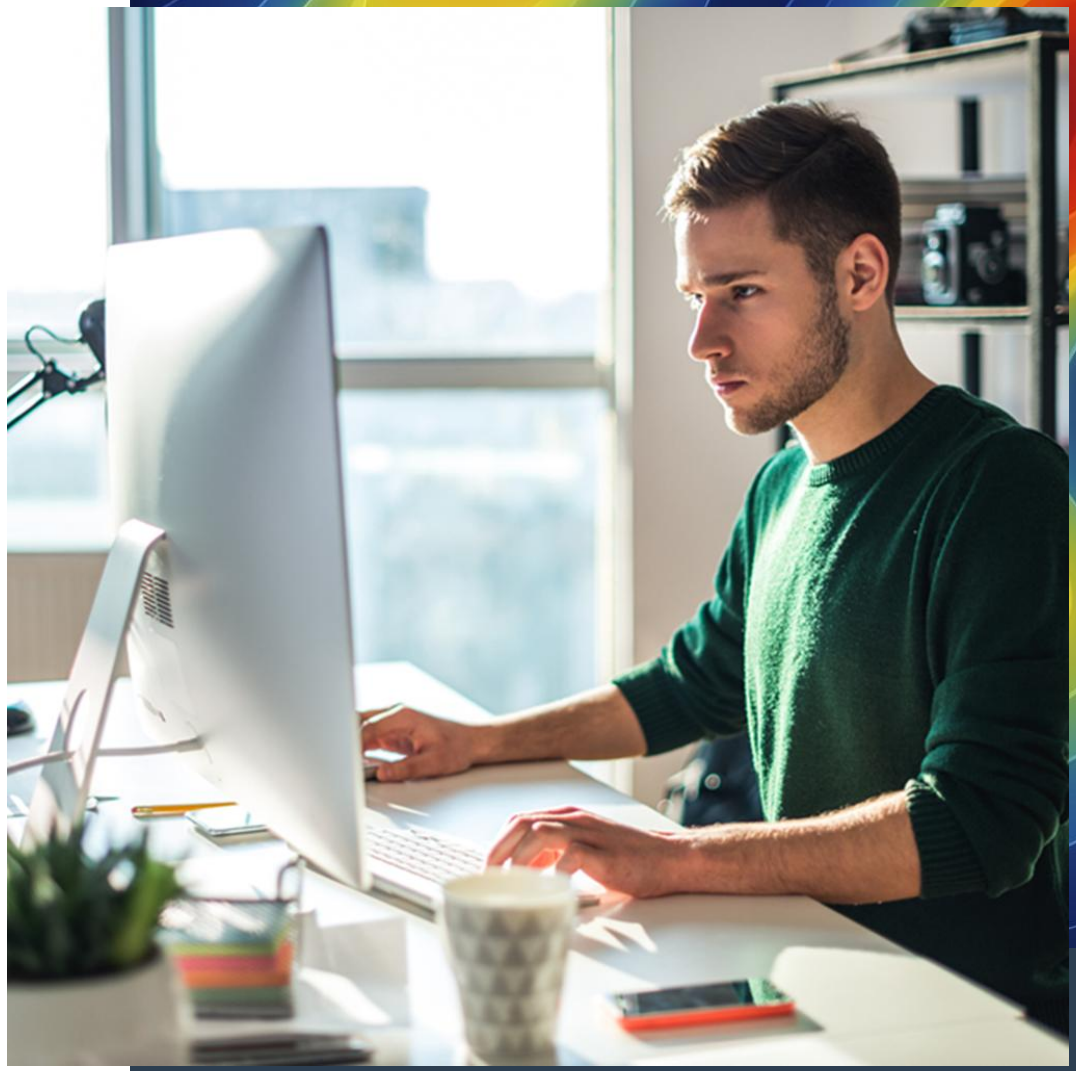
HAH Software

openSPDM

Unlock siloed data in digital engineering programs with openDEMS and openSPDM

- Digital Engineering for Modelling & Simulation
- Simulation Process and Data Management



QARNOT

Why digital engineering matters

Digital Engineering (DE) transforms engineering into a data-driven, model-centric discipline.

It replaces document-based workflows with complete digital definition models, including system models, multi-fidelity simulations, and AI-assisted analysis.

Across transportation, energy, aerospace, defence and construction, DE has delivered many billions of savings over the past 25 years.

The goal is to create an Authoritative Source of Truth (ASoT) platform that ensures:

- FAIR data (Findable, Accessible, Interoperable, Re-usable & Reproducible)
- Digital thread traceability across disciplines and lifecycle states
- Real-time access to validated engineering data
- Consistent, auditable decision-making

This is enabled by a move from sequential, document-driven processes to continuous development through:

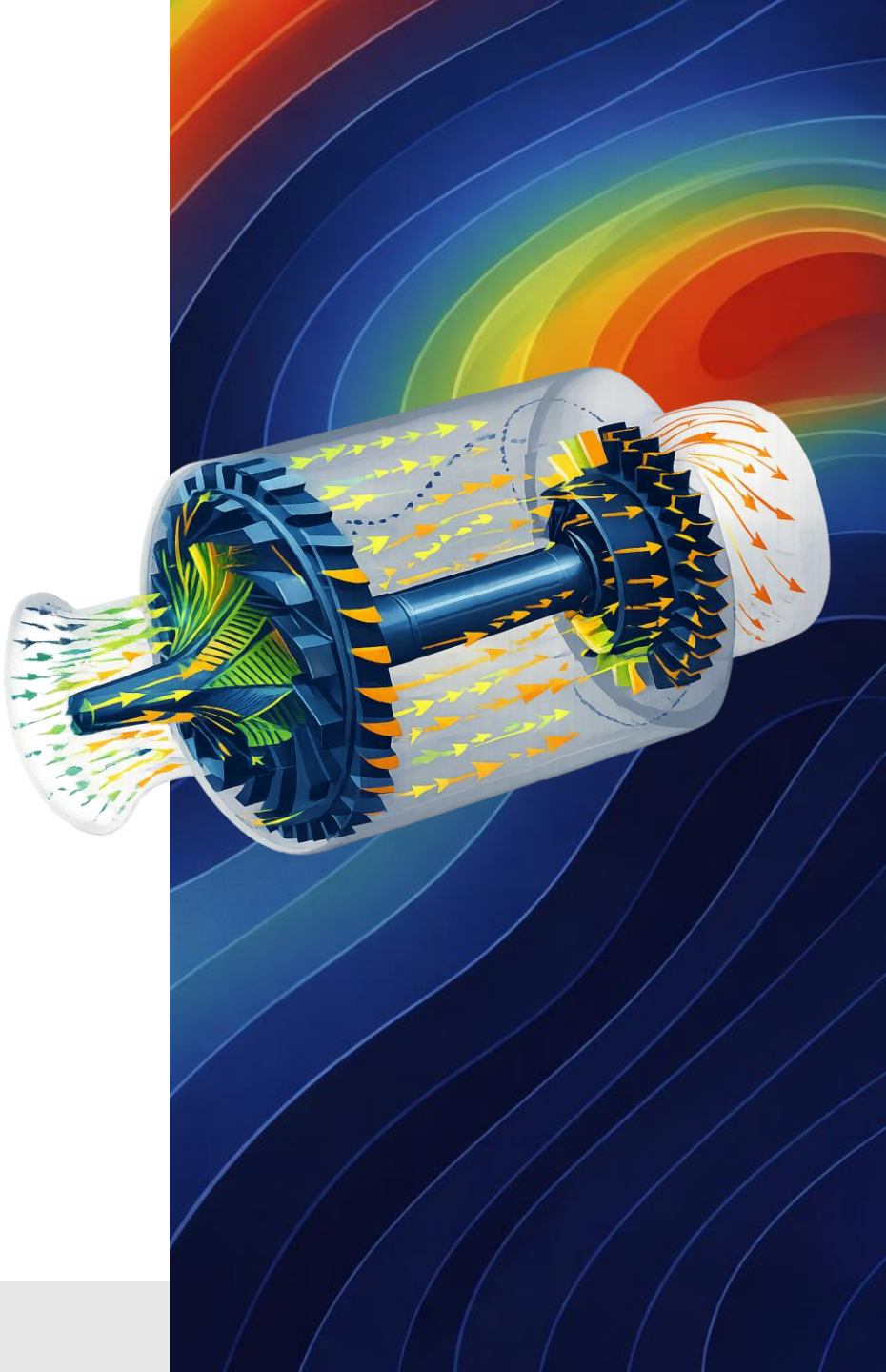
- Advanced modelling, simulation and AI to predict performance and support trade-offs
- Seamless data exchange in native, neutral or standard formats
- Major reductions in lifecycle cost and program risk
- Increases in engineering throughput
- Trusted simulation replacing physical tests, enabling Certification by Analysis
- High-quality datasets for training AI agents with known provenance

DE helps firms enhance their competitiveness, speed to market, and engineering assurance.

- **Renault**: A €100M annual investment in DE, simulation and AI enabled a new passenger car to be developed in two years, half the 2020 timeline.
- **Boeing 777**: 95% reduction in design rework, saving $61M on doors alone.
- **Toyota**: 29% shorter projects and 40% less engineering effort.
- **BMW**: 12× increase in simulation throughput.
- **US Department of Defense**: DEMS is now mandatory for all programs, with strict ASoT requirements.

What are the benefits can you expect?

	Traditional Engineering	Digital Engineering for Modelling & Simulation (DEMS)
Data sharing	Fragmented across paper documents and siloed files	Centralized data unified via a connected digital thread
Prototyping	Heavy reliance on slow, expensive physical prototypes	Rapid, virtual prototyping and high-fidelity simulations.
Risk management	Flaws often discovered late during testing or deployment	Enables flaw detection early in design and rapid iteration
Lifecycle support	Static maintenance and upgrade manuals	"Digital twins" simulate wear and predict failure in near real-time



Digital engineering: From static to smart

Unify data, accelerate design, and predict outcomes — turning traditional engineering into a connected, intelligent ecosystem.

What are DEMS and SPDM?

If DEMS is the strategy for using simulations and models, SPDM is the “engine room” that makes it technically possible.

It manages the huge volumes of data and workflows from thousands of simulations across complex engineering programs, including dataset provenance tracking.

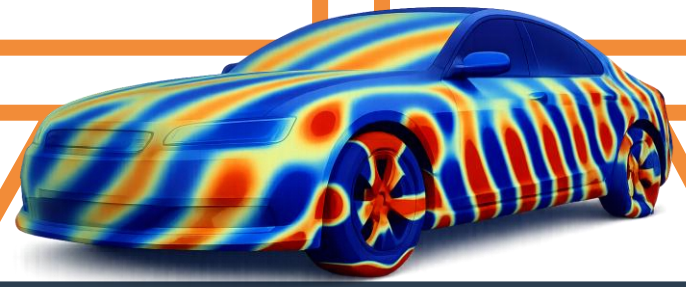
openDEMS provides the platform, and openSPDM delivers the simulation-specific process and data management within it — both built on open standards to ensure interoperability, transparency, and long-term accessibility.

Digital Engineering (DE)

Moving from scattered, document-based engineering to a highly connected, digital environment where a single, authoritative source of data handles a system's lifecycle.

Modelling & Simulation (M&S)

Creating highly precise virtual models of physics, mathematics, or logical expressions and putting them through simulated real-world scenarios over time.



SPDM (Simulation Process and Data Management)

A system that manages and automates simulation workflows, data, and results — linking them to design and product information to ensure traceability, repeatability, and collaboration across engineering teams.

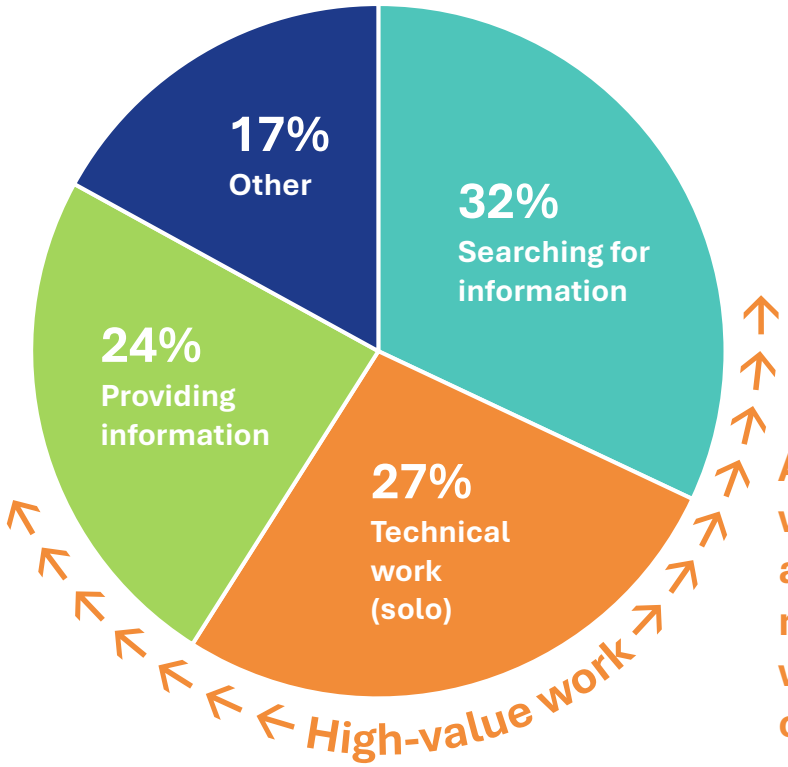
Analysts need an information system that works like a search engine for simulation engineers

Simulation engineers waste huge amounts of time:

- Searching for past models
- Hunting for input decks
- Asking colleagues for files
- Trying to understand what was done before

openDEMS creates value by making simulation knowledge findable, reusable, and shareable — like a “Google for simulation engineers.”

Reduce non-technical work by centralising and organising simulation data with openDEMS



Accelerate technical work through automated, repeatable workflows on an openSPDM platform

Figure 1: Traditional workflows limit the time available to teams are able to deliver high value work

Source: Robinson M., Journal of the American Society for Information Science and Technology, *An empirical analysis of engineers’ information behaviours at Rolls Royce*

The integration bottleneck and need for simulation connectors

DE is constrained by one persistent challenge: the lack of standard connectors between simulation applications and platforms.

The scale of the problem:

- NASA catalogues 2,400 simulation tools
- Airbus Helicopters uses 220
- A single fusion project used 19 plasma codes
- Typical DEMS deployments integrate ~30 tools

Connector development is slow, expensive and non-reusable:

- Vendors protect APIs (Application Programming Interfaces) and licensing
- PLM systems often restrict competitor integrations
- Each connector is bespoke and fragile

This bottleneck delays DE adoption by years and increases the cost for all stakeholders.

How can openDEMS and openSPDM help?

A lightweight, open, rapidly deployable Simulation Process & Data Management (SPDM) layer designed specifically for DEMS environments.

> "Toulouse, Renault, Toyota and Safran have implemented modelling and simulation on digital platforms which enable the performance of complex systems to be assured without physical prototypes and before manufacturing is launched.
>
> The UK lags the leading industrial economies in the adoption of DEMS or SPDM.
>
> **Mark Norris**
> **Founder and CEO of openSPDM Ltd**"

What is openDEMS and openSPDM?

1. A neutral parameter-exchange layer
This allows simulation tools to be integrated without needing access to proprietary APIs. It dramatically reduces connector development time from months or years to weeks.

2. A connector development framework
A structured method for building reusable connectors for:

- Computational Fluid Dynamics (CFD) solvers
- Finite Element Analysis (FEA) tools
- Multibody dynamics
- In-house code
- Scripting environments (Python, MATLAB, etc.)

3. A lightweight openDEMS and openSPDM platform

- Simulation data capture
- Workflow automation through integration of PIDO (Process Integration and Design Optimisation) tools
- Versioning and traceability
- Integration with Digital Engineering modules (MBSE, CAD data management,...) on the Aras Innovator DE platform

4. Flexible deployment models

- On-premise, private and public cloud
- Sustainable cloud-based HPC platforms, such as Qarnot

This makes openSPDM ideal for SMEs and mid-sized engineering organisations that need SPDM capability without the cost or complexity of traditional PLM-based SPDM systems.

"Bringing openDEMS and openSPDM together with Qarnot's sustainable HPC gives customers something genuinely new: traceable, high-fidelity simulation at scale, powered by infrastructure that recovers and reuses its own heat.

It's a smarter, cleaner way to run engineering workloads and it turns digital engineering into a direct contributor to sustainability."

Gavin Helinksi
CEO & Founder, HAH Software

What does Qarnot deliver?

Qarnot: Sustainable cloud-based HPC, designed for simulation workloads

Qarnot provides a sustainable, low-carbon cloud computing platform designed for high-performance workloads, including:

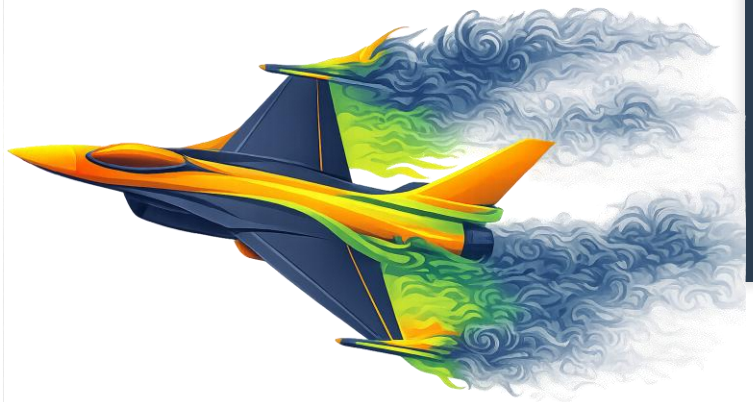
- CFD and FEA
- Multiphysics
- AI/ML training
- Parametric sweeps and optimisation

Qarnot's compute nodes are deployed as heat-recovery units, where the waste heat from HPC workloads is reused to warm buildings, reducing energy waste and your carbon footprint.

A dashboard provides real-time job monitoring through a convergence plot, file tailing, and simulation snapshots. This enables engineers to track simulation progress and debug issues without specialist IT knowledge.

Why Qarnot matters for openDEMS and openSPDM?

- Ideal for burst simulation workloads
- Predictable pricing
- Low-carbon compute for sustainability-focused engineering teams
- Proven support for demanding simulation toolchains
- Compatible with openSPDM's connector framework and workflow automation



> "Running openDEMS and openSPDM workloads on Qarnot means high-performance simulation without the environmental cost.
>
> Our infrastructure captures the heat generated by HPC compute and redistributes it to warm homes and offices, turning engineering workloads into a direct source of local, low-carbon energy."
>
> Qarnot

Accelerate digital engineering

HAH Software can help you deploy and implement the capabilities of openSPDM Ltd and Qarnot to advance business growth and your sustainability progress.

Our solution is designed to be affordable, open, and accessible to SMEs, as well as scalable for larger enterprises

- Rapidly deploy openDEMS (Digital Engineering for Modelling & Simulation) and openSPDM (Simulation Process and Data Management)
- Integrate your simulation tools without vendor lock-in
- Run and monitor workloads on a sustainable HPC platform
- Build traceable, reusable simulation workflows
- Prepare for AI-enabled engineering

HAH Software

Simulation consulting, engineering and integration services

openDEMS and openSPDM

Data management layer + connectors

Engineering productivity

More automated processes

Traceable workflows

Integrated toolchain

Open integration framework

Authoritative AI-ready engineering data

Qarnot

Low-carbon, cloud-based HPC for simulation workloads

Heat-recovery compute

Convergence plots

Real-time monitoring

Live file tailing

Simulation snapshots

User-friendly debugging

What does this solution deliver?

Data management
The vault

Simulations produce vast datasets — often petabytes. Our solution enables you to not just store results, but capture input parameters, mesh settings, software versions, and sensor data.

This creates full traceability. If a wing fails a stress test engineers can trace exactly which model version, physics assumptions, and conditions produced that outcome, ensuring accountability and reproducibility across complex programs.

Process management
The workflow

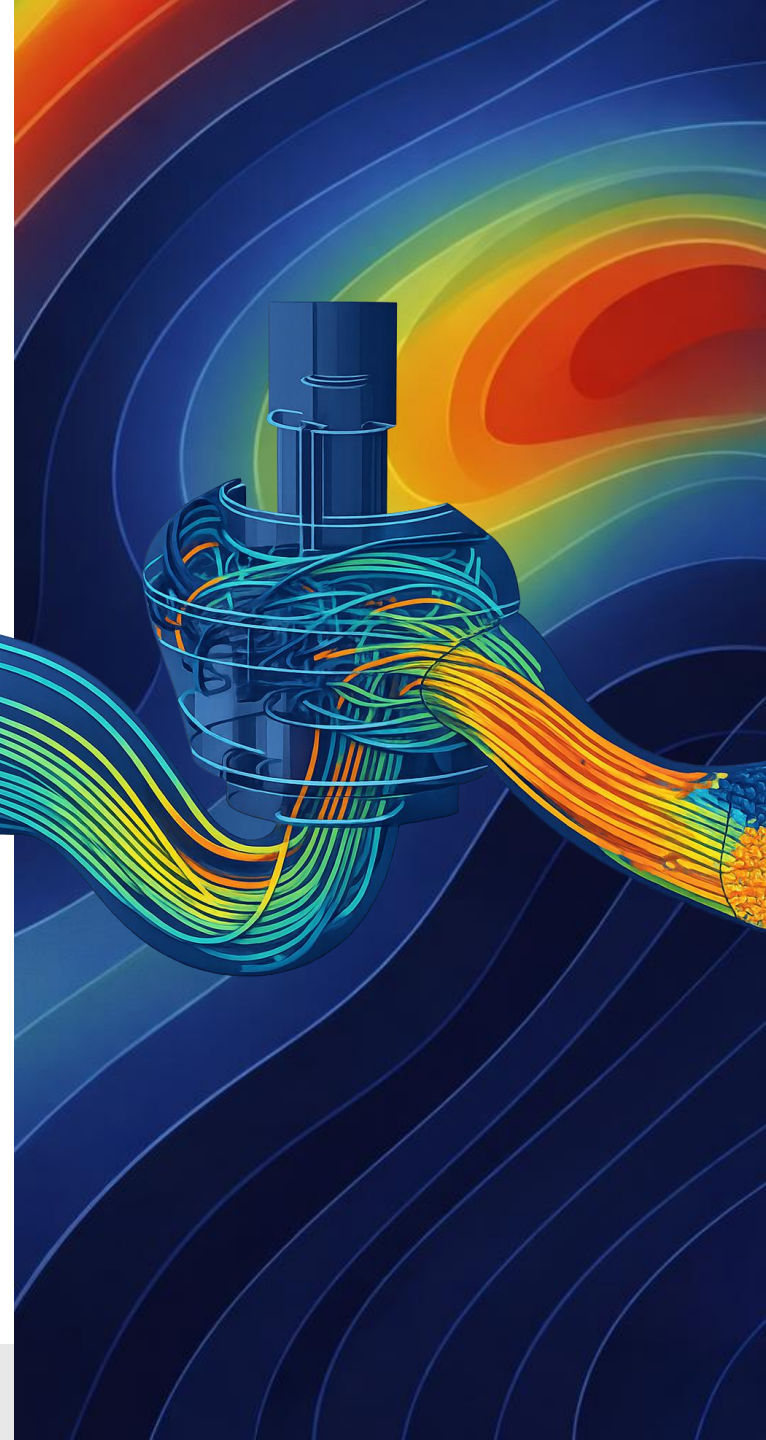
We help you to standarise simulation execution and automate repetitive tasks (report generation and data extraction), freeing engineers to focus on analysis.

Teams can follow certified procedures for every crash test, thermal analysis, or aerodynamic study, improving efficiency, compliance, and confidence in simulation-driven engineering decisions.

Decision-making support
The big picture

Connect simulation results to design requirements. If a modification improves aerodynamics but reduces crash safety, identify the conflict immediately.

An integrated view helps stakeholders balance performance, cost, and safety trade-offs, turning simulation data into actionable insight for design reviews, risk assessments, and strategic engineering decisions across the product lifecycle.



High Performance Computing
Cloud computing with a conscience at a lower operational cost

How does this help your teams?

Cost & time savings

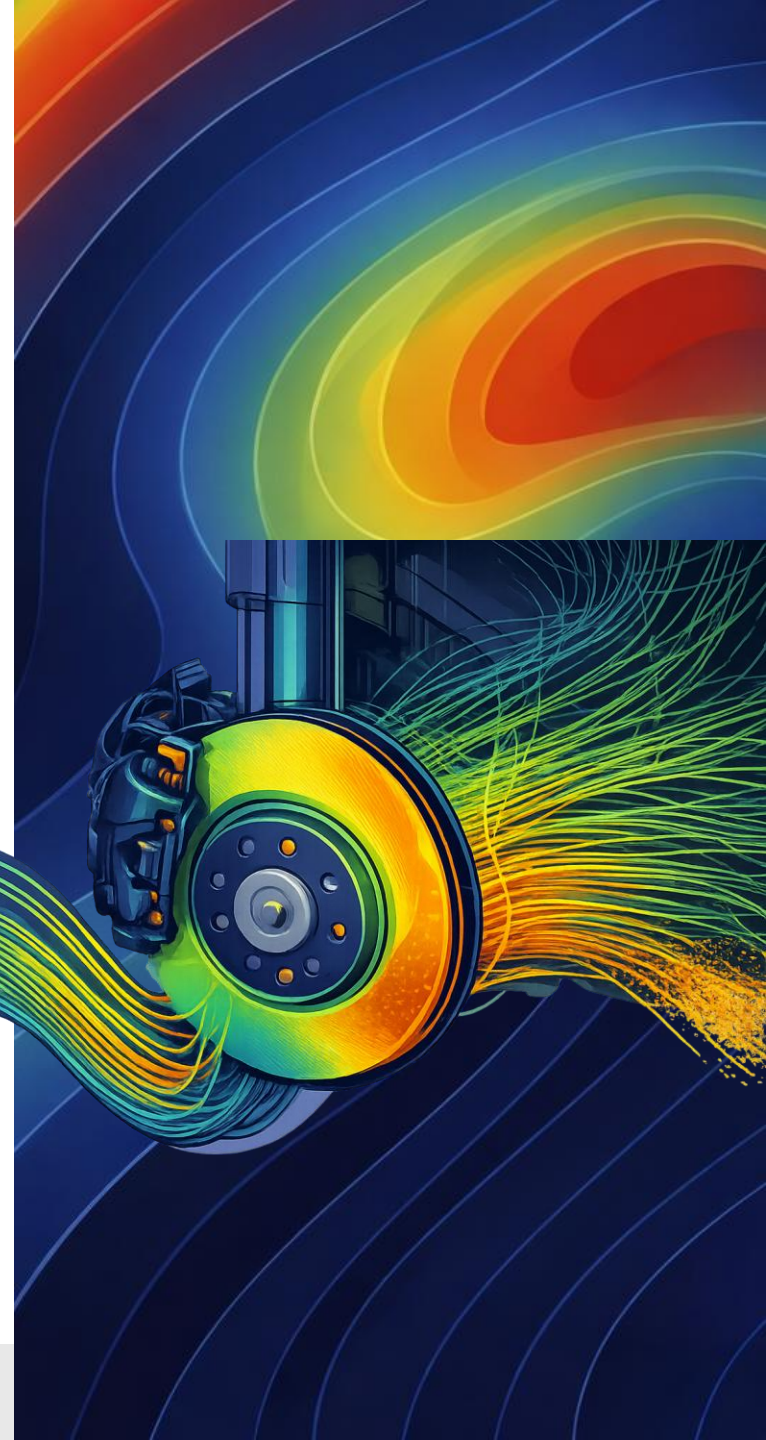
- Reduce reliance on physical prototypes
- Run virtual tests in seconds
- Lower development and operational costs

Shift left

- Identify issues earlier in the lifecycle
- Reduce late-stage rework
- Improve program predictability and quality

Better collaboration

- Shared data standards across disciplines
- Mechanical, electrical, software teams aligned
- Fewer handover delays and misunderstandings



Better Business performance

Enhance WAG (Environmental Social Governance) performance and reduce OpEx (Operational Expenditure) through sustainable HPC and digital workflows

Take the next step

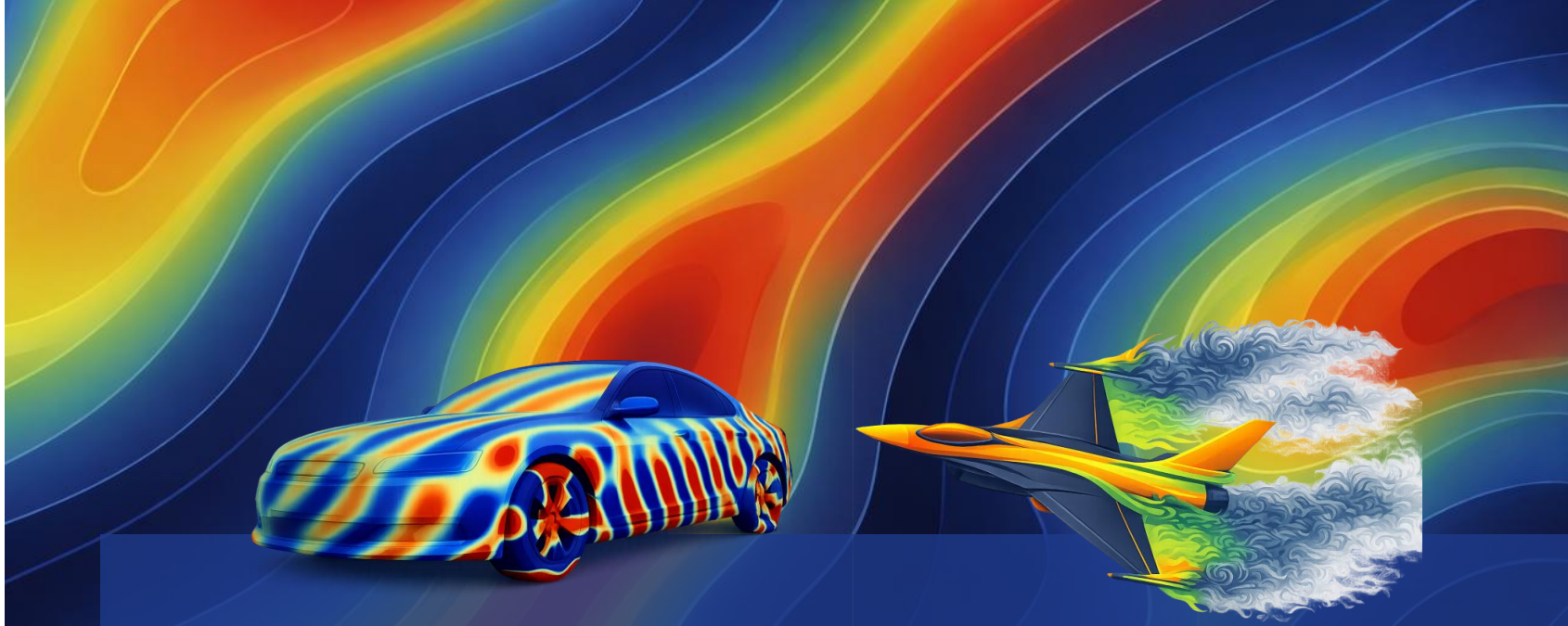
Discover more with:

- Mark Norris, founder and CEO of openSPDM Ltd
- Gavin Helinski, founder and CEO of HAH Software Ltd

What? NAFEMS UK
Where? Coventry
When?: Tuesday 19 May 2026 at 14:15hrs BST
Speaker session: Digital Engineering Matters (Track D)

Register now: Email us at info@hahsoftware.com

You can also email us to register for a free webinar or 1:1 meeting.



Contact us today to learn how we can help you deploy openDEMS, openSPDM and Qarnot to give your organization the digital engineering foundation you need.

https://hahsoftware.com/contact