

Practical Task Assignment 3 – Nd: YAG Laser Machining

Laser is an abbreviation of **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation. Laser systems have found widespread use within industry in processing material. The laser beam is focused and strikes onto the surface resulting in the extremely high power intensity. Processing is achieved from melting and vaporization of the material.

The Nd:YAG Laser for manufacturing applications have broadly adopted in metal cutting, drilling and welding. The below type of laser system is going to be used to carry out in this practical assignment.

Table 1: Specification of the laser system

Laser Type	Pulsed Nd:YAG Laser
Wavelength	1.06 μm
Average Power	400 W
Pulse Duration	0.1~20 ms
Pulse Frequency	1-300Hz
Beam Structure Mode	Multi-mode
Focal Length	100 mm
Working Area	400×350×400 mm ³

An artistic model presenting an idea of creativity is a result of flying through the time frame and knowledge boundary toward new horizons. It comprises two parts namely flying body and base frame as schematic drawings shown in Fig. 1 and 2.

Fabrication of this model mainly by laser material processing that is cutting, drilling and welding. The following laser practical tasks are designed to carry out laser cutting, drilling and welding respectively.

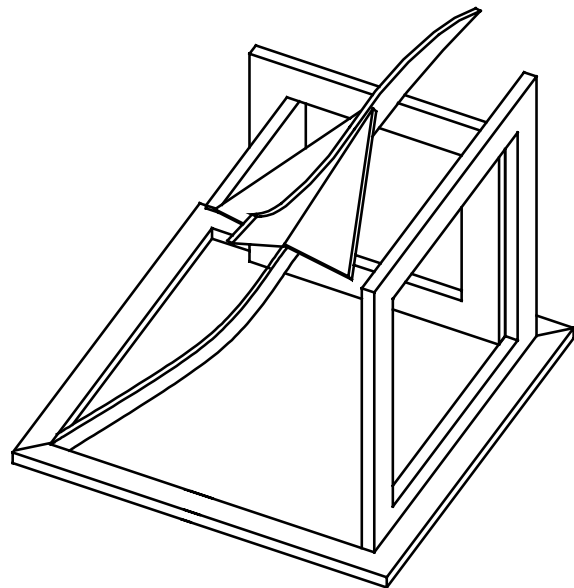


Fig. 1 An artistic model of the flying through

1. Practice Section 1 – Laser Cutting

Laser cutting is material removal in one or more axes to produce material separation. In the technology of laser processing, the Nd:YAG laser in pulse mode is more suited to cutting thin section of steel metals.

A. Objectives:

- To understand the basic principle of Nd:YAG Laser cutting;
- To familiar with the typical specification and setting of a Nd:YAG Laser system;
- To be able to set operating parameters for different cutting applications;
- To understand the application of assistant gas in the Laser cutting process;
- To familiar with the operation procedures.

B. Training content

This assignment is required to cut two profiled parts of the artistic model as the following figures shown by the Nd:YAG Laser machine from 0.5 mm thick metal sheets of either stainless or carbon steel.

Laser cutting is the first step of the model fabrication. The process can be divided into three main steps including generation of NC tool path program, setting out of the machine parameters and execution of Laser cutting process.

(i) Generation a NC part program

First of all, a 2D CAD file of the required geometrical profile of parts is created by any kind of CAD software for example AutoCAD. Then converting the CAD file into CNC program file via any kind of CAM software like MASTERCAM.