2. Перспективи використання біофільтрів у біогазових установках/ О. Г. Скляр., Р. В. Скляр., Б. В. Болтянський, С. В. Сиротюк, С. В. Коробка // *Праці ТДАТУ. Технічні науки*. 2025. Вип. 25, т. 1. С. 45–53. https://doi.org/10.32782/2078-0877-2025-25-1-6

3. Комар А. С. Удосконалення конструкції біогазової установки з рекуперацією теплоти зброджені біомаси. *Праці ТДАТУ*. 2024. Вип. 24, т. 3. С. 62-70. https://doi.org/10.32782/2078-0877-2024-24-3-5

4. Скляр Р. В. Методи інтенсифікації процесів метанового зброджування. *Науковий вісник ТДАТУ*. 2014. Вип. 4, т. 1. С. 3-9.

5. Болтянський Б. В. Аспекти вдосконалення технології виробництва біогазу. *Праці ТДАТУ*. 2024. Вип. 24, т. 1. С. 89–100. https://doi.org/10.32782/2078-0877-2024-24-1-6

Науковий керівник: Скляр Р. В., к.т.н., доц.

UDC 658.5

SEQUENCE OF DESIGNING THE TECHNOLOGICAL COMPONENT OF PRODUCTION SECTIONS AT A SERVICE ENTERPRISE

Trach D., recipient of higher education “Master's” degree
Dmytro Motornyi Tavria State Agrotechnological University, Zaporizhzhia, Ukraine

Sequence of designing the technological part of production units:

1) justification of the purpose of the section**,**
2) determination of initial data**.**

The initial data for designing production sections include the production program, labor-intensity standards, and the preliminary layout plan of the enterprise’s production building. The program is specified in natural units (pcs.), physical units (kg, m²), monetary terms (UAH), or labor/time units (man-hours, machine-hours).

Labor-intensity standards for repairing one unit are obtained by developing technological processes for disassembly–assembly, restoration, and subsequent standardization of these processes, or by using standards from existing production, materials from previously developed projects, and tightening them as needed.

When preparing a reconstruction project, it is necessary to have data related to the existing production unit (shop, department, section) [1]:

· purpose of reconstruction;
· list of technological and lifting-transport equipment;
· equipment layout of the section;
· current enterprise time standards per unit of output by type of work;
· operating mode of the section;
· material consumption;
· characteristics of the industrial building;
· consumption of water, steam, compressed air;
· characteristics and condition of the ventilation system;
· registered number of workers;
· output in natural and monetary terms;
· planned and actual cost calculations;

3) development of the technological process;

4) establishment of the operating mode of the section and the time funds of equipment and workers.

The operating mode of the enterprise is determined by the number of working days per year, the number of shifts per day, and the duration of the working shift in hours. Nominal and actual annual time funds for workers and equipment are distinguished. The nominal annual time fund is the number of working hours according to the operating mode, without considering possible time losses. The actual annual time fund reflects the time actually worked by a worker or equipment, taking into account losses.

5) determination of the annual labor intensity of operations.

Depending on the units in which the program is expressed, production sections are divided into groups [1, 2]:

Group I – external washing, disassembly, fitting-and-machining, assembly. The program is expressed by the nomenclature and quantity of repair objects N.

$$T = \sum_{i=1}^{n} T_i \cdot N, \qquad (1)$$

where T_i – the time standard for this type of work per one repair object, hours.

II – cleaning of parts, heat-treatment, forging. The program is expressed by the quantity and mass of repair objects Q

$$T = \frac{Q}{q_H}, \qquad (2)$$

where q_H – the hourly productivity (kg/h).

$$Q = \sum Q_i \cdot N \cdot \beta, \qquad (3)$$

where Qi – the mass of one repair object, kg (t);

β – the coefficient accounting for the share of part mass subjected to this type of processing.

III – welding, electroplating, painting. The program is expressed by the quantity and surface area of repaired parts S

$$T = \frac{S}{S_H}, \qquad (4)$$

where S_H – the surface area of parts processed per unit time (m^2/h);

$$S = S_i \cdot N, \qquad (5)$$

where S_i - the surface area of one repair object subjected to this type of processing.

6) calculation and selection of the required quantity of main technological equipment and lifting-transport (auxiliary) equipment;

7) calculation of the number of production workers;

8) determination of the production area of the section;

9) development of the equipment layout and final clarification of the area and dimensions of the section.

When developing the equipment layout, the following requirements must be taken into account:

· equipment in the section must be arranged in accordance with the adopted organizational form of technological processes;

· the requirements of straight-through (unidirectional) workflow must be satisfied as fully as possible. The equipment layout must be coordinated with the use of lifting-transport devices;

· the arrangement of equipment, walkways, and driveways must ensure convenience and safety of work, as well as the possibility of equipment installation, dismantling, and repair;

· the layout must allow for equipment replacement when more advanced or alternative technological processes are introduced;

· the layout must ensure rational use not only of the floor area but also of the volume of the section.

10) calculation of the demand for electric power, steam, compressed air, and water;

11) calculation of technical and economic indicators: production program, number of equipment units, labor intensity of operations, number of workers, area, power of electrical receivers, cost of fixed production assets, level of process mechanization, etc.

When reconstructing a section, the technical and economic indicators are compared with the corresponding actual data of the section before reconstruction. If a new section is being designed, the indicators are compared with data from similar advanced-technology production facilities.

References

1. Дашивець Г. І., Дідур В. А., Бондар А. М. Проєктування сервісних підприємств: посібник-практикум. Мелітополь: ТДАТУ, 2019. 144 с.

2. Дашивець Г.І., Бондар А. М., Паніна В. В. Проєктування сервісних підприємств: навчально-методичний посібник для самостійної роботи студентів. Мелітополь: ВПЦ «Люкс», 2019. 84 с.

Research supervisor: Dashyvets H., Ph.D., Assoc.

UDC 658.5

DESIGN CONSIDERATIONS FOR THE WELDING SECTION OF A SERVICE FACILITY

Usenko Y., recipient of higher education “Master's” degree
Dmytro Motornyi Tavria State Agrotechnological University, Zaporizhzhia, Ukraine

The welding section is intended for restoring machine parts by welding and surfacing. A wide range of processes is used for this purpose, including manual gas and arc welding and surfacing; automatic surfacing under a flux layer; automatic and semi-automatic welding and surfacing in shielding gases, vapors, and liquids; resistance, spot, plasma, and other specialized welding methods. These processes ensure the restoration of worn surfaces, the buildup of material on critical areas, and the repair of cracks or fractures in structural components.

Designing the welding section of a service enterprise requires creating a safe, functional, and ergonomically optimized workspace. This includes powerful supply-and-exhaust ventilation systems to remove fumes and aerosols, high-quality artificial lighting to ensure visibility during precision welding, and reliable grounding of all equipment to prevent electrical hazards. Key considerations include: adequate room height (typically 3 - 4 m) to disperse heat and fumes; spark-protection screens or welding booths 1.8 - 2 m high; designated storage areas for gas cylinders, consumables, and materials; strict compliance with fire-safety regulations; and convenient internal logistics, such as wide gates for transporting large assemblies [1].

Main design features

· layout and placement – the welding section should be isolated from other production areas to prevent the spread of sparks, fumes, and noise, yet it must have convenient access for transporting large components. Welding stations are arranged in enclosed booths 1.8–2 m high with a floor-level air gap to ensure proper airflow and prevent accumulation of hazardous gases.

· ventilation and safety – each workstation must be equipped with local exhaust ventilation directly above the welding table, complemented by a general supply-and-exhaust system for the entire section. Fire-extinguishing equipment, emergency shut-off devices, and reliable grounding of all electrical equipment are mandatory.

· lighting – welding operations require stable, high-intensity artificial lighting, as natural light is often insufficient in enclosed industrial spaces.

· workplace organization – welding booths are equipped with robust welding tables, holders for torches and electrodes, clamps, vises, and other essential tools. Ergonomic arrangement of tools reduces fatigue and increases productivity.

· storage areas – a dedicated storage zone is required for gas cylinders, welding wire, electrodes, fluxes, and finished parts. This area must be isolated from dust, chips, and contaminants originating from machining or grinding sections.

· compliance with standards – the design must meet occupational safety requirements regarding permissible concentrations of harmful substances, noise levels, and thermal radiation. Auxiliary