

**Project**  
Scalable platform for  
frequency converters

A leading manufacturer of industrial automation solutions, developed a powerful drive platform that is compact, flexible, efficient and more secure.

# Secure OTA firmware update capability for frequency converters

## Next-gen means new markets

Our client’s long-time product had already been successful for two decades, serving industries like food production, HVAC, cranes, and elevators. And the new-market usage potential for heavy industries like mining, metal, material handling, and marine was steadily growing.

But to conquer these new markets would require a more powerful and flexible next-gen version of their product line. The product provided flexibility and configurability to its users, but to improve performance the new frequency converter platform would need to be more open and securely connected.

The client had two primary goals: (1) Make the drive configuration and application writing process easier for technicians, and (2) create the ability to remotely, yet securely, update drives.

## Over-the-air firmware updates

Proekspert was trusted with both tasks: to develop a secure remote firmware update infrastructure and to develop software for the selection of drive option cards.

## Developing secure firmware update infrastructure

To build secure over-the-air firmware update functionality, we needed to consider a multi-layered security system, like firewall, OT (operational technology) network, and drive-level security checks. And all of this had to be combined with firmware-, application-, and user authenticity verification.

Since the new platform had to be highly modular and consist of dozens of different hardware modules, the firmware update functionality also had to be able to support all those modules in a variety of drive setups. Also, due to the platform’s software architecture, the software update had to be script-free and rule-based.

## Developing drive option cards

The most exciting challenge for our engineers was the data-driven architecture used for the first time to develop the electric motor drive platform, as well as the fascinating peculiarities that occur when developing a new hardware product, like the limits and constraints set for software engineers due to FPGA technology.

Developing low-level signal processing functionality for option cards was required to integrate various first- and third-party sensors that measure environmental parameters like temperature, vibration, and the voltage of large electrical motors. Also, grid and drive parameters are constantly measured. Aside from continually monitoring system health, some option cards analyze motor feedback to automatically identify its type. This is needed for aligning the drive with the required technical parameters of electric motors from different manufacturers.

## Deeply integrated engineering teams working on base model

Throughout the development, the Proekspert team was closely integrated with the customer’s development teams, where we participated in the development of the base product and were entrusted with unique complex integrations and technical challenges. In addition, we actively participated in the test token system, where Proekspert- and client teams took turns tracking down and eliminating time-critical errors that typically occur in development.

## With the modular drive control architecture, our client can focus on growth

Our client now has a new, more compact, more secure, and more powerful drive platform. It is easier to engineer, assemble and install. The drive has better performance, better connectivity and is more energy efficient.

Machine engineers now get the flexibility they need. They can run all drive applications as optimally as possible. They can configure the drive to do exactly what they want. They can scale up functionality. Also, these drives can be flexibly accessed from any device.

The drive platform is easy to configure for a huge number of different motors and systems. This extends the life of the system which makes the new drive platform future-proof for decades to come.

## Impact for the client business

Our client’s product platform is market-ready with full specifications for a wide range of next-generation drives.

- The product is capable of serving new segments in industries that use heavy electric motor equipment.
- The product users get the extended flexibility they need.
- The product has a long lifetime thanks to future-proof configurability.

**Competencies**

|                                                   |                                                            |
|---------------------------------------------------|------------------------------------------------------------|
| Secured firmware update                           | Connectivity                                               |
| 3rd party libraries / Middleware                  | DevOps                                                     |
| Embedded software design and development          | Test automation for embedded systems                       |
| Multi language/region systems                     | Integration with enterprise and 3rd party systems and APIs |
| Data driven development                           | Pre-production testing                                     |
| Industrial and automation communication protocols | Sensors                                                    |