



Virtual laboratory work
(simulators for virtual
experiments)

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Translated by Google translator



Lectures, seminar

Purpose - Creation of an overview of the nature of a topic or problem; systematization and generalization of knowledge on a topic or section.

Method - Perception and comprehension of the information provided by the teacher. In the lecture presentation of the material, the listeners, as a rule, do not have the opportunity to show initiative.

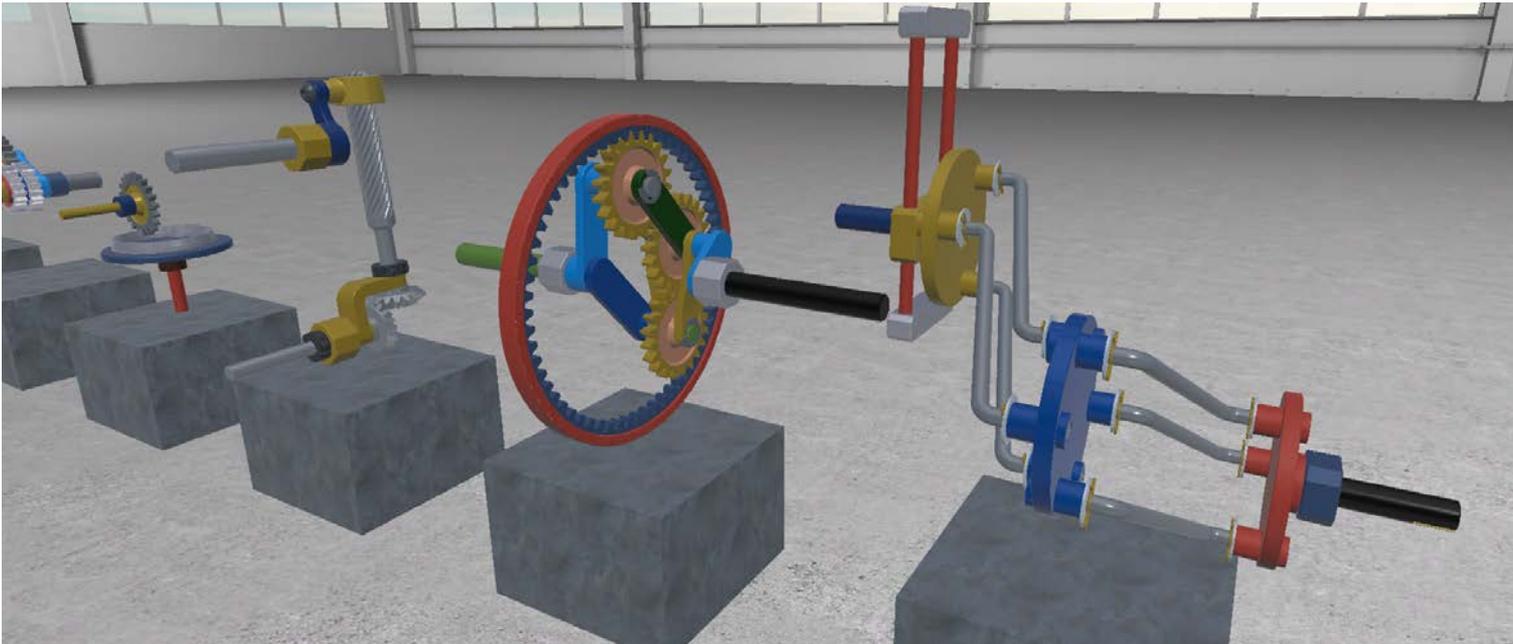


Sample -Lecture, virtual instructor tells and shows ... (valves and taps)

Laboratory works

Purpose - Obtaining knowledge based on the process of obtaining and processing experimental data - quantitative characteristics of real physical quantities that determine the behavior of the object under study, process or phenomenon, confirming or refuting the formulated objective functions of the experiment.

Method - An educational physical experiment aimed at working out the basic techniques and technologies for planning and conducting an experiment, including its main stages: formulating the goal and research objectives, determining ways and methods to achieve the goal, equipment and technologies used.



Sample - laboratory work - Study of types of mechanisms (*Theoretical mechanics*)

Laboratory works

Purpose - Training in the application of the knowledge gained in solving complex problems related to the field of activity of future specialists.

Method - It is used at the final stage of studying a subject; the result is a written term paper or term project (according to curricula and programs).



Sample - Checking PID Controller Settings

Certification or Approvals

Purpose - Assessment of the skills and professional skills of specialists for the purpose of their subsequent certification or certification

Method - Answers to questions (theory), the correctness of actions (practice).

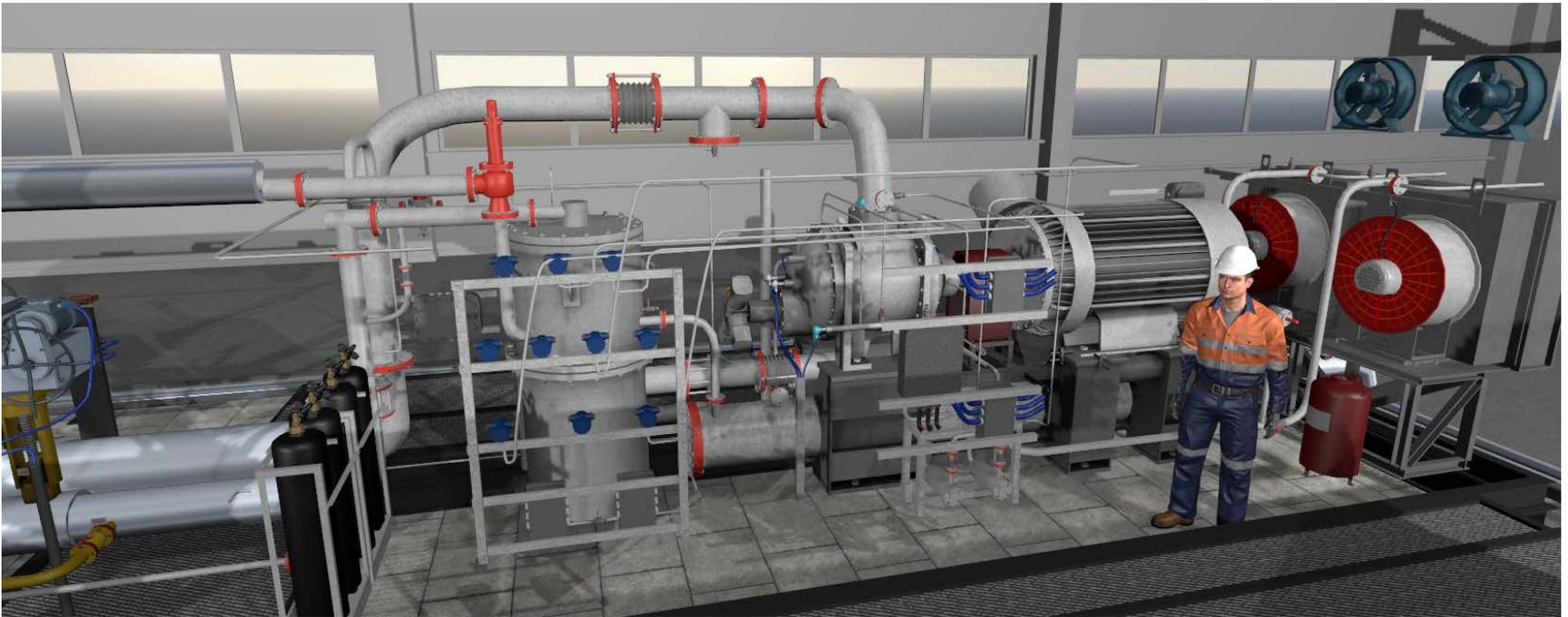


Sample - detection of violations of industrial safety and labor protection

Workshop

Purpose - Practical study of the device, the principle of operation, adjustment, adjustment of equipment characteristic of the profession being mastered.

Method - Performing tasks using specialized equipment.



Sample for a workshop - starting and stopping a screw compressor

Training, professional development

Purpose - Formation and improvement of the trainees' professional skills and abilities necessary for them to manage a material object.

Method - Repeated performance of the trainees inherent in the control of a real object.



Sample - simulator - personnel actions during well workover



Tasks

- Thus, simulators can be used at almost all "stages" of the educational process. Simulators for laboratory work and lectures form knowledge, simulators for a workshop form skills, simulators are already improving these skills, etc. Simulators for certification and validation can be used to diagnose and control the process.



Our experience

- Our company has extensive experience in developing simulators for general education (primary general education, basic general education, secondary general education, additional education for children), vocational education (primary vocational education, secondary vocational education, higher vocational education, bachelor's degree, specialist training, master's degree) , postgraduate professional education (postgraduate study, doctoral studies, advanced training, second higher education), professional training and retraining.



Contents

1. Methodically materials - SCORM 2004v3, XAPI, PDF, WORD.

The methodological guidelines indicate the goals and objectives of the experiment, the implementation process, theoretical material, control questions and a sample report.

The screenshot displays a PDF document titled "18_ЗапорнаяРегулирующая арматура.pdf" in Adobe Acrobat Reader DC. The document is divided into two columns of text. The left column lists various types of regulators: "регулятор температуры", "регулятор уровня", "регулятор перепада давления и расхода комбинированный", "регулятор перепада давления, расхода и температуры комбинированный", and "регулятор перепада давления и расхода комбинированный с дополнительным электрическим приводом". Below this list is a section titled "Разновидности предохранительной арматуры" (Types of safety valve hardware) with a sub-section for "блок предохранительных клапанов" (Safety valve block), which is accompanied by a 3D CAD model of a blue valve assembly with red handwheels. The right column contains a list of safety valve types: "импульсный предохранительный клапан", "предохранительный маломощный клапан", "предохранительный среднетемпературный клапан", "предохранительный полнодвухседельный клапан", and "предохранительный пружинный клапан". Below this list is a 3D CAD model of a yellow and blue safety valve. The bottom of the page features a blue silhouette of an industrial refinery or chemical plant.

Contents

2. Software - SCORM 2004v3, XAPI, standalone application (exe for Windows).

System requirements:

Operating system Windows: 7 SP1 +, 8, 10, 32/64-bit versions CPU - SSE2 instruction set support. GPU - Graphics card with DX10 (shader model 4.0) capabilities.

Support for VR system HTC VIVE.

Build for Linux / Mac is possible if necessary.



Principle of operation

Control keys (when using standard input / output means - keyboard and mouse):

W / S - move forward / backward (parallel to the direction of sight).

A / D - move left / right (perpendicular to the direction of view).

R / F - move up / down (change in height).

E - enable / disable gravity (determines whether the user falls in the absence of a fulcrum or not).

Q - Pressing and holding the key - briefly enlarges the central area of the screen.

Z - Change between first person and orbital camera modes.

Mouse pad keys:

Left key - clicking on the object selected by the cursor.

Right key - when you press and hold the right mouse button and move the cursor, the direction of the user's gaze changes (head rotation).

Center mouse button (click on the scroll wheel) - while holding down the right key is the same as pressing the W key (move forward).



Principle of operation

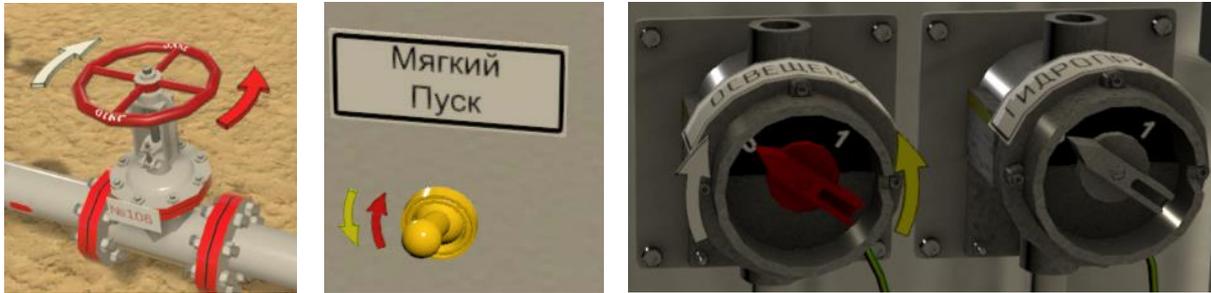
When using the HTC VIVE virtual reality system, control is performed using the appropriate input devices. Turning the head is done directly by turning the head. Moving is carried out by pressing the key 2 with the subsequent indication of the new location, when the key 2 is released, the movement to the new indicated point occurs. Interaction with objects is carried out by aiming the "laser beam" emanating from the right controller at the desired object and pressing 1



Principle of operation

Further work is done by moving and interacting with objects (go to the valve and open it, for example.)

When you hover over an element that intends to interact, additional controls appear to make the interaction easier, such as arrows when hovering over a slide wheel



When executing the script given by the instructor, you must perform the following typical actions:
When dialog boxes with the OK key appear, you must read and listen to the information provided, and then press the OK key to continue the script execution.



Principle of operation

- When executing the script given by the instructor, you must perform the following typical actions:
- When dialog boxes with the OK key appear, you must read and listen to the information provided, and then press the OK key to continue the script execution.
- When the MY ACTIONS button appears, you need to press it, and then answer the question of what action you need to perform. The script will continue after the correct answer.
- When executing the script given by the instructor, you must perform the following typical actions:
- When dialog boxes with the OK key appear, you must read and listen to the information provided, and then press the OK key to continue the script execution.
- When a rotating arrow or a blinking object appears, you need to approach the indicated arrow or blinking object and press the arrow / selected object.



Examples

Examples:

<https://youtu.be/7ltgKbAKRuA>

<https://youtu.be/mBeI2SSQTOU>

https://youtu.be/KRoXCj_0L04

<https://youtu.be/W3LXV9qHsmU>

