Penentuan Interval Waktu Penggatian Suku Cadang Mesin Vertikal Packaging Berbasis Reliabilitas dengan Pendekatan Weibull Competing Risk Model = Determining Time Interval of Spare Part Replacement For Vertical Packaging Machine Based On Reliability With Weibull Competing Risk Model Approach

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Abstrak

Pemeliharaan berfungsi untuk memperpanjang umur aset atau barang. Pemeliharaan dibagi menjadi empat klasifikasi yaitu reaktif, preventif, proaktif, dan prediktif. Pemeliharaan preventif bertujuan untuk meminimalkan risiko kegagalan dengan melakukan pemeliharaan secara berkala. Dalam pemeliharaan preventif, hal-hal yang perlu dicari adalah Median Time to Failure (MTTF), Distribusi Kegagalan, Analisis reliabilitas, Kurva Hazard dan Cumulative Failure. Analisis reliabilitas adalah estimasi benda tetap berfungsi melewati waktu tertentu. Model yang biasanya digunakan adalah reliabilitas parametrik, yang menggunakan pendekatan distribusi dalam perhitungan reliabilitas. Metode yang digunakan umumnya adalah Maximum Likelihood Estimation (MLE). Objek penelitian yang digunakan adalah mesin vertical packaging dalam pengemasan makanan ringan. Penelitian berfokus kepada reliabilitas mesin dan suku cadangnya (Pin Bushing, Thermocouple, Heater, dan lainnya) serta failure mode terhadap reliabilitas mesin. Analisis dimulai dengan Fault Tree Analysis (FTA) untuk membuat hirarki failure mode yang ada. Failure mode berguna dalam pengelompokkan efek kegagalan terhadap distribusi. Hasil men unjukkan data berdistribusi Weibull CR (Competing Risk), yang menunjukkan failure mode jamak. Pada contoh pin bushing, ditemukan bahwa kurvanya paling mendekati hasil analisis mesin Hasil analisis menunjukkan bahwa reliabilitas mesin pada 90% sekitar 150 jam dan 80% sekitar 480 jam. MTTF dari mesin yang digunakan mendekati 2500 jam. Temuan lebih buruk daripada acuan, temuan dapat menjadi dasar improvement kepada pemeliharaan preventif. Temuan kurva hazard yang umum terjadi pada suku cadang elektronik juga muncul pada suku cadang mekanik yaitu “monotone decreasing hazard” dengan likelihood hazard selalu menurun sepanjang waktu

.....Maintenance functions to extend the life of assets or goods. Maintenance is divided into four classifications, namely reactive, preventive, predictive, proactive, and predictive. Preventive maintenance aims to minimize the risk of failure by carrying out regular maintenance. In preventive maintenance, the things you need to look for are Median Time to Failure (MTTF), Failure Distribution, Reliability Analysis, Hazard Curve, and Cumulative Failure. Reliability analysis is an estimate of whether an object will continue to function over a certain time. The model usually used is parametric reliability, which uses a distribution approach in calculating reliability. The method used generally is Maximum Likelihood Estimation (MLE). The research object used is a vertical packaging machine for packaging snacks. The research focuses on the reliability of the machine and its spare parts (Pin Bushing, Thermocouple, Heater, etc.) as well as failure modes on machine reliability. The analysis begins with Fault Tree Analysis (FTA) to create a hierarchy of existing failure modes. Failure mode is useful in grouping the effects of failure on distribution. The results

show that the data has a Weibull CR distribution, which indicates multiple failure modes. In the example of the pin bushing, it was found that the curve was closest to the engine analysis results. The analysis results showed that engine reliability at 90% was around 150 hours and 80% was around 480 hours. The MTTF of the engine being used is close to 2500 hours. Even though the results are in contrast to other research, the findings can be the basis for improvements to preventive maintenance. The common hazard curve finding that occurs in electronic spare parts also appears in mechanical spare parts, namely "monotone decreasing hazard" with the likelihood hazard always decreasing over time.