

ENGINEERING
TOMORROW

Danfoss

Global Application Development Centers

Creating and **proving**
solutions to customer challenges



A truly global team
working for

you.

ACHIEVING SUCCESS,

TOGETHER

Thriving in today's marketplace is more than meeting customer challenges. It's surpassing expectations by creating innovative solutions that help customers achieve more by using fewer resources. It's working faster than your competition to deliver the equipment we all depend on to harvest our food, build the infrastructure of our cities, enable us to live comfortably, and make the most efficient use of our resources.

ADC

At Danfoss global **Application Development Centers (ADCs)**, we're creating new ways to maximize the value, efficiency, and productivity of equipment like yours — and we're ready to work with you on the specific challenges you face. Together, we can develop new ways to optimize your machines' key systems — and then test, prove, demonstrate, and refine the results. Together, we can reduce the risks you face in system development, manufacturing, and testing. Together, we can quickly and economically get your innovative products to market, where they can stand out from the competition — and make a positive difference.



Solutions that answer tomorrow's challenges

Around the world, Danfoss works to develop innovative solutions benefiting not just the owners and operators of heavy equipment — but all of us.

By combining our talents and skills, we create machines that put food on our tables and shape our cities. By sharing our knowledge and ideas, we help those machines work more efficiently. By pursuing our aspirations, we create solutions that contribute to energy savings and emissions reductions.

DANFOSS **ADCs**:

Proving grounds for **partnerships**



When you work with a Danfoss ADC, you will experience a level of collaboration and application expertise that cannot be replicated in the industry. Regardless of your challenge, we will work with you to efficiently develop innovative solutions that help separate you from your competition and provide real value for your customers.

Collaboration is at the heart of ADCs

Danfoss ADCs thrive on honest communication and close collaboration with our customers. Our team-centric atmosphere is highly conducive to shared goals and achievements, allowing us to challenge the status quo and set higher standards of performance — and deliver on them. It's just one reason why many of our customers consider Danfoss an extension of their internal research and development efforts.

The science lab that works to make discoveries for you

Once we thoroughly understand your challenges and goals, our application knowledge and industry experience is focused on creating solutions with you. During the course of our work, it's not uncommon to discover additional opportunities for product refinement and improvement that you may not have considered — an added benefit of the deep immersion into every project we undertake.

Your vehicles deserve the world's best test environments

In the development of industrial solutions, theoretical and computer-based modeling and testing play essential roles. But there's no substitute for putting actual tires on actual terrain.

Our three ADC proving grounds are unmatched. No one else in our industry has more comprehensive testing capabilities. And at each location, we can simulate the most challenging work conditions. Nearly any vehicle can be evaluated on its ability to brake from high speed on rain-soaked pavement, traverse mud-filled pits, handle extreme grades, and much more. We can even accurately simulate glare ice conditions during the heat of summer. The scenarios on our proving grounds are probably more severe than actual jobsite conditions — but tough testing is necessary to ensure success in the marketplace. When you see how Danfoss-developed system solutions help your machines perform at our test track, you'll know those machines are ready to take on any task — and satisfy any customer.

THE FOUR STEPS OF **ADC SUCCESS**:

DEVELOP



We work with you to understand your applications' unique challenges — and together, we conceptualize and design solutions to overcome them.

TEST



Designs become tangible as we build and integrate solutions into test vehicles to thoroughly assess how they perform.

PROVE



Together, we observe solutions in action on test vehicles and analyze the data, validating component and system performance.

DEMONSTRATE & REFINE



Danfoss-developed solutions are applied to your machines, allowing us to demonstrate and refine systems solutions in real-time based on your feedback.

Danfoss creates **solutions** to industry-wide **challenges**

Our three ADC locations serve the world — and you. Each ADC shares important information with the others, including insights, research findings, engineering breakthroughs, and best practices. By continually adding to this growing library of vital industry knowledge, Danfoss can not only help address your specific machine challenges, but also advise you of other available — and proven — improvements.

► Time to market

Strict emissions regulations, demanding safety standards, and rising fuel economy requirements challenge every manufacturer — and present opportunities for success. Working with Danfoss, you can leverage our deep industry and regulatory knowledge to anticipate new requirements, proactively planning to meet them before the competition. Our independent research and development on key machine systems ensures more solutions are ready when you ask for them — reducing your products’ time to market and minimizing risk.

By fostering progress through innovation, we can help you build the machines that harvest and transport food, build the cities and homes where we work and live, and create the solutions that drive your business forward.



PERFORMANCE

100%
global collaboration
to address your
specific challenges.

► Machine performance

As we continue to search for new ways to meet tomorrow’s challenges, the machines we use to meet those challenges are expected to perform better than ever before. Factors such as emissions regulations, fuel costs and less-experienced machine operators dictate the need for higher performing, more innovative machines.

Danfoss is ready to work with you to push the boundaries of machine performance. We invest heavily in the time and technology necessary to ensure we have the solutions and expertise necessary to help you achieve your machine performance goals — today and tomorrow.

CONTROL

► Power management

All power has its limits. Every system on a machine — including propulsion, hydraulic work functions, thermal management, steering and more — draws from an engine's finite power.

Danfoss has an ever-growing library of proven solutions that intelligently manage power to increase your machines' productivity and efficiency. We're ready to help you address non-work power demands — like stringent emissions regulations — and find new solutions that efficiently use available engine output.

By accepting the new reality in which bigger engines are no longer the single answer to a need for bigger output, Danfoss can help you optimize power management in your machines to help them deliver the performance your customers want — and the world needs.

► Customized operator control

The ideal machine operator is highly skilled and experienced. But not every operator has that perfect combination of talent and time. Your customers need machines that can be forgiving in inexperienced hands — yet also deliver immediate, precise response for seasoned pros.



Danfoss PLUS+1® compliant joysticks, foot pedals, and microcontrollers combine with advanced software and our user-friendly PLUS+1 GUIDE programming environment to provide your customers with precise control system customization that can be easily and quickly modified from one operator to the next. This agility helps ensure maximum productivity from every user.

Doing work more efficiently drives all we do. When even the smallest improvement is implemented across multiple machines, it's rewarding to see the cumulative benefit it can have on our daily lives.



► Fuel efficiency

Danfoss is committed to leading the world in creating systems that minimize fuel consumption, conserve resources, and reduce expenses. Our extensive portfolio of highly efficient motors, pumps, and PVG valves — along with our PLUS+1 electronic solutions — take intelligent power management to new levels.

Today, we deliver fuel efficiency that was unimaginable just a decade ago — all without sacrificing machine performance. In a world where other resources are in short supply, imagination is limitless.



EFFICIENCY

► Functional safety

Our functional safety solution is a complete package of proven innovations. Highlighted by our certified steering solutions, components, software, processes, and training, Danfoss helps make the safety certification process easier, less expensive, and less time-consuming.

Partner with Danfoss for solutions like these:

Hydrostatic drive systems

Industry-leading innovations that are easier for operators to control and offer many improvements over traditional drive systems, including superior traction control, greatly decreased stopping distances, and exceptional downhill speed control.

Telematics Solutions

Includes technology to help protect both machines and operators, reducing the potential for theft, machine misuse, and injury. Danfoss PLUS+1 technology makes it easier and faster to integrate Telematics Solutions with your machines.

Work function improvements

Danfoss helps you create total machine solutions that operators need for a safer and more productive work environment. By ensuring propulsion, steering and work function systems are all working in unison — we can develop machines that are easier to use, easier to control and more responsive.

World-leading steering systems

Danfoss steering solutions are available for a wide variety of equipment. Steering is made easier and safer with industry-leading enhancements that reduce effort, improve road feel, minimize wheel jerk, prevent drift, and accommodate inexperienced operators.

In-depth regulatory knowledge

When you use Danfoss pre-certified system solutions, you can count on rapid product development. Danfoss global ADCs actively maintain databases of the latest government and industry safety requirements and guidelines — and share that information with each other. Our goal is to ensure that Danfoss pre-certified system solutions are always safety compliant — and are ready to speed your time to market.

CASE STUDY:

Danfoss brings it all **together**

From system enhancements to complete vehicle solutions, ADC engineers will work with you to make your aspirations a reality. Innovative sprayer solutions developed by ADC engineers exemplify how Danfoss can help address specific machine challenges. Using our global ADCs, the ADC engineers have built the most capable, fuel-efficient, easiest-to-control sprayer in the world. Many of the lessons learned on this vehicle have been applied to other applications and have helped to improve overall machine performance and reduce time to market for our customers.

Better machine performance

An advanced hydrostatic drive is integrated with an anti-lock braking system to dramatically reduce the sprayer's stopping distances and improve controllability. The drive also detects low-traction conditions and redirects power to wheels that have traction, helping improve maneuverability on loose soil/gravel and in slick, steep, and muddy conditions.

Improved power management

The sprayer uses Danfoss hydraulic components that are engineered to exacting standards and operate together as an optimized system. PLUS+1 microcontrollers ensure consistent, reliable performance, working with Series 45 pressure compensating/load-sensing pumps, industry-leading PVG valves, and advanced orbital motors to deliver high efficiency, low energy consumption, and precision operation.

Enhanced safety

In addition to its improved high-speed braking and traction control abilities, the sprayer's hydrostatic drive system delivers exceptional downhill speed control that greatly improves an operator's ability to safely regulate the rate of descent on a steep grade.

Increased fuel efficiency

Equipped with the Danfoss Sprayer Control system, the sprayer intelligently responds to increased drive command by precisely adjusting the engine RPM and drive ratio simultaneously — delivering the requested vehicle acceleration at the maximum fuel efficiency. The result is 15% to 30% improvement in fuel economy between on-highway and off-highway use.

Customizable operator controls

The sprayer is equipped with operator controls that are integrated with the PLUS+1 GUIDE software system, so they can be quickly and easily modified to respond to individual operator preferences — and accommodate both new users and experienced professionals.





GLOBAL

ADC LOCATIONS

Danfoss is improving machine efficiency and productivity all over the world. Our worldwide ADC locations all share information, creating new innovations and best practices that make great products even better.

**Machine user.
Machine designer.**

"When I think about designing machines, I think about operators like my father and my brother, who I've worked with on our family farm. I've grown up around these machines — I've taken them apart, I've driven them, I've repaired them. One of the most rewarding things for me now is that I know there's an end user whose life is going to be improved by my work."

**Simon Nielsen, Danfoss Senior Systems Engineer
Integrated Solutions | Nordborg, Denmark ADC**

Let's work in partnership

All around the world, Danfoss works with people who see opportunities — from feeding a growing population to building its infrastructure — from maximizing energy efficiency to letting everyone enjoy a more comfortable, better quality of life.

With leading expertise in refrigeration and air conditioning, controls for electric motors, heating systems for buildings and cities, and hydraulic solutions to power agricultural and construction machinery, the positive impact that Danfoss makes can be felt nearly everywhere.

We believe that aspirations can become reality by working tirelessly today to engineer tomorrow.

What challenges do you face? What aspirations do you have? We're engineering tomorrow — and we're ready to help you today.

Contact your Danfoss Sales Representative and let us get to work with you to find the solutions you need at powersolutions.danfoss.com

About Danfoss Power Solutions

Danfoss Power Solutions is a global manufacturer and supplier of high-quality hydraulic and electronic components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market. Building on our extensive applications expertise, we work closely with you to ensure exceptional performance for a broad range of off-highway vehicles. We help OEMs around the world speed up system development, reduce costs, and bring vehicles to market faster.

Danfoss Power Solutions — your strongest partner in mobile hydraulics.

Products we offer:

- Bent Axis Motors
- Closed Circuit Axial Piston Pumps and Motors
- Displays
- Electrohydraulic Power Steering
- Electrohydraulics
- Hydraulic Power Steering
- Integrated Systems
- Joysticks and Control Handles
- Microcontrollers and Software
- Open Circuit Axial Piston Pumps
- Orbital Motors
- PLUS+1® GUIDE
- Proportional Valves
- Sensors
- Steering
- Transit Mixer Drives

Wherever off-highway vehicles are at work, so is Danfoss Power Solutions. We offer you expert worldwide support for ensuring the best possible solutions for outstanding performance. And with an extensive network of Global Service Partners, we also provide you with comprehensive global service for all of our components.

Go to powersolutions.danfoss.com for further product information.

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