# Implementasi pilot-scale turbin aerasi terintegrasi dalam meningkatkan kadar oksigen dan menurunkan beban organik (COD) = The implementation of pilot-scale aeration integration turbine to increase Dissolved Oxygen (DO) and to decrease organic loadings (COD)

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Abstrak

ABSTRAK<br>
Energi Mikrohidro merupakan konversi energi kinetic dan energi potensial yang didapatkan dari aliran air. Hal ini telah diimplementasikan pada Sungai Ruhr di Jerman, sejak tahun 1977 sebagai pembangkit listrik dan pengolahan air dengan metode aerasi pada suatu bendungan. Penelitian ini melakukan percobaan untuk mengetahui dan membuktikan konfigurasi pada turbin Aerasi terhadap kenaikan oksigen terlarut (DO) dan penurunan beban organic (COD). Dengan memvariasikan kecepatan putar, kedalaman turbin/runner dan memperhatikan boundary condition system hidrolika, kenaikan DO optimum diharapkan akan dihasilkan. Konfigurasi alat pada penelitian ini dengan memvariasikan kecepatan putar turbin/runner pada kisaran 65-75, 85-95, 105-115, 125-135 dan 145-155 rpm dan kedalaman turbin/runner sebesar 7, 6 dan 5 cm di bawah titik limpasan air pada alat Turbin Aerasi Terintegrasi. Variasi tersebut menghasilkan kenaikan DO optimum ada pada kecepatan 150.9 rpm dan kedalaman runner 7 cm, dengan kenaikan DO sebesar 0.9 mg/L. Dengan menggunakan permodelan MATLAB, didapatkan suatu persamaan untuk mengetahui kecepatan dan kedalaman yang dibutuhkan dalam meningkatkan DO optimum pada pengolahan air. Dari persamaan fungsi yang didapatkan dari pengolahan data, kenaikan DO optimum dapat mencapai 2.533 mg/L dengan kecepatan 221.87 rpm dan kedalaman turbin/runner 1 cm.
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ABSTRACT<br>
Micro hydro energy is a conversion between kinetic energy and potential energy, which comes from water flow in specific velocity. As this implementation already used in Germany since 1977, micro-hydro energy comes to a result of power plants and water treatment plants. These research aims are to find and to proof the best configuration that can possibly be applied, in order to increase the dissolved oxygen and to decrease the organic loadings of water. In terms of increasing dissolved oxygen, the variation of turbine velocity, depth of immersion and boundary condition of the hydraulic system is needed, in order to find out the best configuration.  The variation of turbine velocity is 65-75, 85-95, 105-115, 125-135 and 145-155 rpm, followed by the variation of depth immersion are 7, 6 and 5 cm under the location of water runoff. As a result, the optimum DO increase is 0.9 mg/L, which comes from 150.9 rpm in velocity and 7 cm in depth of immersion of water runoff. MATLAB modelling is used to produce the function, which can possibly be applied to find out the DO increase according to turbine velocity and depth of immersion needed in the water treatment plant units. As a result, the optimum DO increase is 0.9 mg/L, which comes from 150.9 rpm in velocity and 7 cm in depth of immersion of water runoff. MATLAB modeling is used to produce the function, which can possibly be applied to find out the DO increase according to turbine velocity and depth of immersion needed in the water treatment plant units. Based on the function, the optimum DO increase can be obtained by 221.87 rpm in turbine velocity and 1 cm depth of immersion, in the amount of 2.533 mg/L.