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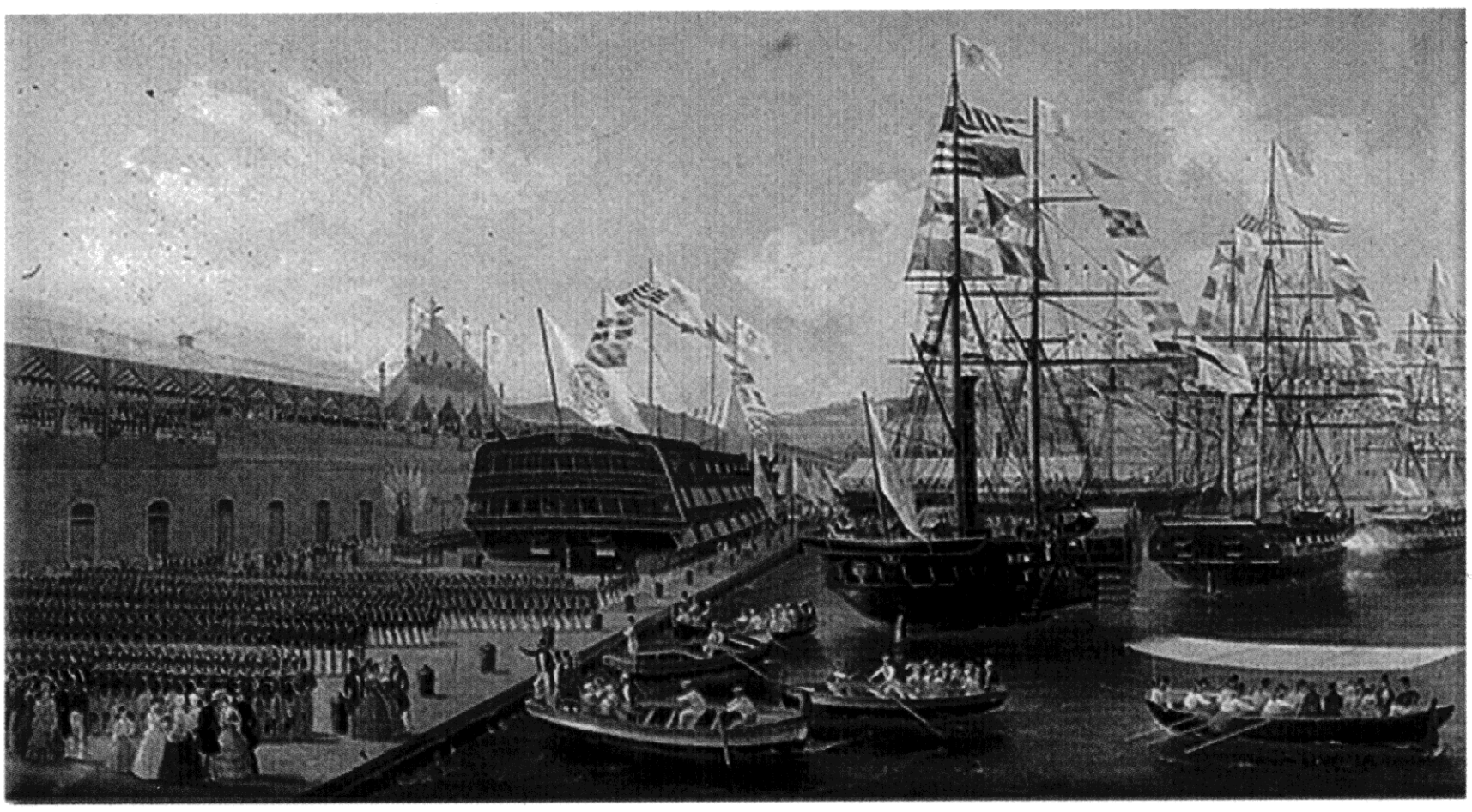

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Aplicación docente de un programa de modelado 3D mediante bocetos axonométricos

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ABSTRACT

Acquiring *spatial vision* ("the ability to picture three-dimensional shapes in the mind's eye"). is important for the future engineer, but the process becomes very complex when three-dimensional shapes are manipulated through two-dimensional static drawings. It is far better to deal with models, even though they are "virtual" models and are displayed by means of two-dimensional representations. In spite of these advantages and although design through virtual prototypes is being introduced in advanced courses, design through drawings is still used in basic courses (but with the introduction of the new computer-aided drafting tools). The consequence of this is that these courses attempt to combine learning the essentials of representation systems with the acquisition and/or consolidation of spatial vision. CAD modelling applications are not used for this purpose because their interfaces are not very user-friendly. Moreover, the interfaces of CAD modelling applications, in addition to not being user-friendly for those who have not acquired spatial vision, are of no use in the conceptual design phase, where incomplete ambiguous ideas are being handled. This shortcoming of CAD systems makes teaching students to sketch with "classical" instruments (pencil and paper) an even more important objective in Engineering Graphics courses. One undesirable consequence is that the current situation forces the planner to generate the design by means of rough drafts and sketches and later to construct the model on a CAD system once the process of drawing the rough draft has finished, which creates the bad sensation of "repeating the same work".

We present a computer program that attempts to solve the situation we have described above. The application provides the user with a *virtual pencil* with which to draw freehand on a sheet of *virtual paper*. The sketch introduced by the user is a (pseudo-axonometric) pictorial representation of a polyhedral shape. The application includes an analyser that automatically recognizes and reconstructs the three-dimensional model sketched by the user. If the sketch contains very important imperfections, a second module is activated which "repairs" the sketch before reconstructing the model.

The sketcher is a simple tool and it is easy to incorporate into a design-by-drawing syllabus. Its main value lies in its being able to reinforce the capacity for spatial vision at the beginning of the course. It is especially appealing because in that moment the student still does not have enough skill in handling commercial 2D CAD programmes, and also because the tools for drafting axonometric projections included in these programmes are very limited and force the user to work in a way that is not particularly natural and not at all user-friendly.

Secondly, the sketcher makes learning the absolutely necessary skill of sketching more attractive to the student because, since the final model is generated automatically, the feeling that sketching is "pointless work" disappears.

The first tests carried out in the classroom have offered very promising results.

Key words: Methodology and innovative teaching experiences. Educational software. Engineering graphics. Computer-aided sketching.