

Preliminary Design Review – April 28, 2009

MAE155B

Time available for presentation: 20 minutes

The objective of the PDR is to make sure that you have a reasonable concept that is likely to work, and to give senior management (and ultimately the customer at the actual PDR) an opportunity to review the system.

You should have a pretty good idea of what your airplane will look like and how (and where) the parts are going to fit together. You should also have built an analytical model of the airplane such that the outputs from the mission sizing and design constraint modules feed into the weights and aerodynamic modules, and the weights output goes into a cost module. So even if you haven't finalized the design, you should be able to resize the airplane quickly and easily as the design is refined. If, for example, you perform a trade study on wing aspect ratio, those changes should flow through the whole system and show a change in operating cost. You don't have to have an analytical system that works flawlessly by Tuesday, but you should be getting close. You do not need to describe your analytical model in the PDR.

Your presentation should include –

- A dimensioned three-view of your concept. Dimensions won't be final, but should be indicative of the size of the final design. Justify your choice of planform selected.
- Include on your three-view a table showing the area of the wing, horizontal stabilizer and vertical stabilizer (again, these won't be final values, but you should have some idea of these values). Also show your current estimate of the Max Takeoff Gross Weight of the airplane.
- Show the interior of the airplane (including the flight deck) and describe why you selected this particular layout.
- Show a fuselage cross section.
- Describe your selection of airfoil section, or sections. Describe why you selected it (or them).
- Show the location of primary aerodynamic controls (ailerons, elevators, rudder, leading edge slaps, flaps, spoilers).
- Show a preliminary zero-lift drag buildup.
- Show a preliminary weights buildup.
- Describe the propulsion system, why you selected it, and why the engines are located where they are.
- Show the location of the auxiliary power unit.
- If possible, show some primary structure (front and rear wing spars, wing box, landing gear location, typical fuselage frames, horizontal and vertical stabilizer spars).
- Show the location of fuel tanks.

- Describe your choice of materials for primary structure and the expected weight savings compared with conventional (aluminum or steel) structural materials.
- Describe and justify your choice of environmental control system, actuation systems (aerodynamic controls and landing gear), and de-icing.
- Show compatibility with ground service vehicles, passenger boarding and emergency exits.
- Describe how you are going to meet the environmental requirements.
- Describe the high-risk items in your configuration, and describe how you plan to mitigate that risk.