



FFPLUS SUCCESS STORY: BUSINESS EXPERIMENTS

HPC AND AI FOR PRECISION ENGINEERING IN WELDING

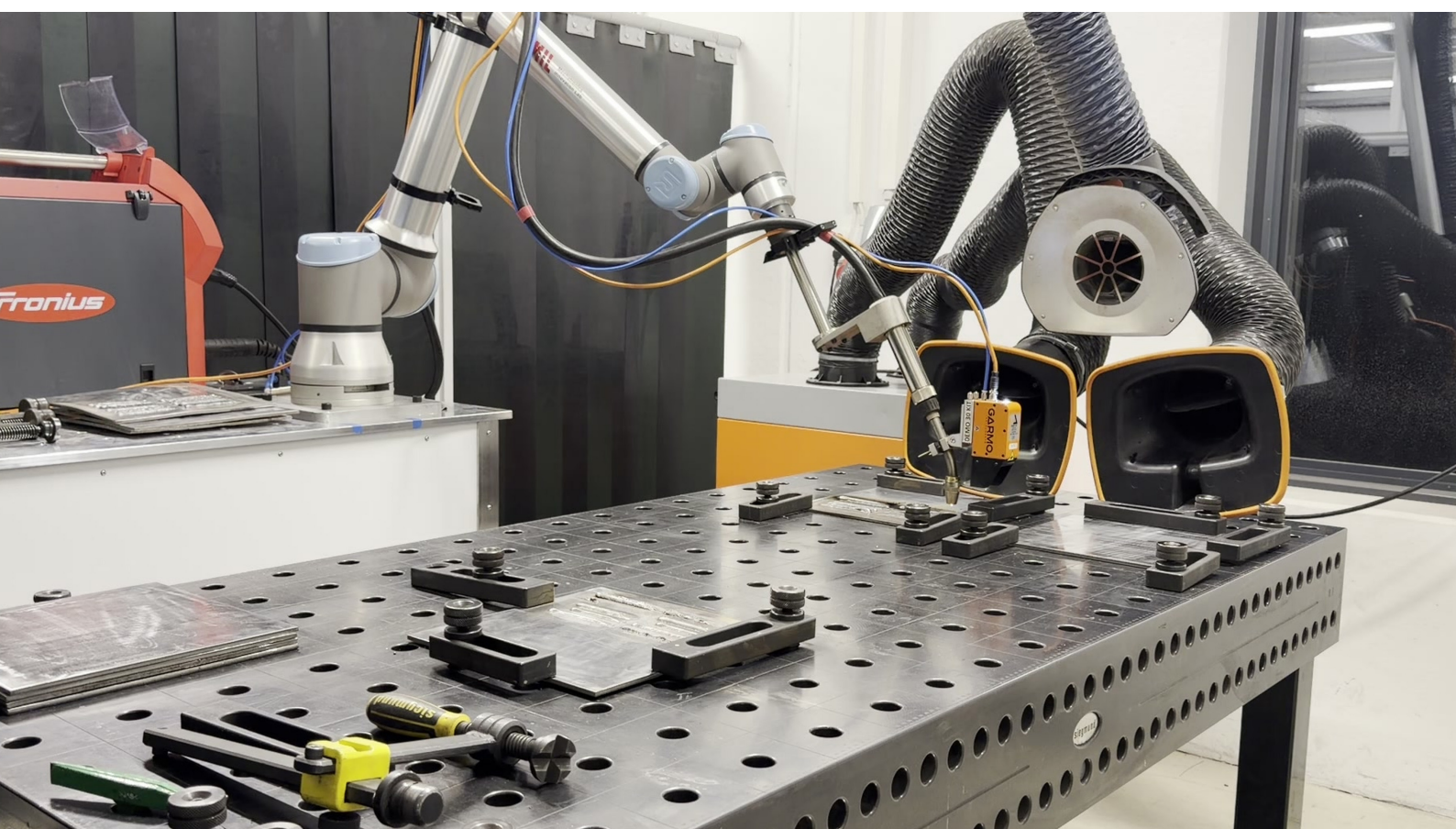
ORGANISATIONS

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.



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

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 CO₂ emissions by up to 90%. Even a 1% scrap reduction on a €10 million production line could save about €100,000 each year.

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 CO₂ from fewer physical trials.



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