Conf-770532-2

PRECISION MINIATURE PARTS FABRICATION
SANDIA LABORATORIES
ALBUQUERQUE, NEW MEXICO

Sandia Laboratories is a 28 year old corporation operated by Western Electric Company as an R&D agency for the Energy Research and Development Administration.

Approximately 7,000 people are employed at Sandia Laboratories in diverse scientific and engineering programs related to the practical uses of nearly all forms of natural energy including nuclear, solar, geo-thermal, combustion, etc., for both national defense purposes and consumer benefits.

Sandia's nuclear weapons development work necessitated the furtherance of "the state of many arts" across a broad spectrum of scientific and engineering technologies. This progress includes the development of exceptional machine methods and highly refined craft skills for producing miniature, intricately machined parts made to ultra precise dimensions in unique materials. A natural accompaniment to these requirements is, of course, a higher than ever standard for craftsmanship.

'Miniature', by Sandia's definition means piece part masses on the order of fractions of a gram, tolerances to six place customary decimals and three place metric decimals, surface finishes better than 16 micro inches all over and feature details that look clean and precise at 50 power magnification. Materials include the gamut of ferrous and non-ferrous alloys, stainless steels through

DISCLAIMER

Inconel, Elgiloy, etc., glass, graphite, precious metals, titanium, tantalum, tungsten, kennertium, ceramics, hard, soft, and on and on - - -.

Miniature mechanical assemblies developed from Sandia-made miniature prototypes may typically contain, within one cubic inch, 150 machined, molded, and/or stamped parts including working clearances. These mechanisms may ultimately serve widely different purposes but always with reliability exceeding 99% through a minimum of 300 cycles at any time during a 25 year shelf storage.

Such miniature assemblies are even more unusual considering that it may contain as many as 10 different materials in metals and chemical products (with attendant compatibility problems) at operating speeds measured in milliseconds and internal dynamic forces approximating 100 gram centimeters.

Today's advanced technology and resultant complexity made this kind of miniature accomplishment applicable to many fields.

Sandia's temperature controlled miniature machining section is excellently equipped with a very wide variety of modern machine tools for fabricating and gaging precision miniature parts. This special activity is further supported by the use of numerically controlled multi-axis machines, (up to 5 axis), master template reduction duplicating tracers and conventional optics and laser equipment for both viewing and measuring.

The Sandia craftsmen who operate our miniature machine section are top rated machinists who perform their work with highest accent on accuracy, innovative skill, and technical contribution, in cooperation with engineers, physicists, chemists, etc., to the overall success of the project. Per assignment these same men operate also as lead men exercising a degree of production administration control.

This kind of top flight technical performance has resulted in Sandia's outstanding miniaturization success. For example, our miniaturization accomplishments have resulted in smaller, lighter, components and weapons which, in turn, caused a mighty reduction in taxpayer cost for weapons delivery systems; i. e., smaller weapons needing smaller delivery aircraft at savings of millions of dollars per copy.

As previously hinted, the advances in miniaturization for nuclear application spins off for equally valuable application to other specialty fields of energy research; quite in line with Sandia's long term endeavor to provide the greatest and most reliable efficiency - in the least space.