

Engineering Design Midyear Project Camera Dissection and Analysis

The goal of this project is to analyze a typical disposable film flash camera from both user-centered and electro-mechanical design perspectives. The primary deliverable is a written report in .pdf format, but additional deliverables may include CAD files.

	Milestone	Points	Description
1	User Values Analysis	15	Using personas, characterize target groups of users with specific user values that can be fulfilled using the camera. List usage scenarios – who, when, where, and why – these target users would use this camera instead of alternatives like digital cameras or smartphone cameras. Obviously there must be some, because they still sell them! The more specific, distinct personas and values you can identify and justify, the better.
2	Parts Table	20+	<p>Disassemble the camera completely (but see below about "incremental reassembly"!). You do not have to remove any wires or electronic components from the circuit board(s), although you should inventory all parts not soldered onto the circuit board itself separately.</p> <p>For each part, provide the following in a table:</p> <ol style="list-style-type: none"> 1. A catchy, descriptive name, pithily summarizing #2 below 2. A brief description of what its purpose is in the operation of the camera 3. A formal mechanism name if possible (i.e., cam, cam shaft, gear, crank, etc.) 4. A clear, color picture 5. Measurements of all important dimensions in mm; label them clearly on the photograph when they are not obvious. <p>Earn 2 additional points for each accurate CAD part created using Creo with correct dimensions. Assuming perfect printing, if you printed it on the 3D printer, it should work with the camera.</p>
3	Explanation of Operation	25+	<p>Explain how the camera takes a flash picture, including advancing the film. What are the steps? What happens inside the camera? You may refer to the parts list, but your audience for this section is not another engineer - it's a business product manager who needs to understand how the camera works without all the mechanical details, and why it's as complicated as it is.</p> <p>This section should include enough “exploded views” of the camera to show how all parts fit together. Photos and/or sketches should be clearly labeled with the part names in the Parts Table.</p>

			<p>Your explanation should refer specifically to these views, and they should be embedded in the document near the relevant text.</p> <p>Earn an additional point for every CAD part from #2 above included in a CAD Assembly of 3 or more parts. An assembly of parts (or any number individual parts from a separate assembly) earns one point in a new assembly.</p>
4 5 6	Mechanical Descriptions	50	<p>There are three important User Input motions:</p> <ol style="list-style-type: none"> 1. Advancing the film (20 points) 2. Charging the flash (10 points) 3. Taking a picture (20 points) <p>For each of these User Inputs, one Milestone describes in detail:</p> <ol style="list-style-type: none"> 1. All resulting System Outputs - tactile, visual, or other feedback provided to the user 2. Internal system "State Changes", including <ol style="list-style-type: none"> a. storage of energy b. release of previously stored energy c. changes in positions of internal parts 3. The chain of mechanisms that transformed the input motion into the outputs and state changes, using the formal mechanism names we used in the Motion Analysis assignment <p>Use the part names from your parts table in all your descriptions.</p> <p>You can submit any of the three User Input motions in any order for partial credit; just do the first as Milestone 4, the first and second as Milestone 5, and all three as Milestone 6.</p>
7	Reassembly	15	<p>Reassemble the camera from a bag of parts such that anyone can advance the film, take a flash picture, advance again, and take a second picture. Already exposed film may be used. You will have one chance to complete the reassembly, in 45 minutes or less. Some, but not much, partial credit will be earned for partial functionality after reassembly.</p> <p>If you are working with a partner either person may do the assembly. The other person may coach the re-assembler, but may not come within 3 feet of any tool or part during the 45 minute period.</p> <p>You will receive two identical cameras so you can use one for spare parts if you lose or break parts of the other one disassembling it.</p>
	Final Report	10	See below

Except for Milestone 7, deliveries are essentially draft sections of a complete report. You are free to modify previously delivered sections when delivering new milestones for a re-evaluation.

Milestone 1 may be included at any time, but the others should be in order as the information builds on each one sequentially except as noted for Milestones 4-6.

CAD .prt and .asm files for Milestones 2 and 3 should be clearly identified in the Parts Table or Explanation of Operation by name. Use a one team member's shared Engineering folder for these files and a subfolder "Midyear" to contain them all. All must be openable using only the files in that single subfolder.

Professionalism

The complete report should be delivered as a single, professional-quality .pdf document, double-spaced. It's important that the document look clean, and "hang together". Text should be free of obvious grammatical and spelling errors; use the spell and grammar checkers! Drawings and figures should be embedded in the document electronically. Don't get carried away with fonts and formatting, but it should have consistent section headers, paragraph styles, fonts, etc. Before you turn it in, ask yourself "Would I give this to the person responsible for my next raise, or for even keeping me on the payroll? Would a client pay good money for it?"

Failure to meet these requirements may cost you up to 20% of the value of individual Milestones.

Academic Integrity

You may complete all work for this project on your own. You may discuss general principles of the operation of the camera with other people working on the project, but you may not share photos, CAD files, or any other materials. If you read or look at others' drafts or final documents, you are violating academic integrity. If you include ideas or details from any internet, text or other source, you **MUST** cite the source in the text where the ideas are used – a bibliography or works cited page at the end is not sufficient.