

Press release

Trainee project: Three weeks of AC/DC

Trainees from KEB Automation, Lenze, and Weidmüller ensure greater energy efficiency in a joint project.

Aerzen, 3rd March 2023. With a share of 38 percent, the industry is one of the largest energy consumers in Germany. Yet there is a lot of potential for reducing energy consumption and conserving resources. One promising path to greater sustainability is to convert factories from alternating current (AC) to direct current (DC). Five trainees from the automation companies KEB, Lenze, and Weidmüller implemented the "DC Industry" concept in a joint project at the end of February.

The trainees Jannis Brand and Felix Heiland (Weidmüller), Moritz Drinkuth and Hannes Schneider (Lenze), as well as Marvin Günter (KEB), had a clear task: Within three weeks, they were to convert a stationary drilling machine to DC technology and thus gain their first experience with the future topic of DC industry. Now they presented their results. "It is so motivating to take part in the future-oriented project "DC Infrastructure" at the Weidmüller Academy in Detmold and to see how enthusiastically the trainees implemented the project with all its ups and downs," project coordinator Thomas Möllerfriedrich from Weidmüller was pleased to say. Hannes Schneider, a prospective mechatronics technician at Lenze, is also happy: "Despite its partially difficult requirements, the project showed us that, with the support of some experts, we as trainees are capable of mastering even larger problems."

The trainees entered new territory with this project. Not only did they have to find each other as a team, but they also had to be introduced to the new topic of DC networks. They planned the project independently and applied the modern, agile project management method SCRUM.

After the state analysis, they went on to conversion planning and procurement, then to the actual conversion and commissioning of the plant. In the process, they experienced live the challenges that are not uncommon in projects, such as product availability or delivery difficulties, and found solutions independently. "In the three weeks, we learned how complex projects can become that seemed quite simple to us at the beginning," summarizes Marvin Günter, trainee electronics technician for devices and systems at KEB.

There was a lot to do in the project: the team has built a mobile energy input system that maps a DC grid and integrated a human-machine interface (HMI) to control and visualize the system. In the future, this will be operated by "touch" and also provide energy data. Instead of the mechanical speed setting, a new motor with a frequency converter is now used for the electrical speed setting. With the successful completion of the project, the five trainees were able to demonstrate that the concept works and provides the desired improvements. The "new" stationary drilling machine will be used for training and exposition purposes in the future.

The project was nothing less than a blueprint for converting the entire Weidmüller Academy from AC to DC. The system will later integrate a photovoltaic system (which generates DC), a power storage unit, DC e-car charging stations, and ultimately all workstations in the training centre. The benefits are clear; for example, this conversion will save 55 percent of all copper wiring alone. "A DC grid can provide a stable, resilient, and also simple energy supply while saving energy and resources," explains David Kater, development engineer at KEB, on the importance of the DC industry concept.

Torben Müller, a trainer at Weidmüller, sees that such joint projects are becoming increasingly important, especially in times of a shortage of skilled workers: "The trainee project is an incredible opportunity for the trainees and the region to help shape the future development of energy supply. It also shows how important it is for training companies to work together to ensure the best possible development and training for trainees."

The key to a sustainable factory of the future

Martin Ehlich mechatronics expert in the Innovation department at Lenze, explains: "DC factories have a great future in times of volatile energy supply and scarce resources. I'm all the more pleased that the younger generation is getting involved here as a team in practical implementation."

The trainee project grew out of the DC-Industry2 research project, in which 39 partners from industry and research worked together to develop the fundamentals for a direct current infrastructure in the industry. Entire manufacturing halls can be powered by direct current (DC) from renewable energy sources, and the benefits are considerable. Some examples:

1. renewable energies can be integrated more easily. The factory thus becomes a "prosumer" - it is both an energy producer and consumer.
2. fewer conversions from AC to DC and vice versa reduce losses and energy consumption.
3. the feed-in power from the central supply network is lower.
4. DC plants have higher availability because they continue to run from their storage when the utility grid fails.
5. the converters required for energy-efficient drives become smaller (up to 25 percent less volume). Many components required for AC can be eliminated.

"With the successful implementation of the project, we were able to expand our network and build valuable relationships with experts. These contacts could also support us in similar projects in the future," says a delighted Jannis Brand, an IT specialist trainee for application development at Weidmüller.

Kastentext: DC-INDUSTRY: Energy turnaround meets Industry 4.0

The German federal government supports companies and research institutions in the development of innovative technologies that drive the achievement of international climate targets. In particular, the energy research programs of

the Federal Ministry for Economic Affairs and Energy support the industrial - and production landscape in Germany. Since October 2019, 39 partners - including 33 companies and 6 research institutions - have been working on the seamless, efficient integration of renewable energy (e. g. solar panels on factory roofs) and storage systems to balance electricity supply and demand in factories. The focus of DC-INDUSTRIE2 is the DC supply of an entire production hall after the DC supply of a production cell has already been realized in DC-INDUSTRIE since 2016. The DC infrastructure is being implemented and extensively tested in nine model plants and transfer centres at various partners. The power of these plants ranges from a few kilowatts to 2 megawatts. (Source: dc-industry.zvei.org -)