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PARAMETERS INFLUENCE ON CROSS SIZE OF CUT RIFT AT PLASMA ARC CUTTING

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***Abstract**: At nowadays expansion of use of plasma arc cutting in praxis a lot of novel question rise up connected with this process. Paper describes parameters, which influence cut rift at plasma arc cutting, what is important in term of material save in manufacturing process.*
***Key words**: plasma arc, cut rift, meltings*

1. INTRODUCTION

A lot of authors think, that the plasma is some elements of ionosphere, especially film F, which resists radiophare wavepath bounce to ionosphere. Plasma is in the van Allen radiating line. The sunny wind, the non/stop ampere of the elements from our sun, in which our Earth is too, it is the plasma again. In the plasma's state are nitra, the nucleus of the nebulas and a lot of subjects in the cosmos. Underfoot we meet with the plasma in the lines of bolts, by different discharges and plasma is producing imitation and it's search into the research laboratory too.

Plasma is the fourth and most highly energized state of matter: solid, liquid, gas and then plasma. In fact, plasma looks and behaves like a high-temperature gas, but with an important difference - it conducts electricity. The plasma arc results from electrically heating a gas (typically air) to a high temperature. This ionizes gas atoms and enables them to conduct electricity. A fluorescent light is an example of plasma in action.

Fig.1 Plasma cutting

A plasma arc torch spins a gas around an electrode. The gas is heated in the chamber between the electrode and torch tip, ionizing the gas and creating plasma. This causes the plasma gas to expand in volume and pressure. The small, narrow opening of the torch tip constricts the plasma and accelerates it toward the work piece at high speeds (20 000 ft/sec) and temperatures (up to 20 000 °C). The force of the high-intensity plasma jet pushes through the work piece and removes the molten metal. This jet easily cuts through metals with poor heat conductivity (stainless steel) or excellent conductivity (aluminum).

1.1 HISTORY OF THE DEVELOPMENT THE PLASMA CUTTING

1957 – Conventional plasma cutting
1962 - „Dual flow“ plasma cutting
1963 – Air plasma cutting
1968 – Water injection plasma cutting
1972 – Water shield plasma cutting
1977 – Plasma cutting in water
1983 – Oxygen plasma cutting
1990 - „Hi-Definition“ plasma cutting

2. THE EFFECT THE SPEED THE FEED OF THE PLASMA'S TORCH ON THE BREADTH THE CROSS SIZE OF CUT RIFT

The speed of the feed plasma's torch doesn't induce only the relief and the buckling, but the breadth of the cutting joint of divide material. With minor speeds the cut joint is bigger and it makes the damage of divided material. With the bigger speeds, the cut joint is closer and the plasma's circular doesn't break through the divided material. The samples with the design of the trajectory with the form of the function sinus designed for the evalution this depended. All speeds of the feed plasma's torch used by these samples. The quality of the relief of divided cant, the buckling and a lot of created hat/melt had monitored too.

2.1 THE EFFECT THE LINE THE MOVE OF THE PLASMA'S TORCH ON THE DIVIDED EDGE

There are image the surface fields of the divided edges with the angle of the yaw the joist diameter of the plasma's circular with the identical line of the look as is the line of the move torch on the following picture.

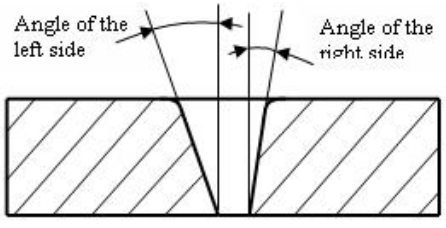


Fig.2 The effect the line the move of the plasma's torch on the didvided edge

The point is abide the correct line of the divide by the divide annulus. The outside circumference needs to divide clockwise, the inside circumference needs to divide counter-clockwise.

2.2 THE EFFECT THE SPEED THE FEED OF THE PLASMA'S TORCH ON THE QUALITY OF THE DIVIDE FIELD

We can acknowledge correctness of the adaptation of the speed of the plasma's torch, when we eye the plasma's circular below the metal plate of the material.

Three kinds of the plasma's circular:

- The plasma's circular vectors immediately down and it's vertical on the surface of the divide metal plate (Straight Arc), generally this type is recommendly for divide especially by thermical divide with the atmospheric plasma of stainless steel and aluminium.
- The plasma's circular tails away beyond the line of the move torch (Trailing Arc), the speed is available to set so as the lag wasn't bigger than 5º, it uses by divide with nitrogen.
- The plasma's circular advances the torch in line its speed (Leading Arc), it uses in some incidents by divided of the steel with the wind and by divide the thin materials. The speed is available to set so as the advance wasn't bigger than 5º.

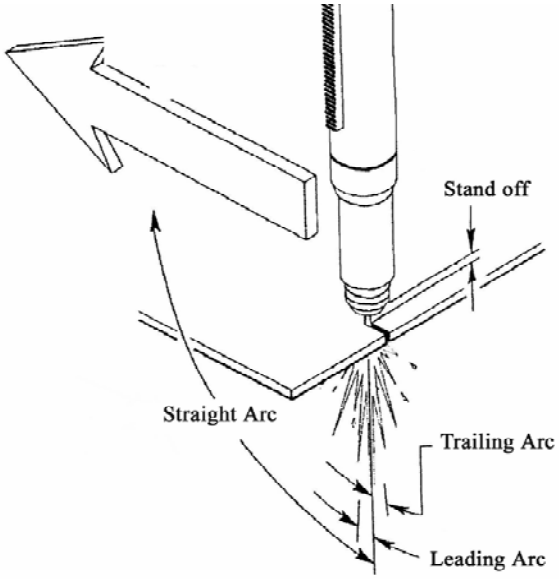
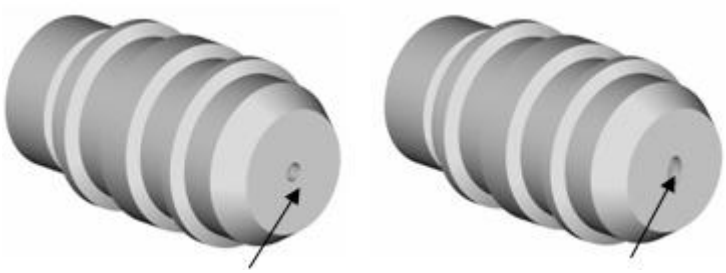


Fig.3 The effect the speed the feed of the plasma's torch on the quality of the divide field

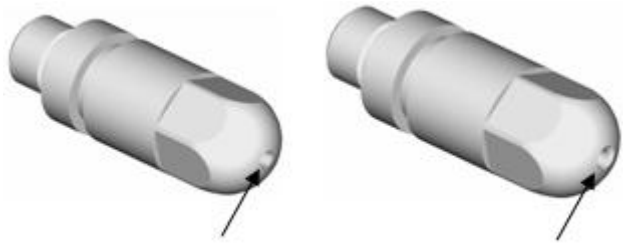
2.3 THE EFFECT THE USE THE ARCICLES DETAILS ON THE QUALITY THE DIVIDE FIELD

On the quality of the divide fields influence essentially the use of the electrode and the die. These parts is to change needs, when on the hole of the die is the oval hole and on the electrode is the material drop in the figures 4 a 5.



a) b)

Fig.4 a) new die, b) damaged die

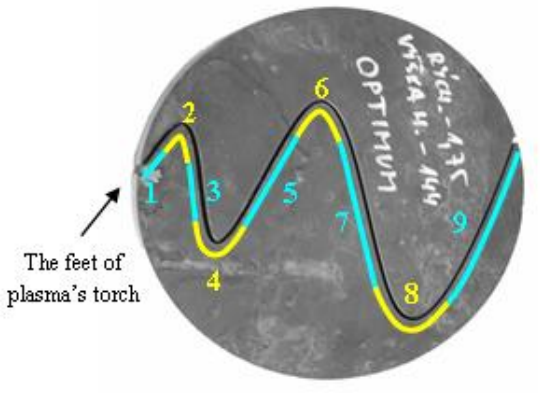


a) b)

Fig.5 a) new electrode, b) damaged electrode

3. THE MEASURING THE AMOUNT THE CUTTING JOINT

For the measuring the amount the cutting joint was using the special shift digital rate MITUTOYO 573-102-10, with the outlet of the data with the correctness 0.02mm and with the numeric step 0.01mm. The measurements made in the high divide edge and in the down divide edge on the divide divisions for the competent sample in the picture 6. The cut joint ranged on the high edges (HH) and on the down edges (DH). The measurements was 540.



1 – linear tajectory
2 – the radius of the round 5 mm
3 – linear tajectory
4 – the radius of the round 10 mm
5 – linear tajectory
6 – the radius of the round 20 mm
7 – linear tajectory
8 – the radius of the round 30 mm
9 – linear tajectory

Fig. 6 Example the divide the trajectory of sinusoid on the measured edges the cross size

By the application the constant speeds of the shifts of the plasma's torch on all trajectory of the divide samples, the measure of the cut joint made the different amounths on the individual edges of the measure. You can see it in the diagram in the figure 7.

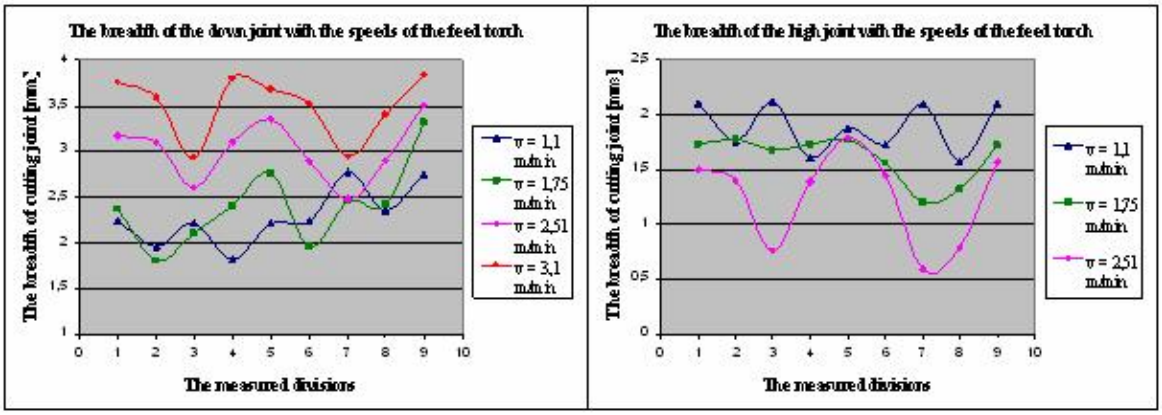


Fig.7 The diagram of the amount the cutting joints with different speeds of the trajectory with the form sinusoid

3.1 THE MEASURING THE AMOUNTH THE CUTTING JOINT WITH THE TRANSFORM SPEEDS THE FEED THE PLASMA'S TORCH DURING DIVIDE

The amounts the cut joints with the constant speed of divided don't have and identical account during complete trajectory. The answer of this problem is the transform the speed of the feed plasma's torch during divide. The measured results of the samples of the circular and elliptical trajectory had for single division of the trajectory the form of sinusoid:

- the division of the linear trajectory - the speed of the feed plasma's torch 2.51m/min
- the division with the radius of the round 5 mm - the speed of the feed plasma's torch 0.63m/mm
- the division with the radius of the round 10.20 and 30mm – the speed of the feed plasma's torch 0.63m/min

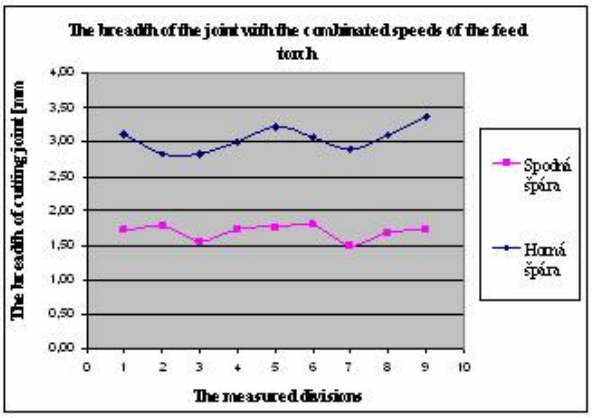


Fig. 8 The diagram of the measure cutting joint with thje design speeds of the divided trajectory with the form of sinusoid.

The results of the measuring of the measures cutting joints are in the picture 8. The measuring of the cutting joints during the trajectory of sinusoid has an identical amount. The component begins to make with the production the raw products in the metallurgy operations. The divide and the feed of the materials for smaller raw products and the adapting to the future component are the main actions in these operations. The divide of the material is the service action, when the capacity divides from the specific Mass of the material. The deficit for one piece of the cutting material is some millimeters of the long. The technical distinction of the divide material influences the efficiency of the manufacture process.

4. CONCLUSION

Manufacturing is the means by which the technical and industrial capability of a nation is harnessed to transform innovative designs into well-made products that meet customer needs. This activity occurs through the action of an integrated network that links many different participants with the goals of developing, making, and selling useful things. Manufacturing is the conversion of raw materials into desired end products. Manufacturing, in the broad sense, begins during the design phase when judgments are made concerning part geometry, tolerances, material choices, and so on. Manufacturing operations start with manufacturing planning activities and with the acquisition of required resources, such as process equipment and raw materials.

5. LITERATURY

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