

Heating and technological operations combination

Kilov Alexander S.

Orenburg State University, Orenburg

Processes of direct heating that use electricity to electric heat in installations of induction or resistance heating, are becoming more common to heat the metal. Such installations are deprived of the basic advantages of furnaces - as their versatility, because the most economical operation of electric heating systems is manifested by heating of specific billet on which they are designed. But at the same time they don't have lack of furnaces.

Contact heating is effective for heating long thin billet or heating to the melting of small plots (welding machine). Studies have shown the possibility of using contact heating in combination with pressure treatment (stamping) for flat billet. For this purpose, a method and the device of the electric contact heating an electrically conductive material developed.

Using this method and device for heating of local zones in strip material in combination and conjunction with stamping allowed receiving cut holes with a chamfer on the heated areas of the strip in the same position in a single stroke of the ram press. Moreover, uniform heating cultivated zones will ultimately result in increased of productivity and quality of the holes with a facet [1].

Specific contact heating is heating in the electrolyte [2].

A disadvantage of the known devices for heating in electrolyte to a voltage source 220 and rectifier, with the rectified current having a pulse is limited processing capability, because the presence of ripple current limits the size of the heated billets and existing methods allow for heating and surface hardening only parts with a diameter of 10 mm. the oscillation period (no anode current) is reduced, which reduces time and improves the uniformity of heating when connected to a three-phase network (380) using a rectifier unit (at least two) corresponding to the presence of phase shift. This allows to heat the billets with diameter greater than 10 - 15 mm, and after heating to tempering temperature and after the current interruption, quenching is carried out in the same electrolyte [2].

Contact heating is used in the manufacture of bent details V-shape of thick ($d > 5$ mm) structural steel, for example, in the manufacture of details "stiffening plate" of the steels 35, 6 mm thick. Pulse current for differential heating is passed simultaneously with the cutting and bending of the flexible axis on the billet. Final bending and at the end of it, calibrate of the detail on a rigid mandrel is carried out with the heated detail. This clamp-remover made of non-conductive material (dielectric) for the manufacture of stamped bent parts and the current-supplying contacts mounted therein on opposite sides of a plane of symmetry of the punch – matrix. The pulse of electrical current supplied to the billet only at the time of felling. Final felling takes place in areas above the axis of bending and line axis bending heated possible. current pulse stops after felling. Warmed up, bent billet calibrated to form a rigid mandrel detail [3-4].

Contact heating is employed in butt welding method.

The essence is that detail of the clamp in the current supply terminals, reducing them to form an electrical contact and pass electric current through them. At melting the edges carry sediment. In the reflow process, at least one of the welded billets is rotated around its longitudinal axis by an angle in the range 90-360 °.

Contact heating was also used in research for hardening carbide using the welding machine and the inductor as a heating device [5-7], providing a non-oxidizing heating products made of hard alloys in their heat treatment, and this has led to an increase in their operational durability and quality.

The possibility of replacing inefficient heating furnace for heating in high performance electrical (contact and induction), and the possibility of combining heating with technological operations is shown in these works.

REFERENCES:

1 Kilov, A. S. Getting the mounting holes for screw assemblies / Kilov A. S. // Assembling in mechanical engineering, instrument-making.- 2003. - № 12. - 39-42.

2 Kilov, A. S. The combination of high-speed heating and cooling products / Kilov, A. S. // hardening technology and coating. - 2013. - № 01. - 20-23.

3 Pat. 2230621 Russian Federation, MPK7 B 21 D 35/00. Method of manufacture of roll-formed parts and device for its implementation / Bondarenko V. A., Kilov A. S.; applicant and patent holder-Orenburg. state University-that - No. 2005122139/02; Appl. 26.03.2002.; publ. 20.06.2004, bul. № 17. - 3 C.

4 Kilov, A. S. Automation of the process of removing from the stamp of bent V-shaped parts during their manufacture in the same position / A. S. Kilov, V. F. Grebenyuk // Automation and modern technologies. - 2005. - № 03. - 3-8.

5 Improving operational characteristics of hard alloys by heat treatment / S.I. Bogodukhov, A. S. Kilov, E.A. Shein, A.S. Yasakov, R.R. Haibulin. / Vestnik. Orenburg State University. - 2011. - № 5. - 164-170.

6 Pat. 115781 Russian Federation, the IPC C21D 1/34 (2006.01). Unit for hardening of hard alloys / Kilov A.S., A.A. Zaitse; applicant and patent holder-Orenburg. state University-that - No. 2011123000; Appl. on 10 may 2012, опубли.2012, bul. № 13. - 3 C.

7 Pat. 2463357 Russian Federation, the IPC C21D 1/10 (2006.01), F27B 14/08 (2006.01). Induction-hardening installation / Kilov A.S., Bogodukhov S.R, Yasakov A. C. ; applicant and patent holder-Orenburg. state University-that - No. 2011109794; Appl. 10 October 2012, publ. 2012, bul. № 28. - 4 C.