

MICRO MACHINING + SHEARS & PRESS BRAKES + COATINGS FOR CUTTING TOOLS

Canadian METALWORKING

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GOOD VIBRATIONS

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Ask the Expert

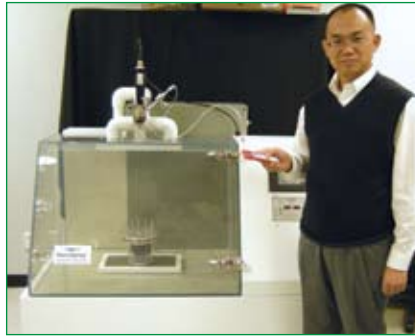
Why have coatings become such a critical factor in the performance of cutting tools?

These days, cutting tool suppliers are devoting increasing amounts of R&D resources into the coatings that go on cutting tools, and for good reason. Coatings and coating processes are getting the credit for recent improvements in metal removal rates in many of the difficult-to-machine materials such as hardened steels and Inconels used in the aerospace industry and other sectors.

Canadian Metalworking recently had an opportunity to speak with Dr. Wenping Jiang, director of product development at Duralor LLC, Fayetteville, AR, about the history of coatings on cutting tools and the challenges that coatings developers are trying to overcome today. Duralor recently patented cubic boron nitride (cBN) composite coatings for metal cutting tools and is now marketing those coatings as TuffTek to metal cutting manufacturers and cutting tool companies. Jiang explained how the different coatings and coating processes impart various properties to the cutting tool depending on the requirements of the application.

Q. What is the history of the use of coatings for metal cutting tools?

Early tools for removing metals were primarily made of carbon steels and high speed steels. The increased demand for materials of high strength for functional requirements and high manufacturing productivity posed significant challenges to the early tools. The application of hard and wear resistant coatings on cutting tools began in the middle 1960s to provide improved surface hardness, chemical stability, and wear resistance that are essential for a typical cutting tool. Since then, both PVD and CVD coatings and processes have experienced significant development, with effort geared toward superhard and supersoft coatings for various applications. Superhard coatings offer significantly improved properties such as hardness and wear resistance



Dr. Wenping Jiang, director of product development for Duralor.

as compared to many conventional hard coatings like TiN coating. These properties make the coatings suitable for many ferrous- and non-ferrous related applications. The development of supersoft coating is driven by the increasing interest in dry machining, which could help to reduce environmental pollution and disposal cost related to cutting fluids. In combination with hard coatings such as TiN, supersoft coatings have demonstrated promising results in high-speed machining of aluminum alloys. If it is fully developed, it can be a substitute for coolants, and has potential for round tools (drill bits, end mills, etc.) in machining and forming.

Q. What are the advantages and disadvantages of coated cutting tools?

The properties of coated cutting tools include high hardness, fracture toughness, and abrasive wear resistance that are typically difficult to obtain in uncoated tool material. Therefore, if it is properly selected for the application, coating on a tool helps to extend tool life and increase material removal rate, and thus productivity rates. Cycle times for cutting inserts vary depending upon the coating chemistry and thickness.

The common problems that can occur in applying a coating to uncoated inserts include degraded coating chemistry, substrate, and mismatch of

PRODUCT REPORT

Duralor: TuffTek Coating

Duralor has developed a new cubic boron nitride (cBN) composite coating for metal cutting tools called TuffTek. The successful application of cBN as a coating had not been realized despite several previous development efforts by cutting tool companies. With the release of the TuffTek product line, users can now gain the performance and longevity advantages of cBN at vastly lower cost, says the company.

In side-by-side comparison for the machining of hardened steel, TuffTek-coated tools outperformed traditional coatings by 300 per cent or more, claims Duralor.

www.duralor.com

Ingersoll: TT8125 Turning Grade

Ingersoll's new CVD coated grade TT8125 has been developed for general machining on steels such as mild steel, carbon steel, alloy steel, bearing steel and tool steel. According to the company, the grade is built on a tough substrate with a cutting edge that provides excellent wear characteristics and crater resistance. TT8125 is



designed to deliver exceptional performance in both interrupted and continuous cutting. The cutting edges of this grade stand up very well to forged steel or parts with surface scale. Grade TT8125 minimizes edge build-up when machining low carbon steels and increases tool life by minimizing the friction between chips and the upper surface of the insert.

www.ingersoll-imc.com

Iscar: Sumo Tec

Iscar's Sumo Tec line now includes CVD and PVD coated carbide grades for turning. In identical tests in a variety of turning applications, the inserts outlasted their nearest competitors by 26 to 288 per cent, claims the