

PRESS RELEASE

January 14, 2003

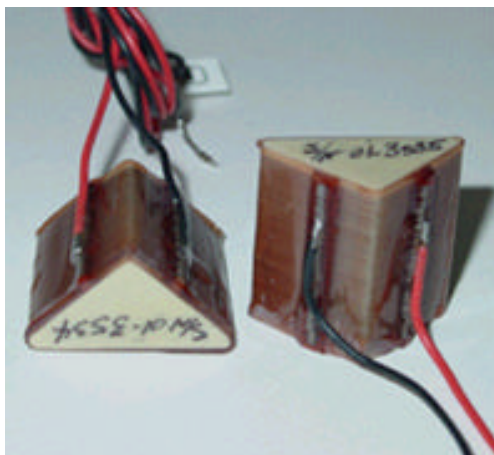
Piezoelectric Actuators Enable a New Type of Precision Machining

*Precision Actuators and High-Power Electronics
Move the Diamond Tool in Vibration Assisted Machining*

Kinetic Ceramics, Inc. (KCI) in Hayward, CA recently delivered custom piezoelectric actuators and drive electronics to the Precision Engineering Center (PEC) at NCSU in Raleigh, NC. These actuators support the PEC's research on new class of precision machining called Vibration Assisted Machining. The actuator shape and specifications were developed by researchers at the PEC to optimize stroke, stiffness and resonant frequency of their Ultra Mill machining workstation. KCI delivered the actuators and power supply to meet the PEC requirements.

"Our ability to deliver customized high-performance piezoelectric solutions is highlighted by the Ultra Mill project", stated Conal O'Neill, president of KCI.

Two triangle-shaped stacks achieve a first resonant frequency in the Ultra Mill of 5000 Hz. Each actuator has a 30 mm base, 13 mm height and 22 mm length. The piezoelectric ceramic layers are 0.5mm thick and formed from PZWT-100, a proprietary ceramic composition from KCI. Each stack has a modest capacitance of 0.2 uF. In the Ultra Mill mechanism the actuators produce a tool movement of 7 μm in the minor axis and 33 μm in the major axis with drive voltages of 0 to 1000 volts.



Triangle Piezoelectric Stacks from KCI

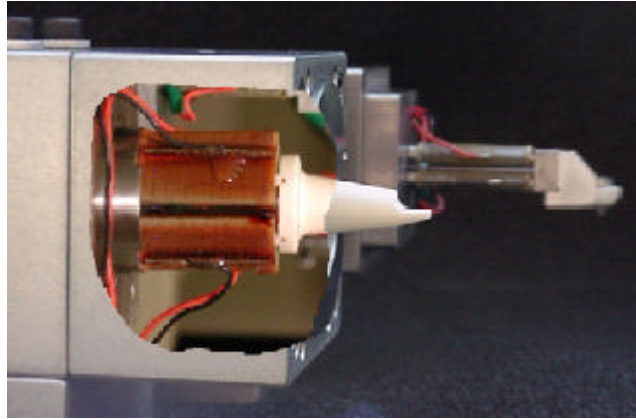


KCI Drive Electronics, 1000 Volts, 1500 Watts

Fast operation requires a high-bandwidth and high-power amplifier that can rapidly charge and discharge the piezoelectric actuators. The Model KCN15-1 KCI power supply produces 1500 watts and 6.3 Amps peak at 1000 volts with a bandwidth of 15,000 Hertz. The external bias voltage adjustment enables input drive signal to be centered at zero volts while keeping the output drive voltage always positive.

When asked about the KCI actuator solution Professor Tom Dow, Director of the Precision Engineering Center, responded;

“The KCI actuators and power supply perform very well in the Ultra Mill. The expected stroke, stiffness and resonant frequency were achieved. At peak power the thermal losses are significant, nearly 100 Watts, which requires active fluid cooling. The triangle shape maximizes cooling and provides the best dynamic performance. We estimate the temperature inside the stacks to be 120 °C and no failures have occurred.”



Cut-away Picture of the Ultra Mill showing the KCI Actuators (Courtesy of the Precision Engineering Center)
<http://airy.pec.ncsu.edu/PEC/index.html>

For more information about the PEC please see: <http://airy.pec.ncsu.edu/PEC/index.html>

About Kinetic Ceramics, Inc

KCI has manufactured piezoelectric stack actuators since 1966 under the trademarked name PIEZOMOTOR[®]. Their staff has more than 60 years of combined experience making high performance actuators for the most demanding industrial and research applications. They offer a broad selection of standard PIEZOMOTOR actuators and can also quickly respond to special requirements.

At KCI, all piezoelectric manufacturing processes are proprietary and completed in-house to maintain flexibility and full control of quality and performance. KCI produces ceramic powders, forms and fires plates and assembles piezoelectric stacks.

KCI offers several types of electronic drive amplifiers that are optimized for PIEZOMOTOR actuators. To achieve the fastest and most linear response “charge control” amplifiers are available with output power exceeding 1500 watts.

KCI also produces systems and modules based on PIEZOMOTOR actuators. These integrated solutions offer the highest possible performance in fully engineered modules. For example: KCI is the world-leader in manufacturing Fast Tool Servo modules for contact lens manufacturing.

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