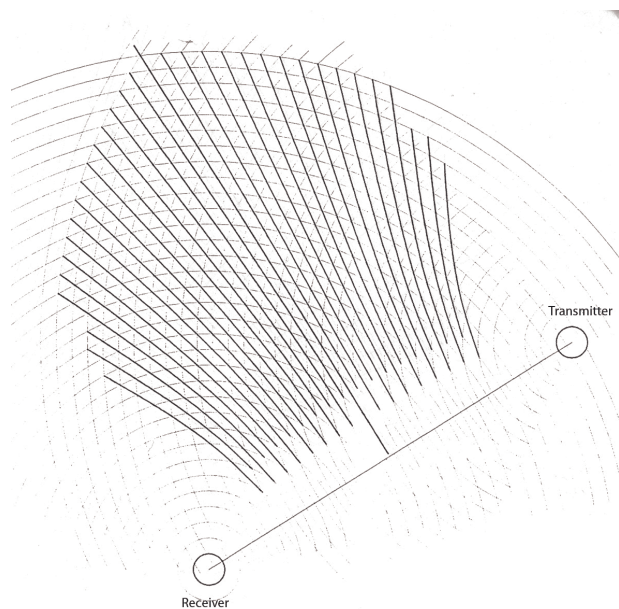
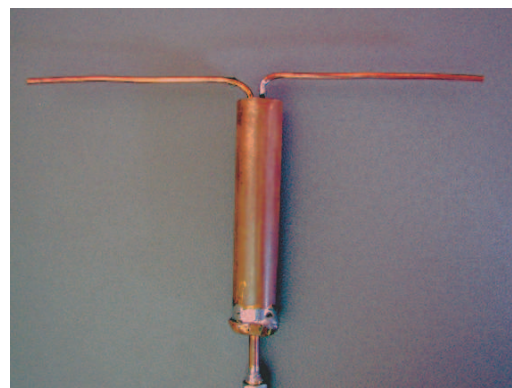


One of current research topics of the Silos and Granular Solids Research Group, in collaboration with the NDT Research Group, involves investigating the behaviour of solids material flows during the eccentric discharging of silos. This is an area of research that is of great importance to industry and which has the backing and funding of the Engineering and Physical Sciences Research Council (EPSRC). The outcomes from this research could have far reaching consequences for the huge range of industries that use silos as an essential part of their materials handling process. Some of these industries include power generation, food processing, steel making, plastics, pharmaceuticals, mining and quarrying, and grain handling.

Despite years of research, solids material flow is an area that is still poorly understood in scientific terms and does not fit into any one analytical field. The only way to further knowledge in this area is by attempting to measure the patterns that occur as a result of the material flows. An analysis of all the currently known flow pattern observation techniques is given by Rotter *et al* (1995), where the advantages and disadvantages of each method are outlined. Photographic, tomographic and radiographic techniques are among those that have been tested, but Rotter points out that most of these methods are unsuitable for testing on full-scale silos. The conclusion drawn is that all current flow pattern observation techniques have some sort of shortcomings.



Decca radar system hyperbolic mesh.



Silo radar system, dipole antenna.

The Silo Research Group, however, has devised a new completely novel technique for observing flow behaviour in silos that uses a radar system to track a particle within the solids

material flow. The system uses a method of phase detection similar to the Decca navigational radar system i.e. by measuring the phase difference between transmitted and received radio waves the system can calculate a target's location. The proposed method to implement this system is to use a miniaturised radio transmitter placed within the solids material in the silo to act as a tracer particle. By using radio receivers to track the transmitter as the silo is discharged it is hoped to be able to plot the path of the transmitter and therefore begin to analyse the behaviour of the flow.