

Generating partnerships



The Royal Academy of Engineering's support has been instrumental in inspiring a complete change in the research philosophy of Cummins, an international power generation group with long standing roots in the UK

Cummins, an American-owned multinational company with a long heritage of manufacturing in the UK, is known primarily for its diesel engines that power trucks and off-road vehicles around the world. But engines are only part of their business, which covers a broad range of power generation systems and related technologies.

One arm of the Cummins group, Cummins Generator Technologies, has had manufacturing operations in Stamford, Lincolnshire for over 100 years and is a long established supplier of generators to some of the largest power generation companies across the world. Cummins Generator Technologies already had strong links with the UK research community spread over many universities

and research groups, but new challenges and changes that faced the advanced electrical machines industry meant that a different approach was needed.

Increased electrification of transport, the growing need to integrate different kinds of power generation systems and evolving environmental and emissions targets are stretching existing technologies to their limits and require a fresh wave of innovation from research. Dr Neil Brown, Director of Research and Technology at Cummins, reflects: "In the past we engaged with most of the UK universities wherever we saw pockets of expertise, and also with some in other parts of Europe. That was great for creating a network and keeping our ears to the ground in terms of knowing what was going on", said Dr Brown. "This

policy of 'trying to do lots of little bits in lots of places', though, meant there was a lack of focus to our overall research strategy".

Dr Brown acknowledges the Royal Academy of Engineering's support in the area of applied sciences. "Funding is already available from research councils for blue skies work, but there is always a need for other funding streams that can help turn ideas into profitable products and services," he said. "The Academy has really caught on to the urgent need for support in the applied sciences and that is really commendable. I think we've already made a lot of progress between ourselves and the University of Nottingham thanks to their support and there's still a huge amount more to come."

The impact of research

A particular challenge of conducting a research project is the vagaries of academic life - individual researchers leave when a project ends, and hence, the talent pool of the institution can dry-up very quickly. After discussing the possibility of collaborations between academia & industry with the Royal Academy of Engineering, Brown decided to steer Cummins' research strategy in a completely different direction.

"We decided that we needed to establish a single centre at a centralised location," Dr Brown said. "We had worked with the University of Nottingham for many years and noticed that people didn't move on, so we could have that continuity. And it had what may well be the largest power electronics and machines group in the world."

The result of this change in philosophy has been the establishment of the Cummins Innovation Centre at the University of Nottingham and the appointment of Professor Chris Gerada to a joint Royal Academy of Engineering and Cummins Research Chair. The Centre provides Cummins with a range of world class facilities and a research community eager to explore and develop the real-world industrial applications, with the benefit of secured research continuity thanks to the clear focus of the Centre and its research groups.

Dr Brown said that none of this would have been possible without the active support and sponsorship of the Royal Academy of Engineering. "On cost alone, it would have been difficult for us to justify were it not for the Academy backing," he said "The Royal Academy of Engineering's role in actively encouraging the setting up of centres of engineering excellence, and the keenness of the University of Nottingham to embrace the concept, have been crucial."

Cummins' partnership with the Royal Academy of Engineering:

Professor Chris Gerada is the Director of the Cummins Innovation Centre and the Royal Academy of Engineering/Cummins Research Chair within the Faculty of Engineering at the University of Nottingham. He has been part of the Power Electronics, Machines and Drives group at Nottingham for 10 years, with a research focus on electromagnetic energy conversion in electrical machines and drives, concerned mainly with more-electric transport and distributed energy generation.

Measuring the impact

The impact of the Cummins Innovation Centre at the University of Nottingham has been much greater than Dr Brown anticipated.

"Initially, we expected to have a research portfolio that the academics would work on," he said. In fact, the relationship with Professor Gerada and other academics at the centre has been much broader and more interactive than had been foreseen.

"We now have a number of our fulltime employees spending time at the university, and we have students and researchers spending time with us in our facilities," Dr Brown said. "We've been able to use their world-class facilities for our research, and they've been able to benefit through greater opportunity to participate in projects with real-life applications. It's becoming a seamless interaction between Cummins and the University. We have a symbiotic relationship which integrates the creative initiatives at Nottingham with the ambitions of Cummins in new products and they come to us when they're drawing up their research plans to see how we can fit in with them."

There are range of different research project areas where Cummins is benefitting from the collaboration with Professor Gerada and his colleagues - including electrical machine topology, thermal analysis, machine prognostics and diagnostics, and integrating power electronics with electrical machines.

Thanks to this collaboration and the additional funding that the establishment of a centre of excellence can bring there are always new projects on the horizon. "It's quality research at the cutting edge," said Dr Brown. "And the fact that we've got a channel to market through Cummins provides real value."

Future plans

As a global company, when looking for a research partner, Cummins was particularly attracted to the University of Nottingham's international outlook. "This has been a somewhat unforeseen bonus," said Dr Brown. "Nottingham's Ningbo campus in China is near our centres of particular strength in Shanghai and Wuxi and we've already sponsored two PhD students there."

"I think the Royal Academy of Engineering's Research Chairs scheme is outstanding, and it's commitment to engineering research is really commendable."

Dr Neil Brown

