

Collaborative Design across the United States

*Thomas M. Singer
Sinclair Community College*

*Scot Rabe
Ventura College*

*Steve Brown
College of the Redwoods*

ABSTRACT- How Community College design programs have linked up in developing curriculum and student projects in using collaborative design methods in the classroom.

Project / presentation overview

www.designcollaborative.org

The design of manufactured parts at times requires a team effort. This team effort may also require having to work with other design teams that are separated by a great distance. Getting design and drafting programs to simulate this type of commercial interaction has been traditionally difficult. Our Design program at Sinclair Community College and the Design programs at Ventura College, and College of the Redwoods have teamed up to develop modular curriculum in collaborative design and created a design “out of the box” style project that can be used by any design or drafting course /program to get started in using collaborative design and working with other design programs.

The presentation will focus on the development of the original collaborative design curriculum integration concept, how the concept has been implemented into our curriculum, the tools that are involved and how it can easily be placed into any curriculum of a drawing or design class.

This presentation will also provide information on our National Science Foundation funded grant for faculty development on collaborative design and rapid prototyping /tooling. Community college and undergraduate faculty will have the opportunity to receive an immersive “hands on” look at applying this “out of the box” collaborative design or rapid prototyping curriculum beginning August 2005 at the campuses of Sinclair community College and Ventura College.

This weeklong training program will provide an in depth look at how to integrate collaborative design into a curriculum, provide training in parametric design software and collaborative tools, and participate in a collaborative design process during the weeklong event. There is also a stipend available to help offset travel expenses.

Beginning in the summer of 2005 a network of community college design programs will start a design resource bartering network focused on sharing resources that are used in design curriculum. As educational budgets get slashed across the United States every program cannot have the absolute latest tools used in design and rapid prototyping. Team up with other colleges from around the nation to participate in a barter of tools and resources with other design programs.

Key topics of the weeklong event are:

Collaborative design: What is it?

What software tools are involved in collaborative design?

How can collaborative design get implemented into my curriculum?

How can you get more training in collaborative design?

What is this design resource barter network?

I. INTRODUCTION

a. Background information on collaborative design

Internet e-mail communication has been used for almost ten years. As the user base increases, more tasks are implemented on the Internet platform. For example 15 years ago most engineering drawings made in industry were accomplished using traditional drafting instruments and paper. As the industry progressed into the personal computer age, the new avenue of applying e-mail as a tool emerged, for example engineering technicians send engineering drawings across the world from industrial design firms to manufacturers.

In just the last seven years another tool, termed Instant Messaging, has become available over the Internet to aid in communication. This tool can be employed into the drafting and industrial design process as well. Instant Messaging provides real time communication and file sharing between two or more individuals. Several software and portal companies provide these feature-laden tools as a free or low cost service. Besides direct real-time communication, some additional features include sharable whiteboard, immediate file sharing, live video capabilities, web to phone calls, and messaging archives. The availability of a person is personally controllable within the software. Since these tools use existing Internet access capabilities, they can be used through firewalls in a text mode.

These instant communication tools have greatly expanded in use within the industrial sector. The CAD industry is rushing towards Collaborative Design. Theoretically this could link industrial designers in different countries and time zones, saving them from expensive trips and overnight mail bills. (Cahners, 2002). The benefits reach beyond cost saving. This form of communication and development is part of a growing trend within the manufacturing community. The focus to move industrial design to production cycles to a shorter time frame, and the vast outsourcing of industrial design work, has made these tools a necessary part of the industrial design landscape.

Another strategic imperative for collaboration is emerging from a basic transformation in discrete manufacturing. As the build-to-demand model replaces yesterday's build-to-stock paradigm, the ability to collaborate with customers and suppliers at a product engineering level becomes a primary competitive tool. It is a need that has been transforming the product strategies of companies that were once known for their ability to deliver CAD/CAM solutions. (Teresko, 2000).

These collaboration tools are being incorporated into industrial design software packages like Pro-engineer, Solidworks, Inventor, and AutoCAD. Interestingly engineering technicians in industry use the collaborative tools yet there is little use of these tools within the educational industrial design community. Few of the concepts are incorporated into the associate degree industrial design curricula. The Collaborative Design track for this grant will provide the necessary instruction, hands-on experiences, and the tools needed to apply this technology in a real-time manufacturing scenario.

b. The training event in collaborative design

The Collaborative Design track faculty training will revolve around classroom activities that use the web-based collaborative design tools in the development of an assembly part for an enhancement for a common household item. Faculty in their classrooms can directly apply this exercise by having their students' link up with students in other classes either locally or across the country or world. The project website developed by both colleges will provide not only the dissemination of information provided in the training module, but also serve as a database of collaborative design operations. As a participant in this track, the instructor agrees to implement a collaborative design module.

Collaborative Design has a huge opportunity to be embraced by the educational community. As budgets in the educational community continue to shrink, the application of collaborative design tools will maximize the investment in purchased equipment through a bartering process between classes. The project website will advertise the availability of equipment for loan at no cost/or at cost recovery to participants. Participants will be able to request equipment via the web site and share activities resulting from the borrowed items. Between institutes, the web site postings and forum discussions will engage participants in regular communication. This website of information will become the hub to the spokes of design collaboration between two year community college industrial design programs across the United States.

Since the expected group of faculty participants will be diverse in skills, a design skills inventory, completed during the selection process, will be used to develop industrial design teams. The instructional module will be a full week of hands-on instruction embedded with classroom implementation ideas that faculty will bring back to their industrial design programs.

Faculty in California and Ohio will collaboratively design parts using industrial design tools and Internet-based Instant Messaging tools to enhance common household items found in national chain stores.

The Collaborative Design enhancement training is broken into several topic areas:

1. First, faculty will investigate collaborative design tools (Internet based and either low cost or free) and how the design industry uses this technology to aid in the design process.
2. The second topic is a primer/review class in parametric design software, the use of 3D parametric design software allows easier coordinated changes to designs.
3. The third component of the training brings the technical concepts into the classroom. The participants will work with their corresponding development team counterparts (Sinclair and Ventura College) to develop design changes on readily available household items found at national chain stores. After completing the Collaborative Design Institute, each participant will have the design and a prototype of the design on which they worked. This enhancement task can be used as a complete plug-in learning enhancement into a design curriculum. The website and collaborative design database will allow faculty to partner on design projects to allow students to experience the use of teamwork and to overcome the hurdles of working with regionally displaced partners.

Through our corporate partner network participating faculty will go away with prototype models of their teams design, and Inventor parametric design software developed and donated by Autodesk.

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II. REFERENCES

Cahners (2002). .TV viewers share interactive images on screen just like CAD,.

Manufacturing.net, Cahners Business Information, May 6, 2002.

Teresko, John (2000). .E-Business.E-Collabrati.on., *Industry Week.com*, June 12, 2000.

Biographical Information

Thomas Singer, Project Director, is Associate Professor of Drafting and Industrial Design Technology. Mr. Singer manages the PC-based hardware and software courses for the drafting and industrial design program. He is a Certified Manufacturing Engineer Technologist and a member of the Sinclair faculty since 1987. Mr. Singer's duties include input to international CAC certification examinations (National Coalition for Advanced Manufacturing and AutoCAD), solid model geometry and animations. Mr. Singer has participated in international exchange programs focusing in CAD education in both Brazil and India, and he manages Sinclair's Autodesk Software Training as an Autodesk Authorized education partner.

Scot Rabe, Principal Investigator, is Professor of Machine Technology and teaches in the departments of Manufacturing Technology and Design/Drafting Technology at Ventura College. His duties have included management of high school articulation and Tech Prep programs for Ventura College's division of Business Industry and Technology. Since joining the college in 1984 he has developed and taught the Autodesk Authorized Training Center, managed the Bridgeport Machine Tools EZCAM training center and

planned for the implementation of The VC Manufacturing Technical Center in Santa Paula.

Steve Brown, Faculty Presenter, is Division Chair for the Business and Technology Division and a Drafting Technology faculty member from the College of the Redwoods (Eureka, CA). He is the program coordinator for the award winning Authorized Training Center for Autodesk which offers courses in traditional technical drawing concepts, 3D animation and rendering, solid and parametric modeling, video output, and discipline specific CAD applications used in the areas of mechanical, architectural, and civil engineering design.