**AE 522/722**

**Aerospace Design & Design Laboratory II**

**Spring 2025**

**Report Block 9**

Due 7 April 2025 8am to kuaerodesign@gmail.com

**All Preceding Chapters & Contents, reworked as directed as well as Appendices A–M.**

|  |  |  |  |
| --- | --- | --- | --- |
| **UG Missile** | **UG Individual, Interceptor & Grad.** |  | **Avery & May** |
| Do the appropriate sections below, understanding that many will be missing.  In place of Landing Gear, do “Launch System.”  In place of “Fuel System” do a “Rocket Motor Performance and Characteristics” section (going over all known and reverse-engineered rocket motor properties)  Skip all other systems that you won’t have. | Do the sections below as appropriate. UG Individual, do a separate system on Effluent Handling in place of one of the others that is not present. |  | Avery: Home in on Schiphol Ground Ops bracketing highest and lowest densities, movements per day and associated estimates considering:   1. Same movements per day as Schiphol, but determining footprint needed to make that happen. 2. Same land area Schiphol is on today, solving for the reduction in movements per day.   May: Continue hammering out the various carbon-related ground – process – atmospheric systems. Do NOT cast them in .pptx, just sketches are needed at this point. |

**Appendix N Analysis of Weight and Balance, Stability and Control and L/D Results and Iterations**

**Appendix O Preliminary Three-View and List of Salient Characteristics**

**Appendix P Class I Layout of Major Systems**

12.1 Landing Gear Layout

12.2 Flight Control Systems

12.3 Fuel System

12.4 Hydraulic System

12.5 Electrical System

12.6 Environmental Control System

12.7 Cockpit Instrumentation

12.8 De-Icing, Anti-Icing, Rain Removal & De-Fog

12.9 Escape System

12.10 Water and Waste Systems

12.11 Safety and Survivability

i.) Continue long-term projects for coming reports:

a.) Class I Configuration Definition (enter in AAA)

b.) Class I Performance Estimation (enter in AAA)

c.) Class I Cost Analysis (translate Roskam Part VIII equations into Word and begin analysis in AAA)

ii.) List of all team member actions and contributions. Note that some team members may be assigned a "long term" job and may not show up as contributing to this section. That's okay, but it needs to be noted.

**Critical Design Review (CDR)**

**To be delivered sometime on or before 8am Monday 8 April 2024**

Dr. B. Will then share with experts.

Purpose: Get feedback from professionals and user community at an early design stage

Record and send both .pptx and video files to kuaerodesign@gmail.com

Structure:

1. Title Slide with handsome faces, names & jobs
2. Mission Specification & Profile
3. Overarching Design Philosophy
4. Report Contents
5. Current State of Design
6. Coming Design Steps
7. Ask questions of experts, like: Are you aware of any other changes in aircraft design and/or configuration that can reduce personnel costs? Do you think the traveling public and/or operators could accept an aircraft configured like an AN-72 rather than a traditional 737/DC-9 configuration? While the engines are overhead and far away from the ground, do you see any other grounds operations considerations with keeping them in ground idle so as to reduce the number of start cycles and associated engine fatigue?

• Prepare in PowerPoint format

• Audience: industry and aircraft design engineers and experts

• Mark every page as: "Competition Sensitive for Evaluation Purposes Only"

• If you have a proprietary idea, mark that page as such

• Every team member should speak with Team Leader going first, introducing team

• Try to give similar amounts of time for each member

• Target 30 – 45 min. If it's a bit longer, that's okay, just keep it under 1 hr

• Thank audience for taking the time to review the work and will "look forward to feedback"

**Report 10 AIAA Individuals, Team & Swarm**

Due 3 April 2024 8am to kuaerodesign@gmail.com

**All Preceding Chapters & Contents, reworked as directed as well as Appendices A – K.**

**Appendix M Class I Drag Polar and Performance Analysis**

Perform your Class I Drag Polar and Performance analysis as covered in Roskam's Airplane Design Part II and as shown in class.

**Appendix N Analysis of Weight and Balance, Stability and Control and L/D Results and Iterations**

**Appendix O Preliminary Three-View and List of Salient Characteristics**

**Appendix P Class I Layout of Major Systems**

12.1 Landing Gear Layout

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i.) Continue long-term projects for coming reports:

a.) Class I Configuration Definition (enter in AAA)

b.) Class I Performance Estimation (enter in AAA)

c.) Class I Cost Analysis (translate Roskam Part VIII equations into Word and begin analysis in AAA)

ii.) List of all team member actions and contributions. Note that some team members may be assigned a "long term" job and may not show up as contributing to this section. That's okay, but it needs to be noted.

ii.) Identify and Interview Experts

**Report 11 Coleopters**

Due 10 April 2024 8am to [kuaerodesign@gmail.com](mailto:kuaerodesign@gmail.com)

Refine cut parts, demonstrate fit checks, mock up first incarnation of grid fins and take pictures of

1. Free standing components
2. Components assembled into an aircraft
3. Components disassembled in case

**Report 11 AIAA Individuals, Team & Swarm**

Due 10 April 2024 8am to kuaerodesign@gmail.com

All Preceding Chapters & Contents, reworked as directed as well as Appendices A – K.

All previous sections +

Chapter 12 Class II Sizing of Landing Gear­­

Addendum

Chapter Q Class I Structural Layout

Chapter Z Compliance Matrix

i.) Continue long-term projects for coming reports:

a.) Update Class II Configuration Definition with Class II Weights Information (enter in AAA)

b.) Initiate Class II Performance Estimation (enter in AAA)

c.) Initiate Class II Cost Analysis

d.) Initiate Class II Stability and Control Analysis

ii.) List of all team member actions and contributions. Note that some team members may be assigned a "long term" job and may not show up as contributing to this section. That's okay, but it needs to be noted.

References (always at end of report)

**Report 12 Coleopters**

Due 17 April 2024 8am to [kuaerodesign@gmail.com](mailto:kuaerodesign@gmail.com)

Refine cut parts, demonstrate fit checks, mock up first incarnation of grid fins and take pictures of

1. Mocked up figures cut from foam core or Depron and assembled
2. .jpgs of all parts to be laser cut
3. Full assembly of Depron parts
4. Mock up of grid fins
5. Motor mounted in Depron frame

**Report 12 AIAA Individuals, Teams, Swarm, Missile**

Due 17 April 2024 8am to kuaerodesign@gmail.com

All previous sections +

Chapter 11 Class II Weight and Balance

Chapter 12 Class II Systems (as appropriate)

12.1 Flight Control Systems

12.2 Fuel System

12.3 Hydraulic System

12.4 Electrical System

12.5 Environmental Control System & Cabin Sterilization

5.1. Pressurization System

5.2. Pneumatic System

5.3. Oxygen System

5.4. Air Conditioning System

5.5. Cabin Sterilization

12.6 Cockpit Instrumentation

12.7 De-Icing

12.8 Window Rain, Fog and Frost Control

12.9 Escape Systems Ingress/Egress Systems and Compatibility

12.10 Lavatory, Galley, Water and Waste Systems

12.11 Safety and Survivability

12.12 Checked Baggage or Major Cargo Handling Systems

12.13 Cabin Baggage or Infantry Accommodations

12.14 Ground Equipment and Vehicles Compatibility

Chapter 13 Fault Tree Analysis of Flight Critical Systems

Chapter Z Compliance Matrix

i.) Continue long-term projects for coming reports:

a.) Update Class II Configuration Definition with Class II Weights Information (enter in AAA)

b.) Initiate Class II Performance Estimation (enter in AAA)

c.) Initiate Class II Cost Analysis

d.) Initiate Class II Stability and Control Analysis

ii.) List of all team member actions and contributions. Note that some team members may be assigned a "long term" job and may not show up as contributing to this section. That's okay, but it needs to be noted.

References (always at end of report)

ii.) List of all team member actions and contributions. Note that some team members may be assigned a "long term" job and may not show up as contributing to this section. That's okay, but it needs to be noted.

References (always at end of report)

**Report 13 Coleopters**

Due 24 April 2024 8am to [kuaerodesign@gmail.com](mailto:kuaerodesign@gmail.com)

Refine cut parts, demonstrate fit checks, mock up first incarnation of grid fins and take pictures of

1. Mocked up figures cut from foam core or Depron and assembled
2. .jpgs of all parts to be laser cut
3. Full assembly of Depron parts
4. Mock up of grid fins
5. Motor mounted in Depron frame

**Report 13 AIAA Individuals, Teams, Swarm, Missile**

Due 24 April 2024 8am to kuaerodesign@gmail.com

All previous sections +

Chapter 14 Class II Stability and Control

Chapter 15 Class II Performance with Electric Motors and Energy Handling

Chapter 16: Advanced CAD 3-View, Situational Rendering & Exploded View

Chapter Z Compliance Matrix

i.) List of all team member actions and contributions. Note that some team members may be assigned a "long term" job and may not show up as contributing to this section. That's okay, but it needs to be noted.

References (always at end of report)

**Report 14 AIAA Individuals, Teams, Swarm, Missile**

Due 1 May 2024 8am to kuaerodesign@gmail.com

All previous sections +

Chapter 17 Manufacturing, Fielding, Logistics, Handling & Deployment

Chapter 18 Class II Cost Analysis

Chapter Z Compliance Matrix

i.) List of all team member actions and contributions. Note that some team members may be assigned a "long term" job and may not show up as contributing to this section. That's okay, but it needs to be noted.

References (always at end of report)