Responsive Aerial Firefighting Aircraft Design Proposal

Negative Implications of the Production of Aircraft on Society

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

The aerospace industry has become an essential part of our daily lives and us, as humans, can no longer live with out it. Planes are a necessary form of national and international travel, and they provide a quick and efficient system to trade around the world. News stories are filled with stories about new companies that are launching commercial spacecrafts and aircraft daily. This industry has also helped provide solutions for problems such as raging wildfires and how to best aid firemen in fighting them. Just as any engineering project, it is important to understand the good and bad politics that go into engineering the technology at hand. It is superficial to look at aircraft from only one lens and label them as good without taking into account all additions that they have in society, both positive and negative.

Technical Project

For my technical project, I have been tasked with designing an aerial firefighting aircraft with an assigned team. These aircraft have provided much relief by aiding on-ground firefighting crews in fighting raging wildfires. Wildfires have gradually worsened with climate change over the years and have put both people and wildlife at risk. From January to October 2021, 47,057 wildfires occurred in comparison to the same period in 2020 where 45,635 occurred instead. On July 13, the Dixie fire broke out which burned through 963,309 acres and became 94% contained on October 12 (Insurance Information Institute, 2021). Due to the intensity of these fires, aerial firefighting aircraft have been a necessity, but there is a need for improvement. The existing aircraft used are not the newest, are cost inefficient, and break down easily. The market is in the need of a new design that would be easy and cheap to maintain while also being efficient enough to fight raging wildfires.

The aircraft that we are designing must fit the given requirements of payload capacity, speed, and flight requirements. At the same time, we are required to make it cost efficient and low maintenance. Another key design feature that needs to be considered is making the aircraft sustainable. That means that it must emit as little pollution as possible, be fuel efficient, and be composed of sustainable materials. The goal of this aircraft is to be sustainable while still efficiently fighting fires. The airplane should not be contributing to the already worsening global climate change.

Research Question

The world has become very reliant on aircraft as they have helped connect the world in many ways. Simultaneously, they have resulted in many negative repercussions due to the unsustainable practices used to both engineer and utilize them. The aerospace industry heavily relies on metals such as tantalum and gold. These metals are known as conflict mineral: minerals that are sourced from countries such as the Democratic Republic of Congo (DRC) and have been controlled and extracted by imperialistic powers with violent forces (Aerospace Industries Association, 2013).

Not only are the metals used to build the aircraft unsustainable, but so is the fuel; most of the aviation industry utilizes kerosene, otherwise known as Jet A-1. Kerosene is used in jet planes, large aircraft, and helicopters, and this substance is derived from oil and gasoline (Peterson, 2021). The Middle East produces over 30% of the world's crude oil and holds 40% of the world's conventional gas reserves as well (Rasoul et al, 2015). Due to the abundance of oil and gasoline that is naturally present in the Middle East and the world's reliance on these resources, the Middle East has been the central ground of conflict for decades as imperialistic powers attempt to gain control over these resources. Oil, specifically, has been a leading cause of

war and makes up one-quarter and one-half of interstate wars since 1973. Iraq, Iran, Kuwait, and Yemen are just a few countries that have been impacted by these imperialistic aggressions (Colgan, 2013). Countless civilians have been harmed and countries have been destroyed due to imperialism and the need to consume resources purely out of greed. The world around us is massive, and our actions affect thousands of people, which is an important concept to consider when engineering. The above are just a few examples of how something as simple as an airplane can have a negative impact in the world for our generation and future ones to come.

For my technical project, I am tasked with designing and developing an aerial firefighting aircraft. The use politics of this aircraft are positive; they are meant to help minimize damage and mitigate fires to stop them at a quicker pace. That being said, its inherent politics are bad. The metals that these aircraft are composed of are extracted by violent force; the oil /gasoline used to fuel these aircraft have been acquired off the backs of innocent civilians. This fuel continues to negatively impact the environment and is the very thing that is worsening wildfires resulting in the need for more planes, a never-ending cycle.

The end does not justify the means. Ignoring the bad politics of an object does not make them go away. For situations to change and for us to begin to work towards ending colonialism and its damaging impacts, we as a society first have to acknowledge that the act of colonialism in it of itself is bad and then we have to want to make a change in the world. To make this change, we need to ask ourselves a very simple question: how can we end the current practices of colonialism and how can we replace our current fuel and metal options for aircraft with more sustainable ones?

Methodology

To comprehend the bad politics of airplanes and how they have had negative impacts around the world, reading and synthesizing is going to be a key method. First, the resources that have been extracted due to imperialistic efforts (oil/gasoline and conflict minerals) and how the extraction processes impacted native populations need to be identified. This information will likely be found in research and scientific papers. The impacts on native populations, specifically negative impacts, will be more challenging to find. This is going to come from historical analysis, specifically primary sources. It is easy to find a history textbook explaining what happened in the DRC during the 1800s from a Western perspective, but that does not shine light on those who fell victim. We do not want to know how the United States views imperialism, rather we want to hear the voices of the colonized people and how their lives and homes were destroyed. Native and minority voices have always been silenced and the purpose of my prospectus is to get a full scope of understanding around colonialism. These sources can consist of personal accounts, diary entries, or research written by the local population.

The history of imperialism is going to provide a lot of contexts in understanding my direct argument, but these past actions still have repercussions in the world today or are still being committed through “neo-colonialism”. Because of this, my research should not be limited to a certain time period and should encompass a wide range of dates. To analyze this specific lens, it is important to branch out of historical texts and also analyze the current news reports, recent papers, and relevant primary accounts on this specific topic.

Visualizing the issues put forth for discussion brings the argument together; it is easy to say that conflict metals and oil/gasoline are extracted in negative ways, but it is more comprehensible to list the specific actions that were taken by violent forces, the number of

people that were impacted, and the numerical amount of damage that was done overall. Research papers written by experts and researchers will provide the statistics and facts needed for this discussion to be formed. These agencies have done the necessary work to produce and report accurate and reliable information.

Having one on one discussions with experts in the field would also provide a new insight when attempting to tackle my research question. I have taken a few classes within UVA's Global Development department, the specific one of interest being *Environmental Studies in the Middle East and South Asia*. In this class, I have come across several sources that would deliver valuable material for my topic. My past professor's focus is specifically on global studies, and she has done work, research, and written texts about the topic. I have set up meetings with my past professors to discuss my research question. This will help me understand different angles from the perspective of someone who had made a career out of this issue. I will then be directed to new sources that would help guide my research process for the thesis paper.

Key Texts

A Rebellion of Technology: Development, Policing, and the British Arabian Imaginary by Priya Satia is a paper that discusses the imaginaries behind Britain's invasion of Iraq. The main fuel for this invasion was for Britain to be able to control Iraq's oil supply while justifying their military efforts by claiming that the Arab population was "savage," that they destroyed their country's environment, and that the west needed to reclaim it in order to return it to "Babylonian times." Satia also discusses how this imaginary justified the use of force against the native population, which is why aerospace weaponry was used (Satia, 2011). This fact is important to note because oil, one of the root causes behind the invasion, is the fuel source for planes. The aircraft in this situation bad inherent and use politics as war and colonization was used to obtain

the resources need to fly the planes, but the planes were also used as a means to control the supply. This discourse is essential for my paper as it discusses the history behind imperialism, how it has been justified through centuries, and it connects it back to my technical project at hand. To develop a plan to fix an issue it is necessary to dissect the root causes of it.

Another source I will utilize is *Conflict Minerals Story*, a lecture presented by the Aerospace Industries Association's Conflict Minerals Working Group. This lecture discusses conflict minerals, many of which are used in the aerospace industry, how they are obtained, and the legislation behind them (Aerospace Industries Association, 2013). The facts embedded in this source are which main conflict minerals are prevalent, their applications, and their source location. It gives me the evidence I need to justify how conflict minerals and aviation intersect.

My third source that is why I will be using is *George Washington William's Open Letter to King Leopold on the Congo*. This specific primary source has much significance in relation to the topic that I chose. This letter provides a case study of colonialism in the DRC. It is a first-hand account on how imperialism has impacted native populations (Williams, 2019). It is not enough to say that violence was used to access the conflict minerals present in the DRC but rather it should be explained how the violence impacted people.

Conclusion

Imperialistic endeavors have negatively impacted native populations throughout the course of history. Those in privileged positions rarely admit the detrimental impacts of their or their ancestors' actions, but the first step in moving towards a solution is acknowledgement. Aerospace is currently a microcosm of this concept with the narrative is that airplanes have only provided opportunity. The positive impacts of aerospace should not be ignored, but they do not

outweigh the negatives implications such as the ongoing imperialism that is occurring. Advancing in the world includes ensuring that everyone is at equity, part of that start is making changing how the world's resources are utilized. It is time to push forth a sustainability plan to ensure that the current harm being done due to imperialism ends and reparations are provided for past actions. The goal of this research project is to find solutions on what this plan could be and any possible implementations of it.

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