With global growth driving demand for minerals, especially copper, and the need to mine lower grade ores in remote locations to keep pace with demand, the mining industry is under increasing pressure to reduce its huge energy consumption, with an estimated 5% of the world's electricity used to fine-grind rocks in mineral processing plants.

Years of research by Professors Sam Kingman and Chris Dodds with microwave experts Teledyne e2v has developed MicroHammer – a revolutionary process for extracting copper from its ore using microwave technology. MicroHammer heats and expands the copper grains, causing them to split from the encasing rock. The microfractures weaken the host rock and make it possible to extract the copper without completely grinding the ore.

MicroHammer reduces copper extraction energy consumption by over 20% whilst increasing production by almost a third – massive gains for an industry whose capital expenditure runs into billions of dollars.

Working with mining corporation Rio Tinto, the team developed a demonstration system processing over 150 tonnes of rock per hour. Using numerical simulation and experimental validation, the team demonstrated that this can be expanded, developing the largest microwave processing system ever constructed, capable of processing up to 3,000 tonnes of rock per hour – the scale required for commercial use in a mining environment.

The significance of this step-change was recognised with the Royal Academy of Engineering Colin Campbell Mitchell Award, for having made the greatest contribution to the advancement of any field of engineering within the preceding four years.

Find out more
nott.ac/engineeringimpact