Analisis desain dan simulasi dari alat pengering hasil pertanian dengan kolektor panas matahari dan penyimpan panas = Design and simulation analysis of solar collector thermal storage for drying agricultural product

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Abstrak

Conserving the agricultural product has been a challenge for farmers to maintain the freshness during transportation. One of the methods is to reduce the level of moisture by drying the products by using solar dryer. The design of the solar collector thermal storage system has been done and completed. However, to evaluate the performance before the actual construction, a simulation is done. The simulation is done by using SolidWorks Flow Simulation. Simulation is done by stating all of the parameters required for the system and chose the approach of the result. The results are analysed as a medium for feedback on revision for the design. Two components are the main focus in the analysis, the solar collector and thermal storage. In both components, a flow simulation is done, evaluating the behaviour of airflow and thermal properties inside. Aside from the conventional design flow, a counter flow simulation is done as well, as the system is design to serve both directions of flow. The results analysed are the air distribution, the change in input and output temperature and also the time dependent study that run on a 12 hour time from 6.00 – 18.00 with climate properties in Brisbane on 1st January 2012. The result shows that the solar collector increases the air temperature by 24 K to a maximum of 317.68 K with several heat build-ups on the edges due to turbulence. Similar pattern shows up as well on the opposite flow but with lower temperature by around 3 K. in thermal storage, a faster velocity occurs on opposite flow that caused by dimension difference on the top and bottom chamber. In both flows, the flow is well distributed throughout the system.