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SOME POSSIBILITIES OF STEEL HARDOX CUTTING ECONOMICAL EFFECTIVENESS INCREASE TECHNOLOGY AWJ IN RELATIONS ON TECHNOLOGICAL PARAMETERS

Abstract:
Economical effectiveness of manufacturing systems is one of decisive indicators of prosperity and firms competitive ability and is influenced through more factors.
Also technological parameters of manufacturing system have significant influence on it. The article presents results of experimental research on the manufacturing system with technology AWJ.
The article describes economical effectiveness of steel HARDOX cutting and technological parameters of manufacturing system on the basis of numerous experiment results. The utilization areas and main contributions also are mentioned.

Keywords:
economical effectiveness, manufacturing system, technological parameters, main contributions

INTRODUCTION

Economical effectiveness of manufacturing systems is one of decisive indicators of prosperity and firms competitive ability and is influenced through more factors.
Also technological parameters of manufacturing system have significant influence on it. The article presents results of experimental research on the manufacturing system with technology AWJ. Influence of technological parameters, cutting head movement speed „v", pump pressure „p" and mass flow of abrasive „m_A"for cutting time „t" is researched. On the foundation of experiments evaluation principles and recommends for firms working manufacturing systems with technology AWJ are formulate.

EXPERIMENTS

The set of experiments enabling to formulate as follows recommends for cutting process effectiveness increase and also manufacturing system working economical effectiveness with technology AWJ was performed in framework technological parameters influence research and quantification on cut area quality parameters with technology AWJ. On the foundation of experiments planning theory knowledge experiment with three factors and three levels of factors (three technological parameters with three values for every researched technological parameter) i.e. 27 (3^3) combinations of technological parameters values was side dimension 40 mm and cut areas number 27.

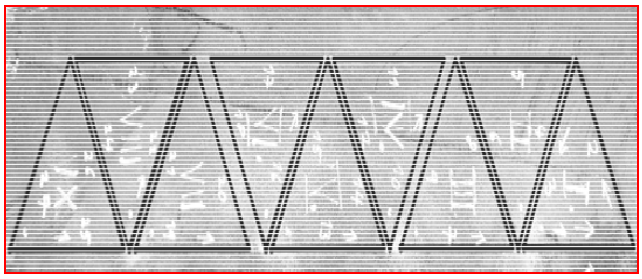

Figure 1 represents Method of samples designation and numbering

EXPERIMENTS EVALUATION AND DISCUSSION

Cutting times for single of three technological parameters v, p, m_A number values combinations are calculated from cutting speed and course given by sample sizes and led into table 1.

Table 1 Measured values of cutting time

Sample thickness h					
Sample Identification		Technological Parameters			
No. of sample	No. of sample cutting surface	m_A [g/min]	p [MPa]	v [mm/ min]	cutting time t [s]
I	1	170	300	10	240
	2	170	300	15	160
	3	170	300	20	120
II	4	170	340	10	240
	5	170	340	15	160
	6	170	340	20	120
III	7	170	380	10	240
	8	170	380	15	160
	9	170	380	20	120
IV	10	220	300	10	240
	11	220	300	15	160
	12	220	300	20	120
V	13	220	340	10	240
	14	220	340	15	160
	15	220	340	20	120
VI	16	220	380	10	240
	17	220	380	15	160
	18	220	380	20	120
VII	19	270	300	10	240
	20	270	300	15	160
	21	270	300	20	120
VIII	22	270	340	10	240
	23	270	340	15	160
	24	270	340	20	120
IX	25	270	380	10	240
	26	270	380	15	160
	27	270	380	20	120
∑t [min]					78

We see from the table that cutting head movement speed increase lowers expressively cutting time. Changes of pump pressure and mass flow of abrasive in researched range of their values did not cause change of cutting time. At speed growth 100 percent (from 10 on 20 mm/min) cutting time was shortened on a half (from 240 on 120 minutes).

NEW KNOWLEDGE AND RECOMMENDS

For cutting process economical effectiveness increase it is possible to recommend cutting speed increase. The cutting speed increase has however expressively unfavourable influence on cut area quality increasing with cut material thickness. This unfavourable influence of speed on quality it is possible to appease with increase of pump pressure and mass flow of abrasive. From authors las measurement on Working-place of liquid jet on Technical University in Ostrava resulted that with increase of pump pressure from 300MPa on 380 Mpa at constant speed 20mm/min and constant mass flow of abrasive 170 g/min lowers unfavourable value of jet deviation at cutting head high speed (20 mm/min) from value 30,1 on 21,2 degree almost by a third. Analogously at mass flow of abrasive with increase of its value from 170 g/min on 270 g/min abd at constant pump pressure 300 Mpa unfavourable value of jet deviation at high cutting head speed (20mm/min) is lowered from value 30,1 on 18,3 degree then more than by a third. At simultaneous increase of pressure from 300 Mpa on 380 Mpa and also mass flow of abrasive from 170 on 270 g/min it is possible to lower unfavourable value of jet deviation at high cutting head speed (20 mm/min) from value 30,1 on 14,6 degree then on less than a half.

REGIONS OF UTILIZATION AND MAIN CONTRIBUTION

Knowledge in the article will be a contribution for increase of economical effectiveness and competitive ability of firms working manufacturing systems with technology AWJ. Their contribution shows mainly in objectiveness and exactness increase at determination of number values of technological parameters, in programming time shortening but mainly in cutting time shortening (with finding suitable numbers values of technological parameters) at

in lowering cut area surface quality. They can serve also as foundations for research aimed at working manufacturing systems and AWJ optimalization.

CONCLUSION

The article busies with actual and for firms working manufacturing systems with technology AWJ acute problematics of technological parameters influence on cutting time and as follows on manufacturing systems working economical effectiveness with technology AWJ at considering cut area surface quality. On basis of evaluated experiments conclusions and recommends are elaborated and concrete examples shown. The solution forms one of foundations for modelling and simulation of technological parameters influence on manufacturing systems with technology AWJ working economical effectiveness. It is possible to utilise methods of solution exercised in the article in the form of analogy also for further especially relative jet technologies.

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