



October 13, 2016

Re: Letter of endorsement for Celtic Engineering Solutions

Dear Fellow Researcher:

I am writing to recommend the electronics design, development, and fabrication services of Celtic Engineering Solutions (CES) for your challenging research and development projects. I can do this with confidence since I have known the founder, Sean O'Leary, for 24 years and have seen his skilled work applied to many difficult problems.

I met Sean when he was an electrical engineering student at the University of Utah and I was on the faculty in Surgery and Bioengineering. I was in the early stages of developing a cardiovascular experiment that was intended to fly on the Space Shuttle as a Get Away Special payload. These payloads were particularly challenging as they were allotted limited size and weight as well as having to be completely autonomous power wise and control wise. These payloads were bolted to the side of the cargo bay, so there was neither crew interaction nor access to spacecraft power – only a turn on signal that would come from the flight deck during the first day of flight. Sean tackled the problem of developing the electrical interface and the power supply and distribution system, fully automating the experiment, and interfacing the pressure and flow sensors with the controller. All this had to survive the acceleration loading and vibration of a launch to orbit and then work correctly in microgravity – no small task. Through endless ground testing, and 14 research missions on the NASA 0-G aircraft, all of the electronics were checked out, modified as needed, and readied for orbital space flight. Two Space Shuttle missions later (STS-85 and STS-95), we had the data we needed for the project, which is a testament to Sean's fine work.

I continue my adventures with NASA with new students, but have maintained an excellent working relationship with what is now Celtic Engineering Solutions which has accrued years of experience in industrial settings including the defense industry. CES has since created for me an accelerometer with a digital display, a pressure monitor with a digital display, and an ECG synchronizer. CES is currently working on a new pressure monitor to help with projects that are developing surgical capabilities for exploration space flight, cardiopulmonary support systems, and other biomedical endeavors. What I appreciate the most is not only the excellent and timely productivity of CES, but their willingness to work with you to create unique electronic solutions for your research needs.

Cordially yours,

George M. Pantalos, Ph.D., FAIMBE, Professor
Department of Cardiovascular and Thoracic Surgery and Department of Bioengineering
University of Louisville
Cardiovascular Innovation Institute