



## One platform - a thousand solutions

When Danfoss Power Electronics decided to develop a new generation of variable speed drive solutions for motion control and frequency converters, they also decided to outsource the software development to an external party. The project was awarded to Proekspert in Tallinn, Estonia.

Danfoss Power Electronics has been providing frequency converters for more than 30 years and is one of the leading global suppliers with manufacturing facilities in Europe, China and the USA.

Frequency converters are a critical component in numerous applications. When driving your car through the Monte Carlo tunnel in Monaco, the frequency converters from Danfoss ensure that the fans are providing the exact amount of fresh air required to make your journey safe and pleasant. When you enjoy the comfort of air-conditioned conference facilities in Rome, Danfoss frequency converters ensure that the energy consumption associated with the comfort is kept as low as possible. When you enjoy a cold beer in a cafe in Paris, you can rest assured that Danfoss frequency converters have contributed to making the brewing process stable and efficient.

To serve as many applications as possible with the same hardware and software, Danfoss decided to develop the configurable P400 frequency converter platform. Danfoss engineers develop the hardware, while Proekspert is tasked with the development of the software.

The embedded software that performs the real time control operation of the frequency conversion, is configurable by the Danfoss client. The control settings are stored in a database within the frequency converter. Proekspert has developed the software, which any user of a solution based on P400 can use to alter the configuration, monitor status and maintenance information as well as generate reports on operational conditions and performance.

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Proekspert provides a team of highly qualified software experts, eager to improve the value of what the final product will do for our clients.



Niels Falkenberg, Vice President, R&D  
Danfoss Power Electronics A/S

### THE DANFOSS GROUP

Danfoss is a **world leader** in research, development and production of mechanical and electronic components and solutions which help heating and cooling homes and offices, refrigerating food and control production lines.

Danfoss combines innovative mechanical design with electronics and software to provide solutions for customer-specific needs.

Danfoss is one of Denmark's largest industrial groups with an annual revenue of **3.6 billion EUR** (2008), employing over **50,000 people**. Through subsidiaries in **56 countries**, agents, resellers and distributors, Danfoss reaches out to every corner of the globe.

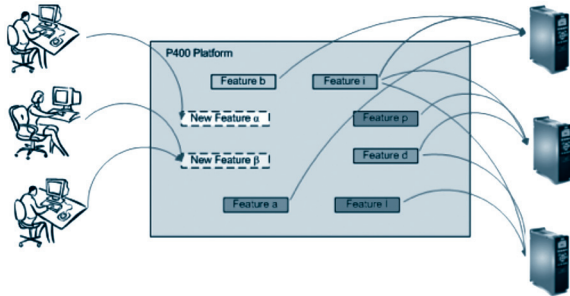


Figure: Illustrated P400 concept

*"The P400 platform is a mission-critical part of a broad range of products which we are offering to the market." - Thomas Fogdal, Embedded Software Platforms Manager with Danfoss Power Electronics. "Proekspert is virtually a part of the development team and has been vital in providing support for the design and development of the software components. Beside being highly skilled software architects, designers and developers, they also react very swiftly when critical situations require attention."*

Proekspert has been using the Danfoss development methods and tools throughout the project. The project has been working with weekly delivery cycles and the communication between the three locations (Denmark, Estonia and USA) has taken place in the form of weekly conference calls and monthly project management meetings.

Proekspert has also been working directly with Danfoss clients in the implementation of P400 based frequency converters in specific applications. For a particular brewery application, the production control environments were replicated at the Proekspert laboratories in Tallinn.

*"Outsourcing such a critical section of a product that is also a major revenue generating solution for Danfoss is a delicate endeavor," says Niels Falkenberg, Vice President of R&D with Danfoss Power Electronics. "Proekspert has proven that they understand the industrial automation environment and the implications for software development. They continuously add value to the features and performance of the software portion related to the P400 range of our frequency converters."*

## PROJECT OVERVIEW

### Customer:

Danfoss Power Electronics A/S

### Project:

P400 frequency converter platform

### Project objectives:

Development of a configurable frequency converter platform which can be adapted and managed by the user to perform within different environments and applications

### Project life cycle:

The project was started in 2001 and has continued to the present day

### Project volume:

28 man years and ongoing

### Competencies:

- High level detailed design specification
- Project management
- Solution architecture
- System design
- Assembler programming – ARM, THUMB, AVR, x86
- PC software development – MS Windows MFC, Qt, Java
- UI development
- Testing and QA

### Methods:

Danfoss Standard Software Product Line Process Model

### Locations:

Denmark, Estonia and USA

Proekspert is a value adding provider of software engineering services. We contribute to and assume responsibility for the definition of conceptual solution objectives and design, definition of requirement specifications, project management, solution architecture, software design and development, documentation, QA, updates, training and ongoing support.