

## **CHAPTER 6**

### **CONCLUSIONS AND RECOMMENDATIONS**

Laser attenuation is a phenomenon when the laser beam is reduced or attenuated after passing through a medium because some portion of the laser beam is reflected at the entrance and exit, absorbed and scattered by the particles in the medium and the remainder of the laser beam is transmitted to the receiver. Beer-Lambert law is an empirical relationship which relates the absorption of light to the properties of the material of a medium when the light passes through that medium.

Laser attenuation measurement system is a device to quantify the number density of suspended particles. It has been designed to have high flexibility, reliability and stability while it is light, movable and safe. Laser is used in the system because it is monochromatic, highly directional, coherent and also bright. This measurement system consists of four main components and they are laser source, lens holder, light intensity power meter and platform. The final design is chosen after considering how well each selected design meets the requirements of the project.

The objects to be tested is placed or focused directly into the measurement area. Beam expander is used to expand the laser beam at a certain angle. This measurement area is created when the expanded laser beam passes through the plano-convex lenses. The changing in the intensity of laser beam is recorded by the light intensity power meter and it gives the reading in voltage.

Further works need to be done on this measurement system to increase its functionality, accuracy and also design. High power laser pointer shall be tried to compare the result with the current laser pointer. There is also a possibility to have a more compact design in the future when this project is continued later. The experiments with the actual

system of spray and homogenous size of solid particles must be conducted in the future to see the accuracy of this measurement system.

As a conclusion, a measurement system has been developed successfully by using the laser attenuation method which incorporating the features that have been mentioned earlier. This system is already completed and now ready to be used for experiments that need the quantification of number density of suspended particles especially in combustion, dust and spray studies.