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Agentic digital engineering: the next frontier in product development.

How agents help engineering teams shorten R&D cycles with Rescale and Amazon Web Services (AWS).



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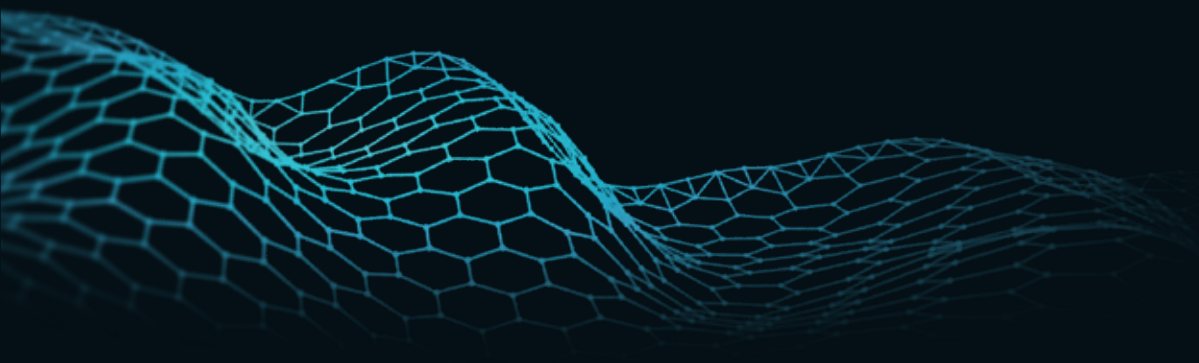
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An agentic future is driving innovation in R&D

R&D leaders are betting on a future in which engineers and AI agents work together to accelerate innovation while managing cost pressures. Those pressures are rising, with engineering organizations reporting higher costs and longer design and development timelines. They face a strategic choice: continue to prioritize cost reduction and more agile processes within existing ways of working to squeeze out efficiencies, or invest in agentic AI to reshape how engineering work gets done and reset product development timelines and productivity metrics.

Industry research from Capgemini's Engineering and R&D Pulse 2026 report suggests the latter. Eighty four percent of engineering and R&D organizations surveyed plan to increase AI spending over the next two to three years, with the expectation that it will lead to faster concepting and design, shorter development cycles and time to market, and higher productivity at lower costs. And half of the executives surveyed also expect engineering and R&D teams to evolve into hybrid human-AI workforces within three to five years.[1]

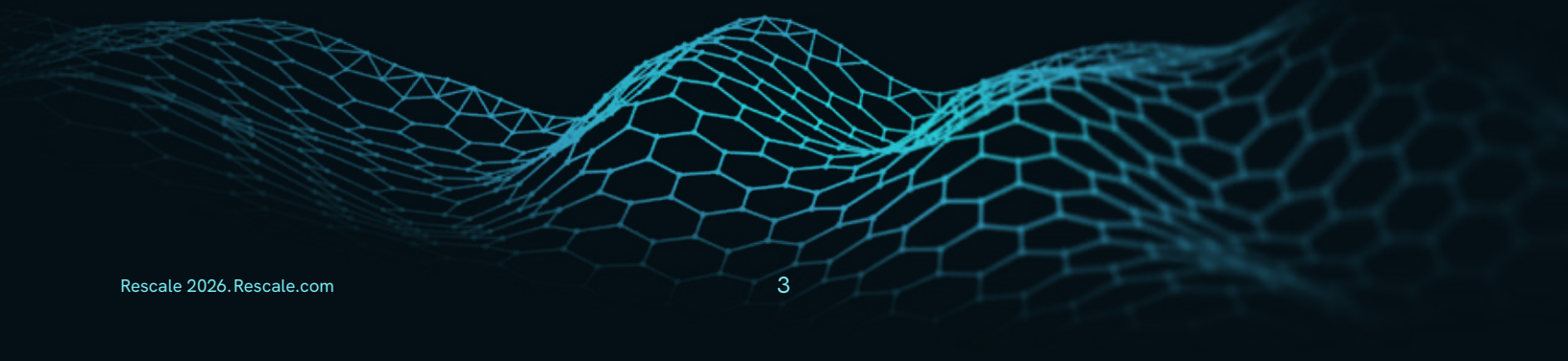
This strategic bet on agentic digital engineering has significant topline implications across the aerospace, automotive, defense, energy, life sciences, manufacturing, and semiconductor industries. Specialized agents can coordinate design, simulation, and analysis workflows, giving engineers more capacity to explore options and move promising designs forward while retaining oversight of critical engineering decisions.

In particular, agents are proving adept at bridging the traditional gaps and handoffs between design, simulation, testing, and production by integrating computer-aided design (CAD), computer-aided engineering (CAE), and computer-aided manufacturing (CAM) workflows and connecting siloed datasets from product lifecycle management (PLM) and requirements systems to manufacturing execution systems (MES). Helping advanced industrial companies accelerate the development and delivery of supersonic aircraft, advanced autonomous and software-defined vehicles, mission-critical defense technologies, and lifesaving medicines.

$450–650B

additional annual revenue by 2030

McKinsey's estimate of agentic AI's potential across advanced industries[2]



What's holding agentic AI back in engineering?

Engineers running compute-intensive workloads and simulations generate vast amounts of data and knowledge. Across disparate teams, disconnected systems and manual workflows make information difficult to use and can lead to limited productivity and delayed decisions.

Fragmented data

Requirements, CAE files, simulation outputs, and test results often sit across separate systems and formats. Essential learnings are not captured for reuse, making relevant engineering context difficult to find and apply. In EY's 2026 aerospace and defense digital thread study, fifty eight percent of respondents reported data silos.[3] Data fragmentation challenges persist in part because engineering toolchains are spread across commercial and proprietary software applications and operating systems.

Manual handoffs

Teams working across aerodynamics, thermal, and structural engineering must coordinate analyses that depend on one another. Moving work between applications and disciplines takes manual effort and slows decisions. EY's study identifies disconnected workflows and unclear ownership as sources of slower execution, rework, and manual coordination across the product lifecycle.[3]

Technical constraints

Limited compute resources and legacy technology make engineering workflows difficult to scale. Security and regulatory requirements also complicate cloud-based AI adoption, particularly in safety-critical engineering. These challenges sit within a broader readiness gap: Capgemini's cross-industry research found eighty-two percent of organizations reported low-to-medium AI infrastructure maturity across computing, integration, orchestration, fine-tuning, and cybersecurity.[4]

Addressing these barriers requires three connected foundations:

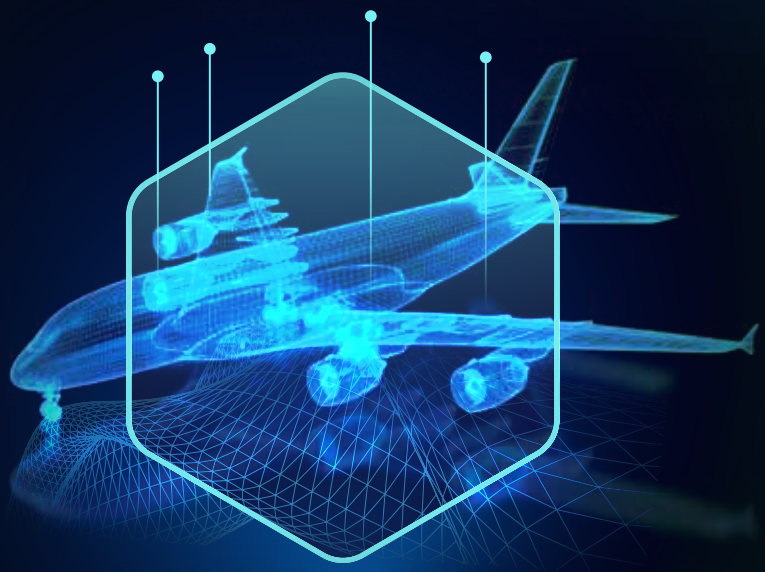
1. Connecting and harmonizing disparate data sources across the product lifecycle
2. Adopting purpose-built agentic harnesses for engineering workflows and guardrails
3. Integrating the engineering applications and high performance computing (HPC) environments at the execution layer

Together, these foundations support agentic digital engineering, helping engineers spend less time piecing work together and more time focusing on product design and development.

The agentic opportunity

Engineers are rarely short of ideas, but their capacity to pursue them is often constrained. One area where exploration is often bottlenecked is the simulation phase between design and testing which involves requirements transfer, study setup and execution, analysis, and test data correlation.

Engineering-specific agents can coordinate these tasks across multi-phase CAD, CAE, and CAM workflows—carrying data and context between tools and disciplines. They help engineers expand exploration, make evidence-based decisions faster, and accelerate product development lifecycles. The digital engineering lifecycle is complex and multifaceted. To demonstrate the potential impact of agentic engineering, we've broken down how agents can be orchestrated across a key phase—simulation and validation—as well as workflows that connect design, simulation, and testing.



Connecting work across the simulation lifecycle

AI agents connect every stage of the simulation lifecycle to streamline workflows and enable faster, more informed engineering decisions.

Requirements to simulation plan

Agents interpret product requirements and engineering objectives to propose a simulation plan, identifying the analyses, inputs, and performance criteria needed. Engineers review the plan before study setup begins, helping teams turn design questions into repeatable simulation workflows.

Study setup and execution

Agents coordinate multi-step studies from preparation and input validation through meshing, solver execution, and post-processing. They follow preferred methods and organize the work around the study's intent and desired outputs, reducing manual handoffs so engineers can focus on design.

Simulation troubleshooting

Specialized agents read extensive solver logs, diagnose failures, and propose corrective actions using solver-specific and platform knowledge. With engineer approval, they can apply fixes, submit a test job, and iterate. Engineers spend less time on manual investigation and troubleshooting.

Analysis and reporting

Agents bring simulation results together into reports with performance measures, visualizations, findings, and recommendations. Engineers can review the evidence and refine conclusions instead of assembling reports manually.

Connecting work across product development

AI agents connect engineering disciplines and enable better collaboration and faster validation for teams.

RFQ response generation

Request for quotation (RFQ) responses draw on both engineering evidence and commercial judgment. Agents can map requirements to design specifications and coordinate simulations to check performance criteria. Feasibility and cost risks can be assessed earlier, helping to increase bid throughput and protect margins.

Multi-discipline coordination

Agents coordinate outputs across disciplines, carrying results from one study into another so teams can evaluate their combined effects. For example, engineers can transfer pressure loads from fluid-flow analysis into structural analysis to assess the resulting stresses and deformation in a component.

Simulation-to-test correlation

An agentic workflow can bring simulation outputs and physical test measurements together, overlay their time histories, and calculate error metrics. Engineers get a more complete picture of their model's fidelity, including where predictions agree with observed behavior and where they diverge.

Agentic manufacturing scale-up

Agents can help engineering teams transfer processes from laboratory or pilot facilities to commercial production, including in life sciences and chemicals. Using simulation insights and AI surrogate models, they can propose changes to batch parameters, update technology-transfer procedures, and flag changes for human validation.

These specialized agents work together to orchestrate end-to-end engineering workflows with human approval points. The result is faster execution, less manual effort, and more time for high-value analysis.

> "Automotive and manufacturing organizations need more than a generic AI assistant; they need agents to interact with their engineering data, and orchestrate workflows within their organizational boundaries. AWS provides the data foundation, while Rescale brings the context and execution layer to deploy Amazon Bedrock and Amazon Bedrock AgentCore that helps engineering teams deliver real outcomes."
>
> **Steve Blackwell**
> Head of Manufacturing & Engineering Center of Excellence, AWS

The engineering impact

Today, engineering progress often stalls between tasks, as teams transfer data, wait for inputs, or resolve access and resource constraints. Agents can keep that work moving by bridging gaps across tools and teams, carrying engineering context forward, and coordinating the next steps within approved policies.

Accelerating whole workflows gives teams more room for design iterations and helps bring promising ideas to validation sooner. The value can be assessed through changes in:



Engineering time

Less preparation, troubleshooting, and reporting work.



Compute efficiency

Reduced time and cost per study.



Result quality

Consistent results validated against established engineering methods.



Faster simulation

AI physics shortens simulation time, with new results helping refine surrogate models.



Real-time performance prediction

Near-instant predictions help engineers assess manufacturing performance for complex components.



Production-ready agentic engineering

Agents automate repetitive tasks, with Rescale reporting threefold gains in expert productivity on infrastructure workflows.



"The conversations we're having with R&D and engineering leaders have changed drastically. A year ago it was about running simulations faster. Now they want to know how agents can help increase design options, reduce validation to testing cycles, scale production efficiency, and reduce time-to-market. Partnering with AWS industry experts helps Rescale meet customers where they're at in their transformation journey, manage change and transform operations with agentic digital engineering faster."

John Moonshower
Chief Revenue Officer, Rescale

Deploying agentic engineers at scale

Human engineers interpret results, challenge assumptions, and weigh up design trade-offs. Agents supporting this work need more than access to engineering tools. They must understand the program's requirements, follow approved methods, and produce results engineers can validate.

Three connected foundations for agentic digital engineering

Rescale and AWS bring together engineering intelligence, an engineering harness, and engineering ecosystem, with governance built into execution. Specialized agents draw on project context and organizational knowledge to coordinate engineering workflows, while an engineering harness provides the tools and controls needed for dependable execution.



1

Engineering intelligence

Engineers configure agents for each study using product requirements, organizational knowledge, and approved methods. This context guides agents' choices and defines acceptable results. Agents can also retrieve cited passages from solver manuals, input-file specifications, and internal references when specialist knowledge is needed. Data connectors bring requirements from existing product lifecycle management and requirements-management systems into the workflow.

Study context includes:

- Requirements, standards, and specifications
- Solver preferences and approved HPC configurations
- Success criteria and output formats

2

Engineering harness

The harness provides the software structure that turns engineering intent into controlled execution. It carries context through dependent tasks, coordinates tools, and enforces prescribed workflow steps where required. Engineers can save approved project workflows for reuse across studies.

Agents can:

- Retain context, access tools, and coordinate workflow steps
- Follow reusable workflows with defined rules, policies, and guardrails

3

Engineering ecosystem

Cloud HPC provides scalable compute capacity for engineering workloads and tools. Agents work across CAD, CAE, and CAM tools and connected engineering systems, with access governed by licenses and policies.

Agents can use:

- 1,350+ pre-integrated engineering applications
- 150+ compute architectures

Governance is built into all workflows

- Engineers set autonomy levels and approve consequential actions.
- Agent actions are logged. Simulation results remain traceable to requirements and standards.
- Teams evaluate performance against engineering scenarios before increasing delegation.
- Policy controls remain in place throughout.

Together, these controls allow engineering work to be inspectable, repeatable, and reusable. Engineers can review the evidence, validate results, and increase delegation as confidence grows, while retaining control for consequential decisions.

50%
less time and effort

Daikin, a global air conditioning manufacturer, achieved a 50 percent reduction in time and effort spent on manual data analysis and organization tasks after deploying Rescale engineering intelligence. This unified data and context layer provides the knowledge graph that agents need to execute to Daikin's specific engineering standards.



"Connecting an agent to a model is the easy part. Engineering work is messy: incomplete inputs, dozens of solvers, failed runs. Our harness is built for that reality. It sets up the study, picks the hardware, and stops to ask the engineer when a decision matters. Amazon Bedrock and Amazon Bedrock AgentCore give us the security and scale to run it in production."

Jacob Surber
Vice President of Product, Rescale

Building on Rescale and AWS

Rescale and AWS bring together agentic digital engineering into a unified environment built to accelerate product development. AWS provides the foundation for Rescale's agentic digital engineering platform with scalable cloud infrastructure, accelerated computing, and AI services. This foundation supports Rescale's engineering-specific context, governed workflows, and orchestration across simulation, data, and compute.

Within this environment, Rescale coordinates interactions between engineering applications, simulation data, and AWS infrastructure, helping agents carry work from study setup through analysis and reporting.

1

Engineering intelligence

The Rescale data fabric automatically tags and organizes simulation data in the AWS-hosted environment, preserving context and traceability. Teams can find and reuse engineering information, grounding agents in proprietary data, product requirements, standards, and approved methods.

2

Engineering harness

The harness coordinates tools and dependent tasks across engineering applications and AWS infrastructure. Reusable workflows capture approved methods and organizational expertise, helping teams turn individual studies into repeatable agentic workflows with defined rules, policies, and approval points.

3

Engineering ecosystem

Pre-configured engineering applications run on scalable AWS infrastructure across regions. Rescale matches HPC and AI workloads to AWS compute configurations using cost and performance data, reducing setup complexity, and adapting resources to study requirements.

Services for building and operating agentic AI

AWS services support the Rescale platform, from model reasoning and agent execution to simulation compute. The platform connects these capabilities to engineering data, tools, and workflows.



1. **Model reasoning and engineering context**
   Engineering agents use Amazon Bedrock-hosted foundation models for reasoning and are grounded in secure, governed context through Rescale's data intelligence. Engineers gain more time for analysis and design decisions while agents handle tasks such as input validation, failure analysis, and reporting guided by requirements, organizational knowledge, and approved methods.

2. **Agent execution and controls**
   The engineering harness governs tool access and records agent actions for review, with Amazon Bedrock AgentCore providing the execution layer. Platform access and security controls help protect proprietary information, while Amazon Bedrock Guardrails helps detect and block or mask sensitive information in prompts and responses. Engineers retain visibility and control as they delegate work.

3. **Simulation and AI compute**
   Rescale orchestrates simulation and AI physics workloads to suitable Amazon Elastic Compute Cloud (Amazon EC2) instances and HPC compute. Teams can improve cost efficiency by spending less time on configuring and managing infrastructure and more time on valuable studies.

> "Agentic engineering depends on a production-grade infrastructure foundation. Rescale has helped enterprises orchestrate complex HPC environments on AWS—from EC2 compute and accelerated infrastructure through storage, networking, and operations—so simulation workloads can run globally at enterprise scale. That foundation is what allows engineering agents to move from experimentation into reliable execution."
>
> **Kirti Devi**
> Head of HPC GTM & Advanced Compute, AWS

Real world agentic digital engineering

Specialized agents and connected engineering data are reducing manual work and supporting faster product development for Rescale customers.

Kairos Power

Accelerating engineering breakthroughs

Kairos Power, a nuclear technology, engineering, and manufacturing company developing advanced reactors, uses Rescale agentic digital engineering to unify engineering data, provide customized context, and deploy multi-step agentic workflows. Outcomes include:

- **Terabytes of valuable data captured and stored** with traceability, governance, and enriched metadata.
- **Less time spent managing data,** reducing the manual effort required to organize engineering information.
- **Engineers focused on innovation** with agents managing setup, execution, and reporting. Engineers spend their time on the judgment and rigor required.

McLaren

Freeing engineers to focus on design

McLaren Automotive, a maker of high-performance supercars, uses Rescale agentic digital engineering and AI physics solutions across CAE, systems, and design. Engineering agents are helping to:

- **Free engineers for design work** by offloading manual job validation, results processing, and report preparation.
- **Improve cost efficiency** by exploring hardware-software optimizations and performing studies within defined budgets.
- **Accelerate product development** by automating complex, repetitive engineering tasks.



> “This is a genuine strategic transformation for the business. By composing and continuously optimizing our data, our intelligence, and our engineering philosophies at unimaginable speed, we can deliver product developments with agility while protecting the DNA of our company.”

Nick Collins
CEO, McLaren Automotive

Advance product development with Rescale and AWS

Agentic digital engineering with Rescale and AWS offers a new frontier in product development. By connecting work across the product lifecycle, engineers gain more time for high-value analysis and important design decisions.

Learn more at Rescale's AWS Partner Page

Sources

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