Comparing ASDS to Existing Software for Engineering Conceptual Design

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Research Question

How does ASDS (Advanced Systems Design Suite), an engineering conceptual design software package, compare to other conceptual design tools in terms of efficiency, satisfaction, and ease of use as perceived and reported by engineering majors and/or professional engineers?

Conceptual Design

Conceptual design is the first phase of the engineering design process, where the initial idea and design are laid out. It is a critical stage in design as decisions made in this phase affect all design choices made later in the process.

CAD Software

Current software for conceptual design is limited. Currently CAD software is commonly used. However, there is concern that its focus on detail hinders output at the conceptual design stage. Here are some example toolbars from a CAD program. These demonstrate the complexity and number of features in these programs.
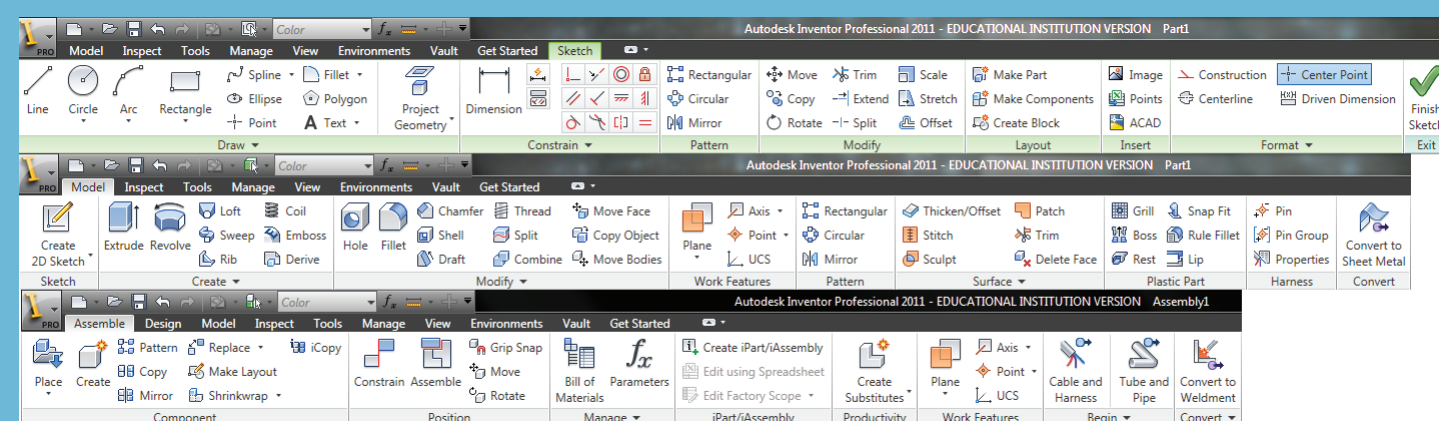
For this experiment, we chose to compare ASDS and Autodesk Inventor 2011. Autodesk Inventor was used in this study because its interface and functionality are representative of the most commonly used CAD programs.
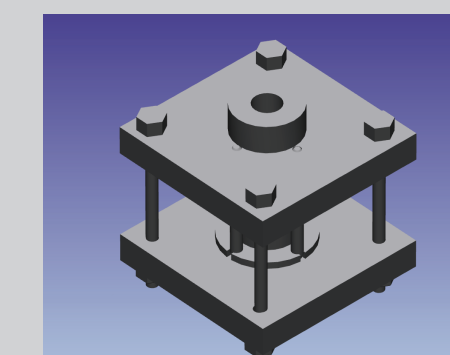
ASDS

The Advanced Systems Design Suite (ASDS) is designed specifically for the conceptual design phase. It features a simplified interface, lessened focus on details, and improved construction and manipulation of objects. The figure below displays the ASDS interface during the process of creating an object. One example of ASDS's relative simplicity is its streamlined toolbar.
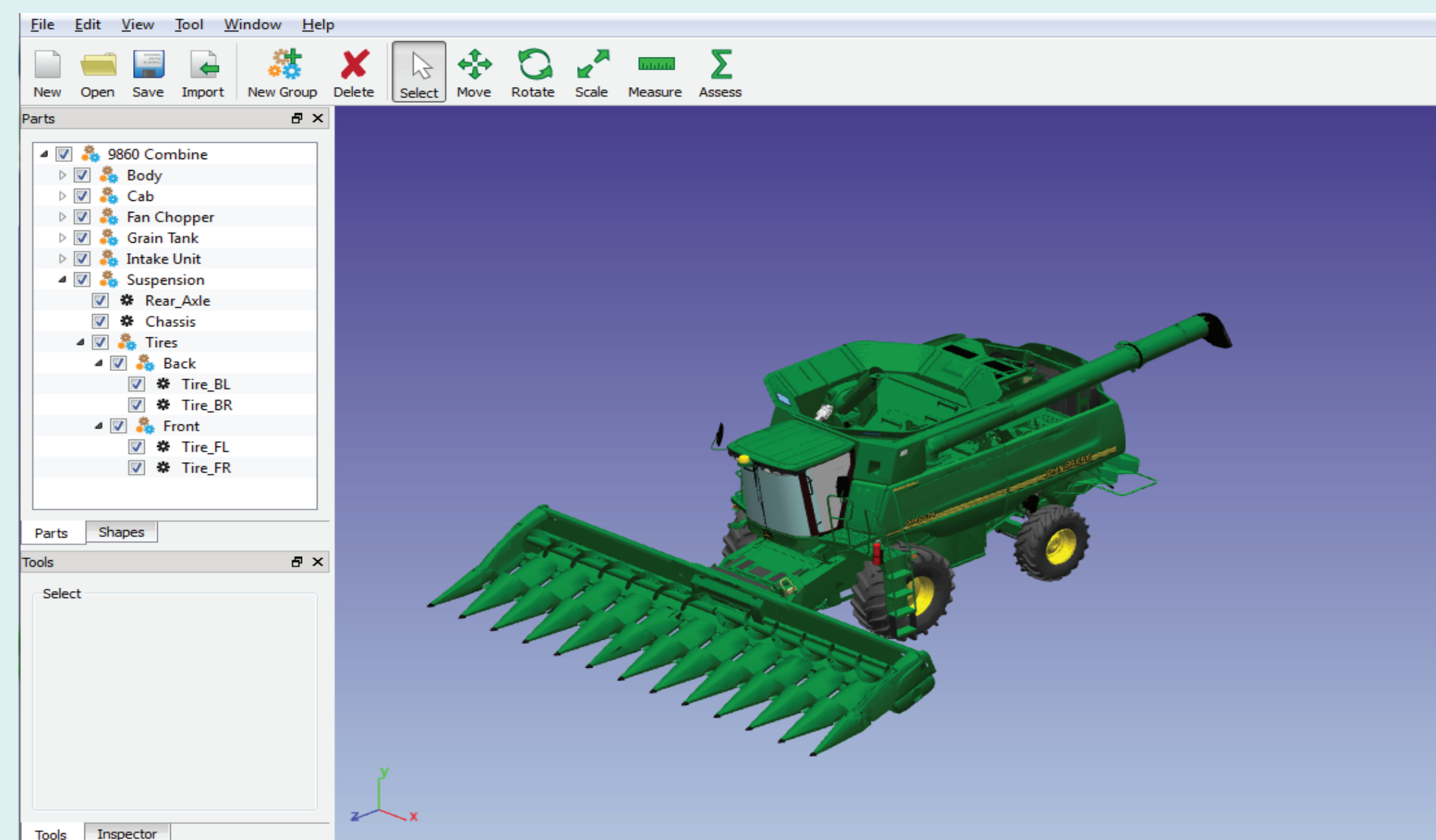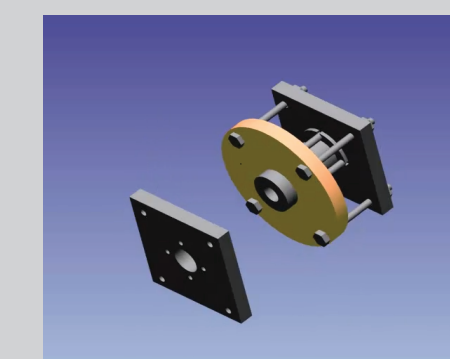

Methods

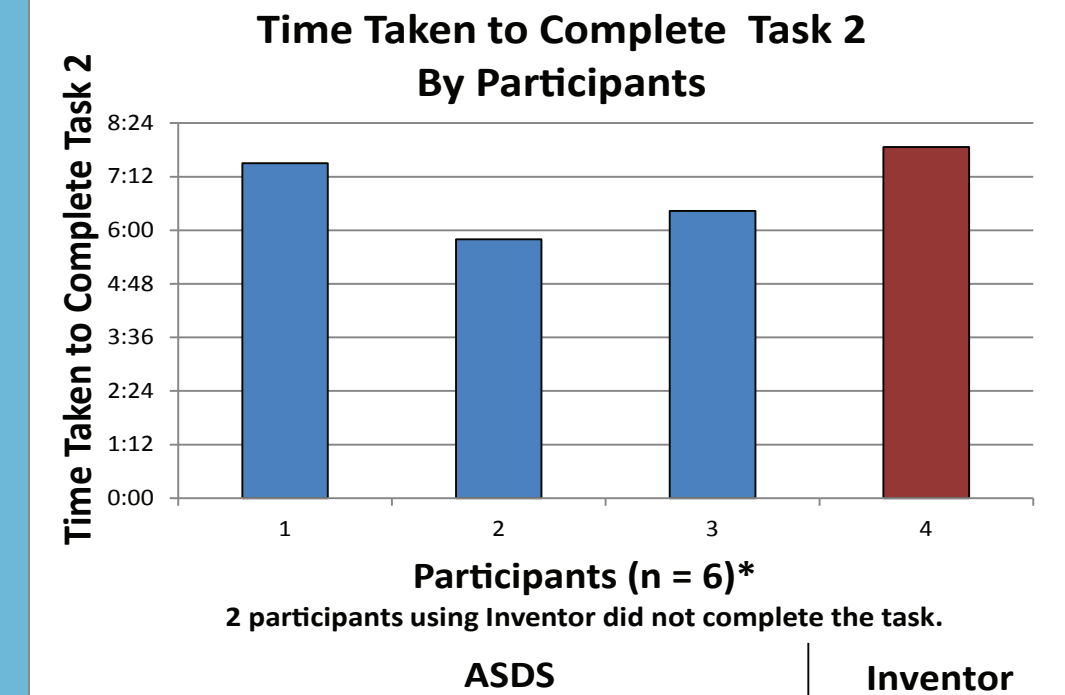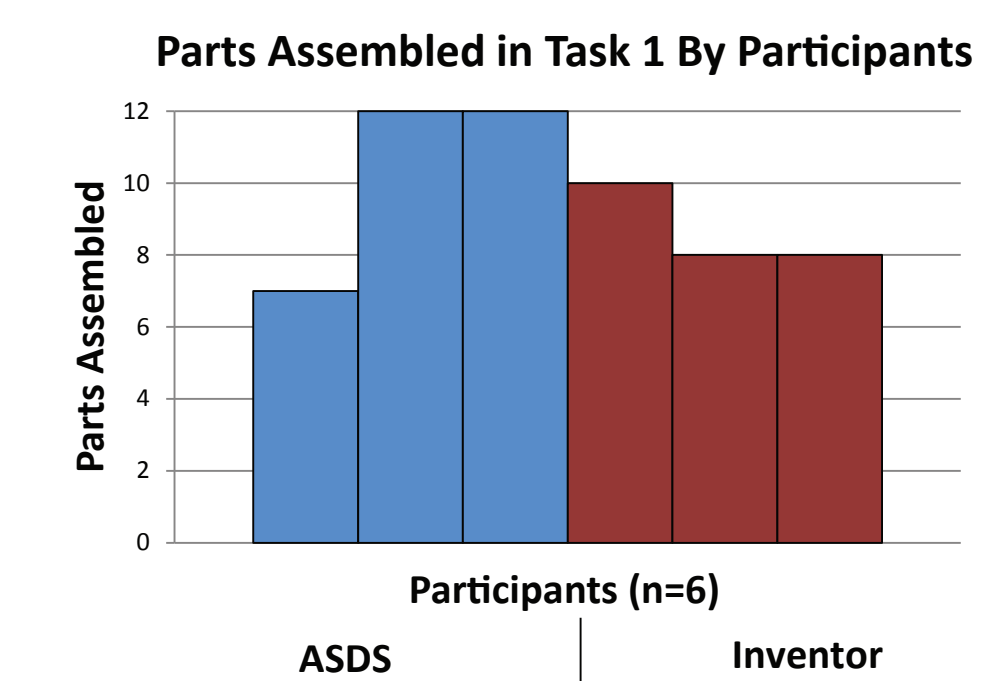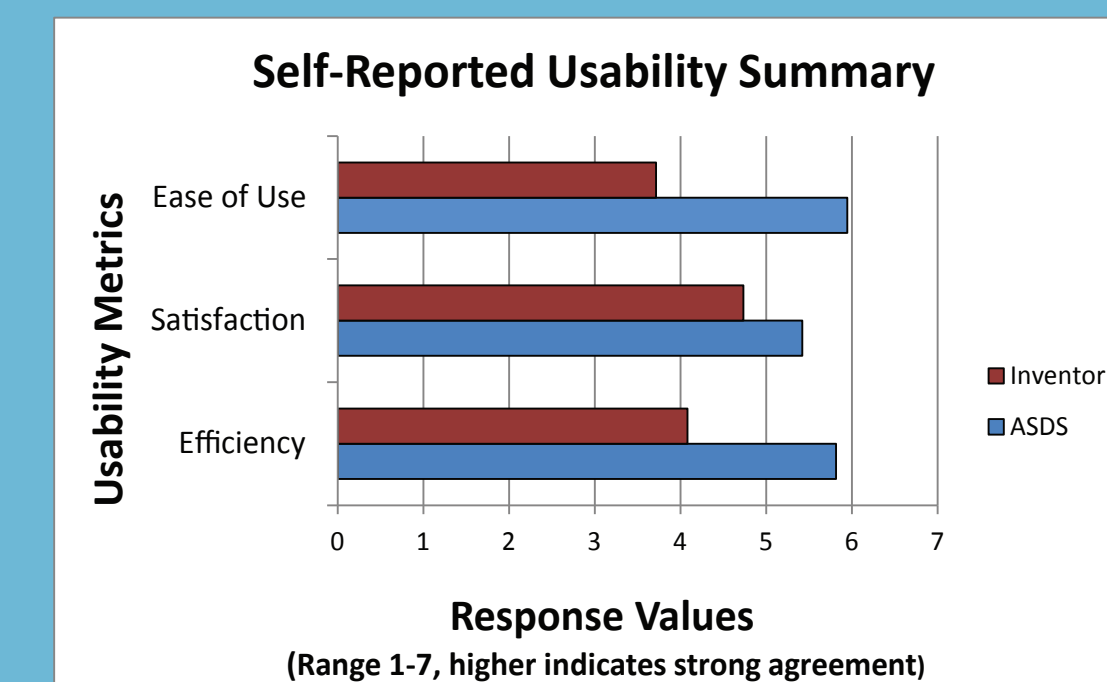|	
Study Setup	The participant watches a tutorial video for the program. The program is either ASDS or a CAD program (Autodesk Inventor 2011).
Task 1: Assembly	The first task is to complete a partially finished assembly according to a given figure.
Task 2: Manipulation	The second task is to replace a square part in the completed assembly with a circular part.
Survey	The participant is given a survey regarding his/her experience with the program. Screen recordings taken during the study are analyzed later.

Results

Parts Assembled in Task 1 By Participants
Participants (n=6)
ASDS   Inventor

Time Taken to Complete Task 2 By Participants
Participants (n = 6)*
2 participants using Inventor did not complete the task.
ASDS   Inventor

The participants had to assemble 12 parts in order to complete Task 1. The graph on the left displays the number of parts each participant assembled per program.

Four out of six participants completed Task 2. The graph on the right displays the amount of time it took the four successful participants to complete Task 2 by program.

Self-Reported Usability Summary
Response Values
(Range 1-7, higher indicates strong agreement)
Inventor   ASDS

Each question on the survey related to a specific usability metric. This is the average of the users' responses as organized by each metric per program.

Summary

The preliminary data encourages our hypothesis that ASDS ranks higher in efficency, satisfaction, and ease of use. However, this study will need to be tested over a larger population to gain significant results.
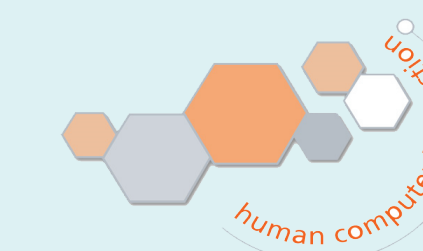
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