

# Precision breakthrough: the world's smallest hole drilled

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Experts at Cardiff University have developed machinery so sophisticated that they can drill a hole narrower than a human hair. Such precision has potentially major benefits in medical and electronic engineering.

The experts at the University's multi-award-winning Manufacturing Engineering Centre, are drilling holes as small as 22 microns (0.022 mm) in stainless steel and other materials.

The human hair varies between 80 microns (0.08 mm) down to 50 microns (0.05 mm) in thickness.

"The holes we are now drilling in Cardiff with the electro-discharge machining (EDM) process could be the smallest in the world," said the Centre's marketing director Frank Marsh.

"The standard rods available commercially are capable of making holes of 150 microns. Although lasers are able to make small holes, these are of poorer quality when compared to the EDM process. Lasers make holes that taper, whereas EDM makes parallel or vertical holes."

The process is achieved by creating a minute electrode, with a diameter of only 6 microns (0.006 mm), which was itself produced by manufacturing a highly precise wire electrode discharge grinder.

"It is thought that the Japanese conceived such a grinder in 1985 and subsequently a paper stated that they have made an electrode of 5 microns (0.005 mm) in diameter, however no further evidence has

emerged," said Mr Marsh.

The ability to produce such quality tiny holes in any conductive material represents a significant advance in mechanical engineering and will benefit designers in the medical and laboratory sciences, as well as electronic design engineers in creating smaller electronic systems which will cover a wide range of industrial and consumer industries.

In the new year, the Centre's scientists will acquire new nano-technological equipment which will enable them to make even smaller holes and add surface materials of tiny thicknesses to finish optical, medical and other components.

Source: Cardiff University

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