RINGKASAN

Septiawan Pambudi Pratama, Jurusan Teknik Industri, Fakultas Teknik, Universitas Brawijaya, Maret 2017, *Perancangan Kebijakan Perawatan Mesin Air Turbo Compressor (ATC) Dengan Metode Reliability Centered Maintenance (RCM) II* (Studi Kasus PT. Polychem Indonesia Tbk., Merak), Dosen Pembimbing: Oyong Novareza dan Dwi Hadi Sulistyarini.

Mesin *Air Turbo Compressor (ATC)* merupakan salah satu mesin yang beroperasi pada *Air Separation Unit Plant* II PT. Polychem Indonesia Tbk. Sampai saat ini, mesin ATC masih mengalami *downtime* dengan rata-rata *downtime* sebesar 16,5% tiap bulan sehingga mempengaruhi nilai keandalan mesin. *Downtime* mesin ATC terjadi akibat jarang dilakukan perawatan pada komponen mesin ATC. PT. Polychem Indonesia Tbk menggunakan jenis perawatan *corrective* yakni hanya melakukan perawatan terhadap komponen yang mengalami kerusakan.

Mesin ATC memerlukan perbaikan perawatan menggunakan metode *Reliability Centered Maintenance* (RCM) II untuk meminimalisir kerusakan mesin saat proses produksi berlangsung. Metode ini juga dapat menentukan prioritas penanganan komponen, penentuan waktu interval perawatan mesin dengan tepat, menurunkan biaya perawatan, meningkatkan nilai keandalan komponen maupun mesin itu sendiri serta penentuan jenis perawatan mesin dengan tepat. *Failure Mode and Effect Analysis* (FMEA) digunakan untuk mengidentifikasi dan memprediksi potensi kegagalan yang mungkin terjadi pada tiap komponen mesin. Penentuan jenis distribusi dan parameter distribusi terpilih membantu untuk mendapatkan nilai *Mean Time to Failure* (MTTF) dan *Mean Time to Repair* (MTTR) dari data kerusakan komponen mesin. Perhitungan total biaya didapatkan dari akumulasi biaya tenaga kerja, biaya kerugian produksi, biaya penggantian komponen, serta lama waktu yang dibutuhkan dalam perbaikan setiap komponen sehingga menghasilkan total biaya terendah dalam perawatan mesin dan juga mendapatkan waktu perawatan interval (TM) yang tepat untuk memudahkan teknisi melakukan perawatan mesin. Perhitungan keandalan mesin dilakukan dengan membandingkan antara nilai keandalan mesin berdasarkan waktu MTTF dengan waktu TM mesin yang bertujuan untuk mengetahui peningkatan nilai keandalan setelah dilakukan penelitian ini. Jenis perawatan yang tepat didapatkan dari RCM II *decision worksheet* dengan masing-masing komponen memiliki perlakuan perawatan yang berbeda. Perhitungan persediaan komponen mesin dapat ditentukan dengan menggunakan metode Q berdasarkan interval waktu perawatan (TM) yang dihasilkan.

Hasil dari penelitian ini didapatkan bahwa terdapat 8 komponen kritis mesin serta waktu interval perawatan (TM) dan biaya perawatan optimalnya yaitu *low speed pinion bearing* tiap 644,37 jam dengan biaya perawatan sebesar Rp 5.738/jam, *oil seal stage 1* tiap 796,93 jam dengan biaya perawatan sebesar Rp 3.489/jam, *gas seal stage 1* tiap 1140,09 jam dengan biaya perawatan sebesar Rp 3.591/jam, *impeller stage 1* tiap 1251,35 jam dengan biaya perawatan sebesar Rp 5.330/jam, *high speed pinion bearing* tiap 732,26 jam dengan biaya perawatan sebesar Rp 5.585/jam, *gas seal stage 3* tiap 1300,48 jam dengan biaya perawatan sebesar Rp 2.808/jam, *oil seal stage 3* tiap 1377,49 jam dengan biaya perawatan sebesar Rp 2.226/jam, dan *thrust bearing* tiap 759,99 jam dengan biaya perawatan sebesar Rp 5.979/jam. Persediaan minimum komponen yaitu 7 unit *journal bearing* (*low speed* dan *high speed pinion*), 4 unit *oil seal,* 4 unit *gas seal*, 2 unit *impeller stage 1*, dan 2 unit *thrust bearing*.

Kata kunci: RCM II, *Maintenance*, TTF, TTR, *Failure Mode and Effect Analysis*.

SUMMARY

Septiawan Pambudi Pratama, Department of Industrial Engineering, Faculty of Engineering, University of Brawijaya, March 2017, *Design of Maintenance Policy Air Turbo Compressor (ATC) Machine Using Reliability Centered Maintenance (RCM) II Method* (Case Studies PT. Polychem Indonesia Tbk., Merak), Supervisors: Oyong Novareza and Dwi Hadi Sulistyarini.

Air Turbo Compressor (ATC) machine is the one all of machines that operate on the Air Separation Unit at PT. Polychem Indonesia Tbk. Till recently, ATC machine still downtime with average value 16,5% that affects on machines reliability value. ATC machine downtime occurs due to uncommon maintain on components of the machine. PT. Polychem Indonesia Tbk use corrective maintenance that just doing maintain for components that have been damage.

ATC machines need maintain method using Reliability Centered Maintenance (RCM) II to minimize damage to the machine when the production process takes place. This method can also sepcify a priority handling of components, timing maintainance intervals correctly, cheapest maintenance costs, increase the value of component realibility nor the machine itself as well as the determination of the type of maintain the machine correctly. Failure Mode and Effect Analysis (FMEA) is used to identify and predict potetntial failures that may occur at each of the components machine. Determination of the types of the parameters of the selected distribution and ditribusi help to get the value of Mean Time to Failure (MTTF) and Mean Time to Repair (MTTR) of data damage machine components. Total cost calculation derived from the accumulated labor costs, cost of production losses, cost of replacing the components, as well as the length of time required in the repair of any component so that it produces the cheapest total cost in the maintain of machine and also get the proper interval time maintainance (TM) to facilitate the technicians doing maintenace. Machines reliability calculation do by comparing the reliability value based on MTTF and TM to find out improvement the reliability value. The right kind maintain obtained from RCM II decision worksheet with each component has different kind maintains. Inventory calculation machine components is determined using Q method of based on time interval time maintainance (TM) generated.

Results of this research obtained that there are 8 critical components of the machine as well as the interval time maintainance (TM) and its optimal cost as follow, low speed pinion bearing each 644.37 hours with maintenance costs Rp 5.738/hour, oil seal stage 1 each 796,93 hours with maintenance costs Rp 3.489/hour, gas seal stage 1 each 1140,09 hours with maintenance costs Rp 3.591/hour, impeller stage 1 each 1251,35 hours with maintenance costs Rp 5.330/hour, high speed pinion bearing each 732,26 hours with maintenance costs Rp 5.585/hour, gas seal stage 3 each 1300,48 hours with maintenance costs Rp 2.808/hour, oil seal stage 3 each 1377,49 hours with maintenance costs Rp 2.226/hour, dan thrust bearing each 759,99 hours with maintenance costs Rp 5.979/hour. Minimum inventory component that is 7 units of journal bearing (low speed and high speed pinion), 4 units of oil seal, 4 units of the gas seal, 2 units of impeller stage 1, and 2 units of thrust bearing.

Keywords: RCM II, Maintenance, TTF, TTR, Failure Mode and Effect Analysis