SURFACE INTEGRITY OF SKD 61 MACHINED WITH ELECTRICAL DISCHARGE MACHINING (EDM) USING TAGUCHI METHOD

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"I declared that this thesis is the result of my own work except the ideas and summaries which I clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree".

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ABSTRACT

Advanced machining techniques are frequently being used nowadays because of high quality product produced and high production rate as well. One of the famous advanced machining techniques is Electrical Discharged Machining (EDM) Die Sinking. EDM can be used to cut hard metals and those that would be difficult or impossible to machine with traditional machining such as Kovar and Hastalloy. In Malaysia's industries, EDM is widely used for machining plastic injection moulds, stamping dies and parts for automotive. The principle used in EDM is based on the erosion of metals (workpiece) by spark discharge; come from basic knowledge where conducting materials separate with small gap and will form arc. Surface integrity is a study about feature of surfaces and their physical and chemical as well as metallurgical properties. This is the continuity study after the workpiece have undergone machining process. The study aims are to study the characteristics related to surface integrity. Other than that, it also to understand and conduct tests related to surface integrity as well as to study the relationship between the parameters selected with the effect on the surface integrity exhibits after the EDM machining. The machining parameter used to machine the sample with Taguchi Method are electrodes (Copper and Copper Tungsten), current (3A, 6A, 9A), polarity (positive or negative), and dielectric fluid (Kerosene, Amoil, Novis), as well as Capacitance ($0\mu F$, $3.3\mu F$ and $10\mu F$). All the effects on the parameter used will be discussed in term of surface roughness, roundness, hardness, microstructure and white layer thickness. Based on the result obtained, when high current is used, the machined surface will be rougher and the depth of cut is deeper because the MRR is higher. In term of polarity, positive polarity always will better surface finish compare to negative polarity but the machining time will be longer.

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