
Southern
Illinois University
Carbondale

Intermetallic Bonded Diamond Materials

- New family of extremely wear resistant tool materials
- Invented at the Center for Advanced Friction Studies, SIU Carbondale (sponsored by ICCI)
- Peter Filip, Ph. D., D. Sc.

  Professor,

  Director of the Center for Advanced Friction Studies

Technology Summary

- Wear resistant materials for various tools
- Developed by:
  - Dale Wittmer, Ph. D., SIU Carbondale
  - Peter Filip, Ph. D., D. Sc., SIU Carbondale
- Potential applications:
  - Coal, ore and mineral mining and crushing
  - Oil, gas drilling
  - Excavating and construction
  - Variety of machining (cutting, drilling, crushing, grinding) tools for normal and extreme conditions
- Types of licensing opportunities available:
  - Non-exclusive licenses

Technology Details

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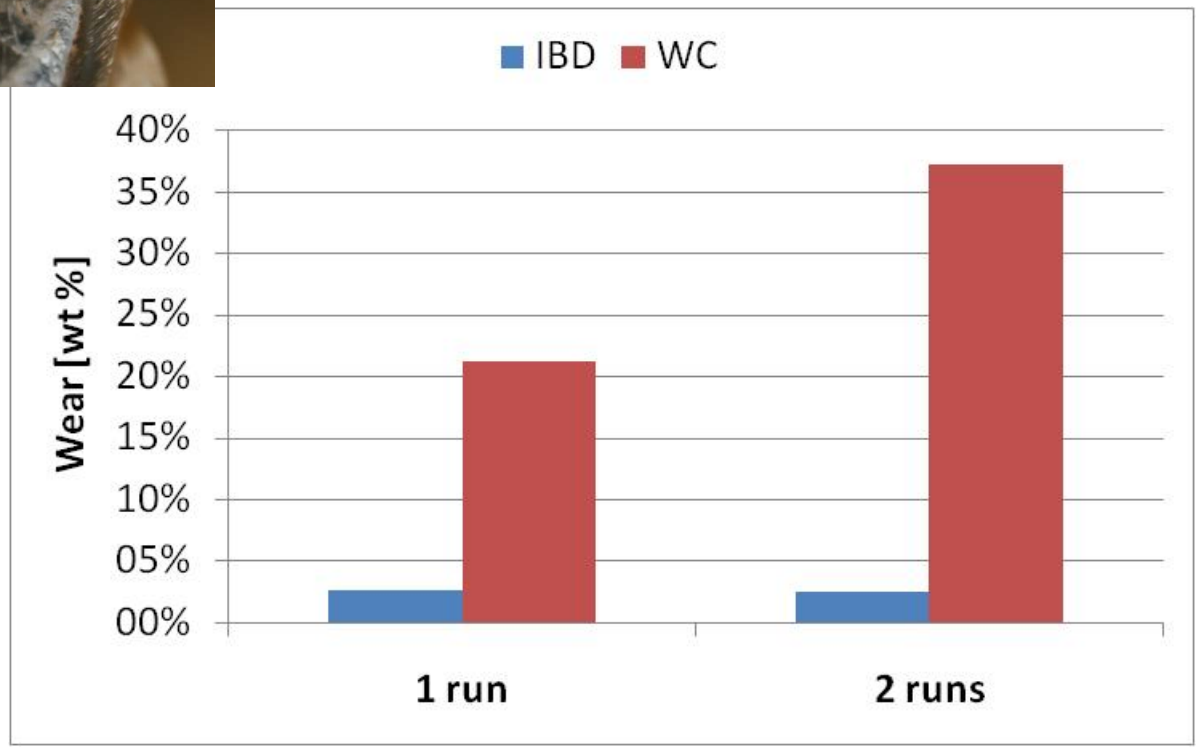
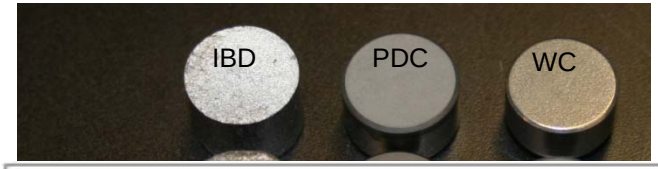
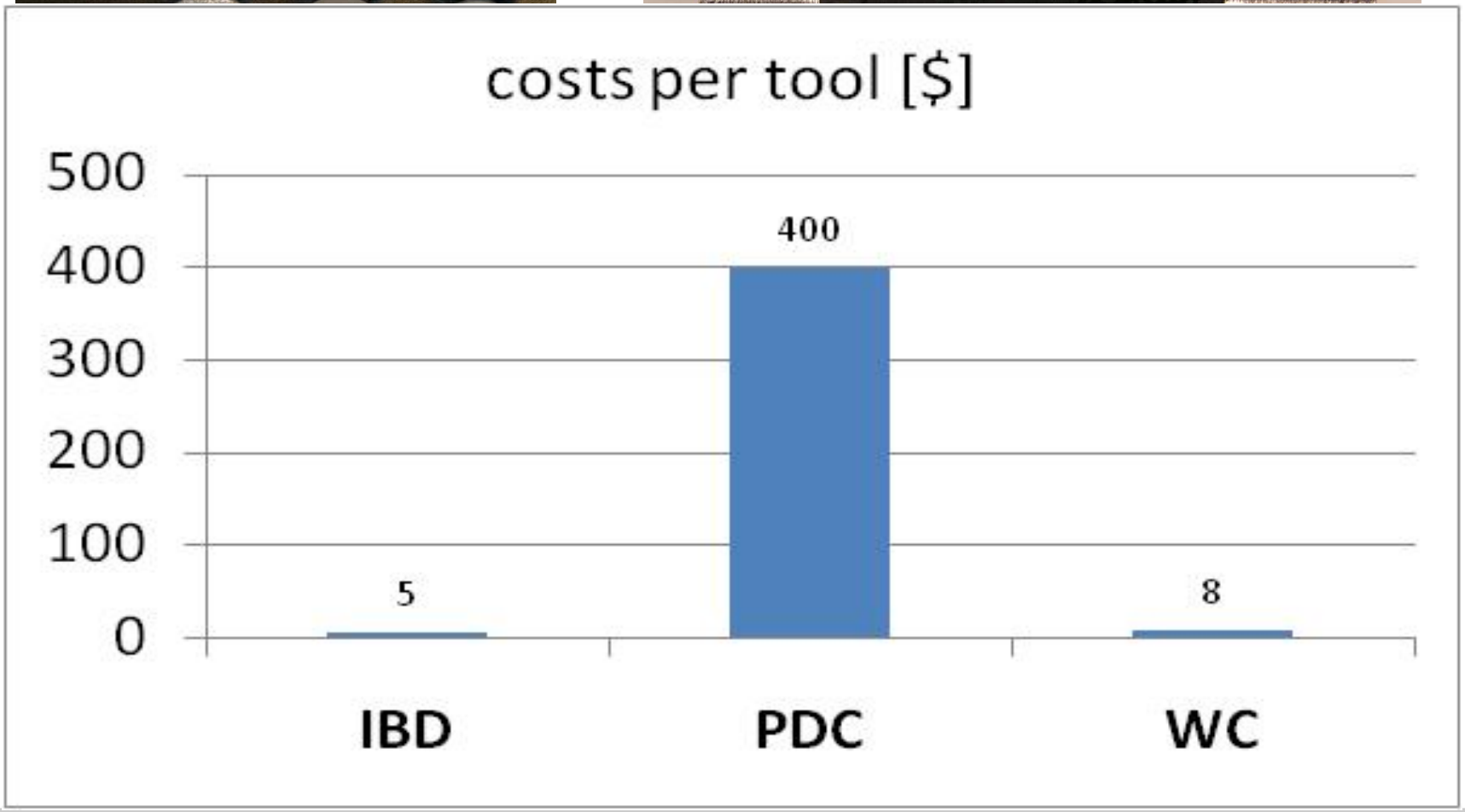
- Friction and wear performance of tool materials is of utmost importance.
- IBDs wear is low and they can maintain a sharp cutting edge leading to improved production and reduction of costs while having the potential to create less dust; obviously **economic, safety, environmental and health enhancements**.
- For over 50 years the standard for most advanced tools has been tungsten carbide (WC) bonded with cobalt (Co) – shortly Carbide tools.
- Polycrystalline Diamond Compacts (PDCs) tools are being used in limited applications and are extremely expensive.

Wear in Coal Mines

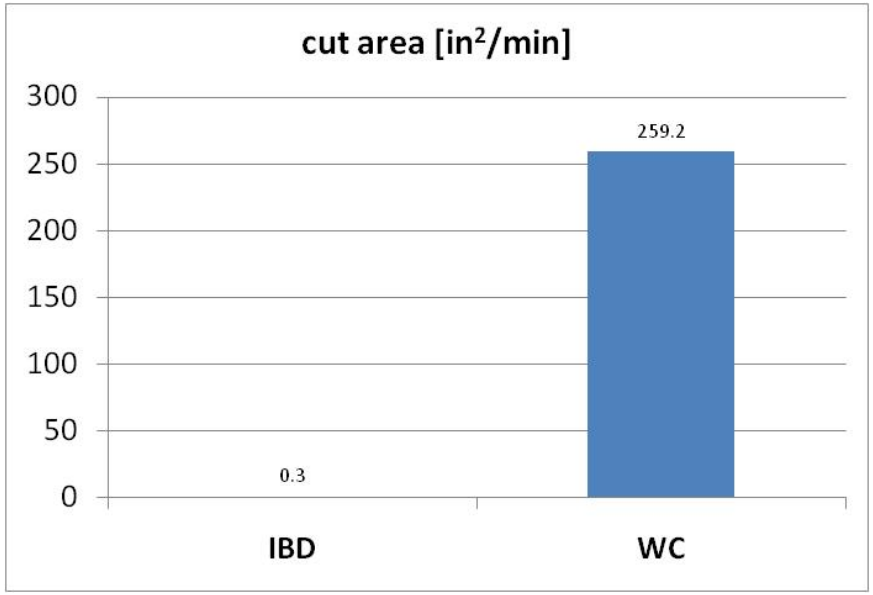


Wear in Machining Test





Wear in Bosch Cutting Test



The Competition

- Diamonds (until SIU discovery) did not survive high-temperature processing in the presence of metals.
- Diamonds oxidize easily at relatively low temperatures, Carbide tools have life limitations.
- Polycrystalline Diamond Compacts (PDCs) are very expensive and brittle.
- SIU's IBD composites offer potential replacement alternatives which are very cost competitive and outperform WC tools as well as PDCs.

Current Developmental Status

- Progress to date
  - Technology is mature and was proven to perform in coal mining and machining applications
  - Ready for licensing/technology transfer
- Developmental hurdles
  - Patenting process to be finished (already paid for) by SIU

Technology Market

- Global diamond market
  - $5 billion/year 2005
- Global market for oil drilling bits
  - $2 billion 2005
- Global market for WC finished tooling
  - $10 billion 2002

Intellectual Property Protection

- Provisional patent filed in April 2005
- Regular US patent application filed Feb 2006
- PTC (International) patent application filed Feb 2006
- Currently awaiting US first office action and international response