

DEDICATION

This textbook project is dedicated to Professor Susan Sherod, Engineering Department Chair at Santa Ana College, best friend, supervisor, and role model, and an ardent supporter of the implementation of new technology in engineering education; and to the Engineering Department at Santa Ana College, where I started my career as a college instructor since Fall 2001.

ACKNOWLEDGEMENTS

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ABSTRACT

Engineering Descriptive Geometry: A Collection of Teaching & Learning Modules for the Dummies With Autodesk AutoCAD & Inventor

By

Edward Locke

The purpose of this collection is to study the capabilities of computer-aided drafting (CAD) programs in solving mechanical engineering-related descriptive geometry problems with both 2D and 3D tool sets; and to explore the ways 2D drafting tools of Autodesk AutoCAD program can be used to teach and learn engineering descriptive geometry-related orthographic projection theories, and the ways to solve mechanical engineering-related descriptive geometry problems with the 3D tools of Autodesk Inventor program, with step-by-step hands-on projects.

The literature review (investigation of existing textbooks in the library system of the California State University system, the textbooks currently used in the descriptive geometry courses taught at local community colleges in Southern California, as well as those available in the current publishing market) reveals that:

- Many textbooks have been published on solving descriptive geometry problems using traditional board drafting techniques;
- Only a few textbooks have been published on solving descriptive geometry problems using 2D tools of Autodesk AutoCAD, and for those that are available, only relatively small coverage of topics is offered; and
- No viable textbooks have been found dealing with the solution of mechanical engineering-related descriptive geometry problems using the 3D tools of parametric CAD modelers such as Autodesk Inventor.

Due to the fact that parametric 3D CAD modelers are increasingly employed in the real world of engineering design and drafting, this collection of teaching and learning modules shall make a contribution to updating engineering drafting courses offered at community colleges and universities to the most current CAD technology, and serve as a template for future development of teaching and learning materials on the solutions of engineering descriptive geometry problems using the 3D tools of other parametric 3D

CAD modelers, such as SoliEdge, SolidWorks and CATIA, which is beyond the scope of this Thesis.

This thesis/project, and the attached collections of teaching and learning modules based on AutoCAD and Inventor can be used in a typical college-level engineering descriptive geometry or sheet metal design course, as a principal textbook or as auxiliary learning materials.

Edward Locke's Résumé

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PROFESSIONAL OBJECTIVE

To become a university professor in engineering and technology education.

EDUCATIONAL BACKGROUND

Undergraduate:

- Bachelor of Arts in Art 3D-Industrial Product Design (California State University, Northridge, graduated June, 1994).
- Certificate of Competency in Computer Animation (El Camino College, graduated December, 2004).
- Courses in mechanical engineering since 2002.

Graduate:

- Master of Arts in Industrial & Technical Studies (Department of Technology, College of Engineering, Science, and Technology, California State University Los Angeles, graduated Summer 2007).

WORKING EXPERIENCE

Professional:

- Consumer product and graphic designer since 1994, including
 - Full-time employment with The University Improvement Corporation at California State University at Northridge, and Sunrider International; and
 - Freelance professional service for local clients.

Teaching:

- Part-time instructor (engineering drafting with AutoCAD and Inventor) at Santa Ana College (since Fall 2001).

HONORS & RECOGNITION

- Honorable Mention from the 1993 GoldStar International Design Competition, for the design of an innovative and ecologically-friendly multi-functional food processor (ergonomic, aesthetic and functional design);
- Scholarship Awards from The Asian-Pacific Association of Los Angeles Community College District (1989 and 1990);
- Boeing Technology Award from Cerritos College (2004);
- Honors Student, California State University, Los Angeles (2006);
- NCETE Ph.D Fellowship (will start Fall 2007).

PROFESSIONAL WRITINGS

College level engineering descriptive geometry textbook:

- *Engineering Descriptive Geometry: A Collection of Teaching & Learning Modules for the Dummies with Autodesk AutoCAD & Inventor.*