Sample Introduction 1

To successfully complete their degree in Mechanical Engineering at Texas A&M University, all mechanical engineering students must participate in a capstone design project. This project is given in MEEN 401 and extends to MEEN 402. The students are placed into project teams, and they must work together to complete the project. This project team includes Aggie Underwood, Jay Smith, Mike Herman, and Walker Balboa. All team members are seniors with extensive experience in engineering. The team is working with John Jones, who is our sponsor and a representative of McDonnell Douglas.

The problem is that McDonnell Douglas has designed an aircraft, the DC-10, with outward-opening cargo bay doors. This is a solid design, but these doors sometimes come open during flight due to the fact that the locking mechanism can fail. The design team's task is to design a better lock that keeps the door in place. Our group met with Mr. Jones on January 8th, 2024 and also learned that the newly designed lock needs to be cheap enough to be retrofitted onto all DC-10 airplanes. It also can't take up any space in the cargo hold.

The team looks forward to addressing this design challenge. We are eager to help Mr. Jones and McDonnell Douglas and to show what we have learned as Aggie Engineers. This report will provide a strong foundation for understanding the project going forward.

Sample Introduction 2

McDonnell Douglas, a significant force in aerospace history, emerged from the vision and efforts of two pioneering companies: McDonnell Aircraft Corporation and Douglas Aircraft Company. Their paths converged in 1967 to form McDonnell Douglas, creating a powerhouse in military and commercial aviation. During the 1930s, Douglas expanded from military contracting into commercial aviation with the DC (Douglas Commercial) series. The DC-3, introduced in 1935, revolutionized air travel and set a new standard for reliability and efficiency. The post-WWII development of the DC-4 and DC-6 solidified Douglas's prominence in the commercial aviation market.

Meanwhile, McDonnell Aircraft Corporation, founded by James S. McDonnell in St. Louis, Missouri, began as a small operation focused on military aircraft. During World War II, the company gained recognition for its fighter designs. McDonnell's reputation grew exponentially in the post-war period with its contributions to jet-powered military aircraft. One of McDonnell's most notable achievements was the F-4 Phantom II, a supersonic fighter introduced in the late 1950s. The Phantom became a cornerstone of U.S. military aviation, widely used by the Navy, Air Force, and Marine Corps during the Cold War and the Vietnam War. McDonnell also played a crucial role in space exploration, contributing to NASA's Mercury and Gemini programs, which laid the groundwork for the Apollo missions.

When the companies merged in 1967, they inherited a robust legacy and were able to draw on one another's strengths to produce cutting-edge aircraft. While continuing to produce the DC-9, a successful short-haul jetliner, they developed the DC-10, a wide-body aircraft intended to compete with Boeing's 747. The current design of the DC-10 includes an innovative outward-opening cargo door, which allows for maximum usage of the cargo hold. To further improve the design, the locking mechanism for the door needs to be redesigned to ensure it doesn't open during flight. This report will cover the design team's approach to addressing this problem.

Sample Introduction 3

As air travel has become more popular as a method of travelling across the country or all over the globe, airlines are all facing the same problem: more passengers mean more baggage. To be competitive in the market, aircraft manufacturers must design planes with enough cargo space to both stow the increased volume of baggage and maintain the comfort and safety of passengers. To carry more cargo, McDonnell Douglas has designed the McDonnell Douglas DC-10 with an outward-opening cargo door. Unlike the inward-opening cargo doors used in other aircraft, which require space in the cargo bay to open and close, the outward-opening cargo door on the DC-10 allows maximum space in the cargo bay for passengers' luggage and other freight.

While the cargo door's design has effectively maximized the amount of space available for cargo, outward-opening doors cannot rely on cabin pressurization to stay closed. Instead, the door must be held in placed with a locking mechanism. After repeated testing, it has been found that McDonnell Douglas's current design is subject to failure, which could cause explosive decompression of the airplane. John Jones, a representative of McDonnell Douglas and sponsor of this project, has therefore reached out to our team to design a more effective locking mechanism for the outward-opening cargo bay door. This improved locking mechanism is essential for ensuring the safety of passengers and flight crew aboard the DC-10. Additionally, Jones has indicated that the lock must be feasible to retrofit onto all DC-10s in service and that it should not reduce the volume of available cargo space.

The team tasked with designing the improved locking mechanism is composed of four individuals: Aggie Underwood, Jay Smith, Mike Herman, and Walker Balboa. The team will work closely with Jones to develop a locking mechanism that ensures the cargo door stays closed during flight, can be installed on all DC-10s, and does not reduce space in the cargo hold. This report, composed during the initial stages of the design process, will present background research to contextualize the problem and the team's understanding of the problem as it currently exists. It will conclude with major findings from the research, key points about the problem, and future steps in the design process.