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VISUALIZATION OF SPATIAL ISSUES IN ADOBE ACROBAT 3D PDF

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In descriptive geometry spatial issues are presented in various methods of projection, which are often difficult to understand for a beginner student. To enhance student's spatial perception it is recommended to use real models which can be viewed from all sides. Virtual models created in CAD and BIM applications are also very important. They can be viewed on screen in a strictly planned mode or freely. The first occurs during a „step by step” presentation of predefined views or during an animation, where the transition between the scenes takes place in a smooth manner. In this case the viewer may only decide which stages of the presentation repeat. The free manipulation of the model is available in the source file or in the appropriate browser (e.g. in AutoCAD and free browser Autodesk Design Review *DWF*). However, in this case the software should be installed on the recipient's computer.

Currently, it became possible to view 3D models in a widely used, free Adobe Reader (from version XI). Spatial models can be constructed in various programs CAD and BIM and then exported as 3D PDF or U3D file using a separate Toolkit utility. Unfortunately this software is not free at present.

The article presents the use of 3D PDF for visualization of selected issues, which can be used in teaching materials, as well as during lectures of descriptive geometry. The presented models were constructed in AutoCAD 2014, and then exported to a 3D PDF files. (Fig.1)

The article focuses on following issues:

- 4- preparation of a model in AutoCAD (layers, colours, lines, points, planes, solids)
- 5- predefined (by the author) settings for viewing in 3D PDF (view settings, lighting, comments)
- 6- free viewing options by the user (rotating, moving, measuring, views, lighting, cross-sections, comments).

The 3D PDF model can be viewed in many ways, but the geometry of the object cannot be changed and it also cannot be re-exported to the source software. The model can be visualized and manipulated in many ways, it can be rotated, moved, zoomed in. Moreover the rendering mode,

lighting and the background colour can be also changed. The layers of original drawing and the elements of the model can be freely switched off, it is possible to add comments and create dynamic cross-sections.

The 3D PDF files can be inserted into pre-existing PDF files and thus enrich the visual presentation. From this point of view, the described technology can significantly improve the existing teaching materials without the need for total reconstruction. It seems that the described technology will quickly find wide application in engineering education.

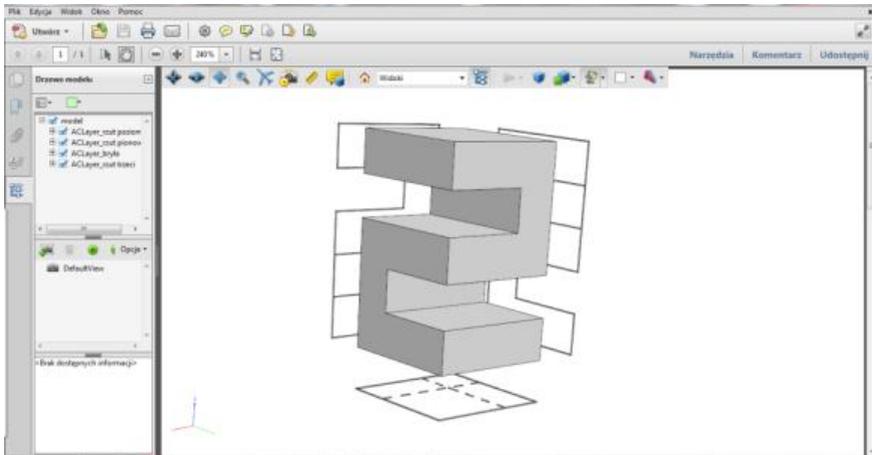


Fig.1. The model and the views on three projection reference planes, model 3D PDF