

NCC SLING Success Stories: A Case of Collaboration with the Company Comtrade 360 d.o.o.

Study of AI-enhanced Production Screening

Comtrade 360 d.o.o. is a Slovenian IT company. We provide advanced custom software development and technology solutions, including data management, cloud & hybrid cloud platforms, cybersecurity, AI/ML, and monitoring analytics.

Technical Challenge

The challenge was to predict cryocooler lifetime using limited labeled data and diverse multivariate telemetry from multiple test phases. Traditional destructive lifetime testing is expensive and slow. The team required high-performance computing and AI to analyze large-scale time-series datasets, address class imbalance, and build robust models that extract meaningful features for accurate early-stage lifetime predictions.

Solution

The team developed an HPC-enabled AI pipeline using self-supervised Transformer models and large-scale NAS experiments to learn robust representations from diverse telemetry data. While awaiting various approvals and EuroHPC infrastructure access, NCC Slovenia provided us a small scale HPC infrastructure to start working on the project, getting to know HPC systems and procedures.

This early boost allowed the team to validate data pipelines, run initial AI models, and de-risk the technical approach before scaling to EuroHPC systems.

Business impact

Using HPC transformed the project's ability to develop reliable lifetime-prediction models for cryocoolers. Traditional destructive testing is slow and expensive, limiting production throughput and delaying qualification. By leveraging HPC-accelerated AI, the team can now extract meaningful insights early in the manufacturing process, increasing confidence in quality while reducing reliance on costly lifetime tests.

Benefits

- Significant reduction in destructive lifetime testing and related costs.
- Faster model development through HPC parallelism.
- Early access to HPC infrastructure accelerates R&D and reduces workflow risks.
- More reliable, data-driven quality assessment throughout production.

High-level Desing of Comtrade's Developed Model

