
THE IMPORTANCE OF ENGINEERING GRAPHICS FOR PRODUCTION PHARMACY STUDENTS

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Abstract: The purpose of this article is to provide effective teaching of the basic concepts and principles of technical drawing and drawings in the science of engineering graphics through graphics programs for students studying industrial pharmacy.

Key words: Industrial pharmacy, engineering graphics, higher education, student, method, necessity, specialists, preparation, organics, didactics, theory, practical use, graphic application, types, clippings, diagrams, clear image, ability, spatial perception.

Introduction. Engineering graphics is a field of knowledge necessary for most specialties, since drawing is the basis of almost any project in construction, mechanical engineering, etc. But as practice shows, visual analytical systems that provide a quick assessment of the situation, various diagrams, in particular status activation diagramming, engineering graphics are very important, particularly for engineering graphics students in an industrial pharmacy.

The Industrial Pharmacy Engineering Graphics course explains the basic concepts and principles of technical drawings and drafting, i.e. the use of different types of projections, scaling, markings and standards, and helps solve questions and explain complex topics. It serves to enhance spatial awareness by developing educational materials, including theoretical information and activities related to their application techniques in the pharmaceutical industry, to provide quality education and support academic learning. Science of Engineering Graphics for Industrial Pharmacy Students, Conducting Lectures and Practicals on Engineering Graphics for Students, Explaining Basic Principles and Techniques for Creating Engineering Drawings and Blueprints, Teaching the Use of Computer Programs to Create and Analyze Engineering Drawings, Designing Graphics Assignments, Teaching Students to think and analyze when completing tasks, teaches students to think creatively, use a scientific approach, express their opinions and draw conclusions based on them, and make suggestions. In addition, in the process of teaching engineering graphics with the help of graphic programs, students are taught to spatially and figuratively represent various objects of the pharmaceutical industry and their relationships, spatial forms and relationships in the form of drawings, spatial constructive-geometric thinking, as well as their spatial analysis and generalization, reading and creating drawings, the formation of knowledge, skills and competencies related to the preparation of design and technical documentation for production.

In Engineering Graphics, the student is trained in various aspects of the creation and interpretation of technical drawings and drawings, which are widely used in the design and manufacture of various products and systems in the pharmaceutical industry. These student assignments include instruction in the basic principles of engineering graphics, practical sessions in which students can practice creating and analyzing technical drawings, and students receive one-on-one guidance and consultation. It offers classes and hands-on sessions where students can practice creating and analyzing engineering drawings



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using computer programs and tools, and grades assignments and projects to help students improve their skills.

In engineering graphics, 3D modeling currently occupies one of the first places in the field of new technologies and promising areas. Engineering graphics gives students the necessary level of knowledge to be able to study subjects with further technical direction at higher courses of institutions, and he is capable of this. In the modern world there is a great need for creative and creatively thinking specialists. Nowadays, modern specialists are required to have qualified personnel with a high level of knowledge, perception, quick reaction, foresight, the ability to calculate opportunities and appropriate education in all disciplines. At the present stage of scientific and technological development, the need to find and train such specialists in industrial pharmacy is extremely great. In order to improve the quality of training in the pharmaceutical industry, higher education institutions specifically conduct training courses in engineering graphics (in particular, drafting geometry and engineering graphics), and extensive training sessions are conducted to improve them. through the effective use of information technology. The organization is effective in graphic education.

Drawing drawings, views, sections, sections, clear images, split and solid connections, diagrams, assembly drawings made by students of Engineering Graphics in Industrial Pharmacy not only helps them develop their spatial understanding but also develops their general thinking and reading. drawings and applies equally to core subjects. This is the integration of engineering and graphic education with the basis of other disciplines. Gradually, this knowledge and skills were systematized and formed into a coherent theory. But nothing stands still, everything changes and is updated. In the mid-20th century, computer technology began to develop, and later universities began to introduce the subject "Machine Graphics". Later, AutoCAD, Paint3D, Microsoft Visio, Lego Digital Designer, and 3dMax programs appeared and entered the educational sphere. Today, computer graphics and the Internet play a very important role in the modern education of schoolchildren. The teaching of engineering graphics subjects in industrial pharmacy must be changed in accordance with modern opportunities.

Engineering Graphics helps undergraduate and graduate industrial pharmaceutical students acquire graphic literacy. Its goal should be aimed at developing students' spatial imagination and imagination, constructive geometric thinking, the ability to analyze and synthesize spatial forms, in the form of mastering drawing documentation in industrial pharmacy. Pic.1



Pic. 1. Examples of drawings of equipment diagrams, machines, equipment, units, parts, premises in the pharmaceutical industry.

Practical training of students in the use of modern CAD software products in an industrial pharmacy includes Compass-3D, AutoCAD, Inventor, SolidWorks, modern methods of two-dimensional and three-dimensional modeling when developing drawings using computer-aided design systems. This is achieved by providing conditions aimed at development. To do this, in order to fully master the educational material of the subject, the student must undergo a preliminary study of the subject "Fundamentals of Drawing" (at the level of school material). AutoCAD graphics software is effective in training modern personnel for engineering graphics in an industrial pharmacy. The reason is that the AutoCAD program is the main CAD package in the global market and is used to create diagrams of products, tools, components, parts, premises in the pharmaceutical industry, draw drawings of machines, engineering objects, and build spatial models. , implement your photorealistic visualization and use AutoLisp, which allows you to develop programs in Visual Basic, SI. AutoCAD provides ample opportunities for training students in modern industrial pharmacy engineer specialties; it can be used as a tool base for teaching a number of graphic disciplines. Students can easily integrate engineering graphics into many other software products for similar purposes.

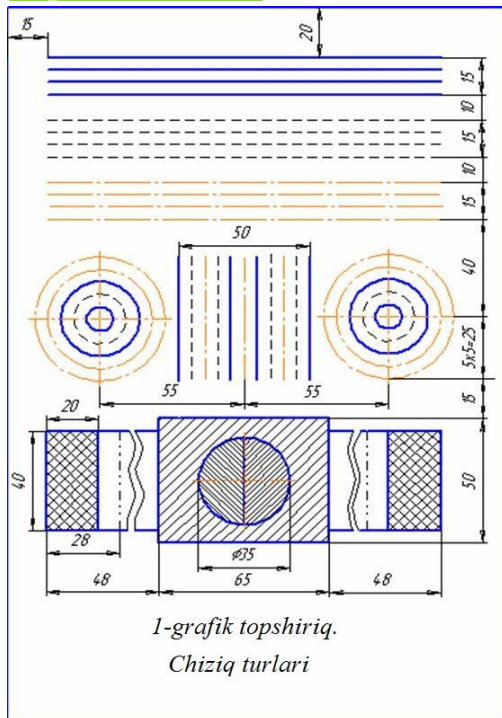
In industrial pharmacy, students of the Faculty of Engineering Graphics are trained using the AutoCAD program in the following areas:

1. Engineering graphics. Students will learn new techniques for 2D and 3D drawing of pharmaceutical products using the theoretical foundations of geometric modeling in AutoCAD.
2. The essence of this method is that in industrial pharmacy, students develop a geometric model in a natural, visual form, and the construction of a drawing of the object is carried out at the final stage, mainly in the automatic mode provided by the AutoCAD program. graphic editor (or).
3. Students of this subject perform test and graphic tasks during lectures and practical classes in the computer class. Graphic tasks are completed in three stages in accordance with the students' implementation methods. Engineering graphics professionals learn new techniques for 2D and 3D drafting of pharmaceutical products using the fundamentals of geometric modeling in AutoCAD. The essence of this method is that in industrial pharmacy, students develop a geometric model in a natural, visual form, and the construction of a drawing of the object is carried out at the final stage, mainly in automatic mode, provided by the AutoCAD graphic editor. (or). Students of this subject perform test and graphic tasks during lectures and practical classes in the computer class. Graphic tasks are completed in three stages in accordance with the students' implementation methods.

The first stage is the construction of projections of the main geometric bodies and surfaces and the execution of flat forms by linear types (Pic. 2). Assignments are completed by students primarily as part of independent work.

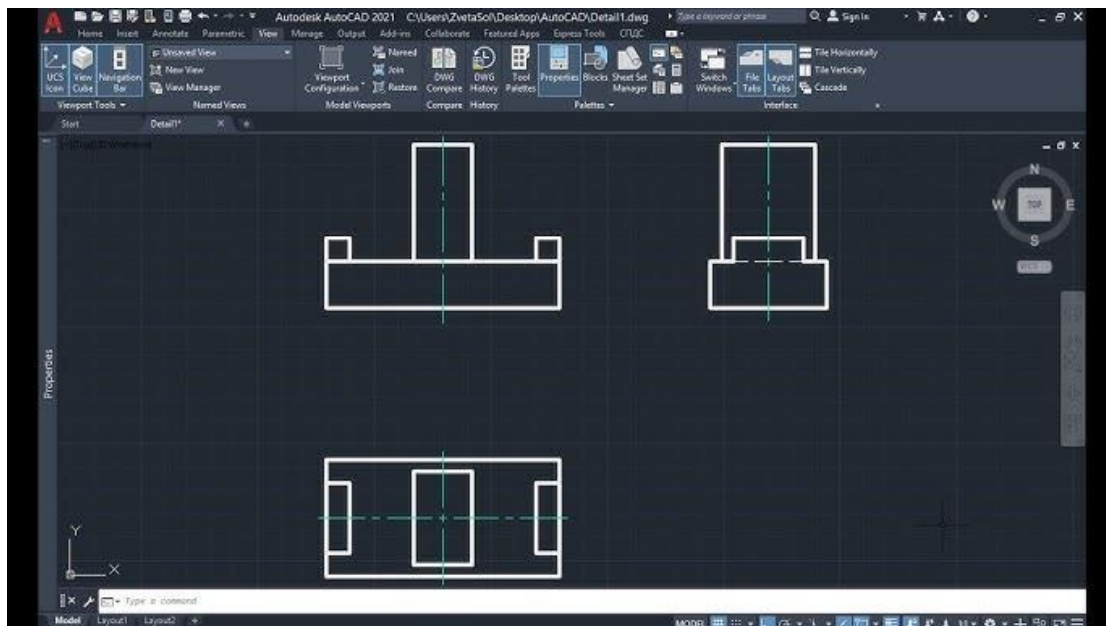


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Pic. 2. An example of the first graphic task completed by students.

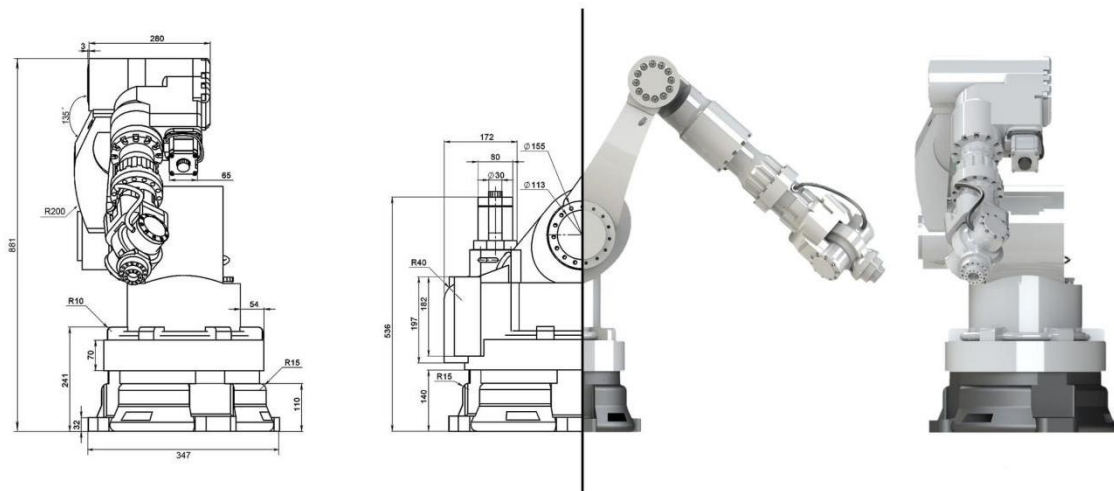
The second stage is for students to work on assignments using both projection methods in their notebooks and 3D methods on the computer. The solution is presented on the computer for comparison and verification with the solution in the notebook (Picture 3).



Pic. 3. An example of a graphic assignment completed by students on the topic of visualization in the AutoCAD graphics program.

The third stage is solving graphic problems only on a computer using 3D methods. These are particularly difficult tasks that develop logical and spatial thinking, and 3D modeling techniques (Pic. 4).





Pic 4. Vectorization-drawings in the drawing.

Conclusions. Teaching engineering graphics to students studying industrial pharmaceuticals using AutoCAD graphics software allows you to achieve the following results:

- know the purpose, objectives, areas of application and basic concepts of the science of engineering graphics in the field of pharmaceuticals; methods of depicting a straight line and a plane in a drawing; location of the straight line relative to the projection planes; surface classification; characteristics of surface classifications; general drawing and reading techniques; methods of geometric modeling of technical objects of the pharmaceutical industry; preparation of project documentation, requirements for the preparation and execution of diagrams; requirements for the design of drawings, description and design of inscriptions, description and designation of parts elements;
- be able to determine points, lines, planes and polyhedra by the method of orthogonal projection of complex machines and machines in the field of pharmaceuticals; construction of polygons, curves, surfaces of revolution, drawn surfaces, tangents and planes to a surface, axonometric projections; use computer graphics programs to create drawings and study geometric objects; solve engineering and geometric problems; apply the basic requirements for the preparation and implementation of design documentation, structural drawings, descriptions of writing and design, descriptions of parts and designations;
- acquire the skills of identifying points, lines, planes and polyhedral images when drawing pharmaceutical products; solve metric and positional problems; fabrication of pipes and similar tools and equipment with complex curves and surfaces; surface intersections; apply the rules for drawing visual images based on axonometric projections; use of regulatory documents and state standards in the development of schematic documents; skills of independent work with literature to search for information about individual concepts, terms, and explain their solutions in practical situations; they will have the opportunity to select and apply advanced methods and technologies, including computer means of collecting, storing and transmitting data.

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