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STRAIGHT FROM COMPUTER TO CUSTOMER - MANUFACTURING - FOCUS.

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John Stansell on a technique that gives instant prototypes

A NOVEL technology that is sweeping through the once moribund world of manufacturing is revitalising companies from the massive to the tiny, saving costs and delivering new jobs. It is called Rapid Prototyping and Tooling (RP&T), and allows companies to create an exact facsimile of a new product directly from computer-design data, without the costs and production times normally associated with prototypes. Conceived ten years ago by the California-based company 3-D Systems, the term rapid prototyping is actually something of a misnomer. A better description of the technology is rapid modelling or the rather more formal "Free Form Manufacturing" (FFM). In essence RP&T machines can create, in less than 30% of the time a human would take, a precise model of a three-dimensional object, whose external and internal dimensions, fixing points, shapes, features, apertures and colours have been created on a computer by a designer.

Even more important is that the shapes thus created can be directly employed to make tools so that actual products in the chosen material (metals, alloys or plastics) can be made faster and cheaper than by conventional methods.

But there is another advantage the ability to minimise the risk that new products will be ready when they are needed. Tim Plunkett, of Formation Engineering Services, describes how the rapid prototyping of a new cellular telephone cost his client #6,000 but saved it in the region of #750,000 by making sure the product was right and was on sale in time to beat the competition.

There are five main commercial RP&T systems, and many more waiting in the wings, says David Wimpenny, manager of the group at Warwick University's Advanced Technology Centre which researches and applies the process to manufacturing projects.The leader, both in its level of development and market share, is 3D System's "stereolithography apparatus", or SLA. In this, the computer-aided design information is used to drive an automated machine in which a laser progressively solidifies layers of resin within a tank, to create the desired shape. There is virtually no waste, and three of the other main systems are based on this concept.

The other key technology is Laminated Object Manufacture (LOM) from Helisys of California. In this process, paper sheets impregnated with resin are moved across a heated table, so that they bond together into a multilayer solid, and then a laser is used to "machine" away the unwanted material. Other key systems are Fused Deposition Modelling (FDM) from Stratasys of Minnesota, Selective Laser Sintering (SLS) from Texas-based DTM Corporation, and SLA and SLS derived systems from EOS of Germany.

These models are used in a number of different ways. Some are "dressed", polished or painted to look like the real thing. Some are used to make moulds from which metallic parts or plastic components can be created.

RP&T systems often costing upwards of #250,000, so only large firms such as Rover and IBM normally own their systems. Smaller firms can use "service bureaux" such as Formation, Amsys, ARRK, Umak and IMI Rapid Prototyping, or university-based commercial units.

Mr Wimpenny says that the rate at which British firms are adopting RP&T is accelerating fast, with about 100 already committed and many more monitoring its potential usefulness.

Taking its place alongside the rapid prototyping section at Manufacturing Week 95 at Birmingham next week will be the Robot Village. According to the British Robotics Association, there are now nearly 700,000 industrial robots in use in industry across the world today. The dominant user is Japan, with about 350,000; America has nearly 50,000, and the UK is a growing user with about 10,000. The main motive for any company using industrial robots is to boost productivity, says Bob Lloyd, chairman of the BRA, but there are important associated benefits in flexibility, consistency of output and reliability.

"Europe has gone mad on robots" over the past two years, says Mr Lloyd, effectively doubling the rate it is installing new machines. In Britain, the message is still being understood more slowly than in other countries, but the development of new market sectors such as food packaging and handling is beginning to turn the tide.

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