Micro-electro-discharge Machining Method and Device

FEATURES
Micro-electro-discharge machining (micro-EDM) is microfabrication technique involving the serial discharge of electrical pulses between a microelectrode and a work piece, with a simple RC circuit controlling pulse timing. Although micro-EDM can cut any electrically conductive material (e.g. steel, graphite, silicon), its serial nature has limited its use so far. Recently, electrode arrays have been used in place of single electrodes to allow parallel processing of work pieces and increase throughput. However, if a single, shared RC circuit is used to control pulse discharge, throughput is again hindered because only one electrode in the array can fire at any one time. This invention is a micro-EDM technology that achieves high throughput micromachining by increasing both the spatial density of electrodes and the temporal density of electrical discharges. The device is composed of a LIGA-fabricated electrode array that sits atop a lithographically patterned, thin film interconnect. The array achieves spatial parallelism in machining, while a pulse generation scheme exploiting the parasitic capacitance of the interconnect allows simultaneous discharge of electrodes to provide temporal parallelism.

BENEFITS
- Achieves high parallelism and high throughput
- Offers a 100-fold increase in machining rate over conventional EDM
- Highly amenable to large-scale electrode arrays, due to tight integration of all pulse control circuit elements
- Provides more precise cutting and a smoother machined surface

INTELLECTUAL PROPERTY STATUS
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