Active method of measurements with the use of laser devices on the base of integrated adaptive through system of stamps manufacture automatization

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Article
The process of details manufacturing with the use of active method of measurements with application of laser out-of-contact devices based on integrated adoptive through system of automation of stamps manufacture is considered in the article.
Key words: iNTEGRATED ADAPTIVE THROUGH SYSTEM, LASER WITHOUT CONTACT DEVICES, MANUFACTURE OF STAMPS, ACTIVE METHOD

Introduction

Actual problems in the aviation, building, machine-tool constructing, automobile, agricultural and radio-electronic industry are: introduction of modern mathematical methods and means of computer facilities; creation of the intellectual integrated adaptive through systems of automation of design works; automated systems of technological preparation of manufacture; creation of the flexible automated systems of machine tools, tools (stamps) and automatic transfer lines manufacture, and also the reduction of time measuring, control and correcting operations with use

of measuring devices on the basis of their overlapping and automation [1].

Problem

Due to shortage of experts on designing and manufacturing of stamps of cold sheet punching, the need of the market for individual manufacture on heightened interest to computer systems by means of which it is possible to provide serial, deserted, paperless and, at the same time, efficient control manufacture with significant reduction of time for measuring -control operations [2] has changed.

Purpose of research

Increase of efficiency and quality of stamps on the basis of «new technology» and laser means of measurements, and also reduction of time measuring, control and correcting operations at their overlapping and automation during preparation of manufacture, production and repair of stamp details of cold sheet punching.

Basic results of researches

In the country there is a problem on manufacture of stamps of cold sheet punching, up to 85 % of work amount is carried out manually. For elimination of the specified problem in the integrated adaptive system automations system of stamps manufacture [2] «new technology», consisting in the following, is investigated. At formation of "Portfolio" of orders, tasks of factories-customers are formed on standard sizes in a lot of products. And in one batch there can be 20, …, 50, …, 100 and more orders depending on loading. Using a stamp - semifinished items at manufacturing of stamps details, for all one-dimensional batch, one complete set of drawings is projected and for them one complete set of technological cards, and as one complete set of operating programs for machine tools is created. The above mentioned has allowed to apply a new method [1] of manufacturing of blocks and packages of dies stamp - semifinished items without a binding to a concrete detail of the customer, increasing the quantity of the same details in a batch that has enabled to pass from individual designing to serial manufacturing of details of stamps in metal [1, 2]. For this purpose in the country two manufacturers are created. For elimination of a problem connected with shortage of experts and as increases of efficiency and quality of stamps on the basis of «new technology» and laser means of measurements, we investigate prolongation of the "life cycle" which has acted in repair stamps-manufacturing of the directing column on the turning flexible industrial module, with active the laser control. The column has the next sizes: general length L_{gen}=180 mm, processable length $L_{proc.}$ = 140 mm, processable diameter ∅ 40 h 14, pressing length $L_{connecting.}$ = 40 mm and pressing diameter ∅ 32 mm, diameter of die ∅ 45 mm. The die is established in the centers and processed by the through passage cutter fixed in cutter support. So during processing, the cutter changes its parameters (wears out), laser gauge "watches" the wear out [3] fixed in the arm on support of machine tool and moving synchronously with a cutter. Laser gauge transfers deteriorations to personal computer, which, having adaptation block, corrects deterioration of the tool and transfers back this information in the machine tool, which makes updating.

In the table 1 and on the diagram 1 (figure 1) the re shown triple updatings in (limit admission of processable surface of details) 3 points by the laser gauge of deterioration tool along the length $L_{proc.}$ = 140 mm, at diameter ∅ 40 h14. Where y1, y2, y3 – are triple deviations of measurements in 20 mm on length of processable ∅ 40 h14, and y4-are the indications of the limiting admission for all fixed points.

Table 1. Triple updating in 3 points by the laser gauge

Д	У1	У2	У3	У4
0	0.05	0.03	0.06	1
40	0.2	0.18	0.21	1
60	0.1	0.15	0.2	1
80	0.55	0,45	0.6	1
100	0.35	0.3	0.4	1
120	0.85	0.83	0.9	1
140	0.5	0.45	0.55	1

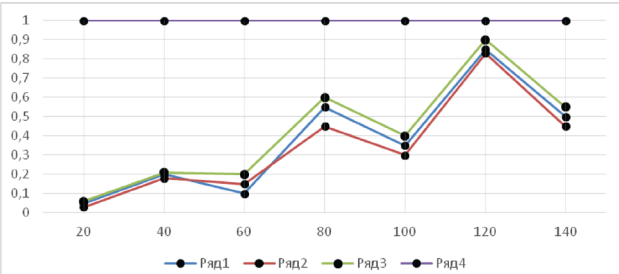

Figure 1. Diagram 1. Triple updating of deterioration of tool on the base of indications of laser triangularly gauge

The use of laser devices as means of measurements during manufacture of stamp details is carried out for the first time and is still actual.

Conclusions

The article shows that combination of mechanical processing and active control with the use of laser devices in the integrated adaptive automated systems of manufacture and production, in particular, details of stamps, allows to reduce essentially the time and labor input of measurements, and from here to raise

efficiency and quality of carried out works, provided necessary accuracy, interchangeability and reliability. Research of «new technology», in conjunction with the integrated systems and laser means of measurement allows to raise considerably competitiveness of the integrated adaptive through system of stamps manufacture.

References

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Distributed control of ore beneficiation interrelated processes under parametric uncertainty

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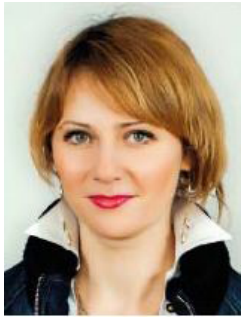

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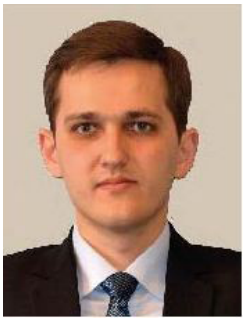

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