Project Title:	'Superconducting Fault Current Limiter with Integrated Circuit Interrupter'
Principle Investigator:	Prof A Smith (University of Manchester)
Project duration:	01/12/08 – 01/12/09
Grant Value:	£74,989

In order for the UK to meet its ambitious targets for energy production from renewable sources (10% of electricity by 2010, 15% by 2020) it needs to expand its capacity to generate all forms of renewable energy. The proliferation of renewable energy generators, both on a large and small scale, present challenges in terms of maintaining the stability of the UK's electrical power system. A fault current is an abnormal current in an electric circuit due to a fault (usually a short circuit or abnormally low impedance path) and increase in generators raises the fault level in the system. This could significantly reduce the efficiency of the electrical power system in the UK. One proposed solution to this problem is the use of Superconducting Fault Current Limiters (SFCL) which can limit the amount electricity lost through faults.

It is intended these should be "invisible" components in the electrical system which do not do anything until a fault occurs at which point they would then become "visible" and present impudence, or resistance, to the system. This resistance then significantly slows the loss of electricity through the fault. Traditionally the problem with these has been the high material/cooling costs and operational instabilities of the superconductors, however recently a new superconducting material has been introduced that offers great promise as a low-cost, reliable SFCL. The main disadvantage of this material (Magnesium Diboride) is that once the superconducting wire quenches it heats up very rapidly and takes many minutes therefore to recover once the fault has been cleared. This means there is a period where electricity cannot be passed through the line properly even though there is no fault. The purpose of this research proposal is to explore the potential for integrating a circuit interrupter into the SFCL which would improve its reaction to the initial fault and reduce its recovery time. Both physical and Computer Aided Design prototypes were created then tested and optimized for this project.

In general, every network operator in the UK would benefit technically and commercially from this work if its successful. Network operators from overseas (for example USA) have also indicated a need for low-cost and reliable fault current limiters, so there is potentially a worldwide market for this technology. It is also a rapidly expanding market as countries worldwide seek to increase the amount of electricity they generate from renewable sources. This would additionally extend into the electrical distribution systems in the marine and aerospace sectors where current limiters are also required. In terms of the Northwest region, Rolls-Royce own the basic Intellectual Property Rights through their links with the University of Manchester, and wish to develop this technology at the University and are actively discussing the possibility of creating a spin-off company. If successful this would create a high-tech company in Manchester requiring highly-skilled technical and business skills from outside the region.