

## PhotoScribe Technologies, TeoSys Engineering and Galil Ensure Your Diamond

A new, user-friendly and safe laser system can now inscribe on the hard surface of a diamond to engrave a certification number or a personal message. Microscopic inscription on these valuable gems is made possible by custom software that mates joint PhotoScribe/TeoSys laser technology with precise Galil motion control.

With its design, PhotoScribe/TeoSys has turned a complex laser system requiring weeks of training into an easy-to-use system—an Excimer laser, custom software and a Galil DMC-1822 motion controller do all the work. Even users who barely know Windows® find it easy to operate.

Engraving on diamonds is used not only to commemorate a wedding or other special event, but also for logos, brand names, photographs and most importantly, serial numbers. A serial number corresponds to a certificate that may be used for security, identification and traceability. Many diamonds are “conflict” diamonds, coming from countries that feed money to a large black market. Some profits go to criminal gangs, others to brutal ruling regimes, and some even to terrorists.

Galil’s flexibility, which enabled the motion control code to interface with both graphics and live video, was key in designing the laser marking system. The user simply types the desired name or serial number into a text box. The PhotoScribe/TeoSys software converts the text into a DXF CAD file so that the image is placed nondestructively on top of the live video showing the diamond. The CAD file is then converted to Galil’s proprietary motion control language and is then sent to the Galil controller for execution.

The PhotoScribe/TeoSys laser marker typically engraves on the girdle of the diamond. The girdle is the part of the diamond hidden by the setting. However, the system is capable of marking all shapes and sizes of diamonds, either mounted or loose. Laser marks are user set anywhere from 7 to 15

microns in diameter and may be engraved from 10 to 30 microns/second.

Galil’s DMC-1822 PCI bus motion controller provides coordinated motion on two axes using stepper motors. The X-axis moves the diamond forward and backward and the Y-axis moves it up and down. The laser stays fixed as it makes a series of points on the diamond that look like a solid line when focused using a manual Z stage. The final engraving is less than the width of a human hair.

In this process, precise, coordinated motion is a must, particularly in the moves that involve vector positioning. The

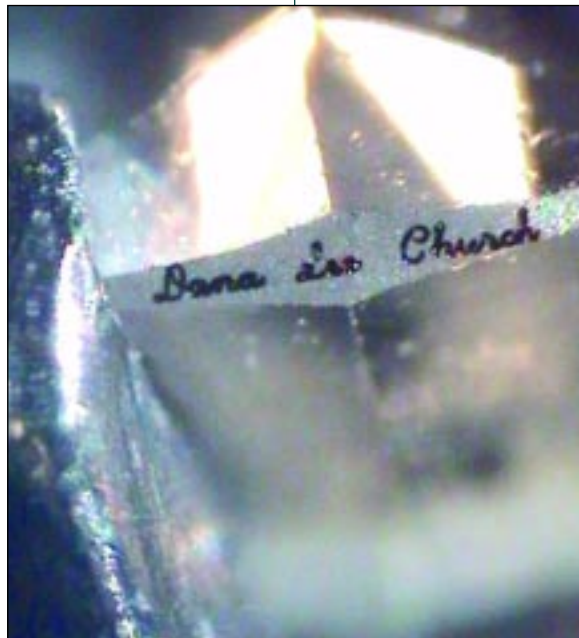
exact motion must also be accurate enough to be repeatable. The user, for example, may choose to repeat the program in order to make the engraving darker, so the controller must move the diamond in the precise tracks of the first engraving. With the combination of the DMC-1822 and the custom designed stages, accuracy is repeatable to 1.5 microns.

PhotoScribe/TeoSys designers found Galil’s I/O and uniquely dependable multitasking ability crucial. I/O was needed to intersperse the commands to communicate with the rest of the system.

Multitasking was essential to move the diamond while synchronizing with the laser pulse.

The low cost of the DMC-1822 was also a critical factor.

Comparable diamond marking Excimer laser systems sell for more than \$300,000. With the Galil controller, PhotoScribe/TeoSys was able to reduce the system cost by more than one third with only a minor reduction in throughput. This reduction in cost is essential to expanding a market that has generally been limited to the large, world-class gemological laboratories. ■



*The PhotoScribe/TeoSys laser system engraves precisely on a diamond.*

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