

#83
SPECTRUM

15

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feel evolu tion



Dear readers,

Fifteen years ago, we started FEV Consulting with a simple conviction. Our customers needed more than technical excellence. They needed a partner who could help them navigate through strategic questions while staying closely connected to engineering reality. Bringing strategic consulting expertise together with the deep technical roots of FEV felt like a natural step, but also an ambitious one. We are happy to say it was a great decision.

Today, FEV Consulting is far more than a specialized consulting company. It has become a trusted partner for customers worldwide, known for clarity of thought, analytical strength, and the ability to turn complex problems into actionable guidance. What I appreciate most is the collaborative spirit the team brings into every engagement. The close cooperation with our technical experts demonstrates how powerful it is when we combine perspectives across regions and disciplines to solve our customers' toughest challenges.

Our customers consistently highlight the unique combination of innovative thinking, strategic discipline, and deep technical expertise that FEV Consulting brings to their most demanding challenges. This reputation has not come by chance. It is the result of continuous dedication, intellectual curiosity, and the willingness to question assumptions and look beyond the obvious.

I am truly proud of what FEV Consulting has achieved and how it has grown into an essential part of the FEV family. FEV Consulting contributes to our success every day, and shapes the path ahead for both our customers and our group.

Congratulations on fifteen remarkable years. I am looking forward to the next fifteen years ahead.

Dr. Patrick Hupperich
President and CEO
FEV Group



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15 Years of FEV Consulting

Fifteen years may sound like a long time, but when you spend them on the frontier between technology and strategy, time tends to move at the pace of innovation. From day one, our ambition at FEV Consulting has been simple and demanding: to be the specialized partner our clients trust when the issues are complex, the timelines are tight, and the outcomes matter.

We have earned that position by building bridges – between the boardroom and the test bench, between vision and validation, and between what’s possible and what’s profitable. And then, together with our clients, we cross those bridges. “From industry, for industry” is more than a motto for us; it is our reflex. We speak the language of engineers and executives alike, and we translate between them without losing nuance.

What makes me most proud over these fifteen years are the relationships we’ve built and kept. Long-standing partnerships are never accidents;

they are forged in challenging projects, honest conversations, and through results that create real, measurable impact. Our clients invite us into their most exciting – and often most demanding – topics, from rethinking products and operations to shaping sustainable, future-proof businesses. We treat that trust as our highest privilege.

None of this would have started without the guidance and support of Prof. Stefan Pischinger, whose encouragement was instrumental in bringing FEV Consulting to life. That entrepreneurial decision helped the FEV Group differentiate in a competitive engineering-services landscape – and it set the stage for the global, technology-strategic consulting firm we are today.

Most of all, I want to thank our team. Your performance, passion, enthusiasm, and curiosity are the energy behind our evolution. You challenge assumptions, you connect dots others don’t see, and you care deeply about the outcomes we deliver. You are the reason clients call us, and the reason they call us back.

As we celebrate our 15th anniversary, we are not looking in the rear-view mirror – we’re checking the road ahead. The challenges will not get smaller. Neither will our ambition. Here’s to the next chapter of building bridges that stand and making an impact that lasts.

Alexander Nase
Global Managing Director,
FEV Consulting

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SPECTRUM #83
Issue 02/2026

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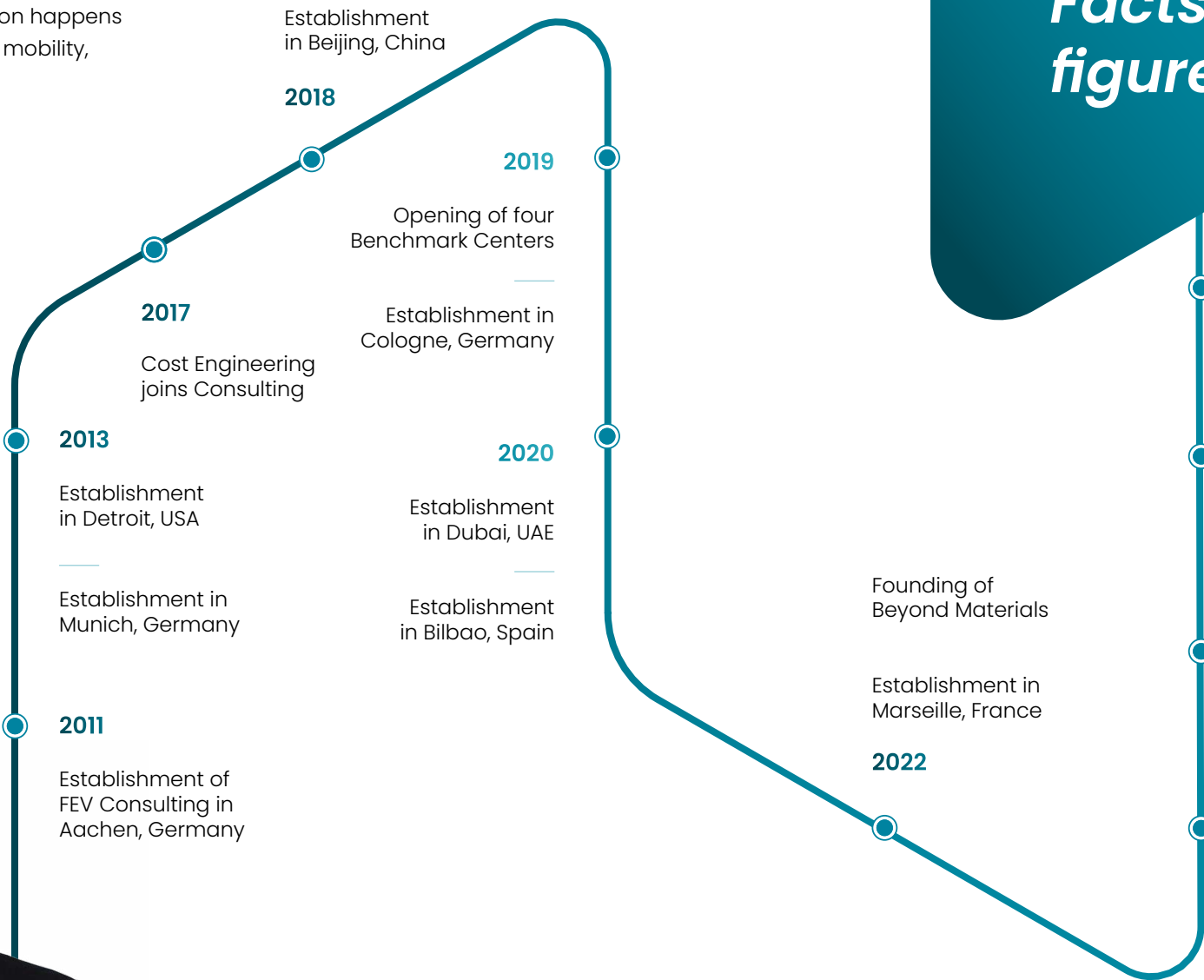
As the world continues to evolve, so do we

What began 2011 as a small, specialized consulting firm has evolved into a global success story.

Over the years, FEV Consulting has continuously expanded its reach, step by step, market by market, growing alongside the industries it serves. Today, the firm operates across 11 offices in eight countries, bringing together more than 150 consultants who combine strategic insight with deep engineering expertise. This journey reflects a consistent ambition: to go where transformation happens and to support clients in shaping the future of mobility, energy, and beyond.

Alexander Nase
Global
Managing Director

Christoph Bollig
Managing Director
Germany



2011	Founded in Aachen, Germany
150	Consultants around the globe
2,000+	Projects in 30 countries
11	Offices in eight countries

Facts & figures



We are honored to have been recognized by both **Forbes** and **brand eins** in the past few years. This achievement would not have been possible without the trust and partnership of our clients.



Named **3x** in the Forbes & Statista list of the **Best Management Consulting Firms**



Recognized **8x** as the **Best Consultants** by brand eins

Three dimensions collaborate *to solve our customers' every challenge*

Today's mobility and energy challenges rarely sit in one domain. They span industries, technologies, and timelines. To help customers navigate this complexity, FEV Consulting has built its operations around a concept that ensures the right experts join forces at exactly the right time.

The concept is based on three complementary dimensions: Industries, HyperThemes, and Services & Solutions. Industries connect deep thought leadership with long-term client relationships. HyperThemes group the technological and strategic topics shaping the future. Services & Solutions provide the methods, tools, and repeatable approaches that bring speed and quality to every engagement. Each dimension is led by dedicated leaders from our organization who contribute their unique perspectives and expertise.

What makes this structure powerful is how these dimensions intersect. For every project, we ensure that industry insight, thematic expertise, and methodological excellence are combined into one coherent solution for the client. This is how FEV Consulting covers a broad range of topics while staying sharply focused on what matters: solving clients' toughest challenges with the best team for the job.

Our Industries

Automotive

Industrial Goods

Government & Associations

PE & Principle Investors

Chemicals & Materials

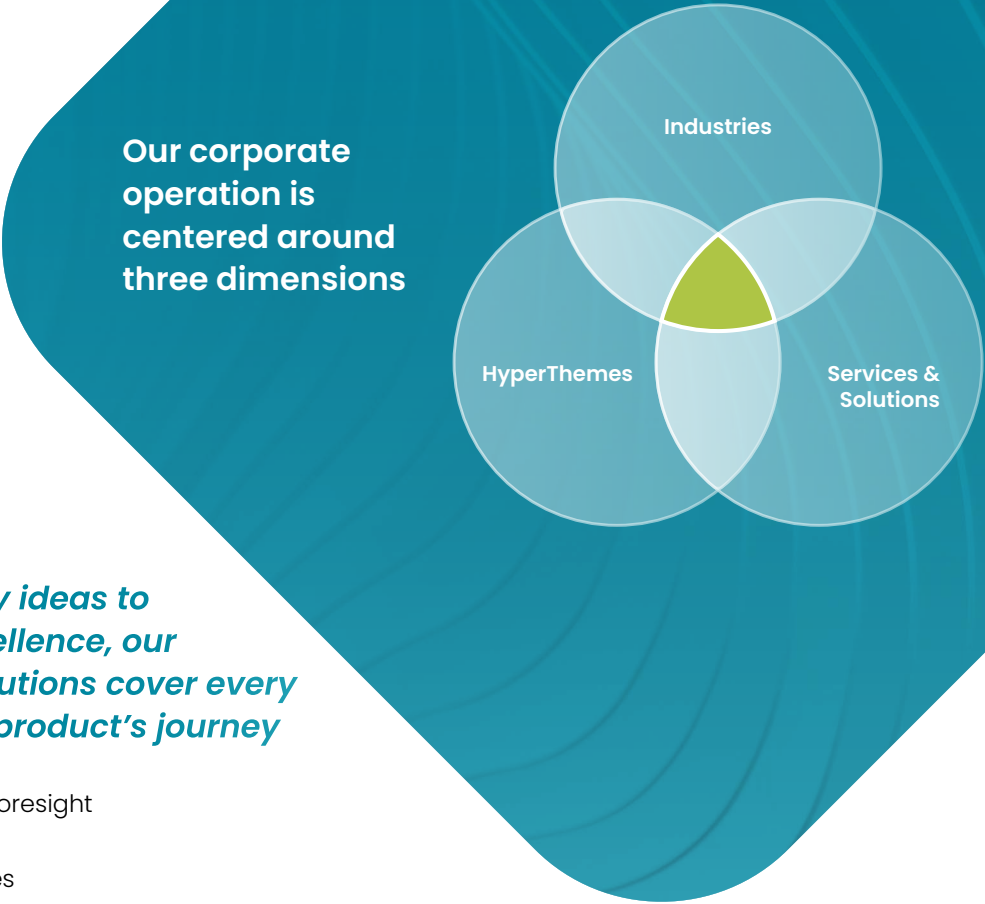
Energy & Sustainability

Transport & Logistics

Defense

On the following pages, inspiring reads and articles highlight recent project successes and important partnerships that are brought to life because of how we operate at FEV Consulting

▶▶▶



From visionary ideas to industrial excellence, our Services & Solutions cover every stage of your product's journey

- ▶ Intelligence and Foresight
- ▶ Benchmarking
- ▶ Business Strategies
- ▶ Technology Strategies
- ▶ Cost and Value Management
- ▶ Industrialization

Our HyperThemes

Advanced Robotics

Mobility

Powertrain Systems

Next Gen R&D

Energy

Sustainability

In our HyperThemes, we're not just about exploring these passions, we're about harnessing them to shape the future. With a powerhouse of strategic insights and technological prowess, we navigate the complexities of these dynamic fields to uncover actionable solutions and transformative ideas.

A look back: 15 years of innovation

E-bike



E-bike manufacturers face rising expectations across segments. Urban riders demand high ranges, quiet operation, and seamless integration, while mountain bike users expect high torque, robustness, and precise ride control. For OEMs, the drive unit has become a system-level differentiator rather than a simple component. FEV developed a compact, high-efficiency drive unit designed to cover both urban and mountain bike applications. The key challenge was balancing torque density, efficiency, packaging, and ride feel within a very small packaging envelope. Using a concept-to-production approach, FEV linked system requirements, simulation, control strategy, and targeted testing from the start.

The outcome was a scalable drive concept that provides efficiency for city stop-and-go scenarios without compromising performance on challenging terrain, all alongside a reduced-risk route to series production.

Klika

The Klika project shows how FEV transforms early ideas into road-legal, commercially-viable products. The goal was to develop an ultra-portable electric scooter with outstanding agility. FEV created two patented innovations, a one-click, self-folding mechanism and a carbon fiber flex suspension for a stable, smooth ride. The team engineered prototypes, performed durability testing, secured type approval under the German Elektrokleinstfahrzeuge Verordnung, and built a 20-unit demonstrator fleet, which was unveiled at IAA Mobility 2023. The successful transfer to and commercialization by a German automotive supplier underline how integrated engineering and business strategy turn concepts into a market reality.



SkyCab eVTOL



SkyCab, a major German initiative in the field of urban air mobility funded by the German government, explored how eVTOL air taxis could provide fast and efficient regional connections. FEV Consulting played a key role by defining the II-route network, selecting vertiport locations, and benchmarking travel times to ensure a clear advantage over ground transport. Based on these analyses, FEV recommended essential aircraft requirements, including at least 95 km of range, a cruise speed of 240 km/h, and a minimum three-passenger capacity to ensure feasibility.

To strengthen the commercial assessment, FEV developed an innovative method to estimate passengers' willingness to pay, combining time savings, cost comparisons and core comfort factors.

Image source: BRAUNWAGNER

CycleBat

With CycleBat, FEV turned battery recycling uncertainty into a practical, award-winning model tool suite. As OEMs, recyclers, and investors faced unclear volumes, shifting regulations, and uncertain process economics, FEV developed an integrated model suite to bring transparency to circularity decisions. CycleBat combines market forecasting, bottom-up value-chain modelling, and battery design analysis to quantify recycling demand, costs, CO₂ footprints, and the impact of design choices. The results help clients make better decisions on strategy, investment, partnerships, and product design. In 2024, CycleBat received the Springer Sustainability Award in Automotive and has since become a core capability within FEV's battery recycling solutions.





#1

Inside the gap

Why automotive engineering struggles with AI adoption

Why AI adoption in automotive engineering is slower than the headlines suggest – and what happens when engineers gain hands-on capabilities

The R&D floor is still quiet when the first engineers arrive. As screens wake up and coffee machines hiss, one of the lead engineers opens a dashboard, not a simulation environment. During the night, three AI agents worked through her backlog. They checked supplier data against new regulatory requirements, scanned a thermal model for unstable parameter combinations, and drafted a memo for the noon review.

She frames the questions, sets the constraints, and inspects every result. She is an engineer who can orchestrate AI with the same discipline she applies to simulation, testing, or calibration. This capability exists only in isolated pockets today, yet it illustrates what many engineering organizations aim for.

Across the industry, most AI programs start with impressive pilots. One use case shows real productivity gains. A business case is validated. Scaling is approved. But once the work moves from controlled conditions into everyday engineering, progress slows. The gap between what is possible and what is practical becomes visible.

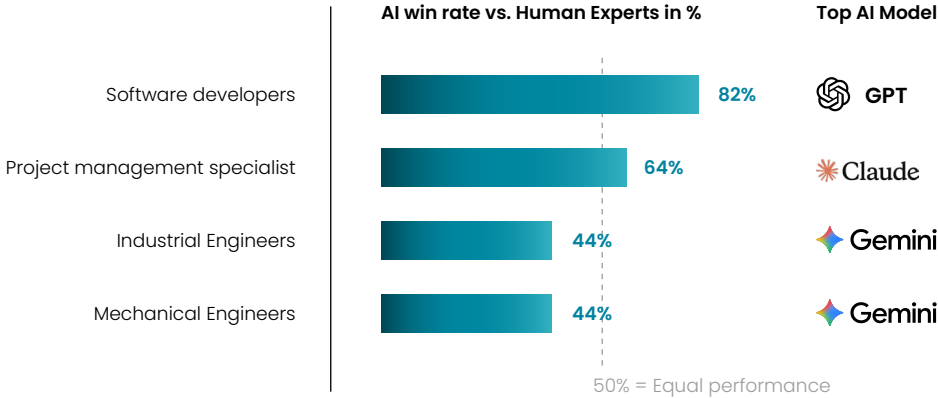
Why the bottleneck is not only organizational

While it may be easy to blame slow organizational adoption, that doesn't tell the whole story. Foundation models are rapidly advancing, with OpenAI's latest benchmarks indicating near-human expert performance in mechanical and industrial engineering tasks (see graph on the next page). In this benchmark, multiple top AI models and human experts were tasked with projects like creating CAD models with experts later evaluating the results side-by-side. In software engineering, AI is already outperforming human experts, with an 86% win rate. For mechanical engineering, AI is closing the gap with a 44% win rate. Nevertheless, current models cannot consistently handle all engineering workflows. Data remains scattered, tools lack uniformity, and requirements for validation and traceability differ widely across domains.

Automotive engineering adds another layer of complexity. Thermal constraints shape electrical design. Regulatory rules influence architecture decisions. Much of this context sits in different tools and formats. Agents can support coordination across these domains, but they cannot resolve the underlying structural fragmentation or interpret ambiguous data without careful human review.

In short, the models are getting close, but the workflows are not yet ready everywhere.

AI already outperforms humans in software development; in engineering roles, it almost matches human-level performance



Source: OpenAI, GDPeval, March, 2026

A live experiment in making adoption real

In 2025, FEV Consulting tested this challenge internally. Instead of solely developing a small expert hub for AI, our firm designed an experiment around a simple question: what happens when everyone learns to build, evaluate, and improve AI agents themselves?

The structure was deliberate. For the first six weeks, each consultant built an agent in Microsoft Copilot independently. No shared examples, no group sessions. Working alone reduced anchoring on early adopters and forced genuine engagement.

After the first phase, each agent received detailed individual feedback. It showed participants how to validate outputs, implement guardrails, and structure instructions so agents behaved consistently, even with partial or noisy inputs. Quality and trust began to form at the same pace.

During the second phase, the focus transitioned to collaborative efforts. Participants worked in pairs to evaluate their respective agents, integrate optimal design elements, and develop enhanced versions. These agents demonstrated notable performance improvements. Additionally, this approach promoted a culture of collaborative experimentation and shared learning.

The next capability: Engineers building micro-automations themselves

As model capability increases, one limit becomes clear. No central AI team can build the hundreds of subtle, domain-specific micro-automations engineers rely on every day. These tasks are too numerous and too context-dependent. The scalable path is enabling engineers themselves to build simple agents on low-code platforms, connecting tools, checking assumptions, and structuring data flows.

Many engineers already have enough technical intuition for this. They script, model, and configure tools every day. The primary barrier is not capability, but the initial inertia. Once they take the first steps, AI becomes a teacher. Engineers use agents to refine their own agents, debug logic, re-structure instructions, and add guardrails. A form of recursive self-improvement emerges: each iteration increases confidence and capability.

This dynamic is what makes decentralized AI adoption realistic.

By the end, several agents became daily tools inside the practice. More importantly, the entire team gained the confidence to build small automations themselves, the same competence engineering organizations now need at scale.

Underlying all of this was a principle that applies far beyond this challenge. In every engineering context FEV Consulting operates in, including its own consulting practice, AI does not own results. Humans do. Every output requires inspection and deliberate acceptance by an expert. AI accelerates analysis, but responsibility never shifts.



»The agent hackathon moved us from ‘waiting for AI’ to ‘building with AI.’ The moment you can create a micro-automation yourself, adoption.«

Where the industry reality stands today

A few OEMs have already started enabling engineers to build low-code automations. Their adoption curves look different. They move faster when new AI capabilities emerge. Their toolchains become more connected. Their engineers know where to rely on agents and where to challenge them. These are early signals, not yet industry-wide patterns, but they point toward a meaningful shift.

For most organizations, progress is slower. Data readiness varies. Integration remains difficult. Safety and compliance require rigorous human oversight, and engineering culture evolves carefully, as it should.

Yet the direction is becoming clearer. AI will not replace engineers. But engineers who can orchestrate and build small AI tools will shape how development organizations work.

The moment before momentum

Back in the R&D office, the engineer closes her overnight dashboard. Every agent output she sees is traceable and reviewed. Every recommendation is examined, as the final responsibility remains hers.

This workflow is not everywhere yet. It requires data maturity, integration, guardrails, and a workforce trained to evaluate AI output with engineering discipline. But it is beginning to emerge in organizations that invest early in hands-on capability.

The technology is accelerating quickly. The question now is whether engineering teams are equipped to keep pace. 

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#2 Humanoid robots are entering the production floor

Insights from supporting leading humanoid robot OEMs

Humanoid robots are moving rapidly from eye-catching R&D prototypes to credible industrial tools. Their momentum is driven by structural labor shortages, technological advances, and the need for automation that can flexibly operate in spaces designed for people. Yet the transition from promising concepts to scalable products is more demanding than public attention suggests. Through close collaboration with leading humanoid robot manufacturers and suppliers, FEV has gained a clear and data-grounded perspective of what truly enables progress in this emerging field and where decisive engineering challenges remain.

A technology reaching its inflection point

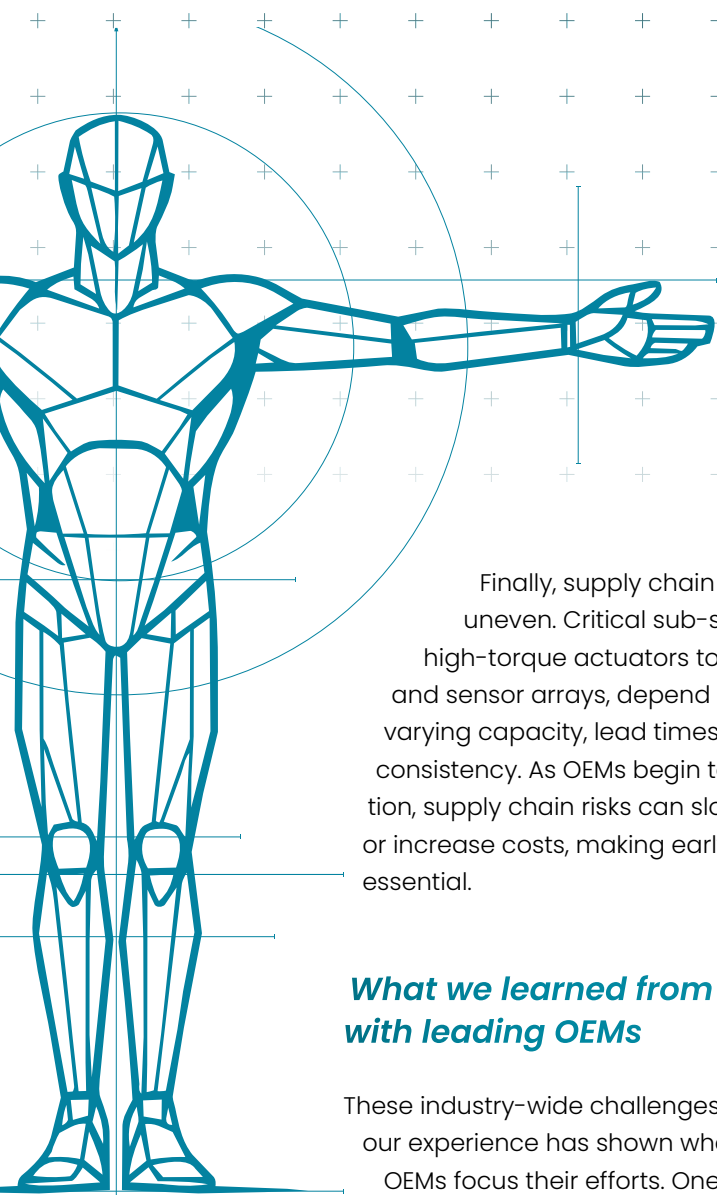
The global development landscape of humanoid robots has expanded quickly. Dozens of OEMs are now investing in platforms intended to perform human-like tasks within existing industrial facilities. The basic value proposition is compelling: a versatile machine that integrates into manual workflows without extensive infrastructure changes. This momentum has drawn substantial funding and accelerated pilot programs across logistics and manufacturing. Yet, despite the visible excitement, CTOs and engineering leaders consistently focus on a more fundamental question: can humanoid robots deliver measurable value in real environments, under real constraints, and at costs that justify industrial deployment?

Industrialization is the hard part

Our engagements across the humanoid ecosystem reveal a common set of hurdles that shape the practical path from prototype to production. First, technology maturity varies significantly, even among advanced platforms. Actuator and end-effector architectures, joint designs, battery systems, sensing suites, and compute infrastructures differ in ways that have profound implications for robot weight, durability, efficiency, and safety. Seemingly small design choices can cascade into major limitations when robots must operate continuously, interact with variable environments, and meet stringent ergonomic and cycle-time targets.

Second, use case selection is critical. Detailed benchmarking of warehousing and automotive value chains shows that only a defined subset of tasks benefits meaningfully from today's humanoid capabilities. The decisive factors are not the robot's theoretical capabilities but measurable parameters such as cycle time, task variability, integration effort, and the previous ergonomic load on workers. Many tasks still favor simpler, established automation. Identifying the right applications early prevents costly detours during development.

Third, cost pressure adds another layer of complexity. OEMs must reduce system costs across successive prototype generations long before reaching series production. Achieving competitive unit economics requires early decisions on design simplification, modularization, and make-or-buy strategies. Without a structured cost-down roadmap, the gap between performance targets and production feasibility widens quickly.



Finally, supply chain maturity remains uneven. Critical sub-systems, from high-torque actuators to battery packs and sensor arrays, depend on suppliers with varying capacity, lead times, and quality consistency. As OEMs begin to scale production, supply chain risks can slow development or increase costs, making early risk mitigation essential.

What we learned from working with leading OEMs

These industry-wide challenges are solvable, and our experience has shown where successful OEMs focus their efforts. One recurring success factor is establishing clarity through systematic benchmarking. By screening more than thirty OEMs, analyzing product maturity, strategic positioning, and team structures, FEV Consulting helped clients establish a realistic view of their competitive position and identify the engineering and organizational choices that differentiate leading platforms.

The second lesson centers on system-level engineering. Through detailed assessments of actuators, joints, and battery systems, it became clear that individual components cannot be optimized in isolation. Choices about gearsets, joint layouts, battery chemistry, and charging strategies interact with one another, shaping efficiency, weight, controllability, safety, and cost. The most resilient platforms are designed with a holistic view of the robot's complete architecture rather than relying on incremental component improvements.

Another area where leading OEMs excel is disciplined use-case prioritization. In warehousing and automotive workflows, quantitative analysis of cycle times, task variability, ergonomic load, and integration requirements already enables OEMs today to identify applications where humanoids can outperform human labor or alternative automation solutions. A grounded use case portfolio helps teams focus engineering resources on functions with the highest commercial and operational relevance.

Cost engineering also plays a decisive role throughout development. By analyzing costs for multiple design iterations, OEMs gain transparency on manufacturability, distribution of sub-system expenses, and opportunities to simplify designs. The OEMs that integrate cost considerations directly into early engineering cycles progress more quickly and achieve more reliable outcomes.

600 suppliers screened

Finally, proactive supply chain management emerged as a critical enabler. Screening more than six hundred suppliers revealed how varied component readiness and risk exposure can be. OEMs that address supply chain stability early avoid later disruptions and maintain momentum as they transition toward higher production volumes.

»Humanoids will scale when training, hardware, and unit economics align alongside robust models, reliable sensors and actuators, and a costed supply chain.«

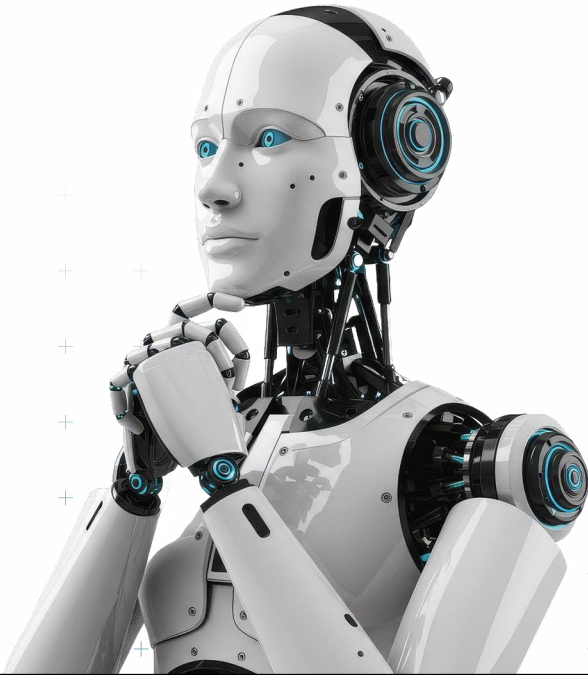
Success factors for humanoid robot OEMs



Engineering will decide who leads the next automation wave

Humanoid robots are becoming a meaningful part of the industrial automation landscape. Their future success will depend less on bold promises than on rigorous, integrated engineering. Platforms that combine system-level design, manufacturability, robust supply chains, and clearly validated use cases will shape the next decade of innovation. FEV's experience shows that with a structured approach and cross-functional collaboration, the journey from prototype to production becomes manageable and strategically rewarding for OEMs aiming to lead the future of automation. [o](#)

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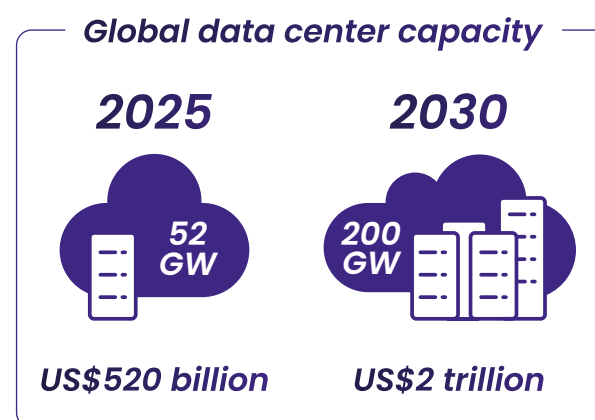
#3 Data centers: Clarity for a power-constrained, AI-driven digital future

For many years, FEV Consulting has supported clients across the energy value chain. The team works with stakeholders ranging from oil and gas companies and equipment OEMs to investors, municipalities, and infrastructure developers. This experience is highly relevant as data centers become critical nodes of the global energy system.

Data centers are entering a phase of rapid expansion. Global capacity is expected to rise from about 52 GW in 2025 to nearly 200 GW by 2030, while the market grows from roughly USD 520 billion to around USD 2 trillion. But growth is increasingly limited by local power availability, which is becoming the defining constraint for the next decade of digitalization.

AI, high-performance computing, and cloud hyperscaling are driving demand sharply upward. Many developers now face grid interconnection delays that average about two years beyond project needs, leaving even strong projects stalled by missing megawatts. For operators, time-to-market has become time-to-power, and advantage is shifting to those who can turn scarce power into value fastest.

At the same time, the internal energy architecture of data centers is undergoing its own transformation. Gensets, renewable integration, fuel cells, battery storage, hybrid microgrids, advanced thermal systems, and waste-heat recovery all need to operate as an interdependent ecosystem. Changes in power conversion ripple through cooling demand. Storage choices shape uptime strategy. Waste-heat obligations reshape thermal design.



Rising compute density amplifies these effects. Every watt lost in conversion or auxiliaries becomes heat that requires removal, reducing the power available for compute.

Energy efficiency is now mission-critical: the most effective data centers are those that can direct the highest possible share of their capacity toward compute rather than toward inefficiencies in the balance-of-plant.

Managing these complexities requires engineering rigor and system-level clarity – strengths FEV has built across energy generation and delivery, power conversion, thermal systems, and decarbonization. Those methods translate directly to multi-technology energy systems at data centers.

This foundation helps data center operators make faster, better decisions on efficiency, resilience, and the fastest-path-to-power. It also supports suppliers navigating new opportunities along the AC and DC power chain – where reliable guidance is often scarce.



Solving the power bottleneck requires a coordinated architecture across generation, storage, thermal systems, and controls—plus a clear view of timelines, economics, and scalability. FEV supports partners across the energy value chain, creating clarity where technical and strategic decisions intersect.

Partner and OEM innovation

Data center performance is increasingly shaped by component efficiency across the power chain. FEV supports OEMs with grid-to-chip power-flow modeling, loss quantification, and architecture roadmaps, linking each percentage point of efficiency to compute-relevant value. We also support portfolio and market-entry choices – what to industrialize first, which customers to target, and which partnerships accelerate adoption in power-constrained regions.

From concept to operation

Plan: Building a strategic energy foundation

Early planning determines how quickly power is unlocked and how efficiently it is used over a site's life. FEV builds demand profiles, sizing concepts, and TCO models to define a fastest-route-to-power strategy balancing utility supply, on-site generation, batteries, and microgrids. Where grids are delayed, we define a pragmatic bridge-to-power pathway (phasing, temporary vs. permanent assets, and permitting / contracting implications) to bring capacity online sooner without stranded investments.

FEV's work in the genset domain complements this focus. We help manufacturers understand data center requirements (demand, sizing, and hybrid integration) and assess supply-demand dynamics for natural-gas units as operators pursue quick-deployment, on-site generation when utility timelines slip.

Design and build: Turning concepts into megawatts

Strong concepts require disciplined implementation. FEV supports supplier evaluation, technical specification, and interface coordination across vendors and EPC partners to ensure real-world performance matches the modeled assumptions. In parallel, we bring sourcing and delivery strategy (e.g., vendor shortlisting, dual-sourcing / localization options, and contracting approaches) to reduce schedule risk when time-to-power becomes the dominant value driver.

Operate: Continuous optimization for maximum compute

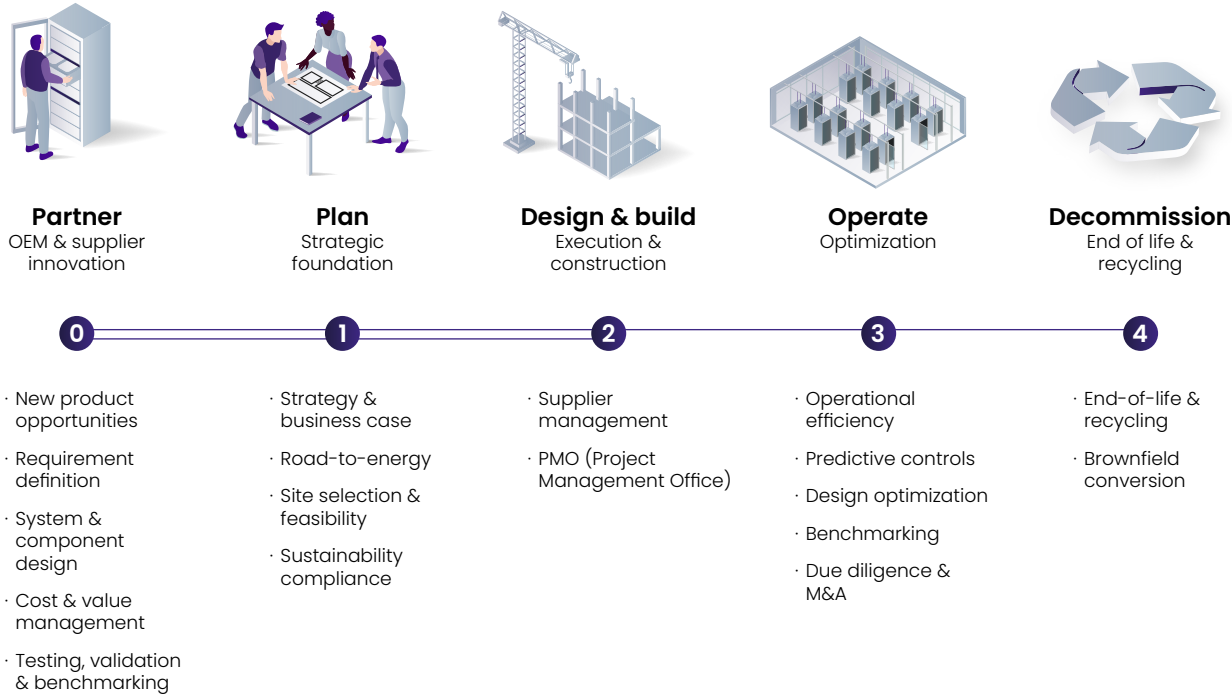
Operational energy systems behave dynamically. FEV helps operators monitor efficiency, find root causes of performance gaps, and refine micro-grid and storage dispatch to maintain uptime while reducing auxiliary consumption so more megawatts reach compute. We also support operating-model choices such as resilience vs. cost / carbon trade-offs, sustainability reporting readiness, and stakeholder communication that protects a site's ability to expand.

Decommissioning and repowering

End-of-life planning is becoming strategic. FEV develops recycling concepts, repowering strategies, and brownfield upgrade pathways that unlock value from existing infrastructure, often faster than building a new site from scratch.



Smart energy solutions for data centers



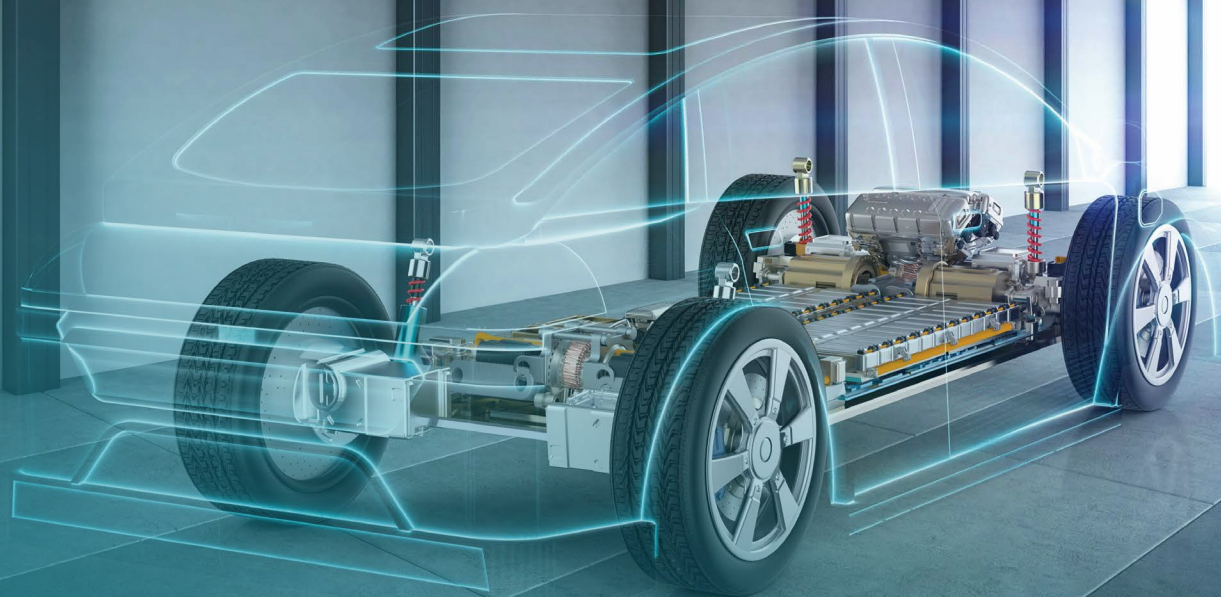
Engineering insight that drives better decisions

Across all phases, FEV combines robust engineering with clear strategic guidance. Power-flow simulations show where energy is lost and how improvements can free compute capacity. Techno-economic microgrid models quantify trade-offs between resilience, sustainability, and cost—supporting systems that are technically sound, commercially viable, and ready for a future where every megawatt matters.

The industry will keep growing, but the pace will increasingly be dictated by power availability. Operators who treat energy as a strategic asset, not an external constraint, will scale faster, run more efficiently, and adapt to sustainability requirements. With integrated engineering and a value-chain-wide perspective, the power gap can be closed. 

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#4 Strategic powertrain decisions in an age of uncertainty



Powertrain decisions have never been more consequential. Substantial investments in electrification, hydrogen, and hybrids, rapid cost pressure, the shortening of development cycles and growing global market uncertainty converge in ways that reshape architecture decisions. FEV Consulting supports OEMs and suppliers in navigating this complexity with strategic clarity backed by a deep technical understanding.

Situation: *A propulsion landscape defined by change*

Globally, electrification continues to accelerate, but progress is not linear. Battery technologies are advancing rapidly, hydrogen solutions are maturing in selective use cases, and hybrid powertrains remain essential in many markets. Simultaneously, new vehicle concepts, intensifying global competition, and shorter development cycles increase pressure on organizations to make early, high-impact decisions on future powertrain architectures and technology strategies.

Complication: *Rising complexity and shrinking margins for error*

This situation forces OEMs to operate under tighter constraints than ever before. Architectures must remain flexible, support multiple energy sources, and allow mid-cycle upgrades, while staying cost-efficient and high-performing in core applications. Battery choices strongly influence cost structures and supply chain resilience. Hydrogen technologies offer potential, but require careful assessment of risk, use-case fit, and ecosystem maturity. At the same time, integrating

next-generation powertrains, from X-in-1 electric drive units to dedicated hybrid concepts and fuel-agnostic engines, demands rigorous system-level thinking early in development. Decisions made in the concept phase define most of a vehicle's performance and cost, and correcting missteps later is often difficult and expensive.

The result is a strategic dilemma: organizations must commit to long-term propulsion pathways while technologies, markets, and regulations remain in flux. For CTOs and strategy leaders, the challenge is not a lack of options but managing their growing interdependencies.

Solution: *Strategic clarity backed by deep technical insights*

This is where FEV Consulting's powertrain systems services provide decisive value. The team supports clients in making confident powertrain decisions by combining strategic advisory with technical feasibility expertise grounded in decades of powertrain development heritage.

System-level strategy and architecture definition

FEV Consulting helps clarify the boundaries of future platforms and powertrain systems. This includes evaluating modularity, multi-energy compatibility, efficiency trade-offs, and the cost performance balance of different propulsion configurations. The team's approach ensures that architectures are both forward looking and implementation ready.

Technology intelligence that informs investment decisions

The team's insights draw from unique access to benchmarking data, test infrastructures, and the FEV Group's extensive engineering practice. This gives clients a deeper view into emerging technologies, from next-generation battery chemistries to eAxe concepts and hydrogen solutions, and enables strategic choices based on evidence, not assumptions.

FEV Consulting's proprietary, industry-proven tools such as the Vehicle Performance Strategy (VPS) and the FEV 720° Battery Review support rapid scenario analysis across performance, cost, and energy consumption. They allow technology

combinations to be assessed systematically, helping clients identify optimized solutions and mitigate risk early in development.

From strategy to execution: End-to-end powertrain pathways

FEV Consulting bridges the gap between strategic ambition and technical reality. By combining business strategy with deep engineering expertise, the team ensures that powertrain decisions, whether related to batteries, hybrid architectures, hydrogen use cases, or EDU cost optimization, are not only visionary, but also technically feasible and economically robust.

FEV Consulting's powertrain systems services support clients across the entire product lifecycle. From early portfolio strategy and concept definition to design-to-value, supplier due diligence, industrialization planning, and launch management, high-level objectives are translated into actionable, measurable outcomes. The strength of this approach lies in integrating these elements into one coherent advisory framework, ensuring that early strategic decisions consistently lead to successful execution.

"The future of propulsion will not rely on a single solution but on a portfolio of technologies."

Case examples:

Non-road, native e-machinery

Off-road machinery has traditionally been designed around combustion-engine constraints. Electric drivetrains, with different space requirements and the ability to recuperate energy and integrate multiple power sources, require fundamentally new machine architectures rather than simple conversions.

While most battery-electric excavators, wheel loaders, or tractors today are still conversion designs, a native electric approach unlocks significant benefits. In a recent project, machinery and powertrain concepts were developed simultaneously across multiple machine types and size classes, resulting in unique vehicle architectures and a modular powertrain platform. Standardized elements such as e-motors and battery cells were combined with machine-specific layouts.

Despite low production volumes, the approach significantly improved range, performance, and total cost of ownership. The architecture was also prepared for REEV integration. Overall, the native design achieved over 50% longer range and uptime, 50% fewer e-motor variants, and 30% lower battery costs, highlighting the impact of early, system-level architecture decisions.

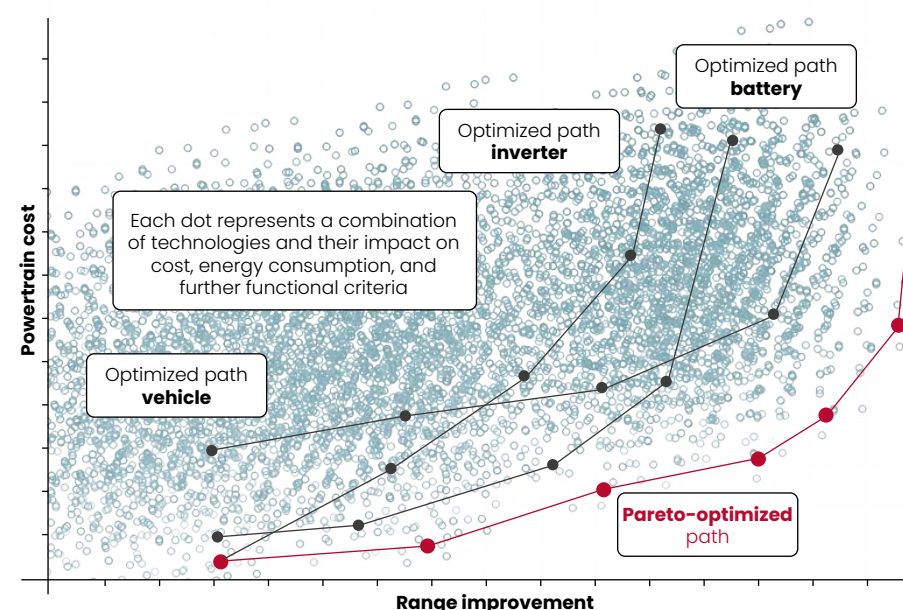
REEV engine integration

Battery-electric vehicle adoption varies widely by region and remains uncertain in some markets due to regulatory and infrastructure effects. As a result, OEMs are reassessing how dedicated BEV platforms can be opened to additional powertrain options.

Against this backdrop, FEV was tasked with developing a REEV (range extended electric vehicle) engine concept based on a dedicated BEV platform. The central challenge was the system-level integration of a combustion engine across mechanical, thermal, electrical, control, and NVH domains, while minimizing impact on BEV derivatives. Achieving a viable concept required close collaboration between FEV Consulting and FEV Engineering.

By jointly addressing vehicle and powertrain architectures from the outset, the resulting platform retained BEV-like driving characteristics while extending range, improving uptime, and reducing total cost of ownership. The case demonstrates how early, system-level REEV integration can future-proof electric platforms under uncertain market conditions. o

BEV range optimization based on FEV VPS tool



BY

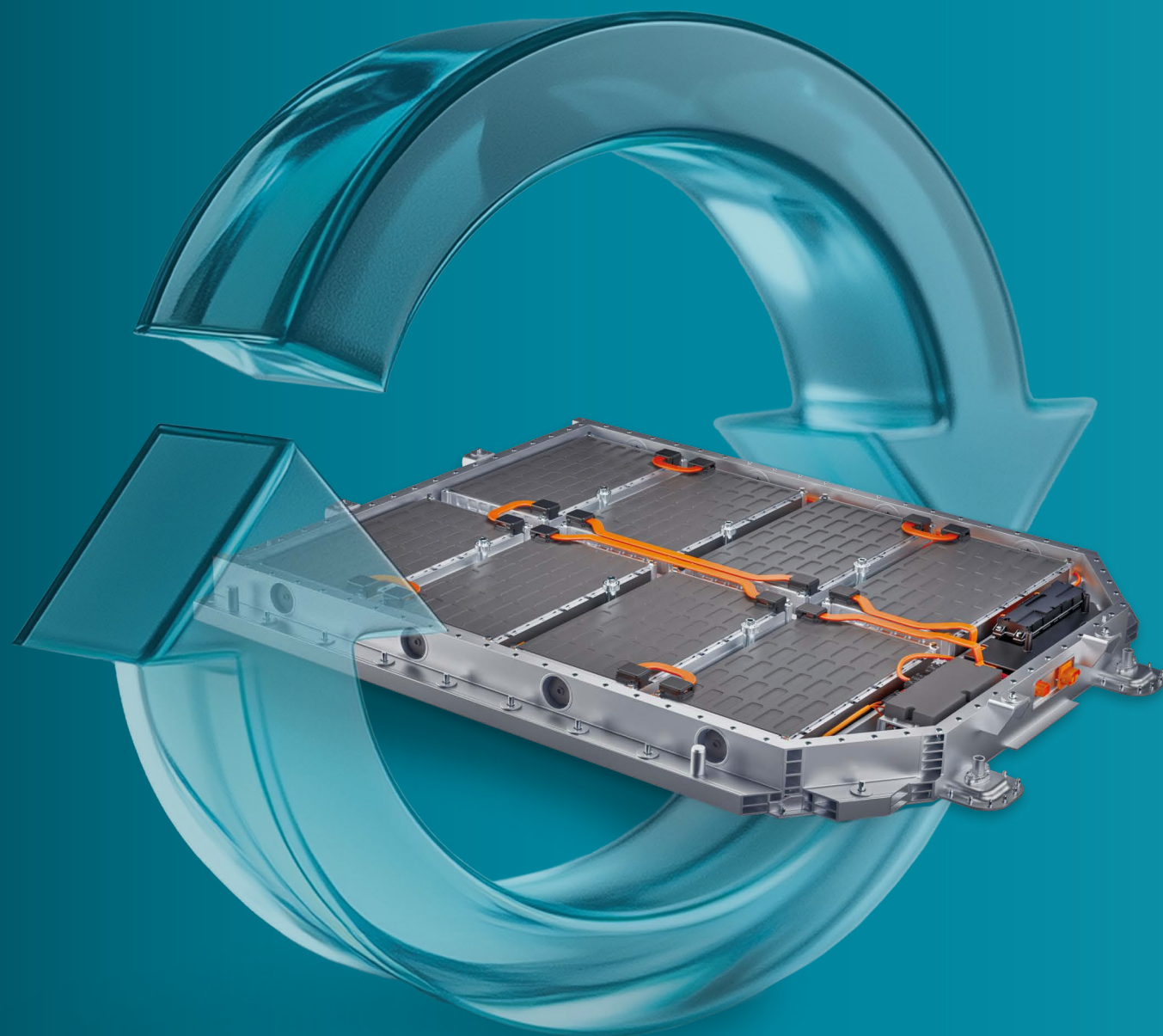
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#5

Battery recycling

Closing the loop – By designing for circularity



FEV's award-winning CycleBat tool allows glimpses into the future of a rapidly changing industry

Battery recycling has moved from a buzzword to a strategic pillar of Europe's industrial agenda. It supports two central objectives: decarbonizing mobility and reducing dependence on imported raw materials. Yet the path to achieving these goals is anything but straightforward as the industry is faced with accelerating developments of the upstream battery value chain, changing regulatory targets for decarbonization and sustainability and increasingly complex geopolitical dynamics. Companies across the value chain must make high-stakes investment decisions while the underlying market is still taking shape.

This created a clear need for reliable long-term guidance. Early in the transition, recyclers, vehicle manufacturers, and investors approached FEV Consulting with a similar problem: although the strategic relevance of recycling was undisputed, the industry lacked transparent, data-driven projections to support design choices, capacity planning, process selection, and capital allocation. Market volumes were unclear, process routes differed significantly in cost and maturity while required investment volumes and scales were extremely high. Many players hesitated to commit.

With deep insight into industry developments, robust methods for market and technology forecasting, and a thorough understanding of the market, ecosystem and regulatory framework, FEV Consulting was well positioned to fill this gap. Over a series of projects, the team developed a structured response to the planning uncertainty the industry was faced with: the FEV CycleBat model suite.

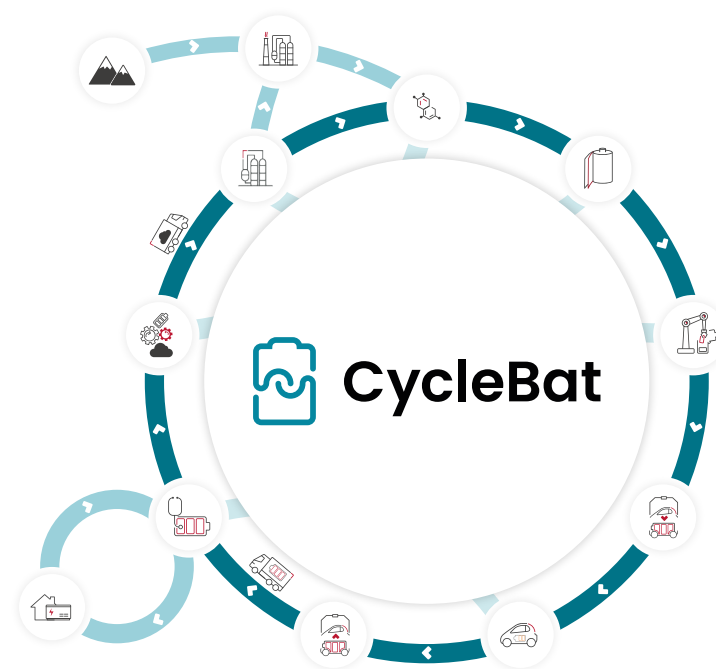
CycleBat integrates three complementary modules:

- CycleBat Market forecasts future recycling demand based on FEV's long-established forecasts for vehicle sales and battery technologies combined with battery and vehicle aging simulations
- CycleBat Value Chain takes a bottom-up approach, calculating cost and CO₂ footprints for different recycling routes, considering different flowsheets, plant scales and battery chemistries

- CycleBat Designer evaluates how early choices in battery design such as cell chemistry, integration level, or dismantlability can impact recycling economics at battery end-of-life

The models were refined closely with players along the entire value chain by integrating actual flowsheets, machinery data, and cost structures. As projects became more technical, the team collaborated with leading research institutes, including the Institute for Process Metallurgy and Metal Recycling (IME) at RWTH Aachen University and the Fraunhofer Institute for Embedded Systems and Communication

Selected CycleBat insights



- In an established EU recycling economy, we project 10.60 €/kWh of revenue potential by 2040 for a typical NMC battery – Turning a liability today into an asset tomorrow
- Designing an automotive battery optimized for circularity can reduce the cost of recycling by more than 1,650 € for a single battery pack
- Second-life batteries' business cases rely heavily on the assumed remaining state of health at first end-of-life with FEV projecting a majority of batteries going straight to recycling due to a lack of economic feasibility for 2nd life business models



Technologies (IKTS), to analyze innovative hydrometallurgical concepts, membrane applications, and process optimizations. These partnerships strengthened both the technical depth and credibility of the CycleBat suite. Together, the models allow a glimpse into the industry's future to support high stake decisions on strategy and technology made today.

As the approach matured, FEV Consulting began presenting its findings at major international conferences. Attendance at events such as The Battery Show, the International Congress for Battery Recycling (ICBR), the FISITA World Congress, and the Aachen Colloquium expanded the company's visibility and network. In 2024, CycleBat received the "Springer Sustainability Award in Automotive," underscoring its relevance for an industry searching for clarity.

Today, CycleBat is embedded in a wide range of customer engagements. It supports market entry evaluations, partnership strategies, technology comparisons, and long-term investment decisions and is fully integrated into the FEV Engineering team's tool chain, informing their design decisions for the next generation of batteries. The models allow companies to understand if recycling volumes will justify capacity build-up, how different process routes stack up

on economics and CO₂, and how regulatory requirements influence market designs. This transparency has become essential for planning in an environment where mistakes are costly and timing matters.

The success of CycleBat enabled FEV Consulting to expand into adjacent circular-economy domains. The methodology has been transferred to model e-motor, electronics and whole vehicle recycling. It also provides valuable insights for battery lifetime optimization, where the economics of recycling need to be weighed against a potential second-life battery application.

While public attention toward sustainability has shifted in recent years, the strategic importance of battery recycling for Europe has not diminished. FEV Consulting remains a trusted partner in this field, combining market intelligence, engineering expertise, and a proven modeling suite to help customers design resilient strategies in an evolving circular economy. o

BY

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#6

Building an automotive nation

Saudi Arabia's vision to create
a new industry

Saudi Arabia is undertaking one of the most ambitious industrial transformations in the world. Under Vision 2030, the Kingdom is reshaping its economy by creating new industries, advancing manufacturing capabilities, and investing heavily in next generation mobility technologies. Central to this effort is the establishment of a domestic automotive sector, a bold initiative to build a modern, sustainable, and globally competitive industry from the ground up.

For decades, the global automotive landscape has been dominated by long established clusters in Europe, Asia, and North America. Saudi Arabia, by contrast, is starting with a clean slate, giving it the rare opportunity to design its industry around the latest technologies, electrification, digital systems, and local value creation.

Saudi Arabia complements its domestic programs with a broad global investment strategy. The Kingdom channels capital into high-potential companies and sectors worldwide to diversify economic exposure and accelerate access to innovation. These international engagements strengthen links to leading markets and technologies while supporting the diversification of KSA's economy.

Building a national automotive ecosystem

Creating an automotive industry is fundamentally different from launching a single new vehicle. It requires a complete ecosystem. An OEM needs to be built. Engineering capabilities must be established. Supplier networks need to be developed. For a country with no previous large-scale automotive manufacturing base, the challenge is both complex and unprecedented.

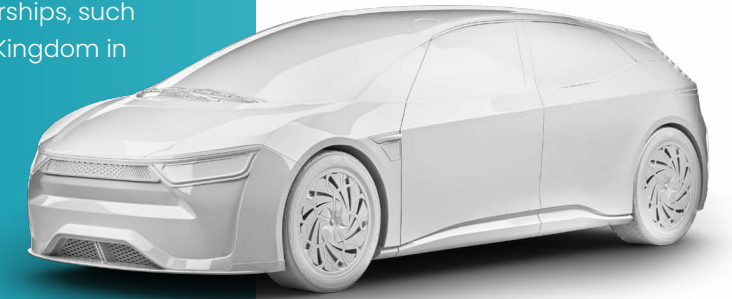
Saudi Arabia's strategy reflects its ambition. Rather than developing incrementally, the Kingdom is building a high-tech industry for electric mobility at scale and with exceptional speed. This approach enables Saudi Arabia to adopt next generation technologies from the outset, leapfrogging traditional development paths.

»Very special thanks to our suppliers, like FEV, who signed an MoU to partner with CEER to build a competitive supplier ecosystem which is a big enabler to develop the automotive industrial cluster in Saudi Arabia as part of Vision 2030.«

Johnny Saldanha
Chief Procurement and
Supply Chain Officer
CEER

Partnerships that make a difference

The success of this transformation relies on close collaboration between government institutions, industry leaders, and engineering partners. By aligning strategic vision with technical expertise, industrial know-how, and operational execution, Saudi Arabia has been able to translate ambitious goals into tangible results. FEV is proud to contribute to this historic transformation. With a growing presence in Riyadh and strong partnerships, such as a collaboration with CEER, FEV supports the Kingdom in developing a modern, competitive, and future-oriented industry ecosystem. Together with other partners, they are helping shape a national industry that reflects the scale of Saudi Arabia's vision and the technological possibilities of the current and future generations.



Localizing the supply chain

Developing a sustainable automotive industry requires more than physical infrastructure. The Kingdom places strong emphasis on building local engineering and design talent capable of supporting advanced vehicle development. By strengthening these capabilities, Saudi Arabia ensures that future OEMs can innovate independently and operate at global quality standards. Talent development becomes a strategic cornerstone of longterm competitiveness.



Designing for the future

The scale of opportunities in Saudi Arabia is extraordinary. Few regions in the world today have the chance to build an entire automotive industry from scratch. This unique starting point allows the Kingdom and its partners to challenge established development practices and push the limits of what is technically feasible, while accelerating engineering progress far beyond conventional timelines without compromising on quality.

Global influence through strategic investments

Saudi Arabia's broader transformation is supported by a strategic approach to global investment. The Kingdom selectively invests in innovative technologies and promising businesses around the world, focusing on areas with strong longterm potential and impact. These investments require a clear understanding of technical and commercial fundamentals, ensuring that capital flows toward opportunities with real strategic value. This approach strengthens the Kingdom's position as an influential player in an increasingly competitive global landscape. 

FEV and FEV Consulting contributions

- Vehicle development
- Electrification technologies
- Software-defined mobility
- Industrial engineering
- Supplier management
- Program execution

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#7

The UAE's blueprint for the future of mobility

Where the future moves first



In many parts of the world, the future of mobility is still discussed in strategy papers and pilot projects. In the United Arab Emirates, it is increasingly being deployed in practice.

Over the past decade, the country has emerged as one of the most advanced and favorable environments for next generation transport technologies. Autonomous driving and urban air mobility are moving from concept to implementation, supported by a clear national vision and close collaboration between authorities, operators, and technology partners. In alignment with the overall targets to reduce emissions, the electrification of fleets is also being pushed forward.

The UAE's approach to mobility innovation is characterized by a willingness to act early by attracting partners. Rather than waiting for technologies to fully mature elsewhere, the country is actively shaping frameworks that allow emerging systems to be tested, refined, and eventually deployed at scale. This has created an environment where complex mobility concepts can be translated into real operational models.

From individual vehicles to mobility systems

In leading global markets, regulations and technical standards for autonomous vehicles are typically shaped within mature automotive ecosystems. In the UAE, however, authorities began defining these frameworks in parallel with technology deployment, despite the absence of a local automotive or autonomous vehicle OEM. The objective has been to enable controlled deployment while maintaining uncompromising safety standards and operational reliability.

»Building autonomous mobility without a domestic OEM ecosystem required a framework driven by engineering rigor, clearly defined operational domains, and measurable safety targets. With the vital technical support and expertise of FEV Group, Dubai has been able to translate this vision into a structured ecosystem capable of scaling autonomous mobility within real transport networks«

Dr Ismail Zohdy

Smart Mobility Expert
working for the Dubai
Government



The next layer: Urban air mobility

While automated vehicles are entering testing phases on the ground, a new dimension of mobility is emerging in the air.

Urban air mobility already exists today through conventional helicopters, but high noise levels, safety concerns, and operating costs limit its broader adoption. Electric vertical take off and landing aircraft could address these challenges and introduce a new, more efficient layer of transportation, enabling faster travel above congested urban areas.

However, making this a viable transport solution requires more than advanced aircraft. It depends on an integrated system including vertiport infrastructure, airspace coordination, passenger handling, and digital scheduling. Engineering teams therefore treat it as a system design challenge, using simulations to optimize operations, charging, and passenger flow. These analyses are key to ensuring that urban air mobility becomes both economically viable and accessible.



Electrification in a desert climate

At the same time, the UAE's mobility transformation is closely connected to its broader energy transition. Major investments in renewable power generation, including the Mohammed bin Rashid Al Maktoum Solar Park in Dubai, are creating the conditions for large scale electrification across multiple sectors.

Electric mobility plays an important role in this strategy. Yet the region's climate introduces unique technical challenges. High temperatures can affect battery performance, reduce charging efficiency, and increase overall energy demand during operation, specifically in peak periods.

To examine the performance of electrified vehicle fleets in desert climates, comprehensive analyses have been conducted. By modeling energy consumption, charging behavior, power grid requirements, route characteristics, driving profiles, and traffic implications, FEV was able to simulate and evaluate the long-term effects of electric mobility for cities in the region. The consideration of not only CO₂ emissions, but also air pollution in the cities, and the social costs related to such, puts electrification in the spotlight for future powertrain choices.

With battery technology and charging infrastructure becoming increasingly mature and cost-competitive, accelerated electrification roll-out become financially attractive. Net-zero targets can be achieved before 2050 at a lower total cost spent per kilogram CO₂ saved even in such difficult environmental conditions.

In this context, the timing of electrification ramp-up becomes as important as the technology itself.

Designing complete mobility ecosystems

Many current mobility initiatives in the UAE therefore extend far beyond individual technologies. Increasingly, the focus lies on designing complete mobility ecosystems in which vehicles, infrastructure, digital platforms, and operational services function as an integrated whole. This includes defining technical requirements, digital backend systems, fleet operations, and safety frameworks as well as establishing partnerships and operating models allowing an overall financial sustainable business model for everyone involved. Infrastructure deployment strategies must be coordinated with regulatory development and procurement processes for technology partners.

A global testbed for future mobility

The speed at which mobility concepts are progressing in the UAE is notable. Technologies that were once limited to pilot demonstrations elsewhere in the world are gradually moving toward real operational services. Autonomous transport solutions, electrified fleets, and emerging urban aviation concepts are being developed in parallel rather than sequentially.

The UAE's progress illustrates how close collaboration between government, operators, and engineering partners can accelerate innovation. By aligning regulation, infrastructure, and technology development, the country has created a powerful platform for next generation mobility. Dubai established the Dubai Mobility Lab, where technology pioneers, stakeholders, and talents can come together to shape the future of mobility. [o](#)

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#8

Charting new frontiers with *China's automotive rise*

»As China's automotive industry accelerates its global expansion, true competitiveness will be defined not only by technology, but by the clarity of decisions behind every product, every market, and every strategic step forward.«

How FEV Consulting enables strategic expansion and product innovation on a global scale

In today's automotive industry, the rapid rise of China's automotive sector has become an undeniable global force. Amid a technological revolution characterized by electrification and automation, Chinese automotive companies have not only expanded their market share at home, but also strengthened their global standing through shorter innovation cycles and increasingly competitive products. This momentum is driven by bold technology iteration, China's mature industrial supply chain as the "factory of the world," the country's talent advantage as an innovation hub, and the unmatched commercialization opportunities created by the world's largest automotive market.

As the domestic market approaches saturation and competition intensifies, Chinese automotive companies are accelerating their exploration of overseas markets. At the same time, China's economic development and regulatory evolution have created demand for product categories that traditionally fell outside many Chinese OEM portfolios, such as advanced vans and pickups. In practice, Chinese carmakers are venturing into unfamiliar territory along two dimensions simultaneously: market geography and product type. Each dimension brings its own unknowns, including regulatory requirements, customer usage patterns, sales channels, and after-sales expectations. Navigating these unknowns requires disciplined choices and a planning approach that balances analytical rigor with practical feasibility.



FEV Consulting's China team has consistently played the role of "companion" and "enabler" as Chinese automotive companies grow stronger and venture into overseas markets. When faced with unfamiliar overseas regulatory environments, the team helps companies sort out and interpret relevant policies, translating them into concrete requirements for product development. Confronted with consumers and end customers whose tastes are entirely different, the team assists Chinese companies in accurately understanding their needs, as well as the differences and similarities with Chinese consumers. By researching customer needs and benchmarking competitors, the team helps companies establish a solid data foundation clarifying "where to compete" and "how to win." In areas such as technology route selection and product function definition, the team always works alongside companies to ensure that core technology directions, such as powertrain and electronic / electrical architectures and product configurations, remain consistent with the company's long-term platform strategy and brand positioning.

Beyond supporting specific decision-making, FEV Consulting's China team also helps companies build sustainable and repeatable product

planning capabilities. The team assists in establishing product matrix planning methodologies and systematic product and technology planning processes, clarifying interfaces among strategy, R&D, procurement, manufacturing, and sales departments. When companies prepare to enter new markets, the team supports the development of market entry strategies and plans sales and after-sales systems that fit local realities. These are precisely the areas where Chinese automotive companies have traditionally lacked expertise. Whether acting as an "accelerator," "advisor," or "strategic partner," FEV Consulting's China team always stands side by side with Chinese automotive companies, turning their vision into step-by-step actionable decisions and actions.

A key differentiator lies in the strength of FEV Consulting's local China team. By combining over a century of German automotive engineering and management expertise with deep insights into China's fast-evolving industry, our team upholds globally consistent standards while delivering practical, customized solutions. These are tailored to each client's development stage, industrial footprint, and organizational capabilities, which help leaders make decisions that are

both analytically sound and implementable. Over time, such work has enabled long-term, trust-based partnerships with Chinese automotive clients in specialized areas. These enduring collaborations have granted FEV Consulting the privilege of exploring new fields with our clients and accompanying their products from early concept definition to global market launch.

One compelling example is FEV Consulting's multi-year partnership with a leading Chinese OEM that is rapidly expanding internationally. When this client began evaluating entry into the light commercial vehicle segment, specifically vans and pickups, in both domestic and international markets, it was entering a field beyond its traditional strengths. The leadership recognized that success would require a clear view of market attractiveness, product requirements, and capability gaps, as well as an operating model suited to the more usage-driven nature of commercial vehicles.

FEV Consulting first conducted a comprehensive feasibility analysis to support the client's business decision. After the intent to enter the segment was confirmed, the team led in-depth research on global light commercial vehicle trends, usage scenarios, competitive landscapes, and technology evolution. These insights supported market prioritization and clarified core product development directions. As the program advanced into product planning and definition, FEV Consulting worked side-by-side with the client to build differentiated product portfolios and feature configurations for target markets. In parallel, the team delivered an after-sales ecosystem analysis for different regions, addressing topics such as service-network requirements, spare-parts strategies, and customer experience expectations.

Over the course of this ongoing four-year collaboration, the partnership has laid the foundation for the birth of a new Chinese light commercial vehicle brand and its step-by-step expansion

into international markets. FEV Consulting is proud to support this transformation as a strategic partner, helping the client reduce uncertainty, sharpen choices, and establish a coherent path from strategy to execution.

Looking ahead, FEV Consulting believes that cross-regional operations will continue to define the automotive industry's competitive landscape, bringing both challenges and critical opportunities for global and Chinese players alike. While supporting Chinese automotive firms in their global product and business layouts remains a core mission, it is equally important to assist international automotive companies in navigating China's dynamic and complex market. The development of both Chinese automotive companies and the market's diverse participants shape the ongoing evolution of China's automotive industry together.

In this context, careful, objective, and rational research and decision-making are essential to avoiding major strategic missteps and building sustainable competitiveness. Delivering prudent, fact-based analyses and actionable recommendations is at the heart of FEV Consulting's value proposition and a commitment we continue to strengthen as we celebrate 15 years of growth, partnership, and impact. 

BY
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China's automotive expansion: *Two dimensions of new growth*

Geographical expansion

- Asia-Pacific
- Middle East
- Europe
- South America
- Africa



Key challenges:

- Regulation unfamiliarity
- Homologation requirements
- Channel structure differences
- After-sales complexity
- Culture and clients' tastes

Product segment expansion

- Pickups
- Performance vehicles
- Vans



Key challenges:

- Usage-driven requirements
- TCO expectations
- Fleet / utility-focused feature sets
- Durability standards
- Value and performance

Crossing both dimensions simultaneously increases strategic complexity, requiring rigorous planning and partner support

#9

Ten years, four eras: *How we became a leading techno-strategic partner for the commercial vehicle industry*



The commercial vehicle industry is transforming at high speed. Electrification, software, autonomous functions, and new business models are reshaping how products are developed and operated. Over the last decade, FEV Consulting's own journey has mirrored this transformation. What started with focused early studies has evolved into a role where FEV Consulting shapes product portfolios, technologies, and software strategies for some of the most significant programs in the sector. Today, FEV Consulting is a leading partner for techno-strategic transformation in commercial vehicles.

Era 1: Focused beginnings and early credibility

FEV Consulting's early work in commercial vehicles centered on compact, highly-targeted studies. These assignments covered emerging technology trends, electrification dynamics, and competitive insights across different global players. The scope was small, but the value was high. These projects helped FEV Consulting build a reputation for precise, technically-sound guidance and gave the team a deep understanding of the fundamental logic of commercial vehicles.

This phase taught FEV Consulting what sets the sector apart: up-time-driven economics, long product life cycles, and a customer base measured in fleets rather than individuals. These early insights created the foundation for deeper involvement with several manufacturers over the years.

Era 2: Breakthrough – Shaping a new electric light-duty van

A major step forward came when the team was asked to define the complete product portfolio strategy for a new electric light-duty van. It was an ambitious program for the customer and a transformative one for FEV Consulting. The work expanded FEV Consulting's reach from focused research to senior-level engagement. It also marked the point where FEV Consulting became a trusted advisor to product and technology leadership.

For the client, the program did not end with a strategy on paper. The team's engineering colleagues at the FEV Group subsequently took on the turnkey development of the vehicle. That seamless transition from strategy to execution highlighted something distinctive: FEV Consulting could not only define product and technology strategies, but could help bring them to life.

This experience strengthened FEV Consulting's relationships with leadership teams and became a reference point for future engagements across multiple manufacturers. It was the moment when FEV Consulting's identity as a techno-strategic partner took shape.

Era 3: Expanding into software, systems, and integration

As electrification advanced and vehicles became increasingly software-defined, the team's work broadened. FEV Consulting was asked to solve challenges at the intersection of engineering, systems, and technology strategy — areas central to modern commercial vehicle development.

Integrating an acquired software stack

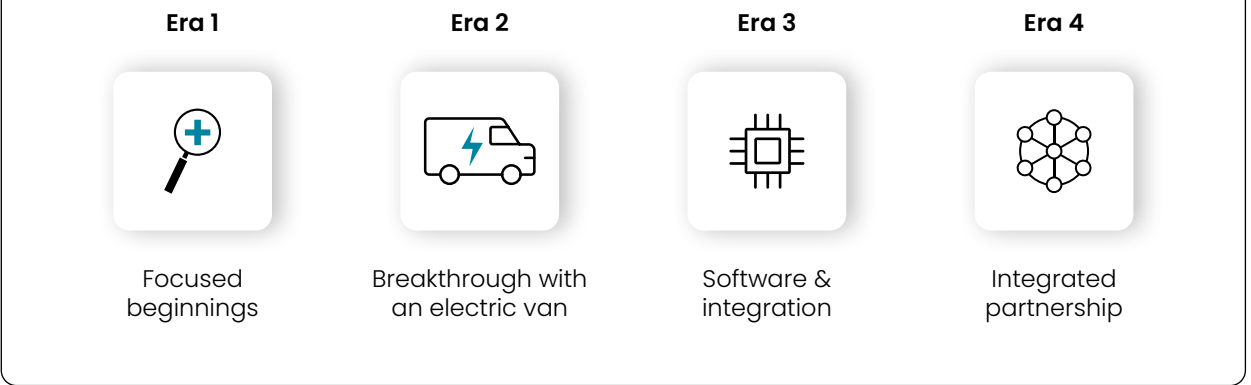
One cornerstone program involved integrating a newly acquired software platform into established vehicle architectures. FEV Consulting led the integration strategy, aligned E/E systems, and made critical contributions to ensuring software readiness for serial production. This work supported the launch of new electric heavy-duty vehicles and demonstrated the team's ability to manage complexity at a system level.

Building a modern software organization

Another major step was designing the strategy and operating model for a dedicated software organization. The unit was set up as an independent entity with a clear mandate, while being fully integrated into the OEM's development and product execution framework. Today, it delivers software across product lines and is a central pillar in multiple clients' technology roadmaps.

Across clients, these programs show a clear pattern: FEV Consulting's role is not limited to classical consulting. The team supports manufacturers in turning software, integration, and system architecture into sustainable capabilities — a decisive success factor in a software defined era.

Becoming a leading techno-strategic partner



Era 4: Becoming an integrated partner across strategy, product, and technology

Over the years, FEV Consulting's involvement expanded further into business-critical areas. Beyond traditional engineering and technology topics, the team increasingly supported service and aftersales teams, product-centric business units, and group wide transformation programs. These assignments allowed FEV Consulting to connect strategic, technical, and organizational dimensions in a way that is essential for today's commercial vehicle challenges.

FEV Consulting's partnerships are long-term and trust-based. The team works closely with CTOs and senior engineering leaders, contributes to strategic dialogues, participates in joint conference appearances, and supports clients in shaping the next generation of products and operating models. What began as single-topic studies has grown into multi-year collaborations with several leading manufacturers.

At the core of this final era is a simple message: commercial vehicle transformation cannot be separated into strategy, technology, product, and organization. All of these elements must be aligned. This is where FEV Consulting has built its strongest value: acting as a bridge across domains and helping clients navigate decisions with structural, long-term impact.

What this means for today's CTOs

The coming decade in commercial vehicles will be shaped by software-defined architectures, regulatory shifts, zero-emission portfolios, data-driven services, and increasingly integrated technology ecosystems. Complexity will rise, not fall. Decisions will carry greater strategic weight and must account for product, technology, and organizational realities at the same time.

What clients value most today is a partner who understands these dependencies and can provide clarity across them. A partner who can navigate structural change, reduce risk in critical programs, and bring strategy and execution closer together.

FEV Consulting's journey over the last ten years has made it a leading partner for techno strategic transformation for commercial vehicles. More importantly, it has prepared the team to support customers as the sector enters the most transformative phase in its history.

BY

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#10

Bridging innovation and culture

Yanmar Power Technology and FEV Consulting on 13 years of strategic partnership



Tomohisa Tao
President & Representative
Director, Yanmar Power
Technology

On the occasion of FEV Consulting's 15th anniversary, we spoke with Tomohisa Tao, President and Representative Director of Yanmar Power Technology.

Yanmar Power Technology has been a long standing customer and trusted partner of FEV Consulting for more than a decade. In this interview, Mr. Tao shares his perspective on the value of long-term partnerships, the combination of strategic and technical expertise, and the successful collaboration between Japanese and German business cultures.

Mr. Tao, Yanmar Power Technology has been working with FEV Consulting for about 13 years now. How would you describe this long-term relationship?

Tao: Our relationship with FEV Consulting is built on trust, continuity, and mutual respect. Over many years of successful collaboration, FEV Consulting has developed a deep understanding of our business, our industry, our company, and our way of thinking. This long-term perspective allows engagements to start at a very high level of quality and efficiency, which is a significant benefit compared to short-term or project-based cooperations.

What are the main benefits Yanmar Power Technology gains from such a long-standing collaboration?

Tao: A long-term collaboration creates consistency and shared understanding. FEV Consulting knows our strategic direction, our products, our technical strengths, and our organizational culture. As a result, their recommendations are highly relevant and practical. This continuity also enables open and honest discussions, which are essential for addressing complex strategic questions.

FEV Consulting combines strategy consulting with deep technical expertise. How valuable is this combination for Yanmar Power Technology?

Tao: This combination is extremely valuable for us. Strategic recommendations are most effective when they are grounded in a solid understanding of technology and engineering realities. FEV Consulting is able to bridge strategy and technology in a quite unique sense, which ensures that strategic concepts are not only ambitious but also technically feasible and realistic.



How important is FEV Consulting's knowledge of the off-road and industrial engine business for your decision making?

Tao: The off-road and industrial powertrain business has very specific requirements and boundary conditions. FEV Consulting's deep knowledge of this industry drives outcomes that go far beyond generic consulting approaches. Their understanding of market structures, customer expectations, competitive landscapes, and technological trends in the off-road sector significantly improves the quality of strategic dialogue.

In what way does FEV Consulting support Yanmar Power Technology's management decision-making process?

Tao: FEV Consulting supports us by providing structured analyses, clear perspectives, and objective viewpoints. They help us evaluate options, understand implications, and assess risks and opportunities in a balanced way. This support is particularly valuable when decisions involve long-term investments or new strategic directions.

How would you describe FEV Consulting's role as a forward-looking partner?

Tao: FEV Consulting consistently brings a future-oriented mindset to our collaboration. They actively address emerging trends, new technologies, and changing market environments which are relevant for the off-road and marine industries. Even if the industries are significantly different with regards to their specific boundaries and requirements, we are also benefitting from insights into market and technology trends from other industries such as the automotive industry as a forerunner. This forward-looking approach helps us not only respond to current challenges but also prepare for future developments at an early stage.

From your perspective, what distinguishes FEV Consulting from other consulting companies?

Tao: What clearly distinguishes FEV Consulting is its combination of strategic capability, technical depth, and genuine commitment to partnership. They do not act as an external advisor only, but rather as a long-term sparring partner who is truly interested in our sustainable success.

The collaboration brings together Japanese and German perspectives. How do these cultures complement each other?

Tao: Japanese and German business cultures share important values such as quality, reliability, and long-term thinking. At the same time, they complement each other well: Japanese organizations emphasize harmony and continuity, while German partners often contribute directness and structured problem-solving. This combination creates a very productive and balanced collaboration.

Finally, what message would you like to share with FEV Consulting on the occasion of its 15th anniversary?

Tao: I would like to congratulate FEV Consulting on its 15th anniversary and express my sincere appreciation for our long-standing partnership. We highly value the cooperation based on mutual trust and look forward to continuing it as forward-looking partners in the years to come.



Mr. Tao, thank you very much for sharing your insights and reflections with us.

Our long-standing relationship with Yanmar Power Technology is greatly appreciated, and we are thankful for the open, constructive, and future-oriented collaboration we have enjoyed over the years. We look forward to continuing our journey together and further strengthening our partnership in the years ahead. ○

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#11

Embracing the next generation of research & development



FEV Consulting drives efficient product development by rethinking strategies for future success. We address challenges through organizational change, process optimization, and skill enhancement. As systems become more complex and cost and quality demands increase, managing and accelerating product development is essential. FEV Consulting's "do more with less" approach covers R&D processes, competencies, and organizational structures. Through leveraging advanced technologies and AI, we boost efficiency, accelerate innovation, and reduce costs. FEV Consulting provides full support – From initial health assessments to scaling implementation initiatives.

Case example: Transforming the delivery model of a global off-road agricultural equipment manufacturer

This three-month transformation program strengthened governance, accelerated decision making, and set the foundation for precision enabled equipment.

Across the agricultural equipment industry, product delivery is becoming more demanding. Software content and precision technologies continue to expand, while global platforms and regional product variations add structural complexity. Many established manufacturers have built their operating models around purely hardware-driven products. Today, this foundation no longer matches the complexity of their portfolios.

A globally-leading off-road agricultural equipment manufacturer faced exactly this situation. After several delayed product launches, quality concerns, and cost deviations, the leadership team initiated a comprehensive transformation program. Their central question was straightforward. How can we create a delivery model that enables reliable execution in a world where hardware, software, and digital features must come together seamlessly?

FEV Consulting supported this effort with a combination of analytical clarity, technical depth, and structured management consulting. The result was a transformed operating model that is already visible in the way teams act, collaborate, and make decisions. The foundation for stronger launch performance is firmly in place.

The challenge: A complex portfolio and growing interdependencies

The client operates one of the most extensive global portfolios in the agricultural equipment industry, including tractors, harvesting machines, construction equipment, and precision technology. Over the past few years, the growing interdependence between hardware, electronics, and software has increased internal complexity significantly.

In parallel, several major product launches encountered scheduling delays, technical risks that surfaced too late, and cost deviations that could not be fully contained. It became clear that the underlying issue was not a single event, but a systemic challenge. Decision paths were not fully transparent. Accountability was spread across functions. Execution governance lacked the strength needed to steer the development of highly integrated products across global teams.

»FEV Consulting delivers outstanding Consulting services to our Group. Technical understanding, strong focus on actionable change and – almost most important – the respectful behavior with my teams have been crucial for the successful organizational and processual transformation.«

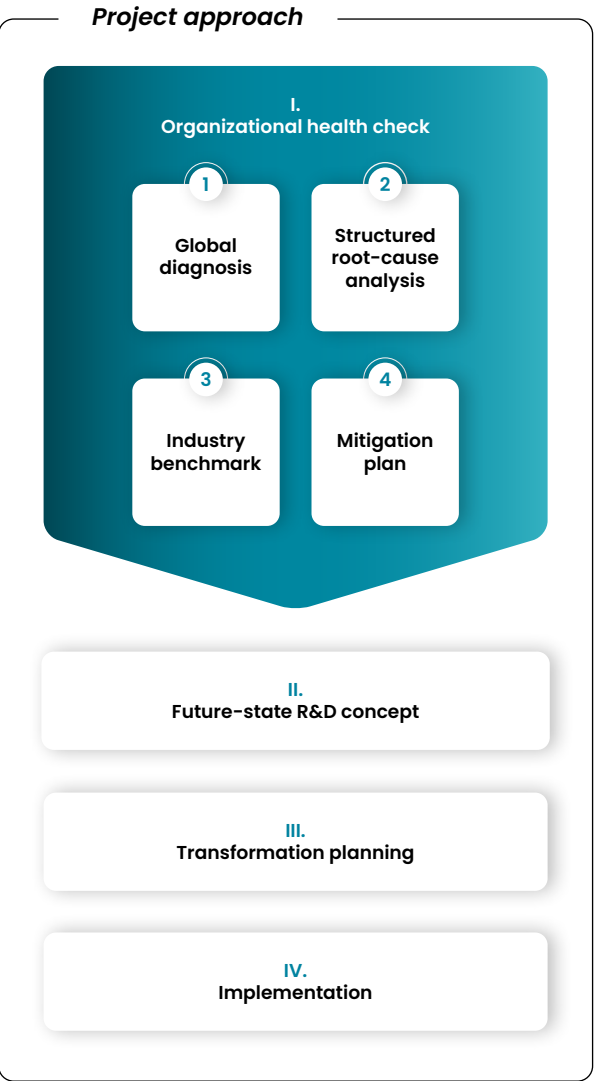
CEO of a leading global off-road OEM

The approach: Holistic, analytical, and embedded in the organization

The transformation program was designed around a simple principle. Understand the system end to end before proposing structural change. Over three months, our team conducted a comprehensive 360-degree review that covered the entire global leadership landscape. This included senior executives across central functions and the regional presidents who carry commercial and operational responsibility in the field.

More than seventy structured interviews were conducted across functions. In addition, three full vehicle programs were analyzed from early concept through industrial launch. This combination created a fact based, cross functional understanding of where the delivery model supported execution and where it introduced friction.

A clear pattern emerged. Roles and responsibilities were not fully defined. Decision authority was fragmented across functions. The organization lacked a single point that owned the delivery of a product across its entire lifecycle.



The solution: A stronger, more transparent operating model

Based on these insights, FEV Consulting developed a set of measures addressing governance, processes, and organizational structure. The central element was the creation of a dedicated product platform function. This function assumed full responsibility for delivery. It stands alongside engineering execution, ensuring clear ownership from concept through launch and transparent decision lines visible at a board level.

Complementing this structural change, process improvements were defined across the entire delivery chain. These addressed concept definition, target setting, cross functional alignment, maturity management, and decision preparation. The goal was not to increase process volume. Instead, it was to strengthen clarity. Who decides. On what basis. At which point in the lifecycle.

The new model provides earlier transparency on risks, improved cross functional alignment, and more predictable execution.

Implementation and impact

A key strength of the program was the direct engagement with the global leadership team. Recommendations were aligned with senior executives in central roles as well as the regional presidents, ensuring that the transformation was owned across the full organization. Implementation followed immediately.

The impact is visible. Teams collaborate with clearer alignment. Decision making is more focused. Product responsibilities are anchored in a transparent structure that supports accountability. The strengthened governance enables earlier detection of technical and operational risks and reduces friction between functions.

Ongoing collaboration: Enabling the future of precision enabled equipment

With the delivery model now in place, the collaboration is entering its next phase. Precision-enabled equipment is becoming a defining feature of the off-road industry. For many OEMs, software development remains a new and rapidly evolving competency. Agile development practices, frequent iteration, and digital release cycles need to be aligned with classical industrial engineering processes.

FEV Consulting supports this integration. Our team helps shape execution structures for precision technology programs, brings clarity to interfaces between software and hardware teams, and defines governance that allows both cultures to operate effectively within a unified delivery logic. The objective is clear: enable precision enabled equipment to reach the market with the same reliability and predictability that customers expect from mechanical products.

Conclusion

Delivering modern machinery requires an operating model that integrates hardware, electronics, and software within one consistent system. This global off-road manufacturer has taken a decisive step in that direction. Their strengthened delivery model provides clarity, ownership, and a shared understanding of how products move from concept to launch. It is a transformation embedded in daily work and an essential foundation for the next generation of precision-enabled equipment. 

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#12

The customer journey that pays off – ***Why sustained collaboration beats isolated projects***

Western off-highway manufacturers operate under multi-dimensional pressure. Cost, power, and weight targets converge more tightly each year. Product complexity grows as electrification and automation move from exploration into execution and become central to profitability. Sales volumes fluctuate sharply with commodity prices, interest rates, regulatory cycles, and investment dynamics in construction and agriculture. At the same time, new market entrants and Chinese competitors are accelerating their push into Europe and North America. In such a landscape, a single project can mitigate a single symptom. A long-term partnership improves how fast and efficient an organization makes decisions and delivers results.

This article reflects a multi-year collaboration between FEV Consulting and a global off-highway equipment manufacturer and focuses on the principles that make a long customer journey pay off.

Outcome 1: Implementing structured early-stage cost and value tracking

The collaboration began with individual projects focusing on addressing cost challenges in on-going vehicle programs. These projects delivered results, but they actually revealed a deeper issue: the customer lacked a unified method for tracking cost and value in early development stages. As a result, added value and added cost were not always aligned.

Building on the initial project success, shared trust, and FEV Consulting's automotive experience, both partners launched a multi-year program to establish a structured cost and value management framework. A dedicated cost and value management toolchain was developed and applied across several new vehicle platforms. With each program, the toolchain was refined and tailored to program needs. This iterative development worked only because of the long-standing partnership and the shared willingness to improve continuously.

For the first time in the customer's history, marketing, product management, engineering, procurement, and manufacturing were aligned early in the process. Their joint discussions created clearer trade-offs between feature value and system cost and enabled more consistent decision making for upcoming vehicle families.

FEV Consulting supported at two levels. The team ensured structured workshops, documentation, and accountability, while also providing technical expertise where required, including design-to-cost evaluations, should costing, and procurement support. Given the unique constraints of off-highway OEMs, including long development cycles, specialized material requirements, and low production volumes, the joint industry knowledge was critical.

The results were significant. Together, the partners identified and implemented multi-million-dollar cost improvements across different programs. Benchmarking and teardown-based analyses added the transparency needed to understand cost drivers and to move from generic targets to actionable ideas. Discussions shifted from "guestimates" to engineering-grounded decisions.

Outcome 2: Turning complexity and market uncertainty into decision ready options

As technology pathways are shifting, economics alone no longer provide answers to the key questions. Our customer's leadership was in

need of clarity on where to invest, which capabilities to build, and how to shape product variance for global markets. The partnership therefore expanded into forward-looking analyses that translated uncertainty into structured decision options.

Off-highway machines serve highly diverse markets in Europe, North America, South America, and Asia. One platform must support many configurations and price points. This makes seemingly simple questions highly complex. How much cost does a feature add? Which mutually exclusive features should be offered? What is the revenue potential across regions?

To address this, multiple analyses examined variance strategies, cost implications, and customers' willingness to pay. The findings reduced product complexity in development and manufacturing with minimal impact on market coverage.

Customer insights played a decisive role. In one study example, a choice-based conjoint analysis surveyed approximately 300 end-users to quantify willingness-to-pay for a high-value component option. The outcome was a set of data-based preference curves that supported both ongoing development decisions and pricing strategies.

These activities helped leadership evaluate options with confidence and build a product roadmap grounded in facts rather than assumptions.

»I am truly impressed from the speed and accuracy achieved by the project team. This would not have been possible without you!«



Outcome 3: Bringing electrification from concept to field

A customer journey demonstrates its strength when it can move from analysis to engineering delivery. In this case, a battery electric tractor demonstrator program provided that proof.

Electrification in off-highway is at an earlier stage compared to in passenger cars or trucks. Small initial volumes, limited development budgets, and stringent end-customer expectations create significant barriers. Because of the trusted collaboration, the OEM engaged FEV Consulting to lead the concept definition, engineering, and build-up of its first battery electric prototype generation.

Teams from FEV Consulting, FEV Engineering, and the OEM collaborated across two continents in an agile setup. The goal was not a single show vehicle, but a functional fleet. Two prototype generations were built as minimum viable product demonstrators to gather real world insights. The first generation was completed within nine months; the second incorporated feedback from field testing and end-customer input. Subsequently, those vehicles collected valuable data and insights as input into the series development process.

These programs reveal what many organizations struggle with. A functional demonstrator requires complete system integration across vehicle architecture, thermal management, E/E integration, high-voltage safety, functional safety, and software behavior. In a mature partnership, speed and discipline reinforce each other rather than compete.

Why the journey pays off. Repeat-ability is the hidden advantage

In this cooperation, the early years already included more than a dozen projects, followed by another multi-project wave. This continuity matters. Assumptions, templates, and decision logic evolve together. New programs do not start from zero.

From the outside, long partnerships can look like comfort. In reality, the payoff is operational.

- Faster decisions with less time otherwise lost on aligning on assumptions
- Lower risk because known bottlenecks surface earlier
- Reusable assets in cost models, decision formats, and workshop structures
- Broader range, allowing the partnership to shift seamlessly from cost gaps to strategy to execution

Long-term value does not come from a single project. It comes from a sequence of engagements that build shared context and trust. This enables a customer journey that produces reliable outcomes quickly even as the questions evolve. ○

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#13

From data to direction –

How modern benchmarking supports early phase decisions and strategic focus



 **Benchmarking
in motion**

Benchmarking today is less about comparison and more about decision support. As technologies grow more complex and development timelines shorten, organizations need reliable insight early on – insight that helps reduce uncertainty and clarify options before commitments are made.

Modern benchmarking combines technical depth with structured methodologies to support these decisions. Design architectures, cost structures, and technology choices are analyzed not only to describe differences, but to explain their consequences for scalability, manufacturability, and long term competitiveness.

A key enabler for this approach is the way benchmarking knowledge is captured and reused. With the development of the benchmarking database carat, insights are no longer limited to individual projects and documents. Design and cost data are documented consistently, made comparable across systems and product generations, and remain accessible when new questions arise. This transforms benchmarking into a continuously growing knowledge base.

Benchmarking supports early phase decisions when different perspectives come together. Engineering, cost, and product teams use shared reference data to discuss options, clarify trade-offs, and align on feasible paths forward. With the benchmarking database carat, these discussions are based on consistent and reusable insights rather than isolated project results.

Creating this kind of exchange requires more than tools. It benefits from physical proximity – from sitting close to engineering teams and turning data into dialogue. One example of how this is put into practice is the Benchmark Center in Aachen.

Where benchmarking takes shape

Stepping into the Benchmark Center, the abstract idea of benchmarking becomes tangible. Hardware is laid out, components are opened, interfaces exposed. Discussions do not start with results, but with questions: What decisions does this enable? What alternatives were available? And what do they mean for the next product generation?

The Benchmark Center Aachen was established in 2024 as part of a broader effort to strengthen FEV's benchmarking capabilities. It was designed not only as a place to analyze hardware, but as an environment for collaborative discussion, where technical, cost, and procurement perspectives are brought together. Physical components, digital tools, and structured methodologies support this exchange and help turn shared insights into decisions.



Benchmarking across markets

United States – A complementary perspective

In North America, benchmarking activities are closely linked to local market requirements and customer programs.

FEV's benchmarking philosophy in North America applies a focused "less-is-more" approach, prioritizing emerging, high-value technologies that are rapidly becoming mainstream. Rather than expending resources on established industry standards, the team concentrates on innovations that influence performance, lightweighting, cost efficiency, and manufacturability. This targeted approach accelerates insight generation and avoids the inefficiency of processing large, low-value data sets. In a region where programs move quickly, and margins for risk are exceptionally small, transforming data into direction is essential for engineering teams.

With benchmarking operations across several continents, FEV leverages a uniquely global perspective while maintaining strong regional relevance. For North America, this access enables the team to identify the "best" technologies worldwide, not just what is present locally, and to understand how those technologies are executed in varying market contexts. These learnings are continuously shared amongst FEV teams and customers, supporting rapid knowledge transfer and informed decision-making. North American customers, in particular, value this global lens as they seek to understand how international OEMs deliver high functionality, strong performance, and competitive cost in fast-evolving segments.

By focusing on technologies that truly matter, the North American benchmarking team can invest more time in high-fidelity teardown work, deeper technical insight, and stronger interpretation for customers. This global-yet-targeted approach not only ensures benchmarking relevance across programs but also enables FEV to provide added value through workshops, webinars, and tailored teaching sessions, all designed to distill complex data into clear strategic direction.

China – Access to a rapidly advancing technology landscape

China plays a central role in the global transformation of electric powertrains. Development cycles are short, integration levels are high, and new solutions reach market maturity at remarkable speed.

With its Benchmark Center in China, FEV is able to benchmark the latest technologies directly at the source. This provides early insight into emerging design concepts, cost structures, and system architectures – particularly in electric powertrains and associated technologies.

In conversation with the heads of our FEV's benchmark centers in China, Germany and United States

What value does the close proximity to FEV's engineering teams create for customers?

Koch: It connects benchmarking directly with engineering reality. Engineers, cost experts, and product teams work side by side, debating design details, questioning trade-offs, and brainstorming alternatives directly at the component level. This hands-on exchange turns benchmarking into a creative process and accelerates decisions while transferring real engineering know-how to our customers

What has been a benchmarking highlight in recent years?

Ma: One real highlight was the project on the BYD Han L battery at our Benchmark Center in China. Being close to that market allowed us to gain very direct insight into how BYD realized its first megawattclass charging capability, tracing the concept all the way from the charging port through to the battery cells. Seeing this system-level integration firsthand is extremely valuable for understanding how future electric powertrains are being designed.

Another strong example was the Audi SQ6 electric drive unit, where we took a closer look at its advanced thermal concept. Direct oil cooling of both rotor and stator, combined with a drysump lubrication system, clearly shows how efficiency and power density can be increased through smart thermal and mechanical integration.



Alexander Koch
Head of the Benchmark Center, Germany



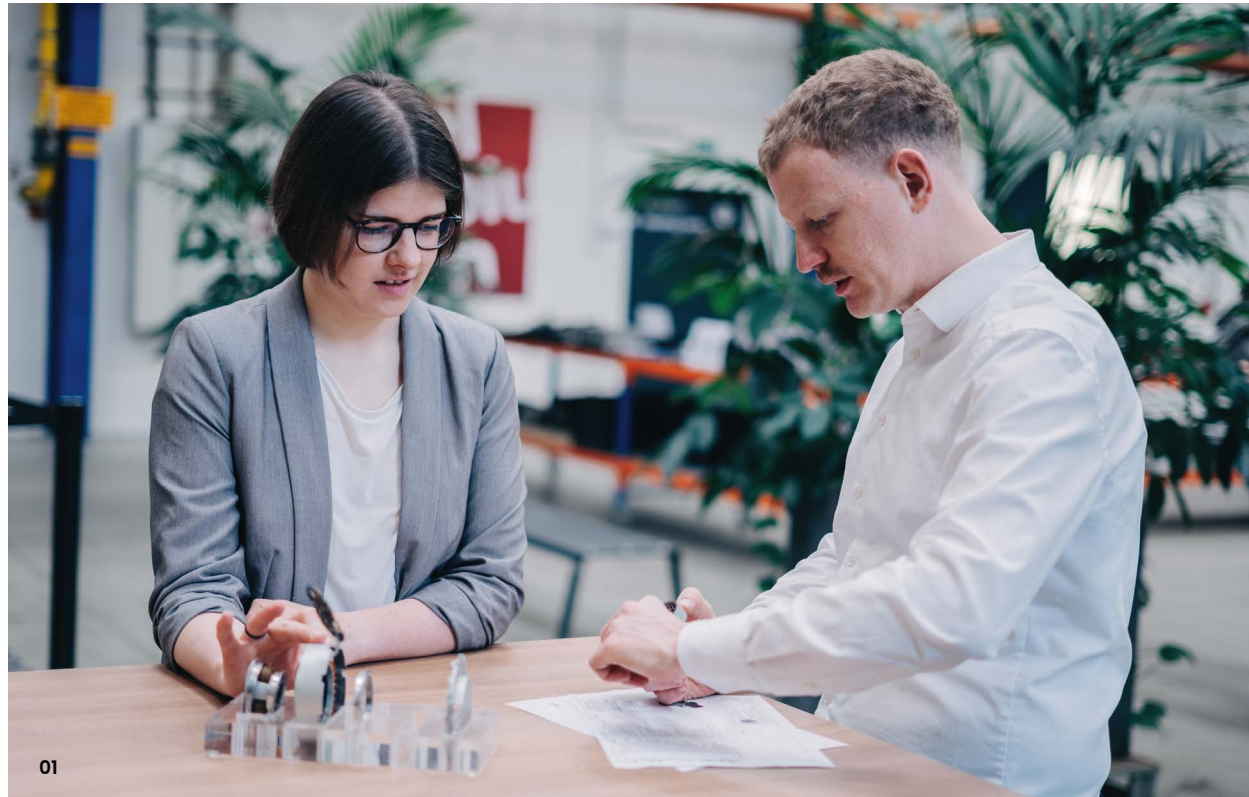
Tengfei Ma
Head of the Benchmark Center, China



Murari Muthukannapiran
Head of the Benchmark Center, United States

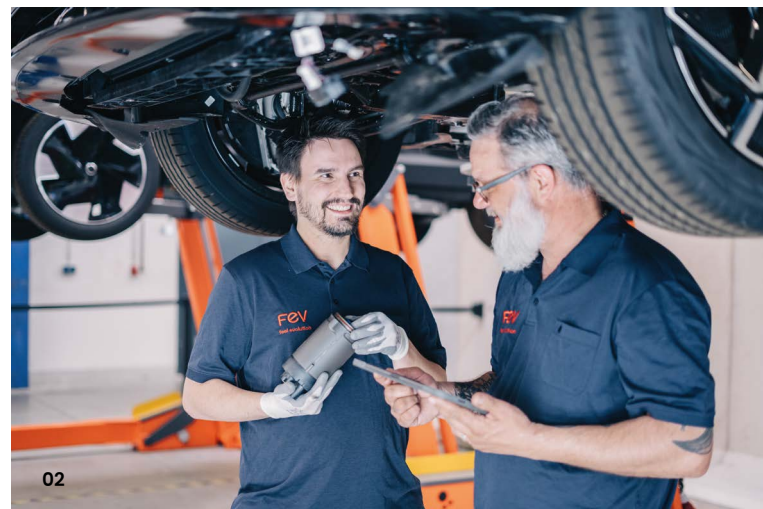
How do you see benchmarking evolving in the future?

Muthukannapiran: Benchmarking is clearly moving upstream. Its strength is no longer limited to comparing solutions; it now helps teams make optimal decisions early on with smart analytics. When insights are carried forward consistently, benchmarking becomes a continuous companion throughout product development from concept to industrialization rather than a one-off exercise.



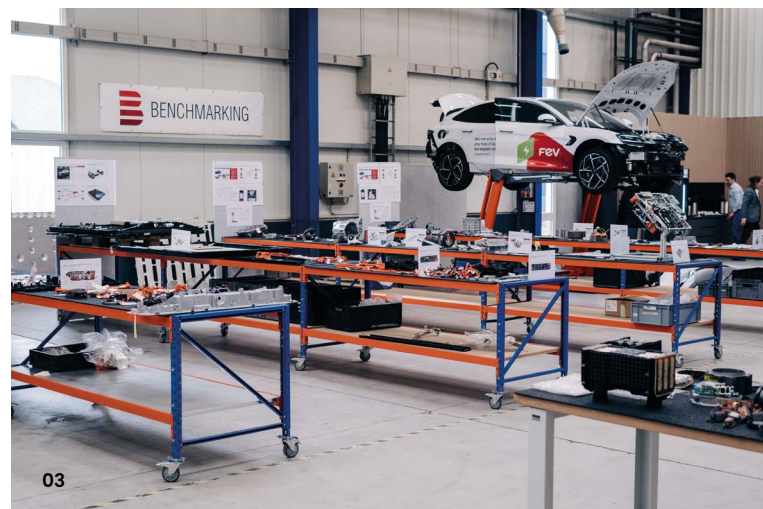
01

01
The Benchmark Center serves as a place for people to meet and exchange ideas



02

02
Interdisciplinary expert teams use digital tools and collaboration to conduct in-depth benchmarking



03

03
A selection of parts on display at the Benchmark Center Aachen

04
Bimanual teleoperation of SO-101 prototype robot arms

05
Inspection of Unitree G1 EDU-U5 shoulder joints



04

Robot gym – Exploring the next frontier

The Robot Gym was established in 2025 as an ideation hub focused on the emerging field of humanoid robots. From the outset, it was intentionally located within the Benchmark Center to complement its collaborative and hands-on approach.

The Robot Gym provides a space where early concepts can be explored jointly with customers, combining hardware, discussion, and structured evaluation. The focus on early understanding – of capabilities, limitations, and potential application scenarios.

As humanoid robots move closer to industrial relevance, structured comparison becomes increasingly important. Benchmarking of robotic systems is therefore planned as a next step, applying established benchmarking principles to a new and rapidly evolving technology domain.

By integrating the Robot Gym into the Benchmark Center environment, future automation topics are approached with the same mindset that defines benchmarking work today: collaborative, transparent, and grounded in real hardware.

We invite you to experience our Benchmark Centers around the world – to engage with real hardware, exchange perspectives with FEV experts across disciplines, explore live benchmarking data, and see proven methods and tools applied in practice. 



05

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#14 Leading innovation in Japan's automotive industry

Japan's automotive industry is entering a new era shaped by electrification, software, geopolitics, and industrial policy. Since 2025, FEV Consulting has expanded its operations in Japan with a dedicated local consulting team. This article summarizes where Japan's automotive industry stands, what is reshaping its outlook, and what it will take to stay competitive before highlighting FEV Consulting's business strategy in the Japanese market.

The current state of Japan's automotive industry:

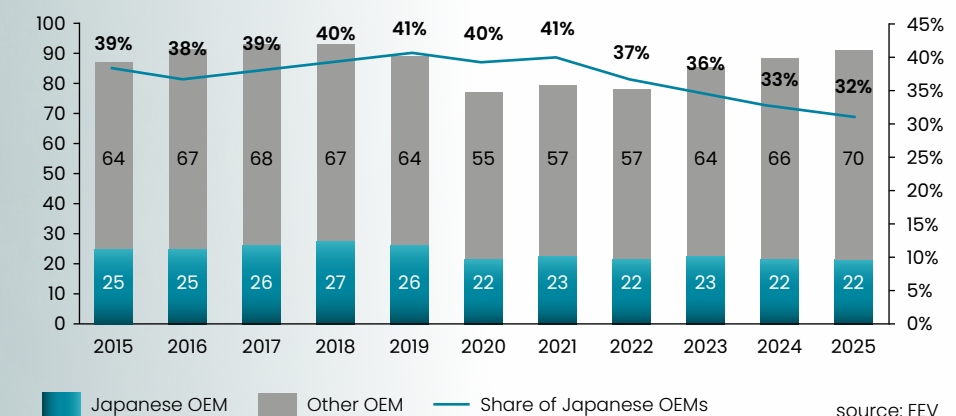
Regarding the Japanese automotive industry's market performance in the passenger car segment in 2025, total sales in the global market amounted to 22 million units. Japan's position was maintained at the global No.1, which it has kept over the past decade, however, its market share has been gradually declining in the past 5 years, which has become a cause for concern.

Japanese OEMs' fiscal year 2025 earnings forecasts (ending in March 2026) signal a sharp profitability downturn and a strategic crossroads. Most major

players forecast declines versus prior years. Toyota projects a decline of over 7.7 billion USD compared to FY 2024, Honda and Nissan both report losses of around 4 billion USD, and others, like Suzuki, are surviving.

Japan has navigated major industrial shifts before as global value chains moved in semiconductors and consumer electronics, competitive advantage moved with them. Automotive is now entering a comparable period of structural change, raising the stakes for how Japanese OEMs position themselves on technology, cost, speed, and execution.

Global automotive production volume and share of Japanese OEMs



The background of the crisis

Multiple forces are hitting at once: electrification is accelerating, China has built scale and speed across the BEV value chain, and policy, especially in the U.S., increasingly determines market access and profitability. Japanese OEMs must decide where to play and how to win in a fragmented landscape.

Electrification trends are continuing to advance and the Japanese automotive industry needs to be sure to keep up pace. Decarbonization targets are shifting the powertrain mix toward electrification. As regulations tighten and technology and infrastructure mature, timelines for scaling BEVs are compressing.

In 2024, Japanese OEMs represented approximately 3% of global electric vehicle sales, including both battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). As BEVs and PHEVs gain wider acceptance among consumers, bridging this gap swiftly becomes a strategic priority to address concerns regarding Japanese OEMs' ability to adapt effectively.

Chinese automakers are continuing to rise and control global BEV sales. Under "Made in China 2025," China treated BEVs as a core national industry. By 2024 it held ~63% of global BEV sales

and ~65% of the battery market, lifting the bar on cost and speed across the value chain. "Digital China" also accelerated software-defined vehicles (SDVs) and new digital user experiences; tech players such as Huawei and Xiaomi have built BEV / SDV into their growth strategies. Japan's slower mobility digitization increases pressure in software, electronics, and release speed.

U.S. policy is another direct factor for Japanese OEMs: the U.S. market is ~4.6 million units (1.4 million imported, 3.2 million locally produced), about 20% of global sales. Recent shifts in U.S. trade, environment, and industrial policy therefore have immediate consequences for volumes, margins, and investment priorities. These recent changes are strongly affecting Japanese automakers. Tariffs on cars and parts from Japan have jumped from 2.5% to 15%, which has cut profits. Less support for BEVs has made things uncertain for OEMs focusing on BEVs, while this helps those who are slow to adapt for now, the trend toward BEVs is still happening long-term. Also, the ongoing split between the U.S. and China is breaking up supply chains and keeping Chinese electric and software-driven cars out of the U.S. market. This gives Japanese automakers a short-term chance to strengthen their position.

Initiatives for the future

As China and other nations enhance their automotive industries through coordinated national strategies, Japan launched the "Mobility DX Strategy" (2024) to redesign the sector for the 2030s, prioritizing SDVs, autonomous driving, and data utilization. A key ambition is for Japanese OEMs to reach a 30% share of global SDV sales in 2030–2035.

In January 2026, JAMA, the Japan Automotive Manufacturers Association, outlined the "New Seven Issues Facing the Automotive Industry." These diverse issues include topics like securing critical resources and components, building a circular economy framework, and establishing a transportation system based on autonomous driving. Chairman Sato emphasizes that "there are limits for encountering competition on a company-by-company basis." In his view, the industry must act as one: coordinating with government stakeholders to drive structural reform.

Japan's new industrial policy, which was announced after the Takaichi administration took office last October, focuses on topics like supply resilience, economic security, and technological leadership. It targets enabling fields central to automotive competitiveness, like AI, semiconductors, GX, critical minerals, and ICT, further reframing automotive as a "complex of national strategic industries." This accelerates structural change in which supply-chain repatriation, a stronger technology base, and the energy transition progress in parallel, raising expectations for coordinated action across industry and government.

FEV Consulting Japan's strategy

The Japanese automotive industry's importance for Japan remains undiminished. The challenge is to protect today's strengths while building the capabilities required for the next decade. FEV Consulting Japan supports clients in both: improving competitiveness today, while shaping a future-ready portfolio, organization, and investment roadmap.

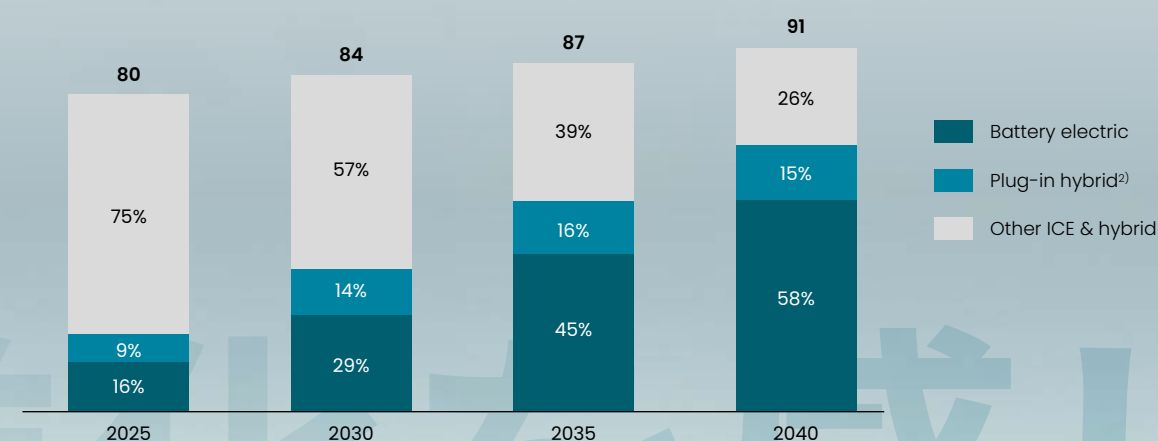
Since 2011, FEV Consulting has supported Japan-based customers in close coordination with FEV Japan. To date, the team has served more than 70 clients and delivered over 950 consulting projects. In Japan, FEV Consulting builds on long-standing client relationships to strengthen competitiveness today while supporting diversification and transformation for tomorrow. Our work spans multiple horizons, linking near-term performance with long-term portfolio and capability shifts.

Finally, several capabilities serve as key enablers for executing FEV Consulting's strategy in Japan and achieving customer satisfaction. Technology plays a pivotal role, with FEV's deep automotive engineering expertise enabling the conversion of technical realities into clear choices and programs for its customers. Leveraging its international network, including a presence in Tokyo, FEV Consulting rapidly accesses specialist talent and assets across regions to support client needs. Additionally, Beyond Materials, a joint venture with Mitsubishi Corporation, further expands FEV Consulting's capabilities and networks beyond the automotive sector, facilitating cross-industry transformation and innovation.

FEV Consulting Japan is committed to working with Japanese OEMs, suppliers, and ecosystem partners to turn strategic ambition into measurable progress in this next chapter. 

BY
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Global passenger car¹⁾ sales forecast (in million units)



1) Including passenger cars ≤3.5 t GVW (all markets) and all light-duty vehicles ≤3.8 t GVW (USA)
2) Includes range-extended electric vehicles

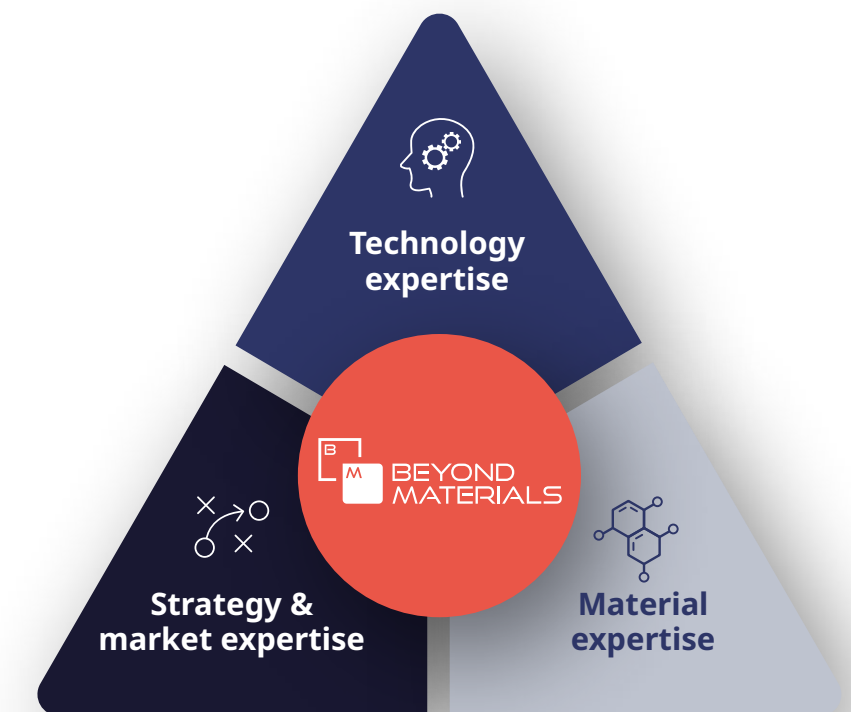


#15

Beyond Materials – *FEV's first joint venture paves the way for future growth*

Beyond Materials (BM) was founded in 2022 as a joint venture between Mitsubishi Corporation and FEV Consulting, created to serve as the strategic and engineering partner of choice for Japan's materials and chemicals industry.

Bringing together Mitsubishi Corporation's global industrial network and FEV's deep application expertise, this JV bridges two historically separate worlds: advanced material innovation on one hand and complex system-level engineering on the other. This unique positioning enables BM to support its customers across the entire product lifecycle, including market intelligence, strategy formulation, application engineering like prototyping, testing and simulation, and lastly, effective customer engagement. The material portfolio covers a broad and continuously expanding range of material categories including, but not limited to, engineering plastics, (non-) ferrous metals, composites, adhesives, ceramics, specialty polymers, and next-generation functional materials, e.g., for battery cells. To stay at the forefront of innovation, BM maintains close collaborations with global, leading material research institutes. This ensures access to cutting-edge developments and highly specialized expertise, creating a direct link between advanced material science and strategic portfolio planning for BM clients.



Our unique selling proposition

»In just three years, BM has transformed from a bold idea into a trusted partner for the Japanese materials industry. Our growth reflects a simple truth: when deep technical and material expertise meets genuine customer needs, meaningful impact follows.«

Three years of measurable progress

BM has evolved from an ambitious initiative into a mature and trusted consulting company with services and methodologies tailored specifically to the Japanese material industry.

By working continuously with material manufacturers in individual and joint consortium projects, BM systematically deep dives into emerging industry trends, such as plastic recycling, humanoid robotics, and functional materials for next-generation battery cells.

This evolution has translated into commercial traction: BM has successfully built up a portfolio of more than 35 customers, completed over 100 projects, and established long-term relationships with selected partners. All of those achievements underline the company's steady growth and its solid, recognized position within the Japanese material industry.

Recent developments illustrate Beyond Material's impact on the material industry in Japan.

One of the success stories is a consortium project on humanoid robots. This joint initiative brought together seven leading Japanese material manufacturers, ranging from polymer to metal specialists, to build a shared understanding of the fast-emerging humanoid robotics industry. BM and FEV developed a proprietary bottom-up market forecast as well as conducted a full technical architecture deep-dive, including a detailed pain point analysis, sub-system and component mapping, and identification of where specific material properties most influence robot performance. The project equipped participants with a unified understanding of the humanoid robot value chain, clear insights into how materials can proactively shape design decisions, and a set of concrete, company-specific market-entry opportunities.

Another success story is the go-to-market support journey for a low-pressure hot-melt material. The customer's initial question was simple: Could this material and process be relevant for automotive applications? What began as a small request quickly evolved into a high-impact collaboration in which BM first conducted a technical feasibility assessment to evaluate the material's potential and the real requirements of automotive electronics. From this, relevant application opportunities and clear specification targets were derived. Mapping those against the customer's existing material grades showed that they already covered several next-generation use cases. Building on these insights, BM utilized its product development capabilities and supported with design studies and various simulations. In a last step, selected automotive target customers from the BM's network were approached to introduce the positive results and facilitate a fruitful exchange.

This is one of many examples, where BM transformed a promising but uncertain material into a strategically positioned solution, opening a new market path for the customer and demonstrating BM's ability to turn early-stage material ideas into viable, industry-aligned innovations.

Facts & figures



Material groups

>10



Customers

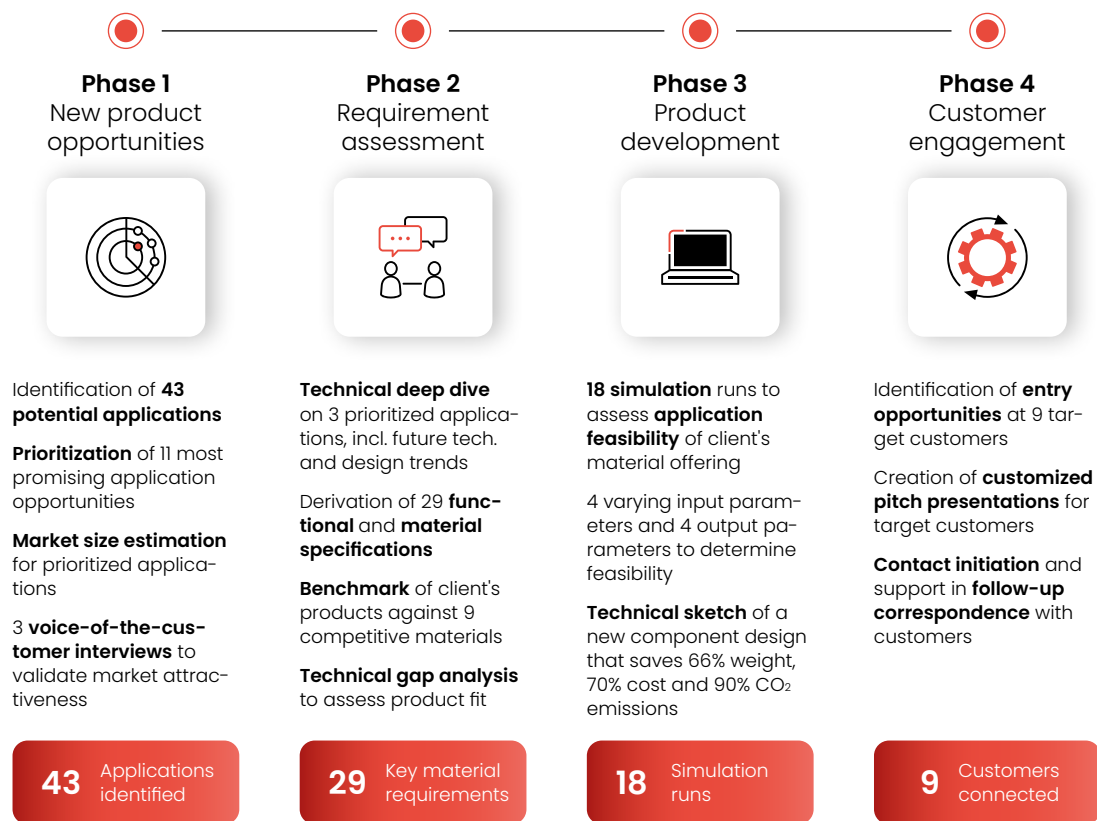
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Projects

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Client: Asian material supplier – From ideation to implementation



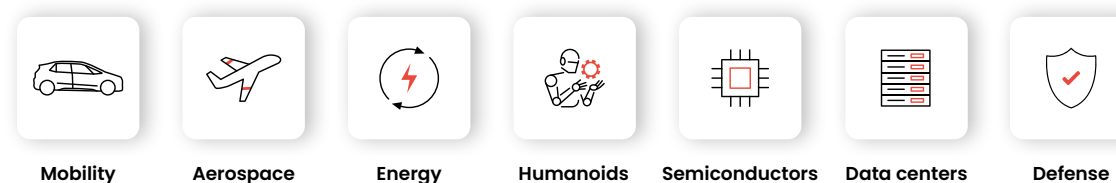
Continuous expansion

BM is well positioned for the future and will support its customers as the industry undergoes significant change. Four major growth areas will be shaping BM's next phase.

First is further diversification into new industries. As the automotive industry is undergoing rapid structural change and has in recent years no longer played the same driving role for global growth in the material industry that it once did,

BM is already gaining traction in other industries such as humanoid robotics, energy systems, aerospace, defense, semiconductors, and data centers. These sectors rely heavily on advanced materials yet partially lack clearly defined requirements or structured development pathways. BM helps its customers to understand how to adapt their product portfolio and corporate strategy.

Beyond Materials: Target industries



Secondly, BM will utilize its product development capabilities to explore advanced demonstrator programs. Many Japanese players must look beyond their traditional value chain position as their future will not be defined by supplying “just” materials but by providing solution-level value. BM will guide this shift by helping clients move strategically and organizationally from pure material development toward joint “solution co-engineering.”

Thirdly, BM will strengthen the organizational excellence of its customers' R&D. Drawing on best practices from automotive and other highly-engineered industries, BM supports the development of efficient, excellence-driven R&D organizations that close the loop between customer needs, application requirements, and material innovation. Especially with established virtual toolchains and the incorporation of AI, BM is accelerating every stage of material development and reshaping how companies operate.

Fourth, strengthening our local presence and the broader industry ecosystem in Japan. BM will expand its role as a catalyst for collaboration by rolling out a structured membership program.

This initiative offers trusted partners a regular platform for meaningful exchange, early insights, and the coordinated exploration of emerging industries. At the same time, a strong local footprint for BM is essential for long-term success in Japan. Dr. Tetsushi Abe and Johannes Houben, whose vision, deep industry understanding and network enabled BM to establish itself strongly in the market have transitioned into advisory roles. The leadership has transferred to Sakuto Goda (President) and Atsushi Tanaka (Vice President). Their industry expertise, market insights, and strong customer connections, supported by a continuously growing local consulting team in Japan, will guide the next stage of strategic expansion.

Looking ahead, BM is well positioned for the future and will continue to evolve with its customers' needs, helping them stay ahead of economic and technological change and secure sustainable growth in the years to come. ○

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#16

Outlook: The future will not be predicted, it will be engineered

When we started our journey fifteen years ago, the world felt complicated, but understandable. Today, complexity and uncertainty have become the default setting. Mobility is no longer just mobility. Energy is no longer just energy. Software is no longer just software. Everything touches everything, and the interfaces are where projects succeed or fail. That is why I want to use these final pages for an outlook that is optimistic, but not comfortable.

Here is my view of the next decade: we are leaving an era where progress was driven by invention, and entering an era where progress will be decided by fast and intelligent integration. The winners will not be those who announce the boldest future. The winners will be those who can industrialize systems under constraints and still move at speed.

Let me make this concrete. First, energy is becoming the dominant design variable, even in places that still pretend it is a utility detail. Artificial intelligence is often described as weightless, digital, and infinitely scalable. It is none of these things. It is chips, racks, heat, water, permits, and megawatts. The broader energy community is already framing this as a two-way relationship: there is no AI without electricity, and AI will reshape how the energy system operates. What this means in practice is blunt: in many projects, time-to-market is turning into time-to-power. If you cannot secure reliable, affordable energy, your roadmap will not survive contact with reality.

Second, the real transformation in AI is not the chatbot. It is the shift from assistance to execution. The most valuable applications will not be

the ones that produce better text. They will be the ones that remove friction from engineering workflows, reduce iteration cycles, and improve decision quality under uncertainty. In this issue, you can see that logic playing out in different forms: agents that take on recurring tasks, tool chains that turn data into decisions, and methods that make engineering knowledge reusable at scale.

Here is the provocative part: many organizations will talk about AI and still get slower. They will add tools, dashboards, and pilots, but keep the same approval chains, the same data fragmentation, and the same fear of changing how work actually gets done. They will automate the surface and leave the bottlenecks untouched. Meanwhile, others will take a less glamorous path: they will standardize interfaces, clean their data foundations, define guardrails, and empower their experts to build small automations close to their work. This is how productivity will compound.

Third, mobility is becoming a multi-energy portfolio business, whether we like it or not. Electrification continues, but not as a single straight highway. We will see a landscape shaped by customer economics, infrastructure realities, regulation, and geopolitics. The implication for technology leaders is clear: the skill is no longer picking one winner. The skill is designing architectures that preserve optionality without letting complexity explode into cost and delay.

This is also where sustainability becomes more serious, and more measurable. Circularity will not be won by slogans. It will be won by data, transparent benchmarks, and engineering choices that hold up in procurement, compliance, and

end-of-life economics. In other words, sustainability is moving from intent to accountability. That is a good thing, and it will be uncomfortable for anyone who confuses ambition with execution.

If you step back, you can see the common pattern behind all of this: technology is accelerating, but the constraints are becoming physical and systemic. Grid capacity. Material availability. Qualification timelines. Cybersecurity risk. Functional safety. Supply chain localization. The future will reward those who treat constraints as the design space, not as an afterthought.

So what does this mean for us, and for you, the reader? For you, especially if you sit in a CTO or similar role, it is more important than ever to ask one key strategic question: "What can we industrialize reliably, safely, and profitably at scale and speed under real constraints?" That question may sound less motivational, but it is the one that protects your credibility, because the cost of getting reliability, safety, and scale wrong will only rise. For us, the commitment is straightforward.

We will keep doing what we are here to do: bridge strategic ambitions and engineering realities. We will keep investing in the solutions and services that reduce uncertainty, from benchmarking and simulation methods to decision frameworks that translate complexity into choices. We will keep pushing for integrated thinking across mobility, energy, and digitalization, because these domains have already merged in the real world. At the same time, we will also keep a healthy skepticism when it comes to hype, including our own.

The next decade will not be awarded to those who predict the future best. It will be awarded to those who can strategize and engineer it end-to-end, and prove it works when the constraints are tight and speed matters.

Thank you for reading, challenging, and building with us. [O](#)

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