



The aircraft described in the Brihad Vimanashastra text and its relevance.

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Abstract

Maharishi Bharadwaj's *Brihad Vimana Shastra Granth Vimana Vidya* contains a vast corpus of material in which the science of aeronautics is systematically analyzed. The text presents detailed accounts of diverse types of aircraft, their nomenclature, and the various methods of construction and operation, which are remarkable in both scope and vision. This work, therefore, has the potential to stimulate significant advancements in the study of mechanics and applied sciences. In modern history, the Wright brothers are recognized as the pioneers of the airplane. However, the successful flight of their creation inevitably led many scholars to reconsider the depth and authenticity of ancient Vedic knowledge. As Maharishi Dayanand Saraswati asserted, "The Vedas are the fountainhead of all true sciences." Within this context, Bharadwaj's treatise may be viewed not only as a record of ancient scientific thought but also as an important source of inspiration for contemporary research and innovation in aviation. The endeavor to reinterpret and reapply the principles of Vimana Vidya in the light of modern technology reflects an effort to bridge ancient wisdom with present-day scientific inquiry.

Introduction

The concept of aerial vehicles (*vimānas*) is deeply embedded in Indian literary and philosophical traditions. One of the most prominent examples occurs in the *Vālmīki Rāmāyaṇa* (Aranyakāṇḍa 6.248.6), where the celestial *Puṣpaka Vimana* is described: "yasya tat puṣpakaṃ nāma vimānaṃ kāmagam śubham | vīryādāvarjitaṃ bhadre yena yāmi vihāyasaṃ ||" (*Valmiki Ramayana*, Aranyakanda, 6.248.6) This verse presents the *Puṣpaka Vimana* as a self-moving, auspicious aerial chariot capable of traversing the skies at will (*kāmagam*). Its depiction suggests not merely a mythical vehicle but a sophisticated conceptualization of aerial navigation.

Beyond the Ramayana, Maharaja Bhoja's *Samarāṅgaṇasūtradhāra* (11th century CE) also provides detailed descriptions of mechanical devices, including aerial vehicles. It specifically mentions an aircraft powered by mercury, highlighting India's longstanding speculative tradition regarding propulsion systems (Shukla, 1966). While its descriptions are often symbolic, they reflect an early attempt to rationalize mechanical flight.

The *R̥gveda* (1.25.7) further provides insight into early aeronautical imagination: "Veda yo vina padmāntarikṣena pattam, veda nāvaḥ samuddiya" He who understands the flight of birds across the sky also comprehends the nature of ships and celestial crafts. This verse illustrates a critical analogy: the observation of avian flight inspired reflections on human attempts at aerial and maritime navigation. It also demonstrates the Vedic method of deriving technical knowledge through natural analogies. Additionally, Vedic literature employs technical terminology to describe aerial devices, such as *Vātaraṇha* (moving with the wind), *Tribandhura*, *Trivṛtta*, and *Tricakra*, which may indicate classifications based on structure, propulsion, or movement. Such terminology suggests an embryonic aeronautical taxonomy, pointing to an advanced speculative framework within Vedic thought. India has, for millennia, been a crucible of scientific, philosophical, and technological innovation. As the repository of the *Vedas* and numerous scientific treatises, it has preserved traditions in which the truths of natural sciences were articulated in symbolic and

conceptual forms. The sages of Vedic and post-Vedic times demonstrated remarkable foresight, envisioning principles that resemble modern concepts such as electricity, atomic energy, and mechanical engines (Kak, 2001; Subbarayappa, 2008). Thus, while the descriptions of vimanas may not correspond to empirical aeronautics in a modern sense, they provide an invaluable window into the scientific imagination of ancient India. They embody a vision where myth, philosophy, and proto-scientific inquiry converge, inspiring contemporary research into the history of science and technology.

Objectives of the Research

1. The primary objective of this research essay is to present the definitions of aviation and aircraft as described in ancient scientific texts, with the auspicious intention that such knowledge may offer a scientific approach to modern aviation and provide a new perspective for future research.
2. Although significant work has been carried out in the field of Sanskrit literature, research with a scientific orientation remains rare. Even within this domain, relatively little scholarly attention has been devoted to the *Brihad Vimanashastra*, which contains numerous mysteries related to aviation. Therefore, the attempt to present the history of aviation and to compare it with modern developments is both novel and uplifting. This forms a central aim of the present study.
3. Examining the history of aircraft construction within the framework of aeronautics will establish a new foundation for modern aviation studies. Another purpose is to highlight the similarities and differences between ancient and modern aviation, while situating these findings within a contemporary scientific context.
4. This dissertation also seeks to demonstrate how far modern science still lags behind in certain respects, by comparing the flight speeds and trajectories of aircraft in ancient sources with those in modern aviation.
5. Another aim of this study is to provide a detailed description of the tools and materials used in ancient aircraft construction, and to clarify their nature by comparing them with the materials and methods of modern aeronautical engineering.
6. This research also intends to analyze the supporting elements necessary for the operation of aircraft, and to evaluate their relevance within the framework of present-day science and technology.
7. The study further seeks to explore aviation-related metals mentioned in ancient texts, and to demonstrate how these may have served as an inspiration for the development of modern astronomy, through a presentation of detailed textual references.
8. An additional purpose of this dissertation is to compare the principles of mechanical engineering described in ancient sources with those of modern engineering, and to draw meaningful conclusions regarding their similarities and differences.
9. The research also aims to examine the precautions prescribed for air travel in ancient texts, and to evaluate their relevance and applicability in the context of modern aviation safety.
10. Finally, this dissertation is a humble attempt to clarify the ways in which ancient aviation knowledge may contribute to the development of modern aviation, thereby offering fresh inspiration for contemporary research and innovation.

Scope of the Research

1. A detailed study of the principles and concepts of aeronautics as presented in ancient sources.
2. A critical examination of modern literature on aviation, with a view to identifying points of convergence and divergence with ancient perspectives.
3. An analytical study of classical and modern works on mechanics, highlighting their relevance to aviation.
4. A comprehensive and in-depth exploration of the principles, forces, and verses contained in the *Brihad Vimana Shastra*.
5. A contextual study of related scientific texts, including those dealing with mechanical physics, astronomy, and astrology, as required by the objectives of the research.

Research Base Material

1. The *Brihad Vimanashastra* treatise.
2. Various classical and modern books on aviation.
3. Reference literature on mechanics.
4. Standard texts on modern aviation science and technology.
5. Ancient as well as modern references related to aviation.
6. Illustrations and depictions of ancient aircraft.
7. Texts and manuals providing information on aircraft parts and accessories.
8. Other works of Sanskrit literature in which references to aircraft are found.

Outline of the Research Topic

The present research paper will be organized into the following chapters to ensure clarity and systematic presentation:

Chapter-1 : Airplane: An Introduction This chapter will define the concept of an aircraft under the sub-topic *What is an aircraft?* It will discuss the fundamental principles of aviation along with ancient symbols and references to aeronautical knowledge. Furthermore, a classification of the various types of aircraft described in ancient texts will be presented.

Chapter-2: Origin and Development of Aviation (History of Aviation) Before examining aviation in detail, it is essential to understand its origin and development. This chapter will therefore provide a historical overview of aviation, tracing its growth from ancient conceptualizations to modern developments. It will discuss various aspects of aviation, including early experiments, the concept of exploration in aviation, the successes and failures encountered in aeronautical history, as well as the research, design, and development of aircraft in chronological sequence.

Chapter-3: The Foundational Text of Aircraft Construction: *Brihad Vimanashastra* This chapter will begin with a brief overview of the tradition of aircraft construction in ancient India, followed by an introduction to the *Brihad Vimanashastra* as a seminal text on aviation. It will provide an account of its author, Sage Bharadwaj, his life and works, the structure and contents of the treatise, and its parallels with principles of modern aviation. The chapter will also highlight the significance of the *Brihad Vimanashastra* as a scientific text, emphasizing its potential value to contemporary researchers and scientists.

In addition, this chapter will draw comparisons between ancient and modern literature on aviation. References will be made to key modern works such as *Quest for Performance: The Evolution of Modern Aircraft*, *Modern Air Transport: History of Aircraft*, *All the World's Aircraft*, *Anti-Gravity Handbook: Technologies of the Future*, and *Modern War Machine: Military Aeronautics*. These texts will be used to show how detailed technical knowledge on aircraft design, construction, and accessories in the modern era finds intriguing parallels in ancient de **Chapter-4: Ancient and Modern Aircraft Construction Materials** This chapter will discuss important materials used in aircraft construction, including various shapes of tubes, metals, iron, mirrors, electrical power sources, heat conductors, heat insulators, and magnets. It will also examine the types of smelting furnaces, the temperatures required, and the combinations of different metals, followed by a comparison with modern metallurgy.

Chapter-5: Research on Aviation Materials This chapter will be divided into two subsections: (1) Research on Ancient Aircraft Materials, and (2) Research on Modern Aircraft Materials. The objective is to provide a detailed analysis of the significant metals and tools introduced in Chapter 4. Many of the mysteries related to metallurgy in large-scale aviation continue to inspire modern metallurgists, and these will be explored in detail here. The three principal metals mentioned are *Saumā* (or *Saumaka*), *Sondālaka* (or *Sondālika*), and *Mautvika*. By mixing these metals in different proportions, sixteen types of heat-absorbing alloys were produced, from which various aircraft components were manufactured. This chapter will attempt to connect ancient metallurgical knowledge with modern science, focusing particularly on material production and research.

Chapter-6: Auxiliary Elements of Aircraft Handling This chapter will present in detail the various auxiliary factors involved in aircraft operation. Specifically, it will discuss: The pilot—his qualifications, diet, and clothing requirements according to different seasons. Fuel—oil, liquid fuel, electricity, etc. The operating mechanisms of aircraft, including the possibility of solar-powered aircraft, which may prove highly beneficial to modern scientists. Additionally, a comparative discussion will be provided on the auxiliary elements of aircraft operation in ancient times and those of modern aviation.

Chapter-7: Different Speeds and Trajectories of Aircraft In this chapter, the various motions involved in the operation of an aircraft will be studied in detail. These include movement, vibration, ascent, descent, circular motion, eccentric motion, *anulomagati* (motion in alignment), southward motion, anticlockwise motion, leftward motion, and vertical motion. In addition, the sky routes prescribed for pilots will be discussed, including *Rekhāpatha*, *Maṇḍala*, *Kākṣyā*, *Śakti*, and *Kendra*, and these will be compared with modern aviation routes. The celestial bodies that may obstruct aviation will also be described here. Furthermore, two subsections will be included: The speed and routes of ancient aircraft. The speed and routes of modern aircraft.

Chapter-8: Ancient and Modern Aircraft Mechanics This chapter will present the thirty-two types of machines (*yantras*) described in ancient aviation literature along with their methods of construction. The similarities and differences between these and modern aviation machines will then be highlighted, along with their mechanical principles. Additionally, the chapter will focus on the roles of these machines in aircraft operation, their structural designs, and the types of metals used in their construction.

Chapter-9: Comparison of Ancient and Modern Aircraft In this chapter, the structure, efficiency, features, and limitations of different types of aircraft described in ancient Brahmanical literature will be analyzed. These will then be compared with the structure, efficiency, features, and limitations of aircraft available in the modern era.

Chapter-10: Ancient and Modern Aviation Precautions This chapter will discuss various precautions related to air travel. These include factors such as diet, clothing, alternative arrangements for air conditioning, aircraft operating forces, and the natural environment. The chapter will also present a comparative discussion of the precautions taken in ancient air travel and those necessary for modern aviation.

Chapter-11: Air Travel Problems and Their Solutions This chapter will examine the problems related to aviation as described in the *Bṛhadvimāna Śāstra* as well as the challenges faced in the modern era. Special attention will be given to sudden problems encountered during travel, whether caused by natural phenomena or human actions, along with measures for protection against them.

Chapter-12: Aircraft Difficulties In this chapter, various difficulties related to aircraft will be presented under three categories: Structural difficulties, Difficulties related to combat, Difficulties related to cargo. The discussion will highlight how these difficulties were conceptualized in ancient aviation and how they are addressed within the framework of modern aeronautics.

Chapter-13: Epilogue This final chapter will present the conclusions drawn from all the previous chapters as the overall result of the dissertation. It will summarize the findings of the comparison between ancient and modern aviation, pointing out the special features and limitations of both. The chapter will also emphasize the significance of India's oldest literary heritage in the modern scientific age and the continuing relevance of the Sanskrit language in technological contexts. Finally, it will be demonstrated that the ancient science of aviation, as described in the *Bṛhadvimāna Śāstra*—composed centuries ago—reveals remarkable insights. The scientific genius of the ancient sage Bharadvāja, whose vision lies at the foundation of this tradition, will be acknowledged and clarified.

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