City of learning

Marek Florkowski

Kraków is a unique city of historical treasures and legends and it is also an important city of learning. With 20 state and private universities and 140 research institutes, combined with a past built on outstanding achievements of scientific, cultural and international importance, it is no wonder ABB decided to locate one of its research centers in Kraków.

With a population of approximately one million inhabitants and given its convenient geographical location, Kraków attracts many people and companies – like ABB – from far and wide thanks to its unparalleled mixture of culture and science. The student population of around 150,000 are educated at some of the most prestigious institutes of learning in Poland and these include the Jagiellonian University, the University of Science and Technology, the University of Economics, Technical University of Kraków, the Academy of Arts, the State College of Theatrical Arts and the Academy of Music.

There is no doubt these institutes of higher education give companies access to a very advanced scientific environment. From an ABB point of view, Kraków's scientists are well equipped to tackle traditional ABB domains from electrical power engineering and systems, power electronics, automation and mechanics, metallurgy and ceramics, to diagnostics and production processes, to areas that are currently enjoying significant growth, ie, IT systems and nanotechnology.

In fact most of the employees at ABB's research center are graduates from universities in the region.

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The process in action

The sources of inspiration for research are factories, production facilities and other industrial partners who provide ABB with information on areas seeking new, innovative solutions. Scientific work thrives where there is an atmosphere conducive to research and this certainly makes it easier to rally interdisciplinary teams to conduct specific research related to ABB's strategies. These interdisciplinary teams consist of academics and ABB employees working side by side in a number of university laboratories. Such collaborations provide a perfect interface whereby academic ideas and the results of basic research are applied to industrial solutions.

The University of Science and Technology, for example, not only has the expertise required for efficient project execution, but its laboratories are well-equipped with state-of-the-art instrumentation.

The university has been an excellent collaboration partner with ABB in many research projects such as the development of a novel oil-water separation technology[1)]. In this project, the first stage of a multi-stage separation process for offshore water-oil separation has been significantly improved by employing what is known as the electrocoalescence technique. This has led to the development of a modular device known as a Vessel Internal Electrostatic Coalescer (VIEC). A successful pilot installation of this pioneering system has been installed on the Troll C platform which is currently operating on the Norwegian continental shelf.

ABB has also worked with the University of Science and Technology on a project which aims at preventing voltage transformer failures in ungrounded networks due to the ferro-resonance phenomenon. The expert knowledge of the team, which included scientists from the university, was a key factor that led to fast and efficient problem solving.

These types of collaboration are, according to Dr. Wieslaw Nowak, a member of the Electrical Power Institute in the University of Science and Technology, a win-win situation for both the company and the university involved. While ABB profits from the research carried out within academic institutes, these in turn get the chance to apply this research to solve practical problems. "It is very motivating and rewarding to see how the results of our calculations and numerical simulations are verified in real devices and how they bring about concrete and measurable improvement in equipment performance and reliability." Prof. Stanislaw Slupek, Head of the Department of Heat Engineering and Environmental Protection at the university adds another benefit: "Such collaborations", he says "result in shared publications in scientific journals and conference proceedings."

ABB has a well-earned reputation for its environmental policies and efforts towards sustainable development. Sustainability for ABB is about ensuring long-term business success while contributing towards economic and social development, a healthy environment and a stable society. The University of Science and Technology, like many others, is doing its bit by helping ABB develop novel technologies – using pyrolytic and cryogenic techniques – to recycle epoxy based scrap.

Prof. Slupek claims that "these projects not only allow scientists to apply their extensive knowledge to the commercialization of new ABB products and processes, but they also give them the opportunity to work on environmentally friendly industrial solutions."

Footnote

1) Piasecki, W.; Florkowski, M.; Fulczyk, M.; Sipowicz, J.; Sundt, H. K., "Vessel Internal Electrostatic Coalescer (VIEC) – Novel oil-water separation technology", ABB Review 4/2004, pp 67–70.

History

Kraków, a city with over 1000 years of history to lean on, is the former capital of Poland.

Its Jagiellonian University is one of the oldest in Europe. It was founded in 1364 by the Polish King Casimir the Great, later restored by St. Queen Jadwiga and has, since its very foundation, played an important role both domestically and internationally offering education to many renowned scientists and people of culture. Between 1491 and 1495, it was Alma Mater to Nicolaus Copernicus who is famous for his fundamental astronomical discoveries. In 1884 its professors Zygmunt Wróblewski and Karol Olszewski were the first in the world to liquefy the constituents of air – oxygen and nitrogen – at –130 °C. Karol Wojtyla, better known as Pope John Paul II, was also amongst its students.

Attractions

According to some cartographers, Krakow is the geographical centre of Europe (it is situated exactly on the intersection of 20 degrees East and 50 degrees North). With a population of one million, it attracts people from around the globe thanks to its unparalleled mixture of culture and science. It is home to famous artists, Oscar winners and Nobel laureates. Internationally, it evokes associations, amongst others, with Krakauer sausage or Cracovian algebra.

The Old City of Kraków attracts tourists through its numerous historical monuments included in UNESCO's World Cultural Heritage List. Kraków has Europe's largest medieval market square and numerous palaces and churches with their magnificent interiors as well as surroundings like Wieliczka Salt Mine from 11th century or Auschwitz-Birkenau concentration camp. Kraków was the City of European Culture for the year 2000.

ABB's co-operation with the Kraków Foundry Institute is another example of a long-lasting and fruitful collaboration. Activities over the years have included metal casting technology and epoxy processing.

ABB engineers work closely with foundry specialists at the institute in the field of rapid prototyping, and with access to the laboratories and other facilities, the engineers are able to carry out advanced materials testing. Currently, ABB's Corporate Research center and the Foundry Institute are developing complex failure criteria and models for different materials, some of which are now broadly utilized in ABB's numerical simulation tools.

There is a need sometimes to perform one-off highly specialised measurements (eg, scanning microscopy, computer tomography or laser scanning). In a city like Kraków, with its impressive number of academic institutes, there is no shortage of highly equipped and sophisticated laboratories for Corporate Research to avail of.

The exchange of expertise is a two-way process and the Corporate Research center in Kraków not only provides scientific training for university students, but it also supports many of them during their masters or doctoral work.

The goal of ABB's Software Factory is to deliver standard IT solutions to support manufacturing and business processes in ABB factories worldwide.

The availability of an ocean of IT "brain power" has resulted in the establishment of a new incentive in ABB's transformer business: the Software Factory. The goal of this approach is to deliver standard IT solutions to support manufacturing and business processes in ABB factories worldwide and to spread this concept to other business areas in the company.

Other benefits

To promote and strengthen its contact with universities in and around the region, ABB organises and partakes in a number of events which include:

- In-company lectures and presentations from academics on subjects which are of interest to the group.
- Corporate Research employees are obtaining advanced degrees in many universities which collaborate with ABB.
- ABB employees participate in numerous international and domestic conferences and symposiums held in Kraków.

Recently Corporate Research in Kraków has launched what is known as a "contest initiative". The first ABB contest took place in 2004 to determine the best doctoral (PhD) and master theses in selected ABB focus areas. The second contest finished in April 2005 and the third has just started. It is hoped the contest will become a permanent feature in the Polish research center.

As director of ABB's research center in Kraków, I hope the ABB contest will contribute towards the intellectual development of young talent, encouraging them to do scientific research as well as establishing contacts with research institutions. The students of today may well be the ABB employees of tomorrow.

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