Airplane Design Project

Business Jet

AERO 443/444/445, 2020-21

Introduction

The system for this design project is a business jet that will compete with existing and other near-term business jets for corporate executive transportation and similar high-value, time critical transportation uses. In order to design this aircraft, it will be necessary to develop an understanding of the target customers, their needs, the current and expected competition, and performance and operating characteristics that will make the aircraft successful in the marketplace.

System Need

Developing a new business jet is a major undertaking for an aerospace company. Because of the significant expense, time, and risk associated with new projects, these development programs happen infrequently and only after careful consideration of the merits of the project. Your system concept will be competing with the concepts from other teams to be your company's next development program.

Team 3: *Large business jet*, which typically provides:

- Transpacific transportation for eight to fifteen passengers.
- Primarily use medium and large commercial airports

Team 4: *Super-midsize business jet*, which typically provides:

- Transatlantic transportation for six to ten passengers.
- Primarily use large and small commercial airports

Team 5: *Midsize business jet*, which typically provides:

- Transcontinental transportation for four to eight passengers.
- Able to use smaller commercial and general aviation fields

Team 6: *Light business jet*, which typically provides:

- Regional transportation for two to six passengers
- Able to use many general aviation fields

Design Approach

This airplane design problem allows significant leeway for the design team to focus on the characteristics most likely to result in a long-term successful product. To arrive at such a focus, the airplane designer must develop and understanding of the stakeholders and their needs and concerns are (far beyond what they may be expected to actually tell you).

Major elements of this design project include:

- Determine user needs and characteristics of competing aircraft.
- Identify specific design requirements and objectives.
- Evaluate candidate aircraft configurations/approaches and select a preferred approach.
- Use the sizing, design, and specification of the initial configuration to assess the soundness of the design requirements; iterate to improve the system.
- Refine the design with additional detail to improve confidence in the aircraft characteristics and performance predictions.
- Plan the development of the system, assess development characteristics, and identify risks with mitigation approaches.
- Use sound analysis to make an objective case for the viability and superiority of the design as a new product development for your company.

System Evaluation and Assessment

The following characteristics will form part of the basis for assessing the relative merit of competing concepts:

1. Marketability of product
2. Competitiveness with other existing and future aircraft
3. Development risk
4. Development cost and schedule

Each design team must use well-thought-out analysis, in coordination with the results of research on customers and missions, to objectively assert the value of their system solution.

Design Reviews

Design Review 1: October 2020—*Explanation of the customer, user, and missions as the basis for selected system characteristics.*

Design Review 2: November 2020—*Candidate airplane configurations and selection of preferred approach.*

Design Review 3: November 2020—*Initial sizing of preferred approach. Program plans, schedules, and approach to advanced technologies.*

Design Review 4: February 2021—*System component sizing, how system component characteristics affect requirements, and program development plans.*

Design Review 5: March 2021—*Sized system components and projected system performance. Comparison of expected system performance to completion/alternate approaches. Well-defined technology development plans.*

Design Review 6: April 2021—*Fully-described system components and overall system performance. Identification of development risks and mitigation plans.*

Aerospace Engineering Symposium: May 2021—*Complete details on the system conceptual design, the performance and merits of the system, the development risks and mitigations, the cost, schedule, and plans for development, and the operational characteristics.*