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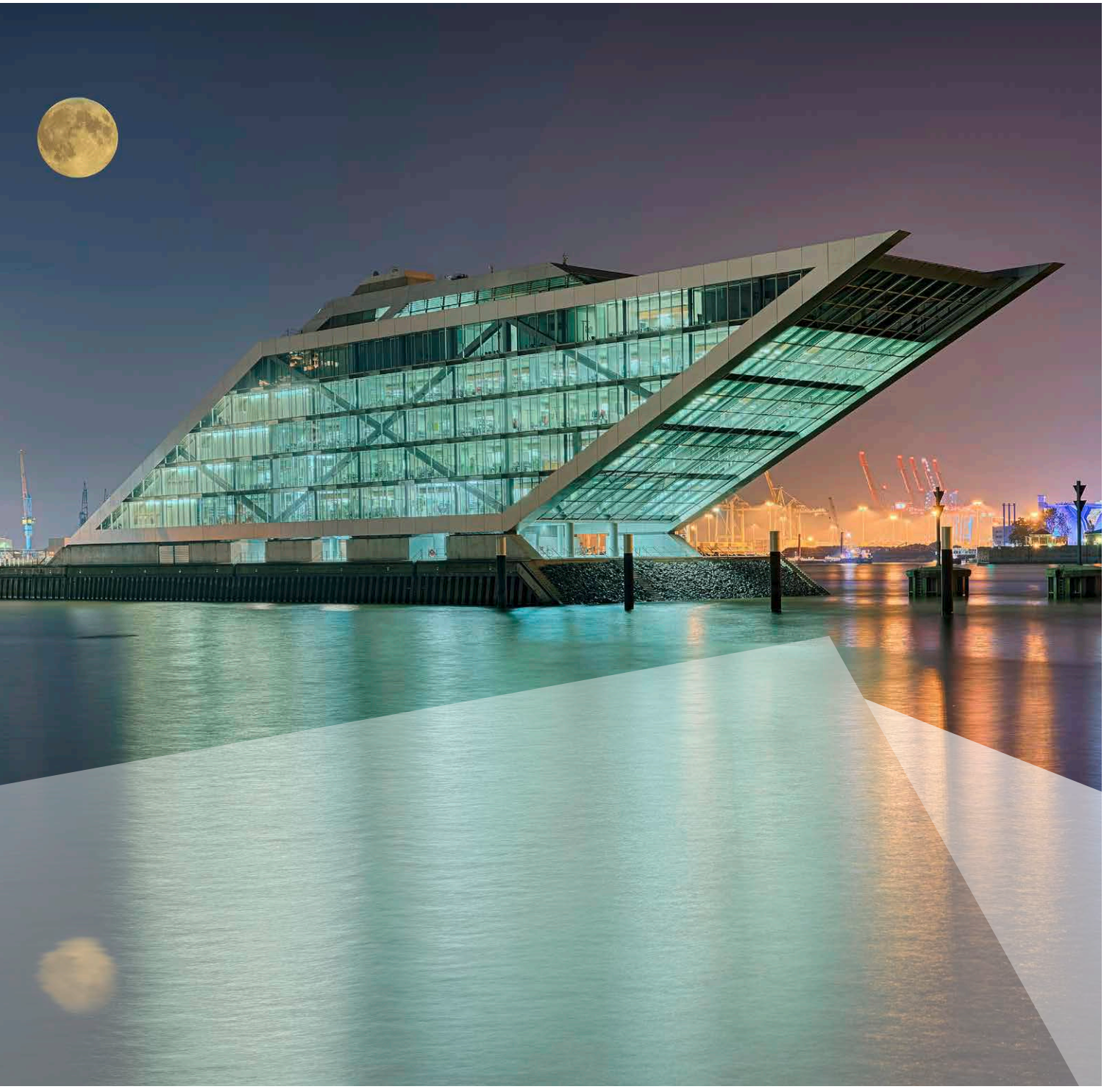
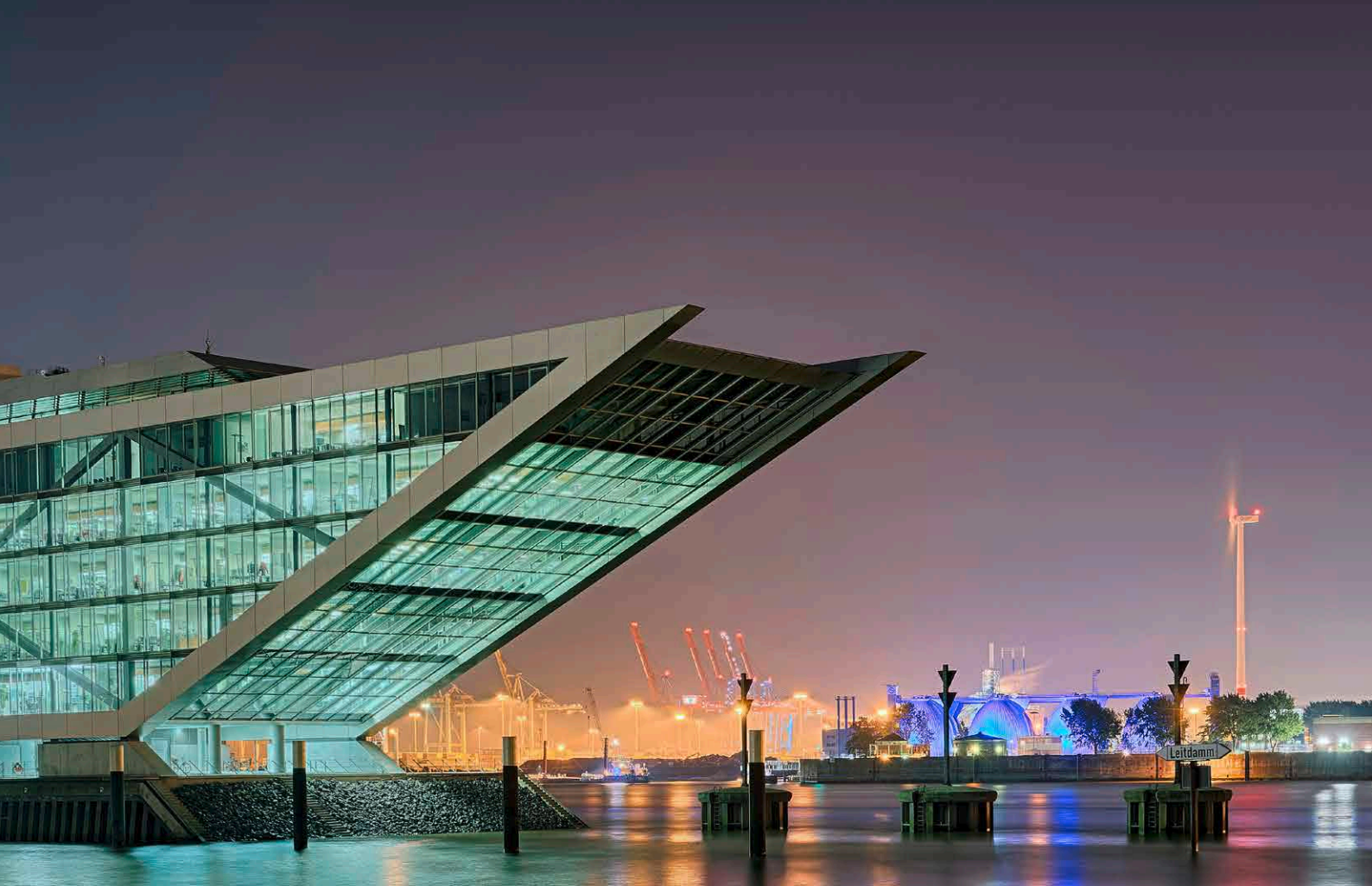
Interview

KEEPING A FINGER ON THE PULSE





Interview

KEEPING A FINGER ON THE PULSE

Cooperation with research institutions: At the Institute for Electrical Power Engineering, Hamburg University of Technology, research is underway into providing efficient solutions that meet the challenges of energy technology. The institute's real-time simulation laboratory has depended on Bachmann technology for several years. Close cooperation between young scientists and industry experts from the automation developer helps ensure that today's research projects result in relevant solutions for tomorrow's problems.

Bachmann spoke to Christoph Klie about plans for a dedicated training center in collaboration with the automation specialists.

»Students are prepared for the industrial world in the best possible way through cooperation with industrial partners. This helps to combat the shortage of skilled workers.«

Christoph Klie, M.Sc.
Research Assistant at the Institute of Electrical Power Engineering, Hamburg University of Technology.

Mr. Klie, the Institute of Electrical Power Engineering works closely with Bachmann as an industrial partner. How did this come about?

We work very intensively with Simulink and MATLAB in our program. Bachmann solutions enable us to implement complex control algorithms very easily. With M-Target for Simulink®, hardware is perfectly integrated into the simulation: In just a few minutes we can put together a simulation model, export it, and everything runs exactly as it should – with total stability. We can even adjust the parameters during runtime without having to rewrite the program. This is a real time-saver for us. With our previous solution, we needed about half a day to execute simulations.

For this reason, we also insisted that our 'Power Hardware-in-the-loop' simulation lab had to be equipped with Bachmann hardware. We have been using these products for many years now, and not once have we had a case where we needed support because something didn't work. That's also why we enjoy working closely with the company's technologies and specialists during student projects.

What are the teaching benefits of the collaboration?

Students benefit from a practical application of their studies – and from the industry know-how they acquire from close cooperation.

One example was a student project to develop a SCADA system for the visualization of our laboratory and to control our devices. We approached Bachmann and were immediately assigned a contact person whom we could reach at any time. We met once a week to develop the system. The result was incredible. We didn't dream that this would produce such an impressive system. The students thought the project was brilliant, they had a lot of fun and learned a lot.

Another project that demonstrated the added value of working with industry was a final thesis on the simulation of protection technology. In that case, overcurrent protection was implemented on a Bachmann controller, which was then measured with an industry-standard protection device test system. You can't get any closer to real-life application within a university context. Through such collaborations, students gain practical experience that they don't get from lectures. This is a great addition to their studies.

And how does the university itself benefit?

We have to come up with something that gets students excited about our research topics and projects, so putting things into practice is an essential and very interesting component of an electrical engineering degree – in addition to studying theoretical concepts.

Industry collaboration also ensures we don't stray too far from reality in our research. If we were to only work theoretically, then we could develop every solution under the sun. But what use would they be if we didn't account for the barriers to actually realizing solutions and making them feasible? Input from our industry partners always brings us back down to earth. (grins)

But there are also benefits for industry: Students are prepared for the industrial world in the best possible way, helping to combat the prevailing shortage of skilled workers.

What are you currently working on?

We are currently working on a large collaborative project called SuSy, looking into DC power supply on maritime vessels (see Factbox). Our students are developing a mobile measurement and automation center, among other things. It features a Bachmann controller and grid measurement module in a robust casing. The idea is to let the unit generate a large data set over multiple weeks, which we can then evaluate and use. However, the unit will also be used to simulate passenger user behavior, and to switch energy consumers on and off based on stored profiles.

Because we are working with direct current, one challenge in the SuSy project is the issue of grounding. Studying grounding concepts can be very dangerous. Bachmann controllers help us to switch loads on and off safely and from a distance.

Likewise, during the course of this project, we are setting up a motor test bench to simulate rotating loads. As an example, the Bachmann controller allows us to easily simulate the behavior of a ship's air conditioning unit.

Are there any ideas for future joint projects?

There will certainly be more joint research projects. One potential idea would be to test communicative system standards, their further development and then application.

We already have some concrete plans: The student project internship to develop the SCADA system was so successful that we have decided to establish a small training center, together with Bachmann, to make our courses even more practical and relevant. There are still so many possibilities in the field of communication, electrical energy system control, or even safety in electrical energy networks. In future, we would like to carry out these student projects regularly with the support of the automation specialists.

Thank you very much for the interview.

SUSY (SUSTAINABLE DC SYSTEMS)

As part of joint project SuSy, the Technical University of Hamburg is researching ways to increase the distribution efficiency and absorption capacity for renewable energy on ships.

To this end, the university is recreating large ship systems in real-time simulations in its 'Direct Current Investigation Environment', part of the 'Power Hardware-in-the-Loop' simulation laboratory, equipped with Bachmann hardware.

Instead of coupling AC and DC grids, the project uses both a unipolar and a bipolar DC grid for the entire vessel. This provides various advantages: renewable energies generating direct current could be integrated directly into the grid. Motor load converters could be connected directly to the grid with their DC link. This common DC link would mean that primary machines would no longer have to be synchronized with the grid, and could therefore always operate at the optimal operating point. Energy from electrical machines in braking mode could be used to charge batteries via a virtual DC link.

The project is also investigating the control of various ship components: Largely isolated and decentrally-controlled power islands would minimize power exchange between islands. Even in the event of the loss of an entire fire compartment, ship operations could be maintained and the ship returned safely to port.

The project team is also looking into the efficient use of heat waste. If electricity is generated from the ship's fuel cells, these could be positioned adjacent to the kitchen, for example. Heat generated in the process could then be utilized over the shortest possible distances. Furthermore, the effects of harmonics, caused by the numerous energy consumers coupled to the grid via converters, can also be analyzed.

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