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Full Length Research Article

THE DESIGN AND IMPLEMENTATION OF PROFESSIONAL QUALITY TRAINING SYSTEM FOR OIL WORKERS IN OIL GATHERING AND TRANSFERRING ENTERPRISE

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ABSTRACT

Oil gathering and transferring faces serious production safety problems because It has the meaning of the special industry characteristics, such as huge transfer station distribution, complex technological process, rich equipment, strict operating norms, potential risk more and dispersed. Company employees need excellent operation ability, strong safety awareness and risk handling capacity. Education and training is an important means to cultivate professional literacy skills. Skills training system of oil worker in oil gathering and transferring enterprise comprehensively uses computer multimedia technology and virtual reality technology to develop training courses, and uses video on demand system based on flash components to integrate curriculum. The system not only improves the efficiency of the enterprise staff training, also provides effective reference for the learning-type enterprise strategic planning approach.

INTRODUCATION

Oil gathering and transferring faces serious production safety problems because It has the meaning of the special industry characteristics, such as huge transfer station distribution, complex technological process, rich equipment, strict operating norms, potential risk more and dispersed. Company employees need excellent operation ability, strong safety awareness and risk handling capacity. Education and training is an important means to cultivate professional literacy skills. At present, the oil field operation skill training usually use to watch video operation training, learning from books or classes and other concentrated training, there are a lot of disadvantages (LIN Lin and LIU Xian-mei, 2012). Such as high training costs, long cycle, limited training effect, the abstract is difficult to understand, the contradiction between work and learning, etc. With the development of computer multimedia technology and simulation technology, enterprise e - learning system can not only targeted to solve the above problems, and provide effective way to realize the learning-type enterprise strategy.

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Training system design

The design of training content and target

The oilfield company work area across the two provinces (Shaanxi province, Ningxia province) and three counties (Jingbian, Dingbian, Yanci), consists of seven transfer station, bear the crude oil transmission tasks. Oil gathering and transferring has special industry characteristics, such as huge transfer station distribution, complex technological process, rich equipment, strict operating norms, potential risk more and dispersed. All company staff must know risks, understand the principle, do operation, do disposal. Through the analysis of oil process, the training content and goal of design are as follows.

The process flow shows: let employees through video images, voice and other multimedia course of study, master oil process by providing employees with a clear view of the technological process.

Working principle explanation: make the staff understand main equipment working principle from the three-dimensional anatomy on the structure, principle by computer 3d imaging technology (Garland and Heckbert, 1998).

Operation practice: on the basis of the grasp the working principle of the main equipment, make the employees master their skills through the virtual operation that it is man-machine interactive system developed by virtual reality technology (Ren Wei-Jian, 2005).

Risk early warning disposal: through virtual demonstration way make employees master contingency plans. Such as fire alarm, gas alarm, crude oil leak alarm, etc.

Training system architecture design

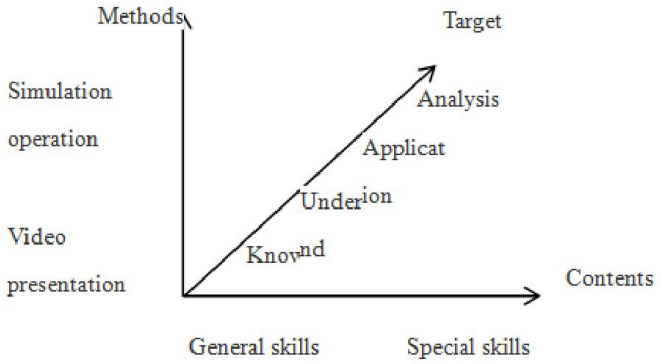

Fig. 1. Training system architecture

Overall architecture design of oil companies oil worker skills training system are shown in Figure 1 below. The transfer station of oil process is not the same because there are much same, such as Oil depot in different geographical, geological, production time. So the training content is divided into general and special skills. General skills are all oil workers must master the basic skills, including the general picture of the entire area oil pipeline, general oil technological process, general major oil equipment, standard operating procedures and post emergency disposal. Special skills are unique to each terminal technology to master the skills, including the terminal area is introduced, the function is introduced, the main station, the unique technological process, etc. Oil workers skills training system integrates demonstration and simulation operation. Post core skills are taught to trained staff by integrating use of 3 d models, video, text, images and sound explanation, etc. It has also developed a virtual simulation system for high risks, sophisticated equipment and operation process. Let employees to simulate operation and enhance practical ability on the basis of demonstration study.

Training content development

The technology roadmap

It reproduced production equipment and production scene through 3 d imaging technology, using virtual reality technology production scenarios interaction and control. It integrated application of animation technology and visual, audio technology, explaining the equipment working principle, operation method, flow switch and warning disposal, etc.

Content about demo develop

Firstly, it generated model of the production equipment, scene, plumbing by 3 d graphics software - MAX 3 d modeling according to each oil equipment drawings, operation instruction, combined with related processes and standard operating procedures. And then it generated video training course by using animation, audio and video editing techniques to interpret the production process, equipment, working principle, operation method and contingency disposal, etc. It generated operating demonstration video courses for standard operating procedures and key equipment standard operation training by shooting the site operation into video, the late video editing and sound synthesis.

Content about the simulation operation develop

Using 3 d interactive software Platform of VR Platform will build a good data model into one complete system interface, the environment configuration, according to equipment structure and instructions to achieve interactive operation. It can do disassembly and assembly equipment, look inside the equipment structure through the mouse control (Sayers and Wilson, 2004). As shown in Figure 2. It implemented simulation operating procedures according to the standard process. It developed the scene simulation cruise. Employees can look around the main campus, familiar with the environment, to understand the process through the mouse and keyboard. As shown in Figure 3.

Fig. 2. Major general oil equipment, the gate valve

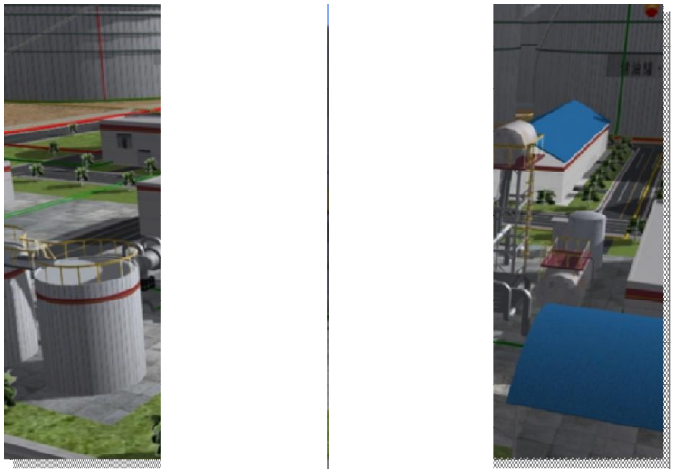

Fig. 3. The plant simulation

Training system implementation

Technical Solutions

The integration of Training content use the video on demand system based on flash components. Video on demand system

based on flash components mainly adopts navigation component, content rendering the component and the representation of a data component to build system layer, data layer and resource layer, and complete the classification of the audio and video files management, storage, description, and on demand, in order to realize the user on-demand broadcast audio program (Huanchenglin and Chen Jianwei, 2012). The presentation layer: provides a user interface, load and display the external data and resources. It is mainly accomplished by two types of components: navigation components and content components. Navigation component includes List, Menu, Tree, etc. Its function is to display the data component import external XML data to set up navigation system. Content rendering components mainly includes FLV Playback, Loader, Scroll Pane, etc., its role is to load and display the external resources, such as: FLV Playback components can display FLV video files. Through component data binding function, it can easily realize the transmission of data between the components.

Data layer: it is the operational layer of raw data, specific to provide data services to the presentation layer, mainly including data description and data connection through XML and XML Connector implementation respectively. XML can be defined according to the needs of the data provider tags, attribute name and description methods. It markups depicts the raw data of the resource layer by XML. The component of XML Connector is the connectors between other components and the external XML data sources. The external XML data is loaded into the Flash to be used by other components (Zhao Zhijing, 2007).

Resource layer: this layer is mainly structured raw data. Resources including text, images, animation, audio, etc are decomposed into relatively independent, particle size smaller parts for the presentation layer.

The implementation process

Training video on demand system based on the flash component implementation mainly is divided into five steps:

Materials to prepare —— resource layer

Copy all FLV video training courses in a folder to generate root directory. And file structure are build according to logic structure of the training content.

generated XML file—— the data layer

Firstly, create an XML file that it describes the video to load resource name and URL address. "Label" and "URL" is used to describe video resources are two basic properties: name and location. The XML document is a tree structure, it from the beginning of the "root", then "branches". "Root" tag is the root of the XML document elements, and "node" tag is the root element of the following child elements. A root element can have multiple child elements. "Sub node" tag is "node" element to the following child elements. Each child element can also have multiple child elements.

Implementation data binding by using XML connector component -- the data layer

1. Set parameters of XML connector instance. Sets the URL value to the previously created .XML documents .Data transfer direction is set to receive that it is meaning only the XML data into Flash movie.
2. Binding data between XML Connector components with XML.

Creation of navigation system—— the presentation layer

1. Create a list component, and instantiated.
2. Binding XML Connector components with the list components.
3. Trigger XML Connector component in order that the XML data is loaded into the program. The trigger code is as follows.

```
Var cnc: mx. data. components. XML Connector;
cnc. trigger ( ) ;
```

Create Windows video playback

1. Create a FLV Playback components, and instantiate and set attributes.
2. Binding FLV Playback components with the list components.

Training system implements results

Training system is divided into eight modules, including a public module (general skills training) and 7 terminal module (specific skills training). Public module provides oil general skills for all employees learn.

Public module system consists of two parts: explain the demonstration and simulation operation. The overall effect of public module system is as shown in Figure 4. The learning of demonstration operation only need single machine on the left menu to select the corresponding project, and then play the video in the video broadcast on the right window. For the study of simulation operation, you need select someone item, and then you will enter a new website that it provides some items. The executable (.exe) virtual simulation software will be opened when someone item is clicked. The results of virtual simulation software opened are shown in Figure 5 below.

Fig. 4. The overall effect of public module system

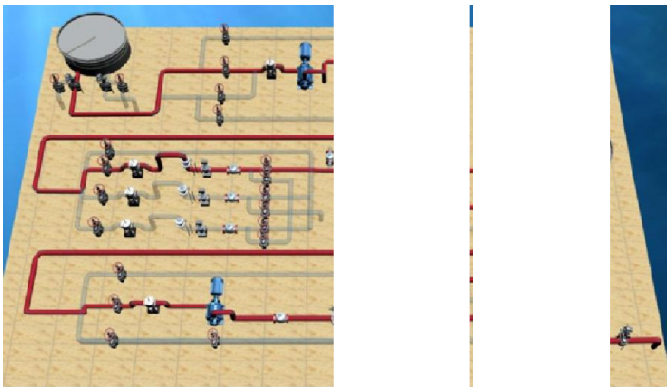

Fig. 5. Oil process simulation

The training system of oil gathering and transferring worker skills has on-line application 1 year in a certain oil enterprise. And practice shows that the system fully functional, stable running, convenient for employees learning, scientific and effective content construction. It can meet the demand of the enterprise staff skills training reality.

Conclusion

Skills training system of oil worker in oil gathering and transferring enterprise comprehensively uses computer multimedia technology and virtual reality technology to develop training courses, and uses video on demand system based on flash components to integrate curriculum. The system not only improves the efficiency of the enterprise staff training, also provides effective reference for the learning-type enterprise strategic planning approach.

REFERENCES

LIN Lin, LIU Xian-mei, Design of Training System of Oil Field Simulation Basedon Virtual Reality Technology, Computer technology and development, 2012 (10), 205-208.

M Garland, P S Heckbert. Surface simplification using quadric errormetrics. PhD thesis, CS Department, Carnegie Mellon University, 1998

Ren Wei-Jian, Application of Virtual Reality Technology in Simulation Training of Transportation and Storage of Oil and Gas, Journal of system simulation, 2005(6),33-34.

Sayers H M, Wilson S. Navigational tools for desktop virtual environment interfaces, Virtual Reality, 2004 (7): 131 ─139.

Huanchenglin, Chen Jianwei, Video on demand system three layer structure design and realization based on flash components. Digital technology and application, 2012 (10), 158-159

Zhao Zhijing, Design and implementation of video on demand system based on Flash + XML + FMS, China's education informationization, 2007(8),48-52

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