

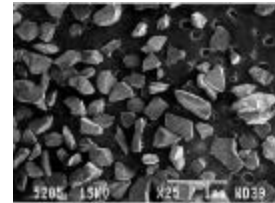
World's Best Technology 2004

Glass Particles for Innovative Applications



Researchers at the **Institute of Materials Processing** were invited to apply and as a result were selected to attend the **World's Best Technologies for 2004**. The technology being addressed involved a process (patent pending) to produce a glass abrasive that been shown to be an acceptable alternative media to garnet for abrasive waterjet (AWJ) cutting systems in many applications. The WBT04 is a showcase for technologies developed at the Nation's most advanced research facilities and top universities, with selection being based on the technology and in particular those with the greatest potential for high growth commercial enterprises.

The process, which was developed under the direction of J. Murray Gillis, Research Scientist II at the IMP, allows a wide variety of glass waste streams to be used as a feed stock in the production of an inexpensive abrasive, for use in an AWJ system. Studies have shown that glass can be processed to produce sharp edged, angular particles, with a aspect ratio suitable for use as an abrasive media, using this new process, at less than 1% the existing price of garnet, which is presently being used in AWJ systems . The resulting media can then be



used in the manufacturing of products cut from a variety of materials, including aluminum, steel, glass, plastic, minerals (dimensional stone), and wood. In some applications the abrasive media accounts for more than 50% of the operating cost of an AWJ system. Therefore, the potential use of this leading-edge technology would be increased considerably if an inexpensive glass media were available.

Abrasive waterjet systems produce net-shaped parts, eliminating many secondary processes, such as deburring and finishing. As an added benefit, abrasive waterjet cutting does not subject the resulting parts to the stresses and high temperatures that occur when conventional machining methods are used. The thin kerf that results from using an abrasive waterjet system minimizes the amount of material removed during cutting. This feature allows greater nesting of parts and thus more efficient use of the material being cut. Better utilization of stock reduces the energy requirements, results in less waste, and in turn the handling of the waste, for parts produced using abrasive waterjet cutting.



This technology would be a very positive environmental impact for many reasons. The glass abrasive comes from an existing glass waste stream. The resulting stream of fine rounded glass particles, generated through the use of glass as the media in AWJ cutting, would be suitable for use as a filler in a variety of polymers. There is less material waste due to the thin kerf and opportunities for nesting. Overall, abrasive waterjet cutting, using waste glass as the media, would provide a very energy, time, and material efficient technique.