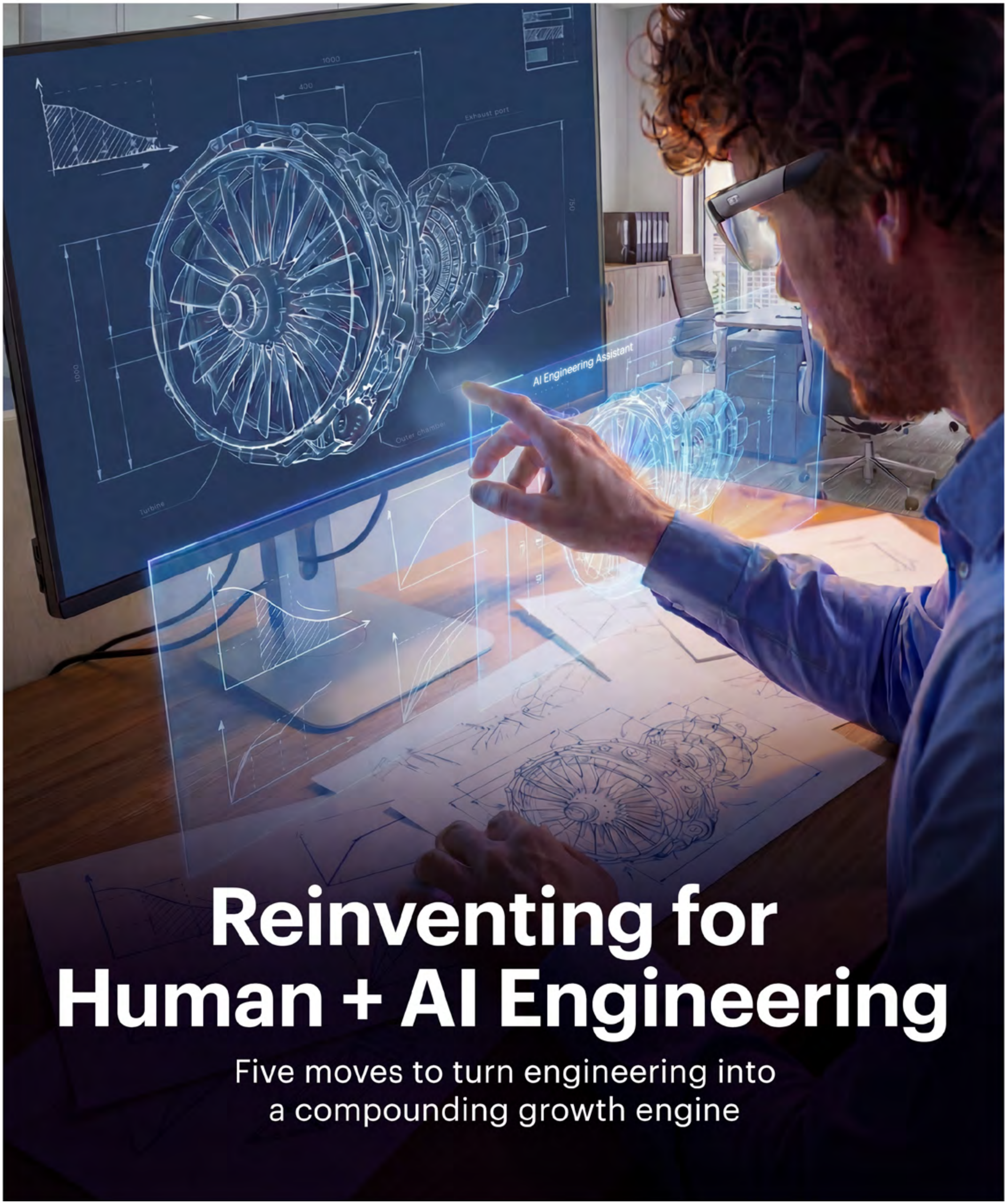

Reinventing for Human + AI Engineering

Five moves to turn engineering into a compounding growth engine

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Engineering at an inflection point

Software-defined products, tighter regulation and relentless cost pressures are changing what engineering departments must deliver. By 2030, adaptability and speed will be the defining measures of performance.

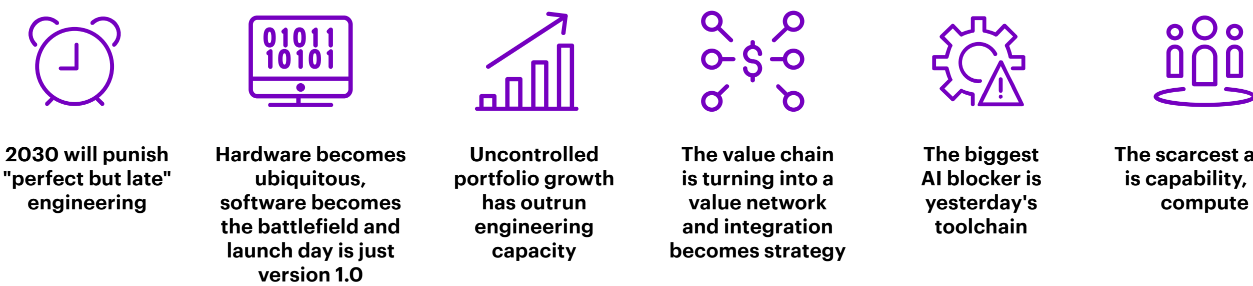
Leading companies recognize that the compounding realities of this decade cannot be resolved with incremental process tweaks or another tool added to existing systems. Instead, they are reinventing processes, data, tools and how work gets done across the value chain to dramatically improve critical outcomes like cycle times, launch reliability and update velocity.

The findings and insights of this study draw on 136 interviews with engineering leaders and practitioners at leading aerospace and defense, automotive and industrial equipment companies across Asia-Pacific, Europe and North America. The sample includes:

- 36 in-depth expert interviews with engineering decision makers conducted in January and February 2026
- 100 AI-moderated interviews with front-line engineers responsible for day-to-day engineering work conducted between January and April 2026

Our new research clearly confirms this. Across our interviews with 100 engineers and 36 engineering leaders, we found legacy systems nearing their limits. Products are becoming more complex as cycles compress, and engineers report spending roughly half their day on documentation, reporting and information search rather than core engineering work. According to our estimation, this represents a US$ 39 billion annual loss in productivity globally.[1] The engineering system is under strain in both its operating model and tool landscape (Figure 1).

Figure 1: Engineering leaders face compounding realities



Source: *Accenture*

By the end of this decade, "perfect but late" engineering will leave behind those who still cling to this paradigm: Late launches repeatedly erode margin, trust and morale. Meanwhile, as hardware performance converges, differentiation shifts to software, customer experience and data-driven improvement. Launch day is no longer the finish line. It's the start of version 1.0. At the same time, uncontrolled portfolio growth and variant proliferation are outrunning engineering capacity, while value chain integration has become the strategy as manufacturing, procurement and suppliers shape design choices earlier and every change impacts multiple decisions, systems and schedules.

Crucially, yesterday's toolchain is blocking AI's potential: broken data flows, disconnected systems and friction-filled handoffs force engineers to hunt for answers, validate consistency manually and chase approvals—exactly the work AI can eliminate. Finally, the scarcest asset is capability, not compute. Organizations need cross-domain judgment, deep expertise and fast trade-offs within safety and compliance guardrails just as they face a shortage of experienced talent.

The implication is unavoidable: These converging pressures leave little room for incremental fixes. Leaders who want software-speed innovation without sacrificing safety, quality, compliance or cost discipline must reinvent engineering as a system spanning processes, tools, roles, decision rights and cross-functional interfaces.

In this context, AI can move from a support tool to a digital assistant that executes work in flow, under clear decision rights and controls. One early market signal came at Hannover Messe 2026, where Siemens introduced the Eigen Engineering Agent, a new class of industrial AI designed for automation engineering. Unlike copilots that offer suggestions, the Eigen Engineering Agent is positioned to plan, code, validate and iterate engineering work end to end, producing ready-to-use outputs rather than drafts.

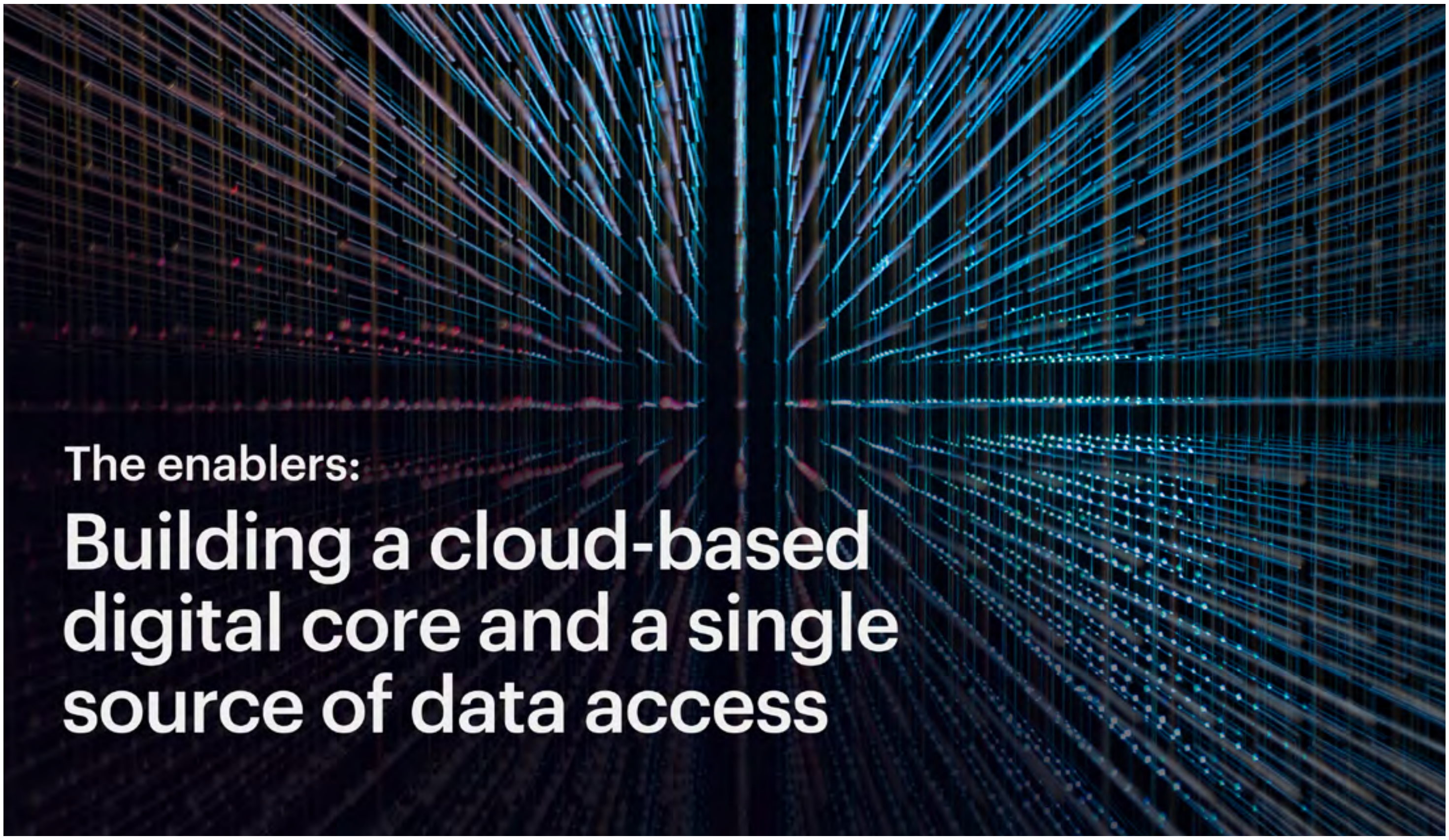
Siemens reports performance gains of up to 5x faster execution and 50% higher efficiency.[2]

So, what does that reinvention require? It starts with an operating backbone that connects the product story end-to-end: a digital thread built on a cloud-based digital core. This provides a single source of access that links requirements, designs, software changes, tests, approvals, quality records, non-conformities and field data across existing systems. That backbone ties information to decisions and workflows and establishes clear rules for what counts as true.

With that foundation in place, leaders can reinvent engineering processes through five system-level shifts that compress cycle time while strengthening control: run the V-model as a continuous evidence system, move to model-based, simulation-first development, automate verification and compliance at scale, redesign the talent model for AI-augmented engineering and make partner collaboration structured, not scrambled.

But even the best internal engineering reinvention will stall if work still waits on cross-functional roadblocks. The same discipline must extend across manufacturing, procurement, aftersales, suppliers and customers, because engineering only moves as fast as the value chain around it.

Done well, this reinvention changes engineering's role from a cost center to a growth engine. Development cycles shorten because teams gain confidence earlier and avoid costly rebuild loops. Engineering cost drops as duplication and rework decline. Launch reliability improves as verification, compliance and manufacturing alignment become integrated and continuous instead of backloaded. Feature velocity increases through reusable and modular product platforms and architectures designed for over-the-air updates and post-launch iteration. And lifecycle performance strengthens as uptime, service revenue and continuous improvement compound over time, turning engineering into a source of competitive strength.



The enablers:

Building a cloud-based digital core and a single source of data access

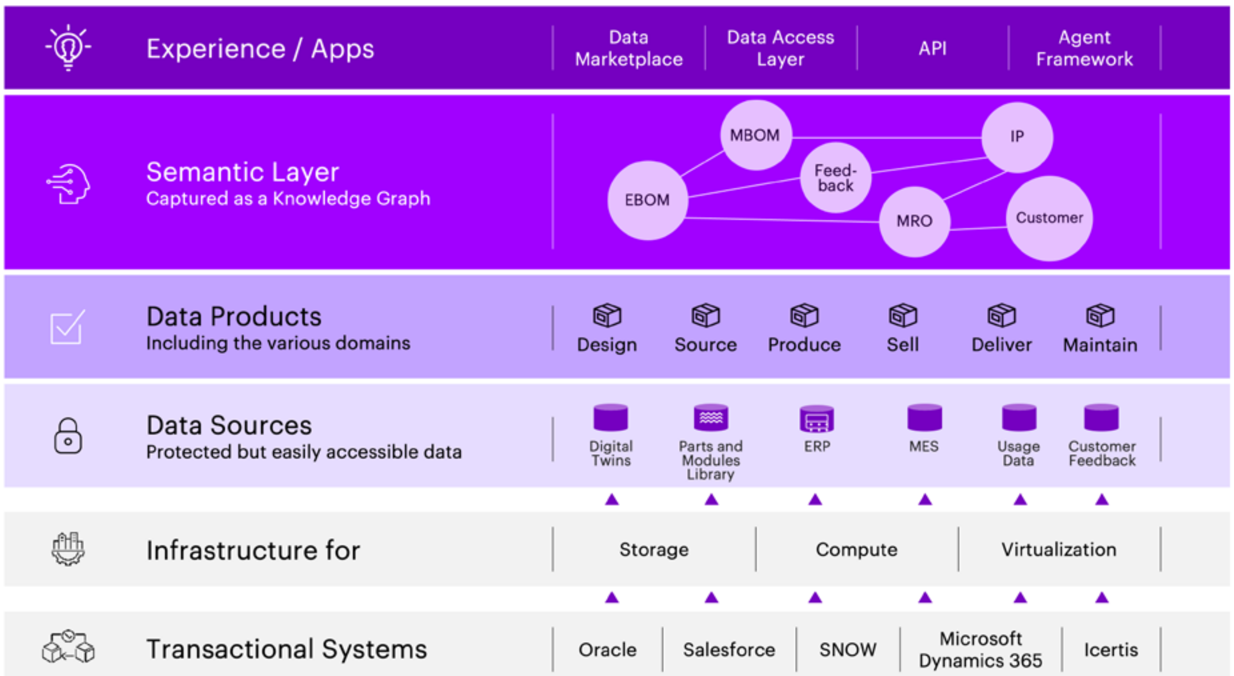
To make the shift from cost center to growth engine, organizations need a cloud-based digital core and a single source of access to data.

The core standardizes data, governance and integration so the continuous, traceable record we call the digital thread can link requirements, designs, changes, tests, approvals, quality records and field signals across the product lifecycle. This is hard to achieve. More than three quarters of C-suite and senior engineering leaders (77%) maintain more than 200 engineering applications, 29% maintain more than 500 and only 4% have implemented a digital end-to-end thread, according to a separate survey we conducted of 234 engineering leaders.[3]

> Aerospace decision maker:
>
> **"Companies are spending 80% of their IT budget on just keeping the lights on with legacy systems and they're living with a dinosaur back office."**

The practical goal is to make existing systems behave like one governed product story. Rather than replacing existing systems, the single source of access connects them, linking data through integration and shared governance so critical records stay consistent, current and traceable (Figure 2).

Figure 2: The layers of the single source of access



ERP=Enterprise Resource Planning; MES=Manufacturing Execution System; EBOM=Engineering Bill of Materials; MBOM=Manufacturing Bill of Materials; MRO=Maintenance, Repair and Overhaul; IP=Intellectual Property; API=Application Programming Interface

Source: *Accenture*

Requirements, approvals and related artifacts should fit together across the product lifecycle. This allows engineers to work with applications and AI tools grounded in one trusted view of the product, making it faster to find the right record, understand its relevance and act with confidence.

CNH Industrial, an agricultural equipment manufacturer, demonstrates how this looks in practice. The company established a shared single source of data access for its engineering, sourcing and manufacturing teams. This helped it embed automated cost intelligence early in the engineering process, before teams locked in designs. The result was faster product development. In some cases, design iterations dropped from as much as 40 hours to minutes, and earlier evaluation surfaced nearly US$9 million in cost-saving opportunities.[4]

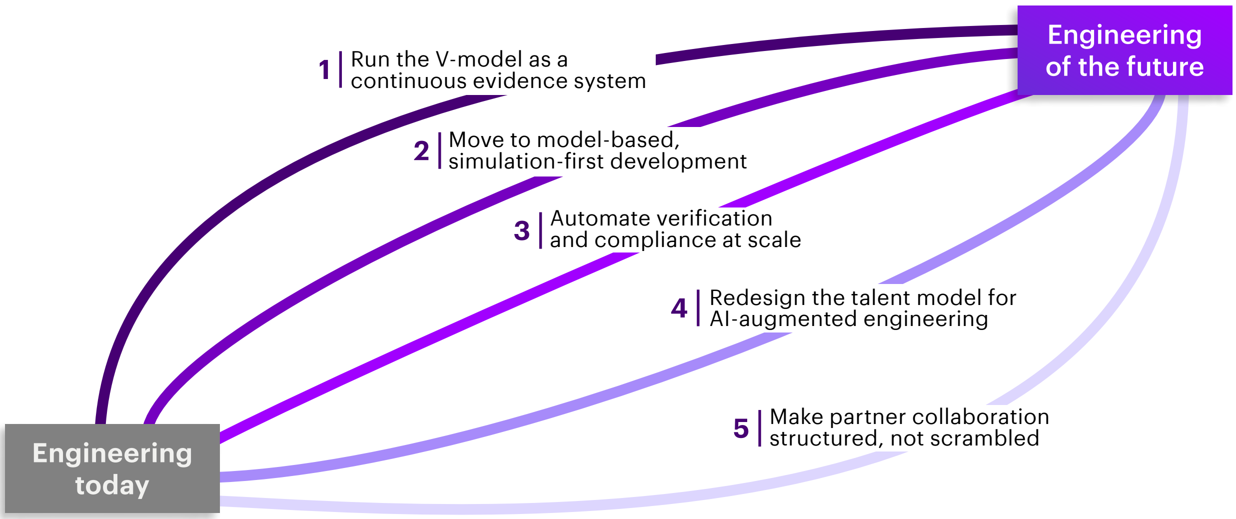
Five moves to reinvent engineering processes for growth

With that foundation in place, the reinvention moves that follow (Figure 3) become practical: evidence can accumulate continuously, models stay linked to requirements, teams generate compliance in flow and partners can work against the same governed baseline.

Just as important, AI stops being a set of isolated tools and becomes a working layer of the engineering system by classifying artifacts, flagging broken trace links, drafting compliance narratives, identifying skill gaps and detecting interface conflicts.

In a reinvented engineering system, AI turns governance and execution into something that happens continuously, at the speed and scale modern engineering demands.

Figure 3: The roadmap to reinvent engineering processes



Source: *Accenture*

1 | Run the V-model as a continuous evidence system

Many teams still run the V-model like a relay race burdened with overly sequential execution, fragmented handovers and weak evidence flow across functions.

Bringing the V-model to the next level starts with making the process explicit. Define what "good" looks like at each stage, including the required inputs and outputs, named owners, decision gates and a small number of deliberate freeze points. When these rules are clear, AI can surface where decisions slip, draft decision gate checklists and help teams arrive at reviews with complete, comparable evidence.

From there, build a minimum viable digital thread across one product line and one critical path through the V-model. The goal is practical coverage, not universal perfection. Connect requirements to architecture, designs, tests and approvals so every claim has a visible chain of evidence. AI speeds this build by classifying artifacts, suggesting trace links and flagging broken chains before they become late surprises. Over time, that traceability turns validation from a late-stage scramble into a continuous activity that keeps pace with shorter cycles.

Finally, extend the V-model beyond launch. Treat field signals as the opening input to the next cycle so updates, upgrades and fixes start with real use, then move through the same disciplined evidence flow as initial development. AI helps teams to make that loop actionable by clustering issues, suggesting likely impact areas and highlighting changes that require fresh verification evidence. When engineering works this way, teams stop relearning lessons late and audits stop becoming fire drills.

BMW shows what happens when traceability becomes an operating capability. The global car manufacturer needed faster access to data from its development vehicles and a better way to track signals across prototyping cycles. It built a Mobile Data Recorder (MDR) solution on Azure that monitors and records more than 10,000 signals twice per second across a fleet of 3,500 development cars. BMW then added an AI copilot that lets engineers query this vehicle data in natural language. Together, the solution delivers data to engineers, and supports analysis, about 10x faster.[5]

Running the V-model as a continuous evidence system

Leads to systemic changes:

- Teams continuously capture evidence
- Decision ownership is explicit
- Traceability supports decision making
- Field signals feed the next cycle

2 | Move to model-based, simulation-first development

As differentiation shifts to software, learning late in hardware builds or software integration costs months, not just money. One engineering leader told us, “When we build a circuit, we may have to rebuild that circuit three to four times, and it takes two to two and a half months each time. If we get it right the first time, we save almost half a year’s worth of work.” That is the real cost of low-trust models: Teams discover architectural or interface issues after build, integration or release, then burn months validating and refactoring across sprints what could have been proven earlier.

At least
20%
increase in productivity improvements with AI-enabled process planning[6]

Our survey respondents expect AI-enabled process planning, simulation and optimization to deliver at least 20% productivity improvement.[6] That upside depends on being explicit about what each model can and cannot predict, and on linking hardware and software architecture and interface models to requirements so issues surface before teams deploy code. AI accelerates the diagnosis by mining program history for recurring failure modes and surfacing where design assumptions most often collapse in test.

Model-based development becomes robust and highly effective when models connect directly to requirements and architecture, and when teams reuse validated work instead of rebuilding it. A reusable model library helps teams carry forward proven assumptions, boundary conditions and verification results across programs. AI supports that reuse by summarizing assumptions and surfacing prior models that match a new design context. As one industrial leader we interviewed put it, “We used to need a CAD operator and a simulation engineer.

Today, an agent can generate design options and run them through simulation automatically. Teams get more designs without the handover delays, so development moves faster." The lesson is simple: Speed comes from removing handoffs and making exploration fast, while maintaining standards for evidence and aligning hardware and software early.

Siemens Energy shows what changes when simulation and virtual development are embedded parts of the core product development system. To build hydrogen-capable gas turbines and reduce CO_2 emissions, it created an engineering digital thread that integrated all product data and engineering tools like Siemens Teamcenter and Simcenter. This helped engineers visualize, simulate and optimize turbine designs globally across engineering teams. As a result, Siemens Energy's engineering team completed 26 design iterations—four times more than with traditional methods—and delivered the world's first 100% hydrogen gas turbine in record time.[7]

Moving to model-based, simulation-first development

Leads to systemic changes:

- Learning moves upstream
- Models stay linked to requirements and architecture
- Product teams rationalize platforms and variants
- Engineers reuse validated models and routinely correlate them
- Development programs reserve physical prototypes for proof that the virtual model cannot provide

3 | Automate verification and compliance at scale

50%

of surveyed C-suite and engineering leaders cited validating software releases in regulated or safety-critical environments as a top challenge[8]

Verification demand is rising faster than testing capacity. Half of surveyed C-suite and engineering leaders cited validating frequent software releases in regulated or safety-critical environments as a top challenge.[8] When compliance becomes a late scramble, speed collapses at the gate and teams burn scarce engineering time rebuilding evidence instead of improving the product. Leaders can reverse that pattern by treating verification and compliance as a continuous system, not an end-phase activity.

Start by standardizing requirement quality and evidence structures so they stay testable and traceable. Clear acceptance criteria, consistent evidence templates and disciplined language reduce ambiguity and make automation possible. AI supports this work by flagging vague phrasing, suggesting acceptance criteria and drafting test ideas that teams can review and refine. When requirements become machine-readable in practice, engineers spend less time interpreting intent and more time validating outcomes.

Automation scales when testing and configuration control sit inside the development pipeline. Teams need to know what changed, what was tested and what deserves regression attention without manual reconciliation. That requires rigorous change control tied to the requirements and architecture each change affects. As verification crosses domains, test results must remain linked to the requirement or architecture they prove, so gaps surface before decision gate reviews.

Finally, generate compliance and cybersecurity evidence continuously. Instead of assembling documentation at the end, teams should maintain an always-current evidence pack aligned to the relevant standards, policies and controls. AI can draft evidence narratives and flags new exposure when changes introduce risk. When evidence accumulates continuously, sign-off becomes a review of what already exists, not a last-minute construction project.

The experience of Daiichi Elektronik, a Tier 1 automotive supplier, shows what it looks like when verification and compliance run inside the development flow rather than at the end. As automotive manufacturer expectations moved toward software-defined vehicles, Daiichi Elektronik had to raise the standard of proof without slowing development. The automotive electronics supplier responded by using software provider PTC's Codebeamer to establish a governed workflow linking requirements, tests, defects and releases end to end. It built a compliant framework in under one year and reduced the core implementation effort from nearly a year to two months. With traceability and defect tracking integrated from the start, teams found issues earlier and reduced the rework that often appears with late-stage evidence assembly.[9]

Automating verification and compliance at scale

Leads to systemic changes:

- Engineers write requirements that are testable from the start
- Testing and configuration control sits inside the development flow
- Multi-domain evidence stays linked to what it proves
- Continuous workflows generate compliance and cybersecurity evidence in real-time

4 | Redesign the talent model for AI-augmented engineering

Skill shortages and siloed roles constrain system-level delivery as much as weak tools. But this moment is also an opportunity to redesign how engineering work gets done so people can achieve more, faster, with less friction. Building and retaining the right capabilities remains difficult, with 59% of executives finding it challenging to acquire or develop AI talent, according to our Accenture Pulse of Change survey.[10]

59%

of executives find it challenging to acquire or develop AI talent[10]

Real value in AI-augmented engineering comes from building a Human + AI workforce with humans in the lead, where routine work shrinks and engineers spend more time on judgment, creativity and problem solving. The opportunity lies in reinventing ways of working so people and AI continuously learn and adapt together in the flow of work. Closing the gap between pilots and production starts with clearer ownership, more fluid teaming and operating models and explicit human accountability for decisions, trade-offs and risk so execution speeds up without eroding trust, quality or morale.

Begin by making skill gaps visible and assigning clear owners for cross-domain decisions. Teams move faster when one person or a small group can resolve trade-offs across mechanical, electrical, software and compliance constraints without waiting for serial signoffs. AI can help identify recurring bottlenecks, show where decisions stall and tailor learning paths to the tools, models and artifacts each role actually uses.

As work evolves, organizations also need more hybrid profiles that carry context across domains. These hybrid engineers, spanning mechanical and electrical, or software and hardware, don’t replace deep specialists; they cut coordination overhead by linking requirements, models, tests and change records so intent and decisions carry across boundaries.

Scale AI automation progressively. Start with understanding work at the task level so teams can identify repetitive steps such as documentation, summarizing change requests, classifying issues and generating first-pass test cases. Then, build an automation roadmap starting with these tasks under clear AI usage rules and human signoffs. As trust in AI agents builds, expand toward architecture and decision support, where AI can surface options, constraints and precedent while engineers retain accountability for trade-offs, approvals and risk acceptance.

The result is more capacity for higher value work without blurred responsibility because teams spend less effort on coordination and more on engineering judgment. ABB provides a concrete example of that shift at scale. In RobotStudio, its simulation tool used by more than 60,000 engineers, ABB integrated NVIDIA Omniverse libraries so teams can design, program, test and validate automation cells before deployment. This approach delivered 99% simulation-to-real correlation, cut deployment costs by up to 40%, sped time to market by as much as 50% and reduced setup and commissioning by up to 80%.[11]

Redesigning the talent model for AI-augmented engineering

Leads to systemic changes:

- Cross-domain ownership is explicit
- Hybrid roles carry context across domains
- AI handles repetitive, low-value tasks
- Human judgment is installed as final decision gate

5 | Make partner collaboration structured, not scrambled

Partners now influence performance, compliance and update speed directly, yet many programs still manage them through email, inconsistent data and late integration tests. That approach fails when suppliers design major subsystems and when evidence must stay intact across organizational boundaries. One senior aerospace engineer manager put it bluntly, "Seventy percent of an airplane is built by the supply chain. So, if I don't have an integrated supply chain in lockstep with what I'm developing and manufacturing, I am doomed for failure."

Start by defining core versus partner boundaries early, then set data-sharing rules that match the risk profile of the program. Clear baselines, explicit access controls and a shared definition of approved artifacts reduce intellectual property anxiety and version churn. AI can support governance by classifying datasets, recommending access controls and flagging oversharing before sensitive material leaves the organization.

This governance only works if partners collaborate in controlled digital environments linked to the single source of access. The goal is one working baseline, not weekly reconciliation of files and interpretations. When teams share the same requirements, interfaces and change records, integration problems surface earlier and engineering time shifts from chasing status to resolving issues.

Standardize supplier onboarding and resilience planning so a partner change does not force a rebuild of the product story. Common checklists, system interface definitions, evidence expectations and escalation paths help partners plug into the operating model quickly.

With these foundations in place, co-development and co-validation can move faster without losing control. Shared environments allow teams to test interfaces, run integration checks and validate evidence against agreed baselines long before mismatches become physical problems. AI adds speed by detecting interface conflicts, spotting anomalous test results and accelerating review cycles by routing the right evidence to the right owners.

Volkswagen's expanded engineering hub in Hefei, China shows what structured collaboration can achieve. It supported faster co-development and co-validation across a local ecosystem including in-depth technology collaboration with XPeng, a leading Chinese electric vehicle manufacturer. By combining software, hardware and full-vehicle validation under one roof and coordinating work with joint-venture R&D teams, the company anticipates reducing vehicle development cycles by 30%. The setup also supports earlier supplier integration in the concept phase, shortening decision loops, adapting features faster to Chinese customers and surfacing integration issues before they become late-stage problems.[12]

Making partner collaboration structured, not scrambled

Leads to systemic changes:

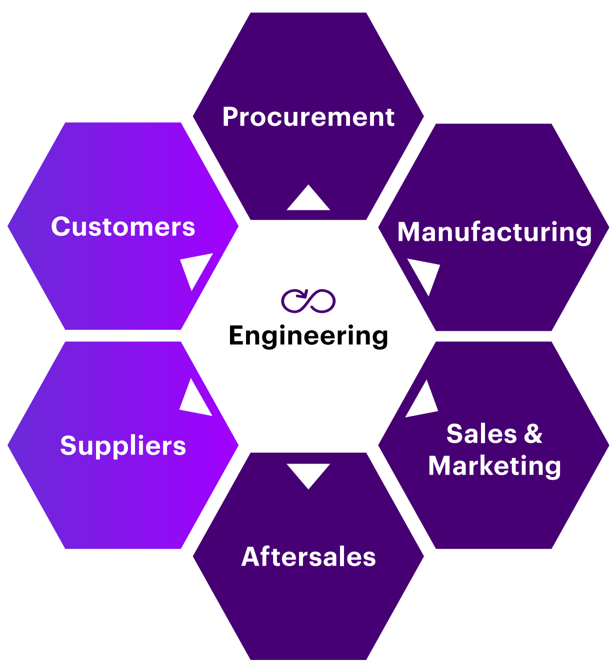
- Leadership defines core and partner boundaries early
- Partners work in controlled digital environments linked to the same product story
- Supplier onboarding becomes structured and standardized
- Co-development and co-validation run against shared baselines

Integrate engineering across the value chain

The five reinvention moves described above speed engineering processes inside the function, as we heard in our interviews. But cycle time still breaks when work crosses the value chain and waits for answers, approvals, parts or fixes.

Engineering has to further orchestrate decisions and evidence across the network, not just optimize its own lane (Figure 4).

Figure 4: Engineering at the center of the value network



Source: *Accenture*

Engineering ∞ Procurement:
If you can't source it, you can't ship it
Supply risk and part substitution can rewrite a program overnight. If sourcing enters too late, engineering redesigns under pressure. Bring procurement into architecture early so designs reflect supplier capacity, alternatives and cost targets.

Engineering ∞ Manufacturing:
Design it for the line, from day one
Manufacturing now influences speed as much as design. If plant constraints appear after design freeze, late fixes hit cost and schedule. Bring manufacturing in early and tie changes to one shared record.

Engineering ∞ Sales and Marketing:
Turn demand into clean choices early
Market demand only creates value when it translates into clean choices early. Last-minute feature requests and variant proliferation create noise, not growth. Translate demand into clear, testable requirements, but also use the process to say no. Great product management is portfolio gatekeeping: disciplined decisions on features and variants allow only those changes to enter engineering that create real customer and economic value.

Engineering ∞ Aftersales and Service:
Make uptime a design input, not a repair bill
Uptime is now a design outcome. If service only sees the product at the end, engineering learns too late and repeats failures. Treat service as a lifetime value co-owner so field issues shape future requirements.

Engineering ∞ Suppliers:
Co-engineer with rules, speed and trust
Design and launch roadmaps depend on partner capability, but ad hoc collaboration creates IP anxiety and version churn. Structured co-development with clear data boundaries, shared evidence and disciplined change control speeds integration and lowers risk.

Engineering ∞ Customers:
Let real use steer what you build next
Customer reality changes faster than annual planning cycles. If feedback arrives late, teams build for yesterday. Create a continuous channel for customer and fleet signals, then feed them into engineering as priorities teams can validate fast.

Engineering as a growth engine

By 2030, the best engineering organizations will win on speed and economics, defined by how quickly and cost-effectively they can launch new products and keep improving them without compromising safety, quality, cost discipline or compliance.

Based on our interviews with engineering leaders and hands-on engineers, along with cross-industry analysis, we see a practical path to this Human + AI engineering advantage. It requires building a modern, cloud-based digital core that enables a single source of access; using AI to convert legacy knowledge into connected, decision-ready evidence; and redesigning how work flows through engineering and across the value chain.

Companies making these moves are building engineering organizations designed for both speed and control, and for continuous product improvement after launch. But that future won't arrive on its own. The work must start now.

Industrial decision maker:

"If you don't have someone at the top who says, 'I'm here, I'm supporting this,' you will not get the organization to do this."

To get started, CEOs and other C-suite executives, along with engineering leaders, should pick one product line where delays hurt most and where they can prove value quickly. Stand up the cloud-based digital core, then use AI to locate the critical data, standardize the minimum set of data basics and surface broken trace links before they become late surprises. Put the reinvention moves into daily practice with clear decision gates, named owners and metrics that track cycle time, launch performance and lifecycle impact. Then extend the same discipline into manufacturing, procurement, service, suppliers and customers so speed holds when work crosses boundaries.

Done well, this approach does more than streamline engineering; it elevates engineering's role in the business. Rework declines, launches become more predictable and update cycles accelerate. The strategic payoff is larger. Engineering shifts from a cost center to a growth driver. Products reach the market sooner and at lower cost, freed from the inefficiencies and delays that erode margins. Over time, the value compounds through higher uptime, new service revenues and the reuse of platforms and components, so each innovation becomes a foundation for the next.

How Accenture can help

Accenture helps Industrials, including aerospace and defense, automotive and industrial equipment companies, turn Human + AI engineering from ambition into operating reality. We combine deep engineering and industry expertise with the ability to design, modernize and run engineering environments end to end.

Our capabilities span engineering process and methods advisory, technology modernization, talent transformation and hands on engineering execution. Because our teams work in real engineering contexts, we help clients build transformations that are practical, scalable and adopted in daily work.

We modernize the engineering stack by connecting PLM, ERP, MES and data platforms into a governed digital backbone. That backbone links legacy environments into a single product story across requirements, design, software, testing and field data, without disruptive rip-and-replace programs. Strong data standards and governance make engineering information traceable and ready for AI.

What distinguishes Accenture is execution depth. Thousands of our practitioners work directly in engineering roles, helping clients embed AI, automation and model-based approaches into workflows with clear human accountability. Our talent and organization expertise ensures roles, skills and collaboration models evolve with technology.

With deep supply chain and engineering expertise and responsible AI built in, Accenture helps shift engineering from a cost center to a resilient, AI-enabled growth engine.

About the research

Accenture Research conducted 36 expert interviews with senior engineering leaders and former board members at leading aerospace and defense, automotive and industrial equipment companies across Asia-Pacific, Europe and North America in January and February 2026. These interviews explored current engineering challenges related to processes and tools, the use of AI and collaboration between engineering and other business functions as well as external stakeholders. We also examined potential challenges and solutions involved in reinventing engineering more broadly.

In addition, we conducted 100 AI-moderated online interviews with hands-on engineers in the aerospace and defense, automotive and industrial equipment sectors across Asia-Pacific, Europe and North America between January and April 2026. The questionnaire sought to understand engineers' day-to-day challenges. This helped us assess how engineers currently allocate their time between core engineering and administrative tasks, identify the day-to-day challenges of using AI tools and examine the gap between the strategic goals of senior engineering leaders and the daily working reality of hands-on engineers. Unless otherwise stated, all insights, findings and quotes in this report are derived from the interviews. These qualitative findings are supplemented by Accenture's proprietary quantitative research.

The main quantitative research survey leveraged is the Buyer Behavior in Product Engineering—Voice of the Customer Survey (2026). This joint Accenture and Everest Group report surveyed 234 senior engineering leaders across eight industry sectors to understand how global disruptions are reshaping enterprise priorities, redefining engineering focus areas and influencing the evolving role of engineering service providers in the market.

We use generative AI in our research production process. Our research experts review and validate generative AI outputs using traditional research methods where possible and they apply Accenture's Responsible AI standards.

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1. This estimate is based on the interviews conducted for this study and official statistical data covering both the number of software and hardware engineers employed by aerospace and defense, automotive, and industrial equipment companies in the United States, the European Union, China and Japan, and their hourly and annual wages by engineering discipline, industry, and location.

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