



INSTITUTO SUPERIOR TÉCNICO

INFLUENCE OF SILICON POWDER MIXED DIELECTRIC ON CONVENTIONAL ELECTRICAL DISCHARGE MACHINING

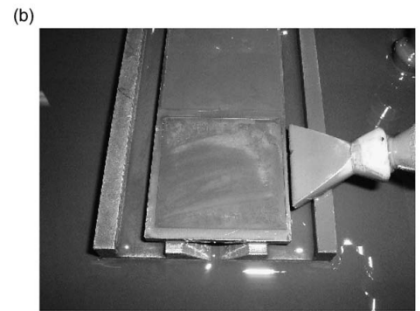
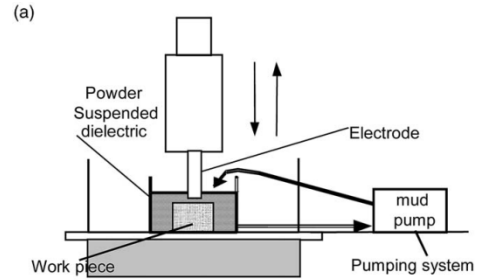
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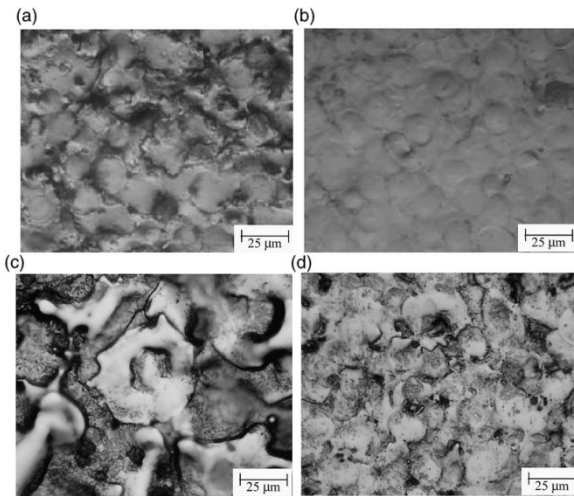
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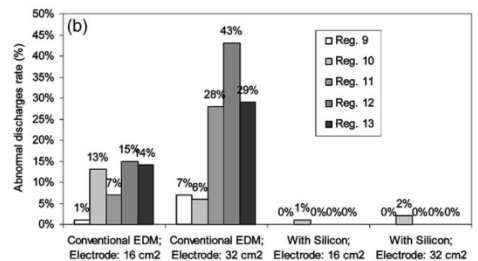
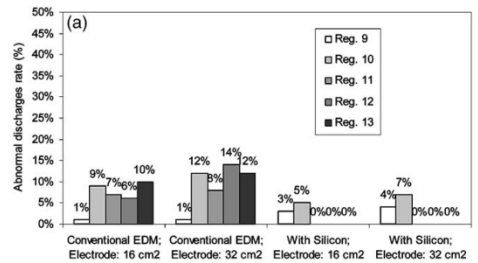
Electrical Discharge Machining (EDM) is a technological process with a large industrial implementation. Its use is particularly intense when very complex shapes on hard materials with a high geometrical and dimensional accuracy are required. However, the technological capability of the process has limited its application when the specification of the part surface quality imposes polished and mirror-like characteristics. The addition of powder particles in suspension in the dielectric modifies some process variables and creates the conditions to achieve a high surface quality in large areas. This paper presents a new research work aiming to study the performance improvement of conventional EDM when used with a Powder-Mixed-Dielectric. A silicon powder was used and the improvement is assessed through quality surface indicators and process time measurements, over a set of different processing areas. The results show the positive influence of the silicon powder in the reduction of the operating time, required to achieve a specific surface quality, and in the decreasing of the surface roughness, allowing the generation of mirror-like surfaces.



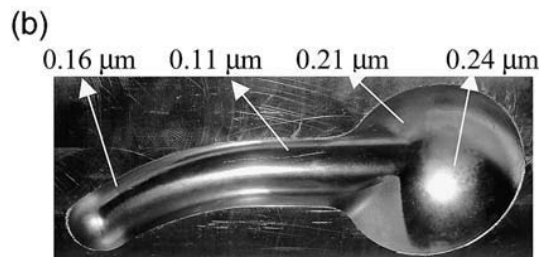
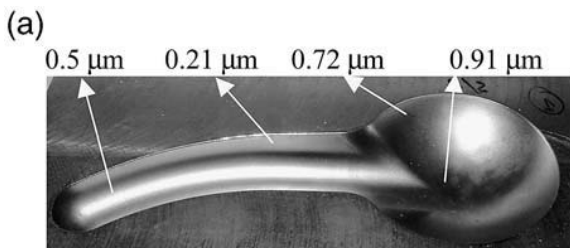
(a) Circulation system schematic view and (b) machined sample with silicon powder suspended on dielectric.



Surface textures obtained for an electrode area of 32 cm² a) without and b) with silicon powder, and for an electrode area of 64 cm² c) without and d) with silicon powder.



Frequency of abnormal discharges occurred in the last five regimes for a) 100 min polishing time and b) 800 polishing time.



Mould cavity performed a) without silicon and b) with silicon powder for 100 min of polishing time.