Department of Mechanical Engineering

Study for popularization of electrochemical machining applied by electromagnetism

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Research Outline

Electrochemical machining by wireless power supply for simplifying equipment

The background is in the order listed below.

1. Electrochemical machining is a process of eluting metallic ions by electrochemical dissolution.
2. Electrochemical machining enables processing without mechanical force and heat affected layers, while it takes labor to prevent rust.
3. Maintenance control must be considered, when the electrochemical machining apparatus is composed.
4. Wireless power supply attracts attention from feeding power method to device as shown in Fig.1.

This research aims to simplify the electrochemical machining apparatus using a wireless charger. The overview of experimental setup is shown in Fig.2.

Fig.1 Qi wireless charger

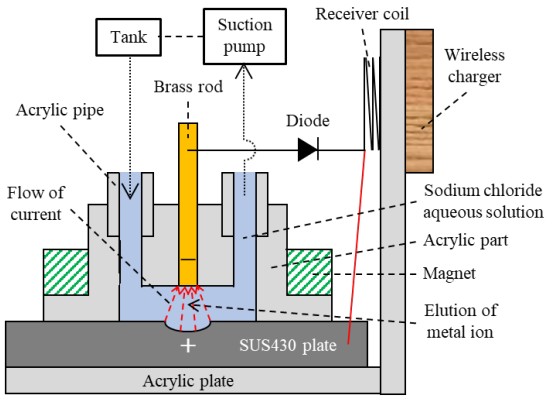

Fig.2 Overview of setup for electrochemical machining with wireless power supply

Local electrochemical machining of ferritic stainless steel using tool with permanent magnet

The background is described in the following order.

1. Exhaust system parts of automobiles are mainly made of ferritic stainless steel.
2. Stainless steel used in exhaust manifolds are both austenitic stainless steel and ferritic stainless steel.
3. Welding is needed for assembling process of exhaust manifolds.
4. Burn through may occur due to wide gap, when exhaust manifolds are welded.

To repair burn through, the projecting part of reverse side should be removed. The purpose of this study is to propose the electrochemical machining using tool with permanent magnet for eliminating the projecting part like the above. As shown in Fig.3, electrochemical machining is performed on the limited surface area of SUS430 plate.

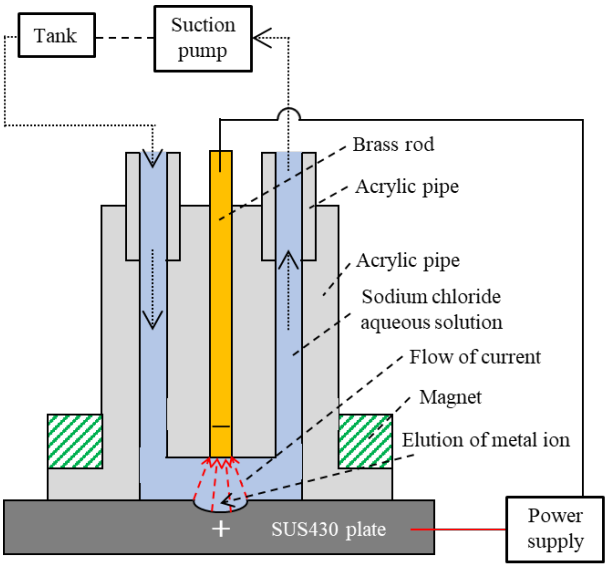

Fig.3 Overview of setup for electrochemical machining using tool with permanent magnet