Facilitating 3D Technologies and Photorealism to Enrich e-Training Content for Engineering Students

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Introduction

The use of computer-aided and web-based educational technologies has increased significantly in the recent past. The asynchronous e-learning platform PME-Moodle constitutes an indicative practice for this type of technologies, investing and capitalizing in the importance of 3D graphics as means of educational content.

The delivered platform instance was piloted and evaluated by engineers and students of the production engineering and management department. The evaluators were asked to browse and experience the platform's content and features, in order to assess their ability to convey and upgrade the learning experience.

Goals

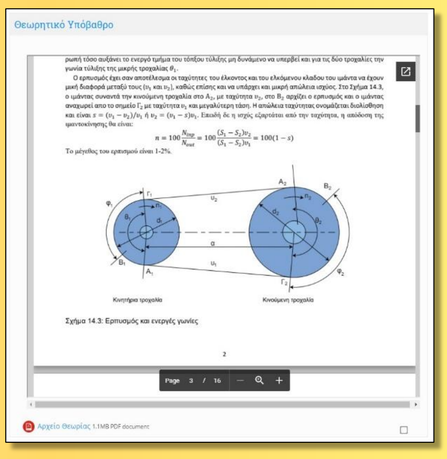
The presented research has the following goals:

- ✓ Employ 3D models and 3D animations to enrich educational material for mechanical engineering topics: convey the geometry and functional behavior of machine elements
- ✓ Use photorealism to enhance the quality of learning objects and multimedia content, aimed for consumption by engineering students
- ✓ Evaluate an e-Training platform equipped with content and tools that deliver, handle and visualize 3D learning objects

Required theory and methodology with structured lab notes and detailed schematics

01

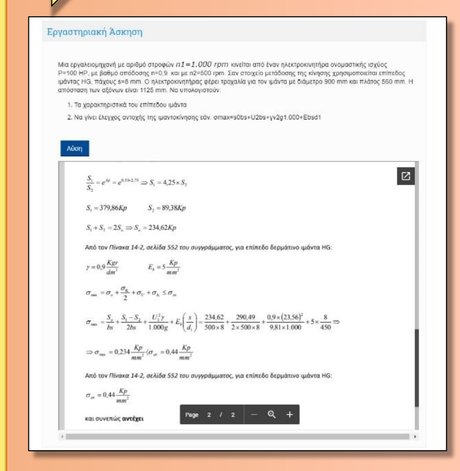
Theoretical Background



Exercise description and starting data
Access to its solution and correct results

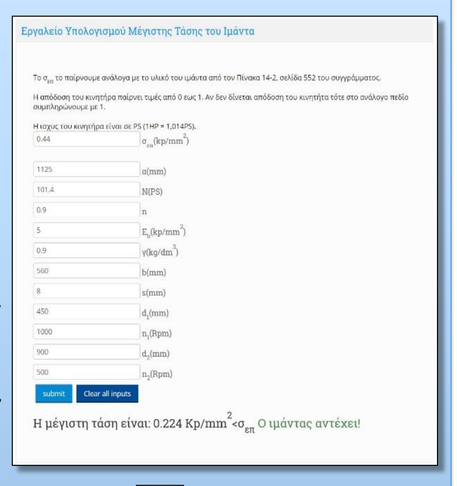
02

Lab Exercise



03

Calculation Tool



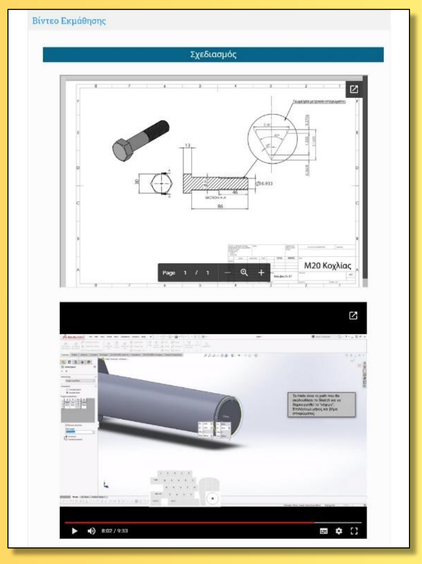
Calculation forms supporting each lab exercise: verify the result and check its status for different inputs

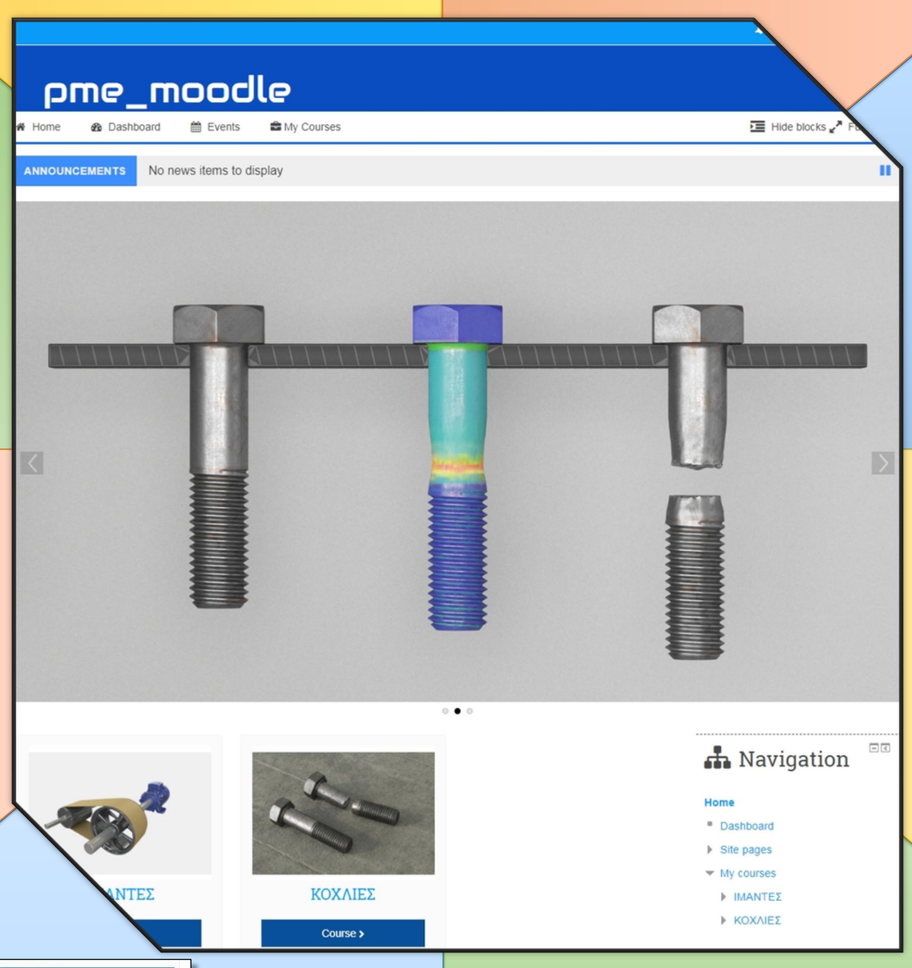
04

Training Videos

Design

Training videos for designing the parts



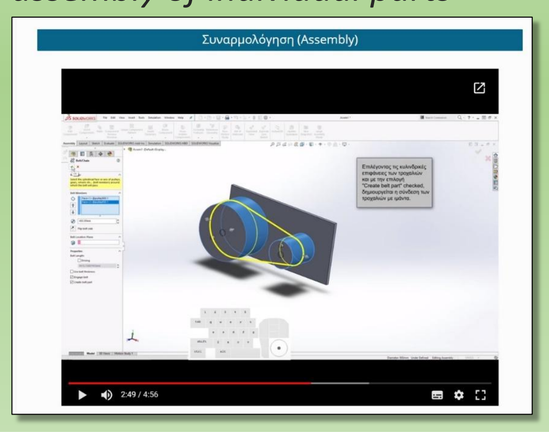


05

Training Videos

Assembly

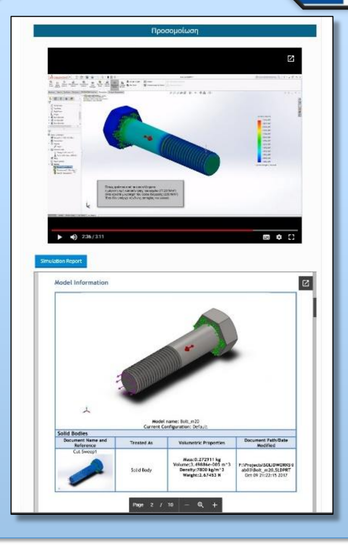
Training videos for the assembly of individual parts



06

Training Videos

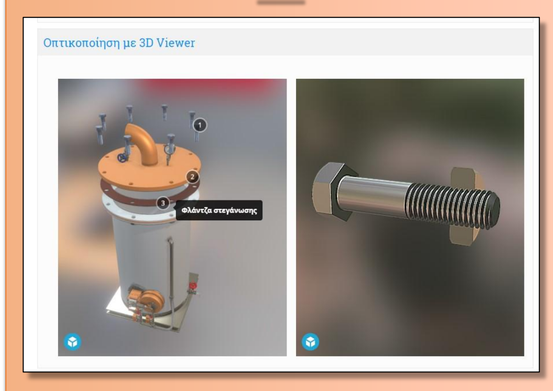
Simulation



Training videos following the simulation steps and providing the final report

07

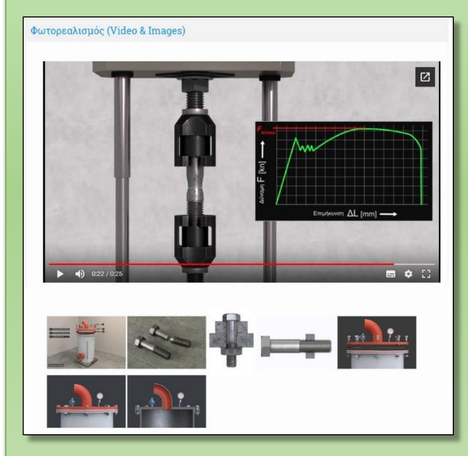
3D Viewer



Real time viewing of 3D models with user-handled camera angle and annotated design points

08

Photorealism



Animations and photorealistic still images of 3D models that support the understanding of complex parts

Evaluation

The piloting was concluded with the use of a questionnaire, facilitating the capturing and collection of user feedback. The questionnaire recorded how and at what extend the 3D content managed to have a positive effect in the understanding of the training material, the apprehension of the exercise and the interpretation of its results.

Result

The results revealed that the use of photorealistic images, animations and real-time projection of 3D models, managed to significantly improve the perception of complex machinery and how they operate. This blend of technologies offer the tools to refine and upgrade the role of 3D representations in the education context of any engineering domain.