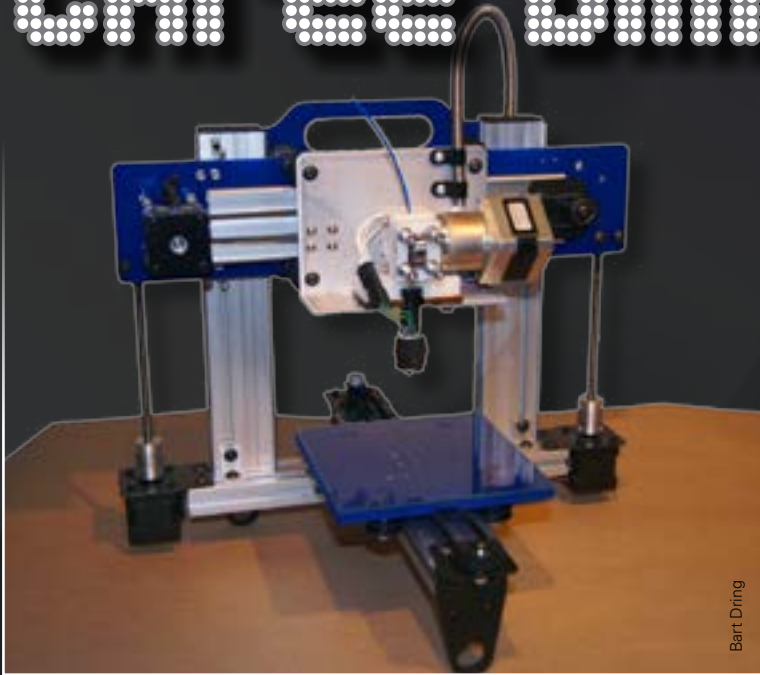
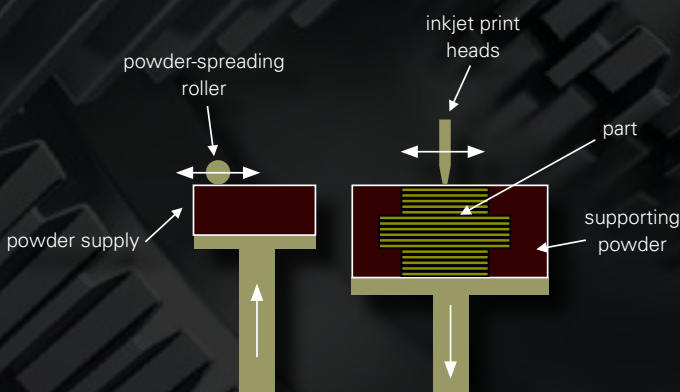


Principles in Three Dimensions



Up and down, back and forth A 3D printer, showing the nozzle through which polymer beads are passed to form the printed object. The position of the nozzle is controlled in three dimensions by a computer.



How it works In a 3D printer, layers of polymer beads are printed one on top of the other. Heat melts the polymer beads so that they form a solid structure. A powder is used to fill spaces where no polymer is required and is removed later.



Better bodies 3D printing is allowing rapid production of replacement body parts. Jake Evill of Victoria University, New Zealand, devised this cast for a broken arm. The design can be adapted to give a precise fit to the individual patient.

3D printing is a new technology which is rapidly finding applications. It's probably too slow for mass production but it is useful for producing prototypes and tailor-made items.



Accurate copy A 3D laser scanner images a Viking belt buckle. The data file was used to 3D print a replica of the buckle.



Now for metals Metals can also be used in place of polymers. This test piece is made of titanium; its dimensions are accurate to one millimetre.



In the future The European Space Agency is devising a 3D-printed lunar base for astronauts on the Moon. They set up a tubular structure; a 3D printer then covers it with layers of lunar soil. A salt solution binds the particles together to form a rock-hard solid.