

The need for speed

Scientists and engineers frequently want faster speed and better resolution when making measurements, but their expectations and needs, present and future, rose dramatically in 1999. Speed and resolution topped the list of performance needs in an annual survey conducted by Keithley Instruments, Inc. (Cleveland, OH). The desire for improved accuracy also increased, but at a smaller rate.

The number of respondents who currently require 1,000 or more readings/s rose from 19% in 1998 to 31% last year. The percentage of scientists and engineers who expected to need a speed of 1,000 readings/s or greater in the next one to two years went from 33% to 51%. Resolution needs soared as well, more than tripling in one year. The number of respondents who now require a resolution of 18 or more bits (5.5 digits) increased from 7% in 1998 to 18% in 1999. And those expecting to need such resolution within two years nearly doubled, from 23% in 1998 to 42% last year.

The survey found a smaller increase in the need for greater accuracy. Respondents requiring an accuracy of 0.10% or greater rose from 26% in 1998 to 28% in 1999, and those expecting to need such accuracy in the next two years went from 47% to 53%.

"We're accustomed to seeing scientists and engineers forecast dramatically higher requirements for their future measurement needs," says Joseph P. Keithley, the company chairman, chief executive officer, and president. "What was remarkable, however, was the tremendous increase in today's requirements for speed and resolution. It clearly documents what we hear anecdotally from our customers—that their new product programs or their new manufacturing processes require them to perform more measurements, more rapidly, and with greater precision."

Keithley began its annual Demanding Measurements Survey of scientists and engineers in 1995 to help it assess the trends and market needs for measurement products and technologies. The 1999 data were collected in July and August, and the

findings are based on responses from 793 individuals, or 19.8 % of those queried.

Respondents reported little change in remote measurement and data acquisition. Those who said that they "acquire data from sensors located outside the plant—in another building, city, or country" fell insignificantly to 18% last year from 19% in 1999. And although 60% expected to perform more remote measurements in the following 12 months, 62% said the same thing in the 1998 survey. The survey also found the same needs for accuracy, resolution, and speed whether users were doing standard or remote measurements.

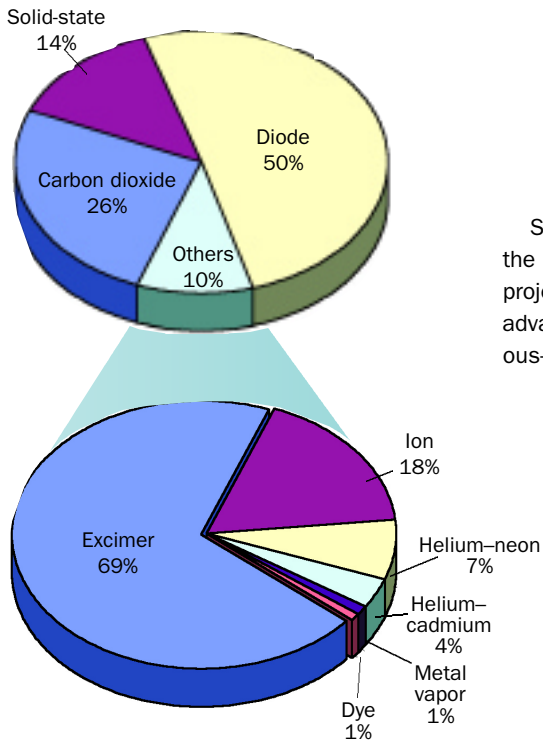
Lasers 2000

Worldwide sales of lasers are forecast to increase by \$514 million in 2000, rising from \$4.237 billion in 1999 to \$4.751 billion this year, according to the Frost & Sullivan report World Laser Systems Market.

A key factor driving sales is the explosive growth in the market for diode, or semiconductor, lasers, whose global sales this year are predicted to hit \$2.475 billion. Diode lasers offer the advantages of small size, a wide emission spectrum, fiber-beam delivery, and good efficiency, and some are tunable. "These characteristics of diode lasers, together with their relatively lower price, have revolutionized much of the laser market, and, indeed, many aspects of everyday life," the report said.

Diode lasers have largely replaced helium-neon and ion lasers for such uses as optical storage, image recording, and barcode scanning, and they have made possible the popular laser pointers often wielded by speakers. Other major industrial applications of diode lasers include telecommunications, material processing, instrumentation, and inspection and measurements.

A major force that will boost diode-laser sales in 2000 is the strong demand for optical networks in communications. "Diode laser transmitters, amplifier pumps, and transceivers, the cornerstones of any optical network, offer significant increases in signal-transmission speed



Sales of carbon dioxide (CO₂) lasers, the most widely used form of gas laser, are projected to be \$1.2 billion in 2000. Their advantage of high output power in continuous-wave mode at relatively high efficiency has won over many users in spite of their higher costs. CO₂ industrial uses include cutting, welding, marking, and heat treatment in metal and nonmetal materials.

Solid-state lasers are used for moderate- to high-power applications such as cutting, welding, and drilling, and for low-power materials processing in the semiconductor industry. Increasing acceptance of solid-state lasers by the automotive and general fabrication industries

has spurred strong growth in the market in recent years. Sales of solid-state lasers should reach \$651 million this year, and sales of other lasers are projected to reach \$425 million in 2000. [2]

Percent of world revenues by laser type, 1999.

and capacity," the report says. Other factors influencing sales will be lower prices, increased reliability and lower operating costs, and a widening range of applications that are driven by technological advances.