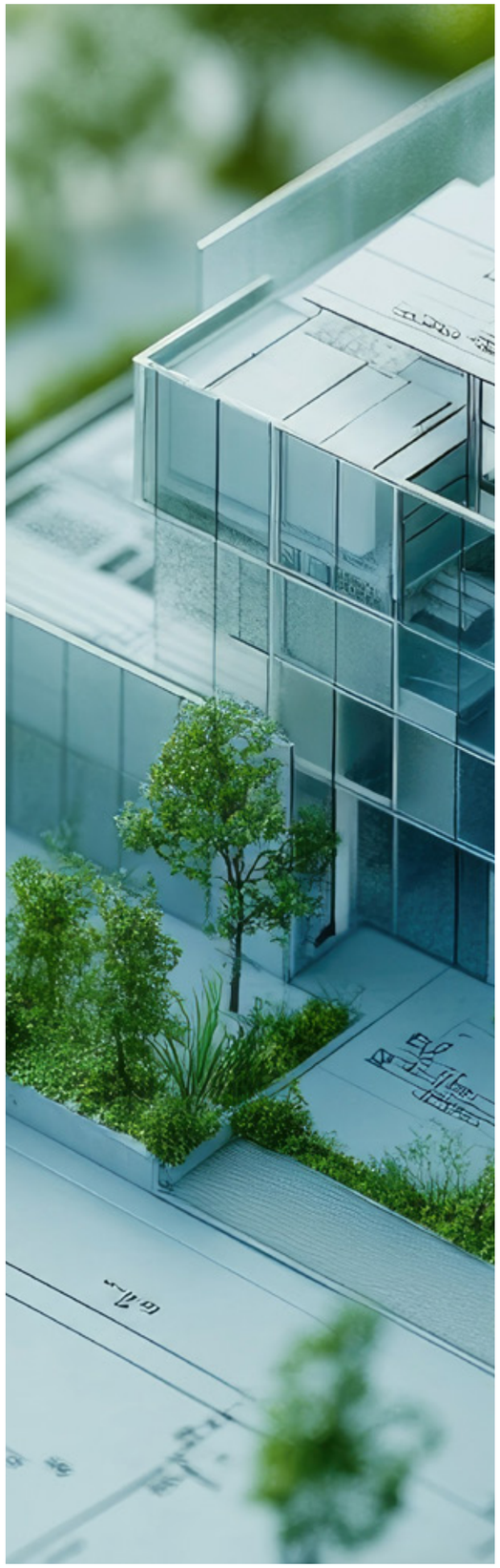
Once cooled, the gases enter the absorption column, where they are mixed with a special (amine-based) solvent that traps the CO_2 chemically. This solvent absorbs the CO_2 while the rest of the gas is released to the atmosphere in a cleaner way.

The solvent that has captured the CO_2 is heated in a second column called a regenerator. The heat allows the CO_2 to be released from the solvent, leaving it pure and ready for processing. The solvent, now free of CO_2 , is reused in the system.

Once separated, the CO_2 is passed through a purification system to remove remaining impurities. It is then compressed and cooled to a liquid for easy transport to the site in which it will eventually be injected for long-term storage.



Getting to that point will be the result of years of intensive research and development efforts by the entire, multi-talented team which began when the client first approached Akkodis for help.



Napkin proposal

"The client came to us with the proposal of the best technology to tackle the problem, but it was, at that stage, really a napkin proposal, we needed to work with them to define the scope and the reality of that initial idea," Quiñones says.

The team set about transforming that napkin proposal into a real-world-ready plan, providing detailed advice to the client on all areas of the proposal, and recruiting specialists on areas such as the kiln process to the team to ensure tailored expertise.

"You cannot find one person that can do everything, but Akkodis's proposal was to put together a team that could satisfy all the client's needs. Then we were able to respond to the napkin idea with a more realistic proposal," Quiñones says.

The team's current focus is on the equipment layout, making sure that everything fits and functions in its place, just one part of a complex project that should see the plant operating before 2030, in time to contribute to those broad European industry goals—and beyond.

"Our client wants to prove this can be done," Quiñones says. "The idea is to implement this in other European plants so we need to show that this can work, it can be green, not just on paper but also in reality."

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Connecting Road & Track

Data and Sustainability Represent new Playing Fields for Shared Innovation

Automotive
& Transportation

They are designed and built for different purposes. But although the development logic of road and race vehicles is not the same, they share a common history. Many racing innovations have been adopted by the wider automotive industry over the years. The new shared battlegrounds for two distinct but interconnected sectors are sustainability, and data science.

In Formula 1, 1/100th of a second may be the deciding factor between victory and second place. In city traffic it doesn't matter. The technology in an F1 car is state-of-the art, while the focus of a mass-production car is on reliability.

"While an average car costs around €50,000 and drives for 10 years, a Formula 1 car costs €20 million and is driven for a year," said Bruno Leroyer, Akkodis' global tech practice lead for verification and validation.

"In Formula 1, 1/100th of a second may be the deciding factor between victory and second place. In city traffic it doesn't matter. The technology in the F1 car is state-of-the-art, while the focus of a mass-production car is on reliability."

For an everyday driver, who needs to concentrate fully on road traffic, all control and assistance systems must work discreetly in the background and be coordinated so anyone can cope with them.

"In Formula 1, it is exactly the opposite," Leroyer said. "The car is tuned to a specific driver, and the driver has many more options to change the controls while driving."

Those differing requirements translate into completely different production approaches, said Reinhard Stachel, program management director of the Akkodis global full vehicle development team.

"You just build a few F1 cars, they are handmade high-precision prototypes. A commercial car requires an automated and scaled mass manufacturing process, with big assembly lines and a spot-on quality control system in place."

While F1 cars perform in a regulated and competitive environment, with the focus on getting a win for the team and entertaining the fans, a commercial vehicle is built to be safe, reliable, comfortable, and energy efficient.

Bruno Leroyer
Global Tech Practice Lead for Verification & Validation at Akkodis

F1 Influences

The differences then, are undeniable. But F1 car technology development has always fed through into commercial vehicles, with traction control an early example, followed by turbo and forced injection, active suspension, the use of carbon fibre, and even the controls placed directly on a modern car's steering wheel. F1 aerodynamics are now influencing car design to improve fuel efficiency and stability at high speed.

Reducing drag and enhancing downforce are all-important in racing, and F1-developed methods have been widely adopted by mainstream passenger car manufacturers in the pursuit of efficiency and reduced fuel consumption.

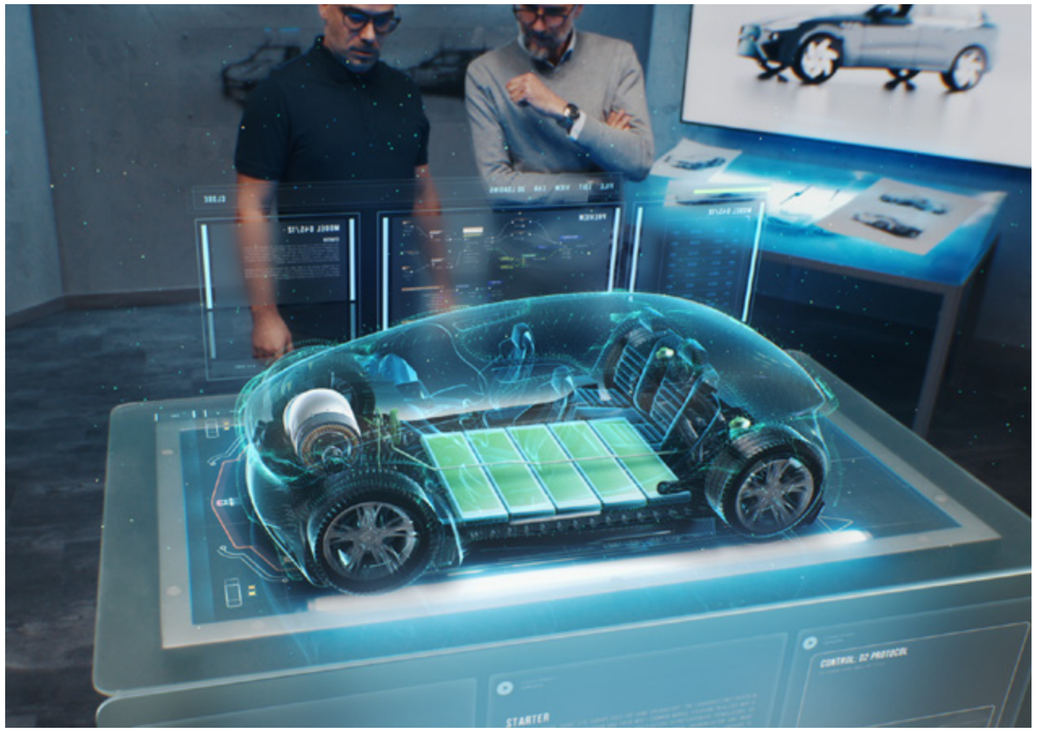
Data and Sustainability

Nowadays, there are two high-profile areas in which F1 and everyday cars converge: data-driven technologies and sustainability.

Racing is a frontrunner in the use of telemetry systems and real-time data analysis. The 300 sensors on-board a modern F1 car—including sensors in shoes, helmets and more—generate 1.1 million telemetry data points per second, which are transmitted from the car to the pits.

The data collection and analysis methods developed and refined in the high-pressure domain of F1 racing have revolutionized automotive technology and led to improved vehicle diagnostics and fuel efficiency, data-driven maintenance systems and driver-assistance technologies in mass-produced cars.

F1 cars will run on 100% sustainable fuels from 2026. These second-generation fuels, made from biomass sources without any negative impact on food production, are carbon-neutral and can be used not only in F1 cars but in all kinds of vehicles without modification, making a scale-up to mass use a possibility.



The Core of the Car

F1's drive for engine efficiency—contrary to popular belief it's not all about building the biggest and most powerful engines imaginable—has led to innovation influencing the mainstream vehicle industry.

A 2014 change in F1 engine regulations created a so-called "engine freeze" and a new playing field for high-performance engineers: a turbocharged 1.6 litre V6 combined with sophisticated hybrid mechanisms, capturing energy from the exhaust and recuperating kinetic energy from braking.

These energy recovery systems allow the driver to boost performance when needed. The stored energy in the car's battery provides additional thrust for overtaking or pulling away from the grid.

Engine manufacturers have been making impressive efforts to optimize their engines and to push the boundaries of hybrid drivetrain technology.

In conventional road cars, hybridization can take many different forms. But the main principle is the same, saving fuel and reducing emissions by using electricity to supplement engine power.

50/50 Energy Split

The F1 regulations for 2026 take that even further, defining a power unit with almost 50/50 energy split between engine and energy recovery systems. The power coming from the engine component—which will run on sustainable fuels—will drop from around 550 kW to 400 kW, but overall, there will be more power at the driver's disposal, as the electrical power produced by the hybrid components rises from 120 kW to 350 kW.

The amount of energy recovered from braking is doubled to generate around 8.5 megajoules per lap.

These new regulations have attracted new car manufacturers to the world of F1, drawn in part by the parallels between the high-performance racing sector's goals and their own technology development plans for high-volume road cars.

> Although there are clear differences between developing an F1 car and a mass production vehicle, racing continues to inspire innovation.

Inspiring Innovation

F1 car technology development will always be a driver for mainstream vehicle development.

"Obviously, F1 technology will have to prove itself before it arrives in the everyday passenger car," Leroyer said. "That takes time, but it will happen eventually. And although there are clear differences between developing an F1 car and a mass production vehicle, racing continues to inspire innovation. Formula 1 is working at the technical limit, and we are continuously getting technical impulses from it."

About Akkodis

Akkodis is a global digital engineering company and Smart Industry leader. We enable clients to advance in their digital transformation with Consulting, Solutions, Talent, and Academy services. Headquartered in Switzerland and part of the Adecco Group, Akkodis is a trusted tech partner to the world's industries. We co-create and pioneer solutions that help to solve major challenges, from accelerating the clean energy transition and green mobility, to improving user and patient centricity. Empowered by a culture of inclusion and diversity, our 50,000 tech experts across 30 countries combine best-in-class technologies and cross industry knowledge to drive purposeful innovation for a more sustainable tomorrow.

We are passionate about Engineering a Smarter Future Together.

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