

MAN

MODERN APPLICATIONS NEWS

The Metalworking Idea Magazine

**EXTEND
THE LIFE OF YOUR
ELECTROPLATED TOOLS**

**Gold-Coated Diamond Tools
Slash Production Costs**

Patented Coating Applied by Timken

Diversified Diamond Products

1-800-336-9959

602-443-4899 or Fax 602-581-6293

GOLD-COATING DIAMOND TOOLING SLASHES PRODUCTION COSTS

Depending on the application, TiN-coating diamond and CBN electroplated tools can double their life, even when they are running at twice the feed rates of uncoated tooling.

Unlike King Midas, when Diversified Diamond Products Co. of Phoenix, AZ turns their customers' grinding wheels to gold, *everyone* reaps the benefits. The grinding wheels, which have been electroplated with diamonds or CBN (cubic boron nitride), are given their gold color by a coating of TiN (titanium nitride). The Timken Company applies the coating using PVD (physical vapor deposition) in a process called Diamond Life™, patented by Diversified Diamond Products.

The specific conditions and temperatures of the process provide increased tool life and efficiency, while avoiding the potential structural damage caused by other application methods. The process creates a hard coating that stabilizes and reinforces the bond between the underlying abrasive layer and the substrate (nickel-covered steel). The added lubricity of the TiN coating decreases friction, dissipates heat and prevents the abrasive layer from adhering to the workpiece. Since the coating is less than 0.01 mm thick, it has no effect on tight tolerances.

After patenting the process in 1992, Diversified Products formed a relationship with Timken as the contractor for applying the coating. Located in Canton, OH, Timken has gained considerable experience in using a TiN coating process on their own tools and products. According to Carl Musille, manager of sales and marketing for Specialty Tooling and Rebuilding at Timken, "We are constantly trying to give our customers more." As serious evidence of their commitment, he reports that Timken has installed a \$1.2 million coating vessel to provide the coating service for Diversified Diamond.

Mary Dillon, president of Diversified Diamond, explains that quality control is a major issue in applying the coating. "You must control the temperature of each tool," says Dillon. The coating specification requirements for various



The gold-colored coating adds extra life and lubricity to electrocoated diamond and CBN tooling.

tool sizes must be followed exactly to achieve the proper results. "Different tools come up to temperature quicker than others, so the time must be monitored for the PVD process to work properly," she says.

Turning Gold Tools to Cold Cash

Several companies are now using grinding wheels with the Diamond Life TiN coating. Pioneer Broach Co. manufactures broaches and broaching equipment. The company had first used a TiN-coated wheel in 1996. "We were pretty skeptical at first, because we've seen new things come and go," says Mike Ochs, manufacturing engineer at Pioneer Broach. "Our surface finish has greatly improved, and our feed rates are almost double."

he says. The greater hardness of the TiN coating also reduces abrasion and, for metal-cutting tools, reduces flank and crater wear.

Before using the coated wheel, excess heating had caused their machines to stall regularly at normal speed. The lubricity of the TiN coating enables the machines to run at much higher speeds. These results encouraged Ochs to apply the coating to more new wheels, and to send out old wheels to be coated as well. Although their experience so far has not been enough to determine actual wheel longevity, according to Ochs, "The coated wheel has outperformed the uncoated tool."

Diamond Life is effective for both standard and custom superabrasive electroplated tools. The patented coating provides a long-lasting alternative to other materials, such as aluminum oxide. "Some customers who have used aluminum oxide wheels have switched to superabrasive wheels with the Diamond Life coating and found it cost-effective," says Dillon. A diamond or CBN wheel can cost up to 10 times that of an aluminum oxide wheel, but the extended tool life will still provide a lower production cost per workpiece.

Diversified Diamond Products
1-800-336-9959

MAN