Research project and supervisory team

Supervisory Team	Dr. Philip Hall Prof. Nick Miles Dr. Zheng Wang
Short introduction & description of research project	Hydraulic systems are widely used in many industries: high energy use, sedimentation of particles and corrosion of critical parts are just three of the problems which affect their day-to-day operation. Typically, these phenomena are a result of the uneven distribution of fluid and particles in the system and therefore mixing protocols are deployed. In reactors and pipelines static mixing is favoured over dynamic mixing as it benefits from there being no moving parts and no additional power requirements, other than pumping. Our team has developed a swirl pipe structure ("GreenPipe") that induces a tangential swirl into fluid whilst minimising pressure losses. Suitable sized swirl pipes can be strategically installed into existing hydraulic systems to reduce energy consumption as well as enhance mixing effects. Our preliminary work (i.e., Computational Fluid Dynamic studies) suggests that the GreenPipe has superior mixing performance with immiscible liquids and solid particles. This project will build on this work enhancing the models and practically validating the results from simulation. We will investigate the application of GreenPipe in industrial settings with special focus on its energy reduction potential. Life cycle assessment using SimaPro will form part of the work to evaluate the environmental impact of GreenPipe in comparison to conventional approaches to mixing.
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