



Modelling Electrical Hazards

Safearth is a specialist electrical engineering group providing world-recognised expertise in safe power earthing systems. Safearth delivers comprehensive earthing solutions and management to safeguard people and infrastructure from electrical faults and lightning. Since being established more than 20 years ago, Safearth has designed and tested hundreds of earthing systems for high voltage installations, for power utilities, mines, oil and gas sites, and other industries.

Safearth would like to develop a more reliable understanding of electrical hazards to improve electrical safety standards in Australia.

It is well known that under strong enough voltages/currents the human heart will stop beating, and this is the principle danger of receiving an electric shock. Such a process is known as ventricular fibrillation.

Currently, the safety standards in Australia specify a safe voltage/current, below which the effect is considered not to be life-threatening. In practice, the individual human response to voltages/currents varies greatly, and it would be better to develop a more sophisticated model in which the likelihood of injury was modelled. Due to the desire for large safety margins, the safe voltage must be one for which the probability of ventricular fibrillation is very small. Thus the probability modelling become challenging due to the need to predict rare events.

Recently, Safearth has developed a more sophisticated safety model in which they proposed a calculation framework for quantifying the probability of the rare events of ventricular fibrillation around the critical voltage/current. They want to know if this model is the best way to approach the problem or if there are other better methods to solve this problem.

The model will be based on the available data on the human response to electricity and will use statistical methods to estimate the probability of, for example, the voltage below which the probability of death is less than one in a million (considered to be an acceptable safety margin). The analysis will use statistical and probabilistic methods.