Silicon Carbide Evolution

What is your product? Silicon carbide is one of the world's hardest and most chemically resistant substances. In fact, silicon carbide is used to cut and grind the toughest steels. Unfortunately this also makes it extremely difficult to manufacture or mold indo component parts. These factors have limited silicon carbide's acceptance to high cost structure, high precision production processes. Silicon Carbide Evolution has a novel technology to rapidly manufacture silicon carbide parts.

What is the underlying technology and what does it do? Silicon Carbide Evolution's manufacturing process occurs in three basic processing stages. A 3-dimensional direct printing of the finished product shape allows virtually unlimited design freedom as well as limiting setup and transition times. Following this, a furnace operation allows for the synthesis of the silicon carbide composite material. Finally, critical dimensions or special surface finishes are machined into the part. The total build cycle for a singe part, including setups and finishing, requires less than 3 days.

How is the technology unique? Competing silicon carbide manufacturing processes require longer process times and more extensive operations. Quartz, the competing product for silicon carbide in the semiconductor fab industry, often requires unique fixtures for each product and complex build operations. Additionally, all current manufacturers of silicon carbide and quartz products are limited to a small set of possible product shapes. Silicon Carbide Evolution's process is not.

How is the product innovative? Silicon Carbide Evolution's launch strategy relies upon the ability of our technology to provide a superior manufacturing service to our customers. By uniting a patented 3-dimensional direct manufacturing operation with a novel material processing method, we can support the design and validation of new products with a speed and ease not yet seen in the industry.

Who will buy it? Silicon carbide's characteristics of high stability, excellent temperature tolerance and good chemical resistance have many applications within the semiconductor, chemical processing and automotive industries. Semiconductor "fabs", in particular, utilize high temperature furnaces and a formidable array of processing chemicals. Very specialized fixtures for wafer handling must meet exacting specifications while eliminating almost every other material. The silicon base in silicon carbide alleviates many of these concerns with silicon wafers. Other industries, such as petroleum and chemical production, pollution control and automotive industries all have problematic applications for which silicon carbide would be ideal.

Why will they buy it? The vast majority of semiconductor capital equipment purchases during 2002 were driven by the desire to upgrade technology, not to increase production capacity [Reed Electronics Group]. Our manufacturing technology not only provides superior products but also has many significant advantages over the competition. Our "just-in-time" supply to customers allows semiconductor equipment manufacturers to significantly reduce inventory. In addition to the speed at which we can manufacture products, Silicon Carbide Evolution requires only a CAD file form the customer for our process to immediately adjust production. Superior material qualities, flexibility in design and speed of delivery contribute to make our product superior to existing processes.

What is the size of the market? The semiconductor capital equipment industry had total sales of $28.1 billion in 2001. Wafer fabrication accounted for almost 75% of this. The wafer manufacturing equipment segment is fairly consolidated, with 10 companies holding more than 70% share. Focusing purely on the initial launch market of quartz replacement represents $147 million annually. From this point, Silicon Carbide Evolution can expand into additional material applications.

How will you protect your intellectual property? The University has a patent application pending with international options on the manufacturing process. Furthermore, the intellectual property position of the process is greatly enhanced by The University's ownership of a large portfolio of patents protecting the underling processes from which the silicon carbide manufacturing technology was developed.