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A REVIEW ON DIFFERENT EFFECTS ON FLUSHING OF DIELECTRIC FLUID IN WEDM

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ABSTRACT

Wire electro discharge machining is an unconventional machining process. It is a thermo-electric process.Dielectric fluid is effectively reduce the response parameters. Flushing is most important process to reduce the material removal rate and also tool wear rate. In this paper presents a literature survey on the flushing methods and effects to reduce the material removal rate and tool wear rate.

Keywords: Electrical Discharge Machining, Flushing, Dielectric Fluids.

I. INTRODUCTION

WEDM is an unconventional machining process. It is manufacturing of complicated shapes, sizes and geometries of the industries. It is 1878 to introduced in concept of EDM by Joseph pristily. He was not used spark in machining and tap water was introduced. In 1944 electrical spark was introduced by Lazarenko, in Russia. Machine can be developed in 1950 involved USA, Japan and Switzerland. In 1952 'method X' was patented by USA.[2]

If the dielectric fluid is forced into the spark zone at the low velocity of fluid, then the flushed and accumulation of tool material is prevented, thus short circuit pulses rarer. So the working efficiency increased and also material removal rate can be increased. If higher flushing of dielectric fluid of ionization bridges across the gap, so the ignition can be improved, whenever discharge energy frequency can be increased of WEDM, but flow rate of dielectric fluid is apply to the gap then breakdown strength can be improved, and forward gap decreased. Discharge energy can be increased and metal particles adhere and accumulate speedily to increase the incidence and also occurring short circuits. So the working efficiency reduced and MRR falls rapidly. Short-circuit pulses increased so the tool surface and wear ratio can be increased.

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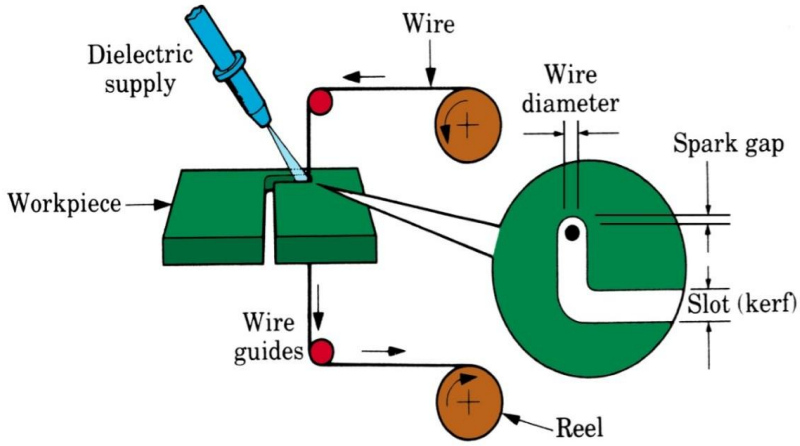

Fig 1: Working principle of WEDM

Above results flushing techniques should be formulated the gap flushing to continuous for finishing and intermittent for roughing operation.

II. FLUSHING TECHNIQUES

Flushing techniques can be classified according toTime and Flow.[2]

Flows:

2.1 Pressure Flushing Method

It is also called injection flushing. It is most common technique,for flushing. One main advantage of this method ,the operator can see the amount of oil that is being used for flushing. Pressure flushing are two types : pressure flushing through the electrode and pressure flushing through the work piece. If pressurize dielectric is applied to EDM gap then the liquid flows upwards into the gap and sweeping the products or work piece material, but debris made up in the gapon either the work piece surface. So it is called 'evacuation-discharges'. In this process the gap is large because of this discharge taking place in the 'down-stream' of the gap, because high debris can be pass further the gap, a tapered hole can be always produced even the tool usedis parallel sided .(Fig shown 2).

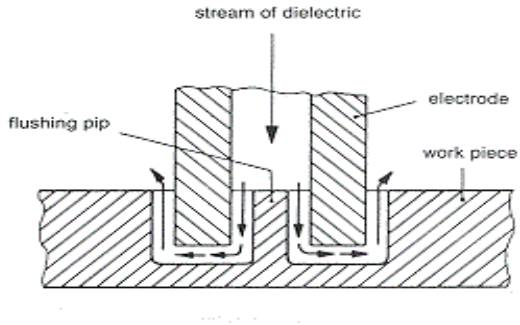

Fig 2: Pressure flushing through the electrode

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The dielectric fluid can be forced to apply and to hole produced a centering effect upon the electrode. EDM drilling can penetrate much deeper than almost any other drilling methods,the secondary discharge machining is very danger because particles pass into the walls of the electrode and work piece.(Fig shown 3).

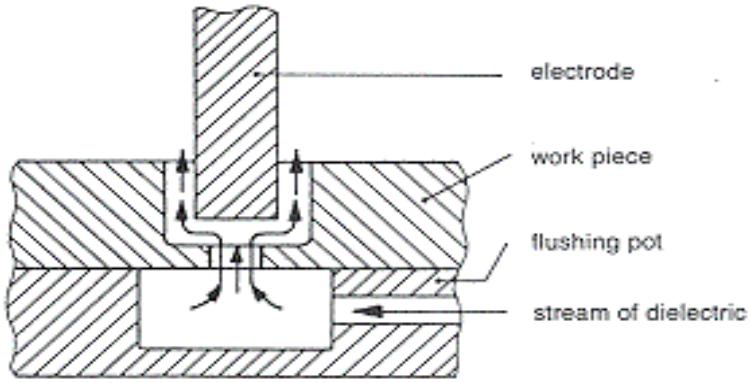

Fig 3: Pressure flushing through the work piece

2.2 Vacuum Flushing Method

In this method also known as suction flushing method, sucks used as a dielectric fluid with erosion products through the electrode. Clean dielectric fluid can be used to the tank in to the gap can be replace the used dielectric sucked out. Some evacuation discharges occur down to the tool, and some taper may at the bottom of the cavity. In this method the side gap can be constant.

It can be minimized the secondary discharge and also minimized the tapering . The suction flushing pulse in dielectric fluid from the work piece. The main disadvantage of this method is no visible the fluid.[2].

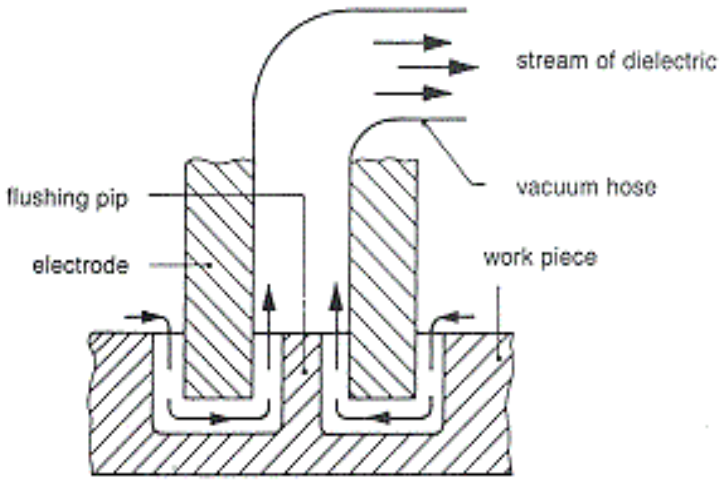

Fig 4: Vacuum Flushing through the Electrode

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2.3 Side Flushing Method

When deep narrow slots can be drilled then it can be used this applications. In this process flushed to be used carefully adjusted to the nozzles. Force set of the gap to be flushing around the periphery of the electrode. Nozzle can be surrounding between sixth to third tool periphery, and also carefully adjusted to the direction of the tool angel of the gap. Then flow can be flushed to parallel to the surface. If the flushing is not parallel then the results only a small proportion of the dielectric fluid actually enters the gap, so the actual flushing will be inadequate. But when it can be process flush perpendicular then tool can be deflection may occur. To avoid the jets of fluid is symmetrical to opposite sides of tool is most important rule, then the flow tend to cancel at the bottom of the cavity with consequence that erosion products are not flushed.One another application of side flushing technique is side flushing with wire electrode can berotation. This process is very useful in to the WEDM machines. When fresh dielectric fluid can be applied in to the EDM gap and electrode can be rotation of viscosity of the fluid.[2].

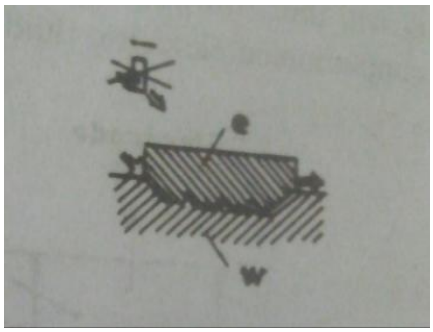

Fig 5: Coining Die[2]

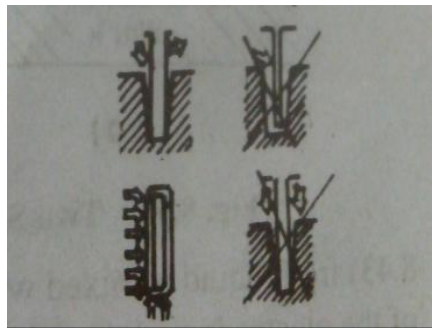

Fig 6: Deep narrow slots[2]

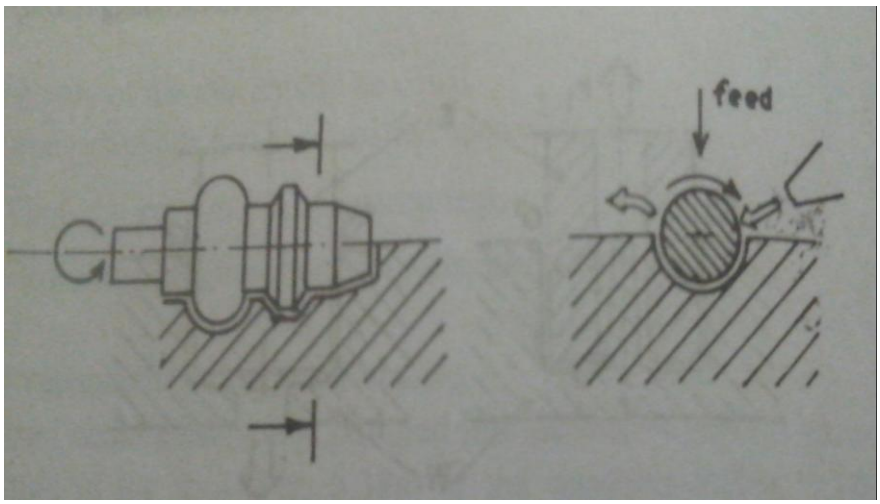

Fig 7: Side flushing with electrode rotation[2]

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2.4 Reciprocating Electrode Flushing Method

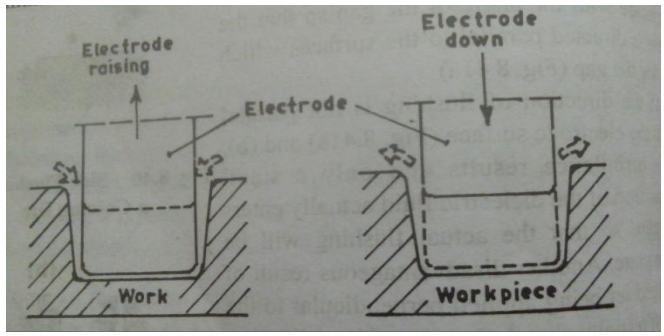

Fig 8: Reciprocating electrode flushing[2]

When fresh dielectric fluid in to the gap and tool can be move periodically up and down, then the expelling dielectric fluid from the gap. In this method each cycle fresh liquid can be mixed with contaminated fluid by upward direction of the electrode and mixture can be cavity by the downward direction, so the EDM debris is reduced with the help of dielectric fluid.

2.5 Other Important Methods

Electrode rotating : When small hole can be manufactured then this method apply. It is most useful for contoured cavities and fine finishing. In this method spindle speed is maximum 200 rpm. This method also increased machining speed.[2].

Electrode Orbiting : It is different from above method, in this method electrode not rotate about its axis but it can be prescribed paths, it is manufactured shaped holes. The radius of most orbiters is limited to about 2.5 mm. The relative motion between the electrode and work piece during orbiting results in improved flushing.[2].

Benefits :The gap between electrode and work piece is large because orbiting radius. :The electrode motion creates a pumping effect of the dielectric fluid into the gap. It is improve finishing of work, also other benefits of orbiting electrode as compared stationary motion of electrode.[2].

2.7 Effects of MRR :

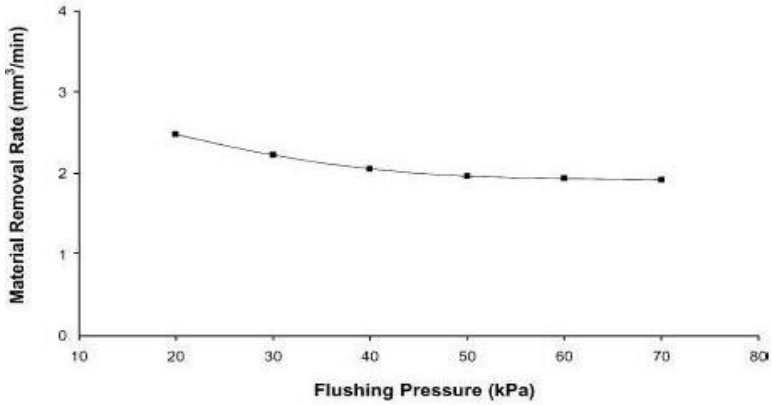

Fig 9:Effect of flushing pressure on material removal rate[1]

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Efficient flushing requires a balance between pressure andvolume. For roughing operations, where there is a much largergap, high volume and low pressure flushing is advised. Forfinishing operations where there is a small arc gap, higherpressure to ensure proper dielectric flow is required.investigated the effects of flushing pressure on the materialremoval rate, relative wear ratio and surface finish of the work pieceproduced the material removal rate does notchange significantly with change in flushing pressure ,eventhough there's gradual decrease in trend as shown in Fig. 9.[1].

2.8 Effects of TWR

The relative wear ratio first decreases and then increasesagain on further increase in the flushing pressure. This isshown in Fig.10. An optimal flushing pressure was foundto be at about 50 Kpa after investigation with a peakcurrent of 24A, a gap voltage of 120 V and using coppertungsten as the tool electrode material with a negative polarity.[1].

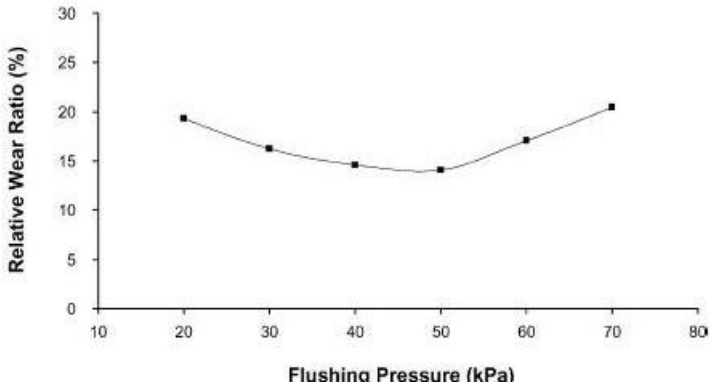

Fig. 10: Effect of flushing pressure on relative wear ratio[1]

III. CONCLUSION

Many authors have been studied, the WEDM techniques. They have been used to different kinds of methods, algorithms to reduced MRR and TWR. But this paper can be represented to the different flushing techniques of dielectric fluid reduced MRR and TWR. In this paper there are four different ways to reduced MRR and TWR, then concluded this procedure most frequently used to side flushing with electrode rotation of WEDM. Machining process in side flushing reciprocating electrode flushing both are used together, pressure flushing is less effective and side flushing more effective to reduced MRR and TWR.

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Vala Upasana Hitendra bhai.

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