WELDING METHOD FOR THICK-WALLED LARGE-SIZED PARTS

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Annotation: *The invention can be used for automatic welding of structures, including large-sized thick-walled parts. The cutting of edges for welding is carried out with a metal-cutting tool simultaneously on both parts after their tacking and from the side opposite to the tacking. As a metal-cutting tool, a cutter is used that has a profile corresponding to the shape of the cut. The method provides automation of the process of welding parts from blanks obtained by forging or stamping, which have not undergone preliminary mechanical processing of the joined surfaces.*

Key words: *invention, thick-walled, large-sized.*

Technical field

The invention relates to automatic welding of structures from thick-walled large-sized parts with cutting edges and can be used in various branches of technology, in particular in the field of power engineering.

Prior Art

In automatic welding of thick-walled large-sized parts, the main problem is to ensure the constancy of the geometric shape of the gap between the welded parts, since the unevenness of the gap leads to fluctuations in welding modes, and as a result, to the occurrence of defects in the weld, such as lack of penetration, pores, cracks, notches, etc. (see V. Vinokurov. Welding deformations and stresses, M.: Mashinostroenie, 1968, p. 200).

GOST 5264-80 defines the sequence of cutting the edges of parts for double-sided automatic welding of thick-walled parts. In this case, the edges of the parts are

first cut on one side, followed by their joining in the fixture and welding, then, on the other hand, the root of the previously applied seam is removed to bare metal with a metal-cutting tool of a certain profile, as a result of which the edges of both parts are simultaneously processed to the required size, then welding is performed split joint.

The disadvantage of this solution is that for the production of automatic welding it is necessary that both workpieces to be welded have pre-prepared surfaces for cutting, which do not have distortions in length and width.

In the method described in ed. certificate USSR No. 806310, 1978, it is proposed to manufacture welded structures from thick-walled large-sized parts using the following operations. On a metal-cutting machine, the edges of parts are cut on one side. Next, on the assembly fixture, assembly and fixing the position of the parts to be welded are carried out. Mark the joints with the maximum gap. Then the joints are welded, while at the joint with the maximum gap, the groove is filled only with side beads, and for the rest of the joint - with central beads for the entire width of the groove.

The disadvantage of this method of welding is that it can only be used by manual welding, since different techniques are used here when applying rollers. The use of automatic welding is excluded due to the occurrence of fluctuations in welding modes due to the presence of significant discrepancies in the gap values along the entire length of the joint, which entails a deterioration in the quality of the weld and the appearance of various kinds of defects in it.

The objective of the present invention is to create such a method for welding thick-walled large-sized parts, in which it is possible to use automatic argon-arc welding.

The technical result of using the invention consists in automating the process of welding thick-walled large-sized parts of any configuration, including blanks obtained by forging or stamping, and mating surfaces that have not undergone preliminary machining.

This problem is solved due to the fact that in the method of welding thick-walled large-sized parts, including cutting their edges with a metal-cutting tool, assembling

the parts, their subsequent tacking and welding, while cutting the edges for welding is carried out simultaneously on both parts after their tacking and from the side opposite tack.

Another difference of the welding method is that a cutter with a profile corresponding to the shape of the groove is used as a metal-cutting tool.

To perform welding, two thick-walled large-sized billets of irregular shape 1 and 2 are taken, obtained, for example, by stamping or forging.

In the assembly fixture, these parts are assembled and their position is fixed.

Then the assembled parts are welded by manual argon arc welding with tacks 3 from the side opposite to the main weld.

At the next stage, the joint is cut simultaneously for both welded parts, which is carried out with a cutter, the cutting part of which corresponds to the configuration and dimensions of the cross-section of the groove for welding.

The processing of the cutting edges is carried out until the formation of the metal surface of the joint obtained by tacking, which makes it possible to avoid in the future, when welding the joint, the formation of various kinds of defects in the place of the tacking.

Then, automatic multi-pass welding of the split joint of two parts is carried out in an atmosphere of inert gas, such as argon.

In the process of welding the specified joint, the welding modes remain unchanged, since the geometric dimensions of the groove are unchanged, therefore, the deformation of the weld is minimal.

Example.

A batch of welded structures made of high-alloy steel with a wall thickness of 25 mm was manufactured. A milling cutter with a cutting angle of 60° and a radius of 2.5–3 mm was preliminarily made. After assembling butt-to-butt its elements in the form of plates of the specified thickness and tack welding by manual welding of a joint 2-3 mm high, both edges were processed with a prepared cutter to form a groove of a

given configuration, and the processing was carried out until the formation of a metal surface of the tacked joint. Next, automatic welding was carried out in three passes.

On the first pass, the welding speed was 30 m/h at a current strength of 410±10A and a voltage of 30±2V. On the second pass, the welding speed is 25 m/h at a current strength of 400±20A and a voltage of 30±2V. On the third pass, the welding speed is 20 m/h at a current strength of 380±10A and a voltage of 32±2V. Welding modes for the entire batch were the same.

Analysis of X-ray control showed full compliance of the quality of the welded joint with the requirements of technical specifications, namely: the absence of various kinds of defects - pores, cracks, slag inclusions, non-fusion.

Industrial Applicability

The use of this welding method is possible in many areas of technology, where it becomes necessary to weld structures from thick-walled large-sized workpieces that have not undergone preliminary machining for welding.

1. A method for welding thick-walled large-sized parts, including cutting their edges with a metal-cutting tool, assembling parts, their subsequent tacking and welding, characterized in that cutting edges for welding is carried out simultaneously on both parts after their tacking and from the side opposite to tacking.

2. The welding method according to claim 1, characterized in that a cutter having a profile corresponding to the shape of the groove is used as a metal-cutting tool.

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