



## MESTECH Research Project



**Project Title:** Rigid Conducting Composites as resistance based sensors for petroleum leaks in transportation pipes

**Project Researcher:** Imogene Blignaut

**Funding Body:** The QUESTOR Centre

**Project Summary:** Leaks in pipelines due to deterioration or cracking etc can have serious economic and environmental implications. It is desirable to detect leaks as they occur and prior to serious impacts. We propose a coating that can experience a conductivity change as fluids make contact with the composite structure.

The work proposed consists of the development of low cost rigid conducting composites that can be used to determine leaks in pipes used to transport petrol. Since the material before curing is mouldable, it can be easily deposited around pipes. The conductivity over the surface can be measured, and the measurements sent to a base station by using motes, i.e. wireless sensing. This wireless sensing approach can be achieved cheaply in real-time using technology that is being tested for many environmental sensing applications currently. This project will also entail the optimisation of the composition of the material in order to obtain optimum mechanical stability and chemical properties. The compatibility of different polymeric matrices with different substances commonly present in petrol will be studied.

During the course of this project, the conductivity and resistance of several different polymeric compounds embedded with graphite will be studied as well as their behaviour when the volume of graphite is altered. The optimum combination of polymer versus graphite quantity for each polymer compound will be found and tested for a change in resistivity and conductivity when placed in a range of different solvents for an extended period of time. Finally, an optimum polymeric compound will be suggested based on experimental findings, to be used as the proposed pipeline coating.