Accretion by Electrical Discharge Machining with Powder Suspended in Working Fluid

URL: http://www.toyota-ti.ac.jp/Lab/Kikai/5k60/

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Background and problems

- Labor to make green compact electrodes in accretion process by electrical discharge machining (EDM)
- Difficulty in accretion onto intricate surface

Solution

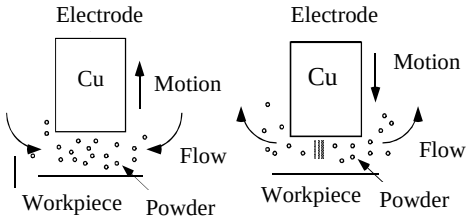
- EDM with Ti powder suspended in working oil with thin electrode or rotating electrode
- Advantages
- Accretion without removal of matrix

Results

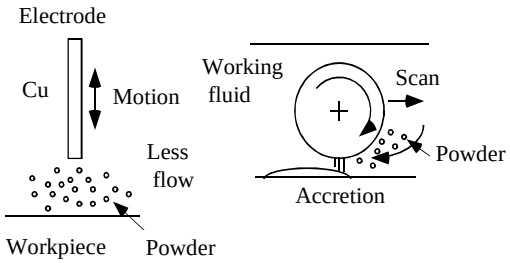
- Thick accretion at smaller discharge current, short pulse duration and powder concentration of 50 g/l
- Accretion with thickness of 170 μm and hardness of 160 Hv
- Column with height of 1 mm and diameter of 50 μm with thin electrode
- Flat accretion with rotating disk electrode

Applicable fields

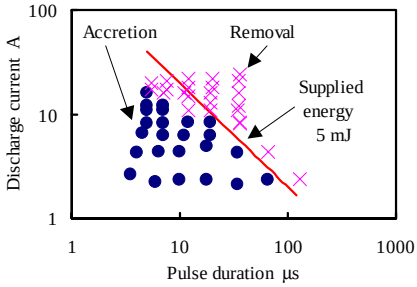
- Fabrication of small structure
- Surface modification for small area or a part of large structure



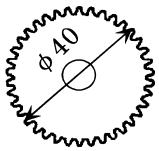
Flow of power suspended in working fluid



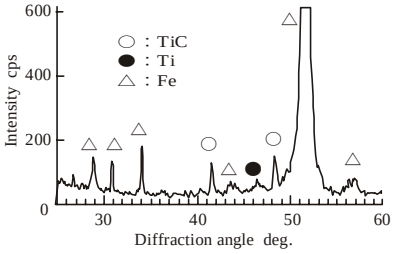
Method to make powder concentration thick



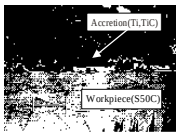
Accretion range



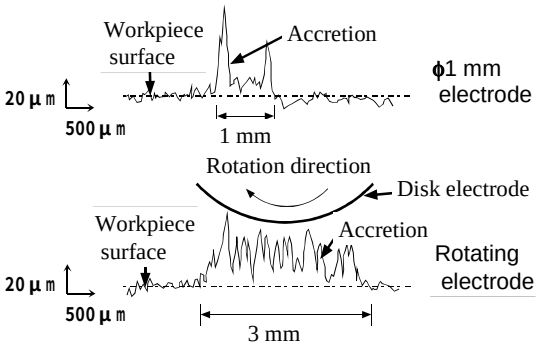
Gear-shaped electrode



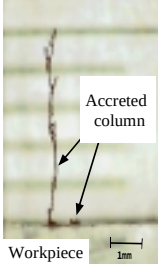
Result of analysis by XRD



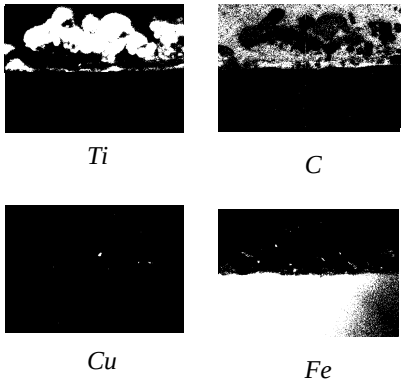
SEM image



Profile of accretion



Accreted column



Result of analysis by EPMA