Introduction
The aviation industry has always pushed the boundaries of technology as it strives to create quieter and more efficient aircraft. One of latest steps is the ‘More Electric Aircraft’. But even before the first flight of the ‘More Electric’ Boeing 787 Dreamliner, at Rolls-Royce, we were already looking at technology for the next development, the ‘More Electric Engine’.

The Rolls-Royce approach
In an industry where it costs tens of millions of pounds to develop a new gas turbine aerospace engine, we are well aware of how much is at stake, not just financially but also in terms of credibility.

It’s perhaps no surprise then that we have invested in the expertise required to help understand the benefits of a More Electric Engine and how to unlock them. Kevin Daffey, Head of Electrical Power and Control Systems (EPACS), the ‘centre of expertise’ we’ve established, explains:

“In very general terms, the difference between a Traditional Aircraft and a More Electric Aircraft (MEA) for an engine manufacturer is the quantity of bleed air the airframe requires from the engine compared to the level of Electrical Power extracted via the generators.”

In the More Electric Aircraft most of the pneumatic systems are replaced by electrically powered systems. On traditional commercial platforms the Environmental Control System (ECS) and Wing Ice Protection System (IPS) both use hot air bled from the engine to ‘power’ the systems. On a More Electric Aircraft platform this bleed air is not required because the systems are electrically driven. As Kevin points out: “You don’t need a More Electric Engine just because you have a More Electric Aircraft, however, how the change in bleed air and electrical power extracted affects the engine does need to be understood, as does the option of a More Electric Engine. The question EPACS is helping to answer is, how can we get a More Electric Engine to provide a better product in terms of fuel efficiency, noise, cost and reliability?”

Rolls-Royce Plc
More Electric Engines for More Electric Aircraft
The More Electric Engine trade
The philosophy of the More Electric Engine is based around replacing the mechanically driven engine accessories, oil pump, fuel pumps, hydraulic pump and generators with electrically driven machines and generators which are attached directly to the engine shafts.

Leveraging technology across all of the company’s sectors, EPACS engineers are investigating the architectures these configurations could employ and the hardware required to facilitate them. The option isn’t simply to replace the mechanical pumps with their electrical equivalent.

Studies show instead that the More Electric Engine requires novel architectures and new technologies. And these need to have a level of reliability and maturity that ensures a low level of risk to future engine programmes. To help identify the cutting edge technologies that will be required to make the More Electric Engine trade work, EPACS is using its links with its University Technology Centres. These are universities in the UK and abroad specifically selected for their research capabilities in power dense electrical machines and power electronics.

Will the More Electric Aircraft have More Electric Engines?
As to whether a More Electric Aircraft will have a More Electric Engine the answer isn’t as clear. It depends on engine size, engine design and the aircraft it is used on.

But what EPACS has seen is that, combining experience from other industries with advanced electrical technology, properly integrated into the appropriate system architecture, will provide customers with lower fuel consumption, more time on wing and a reliable source of clean power to the aircraft.

Kevin Daffey’s view is very clear: “This is a very exciting time to be working on More Electric Engines and we’re beginning to see how this technology can provide real benefits. The next step is to get it flying!”

Rolls-Royce is a global company, providing integrated power solutions for customers in civil and defence aerospace, marine and energy markets.

For further information relating to this article contact:
Eddie Orr - Chief of Sector Civil Aerospace EPACS
EPACS@rolls-royce.com

Or, for general queries, visit the Rolls-Royce web site
www.rolls-royce.com

Rolls Royce is a Corporate Partner of the IET.
www.theiet.org/business/corporate-partners

“This is a very exciting time to be working on More Electric Engines and we’re beginning to see how this technology can provide real benefits.”

Kevin Daffey, Head of Electrical Power and Control Systems EPACS, Rolls-Royce Plc

www.theiet.org/transport