
FORTISSIMO
PLUS
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SUCCESS STORIES
BUSINESS EXPERIMENTS
1st Digital Edition

Fortissimo Plus Success Stories
Business Experiments
1st Digital Edition

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www.eurohpc-ju.europa.eu

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www.ffplus-project.eu

ABOUT THE FFPLUS PROJECT

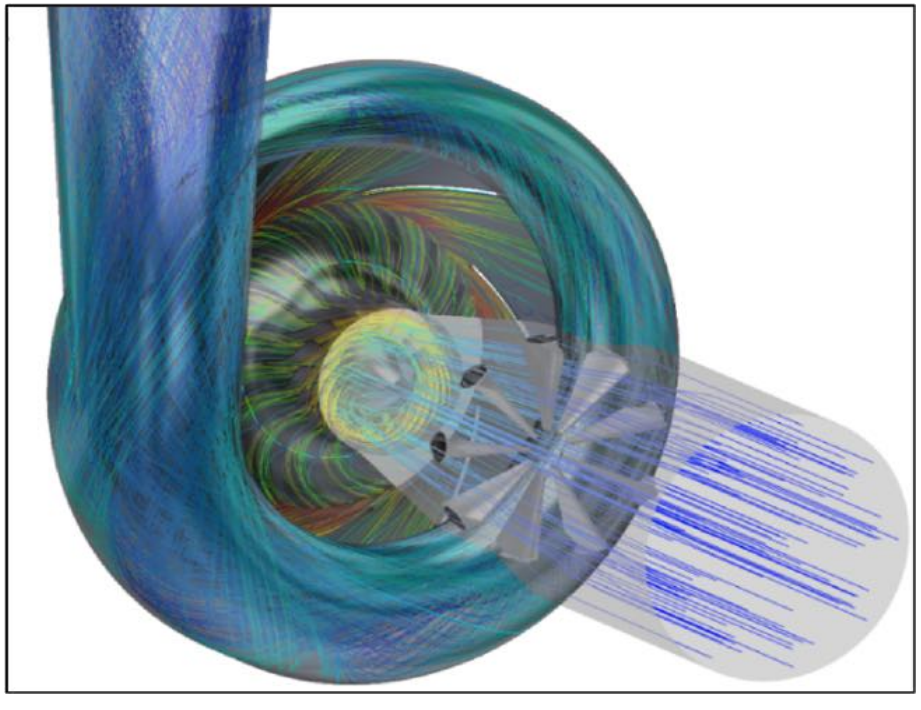
DRIVING SME AND STARTUP INNOVATION BY UNLEASHING THE POTENTIAL OF HPC AND AI

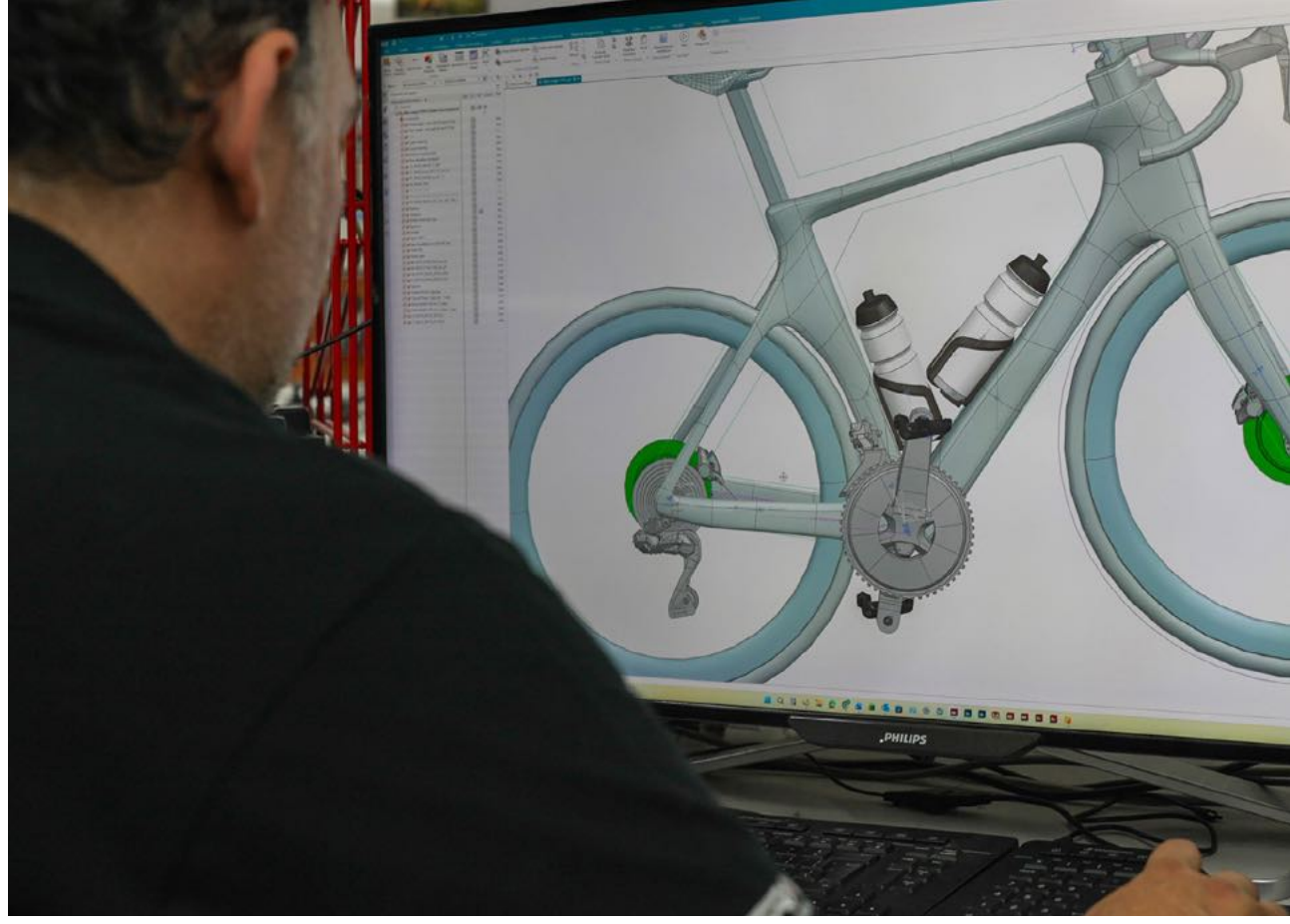
FFplus is a European initiative highlighting and promoting the adoption of High-Performance Computing (HPC) by SMEs and start-ups across Europe. By connecting SMEs with cutting-edge computing resources, expertise, and support, the project helps transform ambitious ideas into practical, scalable solutions.

Through the **Business Experiments**, SMEs and Start-ups with little or no previous experience with HPC are exploring how advanced computing can help them tackle specific business challenges. Through practical experimentation, companies apply HPC-based computational methods to develop new solutions, improve products and processes, and unlock new business opportunities.

The result is more than just a technical achievement. Each experiment demonstrates how HPC can deliver tangible business benefits and measurable impact.

The success stories featured in this booklet showcase these journeys: from the initial business challenge and the adoption of HPC to the solutions developed and the benefits achieved.





BUILDING ON A STRONG FOUNDATION

FFplus continues the legacy of the highly successful Fortissimo project series, which has played a pivotal role in bringing HPC closer to European industry. Since 2013, through Fortissimo, Fortissimo 2, and FF4EuroHPC, more than 130 experiments involving 330 partners have been carried out, resulting in 120 success stories. Building on this strong foundation, FFplus (2024–2029) continues the mission with an expanded focus on both HPC and generative AI. Through a series of six open calls, the project supports Business Experiments and Innovation Studies, engaging forward looking SMEs and startups from diverse industrial sectors.

FROM IDEAS TO IMPACT: FIRST BUSINESS EXPERIMENTS

A key milestone in this journey is the completion of the first tranche of FFplus Business Experiments.

These Business Experiments were selected for funding as FFplus sub-projects through the first open call for proposals. With a total indicative budget of €4 million, the 19 selected sub-projects bring together 45 organisations from 15 countries.

The experiments support SMEs with little or no previous experience in using HPC, enabling them to address specific business challenges through advanced computing technologies. Their key outcomes are compelling success stories that demonstrate the business value of HPC adoption and promote its uptake across the European SME ecosystem.

FFPLUS PROJECT PARTNERS

The FFplus consortium brings together seven leading organisations with extensive expertise in High-Performance Computing (HPC), artificial intelligence and digital innovation.

The project is coordinated by the High-Performance Computing Center Stuttgart (HLRS). Alongside HLRS, the seven partners - ARCTUR, CESGA, CINECA, CYFRONET, scapos and TERATEC - bring a complementary mix of technical, business and innovation expertise.

HLRS

The High-Performance Computing Center Stuttgart (HLRS) was established in 1996 as the first German national high-performance computing center, building on a tradition of supercomputing at the University of Stuttgart that stretches back to 1959. HLRS operates one of Europe's most powerful supercomputers, provides advanced training in HPC programming and simulation, and conducts research to address key problems facing the future of supercomputing.

www.hlrs.de

ARCTUR

Arctur is a privately owned high-tech company specialising in advanced and innovative IT solutions, with a strong focus on R&D. By mastering cutting-edge IT technologies, we inspire & empower organisations to reinvent themselves and co-create innovative products and services, contributing to a more sustainable and equitable future. Our team is deeply involved in R&D projects, especially in the topics of bringing HPC & AI into medicine, tourism, agriculture, manufacturing and defence sectors.

www.arctur.si

CINECA

CINECA is a not-for-profit Consortium, made up of 118 members: the Italian Ministry of Education and Merit, the Italian Ministry of Universities and Research, 70 Italian universities and 46 Italian National Institutions and agencies. Today it is the largest Italian computing centre, one of the most important worldwide. It develops advanced Information Technology applications and services, acting like a trait-d'union between the academic world, the sphere of pure research and the world of industry and Public Administration.

www.cineca.it

CESGA

Foundation CESGA has the mission to contribute to the advancement of Science and Technical Knowledge, by means of research and application of high performance computing and communications, as well as other information technologies resources, in collaboration with other institutions, for the profit of society.

www.cesga.es

SCAPOS AG

scapos AG was founded in December 2008 for the sales, marketing and support of technical computing software. The core scapos business is the distribution of advanced software solutions, particularly from research and academic institutes. Its product portfolio includes: optimisation software, computer-aided engineering, libraries for HPC (in particular fast, scalable solvers for Linear Algebra problems).

www.scapos.com

TERATEC

Created in 2005, TERATEC is a non-profit European pole of expertise in High-Performance Computing, numerical simulation and Data Analytics, and brings together more than eighty technological and industrial companies, laboratories and research centres, universities, wishing to combine their resources in the strategic field of HPC and simulation. TERATEC is involved in major national and European initiatives to ensure the development and the mastery of HPC/HPDA technologies and to guarantee their dissemination and deployment in the ecosystem.

www.teratec.eu

CYFRONET

Academic Computer Centre Cyfronet AGH is a separate legal entity of the AGH University of Science and Technology in Krakow. Cyfronet is one of the biggest Polish supercomputing and networking centres. Cyfronet is a specialised competence centre in the field of HPC and distributed computing. Cyfronet is also the coordinator of Polish National Competence Centre NCC PL. Large part of the centre's activities is devoted to the industrial applications, pharmacy, automotive and medicine sectors in particular.

www.cyfronet.pl

FFPLUS EXPERIMENT PARTNERS

RFMICROTECH
open engineering
AIRMOBIS
BRM AERO
IT4I
BIOS AGROSYSTEMS
bSpoke solutions
D-cube IMMERSIVE SOLUTIONS
PerPlant
SIXT RENT A CAR
DUNAV NET
tubeiq
ADVANCED ENGINEERING
FOSS
POLITECNICO MILANO 1863
CST Compression Service Technology
Ergon research
LUX PROVIDE
ENGINSOFT
EXERGY
Biocomputación y Física de Sistemas Complejos Universidad Zaragoza
KALFRISA ENERGY & ENVIRONMENT
ND
robotina Our world. Connected.
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alitiq
ventus
DigitalSmart
recrewty
3D COMPONENTS

sigma2
NRIS
Sim Evolution engineering simulation
BitBang
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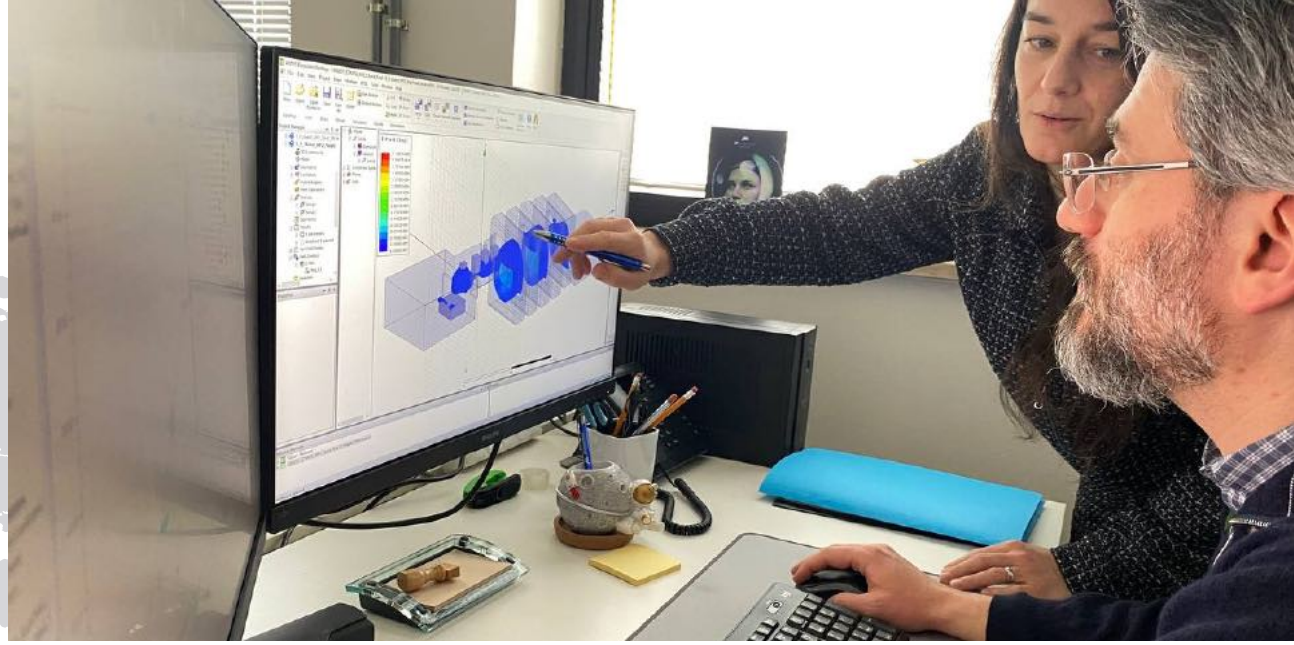
81 Watts
TeraNova
Filippi
MGroup
Nessos
INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON
LivGemini
rbf
Université de Rennes

FFPLUS SUCCESS STORIES

HPC FOR RADIO FREQUENCY SUBSYSTEMS



Technology used: HPC, Structural Mechanics
Industry Sector: Aerospace

ORGANISATIONS

RF Microtech is an Italian SME developing next generation antennas, filters and communication subsystems for space, satellite and aerospace applications currently in deployment across Horizon Europe and European space programmes. **Open Engineering** develops advanced simulation software for virtual engineering and product optimisation. Its OOFELIE platform enables large-scale digital testing and design validation.

THE CHALLENGE

RF Microtech needed to design increasingly compact and complex communication subsystems capable of operating reliably in demanding aerospace and space environments. Traditional engineering workstations could not process the largest simulation models efficiently, limiting design accuracy and slowing innovation.

HPC enabled analysis of more design options, reduced development risk and minimised dependence on costly physical prototypes.

THE SOLUTION

The HoRuS experiment created an HPC-enabled design workflow running on the Leonardo supercomputer. Open Engineering integrated its OOFELIE platform with advanced simulation tools, allowing engineers to evaluate thermal, mechanical and communication performance within a single environment.

By exploiting EuroHPC's Leonardo supercomputer, the computational workflows supported much larger models, faster virtual testing and more informed engineering decisions before manufacturing began.

THE IMPACT

The project strengthened RF Microtech's ability to develop advanced communication subsystems for space and aerospace applications through an HPC-enabled design workflow capable of analysing larger and more detailed simulation models. Access to the Leonardo supercomputer enabled engineers to evaluate more design alternatives, identify performance issues earlier and optimise products before manufacturing.

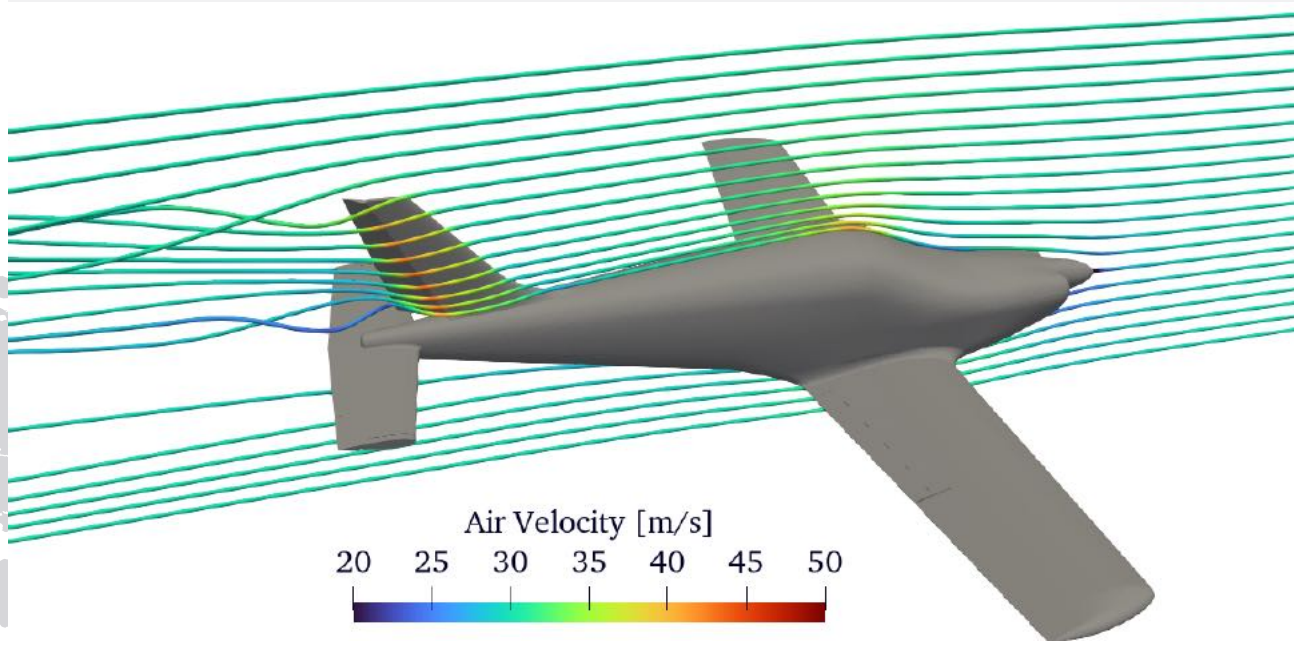
By combining advanced simulation software with scalable EuroHPC resources, the company can accelerate product development while reducing engineering effort and technical risk. Faster access to high-fidelity simulation results improves confidence in design decisions and supports the development of more sophisticated products within commercial timescales.

The capability enhances RF Microtech's competitiveness in the European space, satellite communications and aerospace sectors, where performance, reliability and time-to-market are critical. Reduced dependence on physical prototyping also lowers development costs and shortens validation cycles.

BUSINESS BENEFITS

- 50% reduction in design time for advanced space communication filters.
- 50% reduction in aerospace engineering design costs.
- 25% reduction in overall development costs.
- Larger simulations analysed beyond previous capability limits.
- New HPC-enabled specialist engineering services has created future commercial opportunities.

AI-DRIVEN AIRCRAFT FLAP OPTIMISATION FOR SAFER AND FASTER FLIGHT



Technology used: HPC, AI, CFD
Industry Sector: Aerospace

ORGANISATIONS

BRM AERO is a Czech aircraft manufacturer and owner of the BRISTELL development programme. **AIRMOBIS** is an aerospace engineering SME specialising in advanced aerodynamic design and optimisation. **IT4Innovations** at VSB-Technical University of Ostrava is HPC and technology provider, supplying supercomputing and AI expertise through the Karolina system.

THE CHALLENGE

Aircraft designers must balance low-speed safety with high-speed efficiency. BRM AERO sought to improve their BR66 model flap and wing performance without compromising CS-23 certification, handling or safety margins. Manual CFD-led redesign could assess only a limited number of options, while evaluating thousands of configurations on standard workstations would take months. HPC was therefore essential to make rigorous optimisation practical.

THE SOLUTION

The partners created an HPC-enabled workflow combining high-fidelity CFD and AI. Karolina supercomputer resources ran thousands of virtual wind-tunnel simulations across alternative wing and flap geometries, producing the dataset needed to train a fast surrogate model. The model predicted aerodynamic behaviour in seconds, allowing promising designs to be screened automatically before validation with full-aircraft 3D CFD. The result was an optimised BR66 flap design and reusable workflow.

THE IMPACT

HPC made it practical to explore thousands of aerodynamic configurations at a fidelity and scale beyond conventional engineering workstations. The optimised BR66 design reduced structural mass by 13.7 kg, cut specific fuel consumption by 6.4% and increased cruise speed from 335 km/h to 351 km/h, lowering operating costs and environmental impact per flight. BRM AERO also gained a validated HPC- and AI-based methodology that can be reused across future aircraft programmes, replacing slower manual iteration with rapid, data-driven screening and targeted CFD validation. This can shorten development cycles, reduce engineering and certification risk, and accelerate time-to-market.

The company estimates that the improved methodology could support a gain of 1% in the European CS-23 market and enable annual production to rise by more than 40%. Across over 50 export markets, this strengthened competitiveness could generate approximately €14 million in profit over five years.

BUSINESS BENEFITS

- HPC enabled thousands of high-fidelity aerodynamic design evaluations.
- Aircraft structural mass reduced by 13.7 kg.
- Specific fuel consumption reduced by 6.4%.
- Cruise speed increased from 335 km/h to 351 km/h. Potential 40%+ production growth and EUR 14 million profit over five years.

HPC-ENHANCED GENOMIC SELECTION FOR CLIMATE-RESILIENT CROP BREEDING

Technology used: HPC, AI, ML
Industry Sector: Agriculture

ORGANISATIONS

BIOS Agrosystems SA is a Greek seed-breeding SME specialising in crop improvement and variety development. It contributes proprietary genomic, phenotypic and multi-environment field-trial datasets and validates results against commercial breeding outcomes. **bSpoke Solutions P.C.** is a Greek HPC and AI specialist delivering advanced data engineering, machine learning and cloud technologies.

THE CHALLENGE

Developing new crop varieties typically requires 7–10 years of testing and multi-million-Euro investment. Climate change increases uncertainty, making seed breeding decisions riskier and more expensive. BIOS needed to evaluate thousands of genetic combinations across multiple environments, but analysing genomic, field and climate data at scale exceeded conventional computing capabilities and impacted innovation.

THE SOLUTION

GENESIS is a cloud-based AI platform that combines genomic markers, field-trial results and climate data to predict crop performance before extensive field testing. Running on the MeluXina EuroHPC supercomputer, it trains and evaluates thousands of machine-learning models in parallel. HPC enabled rapid exploration of large model combinations, improved prediction accuracy and delivered actionable breeding recommendations within commercial timescales.

THE IMPACT

GENESIS enables breeders to identify promising varieties earlier, reducing costly field evaluations and accelerating commercial release. During pilot studies across three locations, AI-generated recommendations matched actual top-performing varieties in 90–100% of cases and identified candidates achieving yield gains of 0.46–0.48 tonnes per hectare above site averages. HPC was critical, allowing large-scale genomic and climate-data analysis that would have been impractical using standard IT infrastructure.

For BIOS, this supports lower R&D costs, improved allocation of breeding resources and faster response to market and climate challenges. For bSpoke Solutions, the project created a commercially validated AI-HPC platform suitable for subscription-based deployment, opening new recurring revenue streams. The approach also broadens access to advanced genomic selection for smaller breeding organisations.

BUSINESS BENEFITS

- 90–100% success in identifying field-leading varieties.
- 0.46–0.48 tonnes/hectare yield gains above site averages.
- Up to 95.2% prediction accuracy versus field outcomes.
- Up to 8× faster model training using EuroHPC resources.
- Supports faster, lower-risk breeding decisions.

PRECISION WEED DETECTION FOR SUSTAINABLE ARABLE FARMING

Technology used: HPC, AI, Edge Computing
Industry Sector: Agriculture

ORGANISATIONS

PerPlant ApS is a Danish precision-agriculture SME developing AI-powered camera sensors for real-time, plant-level weed detection and spot spraying on existing farm machinery. **D-Cube** is an AI and computational-strategy provider responsible for designing and optimising the large-scale Vision Transformer models behind the Perplant system.

THE CHALLENGE

Arable farms still rely on broadcast herbicide spraying, a costly and environmentally damaging method facing tighter EU sustainability rules. Current vision systems struggle with changing light, dust and shadows, and cannot reliably support spraying at 9-15 km/h. PerPlant needed to train a robust Vision Transformer on 267,324 high-resolution images (168 GB), making multi-GPU HPC essential to overcome training bottlenecks.

THE SOLUTION

PerPlant and D-Cube built a retrofit camera sensor system that detects individual weeds in real time and activates the spray boom only where needed, at tractor speeds up to 15 km/h and without cloud connectivity. Using the Leonardo supercomputer, they trained the model on 267,324 images with multi-GPU semi-supervised and active learning workflows, then compressed it for reliable edge deployment in dusty, variable field conditions and continuous farm operation.

THE IMPACT

Access to Leonardo shortened PerPlant's route from pilot to commercial production by cutting AI training cycles by 50% and reducing prescription errors by 60% compared with standard infrastructure. This created a stronger, field-ready product for a European crop-treatment market valued at €56.5 billion and growing at 13.1% CAGR to 2030.

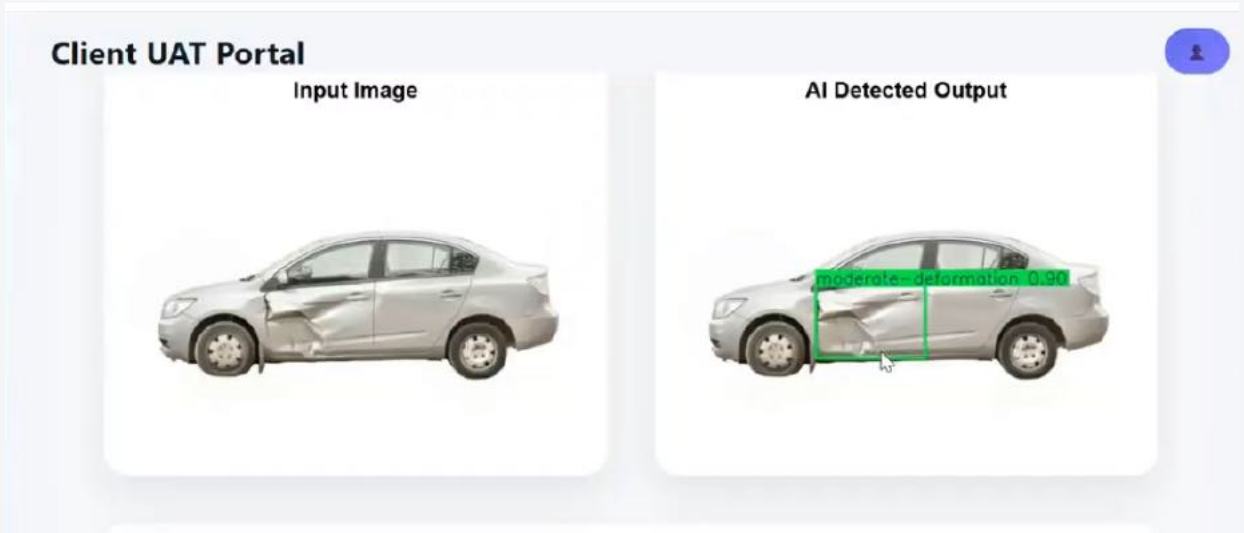
With 700 units targeted over five years in Denmark, the Nordics and wider EU, this represents €7 million in hardware revenue and €700,000 in annual recurring revenue at maturity. Market readiness is evidenced by 50 paying customers in Denmark, the Czech Republic, the Netherlands and the UK.

Farmers can reduce herbicide use by up to 90%, saving up to €70 per hectare per season. At about €5 per hectare, the operating cost is around 6x lower than drone services, making precision spraying affordable for mainstream arable farms and supporting EU environmental mandates.

BUSINESS BENEFITS

- 50% faster AI training on EuroHPC Leonardo, halving R&D time.
- 60% fewer prescription errors from large-scale multi-GPU training.
- Up to 90% less herbicide, saving farmers up to €70/ha per season.
- Spot spraying costs ~€5/ha, 6x lower than drone services.
- 50 paying customers in 4 countries; 700 units targeted in 5 years.

HPC-ENABLED DAMAGE CONTROL FOR RENTAL CAR FLEETS



Technology used: HPC, AI, ML
Industry Sector: Automotive

ORGANISATIONS

TUBEIQ is a Serbian SME developing low-code/no-code workflow automation and business-process-management solutions for enterprises seeking faster digital transformation. **DunavNET** specialises in AI, IoT and advanced data solutions, and is responsible for AI development and HPC integration. **AAA-1 RENT** is a vehicle rental provider that supplied operational expertise, business requirements and real-world validation of the solution.

THE CHALLENGE

Vehicle damage assessment in rental and fleet operations is still largely manual, slow and inconsistent. Staff must interpret photos, text notes and voice descriptions, then translate them into claims-ready reports. The sector needs faster, more reliable damage evaluation, but training robust AI on varied vehicle images, damage types and reporting formats requires scalable HPC experimentation beyond local compute capacity.

THE SOLUTION

Damage Control is a multimodal AI workflow platform that analyses vehicle images, text reports and voice descriptions. Computer vision, NLP, deep learning and vision LLMs identify damage type, location and severity, then generate structured JSON outputs and human-readable reports. HPC clusters enabled training on thousands of annotated images, faster convergence and parallel testing of hybrid AI and commercial multimodal models before integration into real workflows.

THE IMPACT

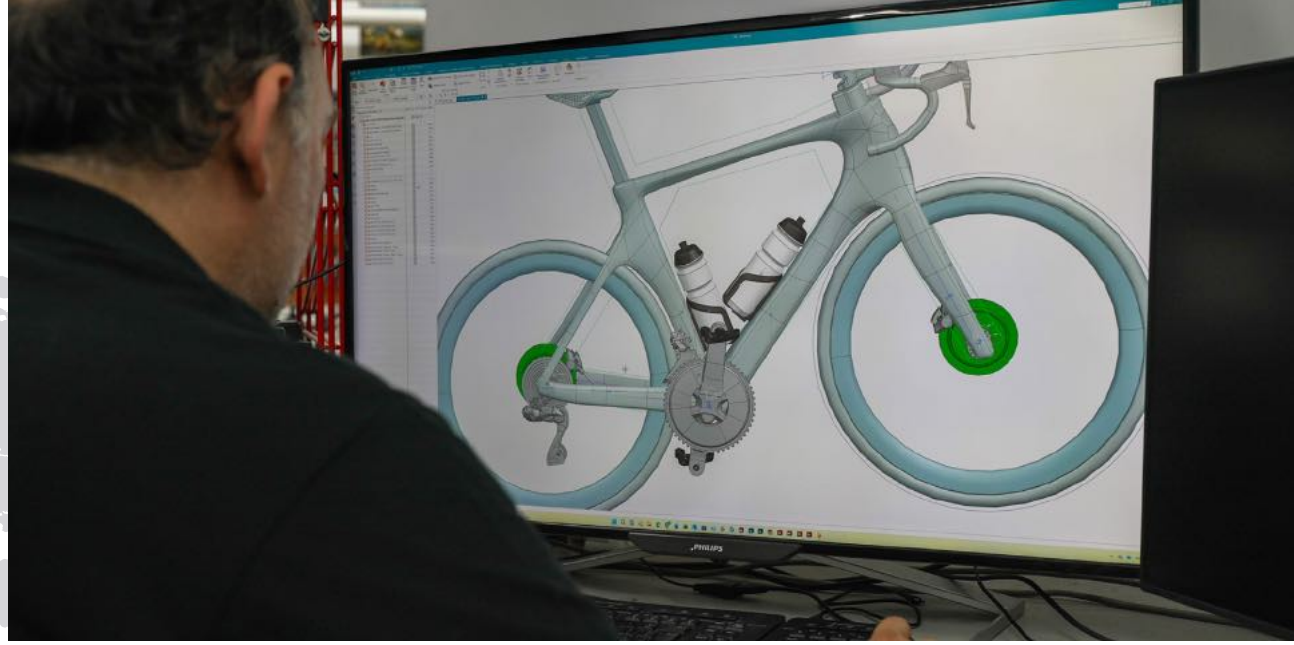
Damage Control turns raw vehicle images and related notes into structured, insurance-ready reports, reducing reliance on subjective manual inspection and enabling faster claims and fleet decisions. The project has already delivered high accuracy in detecting and describing damage, while automated outputs improve consistency, traceability and integration into rental and insurer workflows. HPC is central to this impact: it allowed large-scale model training and parallel comparison of AI approaches that would be too slow on local resources, reducing technical risk before deployment.

For rental and fleet operators, near real-time assessments can reduce administrative workload, shorten turnaround, limit disputes through photo-backed evidence and support customer satisfaction gains projected at 20-30%. The validated workflow gives TubeIQ and DunavNET a scalable service proposition for insurers, fleet managers and rental companies across Europe.

BUSINESS BENEFITS

- Expands TUBEIQ's footprint into rental, fleet and insurance markets.
- Projected revenues exceed €500,000 in 3 years with profitability from Year 2.
- 30-40% faster damage-report processing for rental/fleet operators.
- 20-25% lower inspection/reporting costs per vehicle.
- Up to 30% fewer disputes via consistent, transparent reporting.

AERODYNAMIC AND STRUCTURAL OPTIMISATION OF MODULAR BICYCLES USING HPC



Technology used: HPC, CFD, Structural Mechanics
Industry Sector: Cycling, Manufacturing

ORGANISATIONS

Advanced Engineering (AE) is a Greek SME designing and manufacturing carbon-fibre bicycles for competitive and recreational cycling. **National Technical University of Athens** provides CFD, aerodynamic optimisation and HPC expertise. **Politecnico di Milano** advises on automated CFD workflows and HPC use. **FOSS** supplies black-box optimisation software and structural-optimisation guidance.

THE CHALLENGE

Advanced Engineering aims to launch a modular road bike that converts into a triathlon version by changing only a few components. However, its trial-and-error aerodynamic and structural design process, constrained by limited local computing, can take up to a year. Evaluating many shapes, riding conditions and carbon-fibre configurations is computationally intensive, so HPC is essential to shorten development and secure competitive performance gains.

THE SOLUTION

The team deployed automated Computational Fluid Dynamics and structural optimisation workflows on the LUMI supercomputer. CFD assessed bicycle shapes across multiple speeds, airflow angles and manufacturing constraints to reduce drag and side forces.

Structural optimisation then varied carbon-fibre layers, orientations and materials to cut weight, increase lateral stiffness, improve comfort and meet ISO requirements. HPC made the design search feasible within days rather than months.

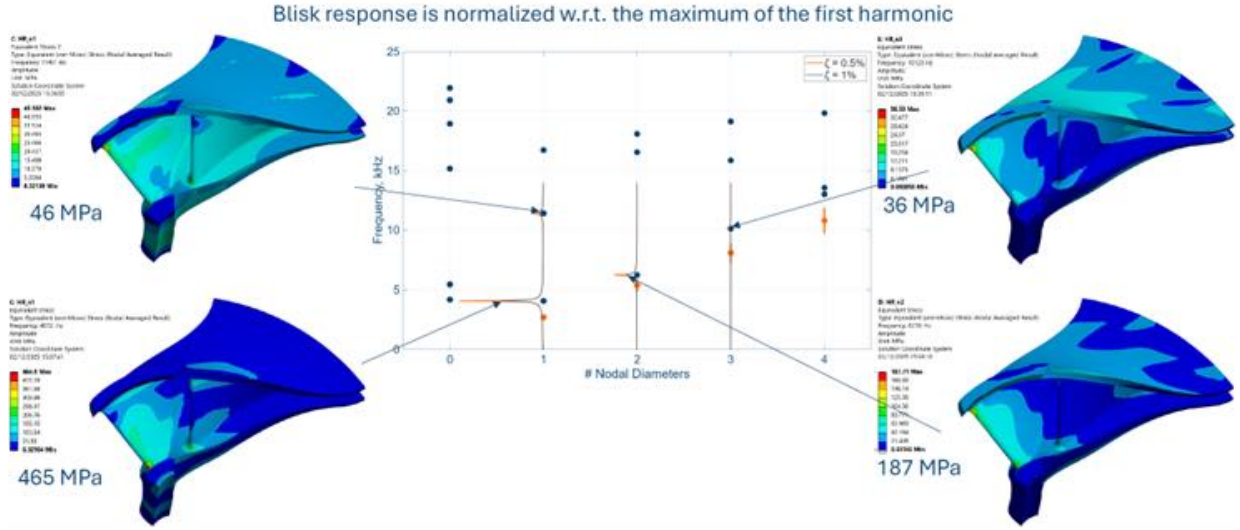
THE IMPACT

HPC-enabled automation reduces the design phase and associated engineering costs by 50%, replacing lengthy trial-and-error work with repeatable aerodynamic and structural optimisation. Material-efficient carbon-fibre designs are expected to lower manufacturing costs by 15-20% while improving performance, comfort and manufacturability. Advanced Engineering plans to produce 50 additional bikes annually, generating up to €350,000 in yearly revenue and creating two jobs. Reusing the same HPC workflows for mountain-bike frames, wheels, handlebars, seatposts and cranksets could add up to €100,000 a year and one further job. This validated capability also supports expansion into high-performance luxury boats, where optimised hydrodynamic, aerodynamic and structural components could generate up to €300,000 annually and create two jobs. This gives Advanced Engineering a scalable digital design capability for faster product development and entry into new markets.

BUSINESS BENEFITS

- 50% shorter design phase, with a similar reduction in design costs.
- 15-20% lower manufacturing costs through carbon-fibre material savings.
- 50 extra bicycles/year: up to €350,000 revenue and two new jobs.
- New cycling products could add €100,000/year and create one job.
- Luxury-boat applications could add €300,000/year and create two jobs.

HIGH PERFORMANCE CENTRIFUGAL COMPRESSOR FOR SUPERCRITICAL CO_2



Technology used: HPC, CFD, FEM
Industry Sector: Energy

ORGANISATIONS

Compression Service Technology S.r.l. (CST) is an Italian engineering company with 50+ years of rotating machinery experience, designing centrifugal compressors from first principles and covering specialist aerodynamic and mechanical calculations. **Ergon Research** S.r.l. (ERG) is a research and consultancy company, formerly a University of Florence spin-off, specialising in HPC-based simulation, with 35+ experts and a 1,000+ core cluster.

THE CHALLENGE

Demand for supercritical CO_2 compressors is rising as CCUS and decarbonisation projects scale across steel, cement and oil and gas. CST was receiving OEM requests but lacked a validated design route. Near its critical point, sCO_2 is too complex for standard tools, while testing prototypes is costly and slow. Multiple geometries and operating points required high-fidelity CFD at a scale only HPC could deliver.

THE SOLUTION

CST and ERG created a reusable design workflow for sCO_2 centrifugal compressors, combining accurate fluid modelling, CFD aerodynamic analysis and FEM structural checks. Using NIST thermodynamic data and the Discoverer supercomputer, they evaluated designs operating up to 23,000 rpm. HPC enabled models with up to 100 million elements feasible, by using 10,000-30,000 CPU core hours per run and up to 1,024 cores to deliver swift results for significant engineering decisions.

THE IMPACT

The project gives CST a validated sCO_2 compressor design capability, allowing it to respond to OEM opportunities it previously had to decline and enter a specialist market served by only a few global suppliers. A proven reference design strengthens CST's credibility with customers and creates a pathway to an estimated +€1million/year from two design orders per year from the end of 2027. The HPC workflow is also reusable for other non-conventional compressor sizes and fluids, reducing future design effort by 40-60% and helping CST scale its offer without relying on slow, high-risk physical prototyping.

For ERG, the study validates a commercial HPC service that combines CFD and FEM for rotating machinery, supporting an estimated +€650,000/year from OEM clients and research programmes. For customers, the outcome provides faster access to reliable sCO_2 compressor engineering, shorter development cycles and reduced cost and risk in CCUS-related projects.

BUSINESS BENEFITS

- CST can now pursue sCO_2 compressor projects previously declined.
- Validated HPC workflow reduces future design effort by 40-60%.
- HPC enabled 100M-element CFD/FEM models impractical on workstations.
- Forecast revenues: +€1 million/year for CST and +€650,000/year for ERG.
- Discoverer ran 10,000-30,000 core-hour simulations on up to 1,024 cores.

EXERGY IMPROVED SEALING SYSTEM

Technology used: HPC, CFD
Industry Sector: Energy

ORGANISATIONS

Exergy International is a global leader in technology that converts waste heat, geothermal energy and industrial by-products into electricity. **EnginSoft** provides advanced engineering simulation and digital design expertise. **LuxProvide** operates EuroHPC's supercomputer in Luxembourg, delivering advanced HPC resources and technical expertise for industry and research.

THE CHALLENGE

Exergy needed to improve the efficiency of Waste Heat Recovery turbines, where leaks through multistage sealing systems can reduce performance by up to 12% of isentropic power. Understanding fluid behaviour across many seal designs required high-fidelity CFD models, with fine computational meshes and advanced turbulence modelling. Running these simulations to reduce engineering timescales demanded HPC resources far beyond conventional workstations.

THE SOLUTION

The project created an HPC-enabled design workflow using CFD simulation to evaluate and optimise turbine sealing concepts. Running on the MeluXina supercomputer, simulations typically used 128 CPU cores and enabled rapid assessment of 46 design variants. HPC made it possible to analyse leakage behaviour, compare alternative geometries and validate results against testing. The work delivered two improved sealing concepts, including an innovative microfluidic brush seal.

THE IMPACT

HPC-enabled simulation strengthened Exergy's competitive position in the growing waste heat recovery market by accelerating development of higher-efficiency ORC turbines. By replacing much of the traditional trial-and-error prototyping process with virtual design exploration, the company reduced development risk, shortened innovation cycles and identified sealing technologies capable of supporting WHR efficiencies approaching 21%.

The project also established a repeatable HPC-based engineering methodology that can be applied across future turbine programmes, enabling faster product development and more informed design decisions. Beyond the company, the work demonstrated how European supercomputing infrastructure can help industrial SMEs solve complex engineering challenges, improve energy recovery technologies and support wider decarbonisation goals.

BUSINESS BENEFITS

- Evaluated 46 seal designs using parallel CFD simulations on MeluXina.
- Simulations used up to 128 CPU cores per design study.
- Pathway towards waste heat recovery cycle efficiencies approaching 21%.
- Reduced physical prototyping, cost and development risk.
- Potential business growth estimated at €25–30 million.

HPC-BASED EFFICIENCY OPTIMISATION OF INDUSTRIAL FIRED PREHEATERS

Technology used: HPC, ML, CFD
Industry Sector: Energy

ORGANISATIONS

KALFRISA specialises in industrial heating systems that improve energy efficiency and reduce emissions across energy-intensive sectors. **nablaDot** supply engineering expertise in simulation, AI, digital twins and industrial optimisation. **The University of Zaragoza–BIFI Institute** operates Aragón's largest research computing centre and provides expertise in high-performance computing and advanced scientific modelling.

THE CHALLENGE

Industrial operators must reduce energy use, emissions and maintenance costs while adopting alternative fuels and maintaining reliability. For KALFRISA, traditional fired-preheater design methods could not deliver the accuracy or flexibility demanded by customers. Creating digital twins required thousands of high-fidelity CFD simulations whose computational and memory demands exceeded conventional engineering systems, making HPC essential.

THE SOLUTION

The IGNITE experiment developed an HPC-enabled digital twin platform for industrial fired preheaters. Large-scale CFD simulations of combustion, heat transfer and fluid flow were executed to generate validated datasets across multiple fuels, operating conditions and equipment configurations. These datasets trained AI and reduced-order models that deliver near real-time performance predictions, enabling optimisation, design assessment, degradation forecasting and predictive maintenance.

THE IMPACT

IGNITE strengthens KALFRISA's competitive position by expanding its portfolio from equipment supply into higher-value digital services, including optimisation, performance monitoring and predictive maintenance. The project establishes a scalable collaboration model with nablaDot, combining industrial expertise with advanced digital engineering capabilities.

HPC-enabled digital twins allowed customers to evaluate operating strategies, fuel transitions and equipment upgrades faster and with lower risk. The solution supports improved reliability, more efficient thermal processes and accelerated adoption of low-carbon fuels such as hydrogen.

By enabling data-driven optimisation across energy-intensive industries, the project contributes to industrial digitalisation, reduced energy consumption and lower emissions while creating new commercial opportunities for both SMEs.

BUSINESS BENEFITS

- The models improve fired preheater efficiency by 5–15% through continuous optimisation.
- Reduced thermal energy consumption by 10–35% and lowered emissions.
- Maintenance costs reduced by 20–30% through predictive maintenance.
- Unplanned downtime reduced by 20–40% using Remaining Useful Life forecasts.
- New digital-service revenue opportunities for KALFRISA and nablaDot.

HPC-ENABLED DEEP LEARNING FOR REAL-TIME ENERGY FORECASTING IN BUILDINGS

Technology used: HPC, AI, ML
Industry Sector: Energy

ORGANISATIONS

Robotina d.o.o. is a Slovenian SME delivering IoT-enabled hardware and cloud software for smart buildings, automation and energy management. **Rudolfovo Science and Technology Centre** supported technological development of the HPC-enabled AI workflow. **The University of Ljubljana - Faculty of Mechanical Engineering** contributed engineering knowledge and model-development expertise.

THE CHALLENGE

Robotina wanted to extend its xEMS solution from monitoring and control into predictive optimisation for offices, hotels, public buildings and campuses. Customers need accurate 1-3 day energy forecasts at 15-minute resolution as dynamic tariffs renewables and storage make demand harder to plan. BiLSTM models could provide the accuracy but were too slow to train, tune and validate building by building on CPU infrastructure, making HPC necessary.

THE SOLUTION

The team built an HPC-enabled forecasting workflow connecting the xEMS data pipeline with the VEGA supercomputer. Building, weather, tariff and market data were prepared automatically for AI training, then used to compare forecasting models. Four GPU nodes ran model searches in parallel, with Python and TensorFlow packaged in Singularity containers. The result is a reproducible training pipeline, optimised 15-minute multi-step model and TensorFlow Lite edge version for xEMS devices.

THE IMPACT

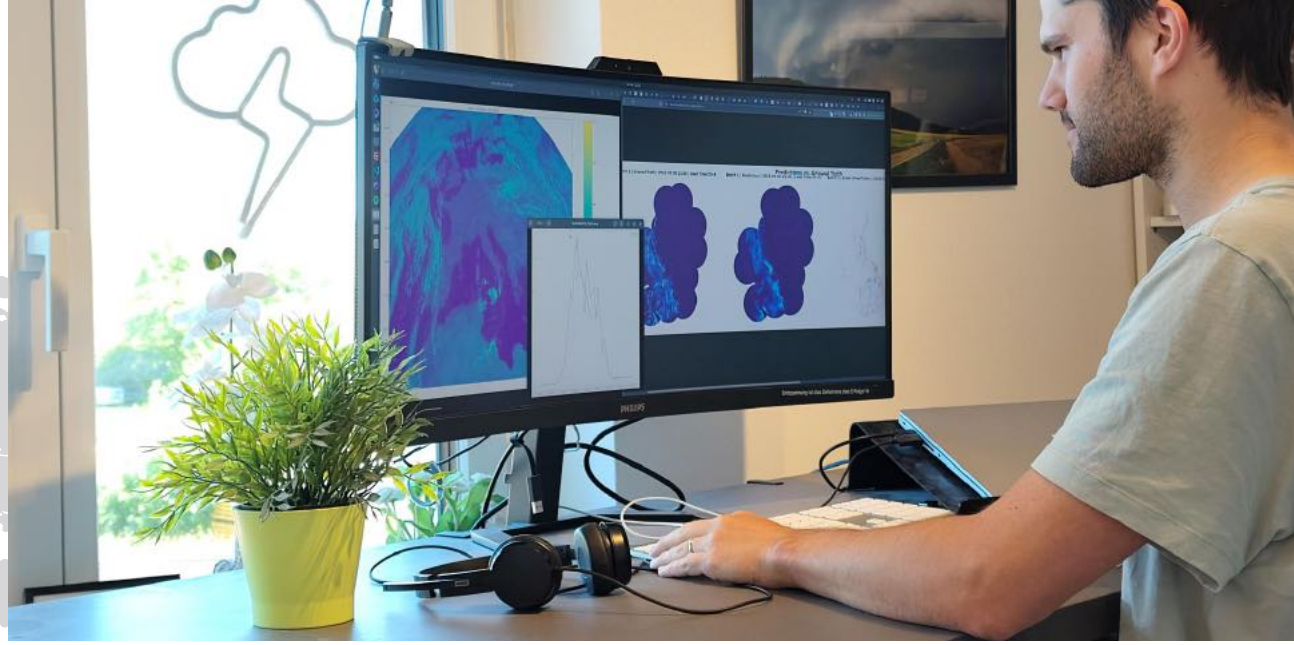
The experiment gives Robotina a commercially deployable AI forecasting module for xEMS, strengthening its position in smart energy management and creating a subscription add-on for commercial and public buildings. HPC is central to the business case: model-search and training runs that previously took around a week now take less than one day, allowing Robotina to refine deep-learning models for multiple buildings and scenarios without the CPU bottleneck. This shortens release cycles and enables scalable onboarding rather than bespoke development.

Robotina estimates that forecasting subscriptions could create up to €800,000 annual revenue, based on around €80 per subscription per year. For customers, accurate 1-3 day forecasts at 15-minute resolution support better scheduling of energy-intensive operations and use of dynamic tariffs, renewables and storage, with potential energy-cost savings of up to 10%. Improved accuracy also opens routes to storage optimisation and flexibility-market services.

BUSINESS BENEFITS

- Forecasting error cut from 47.88% to 10.49%.
- HPC enabled a reduced model search from about one week to under one day.
- Up to €800,000 annual revenue opportunity from new xEMS subscriptions.
- Customers can reduce energy costs by up to 10%.
- VEGA-trained models deploy to TensorFlow Lite on xEMS edge devices.

FIXING SHORT-TERM ENERGY TRADING FOR SOLAR POWER GENERATION



Technology used: HPC, AI, ML
Industry Sector: Energy

ORGANISATIONS

alitiq GmbH develops and commercialises AI-powered forecasts for renewable-energy markets. **Validation Partners & Utilities** is their domain expert, testing operational and commercial value for energy trading, virtual power plants and grid management. **Ventus Technologies GmbH** provides meteorological modelling, large-scale weather-data processing and forecasting expertise for solution development and evaluation.

THE CHALLENGE

Rapid growth in solar power is increasing short-term supply variability. Traders and grid operators must balance 96 quarter-hourly contracts each day, yet conventional weather models struggle to capture fast, local cloud movements two to three hours ahead. alitiq needed to use HPC to train and repeatedly test deep-learning models on multi-terabyte datasets beyond the memory, speed and iteration capacity of its in-house workstations.

THE SOLUTION

The team developed NowcastAI, combining live satellite, radar and weather data to predict solar irradiance, convert it into site-specific PV output forecasts and refresh results every 15 minutes. GPU-accelerated HPC on the EuroHPC JU Leonardo Booster processed Zarr datasets and trained neural networks. More than 4,000 compute hours cut each training cycle from 14 days on standard workstations to about 12 hours, enabling rapid comparison, testing and refinement of model variants.

THE IMPACT

NowcastAI gives alitiq a higher-value intraday forecasting service, extending its portfolio beyond day-ahead products. Better benchmark performance is expected to raise customer trial wins from 4 in 10 to 7-8 in 10. Within 24 months, alitiq projects management of 2,500 MWp of solar capacity and €500,000 in annual recurring revenue, recovering the €200,000 development investment in about five months. For a 1,000 MWp portfolio, a 10% forecast-error reduction could lower annual imbalance costs by around €275,000.

The service is expected to secure two technical roles by 2028 and support five operational roles by 2030. More accurate forecasts can also reduce solar curtailment and reliance on fossil-fuel peaker plants, supporting a more efficient, lower-carbon grid. GPU-accelerated HPC was essential because multi-terabyte data volumes, memory demand and repeated model iterations exceeded in-house workstations. Reducing training from 14 days to 12 hours made extensive testing commercially practical within the project timeframe.

BUSINESS BENEFITS

- 28x faster training: using GPUs cuts each model cycle from 14 days to 12 hours.
- Trial win rate expected to rise from 4 in 10 to 7-8 in 10.
- €500,000 projected ARR from managing 2,500 MWp within 24 months.
- €275,000 potential annual saving for a 1,000 MWp solar portfolio.
- Two technical roles by 2028 and five operational roles by 2030.

HPC-DRIVEN HUMAN RESOURCES INNOVATION FOR THE WESTERN BALKANS

Technology used: HPC, AI, ML
Industry Sector: Management & Recruiting

ORGANISATIONS

Recrewty d.o.o. is a Montenegrin SME developing an AI-powered HR platform for recruitment, candidate assessment and decision support for SMEs and enterprises across South-East Europe. It defined the recruitment workflow and validated the service with end users. **DigitalSmart d.o.o.** is specialising in HPC, AI infrastructure and advanced systems, enabling scalable model training, deployment and integration.

THE CHALLENGE

Recruiters across South-East Europe must screen hundreds or thousands of applications, yet CV analysis, candidate comparison and shortlisting remain largely manual. Generic AI can invent details, while English-led models underperform in Bosnian, Croatian, Montenegrin and Serbian. Recrewty therefore needed a reliable regional model; HPC was essential to train and test it at scale within practical time and cost limits.

THE SOLUTION

The partners developed an integrated recruitment platform for CV analysis, chat interviews, psychometric testing and audio processing, combining the Big Five test with Recrewty's 4C method. A regional language model was trained on the Leonardo supercomputer using 32-64 A100 GPUs, enabling full CVs and interview transcripts to be processed in one pass. The pipeline extracts data from PDFs and scans, transcribes interviews and returns structured results for human-controlled decisions.

THE IMPACT

The experiment gives Recrewty a differentiated HR product and a strategic AI asset purpose-built for Bosnian, Croatian, Montenegrin and Serbian languages. HPC training on Leonardo made it feasible to process long documents and multilingual recruitment data at a scale and speed unavailable on conventional infrastructure. This strengthens Recrewty's competitiveness, supports new customer acquisition and creates revenue opportunities through licensing, HR extensions and sector-specific versions.

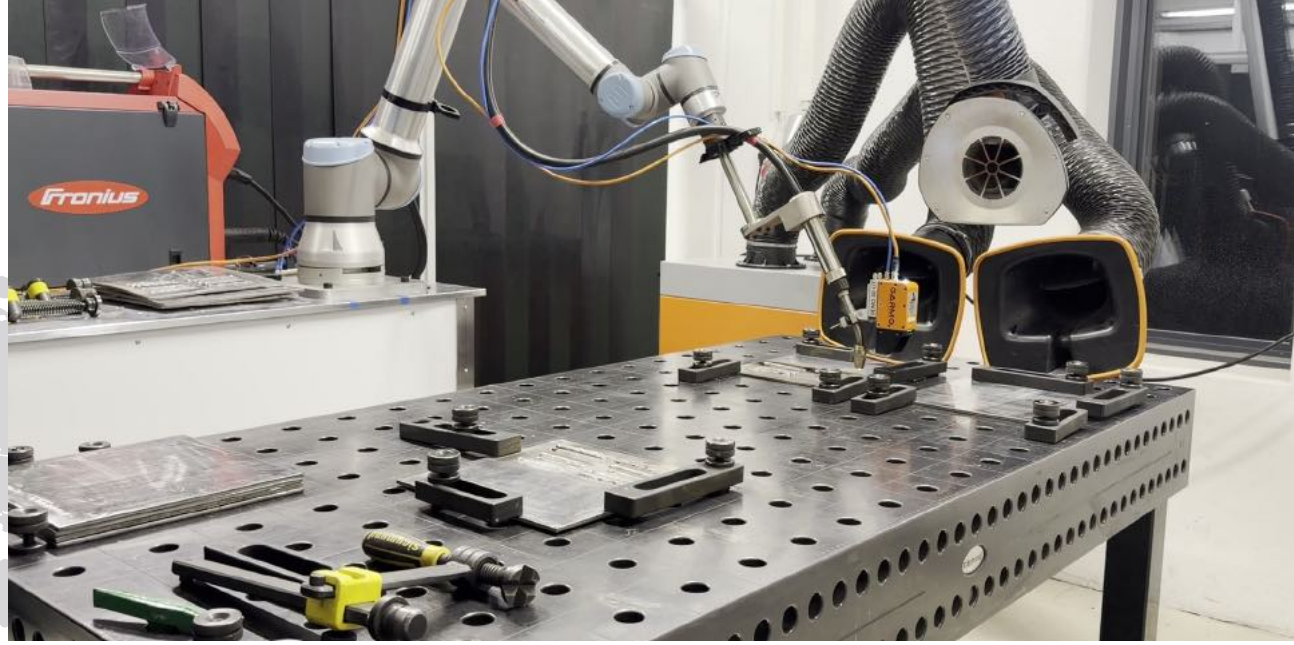
The model can also support regional-language search and human-in-the-loop workflows in media monitoring, banking, compliance, legal review, customer service and public-sector digitisation. ModernBERTic and the BalkanBench benchmark position Recrewty as a regional AI innovator with greater independence from generic foreign tools.

For employers, the solution reduces screening time and cost, improves consistency and retains human authority over final selection, supporting transparent recruitment and alignment with EU AI Act expectations for high-risk workplace systems.

BUSINESS BENEFITS

- 85% less screening work: 1,318 applicants reduced to 3 interviews, saving 55.7 hours.
- Candidate search fell from about €90 to €0.05 per query - around 1,800 times cheaper.
- 32-64 A100 GPUs enabled full CVs and interview transcripts to be processed in one pass.
- Human-controlled shortlisting supports transparent, EU AI Act-aligned recruitment.
- Regional AI creates licensing and expansion opportunities beyond recruitment.

HPC AND AI FOR PRECISION ENGINEERING IN WELDING



Technology used: HPC, AI, ML, FEM
Industry Sector: Manufacturing

ORGANISATIONS

3D-Components AS (3DC) is a Norwegian SME developing RobTrack, a patented hardware-software platform for robotised welding and directed energy deposition process development. **SimEvolution A/S** is a Danish authorised Cadence partner providing finite element analysis and Simufact Welding expertise. **Sigma2 AS** is Norway's national HPC centre, providing access to the Saga cluster.

THE CHALLENGE

Welding and directed energy deposition rely on costly qualification campaigns across more than 50 interacting process parameters. 3DC's RobTrack could use AI to screen geometry, but reliable recommendations also needed thermal and structural prediction. Dozens of detailed finite element runs exceeded workstation throughput, making HPC essential for rapid optimisation, repeatable results and scalable customer delivery.

THE SOLUTION

SHAPE-AM enabled RobTrack to automate experimental configurations in Simufact Welding software using the Saga HPC cluster. These configurations are converted into thermomechanical simulation models and run in parallel, using up to 256 processor cores per job to explore parameter combinations. The output data trains AI models that predict weld quality, structural performance and cooling rates above 98% accuracy, giving engineers rapid guidance while reducing costly physical trials and manual analysis.

THE IMPACT

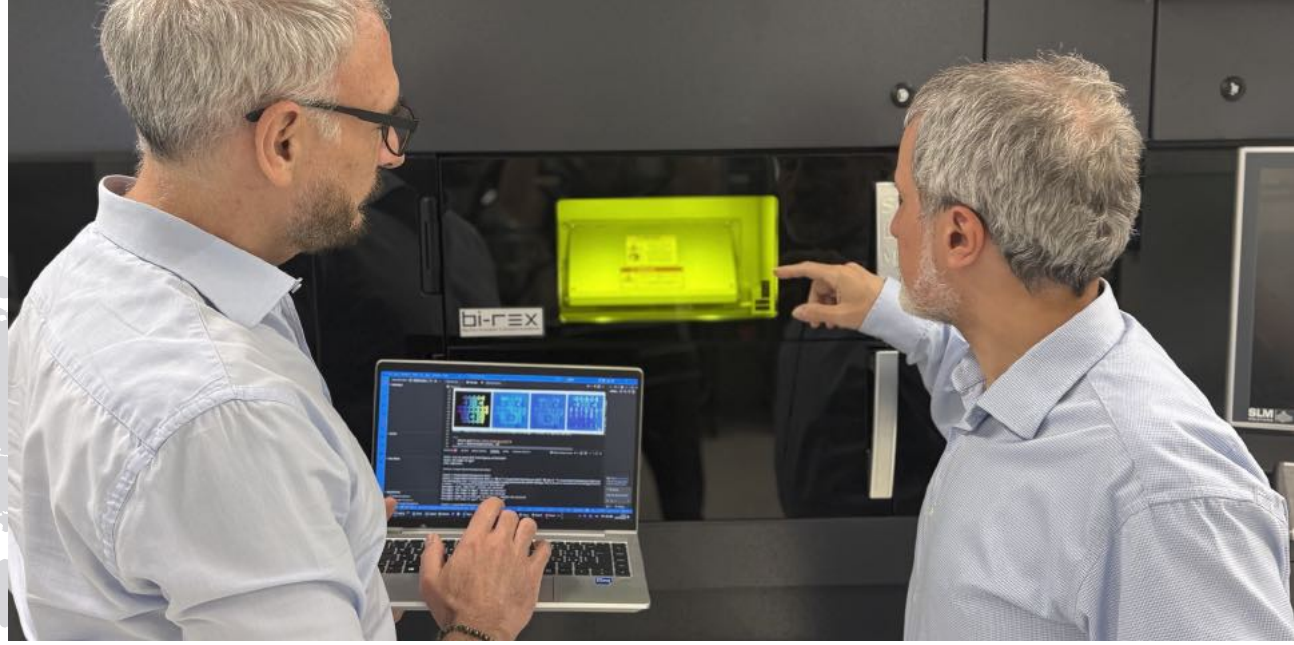
RobTrack has advanced from a robotised welding platform into a scalable digital engineering solution that combines HPC simulation with AI process intelligence. A 40-case study now runs in about 1.5 hours instead of 2.5 days, helping qualification and process development move from weeks to hours and enabling up to 200x faster campaigns. This improves customer response, supports concurrent projects and reduces dependence on scarce simulation expertise. Integration with Siemens technologies gives access to an estimated initial market of around 2,000 users, with projected revenue growth from €2 million to almost €26 million within six years.

Customers gain more predictable production outcomes, lower engineering effort and operational cost reductions of around 60%. Avoiding physical trials with HPC-based virtual testing can cut material waste and associated CO_2 emissions by up to 90%. Even a 1% scrap reduction on a €10 million production line could save about €100,000 each year.

BUSINESS BENEFITS

- HPC enables a typical 40-case study to run in about 1.5 hours (reduced from 2.5 days).
- Up to 200x faster welding qualification and process development.
- AI predictions of weld cooling rates show over 98% accuracy.
- Siemens collaboration opens an estimated market of around 2,000 users.
- Up to 90% less material waste and CO_2 from fewer physical trials.

GENERATIVE AI FOR ADDITIVE MANUFACTURING



Technology used: HPC, AI
Industry Sector: Manufacturing

ORGANISATIONS

BitBang is an Italian SME specialising in data, analytics and AI, helping manufacturers turn complex operational data into actionable insights. They have partnered with technology expert **BI-REX** - a public-private consortium focused on Big Data, advanced manufacturing, technology transfer and industrial digital innovation. It it is one of Italy's eight competence centers supporting industrial innovation.

THE CHALLENGE

Additive manufacturing runs can last hours or days, especially for complex parts made from materials such as titanium. A last-minute failure in production wastes material, energy and machine time. Industrial printers generate instrument data, but many SMEs lack the AI expertise and computing power to train reliable multimodal models. BitBang's cloud stack made experimentation possible but too slow and costly, so HPC was essential to accelerate the solution.

THE SOLUTION

BitBang developed a SaaS platform that connects live printer sensor data and layer images to AI models, returning real-time failure forecasts so operators can intervene. Its pipeline combines pre-trained Chronos time-series models with GAN-based image analysis.

EuroHPC's Leonardo system provided about 14,000 GPU hours to train, fine-tune and compare models on large heterogeneous datasets, delivering the speed, scale and model quality needed for a robust deployable service.

THE IMPACT

The experiment enables BitBang to move from project-based analytics towards a repeatable industrial SaaS product, with recurring revenue from annual subscriptions, pay-per-model access and specialist services. Indicative pricing of approximately €10,000 per customer each year (plus up to €40,000 for configuration, model adaptation and support) creates a scalable route to market and strengthens BitBang's position as an HPC-enabled AI provider for manufacturing SMEs.

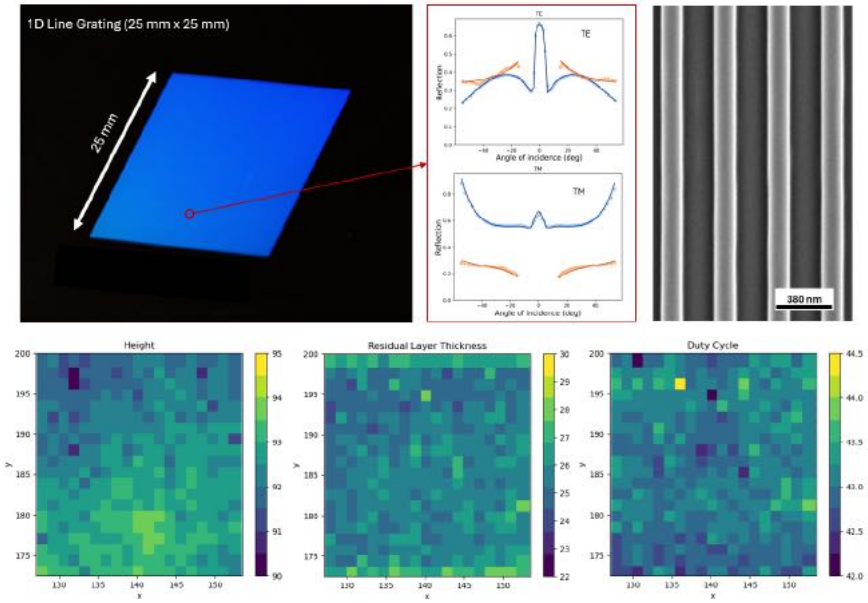
For additive manufacturers, earlier warning that a build is likely to fail can reduce failed prints and high-value material waste by 20-30%, protecting titanium and other costly inputs. Predicting failure before completion can also save several days of machine time on complex prints, reduce rework and energy use, improve production scheduling and machine-capacity planning, and support new joint offerings with 3D-printer vendors. It also makes advanced predictive models accessible without costly in-house AI infrastructure.

BUSINESS BENEFITS

- 14,000 GPU hours enabled scalable multimodal model training and fine-tuning.
- €10,000 annual SaaS subscription revenue expected per customer.
- Up to €40,000 per customer from model adaptation and specialist services.
- 20-30% fewer failed prints and less high-value material waste.
- Several days of machine time saved by predicting failures before completion.

SEMICONDUCTOR METROLOGY WITH NANOMETRE PRECISION POWERED BY HIGH-PERFORMANCE COMPUTING

Technology used: HPC, AI
Industry Sector: Manufacturing



ORGANISATIONS

TeraNova is a Dutch SME developing metrology and non-destructive inspection systems for functional nanostructures. Its instruments support quality control in photonics and electronics manufacturing. **81Watts**, an Estonian DeepTech SME specialising in HPC, AI and mathematical modelling, is the Technology Expert, developing computational workflows and integrating it with EuroHPC resources.

THE CHALLENGE

Manufacturers of large-area wafers for photonics, metasurfaces and augmented reality must verify nanostructures to within a few nanometres and recover detailed geometry quickly. Each optical measurement requires repeated simulations across large parameter spaces. Conventional workstations lack the speed, convergence and throughput required for scalable, production-grade inspection, constraining industrial deployment now.

THE SOLUTION

TeraNova and 81Watts combined optical measurements with physics-based simulations, automated fitting and machine-learning-assisted initialisation. The Deucalion EuroHPC supercomputer ran data preparation, synthetic-data augmentation, model training, inference and parallel fitting, using about 6,400 GPU-hours and 10,000 kCore-hours. HPC enabled larger parameter searches, improved convergence and cut processing time by around 40% versus a standard desktop PC.

THE IMPACT

The experiment strengthens TeraNova's commercial position by adding proven HPC-enabled capabilities to its LabScatter and AutoScatter metrology systems. Processing approximately 40% faster than on a retail PC makes the workflow better suited to production environments, where inspection speed, repeatability and scalability influence adoption.

By parallelising computationally intensive simulations and fitting, HPC removes a key bottleneck and supports higher-throughput, nanometre-precision quality control. Manufacturers can shorten inspection cycles, identify process deviations earlier and obtain richer information on nanostructure geometry without destructive testing. This supports customer acquisition and revenue growth in photonics, augmented reality, metasurfaces and advanced optical manufacturing. The project also expands 81Watts' expertise in HPC-enabled metrology, creating opportunities to apply similar methods in other industrial quality-assurance markets.

BUSINESS BENEFITS

- Cut computation time by around 40% compared with a standard PC.
- Used 6,400 GPU-hours and 10,000 kCore-hours on Deucalion.
- Improved fitting convergence by exploring larger parameter spaces.
- Scaled LabScatter and AutoScatter for higher-throughput quality control.
- Opened new opportunities in photonics, AR and advanced optical manufacturing.

COMPETITIVENESS IN THE DESIGN OF ROWING BOATS USING AI AND HPC

Technology used: HPC, AI, CFD
Industry Sector: Manufacturing, Sport

ORGANISATIONS

Filippi Boats is an Italian SME producing Olympic and Paralympic-class rowing boats for elite crews. **81Watts** is an Estonian AI technology expert, specialising in HPC, AI and mathematical modelling. Researchers from **Politecnico di Milano** are the fluid-dynamics experts, supporting design of hull models and performance targets. **NTUA** provides HPC expertise and contributes to the advanced simulation, stochastic optimisation and workflow integration.

THE CHALLENGE

Elite rowing requires marginal gains in hull resistance, stability and efficiency. Similarly, paralympic crews may need individual configurations. Standard hull families and engineering judgement made traditional design too slow and costly to assess hundreds of variants. Filippi needed faster customisation before fabrication with less risk. HPC was essential for high-fidelity CFD simulations and AI training at the scale required.

THE SOLUTION

The partners created an HPC-enabled workflow that automated mesh generation and OpenFOAM CFD simulations for hull parameters and performance targets. The Deucalion cluster provided up to 64 CPUs and eight NVIDIA A100 GPUs, allowing many designs to run in parallel across more than 700 compute hours. The results trained AI surrogate models for rapid predictions. NTUA combined these with sensitivity analysis and stochastic optimisation to identify crew-specific hull configurations.

THE IMPACT

Filippi can now replace judgement-led design with a validated, simulation-backed process before fabrication. The HPC workflow cuts the design cycle from about 20 days to around three days, an 85% improvement, while reducing trial-and-error, technical risk and the cost of customised racing shells. Engineers can compare crew-specific configurations at scale and respond faster to elite customers, strengthening Filippi's premium offer in Olympic and Paralympic rowing.

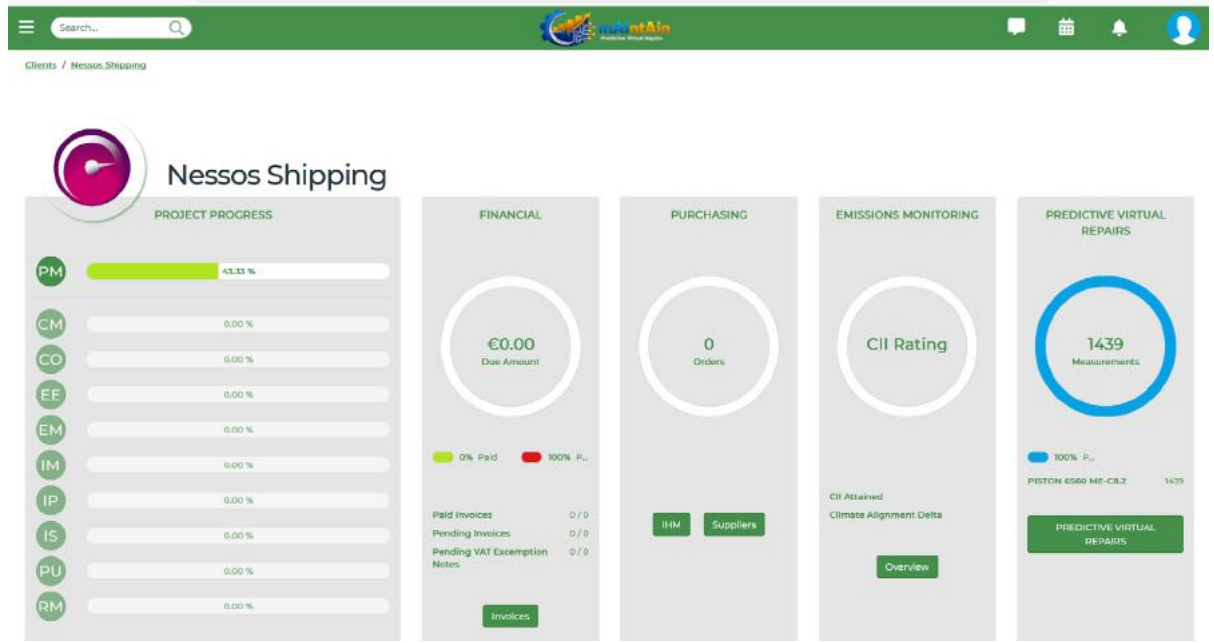
The capability supports growth in export markets, including the USA and Asia, with evidence that a selected hull suits the athlete, crew and competition goal. For Paralympic rowers, more individualised assessment increases confidence that stability, efficiency and performance needs are addressed.

81Watts has gained reusable expertise in CFD, HPC workflows and AI surrogate modelling, creating further consultancy and collaboration opportunities. Integrating the workflow into design and fabrication makes advanced optimisation repeatable and commercially scalable.

BUSINESS BENEFITS

- Design cycle reduced from about 20 days to three days, an 85% improvement.
- HPC-enabled CFD assesses many hull variants in parallel before fabrication begins.
- Crew-specific designs improve responsiveness to Olympic and Paralympic customers.
- Simulation-backed optimisation lowers technical risk for premium customised boats.
- Filippi targets USA and Asian growth; 81Watts gains reusable HPC and AI expertise.

AI-ENABLED PLATFORM FOR MONITORING AND MAINTENANCE OF INDUSTRIAL EQUIPMENT



Technology used: HPC, ML, FEM
Industry Sector: Maritime

ORGANISATIONS

Nessos is a Greek independent software vendor, specialising in cloud, web, mobile and enterprise systems. As Main Participant and ISV, it leads development and commercialisation of the mAIntAIn platform. **MGroup at the National Technical University of Athens** is the Technology Expert, providing advanced numerical modelling, physics-informed simulation and HPC expertise.

THE CHALLENGE

Maritime operators rely on complex machinery but often manage maintenance through fragmented OEM systems, monitoring tools and data pools. This limits fleet-wide visibility, slows technical triage and leaves engineers dependent on manual judgement, increasing downtime, repair costs, port delays and compliance risk. High-fidelity simulation and AI training are too computationally intensive for conventional workstations.

THE SOLUTION

mAIntAIn combines a three-tier Azure platform with HPC batch analytics. Curated equipment data feeds physics-informed digital-twin simulations using MSolve, while large parameter sweeps assess sensitivity and uncertainty.

AI workflows reduce complex model outputs and forecast equipment behaviour. HPC enables many high-fidelity models to be calibrated across configurations and operating regimes quickly, without sacrificing accuracy through simplification.

THE IMPACT

Commercialising mAIntAIn gives Nessos a differentiated offer for maritime and other asset-heavy industries, where reliability and compliance influence purchasing. Combining HPC-enabled physics models, AI and operational workflows, the platform moves beyond generic alarms to provide explainable risk, anomaly and degradation indicators. Validation with two maritime companies strengthens market readiness and supports new customers, renewals and higher-value contracts through ERP, maintenance and equipment-vendor integrations. The capability can also extend to industrial plants and energy.

For users, a unified view of measurements, diagnostics, predictive indicators and actions can reduce technical issue triage time by approximately 20-30%. HPC accelerates simulation and model-calibration cycles by approximately 5-10 times versus workstations, making repeated high-fidelity analysis practical across machinery and conditions. Earlier detection and traceable evidence can reduce unplanned downtime and maintenance costs while enabling faster, consistent and auditable fleet-wide decisions.

BUSINESS BENEFITS

- Validated with two maritime companies, improving commercial readiness.
- 20-30% faster technical issue triage through unified predictive insights.
- 5-10x faster simulation and model calibration than workstation processing.
- Expected to create 2-3 technical jobs across the SME ecosystem.

FROM SUPERCOMPUTER TO SURGEON'S DESK: SAFER AORTIC SURGERY

Technology used: HPC, FEM, AI
Industry Sector: Medicine

ORGANISATIONS

LivGemini develops software for cardiovascular surgical planning. **RBF Morph** is the technology expert for mesh morphing and simulation. **The University of Rennes** and affiliated hospital surgeons are the clinical domain experts, contributing imaging and cardiovascular knowledge. **INSA Lyon** is the biomechanics expert, specialising in vascular graft materials and linking engineering evidence with clinical needs.

THE CHALLENGE

Around 20% of vascular graft procedures require secondary intervention because grafts are poorly adapted, compromised or incorrectly sized. Surgeons need patient-specific predictions of graft deformation after suturing, but high-fidelity finite-element analysis can take days on a workstation. Testing anatomical and graft variations requires many simulations in parallel, making HPC essential for clinically acceptable speed and scale.

THE SOLUTION

PANDORA used 900,000 core-hours on the Leonardo supercomputer to create a virtual population of 3D aortic anatomies and run commercial graft implantation simulations in parallel. HPC produced the varied training data that standard workstations could not generate in practical timescales. The results were distilled into an AI surrogate model in LivGemini's software, predicting graft behaviour in seconds, while a classifier flags unreliable configurations before use.

THE IMPACT

LivGemini gains a differentiated digital-health product: secure, on-site software that turns HPC-derived biomechanical evidence into rapid graft assessment. Converting research-grade simulation into a clinical workflow creates an estimated €8.8 million annual recurring revenue opportunity within four years and strengthens its position in personalised cardiovascular care.

Surgical teams can compare graft options, sizing and post-suturing deformation before operating, improving traceability and reducing reliance on generic guidance. Subject to clinical validation, more precise matching could help reduce avoidable complications and secondary interventions, which affect around 20% of procedures. Each avoided aortic re-intervention is estimated to save €25,000-30,000 in repeat surgery, intensive care and extended stays. PANDORA also shows how HPC-generated evidence can advance validated in-silico methods for medical devices, while clinicians use the resulting model locally without direct supercomputer access.

BUSINESS BENEFITS

- HPC cuts high-fidelity graft prediction from days to seconds.
- Surgical planning falls from 40-50 minutes to under 5 minutes.
- Improved graft matching targets the 20% secondary-intervention burden.
- Each avoided re-intervention could save hospitals €25,000-30,000.
- Commercial sales are predicted to generate €8.8 million annual recurring revenue in four years.

Funded by
the European Union

EuroHPC
Joint Undertaking

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The JU receives support from the Digital Europe Programme.

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LIST OF ABBREVIATIONS

3D	3-dimensional
AI	Artificial Intelligence
AR	Anti-Reflective Coating
BiLSTM	Bidirectional Long Short-Term Memory
CCUS	Carbon Capture, Utilization and Storage
CFD	Computational Fluid Dynamics
CFRP	Carbon Fiber Reinforced Polymers
CO_2	Carbon Dioxide
CPU	Central Processing Unit
CSM	Computational Structural Mechanics
CV	Curriculum vitae
DED	Directed Energy Deposition
EU	European Union
ERP	Enterprise Resource Planning
FEM	Finite Element Method
GAN	Generative Adversarial Network
GPU	Graphic Processing Unit
ha	Hectare
HPC	High-Performance Computing
HR	Human Resources
ISO	International Organization for Standardization
ISV	Independent Software Vendor
IT	Information Technology
JSON	JavaScript Object Notation
kg	kilogram
km/h	kilometre per hour
ML	Machine Learning
MWp	Megawatt peak
NLP	Natural Language Processing
OEM	Original Equipment Manufacturer
ORC	Organic Rankine Cycle
PC	Personal Computer
R&D	Research and Development
rpm	revolutions per minute
sCO_2	Supercritical CO_2
SME	Small and Medium-Sized Enterprise
UK	United Kingdom
USA	United States of America
WHR	Waste Heat Recovery
xEMS	Extended Energy Management System

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