

# Pengembangan proses biomachining multi-axis dengan bakteri acidithiobacillus ferrooxidans NBRC 14262 dan analisis pengaruh inklinasi benda kerja dalam cairan medium kultur = development of multi-axis biomachining using acidithiobacillus ferrooxidans NBRC 14262 and analysis of the influence of inclination to the workpiece in cultured medium

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## Abstrak

[<b>ABSTRAK</b><br>

Beberapa penelitian telah menunjukkan bahwa bakteri mampu melakukan pemesinan pada logam, salah satunya adalah Acidithiobacillus ferrooxidans. Keuntungan utama menggunakan bakteri untuk proses pemesinan adalah efisiensi energi yang digunakan. Penelitian sebelumnya telah membuktikan kemampuan Acidithiobacillus ferrooxidans dalam melakukan pemesinan termasuk karakterisasi pelepasan material dan hasil akhir pada benda kerja. Namun tidak satupun dari penelitian tersebut yang meneliti kemungkinan dari bakteri tersebut

melakukan pemesinan multi-axis. Dalam penelitian ini akan dibahas mengenai kemungkinan dari Acidithiobacillus ferrooxidans dalam melakukan pemesinan multi axis dengan menggunakan total 15 buah sampel benda kerja. Beberapa benda kerja tersebut diletakkan dalam cairan medium kultur dengan diberikan sudut inklinasi 45o dengan menggunakan inklinator untuk membandingkan hasil pemesinan dengan benda kerja yang tidak diberi inklinasi. Hasil dari mikrografi SEM menunjukkan bahwa benda kerja yang diberi inklinasi memiliki kedalaman pelepasan material dan profil potongan yang berbeda dengan benda kerja yang tidak diberi inklinasi. Benda kerja yang diberi inklinasi memiliki perbedaan kedalaman pelepasan material sebesar 45% lebih banyak pada sisi yang lebih tinggi. Dengan adanya perbedaan karakteristik pemesinan, diharapkan dapat dijadikan acuan untuk pengembangan proses Biomachining multi-axis lebih lanjut.

<b>ABSTRAK</b><br>

Recent studies show that some bacteria have the ability to do machining process, and one of them is Acidithiobacillus ferrooxidans. The main purpose of using bacteria to do the machining process is the efficiency of energy used. Previous studies have already investigate the capability of Acidithiobacillus ferrooxidans to do the machining including the characterization of the material removed and surface finishing of the workpiece. However, none of them investigate the possibility for the bacteria to do the multi-axis machining. In this research, the capability of Acidithiobacillus ferrooxidans to do the machining process was investigated. A total of 15 workpieces were used, and placed in the cultured medium with different conditions. Some of the workpieces were placed

without inclination angle while some of them were placed with 45° of inclination angle. The SEM micrograph result showed that there were differences in the cutting depth and cutting profile of the workpieces which were inclined and not inclined. The higher sides have 45% more depth of material removed. According to these results, there is a possibility it might lead to the further development of multi-axis Biomachining. Recent studies show that some bacteria have the ability to do machining process, and one of them is *Acidithiobacillus ferrooxidans*. The main purpose of using bacteria to do the machining process is the efficiency of energy used. Previous studies have already investigated the capability of *Acidithiobacillus ferrooxidans* to do the machining including the characterization of the material removed and surface finishing of the workpiece. However, none of them investigated the possibility for the bacteria to do the multi-axis machining. In this research, the capability of *Acidithiobacillus ferrooxidans* to do the machining process was investigated. A total of 15 workpieces were used, and placed in the cultured medium with different conditions. Some of the workpieces were placed without inclination angle while some of them were placed with 45° of inclination angle. The SEM micrograph result showed that there were differences in the cutting depth and cutting profile of the workpieces which were inclined and not inclined. The higher sides have 45% more depth of material removed. According to these results, there is a possibility it might lead to the further development of multi-axis Biomachining.]