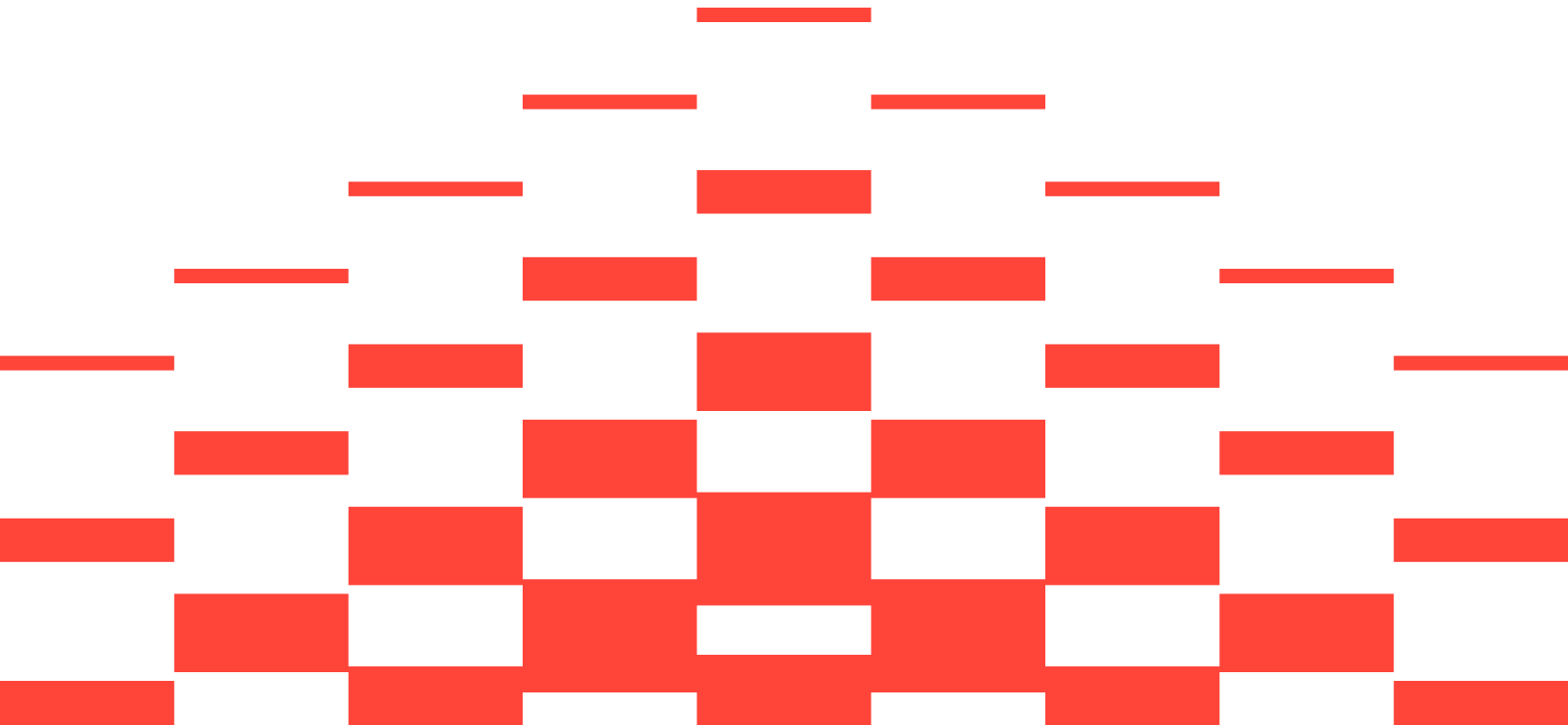Case Study

Revolutionizing Container Terminal Transportation

FERNRIDE Pioneers Safe Autonomous
Terminal Tractors with QNX Software

Customer Background

FERNRIDE, based in Munich, Germany, offers automation solutions for port and yard logistics that aim to increase productivity, promote sustainability, and improve worker safety. The company employs a human-assisted autonomy approach, which allows for remote takeovers of trucks when necessary. This enables seamless integration and reliable operations for logistics operators. FERNRIDE is pioneering a new safety concept for autonomous terminal tractors. With this initiative, the company is enabling efficient and safe operations at scale by removing the safety driver that is currently present in the cabin to provide an additional safety layer.

FERNRIDE is on a mission to meet the global demand for automated logistics operations while meeting high safety standards in autonomous terminal tractors in private logistics yards like container terminals and distribution centers. To this end, FERNRIDE is currently working on advancing its product towards compliance with the European Machinery Directive (Directive 2006/42/EC) and EU Declaration of Conformity (CE Marking) in the field of autonomous logistics, which is required for scaling in the EU. Their use cases include solutions where safety is non-negotiable, including maritime container terminals, distribution centers, and yard shunting for logistics centers, with the current focus on automating horizontal transportation in container terminals.

FERNRIDE understands that their logistics customers cannot afford any disruptions in their operations, so in developing their solution, the company needed to focus on performance and availability, along with alignment with safety standards. It was important to choose a software foundation that would deliver those values at the outset.

Naturally, uptime, reliability, scalability, and cost efficiency would be crucial factors in their software choices, as these are non-negotiable in their industry.

Highlights

- **Safety First:** FERNRIDE prioritizes the safety of their autonomous solution by using QNX® software to create a safe compute platform and to enable safe operations on their customer sites.

- **Regulatory Compliance:** The pre-certified QNX software provided the safe software, training, and support to help FERNRIDE work towards meeting the stringent EU safety regulations and CE compliance.

- **Reliability and Uptime:** FERNRIDE's customers cannot risk any disruptions, so the company takes a human-assisted approach to autonomy to enable the highest reliability in live operations.

- **Faster Time-to-Market:** QNX is helping FERNRIDE achieve the required compliance more quickly and cost-effectively, accelerating their time to market.

The Challenge

Enabling Safety and Efficiency

In the logistics industry, terminal tractors are powerful specialized vehicles designed for yard shunting or moving trailers and containers within confined areas such as shipping yards, container terminals, and logistics centers. With the pressing challenges of driver shortages, thin profit margins, and the need to increase efficiency, the industry turns to automation. FERNRIDE delivers just that by offering autonomous terminal tractors complemented by an additional reliability layer—a remote human operator that oversees the fleet. The company calls it 'human-assisted autonomy'. This approach allows for the remote control of trucks when necessary and enables seamless integration and reliable operations from day one. Currently, a safety driver is present in the truck during live operations as an additional safety layer.

So, FERNRIDE's next goal is to remove the safety driver and to scale their operations with customers. To achieve that, the FERNRIDE system must be safe to operate in the mixed-traffic environments found in container terminals, where autonomous terminal tractors operate alongside manual trucks, external trucks, container handling equipment, and humans.

The main objective for FERNRIDE was to establish the safety of the entire system, which included a safe compute platform and a safe operating system. This meant for their autonomous terminal tractor solution, they needed a software provider that was recognized for its strength in the automotive industry and that could provide a software foundation with certification conducted by TÜV.

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> **The availability and high performance of the solution are crucial to our customers. They cannot afford any disruptions in operations, even when introducing innovative technologies. This is why, at FERNRIDE, we take a phased approach to implementation and deliver the highest reliability with our human-assisted autonomy. A remote operator overseeing the fleet can be looped in any time to handle exceptions or special cases. In this way, we deliver a highly reliable solution to our customers.**
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> Thomas Bock, CTO at FERNRIDE.
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FERNRIDE needed a software provider that had pre-qualification, experience, and could provide support and training. These factors would contribute to the company's goal of achieving safety certification for its autonomous terminal tractor solutions faster and cost-effectively.

> **Safety is a non-negotiable priority at FERNRIDE. Additionally, removing the safety driver from the cabin of our autonomous terminal tractors unlocks the path to scaling with our customers. To do this, we need to authoritatively prove that the entire system is safe, and among other things, this traces down to a hard requirement that we have a safe compute platform and with that a safe operating system.**

John Hughes, Sr. Engineering Manager from FERNRIDE.

Prioritizing a Safe Software Foundation

When selecting a real-time operating system (RTOS), FERNRIDE prioritized safety while also enabling compatibility with their existing expertise. Choosing a POSIX-compliant solution allowed their engineering team—already well-versed in Linux development—to leverage their existing knowledge and transition efficiently without extensive retraining. Other important factors included the availability of training, process isolation, and out-of-the-box networking capabilities.

QNX was the obvious choice because of its ability to deliver reliability, security, and a robust safety-certified real-time OS. The fact that the QNX® networking stack is based on a BSD/Unix implementation was helpful to FERNRIDE engineers as it offered portability, modularity, security, and exceptional performance.

During the selection process, FERNRIDE also considered open-source solutions for their operating system. But they ultimately compartmentalized their product solution into two areas: a safe solution based on QNX® software with safety-qualified hardware and a non-safety portion based on Linux.

The Solution

Building A Safety-Certified Software Stack

In early 2023, FERNRIDE selected QNX® OS for Safety, which is pre-certified by TÜV to ISO 26262 ASIL D. They recognized that QNX was an ideal fit because of QNX's strength in the automotive industry and that QNX provided foundational software that aligned with FERNRIDE's goals of offering safe autonomous solutions.

Through the discovery, purchasing and implementation phases, the two companies developed a strong professional relationship built on trust and mutual respect. FERNRIDE and QNX were in constant communication regarding progress and technical developments, with QNX consistently supporting FERNRIDE, providing assistance and guidance.

QNX software would be a key component of the safety layer in FERNRIDE's solution, as it could provide the low latency, performance and scalability that would serve FERNRIDE innovations today and into the future. FERNRIDE implemented the QNX OS for Safety and a QNX® CI/CD build server and made use of QNX® support and training.

The Result

High Performance, Uncompromised Safety

The FERNRIDE solution made use of QNX software to create a safe autonomous system and remove drivers from hazardous areas like container terminals and shipping yards. With the successful evaluation of FERNRIDE's safety and security concept in 2024 by TÜV SÜD, the QNX solution is now helping FERNRIDE work towards compliance with the European Machinery Directive (Directive 2006/42/EC) and EU Declaration of Conformity (CE Marking) in the field of autonomous logistics for their autonomous terminal tractors.

With QNX, FERNRIDE was able to move forward into the validation testing phase, which included a complex series of tests required to achieve compliance with the European Machinery Directive and CE conformity. FERNRIDE was able to switch over to QNX OS for Safety with no technical issues, which they attribute to the QNX design and their own careful selection of components. The company also had a positive experience with the QNX on-site training, which was thorough and expertly delivered by a seasoned QNX trainer.

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Switching to development for QNX from Linux was easy, and was aided by the POSIX layer, which provided familiarity and easy portability.

John Hughes, Sr. Engineering Manager from FERNRIDE.

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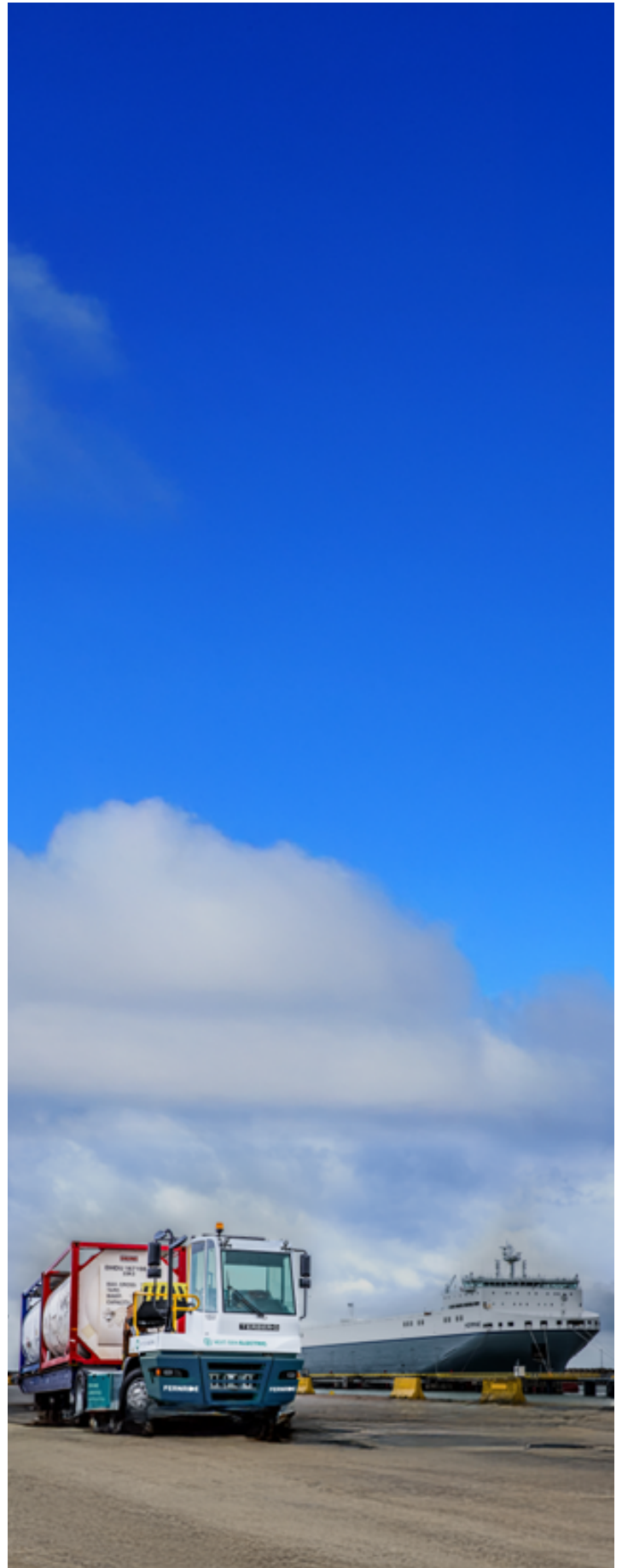
Why Choosing QNX Paid Off

FERNRIDE achieved significant time and cost savings by opting for pre-certified software from QNX. By using a commercially managed, certified RTOS, supported by a company with extensive expertise and comprehensive support and training, organizations can mitigate the risks associated with certifying an operating system in addition to the rest of the software stack. By choosing pre-certified software, companies can save time and costs, which enables them to focus more on innovation rather than OS certification. This was precisely the case for FERNRIDE. By choosing the QNX OS for Safety, they were able to meet their deadlines efficiently, with the confidence that their critical system maintained the highest safety standards.

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Choosing the certified operating system from QNX meant we were able to shorten the timeline for getting the entire technology stack for our solution certified. If we had to certify an open-source operating system for our safe solution, our timelines and roadmap would probably look different. As a startup, we need to be mindful of our resources and spend less without compromising the quality of the outcome—both in terms of time and money.

Thomas Bock, CTO at FERNRIDE.

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About FERNRIDE

FERNRIDE offers scalable automation solutions for yard trucking that increase productivity, promote sustainability, and improve worker safety. The company employs a human-assisted autonomy approach, which allows for remote takeovers of trucks when necessary. This ensures seamless integration and reliable operations for logistics operators. With more than a decade of research and high-profile customers, including Volkswagen, HHLA and DB Schenker, FERNRIDE uses advanced technology to address major industry challenges, such as driver shortages and the negative environmental impact of logistics operations.

The company was founded by Hendrik Kramer, Maximilian Fisser, and Jean-Michael Georg, and currently has over 150 employees.

www.fernride.com →

QNX | FERNRIDE

About QNX

QNX, a division of BlackBerry Limited, enhances the human experience and amplifies technology-driven industries, providing a trusted foundation for software-defined businesses to thrive. The business leads the way in delivering safe and secure operating systems, hypervisors, middleware, solutions, and development tools, along with support and services delivered by trusted embedded software experts. QNX® technology has been deployed in the world's most critical embedded systems, including more than 255 million vehicles on the road today. QNX® software is trusted across industries including automotive, medical devices, industrial controls, robotics, commercial vehicles, rail, and aerospace and defense. Founded in 1980, QNX is headquartered in Ottawa, Canada.

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