ABSTRAK

Steam ejector merupakan sistem refrijerasi yang ramah lingkungan, dimana pengoperasiannya dapat memanfaatkan *waste heat* yang dihasilkan dari berbagai macam proses industri. *Steam ejector* mempunyai beberapa kelebihan dibandingkan dengan sistem refrijerasi yang lainnya, antara lain struktur desain yang praktis, hemat biaya produksi, dapat digunakan untuk berbagai macam jenis refrijeran, dan perawatan yang mudah. Dalam bidang industri, *steam ejector* biasanya digunakan untuk memompa cairan yang bersifat korosif dan berbagai macam gas yang sulit ditangani.

Penelitian tentang *steam ejector* ini digunakan untuk mengetahui performa pada *steam ejector* berdasarkan nilai *entrainment ratio* dan nilai *expansion ratio*. Penelitian ini menggunakan variasi pada *primary nozzle exit position* (NXP), dimana NXP -5 mm, NXP 0 mm, dan NXP +5 mm dilakukan pengujian terhadap *primary pressure* sebesar 1 bar, 2 bar, 3 bar, dan 4 bar, serta *secondary temperature* sebesar 50 ˚C, 60 ˚C, 70 ˚C, dan 80 ˚C. Variasi penelitian tersebut dilakukan untuk mengetahui pengaruh posisi NXP terhadap besarnya nilai *entrainment ratio* dan nilai *expansion ratio* untuk kondisi pengoperasian *steam ejector* yang berbeda.

Hasil penelitian menunjukkan bahwa nilai *entrainment ratio* yang optimal terletak pada NXP +5 mm untuk variasi *secondary temperature* 50 ˚C, 60 ˚C, dan 70 ˚C, serta variasi *primary pressure* 1 bar. Sedangkan pada variasi *primary pressure* 2 bar, nilai *entrainment ratio* yang optimal terletak pada NXP -5 mm. Nilai *expasion ratio* maksimal untuk NXP -5 mm, NXP 0 mm, dan NXP +5 mm terletak pada *secondary temperature* 50 ˚C dengan melakukan variasi pada *primary pressure*. Sedangkan pada variasi *secondary temperature*, nilai *expansion ratio* maksimal terletak pada *primary pressure* 4 bar untuk NXP -5 mm, NXP 0 mm, dan NXP +5 mm.

Kata kunci: ***steam ejector, entrainment ratio, expansion ratio,* NXP**

ABSTRACT

Steam ejector was an environmentally friendly refrigeration system, wherein its operation could utilize waste heat that produced from many kinds of industrial processes. Steam ejector had many advantages over the other type of refrigeration system, such as structural design simplicity, low production cost, can be used for many types of refrigerant, and easy to maintain. In industrial sector, steam ejector usually used for pumping corrosive liquids and many kinds of gases which are difficult to handle.

The study about this steam ejector system was used to discover the steam ejector performance based on the entrainment ratio value and the expansion ratio value. This study used variations of primary nozzle exit position (NXP), where NXP -5 mm, NXP 0 mm, and NXP +5 mm were experimentally tested for primary pressure 1 bar, 2 bar, 3 bar, and 4 bar, as well as experimentally tested for secondary temperature 50 ˚C, 60 ˚C, 70 ˚C, dan 80 ˚C. These experimental variations on this study were used to discover the effect of NXP position toward the entrainment ratio value and the expansion ratio value for different steam ejector operating conditions.

The result of this study founded that optimal entrainment ratio value was NXP +5 mm when the steam ejector experimentally tested for secondary temperature 50 ˚C, 60 ˚C, and 70 ˚C, as well as for primary pressure 1 bar. While for the variation of primary pressure 2 bar, the optimal entraintment ratio value was NXP -5 mm. Maximum expansion ratio value for NXP -5 mm, NXP 0 mm, and NXP +5 mm was at secondary temperature 50 ˚C by variating the primary pressure. While for the variation of secondary temperature, the maximum expansion ratio value was at primary pressure 4 bar for NXP -5 mm, NXP 0 mm, and NXP +5 mm.

Keywords: steam ejector, entrainment ratio, expansion ratio, NXP