**EPSRC funded EngD:** Modelling of Resonant Acoustic Mixing Parameters

Dr Kit Windows Yule (Chem Eng, Univ of Birmingham)

A major defence contractor

Tax free bursary of £23,400 p.a. plus fees paid

Traditionally, multi-material blended components are mixed in planetary mixers, cast to blocks/blanks, and undergo subtractive machining to form shaped components. Composites such as syntactics and highly filled resin based systems are blended in rotary drums and other conventional blade based mixers over long periods of time, decanted, moulded to blocks and again undergo subtractive machining. These are both time consuming, wasteful and potentially hazardous when working with energetically-sensitive materials.

Resonant Acoustic Mixing (RAM) is a novel powder/powder, powder/fluid and fluid/fluid mixing technology that has the potential to directly mix materials into the final net (or near net) component shape without further processing, removing or significantly reducing material waste, time and hazards. RAM is being trialled with a defence contractor and is showing excellent results to-date. However, modelling of this mixing technique is in its infancy and has not been addressed and thus, cannot be said to be optimised. Numerous mixing (intensity, time, pressure temperature), material (particle size, shape, pre-blending, order of addition) and tooling (shape, composition, mixing head space) parameters impact the efficiency of RAM and thus if modelled would add significant value in optimising the mixing process.

Modelling and/or trials would improve understanding of the capability, both limitations and opportunities. A phase space of mixing sweet-spots could be identified, further de-risking potential processing operations by avoiding knife-edge scenarios. Once mixed, the blend of powders still needs to be decanted to a mouldtool. This presents a more controlled flowing environment but can lead to phase separation layering and other forms of de mixing especially when considering particles of different size or density.

For informal enquiries please contact [cdt-formulation@contacts.bham.ac.uk](mailto:cdt-formulation@contacts.bham.ac.uk) , together with a CV. For details on the Engineering Doctorate scheme visit the [homepage](http://www.birmingham.ac.uk/schools/chemical-engineering/postgraduate/eng-d/index.aspx). **Deadline 28th November.**