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Kinetics melting and electrode metal transfer features in electric-arc welding flux cord wire in shielding gases

Student gr.

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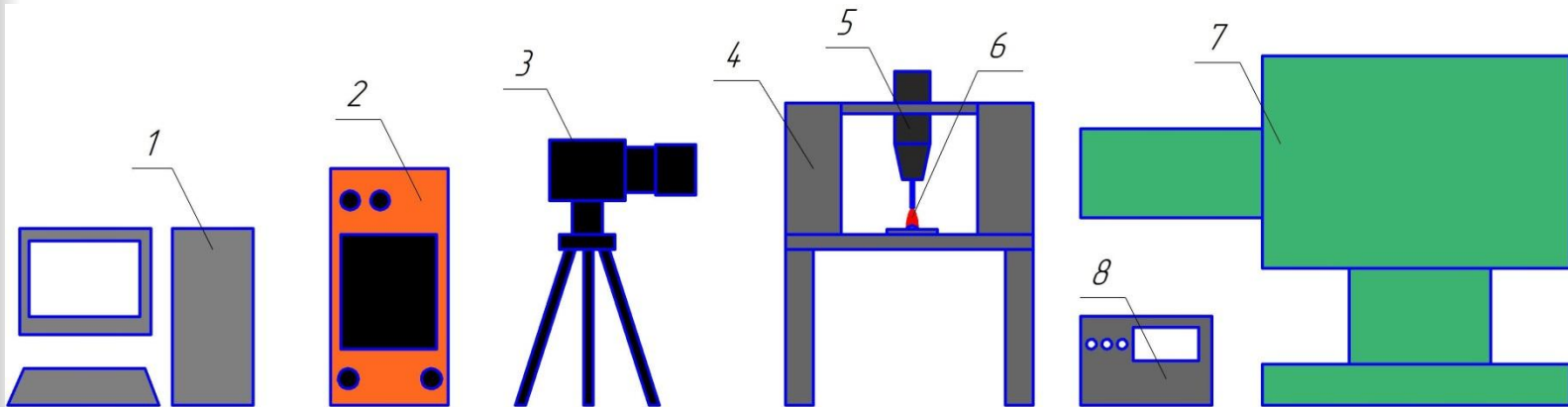
The purpose of the research

Researching the features of melting and electrode metal transfer to the weld pool using high-speed video for welding and surfacing flux cored wire.

Relevance of the work

Nowadays, there is an active development of welding flux-cored wires. Develop new designs and compositions of filler wires. It is possible that in the future, welding cored wires will lead in production, because this method is easy to use, less time consuming, and also has a higher technological opportunities. Researching the features of melting and electrode metal transfer using cored wires for welding will determine the best modes for welding and surfacing, improve the quality of welding, that enhances result of adopting this method of welding in many branches of engineering.

Research complex



1 – personal computer; 2 – welding power source «NEON» PDG-201, equipped with a mechanism for the wire feed; 3 – Digital high-speed video camera «Baumer»; 4 – welding booth; 5 – welding torch; 6 – welding arc; 7 – arc spotlight for a shadow image of the object under study; 8 – digital recorder of welding parameters AWR-224MД 300A;

Research complex equipment

PDG-201 «NEON»



FEB-315 «MAGMA»



Digital high-speed camera «Baumer»



Digital recorder of welding parameters AWR-224МД



Principle of the research complex

Before running the complex held pre-focus projector at the welding arc, as well as focus digital video camera.

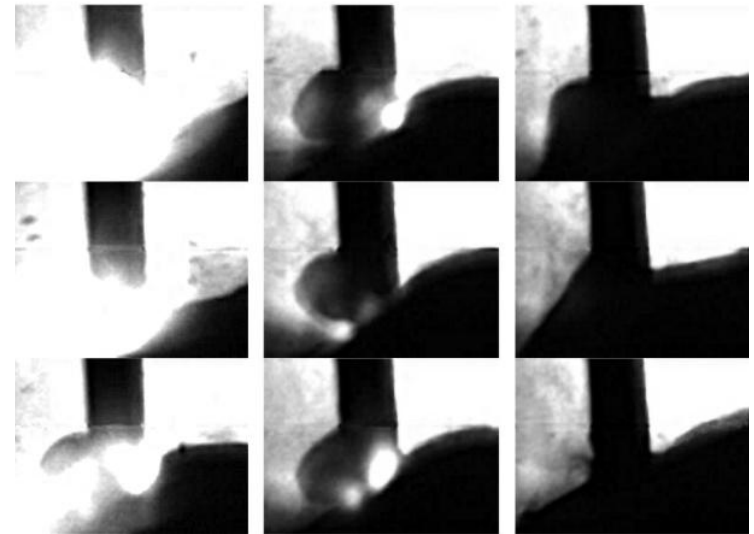
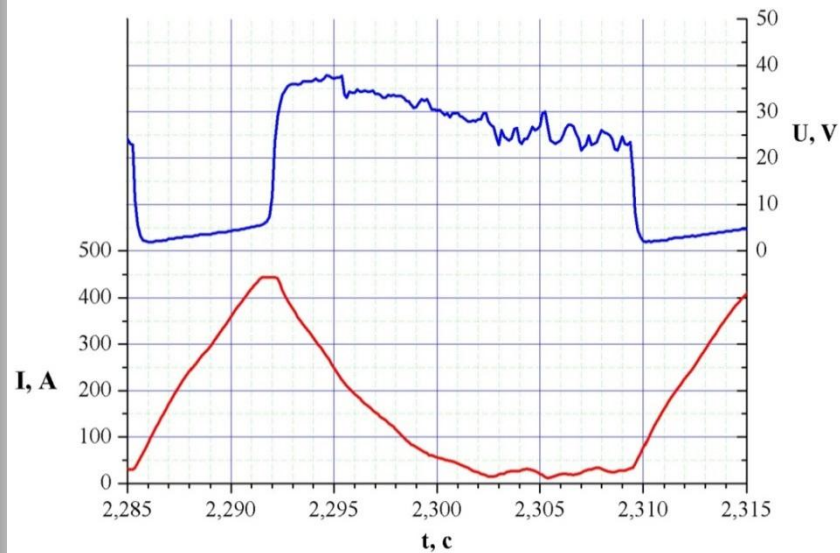
The launch complex is carried out in the following order:

1. Includes a power source arc and an additional light source when idling.
2. Turns DVR settings, a computer and a digital camera in the standby mode.
3. Set up the necessary welding parameters and video recording options (using special software installed on a computer).
4. Raised arc.

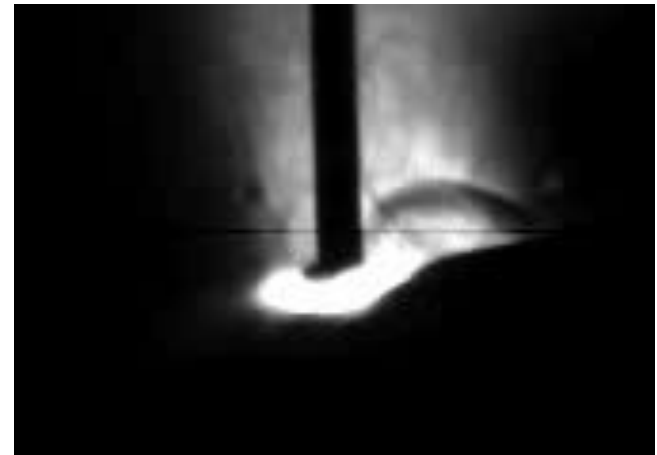
During the welding process is carried out using the registration parameters recorder of welding parameters. After the termination of the process of registering, terminate power supply to the welding arc.

Then going the image processing and processing welding parameters on computer. After processing, the video file is saved, change the parameters of the welding then the process is repeated.

The kinetics of melting an electrode metal drop

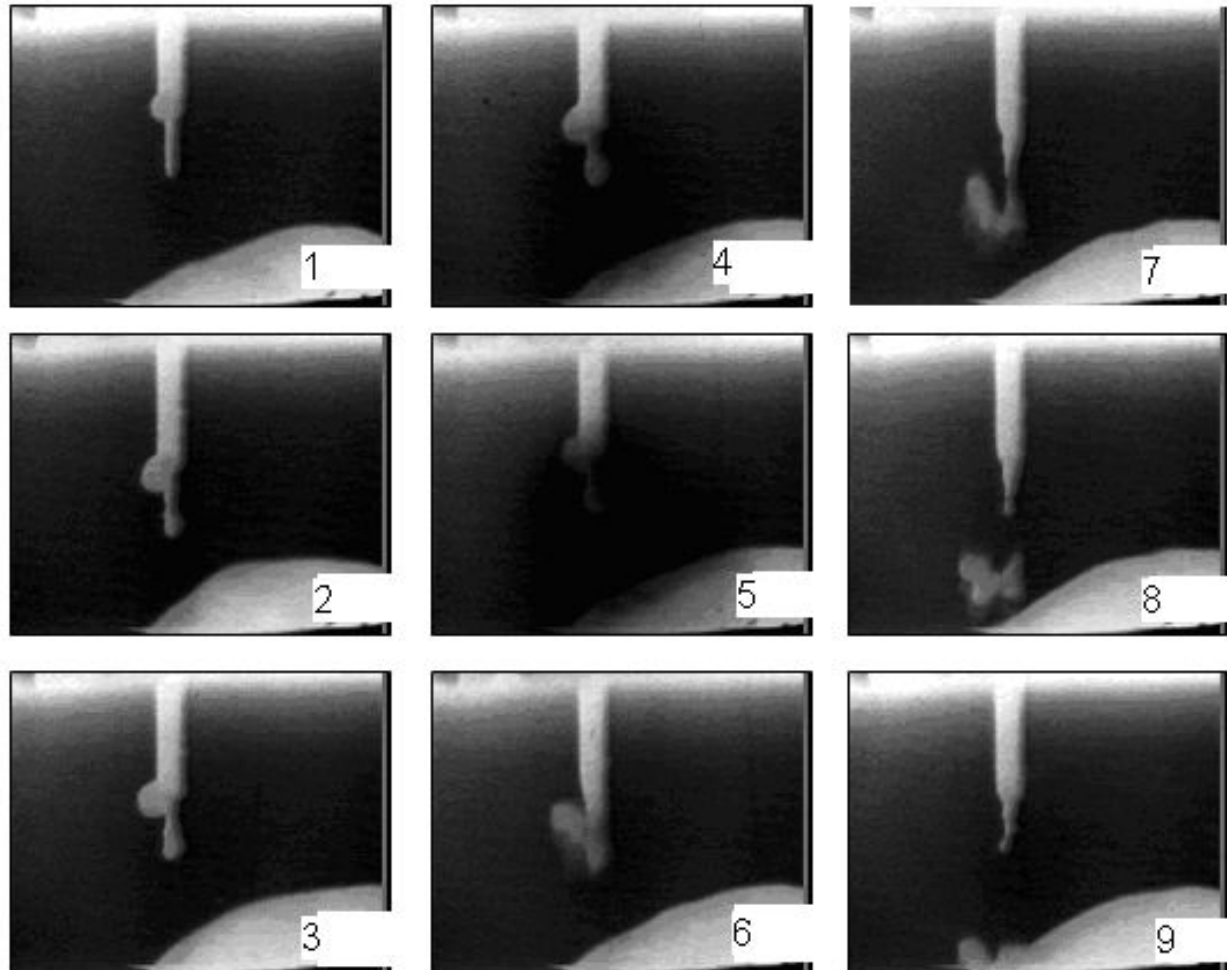


The kinetics of flux cored wire melting

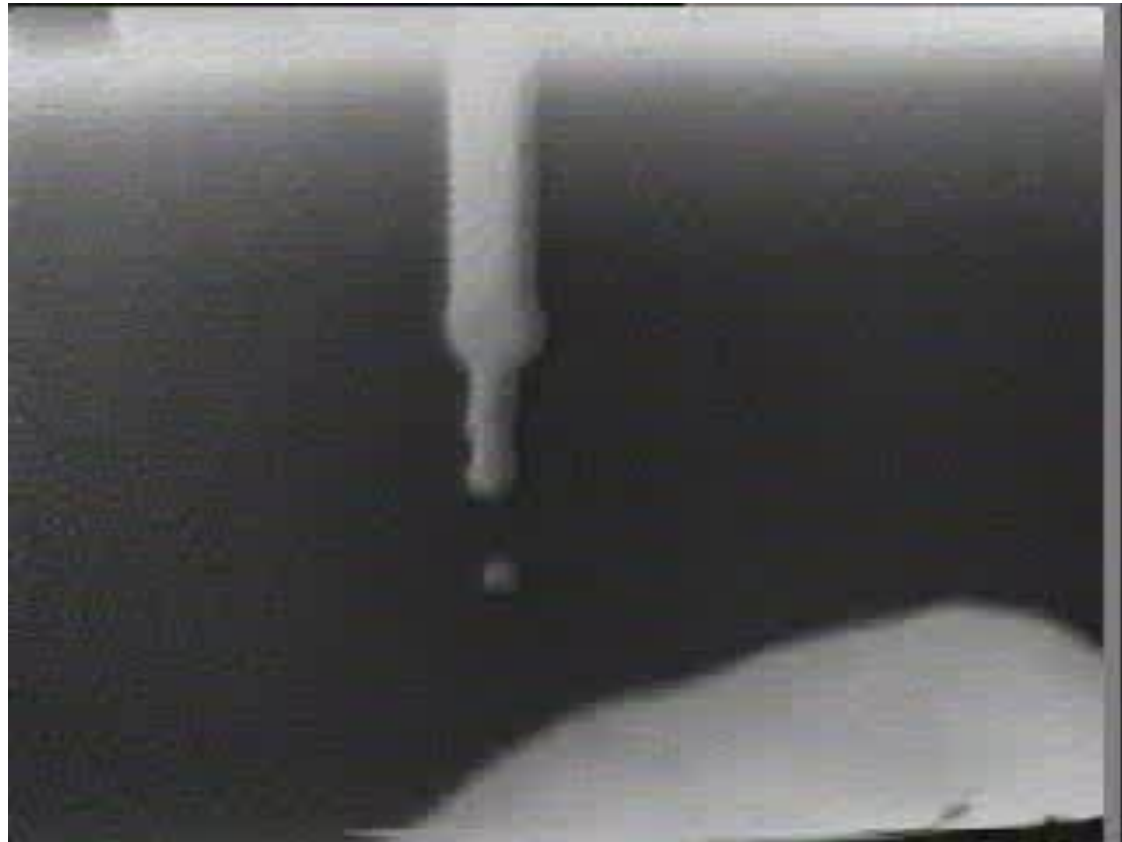


High-speed videography melting cored wire, modified nitride-containing powder composition, wire diameter 1.6 and 1.2 mm

Welding microcycle shots of adaptive pulse welding using flux cored wire in the mixture of gases Ar + CO₂ with metal transfer without short-circuit the arc gap (sequence of frames within the same microcycle 1-9)



Video of adaptive pulse welding process cored wire in a mixture of gases Ar + CO₂ with metal transfer without short-circuit arc gap



CONCLUSION

The executed researches on studying of kinetics of melting and transfer of electrode metal when welding by a powder wire allowed to reveal a number of features which allow to formulate criteria to algorithms of management of power parameters of the modes of welding of self-protective powder wire, and also to systematize nature of influence of characteristics of the heatmass transfer accompanying processes of arc welding with the melting electrode on stability of formation of metal of a seam from fusion.

CONCLUSION

Researches of the fast-proceeding processes of melting and transfer of electrode metal in a welding pool can become a good methodological basis for development of the algorithms of adaptive pulse management of power parameters of the mode of welding allowing to provide stability of characteristics of a heatmass transfer when welding and an adjustable heatinvestment in the processed product.



Thank you for attention!