

New JPSA Picosecond Laser Workstation Micromachines Tough Materials Faster, Better

Manchester, New Hampshire, USA – Engineers at J P Sercel Associates (JPSA) are finding faster and more precise ways to micromachine hard substances such as ceramics, diamond metals and even soft materials such as polymers using a new picosecond laser micro machining system developed at JPSA. Picosecond refers to the 'ultrafast' time duration of the laser's pulse width, one millionth of a millionth of a second. (10^{-12} seconds). Ultrafast lasers permit high-resolution micromachining because the short pulses with their high peak power vaporize the material before thermal diffusion imparts undesirable heat into the workpiece. This allows high density features to be produced without micro cracking and burring.

An ultrafast pulse removes material very quickly and efficiently with sub-micron accuracy. The precise control of the laser allows it to be used like a drill—with a drill bit as small as 5 microns in diameter that does not dull and does not break.

Silicon carbide (SiC) is tough. It keeps drill bits from dulling, withstands the high heat of power circuitry, and forms beautiful, super-hard gemstones. SiC is also used to make mirrors because the material expands and contracts very little during temperature changes. JPSA engineers have developed a picosecond laser system based on their IX-100 laser system to micro machine SiC mirror surfaces for a demanding hi-resolution application. Using this laser tool, the custom configured picosecond workstation can micromachine surfaces as large as 12 inches by 12 inches, producing features as small as a few microns. Due to its high rep rate, the picosecond laser workstation is not dependent upon a specific wavelength to operate efficiently, but can utilize a range of wavelengths for greater flexibility.

JPSA designed and fabricated the custom picosecond laser workstation to produce SiC mirrors, with JPSA large format linear glass encoded X, Y stages and a custom modified high-speed, high-precision rotational stage for this challenging application. JPSA also engineered a laser beam delivery system (BDS) designed for high-precision picosecond laser applications, and the JPSA process camera/inspection camera (JPSA Microtech camera) setup; all elements coordinated with JPSA's Windows-based high-precision motion control system.

About J. P. Sercel Associates

JPSA products and services include UV excimer, DPSS and ultra-fast laser micromachining systems, UV and VUV laser beam delivery systems, laser materials processing development, optical damage testing, and excimer laser refurbishment services. JPSA operates a high-performance laser job shop as well as a systems engineering and manufacturing business. For more information, visit www.jpsalaser.com, or contact the company at 220 Hackett Hill Road, Manchester, NH, 03102 USA; Tel. 603.518.3200, Fax 603.518.3298.

