

# SUPERSONIC TRAVELLING: IN FUTURE, RISE OR DECLINE

Final Year Project





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**SUPERSONIC TRAVELLING: IN FUTURE, RISE OR DECLINE**

**UNIVERSITY OF MANAGEMENT AND TECHNOLOGY**

**SUBMISSION TO**

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**DATE: 2<sup>ND</sup> JUNE 2018**

**Signature of Resource Person: \_\_\_\_\_**

## **Acknowledgement**

This is to acknowledge that this project, “Supersonic Travelling: In future, Rise or Decline” has been successfully completed and submitted as final year project by ‘Abu Bakar, Roll no. 14007001003’, student of Batch 7 of Bs-Aviation Management of University of Management and Technology as a compulsory requirement for Bachelor’s Degree of BS-Aviation Management at University of Management and Technology.

## **Resource Person**

Only under the supervision of Air Commodore (R) Sir Khalid Farooq Chishti as my resource person, I have been able to complete my project. His visionary perspective of doing things, along with his immense support, assistance, and knowledge has provided me with all the help and motivation I needed to successfully complete my project with the best outcome.

## **Profile**

Khalid Farooq Chishti served in the PAF in different squadrons, after joining in 1977. With more than 3,000 flying hours, he was also given the role of Instructor Pilot. He was bestowed with the responsibilities of Assistant to Air Force Chief on Training and Education at Air Headquarters, and Base Commander of Base Masroor, Karachi.

He retired in 2012 at the rank of Air Commodore. After that, he was the General Manager of Shaheen Airport Services (SAPS) for four years. He has been teaching as a visiting faculty at University of Management and Technology, Lahore, and also running his business.

Khalid Farooq Chishti is a very patriotic person, and has been collecting and working on different unseen pictures of Quaid-e-Azam Muhammad Ali Jinnah, along with providing lectures on him as well as other motivational lectures in different renown universities across the country.

## **Achievements**

By the Government of Pakistan, he was awarded for his noble commitment and extreme dedication to the duty, the prestigious Sitar-e-Imtiaz (military) and Sitar-e-Basalat.

## **Dedication**

***In the Name of Allah, The most Merciful and The most Benevolent.***

*I would like to say thanks from the bottom of my heart to all those who extended their hands to pray for me, because only with their prayers, and blessings, I have been successful in my academics and in my life.*

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## **1. Abstract:**

Aviation become one of the major industry after the invention of heavier-than-air aircrafts in 1903. After the formation of air transportation through aircrafts, aviation has become a major focus of scientific community and engineers who constantly seek to make advancements in the technologies related to aircrafts and other operations. The speed is one of the main such focus of advancement, and since the creation of aircrafts, has been subjected to various variations by inventions of engines and streamline designs. One such achievement regarding speed in aviation is the making of supersonic transport aircrafts. Their manufacturing, downfall, and comeback is a very interesting topic for research purposes.

### **1.1. Purpose of Study:**

The purpose of study is to do an extensive research on the advancements regarding speed of the aircraft, by examining the history of aviation, understanding the fundamentals of speed, and looking through how the aircrafts were able to break the sound barrier. The further study on two supersonic wonders of 1970s, Concorde and Tu-144, with the former seeing 30 years in service. The downfall of Concorde, and factors contributing in its demise are also the focus of this research. Another great purpose of this research is to determine the future of the supersonic aircrafts in aviation industry, their demand, and the projects undertaken to manufacture such aircrafts in future.

### **1.2. Project Goals:**

- To understand the need for speed for passenger aircrafts in aviation industry and look at how the aircrafts evolve to the speed we have today
- To look into the only two supersonic passenger transport aircrafts which entered into service and determine what factors brought their demise

To determine the future of supersonic transport aircrafts and see how manufacturers are going towards producing such aircraft that would change the face of the aviation once more.

## **2. Executive Summary**

Aviation industry proved to be a very dynamic industry from the beginning. Immediately after the invention of the heavier than air aircrafts by Wright Brother a technological race began that brought with itself advancements in control systems, aircraft designs and structures, and the main feature, power of the aircraft. Speed is the product of power of the aircraft and its thrust. The ultimate goal of the invention of aircrafts was to provide a faster mode of transportation. The other means like ships, trains, and flying balloons were slower.

Thus, aircraft was subjected to many advancements particularly focused on increasing its speed and capacity. The speed allowed the aircrafts to travel faster and cover larger distances in less time increasing their range. The transformation from propeller driven engines to jet and rocket engines was the result of need for speed for the aircrafts. By increasing the power of the aircraft, the speed as well as lift of the aircraft also increased.

Older aircrafts were not able to fly faster, and with the passage of time along with many experiments, aviation evolved and produced such aircrafts that began to reach higher speed, covering more distances, and were economically viable for operators as well as passengers. But the urge to achieve more speed resulted in exploring the foundations of supersonic speeds, and technologies required to make aircrafts faster than the speed of sound.

This craving of speed made scientists and organizations do extensive research on designs and aerodynamics of aircrafts in order to explore the horizon of supersonic speed. This research was optimistically used by aeronautics community into making marvelous aircrafts like Concorde, and Tupolev Tu-144. Unfortunately, these wonderful aircrafts were subjected to many technical, economical, and external factors that resulted into their downfall.

The shortcomings of these two aircrafts led to many questions regarding the impact of supersonic transport, and finding the answers to the failures associated with Concorde and Tu-144 were necessary. These answers led to researches conducted after the grounding of Concorde.

Results from these researches are focused more on countering the faults of Concorde, as Tu-144 saw little to no years in service, and that's why Concorde was the focus point of every research. After the final flight of Concorde in 2003, the aviation community is working to

design such aircrafts which would be supersonic, and would not have any shortcomings that were in Concorde like noise of sonic boom, high operating and maintenance expenses, and other negative faults.

Now, the aeronautics community is determined to design aircrafts that would be less noisy, reasonable to operate and maintain, and would cover the distance in half the time as compared to the sub-sonic aircrafts. Many American companies like Boom Supersonic, Spike Aerospace, Aerion with joint venture with Lockheed Martin, and many others are stepping up to create designs of their own supersonic airliners, and business jets which would enter the market in 2020s and change the face of the aviation.

The future of the aviation industry lies in the supersonic speed. We had Concorde, and we stepped back from this marvel of that time. But realization has been infused in the minds of aeronautics community that time is important, and the thing which is more important is to save that time by introducing such aircrafts that would cover the distances in half the time of what it takes today.

### **3. Introduction**

The concept of flying has extended for more than over two thousand years, and date backs to the time of Before Christ, when in China, people used to fly kites. No doubt, kites were not something that would carry a man with them, neither the people ever thought of something like that, but still, making an object flying was a success.

With the evolution of human mind, different ideas got turned into reality. Leonardo Da Vinci, a genius of 15<sup>th</sup> century, made many designs that were no doubt, unscientific, but still through this, he infused a dream of flight into mankind, though he never tried to construct one. Afterwards, the discovery of hydrogen gas in 18<sup>th</sup> century led to the invention of hydrogen balloons. At the same time, two brothers made a rediscovery of hot-air balloons and made manned flights on it. Hot-air balloon is a lighter than air aircraft which uses a bag like an envelope to trap the hot air that carries it upward.