



high precision tooling

Machine Tools, PCD, PVD, CVD, CBN, Hard Metal

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news & facts

LACH DIAMANT – 100 Years

Tradition. Passion. Innovation

part 3:

From natural diamonds to synthetic diamonds

“When I held my first diamond in my hand in 1908, I would not have imagined that one day diamonds would not only be used in the automobile industry but also for the machining of wood and plastics”. Jakob Lach, the company founder, said this on camera in 1980. It would become the preface for the first presentation of a new technique for machining wood and plastics – using diamonds as cutting material – the *Dia Tool*. This video, with audio translated into multiple languages, has lost none of its relevance for the choice of appropriate tools within the furniture, flooring and plastic industries, the video can be viewed at:

<https://bit.ly/LACHDIAMANT>

1957 was not only the year of the first signalling satellite “Sputnik” orbiting the earth. It was also the year which would propel the company LACH DIAMANT, Jakob Lach GmbH & Co. KG, to new heights – something no one at LACH could have foreseen at the time. The reason being that, in 1957, an American manufacturer named *General Electric* was the first to offer synthetically produced diamonds, so-called man-made diamonds, to the industry. More precisely, it was a developer of super abrasive materials, which would later set up shop in Worthington, Ohio, under the umbrella of *GE Light Bulbs*. From today’s perspective this could be defined as a mile stone for the beginning of the “diamond age” in our modern industry. For the first customers or users of this material, synthetic diamond grains, it was “only” an opportunity to switch from one natural material to a synthetic alternative. The application was predominantly as polishing

and lapping grain, used in metal-bond bronze grinding wheels and in resin (rubber)-bond grinding wheels which were still in development at the time. The first synthetic diamonds could influence the development of carbide or carbide tools only insignificantly. The reason being that these grains lacked the ability to anchor themselves to the resin bond in order to provide the necessary chip spaces for pre-grinding. This requirement would only be solved ten years later by ASEA, Friedberg, in Hessen, through the development of a procedure for the metal-coating of synthetic diamond grains.

With this coating the plastic binder could now tightly attach to the metal-coated diamond. The diamond was now usable for up to 85% until breaking out of the binder, even when pre-grinding carbides. More about that later.

Diamonds as tools

When I, Horst Lach, started in my father’s company on October 1st, 1960, after completing my education as an industrial management assistant, I was “learning by doing” how diamonds could be used as tools. At that time there was absolutely no literature available on the use of diamond tools, with the exception of an occasional company brochure or some war-time research on the manufacturing of sintered multi-grain diamond dressing tools, so that even the smallest remnants of used single-grain diamonds could still be used for dressing grinding wheels.

At universities and at other educational facilities the topic of “Using Diamonds for Efficient Production” was, if at all, underrepresented; this would change only within the last 25 years.

In the 1950’s, Jakob Lach had already established the basis for the enterprise I found in 1960: industrial diamonds were used for dressing grinding wheels in the ball bearing, anti-



Company founder Jakob Lach, 1894-1984
(photo taken in 1980)

LACH DIAMANT INFORMATION

DER DIAMANT, DEIN HELFER - BEHANDLE IHN RICHTIG!

Diamant
ist ein Stein!

Halt
jeden Diamanten im
LACH-Diamant-Stein!

Nicht so!
Platzung ungeeigneter
Diamant-Steine!

WÄRMUNG 0,4-1
Temperaturbereich
0,4-1 °C

MAX. 60-100
Bereit für
Schleifmittel

DIAMANT
nicht
schleifen!

Schütze den Diamant vor Schlag oder Stoß,
achte auf kräftige Kühlung.

Dieser Informationszettel ist keine Schutzvorschrift und ist keine Leistungsbeschreibung.
Weitere Beispiele werden von LACH-DIAMANT zur Verfügung gestellt.

www.lach-diamant.de

Even today, this information board on the correct handling of single point diamond dressers should be displayed in every training workshop.



Jakob Lach congratulates Kurt Wagner, manager of the diamond cutting shop, on his birthday; right side Willi Reusswig (photo taken around 1965 in the Hanau facility at Bruchköbeler Landstrasse).



A view into a natural diamond cutting shop, servicing single dressing diamonds and profile diamonds as well as natural diamonds (photo taken around 1967)

friction bearing, electrical and the mechanical engineering industries as well as by crankshaft cylinder grinding shops. Contrary to today, back then customers were presented with a selection of loose diamonds (raw diamonds) from larger batches, and they could select the diamonds based on their own personal preferences. The customers themselves would then set the diamonds in holders. Fortunately for us, there was one exception among the high-volume customers, drive shaft manufacturer *Lohr & Bromkamp GmbH* in Offenbach, today known as *GKN*. For this particular company we kept a permanent on-call stock of set diamonds for Morse tapers 0 and 1, in top-notch quality between 1.5 and 2.3 ct, with a monthly order rate of 10 to 20 pieces. Profile cut diamonds, 2-2.5 ct for MSO machines, would soon be added.

Early marketing

Decades of a good cooperation with this customer proved to be a model case for the positive future development of LACH DIAMANT as it was now called. During my apprenticeship at the end of the 1950's, after I was confronted with the concept and basics of "marketing" by my boss, and after I was entrusted with "introducing marketing" in two facilities, it also had a high priority for me at LACH DIAMANT. It might be interesting to some of the readers, which marketing tools were available in those days.

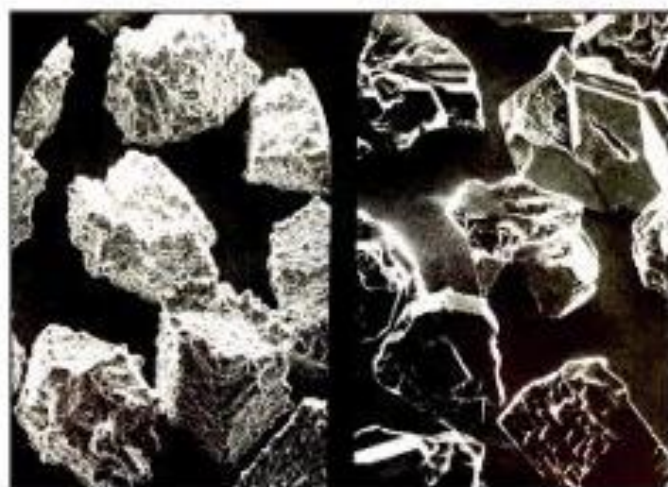
- for the acquisition of potential customers: various address books, ranging from the "ABC of German economy" to telephone or later telex directories
- for the evaluation of potential customers: sales estimates/account cards from our own accounting department/credit agencies
- initial contact was made via: telephone, telex, postal mail, advertisements, personal visits

In other words very tedious and time-consuming work.

Potential market companions with a conventional "diamond background" (diamond cutting shop or diamond retailer) were noted in our "marketing file", such as *Winter & Son* in Hamburg, *Urbanek* in Frankfurt and *Dürr* in Cologne. A new company logo was designed, showing a symbolized holder with a set octahedron diamond in an inclined dressing position (as seen on the information board which was used until the year 2000).

Demand for new services

A growing demand from the cutting shops for more and more consistent precision required the use of single point dressing diamonds and thus also created the wish for a fast repair service. Depending on the quality, set octahedron diamonds show up to six suitable tips for dressing; when they are no longer usable for the desired results, the diamond has to be removed from its holder or be reset to the next useable



Synthetic man-made diamond grains for resin-bond diamond grinding wheels - left with metal coating - right without metal coating (state of development from around 1968).



Doctor Fritsch, owner of the company with the same name, personally operates the first diamond grinding wheel press – a press sintering machine (photo taken around 1963)

tip. When all tips are worn, a diamond cutter can resharpen the natural diamond and create a new tip. This was the result of a first study on the topic "Fast service for repairing single diamonds".

The "Express LACH Repair Service" was born – re-setting within 24 hours. The first marketing success, and executed accordingly, except for the fact that, due to our own production capacity limitations, this work was first carried out by a partner company until it became too much for them. Any way, it was a good thing. My father and I decided to offer this service internally again. It was the start for our own diamond tool production.

Diamond tools, made at LACH

Diamond cutters were employed again, among them experienced cutters like *Kurt Wagner* and *Willi Reusswig*; both had received excellent training at a well-known manufacturer of turning diamonds for the watch- and clock-making industry in Switzerland. Gradually the necessary machines were purchased. Among them the first press sintering machine for the production of metal-bond diamond grinding wheels and multi-grain dressers, personally put into operation by the developer *Dr. Fritsch* in 1962/63.

Thanks to *Kurt Wagner's* know-how as manager of the diamond cutting shop with approximately 20 workers, they succeeded in winning *Bosch-Bühlertal* as customer for the production and service of the necessary turning diamonds for overturning the copper commutators produced there. Word got around. From then on even commutator manufacturers such as *AEG* and *Siemens* were among our customers. The young production team grew day by day, proud of the problems solved.

At the beginning of the 1960's my father and I began to take turns in presenting raw products to customers; if I remember correctly, we were travelling at times with materials insured up to 1 million DM. *Jakob Lach* was still personally in charge



*At Hanover trade show in 1968, and to an astonished audience of experts, *Karl Ruth* demonstrates cutting with a newly-developed resin-bond diamond grinding wheel (K-MC bond) with a metal-coated diamond grain on a *Simon* steel grinding machine*

of purchasing the diamonds in Antwerp/Belgium. At the beginning of the 1960's, an external employee assisted with sales. *Otto Lang* had started as an independent sales representative around the same time as I had. He travelled weekly from his residence in Schorndorf to Baden-Württemberg. He left at 6 am on Mondays, returning on Fridays with a full order book. On Saturdays his wife completed the results of his long trips with visit reports and mailed them at the post office. On Sundays between 11 and 12 am, we took turns picking up the already sorted Saturday mail from our lock box at the main post office in Hanau. And of course father and son took a first look at the visit reports and orders. In case of orders for single dressing diamonds, my father did not let himself be deterred from immediately starting to process the order by selecting suitable "stones" and preparing the order for fulfillment on the following Monday. The *Lang* couple became good friends of our family, especially since they later became the godparents for my son *Robert*.

In the 1960's, sales representatives were also added in Bavaria (Nuremberg) and North Rhine-Westphalia (Düsseldorf), in addition to Baden-Württemberg.

Increased monthly sales

Monthly sales increased. In the beginning, I had kept track of the rising curve on graph paper. However, after I had to attach three to four new sheets for extending the curve, I surrendered and observed future trends solely based on the account sheets of the accounting department.

During the early 1960's you did not have to analyse the numbers in detail to see that turnover originated mainly from sales of industrial diamonds or dressing tools respectively. However, due to increased activities of our sales representatives, we now also received delivery inquiries for diamond grinding wheels for glass (lead crystal) and carbide machining. Our previously mentioned market companions in Hamburg and Frankfurt offered us a resale discount of 10% on inquiries for diamond grinding wheels – not enough for



A view into part of the diamond wheel production in the mid-sixties: Ute Kiesel and Karl Ruth in the process of filling wheel forms

business operations and commissions for our sales representatives. After installing a pressure sintering machine, we had fewer problems with metal-bond grinding wheels; we could do our own calculations based on the required diamond content.

In those years, the wheels which we already manufactured in-house, were mostly sold to manufacturers of lead crystal, such as the company *Nachtmann, Peil and Putzler* which had invested in new grinding machines, e.g. *Kutscher* machines. Attempts to enter the market for eyewear failed due to prevailing price demands.

After making the first wheel for ceramics for *Feldmühle*, Plochingen (with dimensions of 400 x 200 mm width and one (!) mm layer depth) and resulting, to the great dismay of Dr. Fritsch, in the transformer of the sintering machine going up in flames, we left this particular market segment for the time being.

Resin-bond diamond grinding wheels

Our lack of a competitive edge and the general topic of resin-bond diamond grinding wheels remained a topic of great interest to us. Attempts to procure such wheels from newly emerged manufacturers in France and the Netherlands were not that successful. Reasons for failure were the lengthy and tedious communication (via telex), as well as delivery times and, most annoying to us, the lack of consensus on determining the respective diamond content of each wheel. The latter was even in the 1960's a significant factor for comparing prices and bids. The exact diamond content had to be noted depending on the concentration (for example, concentration in percent by volume $C = 100 = 4.4 \text{ ct per cm}^3$).

What to do? Manufacture in-house? But where would the know-how come from? It was 1964/65. As I mentioned earlier, literature was scarce on the subject, even the first usable plastics were sold as "secret recipes". Not to mention mixing proportions for filling agents or compounds. I

received my first hints and tips from a lab manager at *Bakelite* company. But as an industrial business management assistant I must have confused some of the instructional details. He talked about aluminium oxide as a filling agent, and I thought it was aluminium powder. When the so-manufactured test wheels came into operation on a *Finimat* carbide tool sharpening machines, developed by engineer *Erwin Vollmer* in Dornhan, people were very enthused about the number of teeth registered by an automated counter; the coating, "shining with power", hardly showed any wear. Even years later, sales representatives did not quite know how to deal with frequently incoming reorders.

Then, finally - 1966/67 - the previously repeatedly mentioned metal coating for synthetic diamonds became reality in the form of the *de Beers Kornes RDA-MC* (MC standing for metal coating). Developed by the company *ASEA*, bought out and patented by *de Beers*. This meant for *General Electric* that they had to pay a license fee of 5 cents to *de Beers* for every sold carat of the diamond grain with metal coating.



During the boom of the 60's: metal-bond diamond grinding wheels for automated cutting of crystal glasses on Kutscher machines.

I claim that this idea of coating synthetic diamond grains with a sputtered metal coating (which allows for the resin to tightly latch onto its "coral-like" surface), was solely responsible for the boom-like success of carbide in the tool industry, and of course for the success of the resin-bond diamond grinding wheel. Finally, the prevailing school of thought that diamond grinding wheels could only be used for lappers and polishers of carbide, could be successfully refuted. The now available metal-coated diamond grains allowed for pre-grinding and even deep grinding operations with resin-bond wheels. Especially manufacturers of wood machining tools, such as *Ledermann*, *Leitz* and *Guhdo*, as well as the machine manufacturers for these tools, such as the companies *Vollmer* in Dornhan and Biberach, and for example *Stehle* and *Kuhlmann*, would profit the most in this period of prosperity. To name a few representatives for metal tool manufacturers, the companies *Walter*, *Carboloy/USA* and *Sandvik/Sweden* can be listed. Among the many precision machine manufacturers that now distinguished themselves on the market, *Jung* (flat grinding machines) and *PTW* (optical profile grinding machines) remain as outstanding companies in my memory.

Ad hoc, the metal-coated diamond would influence the further development of LACH DIAMANT as well. "MC" (metal-coated diamond) was added to the "K" (Kunststoff—the German word for plastic), as K-MC (representing resin-bond LACH DIAMANT grinding wheels with metal-coated synthetic diamond grains). With the new K-MC



LACH DIAMANT first time at Hanover trade show 1967, being co-exhibitor from Hofmann & Co. Maulbronn; from left to right: Kurt Wagner, Karl Ruth, Horst Lach, Otto Lang and as special guest figure skater Matzdorf

grinding wheel we were able to win the company *Simon* in Neu-Isenburg as our biggest new customer as their machine supplier for the double-tool-grinding machine L15 for lapping and tension grinding of soldered carbide steels; at that time we already supplied the also needed metal-bond flute grinding wheels. In the meantime a lot of other developments had happened at LACH DIAMANT. We had indeed succeeded in gaining much-sought after admission to the spring trade show in Hanover. We were co-exhibitors with *Hoffmann & Co, Maulbronn*. When they were looking for a mechanic to demonstrate the use of a deburring tool for auto bodies we stepped in. In return they allowed us to give a demonstration with the new K-MC diamond grinding wheels on the previously mentioned *Simon* steel grinding machine. Bad luck for our endeavour to show off a new deburring tool. Unfortunately the demonstration of the "deburring process" on the sheet metal auto body proved to be so annoyingly loud that all exhibitors from hall 7 voted unanimously to stop this presentation at that time. However, it was a trade show debut for LACH DIAMANT. At the very next trade show we already had our own stand. By the way, at approximately the same time LACH DIAMANT became a member of FWL, the professional association of the tool industry, section diamond tools.

My father, being then almost 75 years, who also noticed the positive development of our company, then gave the go-ahead for major extensions of the natural diamond cutting shop which later became the location of the diamond wheel production facility and sintering technology.

A good and wise decision, as you, my dear readers, will be able to confirm after the next report that begins with the year of 1969.

Your **Horst Lach**

further information: www.lach-diamant.de



LACH DIAMANT at Hanover trade show, spring 1968, for the first time with our own booth; featured diamond tools were dressing tools, natural turning diamonds, resin- and metal-bond diamond grinding wheels, diamond pastes and the spray MF programme; in the center Kurt Wagner (left) in conversation with Jakob Lach.