Current Polymer Bonded Explosive (PBX) formulation is limited by a compromise - optimised final properties against processability. While explosive content would ideally be maximised and plasticiser content ideally minimised, the formulation would become too viscous to cast and require long and arduous mixing processes using conventional techniques. However, with Resonant Acoustic Mixing (RAM), formulation does not have to be constrained. Instead of traditional mixing blades, mixing is achieved using an oscillating platform to impart acoustic pressure waves (vibrations) into the mixture, agitating it. Mixing is orders of magnitude faster than conventionally achievable, and the added ability to mix in the end use casing (mixing ‘in-situ’) also renders casting obsolete in many scenarios.

In order to maximise the benefits of RAM, its efficiency must be maximised and how material properties may change when mixing `in-situ' must be understood. The research aim of the PhD is therefore to assess how aspects of machine control and mixing vessel design can be altered to improve the mixing mechanisms on which the technique relies, and compare material properties of composites mixed ‘in-situ’ and ‘mixed and cast’.