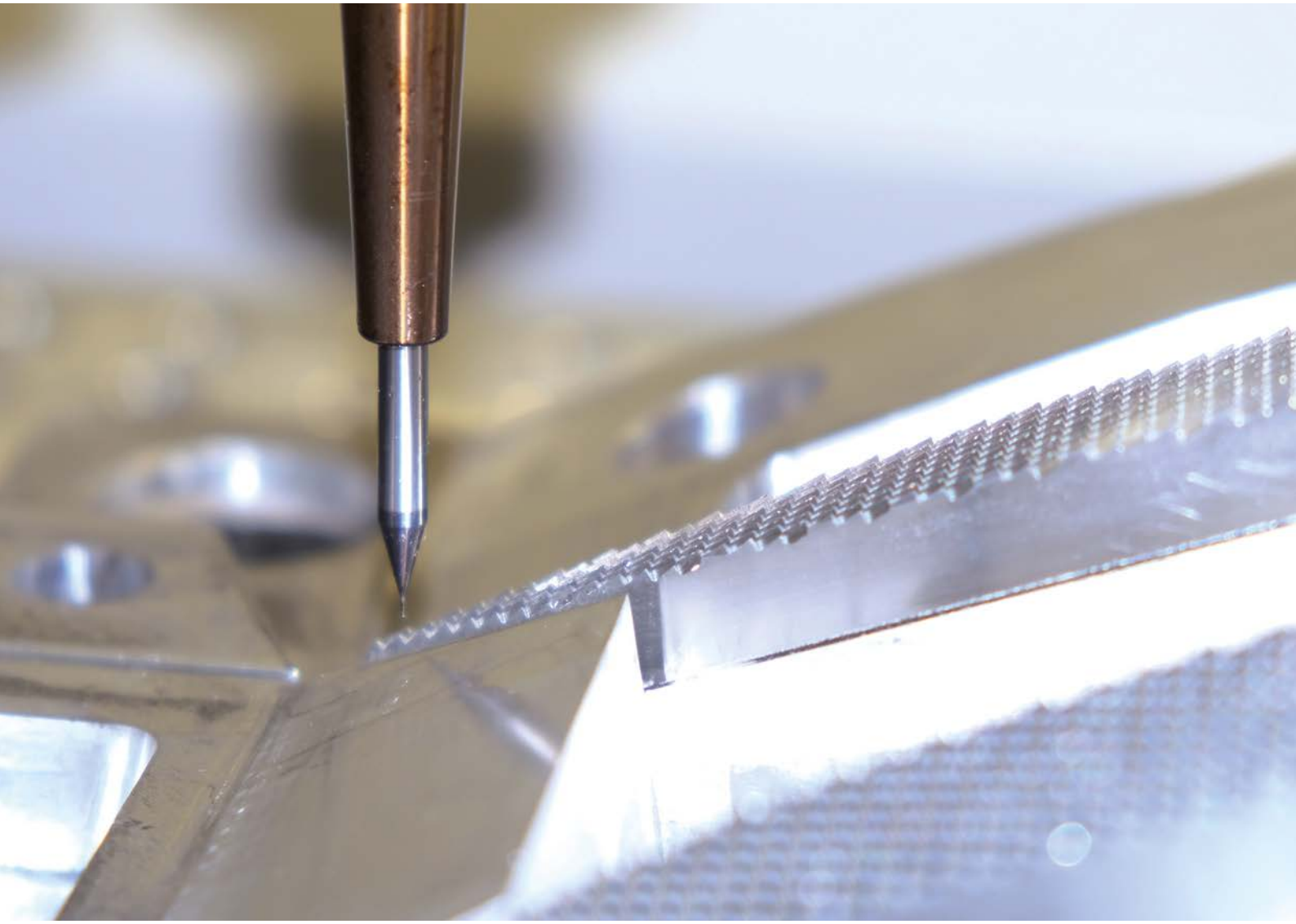
DUDLEY ASSOCIATES & MITSUBISHI MATERIALS

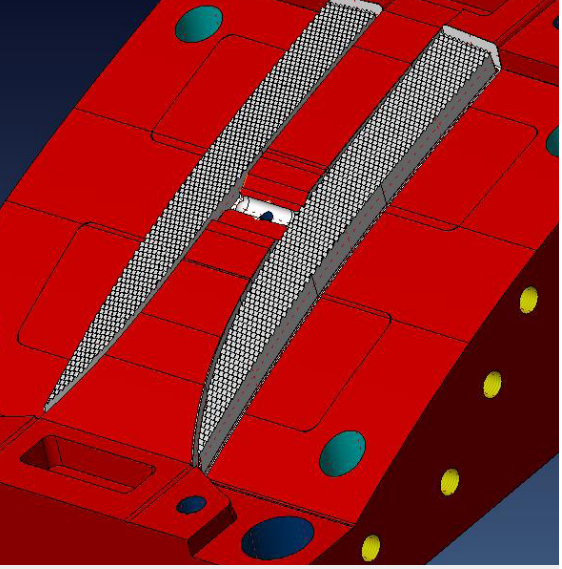
SUCCESS STORY



SPECIALISED MOULD MAKING FOR SPORTS CAR LIGHT LENSES

DUDLEY ASSOCIATES
Precision Tools & Plastic Injection Moulding

MITSUBISHI MATERIALS



Attention to detail is critical due to the tight tolerances and super high quality surface finishes required of the various moulds for the light lenses. (from left to right:) John Churchard, Works Director (Dudley Associates), Ian Watts, Sales and Marketing Manager (Dudley Associates) and Adrian Barnacle, Technical Manager (Mitsubishi Materials)

VFR SERIES

Geometry	Long neck ball nose, 2 flute
Coating	VFR (AlCrSi)N / (AlTiSi)N PVD multilayer coating

Features:

New series of end mills with PVD multilayer coating provides the ultimate in wear resistance for reliability when machining extremely hard materials up to 70 HRC.

HIGH SPEED GAINS FOR DUDLEY ASSOCIATES PRECISION MACHINING

Manufacturing complex premium industrial products requires exceptional quality. It is the complexity of modern-day products that becomes a challenge, and as such, mould toolmakers need to carefully choose adequate processing methods, machines and strategies, as well as the fundamentals of materials and cutting tools. Dudley Associates used high-speed machines and techniques together with the VFR ball nose end mill series from Mitsubishi Materials to mirror finish machine mould tools for the light lenses for a new model of a premium brand sports car. Thereby negating the usual polishing process after machining.

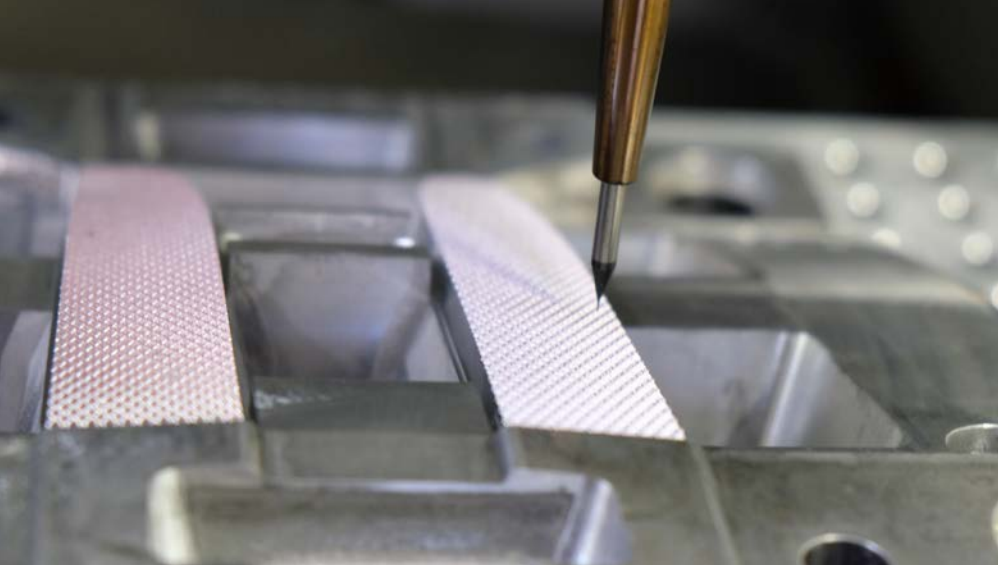
MARKET NICHE

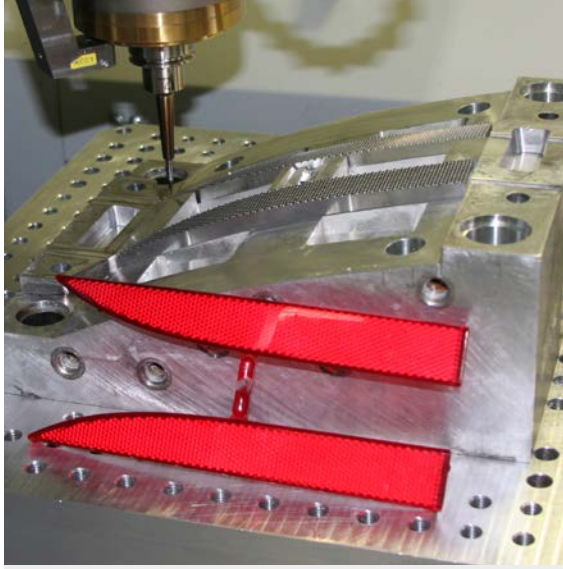
Dudley Associates is a small-sized enterprise with 35 employees, founded in 1991 near Leicester, United Kingdom. It is specialised in technical moulding and toolmaking, and today it is established as a one-stop-shop, filling a local market niche by providing exclusive low to medium volume mouldings and prototypes to various customers in the automotive, medical, oil and gas and defence industries. Following a management buyout in 2014, the new owners recognised the vast market potential in specialised toolmaking and invested heavily in new generation technology. The machining infrastructure has been systematically expanded and renewed with the introduction of six new machines. The new plant includes two high precision machining centres from Röders, the RXP801 & RXP500 with RCM Automation. To compliment this investment in hardware, advanced CAD/CAM software has also been introduced.

SKILLS SET

State-of-the-art equipment is key, especially where modern technology has taken over many of the old-fashioned tool makers' hand skills. Additionally, the company has invested in three young employees whose modern-day skills will develop along with this new state of the art equipment. John Churchard, one of Dudley Associates owners and works director, says: "Our philosophy is to set the same exacting standards to our mould tools that apply to the finished components. Especially because we lie at the start of the supply chain for many industries, we need to deliver tools and finished components of the highest accuracy and quality."

For toolmaking applications, the company regularly processes many different materials such as Alumec 89, P20 steel from 35 – 40HRC and higher hardened steels from 40 – 55 HRC. The moulds produced cover a range of final production volumes that vary from only a few thousand up to millions of mouldings.





A 0.3mm diameter VFR ball nose end mill from Mitsubishi Materails. Used for fine finish machining of the light lense mould.

"For production moulds that are required to produce millions of parts we normally use a standard hardened steel. But in the case of the tools for the new light lenses, due to the exclusivity of the components, we used a special, fully hardened steel of 55 HRC," says John.

SMALL TOOLS MAKE A BIG DIFFERENCE

High-speed machining is now commonly used in the die and mould industry even for machining materials with a hardness of 50 HRC and above. This means that all manufacturing equipment, including the machine tools, spindles, tool holders and cutting tools must meet exacting standards, especially when machining small parts and complex geometries that require removal of very small amounts of material; sometimes only microns, to ensure a precision mirror finish.

The recent order to machine ten different production mould tools for the light lenses, including the side and rear reflectors, the reverse and brake lights, fog lamps and the light pipe for the door mirrors for a new model of an electric sports car was a big challenge. However, due to their investments, Dudley Associates were prepared. "We knew that when it comes to high-speed machining and with our spindles capable of 42,000 rpm, it's essential to use the right cutter. Otherwise the required high-quality finishes and the cost performance ratio would be diminished. Furthermore, the component had to be finished machined to the correct surface finish tolerance and not polished. This was to avoid even the slightest deformation of the original shape as well as any kind of contamination that could be later transferred to the final moulded plastic parts and cause light refraction. Therefore, we sought advice from Mitsubishi Materials", says John.

Adrian Barnacle, technical manager of Mitsubishi Materials in the UK, explains: "We originally tested the standard VF end mill series from Mitsubishi's regular portfolio which had already shown outstanding results in hard machining applications. But with the focus on super high-quality surface finishes and long, stable tool life, this project coincided quite nicely with the introduction of the VFR series. The new PVD coating on the VFR series was ideal in providing the consistent tool life needed to finish machine extra hard materials without any drop off in surface finish and geometrical accuracy when the tool neared the end of its lifecycle. It was also vitally important that the next tool would perform exactly as the previous one in order to maintain a consistent quality across the whole component. Dudley Associates were the first customer in the country that used the VFR series in production."

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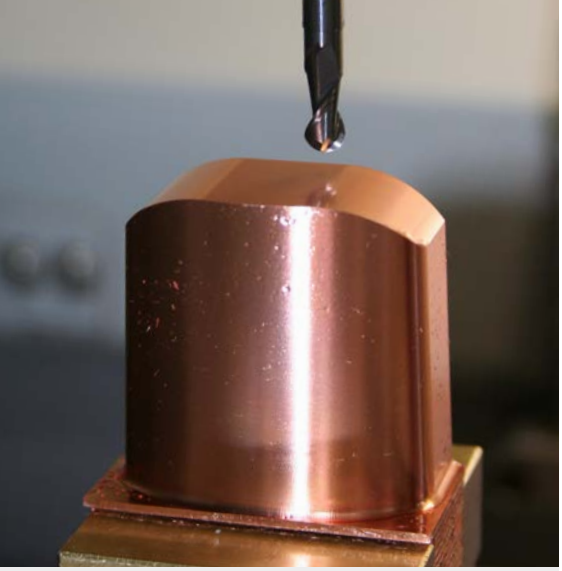
John Churchard (Works Director)

DUDLEY ASSOCIATES



A CRN series end mill from Mitsubishi machining a copper electrode.

The Röders flexible twin machining centre cell with RCM Automation.

DUDLEY ASSOCIATES

The comapny was formed in 1991 and is currently based in Lutterworth, Leicestershire. In 2014 an exciting new chapter began for Dudley Associates. Following a Management buy-out, ownership transferred to MC Industries, a company formed by current Directors of the company.

Under MC Industries, Dudley Associates has exciting plans to expand its capabilities and explore new market sectors, particularly high-end technology sectors such as the aerospace, marine and oil and gas industries.

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MMC HARDMETAL UK & MITSUBISHI MATERIALS

MMC Hardmetal UK Ltd., based in Tamworth (U.K.), is one of the seven European branches of the Japanese Mitsubishi Materials Corporation group's cutting tools division. MMC Hardmetal UK reports to the European headquarters in Germany and since its establishment in 1993, the company has been selling precision cutting tools and providing integrated solutions for the automotive, aeronautical and medical sectors and the mould and die industry. With a large number of qualified partners, MMC Hardmetal UK is able to offer a wide variety of precision tools for turning, milling and drilling to French industry.

Mitsubishi Materials Corporation employs over 24,000 people in 77 countries, operating with head offices located in Europe, India, Brazil, China, the United States, Japan and Thailand. Plus a modern research and development centre in Japan and various production sites across the world, including one in Spain.

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The first performance tests were conducted on actual components with VFR ball nose end mills of various diameters, some as small as Ø0.3 mm. For example, a test finish cut was performed to ensure that the end mill would last across the whole component, or up to a satisfactory lift-off point for a tool change. The final cut was performed to achieve the required mirror finishing. Once the first mould was successfully machined, the optimum parameters and processing strategy were carried over to the other applications. "Even though the shapes differed, we soon became very confident of having the optimum cutting parameters. The accuracy of the end mills but also our advanced equipment enabled us to deliver the moulds in perfect quality within the required time frame", John confirms.

The cooperation between the two companies goes back more than 15 years when Mitsubishi Materials was one of the few suppliers that could provide tool makers with small diameter, long neck end mills from stock. John Churchard Director of Dudley Associates, says: "For us, it was always important to have a high-end cutting tool partner with an extensive range of tooling, such as long neck types and small diameters that are readily available, as they were from Mitsubishi. Such tools enhance our capability to machine diverse materials even for the most complex applications. This was the start of our cooperation with Mitsubishi Materials. However, the great support, the strong personal engagement and the friendly approach of the Mitsubishi's experts are one of the main reasons why we have made them our primary cutting tool supplier".

Adrian comments: "At Mitsubishi Materials a high level of trust is the business model in operation and we target to grow together with our customers. Although it is easy to be complacent with long-standing customers, we always strive to introduce our newest products, enabling them to become even more confident in the technology and use this knowledge for their own benefit."

For the future, Dudley Associates plan to keep growing, utilising further investments in equipment and technologies, especially in the field of toolmaking where the needs for a diverse technical mould making company are substantial. Mitsubishi Materials will continue to support them in their expansion path as a trusted partner.