INTISARI

Dalam rangka mencapai target produksi BBM dan produk *petrochemical* guna menunjang ketahanan energi nasional diperlukan peralatan yang andal untuk menunjang operasional kilang pengolahan minyak bumi. Peralatan-peralatan utama seperti pompa injeksi harus dapat menyesuaikan dengan kondisi operasional yang diharapkan. *Check valve* merupakan salah satu komponen penunjang dari keandalan pompa injeksi. Penelitian dilakukan untuk mengetahui pengaruh ukuran *solid* partikel dan diameter *check valve* pada dua desain *check valve* tipe *ball* menggunakan simulasi numerik *Computational Fluid Dynamics* (CFD).

Pada penelitian ini dilakukan simulasi terhadap tiga variasi *stroke length* pompa yaitu 25%, 50% dan 100% dengan tiga variasi ukuran *solid* partikel yaitu 200, 250 dan 300 mikron. Fluida yang melewati *check valve* adalah campuran *solid-liquid* katalis dan partikel. Analisis yang dilakukan adalah dengan membandingkan nilai kecepatan dan tekanan serta pola aliran yang dihasilkan pada tiap variasi yang digunakan. Simulasi dilakukan pada dua model *check valve*, dimana pada model 1 diameter *ball valve* sebesar 9,5 mm dan diameter *suction* 10 mm serta diameter *discharge* 5 mm. Sedangkan model 2 memiliki diameter *ball valve* sebesar 11 mm dan diameter *suction* 14,5 mm serta diameter *discharge* 19 mm.

Hasil simulasi menunjukan bahwa dari semua variasi yang diuji, model dengan *stroke length* 100% menghasilkan kecepatan paling maksimal. Selain itu, ukuran *solid* partikel berbanding terbalik dengan kecepatan dan *flow* fluida. Dari hasil penelitian ini juga didapatkan bahwa model 2 lebih berpotensi terjadi adanya aliran balik (*backflow*) ke arah *suction*, dan juga model 2 lebih berpotensi mengalami *clogging* karena partikel yang seharusnya mengalir berhenti di dalam *check valve*.

Kata kunci: pompa injeksi katalis, *check valve* tipe *ball*, *Computational Fluid Dynamics* (CFD)

ABSTRACT

In order to achieve production targets for fuel and petrochemical products to support national energy security, reliable equipment is needed to support the operation of petroleum processing refineries. Main equipment such as injection pumps must be able to adapt to the expected operational conditions. Check valve is one of the supporting components of injection pump reliability. Research was conducted to determine the effect of solid particle size and check valve diameter on two ball type check valve designs using Computational Fluid Dynamics (CFD).

In this research, three variations of pump stroke length were simulated, namely 25%, 50% and 100% with three variations of solid particle size, namely 200, 250 and 300 microns. The fluid that passes through the check valve is a solid-liquid mixture of catalyst and particles. The analysis carried out is by comparing the velocity and pressure values as well as the flow patterns produced for each variations used. The simulation was carried out on two check valve Models, where in model 1 the ball valve diameter was 9.5 mm, the suction diameter was 10 mm and the discharge diameter was 5 mm. Model 2 has a ball valve diameter of 11 mm and a suction diameter of 14.5 mm and a discharge diameter of 19 mm.

The simulation results show that of all the variations tested, the model with a stroke length of 100% produces the maximum velocity. In addition, the size of solid particles is inversely proportional to fluid velocity and flow. From the results of this research, it was also found that model 2 has more potential for backflow towards suction, and also model 2 has more potential for clogging because particles that should flow stop inside the check valve.

Keywords: catalyst injection pump, ball type check valve, Computational Fluid Dynamics (CFD)