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Finer Points

SUPERABRASIVE INDUSTRY REVIEW

IMTS Preview & New Machine Technology

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Education Course**

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Anthony V. Lisanti &
Richard Lindsay**

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Meeting Held as
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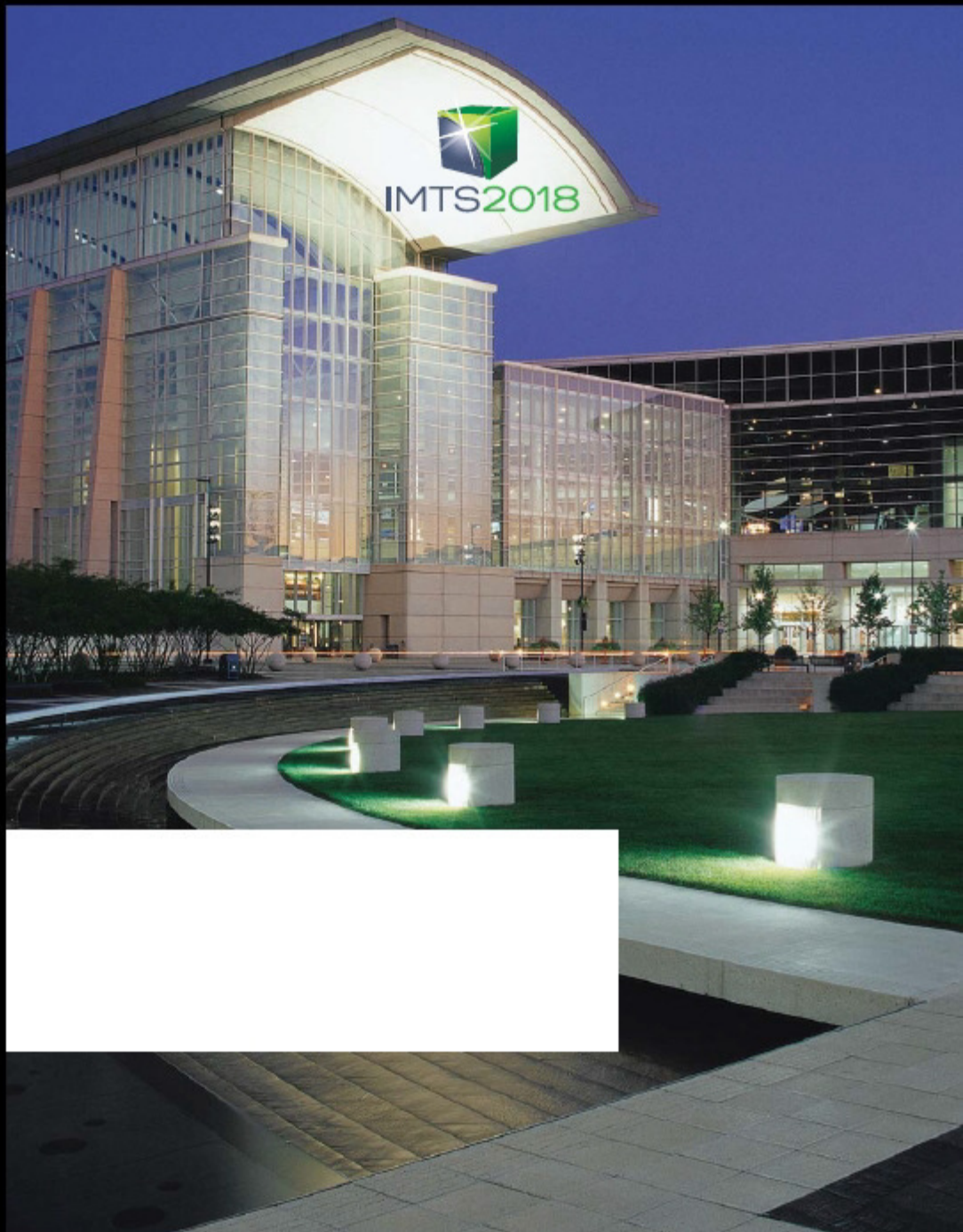
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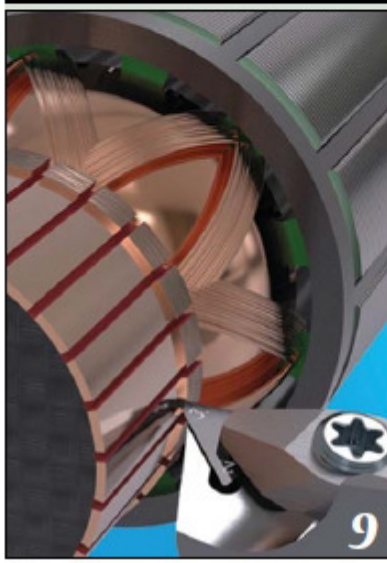
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**THE LONGEST
RUNNING
MAGAZINE
DEDICATED
SOLELY TO THE
TECHNOLOGY AND
APPLICATION OF
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COVER PHOTO

Photo courtesy of Chicago Convention Bureau of McCormick Place home to IMTS 2018

FINER POINTS is the longest running publication devoted exclusively to the understanding, selection and application of diamond, cubic boron nitride and related materials. It is edited for recipients who are involved in some way with these “superabrasives”, either as providers of the materials, producers of products containing the materials or users of these products (e.g., grinding wheels, dressing tools, drill bits, saw blades, sawing wires, cutting tools, polishing tools, grinding compounds, CVD film products, etc.).



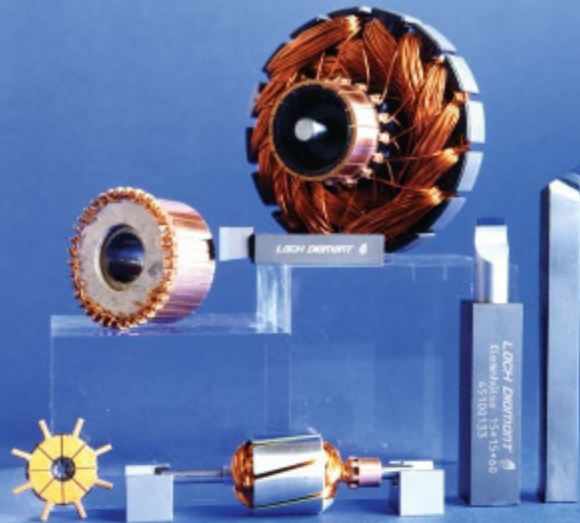
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POLY – POLY – OR WHAT?

How New Super Hard Cutting Materials Revolutionized Machining

BY HORST LACH,
Managing Director & CEO LACH DIAMANT



Horst Lach, managing director and CEO of LACH DIAMANT agreed to write an article about the development of diamond and CBN tools and grinding wheels in modern industries. The occasion: LACH DIAMANT's 96th anniversary in the run up to IMTS 2018. Horst Lach is known as a true industry veteran, and we are excited to have this pioneer of technology share some insights from 56 years of professional experience in the diamond tool business. In this part of his (almost) historical review, Horst Lach looks back to the time between April 26th and May 4th of 1973 when new super hard cutting materials revolutionized machining:

The introduction of our Borazon CBN grinding wheel was still in full swing when I received information from General Electric in 1972 that a new cutting material would be coming soon. What could it be? Naturally all of us were curious! After all, it was the run-up to the Hanover Trade Show that would start on April 26th, 1973. A new cutting material meant another chance to showcase another innovation, like Borazon™, as one of the first companies, or the first, worldwide. After successfully introducing the new abrasive "Borazon", I expected preferential treatment compared to other competitors. Answers to my requests for first samples or test materials were delayed. It was already March 1973. Despite the secrecy of General Electric, I managed to pick up on two little clues: "Compact and poly"! **POLY – POLY – OR WHAT?**

I was fascinated by the possibilities that seemed to open up on an almost daily basis in regard to the new Borazon CBN grinding wheels. At first I thought that "compact and poly" might refer to compressed cubic boron nitride. That would have been great for LACH DIAMANT since we already had a lot of experience with the Borazon CBN grinding wheel: Grinding of high-alloy hardened steel and HSS;

compact CBN; turning instead of grinding, fantastic! As it happened, we then also received a request from DEW (German Edelstahlwerke). They wanted to know whether LACH DIAMANT could offer any tools for machining DEW's material "Ferrotitanit". The new and compact CBN material was so exciting for DEW's management that two of their CEOs paid us a visit only a few days later. They must have been very disappointed when I had to tell them about three weeks later that we would not use a CBN material but a polycrystalline block of synthetic diamonds. The term "PCD", polycrystalline diamond, was born! To be honest, I was a bit disappointed too, at first. **DISAPPOINTED, BUT THEN ...**

Compact CBN would have been something to work with immediately, but a "diamond block" as substitute for natural diamonds? At the time, in April 1973, we employed about 20 diamond cutters for natural diamond for the production and service of natural turning diamonds for customers like Bosch, AEG, Siemens, Menke and others. Should we now switch completely to synthetic diamond blocks? We would have to find new customers, but how and where? At the time, the only way to

find new potential customers was via the ABC of German Industries, a handbook of national companies. I found one Swiss commutator manufacturer and the name "Kautt & Bux". I called them and found out something surprising: Commutators are not turned, but ground in a very time-consuming procedure. At least that was the case in 1973. Out of pure instinct, I spontaneously explained that they could save several minutes of grinding time if they would instead replace this procedure with turning using the new PCD turning steel; they were impressed and promised to visit our stand at the Hanover Trade Show. At this point, my suggestions were only of a theoretical nature, since we did not have the material yet. But in the hope of a timely delivery for the production of the first PCD turning steel, we planned to set up a Weiler turning machine at our stand in order to do a demo presentation on it.

After General Electric had published the first announcements that the new material would allow even for interrupted aluminum cutting, we decided to demonstrate with a "blemished" aluminum round part with several cross bores. Natural diamonds are the hardest of all materials, however very sensitive to shock, especially during interrupted



cuts! However, the new material promised not be affected by this ... **THREE CRITICAL DAYS**

Finally, the long-awaited PCD material arrived as 90° and 60° segments which had apparently been cut out from a 3.2 mm blank. The visible PCD diamond layer was about 0.3 - 0.4 mm thick and connected via a carbide support so that the cutting edge could be further manipulated by soldering. It was now Friday – exactly three business days before the start of the Hanover Trade Show on April 26th, 1973. I proudly presented the first PCD to Kurt Wagner, manager of our grinding shop and a highly talented diamond grinder who had mastered his art as a diamond specialist at a Swiss manufacturer for diamond tools.

After careful inspection and several grinding attempts on a cast grinding wheel that was apparently used for natural diamonds and coated with diamond dust, he announced: "Sir, usually we do everything, but this stuff is so beastly – there is nothing we can do!" I thought, that this was probably the end of it. But then I thought of our Simon steel grinding machine (L15). We had purchased it for our cooperation with Simon, Neulenburg, a distributor of resin and metal bond diamond wheels. I suggested: "Try it with the Simon machine, with the cup wheel!" And to our great astonishment, the very first grinding attempt with a resin bond diamond grinding wheel proved already to be very promising. However, we still had to spend several hours to get the desired cutting geometry.

Right at the start of the trade show, at 9 AM, our driver, Mr. Barmus, arrived at our stand and delivered the first PCD tool, which would later be known under the trade-marked name "dreborid". The driver delivered additional turning steel, on Wednesday and Thursday, until we explained to him that "this stuff will hold long enough, we do not need any more tools." Our visitors could hardly believe that this "little diamond cutting edge" could machine the perforated aluminum turned part without any "rumbling". We became more and more confident and increased the feed with every attempt making use of the maximal edge width. We only succeeded to "kill" our PCD cutting edge on the very last day – it could not cut an (empty) piccolo bottle, which we had boastfully inserted. By the way, the technicians of Kautt & Bux were there as well and very excited about the demonstrations. A first key customer for serial use of dreborid PCD tools was found – so Kautt & Bux can boast to be the first company worldwide using polycrystalline diamonds in production.

This was a stroke of luck for LACH DIAMANT because in the process of turning the surface of copper commutators, we also learned how polycrystalline diamonds can be successfully used with other composite materials. Success followed success – a new era of machining of non-ferrous metals and synthetic materials had begun. •

