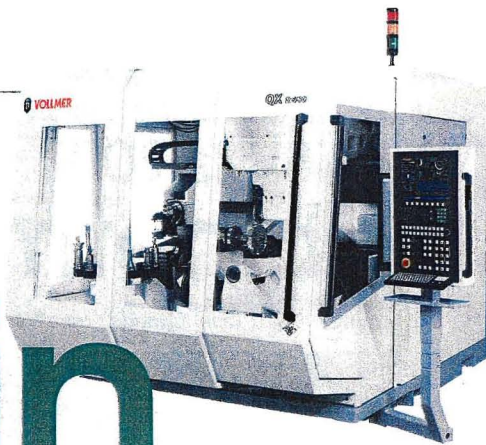




By Scott Ries

Against the Grain

Polycrystalline Diamond (PCD) tools have come a long way



There's no doubt, PCD tools have come a long way since their introduction in the mid 1970s. At that time the technology for producing PCD materials and for finishing PCD tools was very primitive compared to today.

The first PCD blanks, the source material for the cut tips, were limited to a maximum diameter of 13.1mm. This greatly limited the size of the PCD tip that could be produced, and as a result, these first tips were used on shank tools and tipped inserts primarily in metal turning applications. At this time, the diamond tips were cut from wire electrical discharge machines (EDMS)

and laser machines that cut at speeds approaching 1 inch per hour, leaving kerfs as wide as .030", along two axis of movement. As technology improved to create larger blanks, finishing processes also evolved. This evolution was primarily the ability of wire edm machines using CNC controls to cut complex shapes. These complex shapes play an important role in woodworking applications and coincided with the development of laminate flooring in Europe in the 1980s.

In the last ten years, many other changes have impacted the various industries allowing PCD tools to be used in new and exciting ways.

Realizing that the abrasive qualities of their materials were challenging to machine, laminate flooring companies soon began testing PCD tools. These tools outperformed the existing carbide tools in terms of tool life, accuracies and surface finish. As laminates were introduced into the North American markets in the 1990s, many production lines were tooled up with diamond tooling from the European producers. As a result, North American tooling producers faced challenges in supplying this new business. At this stage, most of the diamond used in the tools had lapped surfaces and tolerances that were held in thousandth(s) of an inch. The role of tooling companies in North American was relegated to resharpening existing tools.

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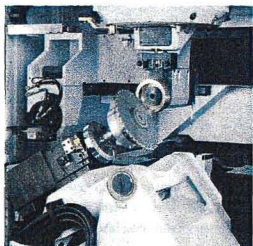
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During this period of time, there was a clear separation between companies that supplied diamond tooling to the woodworking market, and those who supplied diamond tools to the metalworking industries. Beginning in the late 1990s and early 2000s, new materials changed the requirements of these markets. Polished diamond tables originally created to allow extra lubricity for the evacuation of various metal chips began gaining popularity in woodworking tools due to the aesthetic appearance. It was later realized that the polished surface actually helped maintain a clean cutting surface with the resins present in the



wood products. In addition, the use of machinery in woodworking facilities running higher speeds, and increased automation, made it necessary to reduce tolerances on cutting tools to where they now mimic the tolerances of many metalworking tools, measured in microns. As laminate designers have incorporated improvements such as snap together edges, more durable materials, and different looks including replications of wood, marble granite and ceramic, PCD tools continue to provide the economic benefits for the finishing processes.

In the last ten years, many other changes have impacted the various industries allowing PCD tools to be used in new and exciting ways. The composite materials used in aerospace, shipbuilding, automotive and wind turbines are very similar to the makeup of laminate flooring from a cutting perspective. These "laminates" are made of fibres and resin, instead of wood or wood-like materials and resins, and present another great opportunity for PCD tools. As manufacturing facilities embrace lean principals, and "green" technology, PCD tools are very advantageous in helping to reduce processing costs, times and environmental impact. New PCD materials have been introduced by the major PCD suppliers that do not require braze or clamps for drills, routers, and some milling applications. PCD tools are also being used in applications with plastics, rubber and masonry.

What the future holds, no one can

be sure. We do know that as recently as 25 years ago, the line separating PCD tools used in woodworking and metalworking was very clear. Today, that is not the case. The uses of diamond tooling in cutting grooves in rubber, drilling in stone and coal, machining composite materials and many other unique applications, blur this distinction even more. As new PCD materials are introduced

by the suppliers, and new material to be cut and machined developed by industry, the only limit to growth in PCD tools is the creativity and vision of tooling producers and end users. As companies currently aligning ourselves with the "woodworking" industry, sometimes we need to think against the grain in order to grow and achieve continued success. **WW**

Scott Riehs has more than 30 years experience in PCD tools. Prior to joining Vollmer of America in 2008, Scott led the manufacturing team for Diamond Innovations in production of all PCD/PCBN machining products. Now as the Vollmer of America, PCD Division Manager, Scott is assisting customers with improvements in the processing of PCD/PCBN tools for woodworking, metalworking and various other industries. For more information, visit vollmer-us.com.

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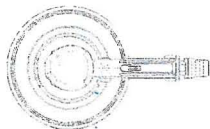
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