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SPECIFICS OF DESIGNING A LOCKSMITH-MECHANICAL AREA OF A SERVICE FACILITY

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In the fitting and machining section, fitting and mechanical operations related to the restoration of parts are performed. These include [1]:

- preparation of parts for various types of coatings;
- processing of parts after coating;
- machining to repair dimensions;
- manufacturing of repair and replacement parts, etc.

The basis for designing the section is the production program and labor-intensity standards. Parts are delivered to the section in batches from the storage area for parts awaiting repair, while blanks for manufacturing repair and new parts are supplied from the materials warehouse. Technological processes of machining are developed for specific groups and classes of parts according to operation sheets and routing cards.

After preliminary machining, the parts are transferred to other sections of the part-restoration shop: electroplating, welding, heat-treatment, etc. Some parts then return to the machining section for final processing. Restored and newly manufactured parts are sent to the assembly-preparation section.

The annual labor intensity of the section is determined based on the time standards for different types of part processing and the annual production program. The total number of machine tools is calculated according to the annual labor intensity. The number of metal-cutting machines S_M , pcs., is calculated using the formula [2]

$$S_M = \frac{T_{Mi} \cdot K_N \cdot K_O}{F_{A.E} \cdot \eta_O}, \quad (1)$$

where T_{Mi} – the annual labor intensity of a specific type of machine-tool operation, man-hours;

K_N – the coefficient of non-uniformity of enterprise workload;

K_O – the coefficient accounting for the volume of production-support operations;

$F_{A.E}$ – the actual annual operating time of the equipment, hours;

η_O – the utilization factor of machine-tool equipment.

Since the production process in the fitting and machining section has the characteristics of small-batch manufacturing, the main machine-tool equipment must be universal, allowing the performance of various types of operations. Grinding machines are selected without calculation. The resulting number of machines is distributed by machine type. In doing so, it is necessary to ensure the capability of machining large-size parts, which is determined, for example, by the height and center-to-center distance of lathes, the table dimensions of milling machines, etc. When selecting the overall dimensions of lathes, it should be taken into account that 90% of parts processed during repair have diameters up to 20 mm and lengths not exceeding 300 mm. If the number of drilling machines exceeds two, a radial drilling machine must be provided.

The number of fitting workbenches is determined by the number of fitters. Other equipment (presses for press-fitting parts, layout and straightening plates) is selected according to the technological process.

For transporting parts, electric carts or trolleys are used. For lifting and transporting heavy parts, cantilever-type slewing cranes equipped with electric hoists or pneumatic lifters, as well as monorails,

must be provided. The number of production workers (machine operators and fitters separately) is determined by the annual labor intensity of machining (or fitting) operations and the actual annual working time of a machine operator (or fitter), hours.

The area of the section is calculated based on the footprint of the equipment, taking into account working zones and walkways. The overall dimensions of the section are determined considering the layout of the enterprise's production building.

Machine-tool equipment in the fitting and machining section may be arranged in two ways: by type (grouped) or according to the sequence of technological operations. Repair enterprises typically use the first method. Machines are grouped by type according to their functional similarity: lathes, milling machines, planers, grinders, etc. Machine groups should be arranged within the section in an order corresponding to the typical sequence of part processing. For initial operations, groups of engine lathes are usually placed first, followed sequentially by milling, planing, and finally grinding machines, where machining is typically completed.

The distance between machines, as well as the distance from machines to building elements (walls, columns), is determined based on safety requirements and ease of operation. Walkways between machines must be straight. Their width is established depending on the method of part transportation and the dimensions of transport equipment. To reduce transportation distances for heavy parts, machines intended for their processing should be located closer to driveways. When installing such parts on machines, the possibility of using lifting and transport equipment must also be considered. For example, it is advisable to place two or more machines within the service zone of a single cantilever-type slewing crane. These cranes are recommended to be mounted on columns.

Machines should be arranged so that operator workstations are located on the walkway side, which facilitates workplace servicing (feeding blanks, receiving parts, removing chips, etc.). Drilling machines should be located closer to the fitters' workstations. In the same area, workbenches, presses for press-fitting parts, inspection and straightening plates, and other equipment are installed. The fitting and machining section must also include racks or platforms for storing parts and tool cabinets (installed near machines).

References

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ОПТИМІЗАЦІЯ ЕНЕРГЕТИЧНОГО БАЛАНСУ БІОГАЗОВИХ УСТАНОВОК В УМОВАХ ЗРОСТАННЯ ВАРТОСТІ ЕНЕРГОНОСІЇВ

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