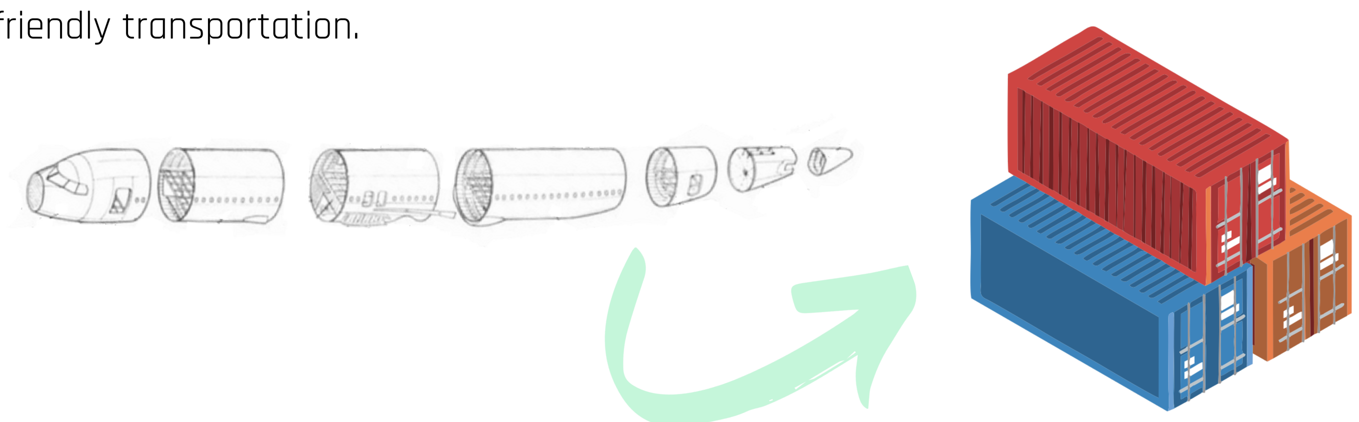
Aircraft in a Box

FISHING FOR EXPERIENCE

Project Definition

A significant opportunity exists in the global aircraft logistics system to enhance cost efficiency and reduce carbon emissions. Currently, the worldwide logistics system relies on standard 8ft ISO containers, it could be more cost-effective at a lower CO2 footprint if standard 40ft ISO containers could transport major aircraft components.

The project aims to address this issue by developing a solution to transport critical fuselage panel elements using standard 40ft ISO containers. The key challenge is that these elements are not designed to fit within the larger containers. The objective is to create a longitudinal junction concept for fuselage sections, with the A320 family as the target aircraft, enabling more cost-efficient and environmentally friendly transportation.



Identification of Hypothesis

Most use of 40 ft containers

Attempt to eliminate Beluga Transport

- (1) Current operating case (Roots)
- (2) France in Focus
- (3) German Wingbox

Cost Calculation

- **Leveraging Expertise:** In the absence of a dedicated database, we relied on our collective expertise, extensive research, and insightful discussions with our supervisors.
- **Dynamic Cost Evaluation:** Our cost assessment evolved continuously, mirroring the dynamic exchange with the company, with each iteration prompting adjustments to both hypotheses and pricing.
- **Iterative Adaptation:** From our initial predictions, we refined our hypotheses and consequently revised our cost estimates.
- **Script-Driven Summation:** We streamlined cost summarization by developing a Python script, which efficiently calculated costs for various scenarios.
- **Data Sources:** Essential route distances, encompassing sea and road, were extracted from reliable sources, including Google Maps and various online references.
- **CO2 Cost Core:** We established a comprehensive CO2 cost framework based on factors such as fuel consumption, payload capacity, route type, and container specifications.
- **Precision in Cutting Lines Costs:** Costs related to cutting lines were meticulously assessed, considering riveting time, rivet types, average Airbus engineer salaries, assembly time, and other pertinent factors.
- **Baseline Reference:** Baseline costs were derived from the operational experiences of other aircraft, providing valuable insights.
- **Supervisor Expertise:** Our team's engineering judgments were enriched by assessments from our knowledgeable supervisors.
- **Model Development:** While cutting line approaches varied across sections and scenarios, these intricacies were minor in the grand scheme of the model's construction.

Validation of Ideas

The major obstacles in the validation of the model were:

- **Lack of Precedent:** Given the absence of prior case studies, our idea was uncharted territory.
- **Pioneering Concept:** Our idea was groundbreaking, lacking a well-established database for reference.
- **Sensitive Data Handling:** Certain data points were sensitive and required careful exploration and classification, limiting our access.

To face this surpass these barriers and validate our model and hypotheses, we engaged in a **continuous feedback loop** with company supervisors and Airbus engineers, leveraging their expertise to gauge the **realism** of our scenarios and calculations

Journey around Research

The research journey began with a clear understanding of the global logistical challenges in the aviation industry. The key problem identified was the inability to fit fuselage panel elements into 40ft ISO containers. The primary focus was on cutting different fuselage parts and developing effective joining methods. Additionally, a comprehensive assessment was made, combining cost and CO2 calculations, alongside evaluations of various transportation scenarios, including those related to the final assembly plants in Germany and France, which were also compared with conventional Beluga transportation. The aim was to create a practical and sustainable solution, underscoring the commitment to enhancing both cost-effectiveness and environmental sustainability in the aviation logistics sector.

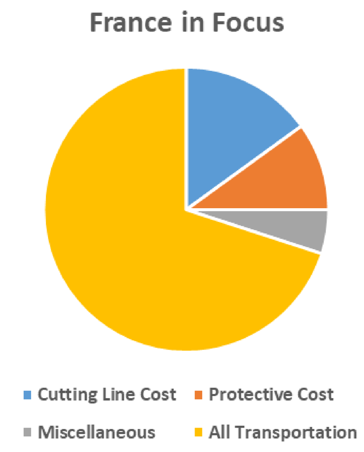
Built Scenarios

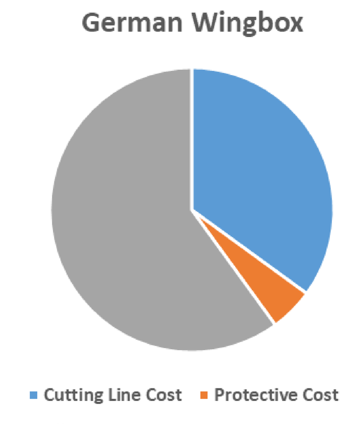
- **Current Operating case:** Current arrangement of A320 assembly line and transportation root has been considered as the core of the project to compare and devolve costs. The core target is to compare the cost of remaining both cases with current operating model to check the feasibility of imlimenting new solution.
- **France in Focus:** France in focus scenario defines case where final assembly is set up in France and all major parts across the globe will be shipped to the France facility for assembly. This case also includes a possiblity of transporting preassembled sections on open plateform via mouting on open platforms through sea and road routs.
- **German Wingbox:** In present arrangement wingbox is manufactured in france and then transported to Hamburg via Beluga which is the targeted elimination. Thus German WIngbox scenario was identified to reduce the major transport via Beluga by manufacturing Wingbox in German location and building final assembly arround it by incorporating cutting lines in sections as and when required.

Comparative Study

Scenarios	1 Minimum Cost	2 Maximum Cost	3 C02 Emission
Current Scenario		183 M + Op cost	4.9 Tons
France in Focus	68750 €	76950 €	4.91 Tons
German Wingbox	74883.17 €	83059.27 €	6.45 Tons

Expenditures





Conclusion

- It is concluded based on our assumption that the "**France in Focus**" scenario is the most feasible option to be implemented.
- Among the scenarios it costs the least at **€76950** and its CO2 emission of **4.91 tons** which is also 2.0 tons lesser than other scenario.
- However, it still has the chance to improve upon its CO2 emission.

AIRBUS

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