

Collaboration Unit

General comments and pedagogical issues on collaborative design

Objectives

This chapter should enable you to achieve the following objectives:

- § Plan for and use collaborative design teams in your design course
- § Describe design teams and their place in the design scenario
- § Establish student roles and the function of team members
- § Create and manage design teams
- § Evaluate team members and design team progress
- § Model a classroom scenario that mimics a design office

Notes to Instructor

· This module covers the drawing management tools built into the Autodesk Data Management software products and services: Autodesk® Vault, Autodesk® Productstream™, and Autodesk Streamline®.

What is Collaborative Design?

Collaborative design involves groups of student designers working together to solve a problem. These groups of designers create a series of parts, handing them off to each other and pulling in expertise, as needed, from a diverse group of contributors throughout the design cycle. This flexible, concurrent design process results in reduced design times and faster-to-market products.

Why Collaborative Design?

Learning is a natural social act that takes place as students work and talk among themselves. Collaborative learners actively engage in exchanging ideas with each other, which results in exposure to different perspectives. Collaborative design and learning shifts learning from a teacher-centered to a student-centered model.

Design Teams

Design collaboration reduces product development cycles and cuts production costs. The design

team is comprised of core members responsible for the final design; and support team members made up of other contributors who represent such areas as marketing, customers, suppliers, manufacturing, and service or support, such as packaging and transportation etc. These team members work in tandem throughout the entire product design process.

Design data management is central to successful product development. Data that is shared across the manufacturing process, including manufacturing, purchasing, and with external suppliers, accelerates the product development cycle and moves the product to market faster. Collaborative design relies on shared vision and accurate data available to all members of the design team. Autodesk data management solutions Autodesk Vault, Autodesk Productstream, and Autodesk Streamline enable design teams to accelerate product development cycles.

Student Roles on Design Teams

By combining groups of students into teams and providing team members with a focused design intent such as manufacturing, marketing, etc., we create a design/problem solving collaborative similar to current industrial models.

Determine the team size by the length of the project: the shorter the task, the smaller the team. Remember it takes time for members of any group to become comfortable together and for each member to understand the roles of his or her peers. Although all of the team members are working on the same design problem, they will have different areas of interest that will motivate their design objective. They will have opportunities to review and reflect upon their work with other members of the team.

When putting design teams together or when establishing the tasks for design teams, it is good practice for the project manager (instructor) to do the following:

- Explain the task to the team members.
- Explain the project objectives and connect them to previous projects and experiences.
- Describe the overall project ideas and the procedures to follow for successful collaboration.
- Use examples of related tasks when needed.
- Review and reflect with the team members to grasp if they have a general understanding of the project.
- Review and describe how team members will interact, the social skills needed, and the overall team structure.

Some areas of design focus for multidisciplinary teams are as follows:

- Design concept creation
- Design development
- Ergonomics
- Environmental issues
- Interactive design and testing
- Engineering

- Packaging
- CAD drafting
- Vendor sourcing
- Patent research
- Brand development
- And others

Plan the team membership and organization to promote interdependence among the team. The design complexity of the project may dictate which areas of design focus are needed and which should be reviewed.

The foundation of Autodesk data management solutions is Autodesk Vault. This designer's tool provides the design team with a single, secure repository for design data. Autodesk Vault is integrated into all Autodesk manufacturing design software products and allows all team members access to the data they need *when* they need it, insuring that the design work in process will not be inadvertently overwritten.

Picking Teams

While there is no single way to determine who will be members of a team, there are some basic strategies that should be analyzed when creating a team:

- Building a team based on personality characteristics may create groups with similar or differing personality characteristics; which may or may not be useful, depending on the task.
- Building a team based on random selection is quick and easy, but may result in a single personality trait being predominant in one group.
- Building a team based on self-selection is simple and encourages potential team members to interact with one another. But introverted persons may be reluctant to participate and some people may feel left out. This may result in a less diverse mix of personality types.

What are Good Design Teams?

Good design teams

- are balanced teams consisting of members with complementary roles, a plurality of view points, a neutral manager, and a “wild card;”
- establish a social contract among members that relates to their purpose, and guides and obligates how they must work together;
- include design strategies, including reflection, that lead to the creation of a shared understanding and result in effective design outcomes.

Sharing design data and releasing documents and bills of materials is controlled with Autodesk Productstream. This tool for engineering design is used to maintain control over the design data until the product goes into production. All internal members of the extended team can access, review, and

add supporting data without overwriting the actual design data.

Evaluating Team Members and Design Team Progress

Collaborative design is a social experiment using concepts from science and management to direct the creative talents of a group or team of design professionals. Working in the field of product design, student designers use their skills in the following ways:

- Scientific methods
- Oral communication
- Written communication
- Teamwork
- Diversity and fair-mindedness
- Global and societal awareness
- Career applications

Evaluating small multidisciplinary teams requires the manager to closely observe the team members interaction during problem solving, brainstorming, and general team decision-making tasks. The manager should pay close attention to problem- solving conflicts, communication, and each member's influence on task outcomes. By using progress reports, daily work sheets, and participant journals to refer to while having team discussions or while reflecting on personal and team progress, the manager has documentation to evaluate team progress.

Autodesk Streamline provides a web-based, hosted project environment where customers, managers, and suppliers can access appropriate, up-to-date project information. Using the integrated Autodesk® DWF™ Viewer software enables extended team members to easily view the most current design data.

Collaborative design involves groups of designers working together to solve a problem. With the tools provided by Autodesk, this group of designers creates a series of parts, manages the design data, and hands them off to other members, confident that the data is current, safe from being overwritten, and assessable [\[RM1\]](#) to a diverse group of contributors throughout the design cycle. This flexible, concurrent design process provides reduced design times and faster-to-market products.

Where can faculty go for collaboration opportunities?

Practicing collaboration techniques in a classroom exposes students to processes that occur in current industrial settings. Providing exposure and tools to link up classes, such as Autodesk Streamline and other communication tools, adds another dimension to the collaborative process. The National Science Foundation ATE division has funded a project to educate faculty and expand the linking of classroom projects. *Collaborative Design and Rapid Manufacturing at*

www.designcollaborative.org is a site dedicated to educating faculty, providing a database resource in the design network, and providing a Web discussion group that faculty and students can use to communicate for projects. There are even some collaborative design projects available on the site.

The design network employs a database capability for instructors to provide a single-stop resource for project link-ups between classrooms. Also provided is a database of Rapid Prototyping and other equipment resources that are available from educational institutions on a no-cost or cost-recovery basis.

General Thoughts on the Module Exercises

The modules that follow have instructor demonstrations, student walk-through exercises and applied-learning tasks to reinforce the application of the tools. The focus is on learning the basic tools and then applying the knowledge in a learning task scenario. Take the learning task scenarios back to your classroom and use them with your students. This is the reason these modules are designed in this fashion.

The Autodesk Streamline website indicated in the module is available for your use. Remember, there may be others needing access, so be friendly and do not use all the logins for too long a period of time. It is recommended that no more than 10 accounts be used at one time for a duration not to exceed 2 weeks on the tutorial access. Also, when you're finished, have your students remove their work from the Autodesk Streamline site as a courtesy to others. If you see this software as a tool you would like to use full-time in the classroom, contact your Autodesk Education Representative about Autodesk Streamline opportunities.

If you have any additional comments or if you would like to share an innovative project, please visit www.designcollaborative.org and use the discussion group or the design network to share your ideas and applications of the tools provided.

Resource List

The following are a list of resources that were used in the development of the documents included in the collaboration unit.

- Doing CL: www.wcer.wisc.edu
- Peter F. Drucker, *Wall Street Journal* : www.web.cba.neu.edu
- William M. Gascoigne, CoCreate Software, Inc.: www.deskeng.com
- Alice Agogino and Shuang Song, University of California , Berkeley : <http://best.me.berkeley.edu>
- Teamwork, Facilitator Guide – Sinclair Community College , Advanced Integrated Manufacturing Center : www.aimcenter.org
- Autodesk Data Management Overview: www.autodesk.com

[\[RM1\]](#) Do you mean “assessable by” or “accessible to”?