Guest Editorial

Laser Engineering

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The August 1977 SPIE Annual Symposium devoted one of its seminars to Laser Engineering. What is laser engineering? To answer that, one must decide what engineering is and how it is distinguished from development or research. Without getting enmeshed in a web of confusing semantics and nuances, one can say without controversy that the term "engineering" is commonly used when there is considerable economic activity in existence or in prospect, and when hardware, structures, or products result. Of course, there can be rather close coupling between engineering and science. The engineering of a new accelerator for basic high energy research or a basic materials research program to obtain improved semiconductor devices are two examples.

The fact that this and other conferences can even refer to "laser engineering" whether or not it is true engineering is a source of considerable satisfaction to workers in the laser field. Laser technology had its birth and early nurture in industry where application, utility and, ultimately, profitability are necessary for survival. Its early promise led to unabashed speculative formation of a horde of laser equipment-producing companies, most of which fed on each other and disappeared, much to the disappointment of the displaced workers (and stockholders). Finding applications of laser technology, producing laser equipment reliable enough to support these applications, and the resulting commerce have been, therefore, principal objectives of responsible individuals in the laser field. That is laser engineering.

The above-mentioned laser engineering program produced twenty-five papers. The intent of the seminar was to present papers of a tutorial nature that would give the audience some perspective in the use of lasers for nondestructive evaluation and diagnostics, nonlinear optics applications, and optical communication. A final session was devoted to laser manufacturing techniques.

The papers, almost all invited, did not arrive early enough to permit much iteration on form and content and as a result ranged from short monographs to progress reports. From those suitable for journal publication, four are presented as a special section of this issue of *Optical Engineering.* They represent to this editor good engineering, adequate analysis to support design or enable comparison, and evidence of present or prospec-

In order of increasing hardware emphasis and orientation:

The paper by Krishnan et al is a review and comparative systems analysis of several methods of IR imaging using upconversion and direct detection. Clear-cut comparisons lead to unambiguous choices.

The paper by Love and Keck is a comprehensive minireview of optical fibers which gives sufficient engineering data to design optical links of predictable performance.

The paper by Kogan et al compares two useful techniques for obtaining second harmonic conversion from a laser. It starts with a succinct review of second harmonic generation and ends with equipment performance data.

The short paper by Eynon et al provides insight into an area which, presumably for proprietary reasons, has received too little attention heretofore: production engineering of laser equipment. The paper examines one performance parameter of HeNe lasers, a low noise specification, and discusses how analysis and statistical surveys of a manufacturing run were used to improve markedly the production yield.

The Proceedings of the technical program (SPIE Volume 122) from which these papers were selected can be obtained from SPIE.