

SUMMARY

Fitrahtur Rahman, Department of Mechanical Engineering, Faculty of Engineering, University of Brawijaya, May 2017, *The Effect of Perforated Plates Distance on the Flame Stability and Exhaust Gas Temperature of Meso-Scale Combustor*, Academic Supervisors: Lilis Yuliati and Haslinda Kusumaningsih.

The vast number of miniaturization of electronic devices shows the sign that in recent decades the development of science and technology has been growing rapidly. One of the technologies being developed today is MPG (micropower generator), which is a micro-scale technology that is capable of generating electrical energy based on meso-scale combustion, and then used on portable electronic devices as an effort to overcome the dependency on the use of batteries. Micropower generator (MPG) has a main component of the so-called meso-scale combustor. Meso-scale combustor is a combustor is relatively small in size, in which the chemical energy derived from fuel is converted into thermal energy through a process of internal combustion. The thermal energy is then converted into electrical energy by using energy converter module (thermoelectric or thermophotovoltaic). However, the lack of meso-scale combustor is still in its combustion efficiency.

The effect of flame holder type and geometry at meso-scale combustion has been studied previously and found that a single perforated plate made of cooper—perforated with a winding geometric line—has the most excellent combustion characteristics. This study focused on combustion characteristics with the effect of the number and the distance of the perforated plates used in the of meso-scale combustor using butane (C_4H_{10}) as the fuel. Air was supplied from the compressor as oxidator. The combustor was made of quartz glass tube. Furthermore, the data of flame stability limit, flame visualization, combustor wall temperature, and exhaust gas temperature were acquired.

The results showed that combustion with double perforated plate is better than the single perforated plate. As for the ratio of the distance, the double perforated plate with the distance of 3 mm is better than the one with 5 mm in distance. The double perforated plate with the distance of 3 mm had the highest combustor wall temperature and the lowest exhaust gas temperature compared to other variations as well as having a stable flame at high speed reactants.

Keywords: flame holder, perforated plate, meso-scale combustion, combustion characteristics