

# Mind the (spark) gap

**Steed Webzell dipped his toe into the dielectric fluid and discovered renewed investment in latest technology EDM machinery**

**O**f all the manufacturing processes, none has advanced as quickly as EDM in recent times. Metal removal rates have jumped 10-fold in the past decade, which, along with strides in accuracy, surface finish, automation, software and tooling, has seen EDM step purposefully out of the toolroom into the aggressive arena of the modern production shop.

However, the manufacturing contraction witnessed in recent years threatened to halt this march at the first hurdle. The encouraging news now is that investment is once again beginning to underpin this vital technology area, as confirmed by Tony Steels, managing director of Agie Charmilles UK: "Sales of EDM machines are up 25 per cent on last year, which saw an excessively large number of used machines being traded – a trend that is now reversing.

"The market appears to be polarised at present," he continues. "The high end users that invested in machines and automation have weathered the contraction of the mould and die sector as they are globally competitive and have fewer commercial opponents, certainly in the UK. They are now investing again and pushing on with further automation projects."

Dr Steels also points out that many sub-contractors are also beginning to invest, highlighting that, "you have to do something when a

machine from the early 1990s cuts at about 30 mm<sup>2</sup>/min and our latest products can achieve in excess of 500 mm<sup>2</sup>/min". It is a salutary point and highlights the technology 'gap' that has occurred in a relatively short space of time.

## THE NEED FOR SPEED

There is little doubt that increased speed is top of most manufacturers' 'want list' when it comes to buying a new machine. Yet, Agie has been quick to realise that increased speed does have its disadvantages too. Greater power consumption and increased consumable costs, such as wire and filters, can all

impact on productivity and cost per part. Agie models such as Progress and Vertex feature its recently developed Intelligent Power Generator with eCut technology as standard, which offers users the capability to reduce the necessity for trim cuts. This in turn can cut wire consumption by up to 60 per cent. A reduction in machining cycles and less

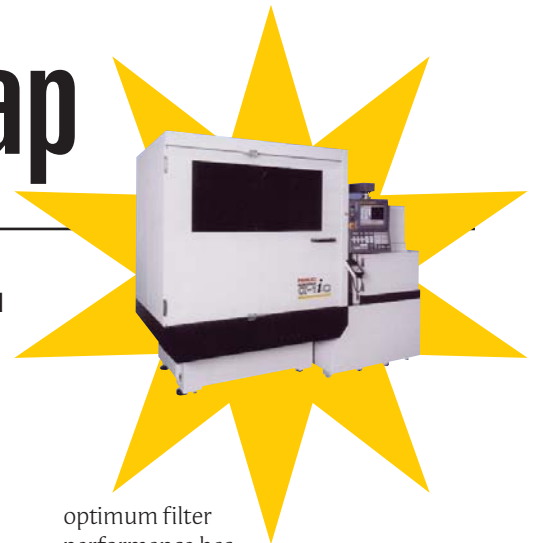
wire consumption also results in less debris, reducing filter consumption by up to 40 per cent. And maintaining

optimum filter performance has the knock-on effect of reducing resin consumption, again by up to 40 per cent.

One company taking advantage of an AgieCut Progress 3 wire-cut EDM machine is Stockport-based Parkside Tool & Die. Installed in May, manufacturing lead times have been significantly improved, part accuracy and quality have increased, and operating costs have been reduced. "We have never been sceptical or hesitant about the commercial advantages that an investment in the latest advanced manufacturing technologies can bring

to our company," says Parkside's technical director, Scott Owen. "In our markets within the UK and Europe, where competition is fierce, we look at every new process and new technology to see if it can secure us a competitive advantage. We have seen a definite pick-up in the market this year and our order book reflects this trend. Our investment in new technology has meant that we have not only been ready to take advantage of the upturn but that we have also managed to control our costs."

Much has been documented about the EDM process becoming less of a 'black art' and more accessible through the introduction of user-friendly





technologies.

Chiefly software-based, such features enable operators to achieve optimum set-up and cycle times without the need for 'a little black book', as in the past.

Charmilles Roboform 350/550 die-sink EDM machines, for example, now come with Windows-based Dynamic Process Control technology, claiming to provide instant productivity gains at the touch of a button.

The Windows platform will be both familiar and user-friendly to all machine operators. Touch screen operation coupled with interactive graphics that visually describe and explain all machining operations – such as measuring, machining cycles and cavity positioning – facilitate intuitive and spontaneous operator understanding. The DPCControl can even suggest the ideal electrode undersize and will automatically rationalise the number of electrodes required for effective machining.

It presents clear choices to the operator for every application and generates the optimum machining strategy for every job. On just one screen the operator enters the required machining parameters, such as surface finish, machining depth and type of application, to obtain the best possible generator performance.



## High speed and precision

The new AE range of wire-cut electrical discharge machines from ONA (represented in Great Britain by Warwick Machine Tools) incorporates the company's novel HTS (high thickness speed) system for spark gap control, which improves considerably the speed and precision of straightness obtained with the first cut. The HTS system can improve cutting speed at 50 mm high work pieces by 93 per cent and at 250 mm pieces by 47 per cent. Also, with only one cut and one trim-cut straightness precision of 9 micron per side can be achieved at 400 mm thick. Operational costs are kept low by the long-life filter unit (no disposable cartridges), 50 per cent resin savings (due to the Ekoadd additive), and low wire consumption of 8-12 m/min.

Putting this technology through its paces is Gloucestershire-based sub-contractor TJ Wire, which installed a Charmilles Roboform 350 die-sinker in January. The machine is fitted with DPCControl and a K-HM generator for trouble-free cutting of hard materials such as carbide, titanium and stainless steel. "This technology has given us a significant commercial advantage over our rivals including: manufacturing flexibility and versatility; additional machining capability;

guaranteed precision; and higher levels of productivity," says company technical director Ben Bartholomew. But trade is not only brisk for Agie Charmilles. At Sodi-Tech EDM, managing director Peter Capp declares: "Business is good. In the UK there has been strong demand for EDM in the aerospace sector and also

among mouldmakers, while for Sodick in general, Asia remains an extremely strong market, to the extent that the Sodick plant is at maximum production capacity." Sodick has just introduced two new models – the AQ300L and the AQ327L – which were recently exhibited at the IMTS exhibition in Chicago. Both machines feature x, y, u and v linear motor drives, glass scale feedback, automatic dielectric level float switch and electrolysis-free circuit as standard.

Midlands-based Hi-Spec has recently acquired three Sodick AQ325L CNC wire erosion machines, which were purchased to help the company recover its market position following a fire at its premises last year. The machines all feature linear drive technology and have helped the toolmaking and moulding firm regain its foothold. The moulding operation is now nine machines strong and more than 10 million mouldings have been produced in the past 12 months. The forecast for the next 12 months exceeds 30 million.

Cutting tool manufacture is an area where EDM has long been effective, yet





in this sector, too, productivity gains are demanded. So much so that Vollmer has launched its QWD755H with automatic tool-loading magazine for the manufacture and sharpening of PCD-tipped metalworking tools.

Tools are loaded into an integral carrier, which has four CNC axes and a laser checks correct tool alignment to allow measurement by a Renishaw probe when automatically fed into the working area.

When finished, the tool is moved back into the holder and the next one is loaded.

### SIMPLE SELECTION

New tools can be programmed while the machine is working – either by using the machine's controller or the separate PC workstation. Vollmer's ExProg software allows processes relating to specific tasks to be individually programmed and combined in any desired sequence. It also offers the ability to erode internal cutting edges.

The first UK installation of the new Vollmer machine is at Coventry-based Exactaform Cutting Tools. The company specialises in rotary PCD tools for all applications in the metalworking industries. "During the past three years our overseas sales have increased by 75

per cent," says managing director John Inglis. "We've also seen a 20 per cent rise in the UK market, so we had to look at adding capacity. We run the QWD755H 24 hours a day, seven days a week", he adds. "Without it I'd have to buy three manual machines or introduce shift working."

### UNIVERSALLY SPEAKING

Mitsubishi Electric likes to term its latest machines as 'universal eroding systems,' purposely designed for complex, high precision mouldmaking.

Its new FA-S series, supplied in the UK by HK Technologies, features an impressive list of standard features such as glass scales, automatic wire threading, integrated fine smoothing, a tank cleaning



assistance system, inverter controlled pumps and an absolute measuring system with a fast processor. Together with automatic functions, Mitsubishi claim the FA-S to be the ultimate universal eroding system. With the launch of its new Robocut Alpha-iC series of wire electro-discharge machines,

Fanuc is quantifying the kind of output that can be expected from this equipment. High-speed cutting up to 330 mm<sup>2</sup>/min using 0.3 mm brass wire can be performed with a precision capability such as holding roundness to within 1.2 micron on a 30 mm diameter hole to a surface finish of 0.7 micron.

It seems little can stand in the way of EDM progress. The process is becoming more production 'friendly' by the month – a fact that many UK manufacturers have already discovered to their advantage.

With competition more fierce than ever before, can you afford to get caught in the technology 'gap'? **M**

## Setting the pulse racing

Electro-chemical machining, previously the province of university research departments and specialist aerospace applications, has been made everyday technology by Gloucestershire-based Impulse ECM with the launch of its new Impulse ECM 50 machine.

The Impulse process pioneered by the company has resolved the problem of a large gap of 4-5 mm between the electrode and the workpiece, reducing this to as little as 20 micron. Previously, with a large gap, the electrode and the job were a completely different shape, making it nearly impossible to manufacture complex parts. "The ECM 50 is capable of metal removal rates of 1000 mm<sup>3</sup>/min in a machine with the same footprint as an EDM machine," says Steve Duffield, technical director. "The very small gap enabled by the Impulse process, and the absence of force on the workpiece, allows the manufacture of very intricate shapes." ECM is capable of producing fine surface finishes. Routinely, 0.1 Ra can be achieved while, with care, finishes can be improved to 0.03 Ra. Because ECM is essentially electroplating in reverse, electrode wear is negligible, resulting in further significant benefits.