Newsletter

CENTRE FOR ADVANCED TECHNOLOGY

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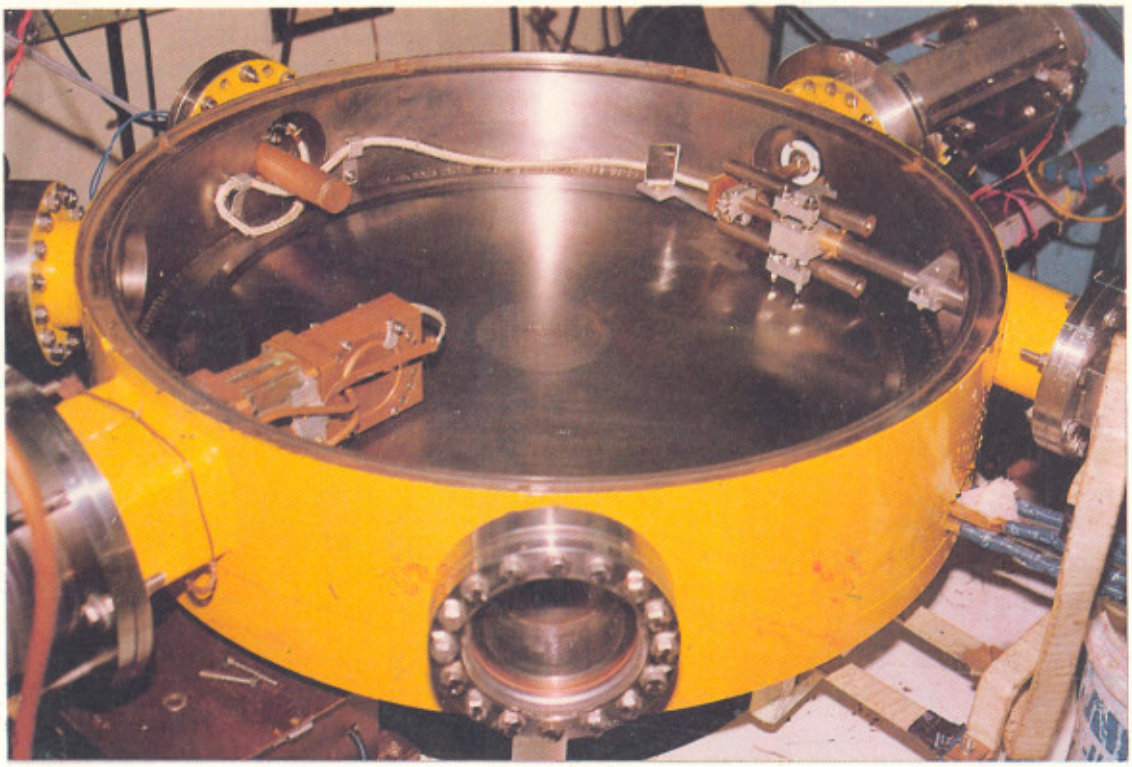


RESEARCH AND DEVELOPMENT

LASER PROGRAMME

Laser Marker System

A PC based laser marker system has been developed. This system can be used to mark logos, pictures etc. on hard surfaces. Main components of the system are a 20 W average power Nd:YAG laser, x-y galvanometric mirrors, driver cards for the mirror, video camera and interfacing software and hardware. The marker software accepts plot files generated by the CAD software or a picture captured by a video camera and marks it on target. The output from the laser is focussed on the target surface by a combination of two plano-convex lenses. The working distance and field of marking can be varied by changing the distance between these lenses. At present two lenses of focal lengths 40 mm and 50 mm respectively are used to get a 100 mm x 100 mm field at a distance of 70 mm from the final optical surface. Required movement of the beam is achieved by means of an x-y scanner placed between the lens combination and the target surface. The

Laser marker system

entire system is mounted on a 3 tie rod structure which provides rigidity along with light weight.

The system has been tested satisfactorily with sample CAD files containing text and logos as well as pictures grabbed through the camera.

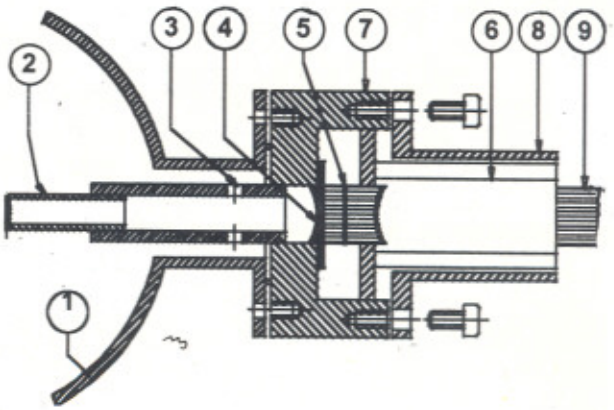
The basic laser without the galvanometric scan mirrors and with an appropriate work station can also be used for a wide range of fabrication requirements such as thin metal cutting, diamond kerfing and in microelectronics. Salient features of the marker system are given in the table below.

Salient features of the marker system

Laser Type	Nd:YAG Q switched (1 - 10 KHz, 20 W average power)
Marking field	4" x 4" (100 mm x 100 mm)
Working distance	70 mm from scanner
Marking speed	140 mm/ sec
Line thickness	50 to 100 μm
Resolution	2 μm /step
Repeatability	± 50 μm
Character fonts	User selectable
Vector graphics	Accepts AutoCAD plot file for HP747A plotter as input file
Raster graphics	Accepts standard 8 bit mono-chrome TIFF image file
Maximum resolution	250 DPI

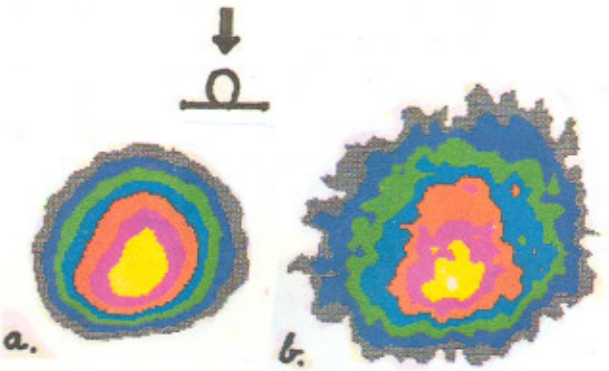
Development of an x-ray pin hole camera

An image intensifier based x-ray pin hole camera has been set up for the measurement of soft x-rays produced in laser plasma interaction. The camera consists of a pin hole and a phosphor coated optical fibre plate coupled to an image intensifier as the detector. In the present set-up, a pin hole with



Schematic diagram of x-ray pin hole camera. 1-Plasma chamber, 2-Pin hole and sliding tube assembly, 3-Evacuation hole, 4-Phosphor coating, 5-Fibre optic plate, 6-Image intensifier, 7- Flange with phosphor screen, 8-Intensifier holding assembly, 9-Phosphor screen of intensifier.

a diameter of 30 μm is fixed to a stainless steel tube which slides inside another tube. A phosphor coated fibre optic screen is fixed at the image plane of the camera. An intensifier is coupled to the camera for increasing intensity of the image. The whole assembly is attached to one of the port of plasma vacuum chamber. All the peripheral electronics has also been developed at CAT. Images from the phosphor screen are recorded by a CCD camera. Image is processed by using 'PROMISE' software (developed at CAT earlier). Figure below shows the images recorded by this camera for the case when the plasma is freely expanding in vacuum (a), and when the plasma expansion is taking place across a magnetic field of 0.6 T (b).



X-ray pin hole image of laser produced plasma : a) Expanding in vacuum.
b) Expanding across magnetic field.