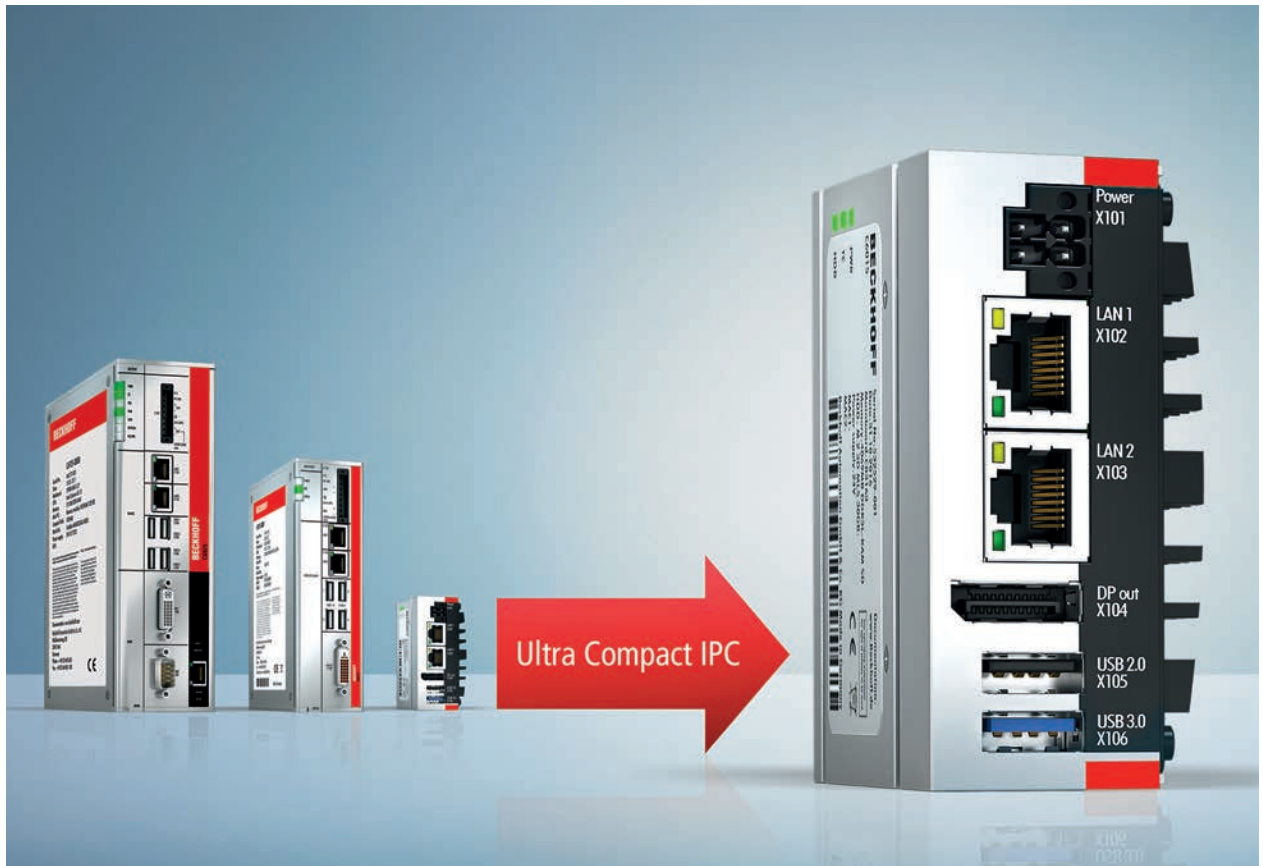


# INNOVATION

Research & Development • Design & Engineering • Forecasting & Analysis  
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## C6015 IPC from Beckhoff Offers Space-Savings and Flexibility



The new C6015 IPC can be applied universally in automation, visualization and communication tasks. (Courtesy: Beckhoff)

Beckhoff Automation introduced a new standard in ultra-compact Industrial PC technology at the SPS IPC Drives 2016 trade show in Nuremberg, Germany. The new C6015 Industrial PC (IPC) opens up new application areas for PC-based control technology, especially those with pronounced cost or space restraints. Fully suited to industrial applications, the multi-core IPC measures just 82 mm x 82 mm x 40 mm, demonstrating the extensive scalability of PC-based control technology from Beckhoff.

The new device is just one-third the size of the C6905, which was previously the smallest control cabinet IPC in the Beckhoff portfolio. Price savings of about 25 percent also place the device well below the previously least expensive x86 IPCs from Beckhoff. These features facilitate highly cost-effective implementation of automation, visualization, and system-wide communication in small and

mid-size applications with a minimal device footprint. As a result, the space-saving device opens up areas where PC-based control technology has not been used thus far, or where motherboards must be integrated as expensive custom solutions.

### UNCOMPROMISING INDUSTRIAL QUALITY

Despite its extremely compact and inexpensive form-factor, the ultra-compact C6015 IPC makes no compromises when it comes to industrial use. This includes the high computing power of the integrated Intel Atom CPU that features up to four processor cores. Moreover, the IPC leverages a robust, aluminum/die-cast zinc housing, designed for passive cooling and long-term availability. The device also offers a full range of standard features for industrial environments, such as extended operating

temperature range up to 55 degrees C and high resistance to vibration and shock.

The C6015 is also extremely flexible with regard to its many installation options. It can be mounted both vertically and horizontally on the rear wall of a control cabinet or attached to a DIN rail. Even in the tightest installation spaces, this permits various mounting scenarios with flexible orientation of the IPC. Due to the small dimensions of the device, this represents an important feature: When connecting up to six separate cables, it is crucial with the small design that the connections can be optimally aligned to the cable routing as dictated by the machine layout.

Apart from that, the full range of onboard equipment

and interface configuration together meet the requirements for a universally applied IPC: A 30 GB SSD and Windows Embedded Compact 7 operating system make the C6015 a powerful automation device even in its most basic configuration. Windows 7 and Windows 10 are also optionally available. Further hardware features include 2 GB DDR3L-RAM (expandable by the vendor up to 4 GB), a display port connection, an on-board Dual-Ethernet adapter with 2 x 100/1000Base-T connection and ports for both USB 3.0 and USB 2.0. ↘

Source: Beckhoff

For more information, go to [www.beckhoff.com](http://www.beckhoff.com)

## Sinamics Power Converter Works for Many Different Applications

Siemens introduces a second addition to its popular Sinamics DCP product family of scalable (4X), bi-directional DC-DC drives. The DCP 120kW facilitates the integration of larger energy storage systems such as batteries and super capacitors into multi-generator applications for a wide variety of industrial, smart grid, and e-mobile uses, including photovoltaics, fuel cells, wind power and high-dynamic uses such as peak shaving.

This new drive features combined buck/boost capability in a single device for optimized interconnection between DC sources and energy storage devices plus the DC link for both motor inverter and infeed/grid inverter. Available in a wide voltage range from 0-800V DC, this new inverter enables connection of energy storage systems to the DC link of an active line module. Bi-directional energy flow and scalable power are further features, along with a high efficiency up to 98.6 percent maximum energy yield can be fed back into a power grid, island, or industrial grid.

The compact footprint of the DCP

Siemens Sinamics DCP 120kW DC-DC converter has a myriad of uses in industrial, smart grid, marine, and e-mobile markets. (Courtesy: Siemens)



120kW converter results from the built-in reactors and control unit for space-saving design use. The built-in control unit also permits stand-alone operation of the drive. Profinet or Ethernet/IP are standard for Profibus communications.

Different infeed sources such as solar, fuel cell, and wind power can be connected to realize a multi-generator power system, further broadening the application of this unit.

Uses for this new drive include peak shaving using stored energy on centrifuges, presses, elevators, stacker cranes, gantry cranes, and industrial lift trucks, as well as battery test systems, test systems for photovoltaic power

plants, smart grid uses including energy storage on wind and solar systems, fuel cells, and numerous marine applications such as emissions reduction, offshore platform winch and crane operations, and charging technology for e-boats with battery power. In the emerging e-mobility market, the unit is ideal for fast-charge stations for e-cars, e-buses, and hybrid systems that incorporate motors in combination with fuel cells or super capacitors. ↪

*Source: Siemens*

For more information, go to [www.usa.siemens.com/drives](http://www.usa.siemens.com/drives)

## Altitec to Increase Aerodynamic Efficiency of Wind Turbines

Global blade access, repair, and inspection specialist Altitec has been appointed official installation partner by the Renewable Energy Division at 3M, a global innovation company, to install its 3M Wind Vortex Generators. 3M Vortex Generators address aerodynamic issues common to most turbine blades and, in doing so, can increase a turbine’s annual energy production by between 2 and 3 percent.

Rotor blades typically twist no more than 10 to 20 degrees from root to tip, and while chord length — the width of the blade at a given distance along its length — can vary, these factors prevent wind turbines from achieving optimal aerodynamic performance. This can often lead to undesired airflow separation — known as aerodynamic stall — and has a significant impact on wind-turbine efficiency, as well as generating additional noise.

In response to these issues, 3M, in partnership with Smartblade, has developed its Wind Vortex Generator, a reliable and quickly installed thermoplastic aerodynamic enhancement. They can be easily attached to the rotor blade, resulting in attached flow to enhance performance by guiding wind flow around its surface.

“In the Vortex Generator, 3M has hit upon an excellent way to address this problem, and we’re looking forward to working with them to roll it out across the world,” said Tom Dyffort, managing director for Altitec Group. “As one of 3M’s official installation partners, Altitec has completed trial installations at sites in Poland, Spain, and Portugal, and hopes to carry out further installations in Chile.”

“Vortex Generators are a financially and technologically economical solution which helps to optimize the aerodynamic efficiency of the blade and improve turbine annual energy production,” said Santhosh Chandrabalan, global business manager at 3M. “We are delighted to have partnered with Altitec, whose specialist knowledge and experience in the field allows this product solution to be widely implemented.”

Vortex Generators have undergone extensive testing and analysis in order to ensure negligible increases in load and deflection when they are installed. Indeed, it has instead been shown that by reducing stall, they help optimize a turbine’s load characteristics and reduce noise.

Altitec, in partnership with 3M and Smartblade, statistically analyzes each turbine to ensure the Vortex Generators are positioned to maximize the annual energy production yield of the turbine.

In addition to their durability and easy application, Vortex Generators also can be adapted to fit almost any blade type, regardless of a turbine’s manufacturer. They not only reduce flow separation and increase turbine energy yields, but they also reduce stall induced loads and help extend service life. ↪

*Source: Altitec*

For more information, go to [www.altitec.co.uk](http://www.altitec.co.uk)

## Siemens Presents Thermal Storage Solution for Wind Energy

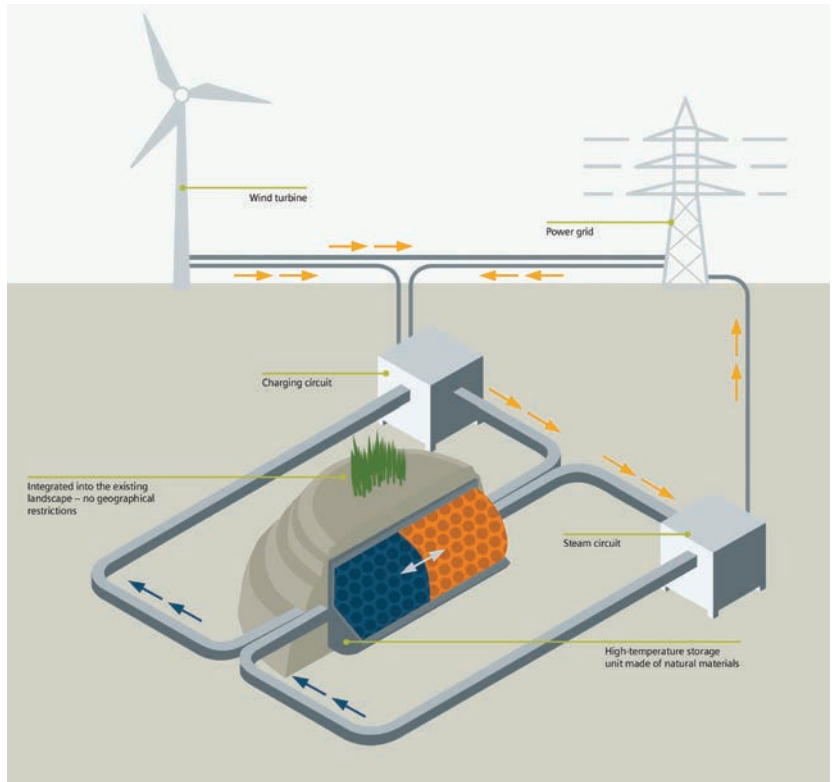
Siemens is developing economic storage technology alongside Technical University Hamburg Harburg (TUHH) and urban utility company Hamburg Energie. Siemens is researching a storage solution in the Northern German city that will set a future standard in efficiency. After having been converted to heat in rock fill, excess wind energy is

stored and protected with an insulated cover. When there is a need for additional electricity, a steam turbine converts the heat energy back to electricity. The simple principle of this store promises an extremely low-cost set-up. The project has therefore received research funding from the German Federal Ministry for Economic Affairs and Energy.

Siemens thermal storage solution will convert excess wind energy into heat energy where it is stored until it can be converted to electricity using steam. (Courtesy: Siemens)

Siemens is operating a test set-up for the storage solution, named Future Energy Solution (FES), at Hamburg-Bergedorf. Alongside scientists from the TUHH Institute for Thermofluid Dynamics, the company is researching how to make charging and discharging the store particularly efficient. The arrangement of the rock fill and the form of the surrounding insulating container are crucial. The store is being tested at temperatures more than 600 degrees C. Just like a hot air gun, a fan uses an electrically heated air flow to heat the stones to the desired temperature. When discharging, the hot stones heat the air current, which then heats a steam boiler; its pressure drives a generator via a steam turbine.

As the current test set-up only tests the thermal requirements for the storage process, no reverse current is generated. However, researchers wish to test the complete energy conversion in spring from electricity to heat storage in the rock fill and back to electricity. They are establishing a complete thermal store on the Trimet aluminum smelter site in Hamburg-Altenwerder to the south of the River Elbe on the German A7 highway. The full-size FES will be able to store about 36 MWh of energy in a container with about 2,000 cubic meters of rock. Via a boiler, the heat it contains will generate so much steam that a Siemens compact steam turbine can generate output of up to 1.5 MW of electricity for up to 24 hours a day. The researchers expect to generate effectiveness of about 25 percent even in this early development phase. In the future, the concept has the potential for an effectiveness of about 50 percent. Partner Hamburg Energie will investigate appropriate marketing options for the stored energy.



# SAN-EARTH M5C

## Effective Grounding with Conductive Cement

- Low Resistance Ground System
- Limits Corrosion
- Key to Lightning Protection
- Economical
- Safeguard Personnel / Equipment
- Permanent
- Safe Proven Performance
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“The technology of our FES store deliberately uses mainly tried and trusted technology,” says Till Bar-meier, Siemens’ project manager. “Because we are working here with tested thermal components and a series-ready steam turbine, we will be able to offer a practical solution within a few years. Our complete experimental system will be operational in just around 15 months.”

Whereas many other stores generate high costs or

only permit limited storage capacities, the FES tech-nology can be used in the most varied of sizes and output classes, and therefore always remains extremely economical. The only limit to the concept is the space required for the rock-filled insulated container. ↴

Source: Siemens

For more information, go to [www.siemens.com/wind](http://www.siemens.com/wind)

## Pitch Control System Improves Turbine Reliability up to Three Times

The Industrial Group of Moog Inc. launched its next generation pitch technology — the Moog Pitch System 3. The first shipment of Moog Pitch System 3 is operating at a wind farm in Brazil.

The new pitch system was developed to meet the growing need for wind-farm operators and turbine manufacturers to reduce wind-farm capital and operating expenses (CAPEX and OPEX).

“The design of the new pitch system reduces the levelized cost of energy (LCOE) by increasing wind-turbine reliability and minimizing downtime,” said Dennis Webster, general manager for the Wind Business Unit of the Industrial Group of Moog Inc.

Levelized cost of energy measures the net cost to install and operate a wind turbine against expected energy output over the course of the turbine’s lifetime. There are a number of factors that contribute to LCOE, one of the most important of which is turbine reliability. Several industry research findings identify the pitch system as the No. 1-ranked component contributing to wind-turbine failure and downtime. Pitch systems are exposed to harsh ambient conditions inside the rotating hub, including extreme temperature, humidity, and vibration leading to lower reliability compared to other turbine components. Though pitch systems represent less than 3 percent of wind-farm CAPEX costs, they account for nearly a quarter of all downtime in turbines.

Most pitch systems used throughout the industry today consist of as many as 2,000 to 3,000 subcomponents depending on the manufacturer. With a highly integrated and optimized architecture that consists of significantly fewer parts, the Moog Pitch System 3 is up to three times more reliable than the industry’s standard pitch systems. This leads to a reduction in both turbine downtime as well as scheduled and unscheduled maintenance activities.

“We benchmarked the reliability of existing pitch systems based on operational data from the industry and compared it with the reliability numbers provided by Moog for their new Pitch System 3,” said Francesco



Wind turbine cutaway rendering shows Moog Pitch System 3 in operation. (Courtesy: Moog)

Vanni, senior engineer, Asset Integrity & Performance, DNV GL – Energy. “Our cost of energy model suggests that reliability improvements expected for the Moog Pitch System 3 could save up to \$1.70/MWh for a typical 3 MW turbine, a significant reduction in LCOE.”

By reducing failures and downtime caused by overly complex pitch systems, the Moog Pitch System 3 improves productivity and ultimately enables wind-farm operators and OEMs to be more competitive in today’s increasingly complex global energy landscape. Moog started shipping the new pitch system to turbine manufacturers in Europe and Asia in October.

Moog Inc. is a worldwide designer, manufacturer, and integrator of precision control components and systems. Moog Industrial Group designs and manufactures high performance pitch solutions for wind turbines including pitch control systems, slip rings, blade sensing, and services for wind-turbine manufacturers and wind-farm operators. Pitch systems monitor and adjust the angle of the wind-turbine blades and thus act as a critical safety system protecting the turbine against adverse wind conditions. ↴

Source: Moog Inc.

For more information, go to [www.moog.com/wind](http://www.moog.com/wind).

## Ultrasonic Wind Sensor Is Alternative to Conventional Sensors

The WindSonic 75 is a genuine low cost alternative to conventional cup and vane or propeller wind sensors, with all of the advantages of solid-state ultrasonic technology. With no moving parts to jam, break, or wear out, this ultrasonic wind sensor is ideal for use in harsh weather conditions.

WindSonic 75 is a 2-axis ultrasonic wind sensor, providing wind speed and direction data via one serial or two analog outputs. To confirm correct operation, wind-sensor outputs are transmitted together with an instrumentation status code.

WindSonic has been designed as a lightweight (0.5 kilograms) and robust ultrasonic wind sensor with a corrosion-free polycarbonate construction. With a true solid-state construction, WindSonic can be operated in harsh environmental conditions without fear of damage often associated with fragile cup or propeller wind sensors.

WindSonic 75 is suitable for a wide range of wind-monitoring applications, particularly for marine and offshore (ships, data buoys) and land-based installations. With a corrosion-free exterior and no moving parts, the ultrasonic wind sensor eliminates the need for expensive on-site maintenance, particularly in remote locations where access is difficult. ↴



The WindSonic 75. (Courtesy: Dynamax)

Source: Dynamax

For more information, go to [www.dynamax.com](http://www.dynamax.com)

## Trident Sensor Products Introduced to China's Wind Market

Poseidon Systems, LLC has three key sensing solutions under the Trident Sensor Product Line. The three products include the Trident QW3100, the Trident DM4500, and the Trident AP2200. These products mark the entry of Poseidon Systems' Trident Product Line into China's wind-power generation market to extend the uptime and service life of difficult-to-reach gearboxes on wind turbines.

"We are proud to be part of the wind-power generation industry and to help our customers reduce the cost of energy production through innovative oil and gearbox health monitoring solutions," said Poseidon Systems President Mark Redding. "One of the key industry challenges has been excessive downtime resulting from unplanned maintenance activities; our solutions enable wind-turbine owners and operators to detect impending failures early, thereby minimizing repair costs and downtime and preventing catastrophic failures."

The ability to detect oil quality and condition enables maintenance intervals to be adjusted as needed, protecting and maximizing the uptime of critical assets.

Poseidon Systems' product offerings include:

**Trident DM4500 Wear Debris Monitor:** With real-time, in-line fluid sensing technology for the detection

of metallic wear debris and particulates in a lubrication system. By continuously monitoring wear-debris generation, the device alerts users to gearbox faults in their earliest stages, allowing for lower cost corrective actions, minimized downtime, and maximized gearbox life.

**Poseidon Systems' Trident QW3100:** With real-time, in-line sensing technology for monitoring the health state of lubricating fluids. The device provides continuous insight into oil health, promoting condition-based maintenance practices such as optimized fluid drain intervals and reduced dependence on offline analysis.

**Poseidon Systems' Trident AP2200:** An easy-to-use platform for collecting sensor data, processing and interpreting measurements, and posting information to web servers for remote access. The AP2200 makes collecting sensor data easy and reliable even in unreliable environments. Data is buffered in the 1.7 GB of on-board storage until successfully off-loaded via Ethernet, Wi-Fi, mobile networks, and more. ↴

Source: Poseidon Systems, LLC

For more information, go to [www.PoseidonSys.com](http://www.PoseidonSys.com)