
Conceptual Design Document (CDD)

Document Scope

This document provides guidance for developing the Conceptual Design Document (CDD) for ASEN 4018, as well as an annotated template for the assignment and a grading rubric.

Purpose

The Conceptual Design Document details the top level design activities for the project leading to the selection of a baseline design. Selection of a baseline enables significant resources to be invested in that design to understand it well enough to establish its feasibility for the preliminary design review (PDR). This then lowers the uncertainties of the approach, and provides a sound basis for detailed design work leading up to the critical design review (CDR). On the other hand, selection of the “wrong” baseline also carries significant project risk. Reduction of this risk requires that a sufficiently broad range of design options is considered, together with a rational basis for deciding which approach is most appropriate for the baseline design.

Key questions that the CDD should answer are as follows:

- What are the key design requirements and how were these developed from functional requirements?
- What major design approaches were considered to satisfy these design requirements?
- How were the design alternatives evaluated?
- What is the current baseline approach?

Format

The CDD should be a stand-alone document. It should not be necessary to read the PDD to understand the CDD. In particular, a brief background description of the project should be provided, including your specific project objectives, FBD and CONOPS diagrams, and the functional requirements determined in the PDD. Do not, however, enclose the PDD in its entirety. Provide a concise synopsis of the relevant issues as a point of departure for the CDD. A template for the CDD is provided below. The CDD is not page-limited, but be clear and concise in your exposition.

Due Date

Your CDD will be submitted on D2L by 11:59 pm on Monday, September 29. Customers are not required to approve your CDD, but it is recommended to keep them apprised of your work. The CDD will be graded by the PAB.

University of Colorado
Department of Aerospace Engineering Sciences
Senior Projects – ASEN 4018

PROJECT NAME HERE
Conceptual Design Document

DATE

1.0 Information

1.1 Project Customer

NAME ADDRESS Phone: Email:	NAME ADDRESS Phone: Email:
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1.2 Group Members

NAME Contact info (email, phone, etc.) Positions:	NAME Contact info (email, phone, etc.) Positions:
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2.0 Project Description (10 pts)

Define the purpose of the project and provide a brief description of its objectives, CONOPS, and functional requirements.

8-10 points: purpose is clear, objectives are unambiguous, CONOPS and FBD diagrams tell the story, and functional requirements are clearly stated.

6-8 points: some aspects of project definition are unclear or ambiguous (say which).

3-6 points: majority of aspects of project definition are unclear or ambiguous (say which are good).

0-3 points: no clear idea what the project is really about or what must be accomplished to be successful.

3.0 Design Requirements (20 pts)

Describe the requirements flow down process from functional requirements to top level design requirements. Include requirements for verification and validation of the design.

16-20 points: requirements are unambiguous and testable, and the flow-down reasoning from functional requirements is clear. No TBDs.

12-16 points: some requirements are vague, or their connection to functional requirements is unclear (say which). Some TBDs.

6-12 points: most of the requirements are too vague for subsequent design. Many TBDs.

0-6 points: stated design requirements appear to be design solutions.

4.0 Key Design Options Considered (20 pts)

Describe each option in enough detail to explain how it works, including a diagram and a brief list of pros and cons relative to the project objectives.

16-20 points: A reasonable breadth of options is considered, with enough major differences to span the design space for this project. Design options were clearly described (using text and diagrams), and pros and cons were specific and related to project objectives.

12-16 points: Obvious options were not considered (say which), or some options and their pros and cons were poorly described (say which).

6-12 points: Few options considered, or were too simplistically described to derive meaningful pros and cons.

0-6 points: Few options even make sense for this project, and little understanding of them is evident.

5.0 Trade Study Process and Results (30 pts)

Describe the rationale for the particular trade studies conducted. Explain the design effects considered and how they were identified. Describe the methodology for assigning weightings on the effects, and the approach for assigning values for the design options. Provide a trade matrix for each study conducted.

24-30 points: Rationale for each study is clear. Choice of design effects is logical and effects are clearly defined. Weighting and valuation methodology is clear, and trade matrix display is well-designed.

18-24 points: Some aspects of the trade study are unclear, or major effects are missing (say which).

9-18 points: A majority of the trade studies are vague, poorly described, or don't make engineering sense.

0-9 points: Little information about the design options is provided by the trades, or an understanding of what is important in the design is not evident.

6.0 Selection of Baseline Design (20 pts)

Discuss how the results of trade studies were evaluated, and how that led to the baseline design selection.

16-20 points: Trade study results were evaluated carefully, and the baseline design is a clear and logical choice based on the study results.

12-16 points: The baseline design is not clear, or aspects of it don't follow from the trade study results (say which).

9-12 points: The trade studies seem to have been used to justify a pre-selected baseline design.

0-9 points: The baseline design has little apparent connection to the functional requirements or project objectives.