



DEPARTMENT OF AUTOMOTIVE AND AERONAUTICAL ENGINEERING

The Effect of Variations of the Height to Span Ratio of Box Wing Aircraft on Induced Drag and the Spanwise Lift Distribution

Task for a *project*

Background

A short to medium range box wing aircraft based on the Airbus A320 is examined within the framework of the research project Airport 2030, focusing on improved performance and a more efficient ground handling. For sizing the aircraft it is essential to estimate its span efficiency. The span efficiency factor depends on the height to span ratio (h/b) of the aircraft and the spanwise lift distribution. For minimum induced drag the lift distribution should consist of a constant and an elliptical part. The ratio between these two parts seems to depend on the h/b ratio. Knowing the exact ratio is important for assessing the wing loads needed for estimating the wing mass and also for determining the required spanwise distribution of the lift coefficient. This is why further aerodynamic analyses are necessary.

Task

The minimum induced drag and the spanwise lift distribution of box wing configurations is to be determined for different h/b ratios with the help of the aerodynamics software *IDRAG*. In detail the following subtasks are supposed to be treated:

- Get familiar with IDRAG and shortly describe its function
- Model box wing configurations with different h/b ratios ($0 < h/b < 0,5$), shortly describe the way of setting up the model
- Analyze their minimum induced drag and their lift distribution with regard to the ratio of the constant to the elliptical part
- Compare the results with predictions from theory

The report has to be written in English based on German or international standards on report writing.