

Silver anniversary for Lach – the first EDM machining of PCD

A milestone in the history of polycrystalline diamond tools was the development of EDM machining 25 years ago by Lach Diamant. With this it became possible to shape these high-performance tools quickly, economically and to a high quality, enabling them to move into an increasingly wide area of applications in industry. Report by **Horst Lach**.

Building on the experience gained since 1922 in the grinding of diamonds and the manufacture of diamond tools, which had already been added to in 1969 with the introduction of cBN grinding wheels to the market, the company Lach Diamant, from Hanau in Germany, became involved with polycrystalline diamond (PCD) as soon as it became available in 1973.

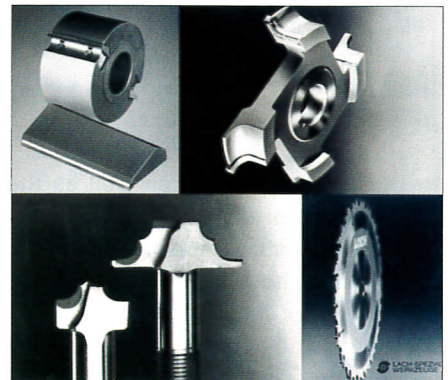
PCD was developed originally as a high-performance tool material for the machining of nonferrous metals such as aluminium alloys and also of hard and/or abrasive materials by turning, milling and boring.

The great potential recognised in this material led 25 years ago to the founding of Lach-Spezial-Werkzeuge GmbH, set up

Fig 2 The company is now run by Horst Lach and his son Dipl.-Ing. Robert Lach



Fig 1 Already at Ligna '79 Lach displayed PCD inserts, PCD profile cutters for postforming, PCD profile cutters for routing, PCD cutters in various cylindrical designs and PCD-tipped circular saws for machining wood and plastic



specially for the manufacture of diamond tools for the wood and plastics industry.

While until 1978 the general opinion was that diamond could only be machined with diamond, at Ligna 1979 in Hanover, Lach-Spezial-Werkzeuge presented the world's first range of tools for the machining of wood, wood materials and plastics, made by electrical discharge machining, or EDM (Fig 1).

The birth of electrical discharge machining of PCD

As so often in life, by chance two events occurred at the same time that would revolutionise the manufacture of PCD tools. Firstly, at a visit with the Matra company in Frankfurt at the end of 1978 it was seen that because of its electrically conductive binder phase, the electrical discharge machining of PCD rounds was possible. Secondly, almost at the same time an enquiry was received from the Römmler company in Großumstadt which was having quality and tool life problems machining chipboard with tungsten carbide tools.

What was needed was a PCD profile tool, which could not be produced using the conventional machining techniques, so electrical discharge machining was investigated. The carbide insert was removed from the tool carrier provided by Römmler, overlapping PCD inserts were brazed in (since at that time only PCD rounds with a diameter of 6.6 mm were available) and machined by EDM to the customer's specification.

The PCD profile cutter supplied in October 1978 exceeded all expectations. While the carbide tool had a life of about three hours, the PCD tool could be used for about four months.

This was the birth of the electrical discharge machining of PCD in the Lach company. With this the conditions were



Fig 3 (left to right) CNC machine for machining one and two sides of the flanks of saw blades in one set-up; the PCD diamond universal grinding machine M-1050-automatic, first launched at Ligna '87; the Dia-2100-CNC developed for the grinding of all diamond tools used in the wood and plastics industries

created for the manufacture of new tools that would revolutionise the machining of all wood materials and plastics and also aluminium.

Products and developments that today are taken for granted, such as high-quality but low-cost furniture, hard-wearing laminate floors, miniaturisation in the electronics industry or the weight-saving and fuel-saving use of aluminium in the automotive and accessories industry would not have been possible without this development.

Development into a builder of machines was natural

In the Lach company, as well as the manufacture of diamond tools for the wood and plastics processing industry, the use of the electric spark as an instrument for the quick and economic machining and the high-quality shaping of polycrystalline diamond led to the company building its own machines, first of all to meet its own needs.

So much know-how was developed in this area that it was decided to present for the first time at Ligna 1987 the Lach EDG universal grinding machine (EDG = Electrical Discharge Grinding).

Fig 3 shows the PCD diamond universal grinding machine, the M-1050-automatic, presented at the fair in 1987. Since then, for almost twenty years the Lach EDG universal grinding machines of the 1st, 2nd and 3rd generation (also Fig 3) can be found all over the world, for example in Japan, Korea, Taiwan, Australia and throughout Western and Eastern Europe. The original NC technology has long since been superseded by CNC technology (for example the Dia-2100-CNC shown in Fig 3).

The future will be marked by innovations

The company Lach-Diamant, which is now run by Horst Lach and his son Dipl.-Ing. Robert Lach (Fig 2), now has a total workforce of 130 employees. Innovations and further product developments in both tooling and machines, accepted by the market, are the guarantee for the continued positive development of the company.

At the new plant built in Lichtenau, Chemnitz in 1997, innovative diamond tools for the machining of aluminium are being made in accordance with the company's own developments, which are the subject of worldwide patents.

An example of this is the 'dia-compact' milling system newly developed in 2003 for the surface and corner milling of aluminium alloys (Fig 4). This is a monoblock cutter for high-speed cutting which is characterised by its compact construction and excellent cutting behaviour without the need for time-consuming adjusting work. Another recent development by the company is the chipbreaker system for PCD inserts, which prevents the build-up of troublesome long chips in the machining of aluminium (Fig 5).

At the main premises in Hanau, the company now concentrates on the manufacture of diamond and cBN wheels for the grinding of tungsten carbide, ceramic and hardened steels as well as the manufacture of diamond dressers and also the design and building of Lach EDG diamond grinding machines. ♦



Fig 4 (top) The latest development from Lach: the monoblock cutter for machining aluminium

Fig 5 (above) The chipbreaker provides for controlled chip breaking in the machining of long-chipping materials such as aluminium

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