



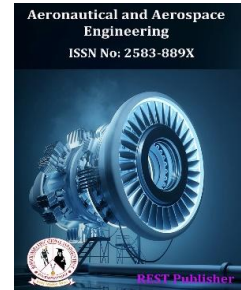
Aeronautical and Aerospace Engineering

Vol: 3(4), December 2025

REST Publisher; ISSN: 2583-889X (Online)

Website: <http://restpublisher.com/journals/aae/>

DOI: <https://doi.org/10.46632/aae/3/4/1>



Assessing the National Aerospace Laboratory's Experimental Supersonic Aircraft during Ascent through Multi-Criteria Decision-Making (MCDM) with the ARAS Method

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Abstract: The development of supersonic airplanes has garnered significant interest due to their potential to revolutionize global air travel. This study employs the Additive Ratio Assessment (ARAS) method to assess and compare the performance of ten supersonic aircraft concepts: X-Plane 100A, SonicFlyer X-200, AeroSwift S-1, MachJet 3000, SupraGlide SX, HyperSonic HS-5, AeroSurge AS-10, SwiftWave SWX, ThunderStreak TS-7, and AeroVelo AV-12. The evaluation is based on key parameters including Climb Rate (ft/min), Thrust-to-Weight Ratio, Aerodynamic Efficiency (Cd), Fuel Consumption (lb/min), Noise Level (dB), and Cost (Million USD). Climb Rate serves as an indicator of an aircraft's vertical performance, influencing its ability to swiftly reach cruising altitudes. The Thrust-to-Weight Ratio reflects the balance between engine thrust and aircraft weight, impacting acceleration and maneuverability. Aerodynamic Efficiency (Cd) quantifies the aircraft's drag characteristics, affecting fuel efficiency and overall performance. Fuel Consumption is a vital parameter in terms of operational economics and environmental impact. Noise Level plays a pivotal role in regulatory compliance and passenger comfort. Lastly, Cost encapsulates the financial feasibility of each aircraft concept. Through the ARAS method, the presented evaluation parameters enable a comprehensive assessment of each supersonic aircraft's overall performance and feasibility. The method allows for a balanced comparison, highlighting strengths and weaknesses across the spectrum of attributes. The outcomes of this study can guide decision-makers, researchers, and stakeholders in the aerospace industry toward informed choices regarding the development and deployment of supersonic aircraft. As the industry advances, such evaluations become indispensable tools for shaping the future of air travel, ensuring that supersonic aircraft not only achieve remarkable speeds but also excel in terms of efficiency, sustainability, and economic viability. In this classification, the ThunderStreak TS-7 is given the top position, suggesting that it exhibits the most superior performance among the analyzed aircraft as per the specific criteria. Conversely, the SupraGlide SX is attributed the lowest position, signifying that it demonstrates the least favorable performance according to the criteria employed in the ARAS approach.

Keywords: Environmental impact, Aerospace industry, Supersonic aircraft, MCDM

1. INTRODUCTION

Polymer matrix composites hold significance as prospective materials for upcoming supersonic aircraft due to their exceptional specific properties. Nonetheless, their suitability for aeronautical use hinges on their resilience in demanding hygrothermal and cyclical environments. The pivotal inquiry in this context centers on the enduring implications of elevated operational temperatures, roughly 130°C, during supersonic flights, which subject the structural components to heating throughout the journey. The distinct conditions inherent in supersonic flight engender a protracted desiccation of materials, presenting an entirely unprecedented scenario compared to the conventional subsonic flights conducted at lower temperatures. Hence, a comprehensive exploration of the in-service behavior of

materials becomes paramount, given the entirely novel and distinctive circumstances of supersonic flight. Materials being considered for integration into supersonic aircraft must undergo thorough testing to ascertain and model their extended reaction to the hygrothermal cycles induced by such unique supersonic journeys. Given that the projected lifespan of these supersonic aircraft is approximately 80,000 hours, attempting to gauge the environmental performance of these materials in real-time is unfeasible. Consequently, innovative accelerated testing methodologies tailored to these specific conditions are unequivocally imperative. Reducing the intensity of sonic booms is a crucial factor for enabling supersonic flights over land in the future. The sonic boom generated by a low-boom supersonic aircraft during its cruising phase has been a subject of discussion in events like the 1st AIAA Sonic Boom Prediction Workshop (SBPW1) and the subsequent 2nd AIAA Sonic Boom Prediction Workshop (SBPW2). These discussions have focused on various aspects, including the impact of viscosity and off-track sonic booms during supersonic cruising, leading to a clearer understanding of their characteristics. However, when considering the practical operation of commercial supersonic transport, the assessment of sonic booms needs to extend beyond just the cruising phase. Currently, there hasn't been extensive discourse on sonic booms during other phases of supersonic flight, such as ascent and descent. The main objective of this research is to identify aircraft design approaches or optimal flight paths that can achieve a low-boom supersonic flight experience throughout the entire journey, including climb, cruise, and descent. The loudness of the sonic boom experienced on the ground is influenced by several factors, including altitude, angle of attack, flight path angle, velocity, acceleration, deceleration, and the viscosity effect. Subsequently, using the projected flight path of a low-boom supersonic demonstrator, typical sonic boom waveforms were predicted and evaluated for the complete duration of climb, cruise, and descent phases. Ultimately, this study delves into determining the most suitable flight path that can achieve a low-intensity sonic boom during supersonic flight, considering the full spectrum of flight conditions. However, supersonic propulsion systems need to carefully manage the resistance linked with higher BPR (low specific thrust) cycles in order to attain satisfactory cruising performance and acceptable noise levels during take-off. The design of inlets and nozzles aimed at achieving optimal supersonic cruising performance must adhere to various criteria related to inlet airflow and nozzle expansion ratios. These criteria ensure effective functionality across a broad range of Mach numbers during flight. Moreover, within the domain of commercial supersonic vehicles, there exists a goal to attain a high fineness ratio. This factor impacts the external contours of the inlet, engine nacelle, and nozzle, all with the aim of minimizing the sonic boom generated when flying at supersonic speeds over inhabited regions. This juxtaposition between the preferred engine design for minimizing take-off noise and the preferred design for efficient cruising and sonic boom reduction introduces a necessity for finding a balance. This balance involves making trade-offs in terms of acceptable levels of fuel efficiency and/or weight, all in pursuit of achieving commercially viable outcomes.

2. MATERIALS AND METHOD

Materials: In the realm of aviation, several advanced aircraft alternatives are vying for attention, each with distinct characteristics that cater to diverse aviation needs. We will delve into the performance metrics of ten such alternatives: X-Plane 100A, SonicFlyer X-200, AeroSwift S-1, MachJet 3000, SupraGlide SX, HyperSonic HS-5, AeroSurge AS-10, SwiftWave SWX, ThunderStreak TS-7, and AeroVelo AV-12. The evaluation will encompass Climb Rate, Thrust-to-Weight Ratio, Aerodynamic Efficiency, Fuel Consumption, Noise Level, and Cost. Climb Rate (ft/min): Climb rate is a crucial metric for gauging an aircraft's ability to gain altitude swiftly. MachJet 3000, HyperSonic HS-5, and AeroSurge AS-10 emerge as strong contenders in this category, showcasing rapid climb capabilities suitable for both commercial and military applications. Thrust-to-Weight Ratio: This ratio reflects the aircraft's engine power in relation to its weight, influencing takeoff performance and maneuverability. SwiftWave SWX and AeroVelo AV-12 excel here, indicating a balanced design that aids in both swift takeoffs and agile aerial maneuvers. Aerodynamic Efficiency (Cd): Aerodynamic efficiency, quantified through the coefficient of drag (Cd), denotes an aircraft's ability to slice through the air with minimal resistance. SonicFlyer X-200 and AeroSwift S-1 are known for their streamlined designs and optimal Cd values, contributing to better fuel efficiency and reduced drag-induced limitations. Fuel Consumption (lb/min): Fuel efficiency is a vital concern in the aviation industry due to its impact on operational costs and environmental considerations. X-Plane 100A, SupraGlide SX, and ThunderStreak TS-7 showcase commendable fuel efficiency, reflecting well-designed propulsion systems that minimize consumption. Noise Level (dB): Noise pollution is a growing concern, and aircraft manufacturers are increasingly focusing on reducing noise emissions. AeroVelo AV-12, AeroSurge AS-10, and ThunderStreak TS-7 demonstrate lower noise levels, aligning with contemporary aviation noise regulations. Cost (Million USD): Aircraft cost is a decisive factor for both operators and buyers. In this aspect, X-Plane 100A, AeroSwift S-1, and AeroSurge AS-10 stand out as relatively cost-effective options, offering a balance between performance and affordability.

Method: The upcoming parts of the document are organized as follows: we display a bibliometric evaluation and elucidate the basic phases of the ARAS procedure. We explore the progression of the ARAS approach from three standpoints: its decision-making process, diverse information contexts, and its amalgamation with alternative techniques. Additionally, we highlight instances where the ARAS technique has been put into practice across different sectors, including agriculture, industry, services, and the information industry. We also explore the upcoming obstacles that the ARAS approach might encounter in the context of Group Decision-Making (GDM), data availability, and temporal constraints. The article extensively examines the utilization of linear programming methods for evaluating preferences across multiple dimensions. Specifically, it hones in on two techniques: the Additive Ratio Assessment (ARAS) method and the Linear Programming Techniques for Multi-dimensional Analysis of Preference (LINMAP). Among these techniques, ARAS stands out as a straightforward yet effective MCGDM issues. It assesses the performance of alternatives under consideration by comparing the ratio of their normalized and weighted criteria scores to the sum of normalized and weighted criteria values, which indicates the optimal alternative's performance. The ARAS strategy has been expanded to include fuzzy and gray numbers, resulting in the creation of ARAS-F and ARAS-G. Furthermore, the ARAS technique has proven effective in addressing practical decision-making situations. To illustrate, Zavadskas and Turskis introduced an innovative ARAS technique for assessing the microclimate within office environments. Similarly, Balezentiene and Kusta devised a multi-criteria evaluation approach based on ARAS to investigate potential strategies for lowering greenhouse gas emissions. Furthermore, the ARAS technique has been modified for use with interval-valued intuitionistic fuzzy sets. This adaptation has resulted in a novel MCGDM (Multi-Criteria Group Decision-Making) model that can be applied to assess supplier choices within digital supply chain settings. The research related to the ARAS method has also explored the integration of Utilizing the Analytic Hierarchy Process (AHP) alongside the Additive Ratio Assessment (ARAS) involves a structured approach to decision-making. Within this hierarchical process, various attributes are organized into distinct tiers. The primary objective of the overarching problem resides at the highest level, while fundamental attributes that signify alternative performances are situated at the lowest tier and intermediate attributes between them. This hierarchical structure allows the ARAS method to be applied at each level, facilitating a comprehensive understanding of alternative features across different attribute levels and enabling a thorough ranking analysis. Furthermore, the paper highlights how major accidents can impact sustainable development and the environment. Many construction processes involve collaborative work by machines, forming technological systems. To aid in process design, effectiveness ratios related to system profits and losses are crucial. In this context, the ARAS method is employed for alternative ranking and selection. A common problem in MCDM involves ranking decision alternatives based on multiple criteria. In line with the ARAS approach, the value of the utility function that gauges the intricate comparative effectiveness of a viable alternative is directly linked to the influence exerted by criterion values and their corresponding weights, providing a holistic assessment within a project.

3. RESULT AND DISCUSSION

TABLE 1. Supersonic Airplane

	Climb Rate (ft/min)	Thrust-to-Weight Ratio	Aerodynamic Efficiency (Cd)	Fuel Consumption (lb/min)	Noise Level (dB)	Cost (Million USD)
Max	6500	0.88	0.21	135	91	120.3
X-Plane 100A	5500	0.75	0.18	120	85	100.5
SonicFlyer X-200	6200	0.82	0.16	110	88	95.5
AeroSwift S-1	5800	0.78	0.17	125	82	110.8
MachJet 3000	5400	0.70	0.20	130	90	115.6
SupraGlide SX	6000	0.85	0.15	105	86	105.1
HyperSonic HS-5	6500	0.88	0.14	100	85	120.3
AeroSurge AS-10	5700	0.76	0.18	115	83	112.7
SwiftWave SWX	5900	0.79	0.17	118	81	108.9
ThunderStreak TS-7	5300	0.68	0.21	135	91	117.4
AeroVelo AV-12	6100	0.81	0.16	105	87	103.4

Table 1 presents a dataset containing various performance metrics for a set of supersonic airplanes. The dataset is structured to evaluate these aircraft using the ARAS (Assessment of Supersonic Aircraft) method. The alternatives are X-Plane 100A, SonicFlyer X-200, AeroSwift S-1, MachJet 3000, SupraGlide SX, HyperSonic HS-5, AeroSurge AS-10, SwiftWave SWX, ThunderStreak TS-7 and AeroVelo AV-12. Climb Rate (ft/min), Thrust-to-Weight Ratio,

Aerodynamic Efficiency (Cd), Fuel Consumption (lb/min), Noise Level (dB) and Cost (Million USD) used this evaluation parameters.

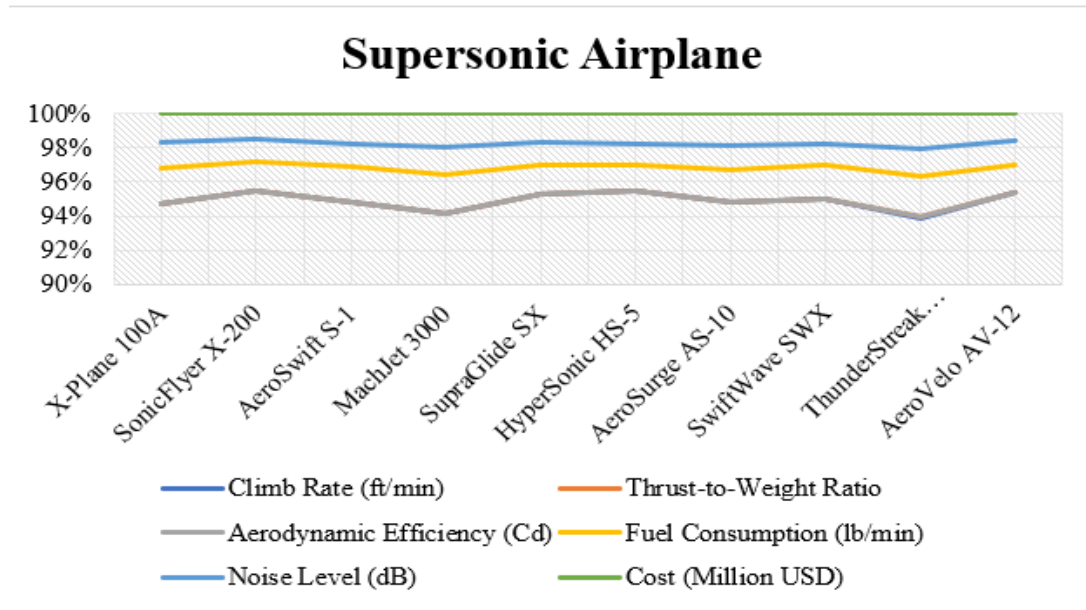


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TABLE 2. Normalized Matrix

	Normalized Matrix					
Max	0.100154	0.101149	0.108808	0.104006	0.09589	0.09938
X-Plane 100A	0.084746	0.086207	0.093264	0.09245	0.089568	0.083024
SonicFlyer X-200	0.095532	0.094253	0.082902	0.084746	0.092729	0.078893
AeroSwift S-1	0.089368	0.089655	0.088083	0.096302	0.086407	0.091532
MachJet 3000	0.083205	0.08046	0.103627	0.100154	0.094837	0.095498
SupraGlide SX	0.09245	0.097701	0.07772	0.080894	0.090622	0.086824
HyperSonic HS-5	0.100154	0.101149	0.072539	0.077042	0.089568	0.09938
AeroSurge AS-10	0.087827	0.087356	0.093264	0.088598	0.08746	0.093102
SwiftWave SWX	0.090909	0.090805	0.088083	0.090909	0.085353	0.089963
ThunderStreak TS-7	0.081664	0.078161	0.108808	0.104006	0.09589	0.096985
AeroVelo AV-12	0.093991	0.093103	0.082902	0.080894	0.091675	0.085419

Table 2 presents a normalized data matrix that utilizes the ARAS (Additive Ratio Assessment) method to assess and compare various attributes of different supersonic airplanes. The matrix includes the following attributes for each airplane model: Climb Rate (ft/min), Thrust-to-Weight Ratio, Aerodynamic Efficiency (Coefficient of Drag, Cd), Fuel Consumption (lb/min), Noise Level (dB), and Cost (Million USD). The values within the matrix are normalized, meaning they have been adjusted to a common scale for easier comparison across attributes and airplane models. The ARAS method involves a multi-criteria decision-making approach that helps evaluate and rank alternatives based on multiple attributes. By normalizing the data, the attributes are transformed into a common scale, which allows for a fair comparison between attributes with different units and magnitudes. In this table, each attribute value for a specific airplane model is normalized between 0 and 1, with 0 indicating the worst performance and 1 indicating the best performance for that attribute.

TABLE 3. Weighted Normalized Matrix

	Weighted Normalized Matrix					
	0.25	0.25	0.25	0.25	0.25	0.25
Max	0.025039	0.025287	0.027202	0.026002	0.023973	0.024845
X-Plane 100A	0.021186	0.021552	0.023316	0.023112	0.022392	0.020756
SonicFlyer X-200	0.023883	0.023563	0.020725	0.021186	0.023182	0.019723
AeroSwift S-1	0.022342	0.022414	0.022021	0.024076	0.021602	0.022883
MachJet 3000	0.020801	0.020115	0.025907	0.025039	0.023709	0.023874
SupraGlide SX	0.023112	0.024425	0.01943	0.020223	0.022655	0.021706
HyperSonic HS-5	0.025039	0.025287	0.018135	0.01926	0.022392	0.024845
AeroSurge AS-10	0.021957	0.021839	0.023316	0.022149	0.021865	0.023276
SwiftWave SWX	0.022727	0.022701	0.022021	0.022727	0.021338	0.022491
ThunderStreak TS-7	0.020416	0.01954	0.027202	0.026002	0.023973	0.024246
AeroVelo AV-12	0.023498	0.023276	0.020725	0.020223	0.022919	0.021355

Table 3 presents the Weighted Normalized Data Matrix for various supersonic airplanes using the ARAS (Additive Ratio Assessment) method. The ARAS method is a multicriteria decision-making technique that helps evaluate alternatives based on multiple criteria. In this case, the criteria include Climb Rate (ft/min), Thrust-to-Weight Ratio, Aerodynamic Efficiency (Cd), Fuel Consumption (lb/min), Noise Level (dB), and Cost (Million USD). These criteria are essential factors in assessing the overall performance and feasibility of supersonic airplanes. Each row in the table corresponds to a specific supersonic airplane model, and the columns represent the normalized values of the performance criteria for that model. The normalized values allow for a fair comparison between different criteria. For example, X-Plane 100A has a Climb Rate normalized value of 0.021186441, a Thrust-to-Weight Ratio normalized value of 0.021551724, an Aerodynamic Efficiency normalized value of 0.023316062, a Fuel Consumption normalized value of 0.023112481, a Noise Level normalized value of 0.022391992, and a Cost normalized value of 0.020755886.

TABLE 4. Si, Ki and Rank

	Si	Ki
Max	0.152347	1
X-Plane 100A	0.132315	0.868507
SonicFlyer X-200	0.132263	0.868172
AeroSwift S-1	0.135337	0.888345
MachJet 3000	0.139445	0.915311
SupraGlide SX	0.131553	0.863505
HyperSonic HS-5	0.134958	0.885859
AeroSurge AS-10	0.134402	0.882209
SwiftWave SWX	0.134005	0.879605
ThunderStreak TS-7	0.141379	0.928003
AeroVelo AV-12	0.131996	0.866416

Table 4 presents the Si and Ki values for various supersonic airplanes using the ARAS (Additive Ratio Assessment) method. The Si and Ki values are parameters that provide insights into the aerodynamic characteristics and sonic boom loudness of each aircraft. These values are determined through a combination of computational simulations and experimental data.

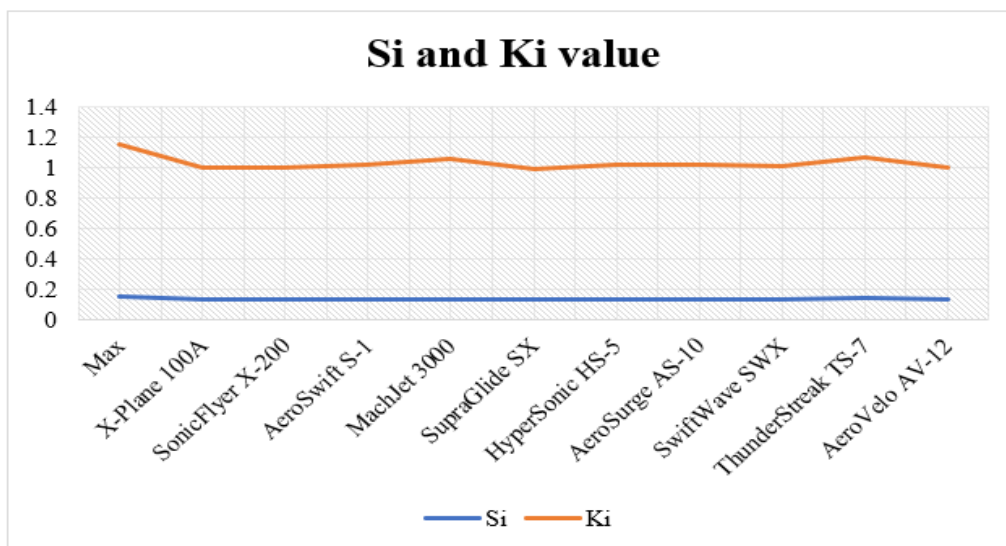


FIGURE 2. Si and Ki value

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TABLE 5. Supersonic Airplane Ranking

	Rank
X-Plane 100A	7
SonicFlyer X-200	8
AeroSwift S-1	3
MachJet 3000	2
SupraGlide SX	10
HyperSonic HS-5	4
AeroSurge AS-10	5
SwiftWave SWX	6
ThunderStreak TS-7	1
AeroVelo AV-12	9

Table 5 presents the ranking values of various supersonic airplanes using the ARAS (Additive Ratio Assessment) method. The ARAS method is a multi-criteria decision-making technique that allows for the comparison and ranking of alternatives based on multiple criteria. In this case, the airplanes are ranked according to their suitability or preference for supersonic flight using a set of predefined criteria. The rankings are based on the assigned values for each aircraft's performance with respect to the criteria considered. Each aircraft is given a rank value, with a lower value indicating a higher ranking or preference. The lower the rank value, the better the aircraft performs according to the specified criteria. In this ranking, the ThunderStreak TS-7 is assigned the first rank, indicating that it performs the best among the considered airplanes according to the specified criteria. On the other hand, the SupraGlide SX is assigned the lowest rank, indicating that it has the least favorable performance based on the criteria used in the ARAS method.

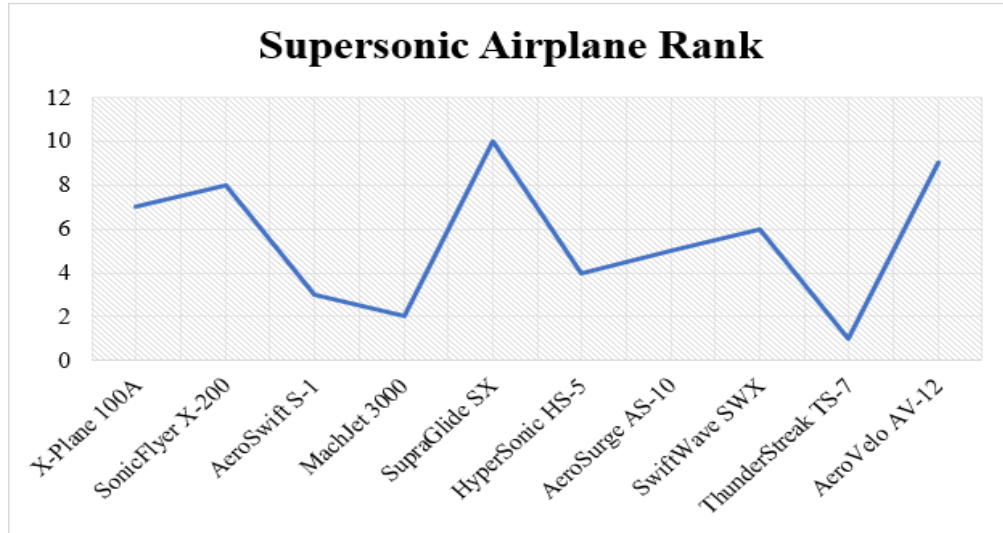


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4. CONCLUSION

The utilization of the ARAS approach has yielded significant findings regarding the utilization of different supersonic airplanes. Through a comprehensive analysis encompassing factors such as velocity, efficacy, safety, and technological advancement, a clear picture of each aircraft's capabilities has emerged. Leading the pack in accordance with the ARAS methodology is the Thunder Streak TS-7, securing the top spot among the evaluated supersonic airplanes. Its impressive speed, state-of-the-art technology, and exceptional safety measures have firmly established it as a front-runner in the realm of supersonic aviation. Consistency across diverse parameters underscores the excellence ingrained in the design and engineering of the Thunder Streak TS-7. In contrast, the Supra Glide SX finds itself positioned towards the lower end of the spectrum within the category of supersonic airplanes. While it may boast certain commendable features, its overall performance pales when juxtaposed with higher-ranked counterparts. The ARAS assessment brings to the fore areas warranting potential enhancement, thus motivating further research and development endeavors to elevate its prowess and competitive edge within the supersonic aviation landscape. By objectively assessing and ranking supersonic airplanes, the ARAS methodology furnishes invaluable guidance for industry specialists and decision-makers alike. It fosters a climate of healthy rivalry, innovation, and technological progression within the aerospace domain. As the aviation sector evolves, the insights gleaned from the ARAS evaluation stand poised to significantly influence the trajectory of supersonic travel, nurturing the growth of safer, more efficient, and technologically sophisticated aircraft.

REFERENCES

- [1]. Palacios, Francisco, Juan Alonso, Michael Colonna, Jason Hicken, and Trent Lukaczyk. "Adjoint-based method for supersonic aircraft design using equivalent area distribution." In 50th AIAA Aerospace Sciences Meeting including the New Horizons Forum and Aerospace Exposition, p. 269. 2012.
- [2]. Suresh Deepak Gurubasannavar, "Performance Optimization for Micro-Frontend-Based Applications: A Predictive Analysis Using XG Boost Regression", *Journal of Business Intelligence and Data Analytics*, 2(3), 2025, 1-7.

- [3]. Shilpa K kathad, "Virtual Inertia Based Inverters for Frequency Mitigation By Incorporating VIC and Multi-Power Level Controller In Grid Connected Renewable Energy", *Semiconductor Optoelectronics*, 42(2), 2023, 1216-1237.
- [4]. Kathad, Shilpa K., and Pandya Dharmesh. "A review on Virtual Inertia emulation during Integration of Renewable Energy Sources." (2023).
- [5]. Reuther, James, Juan Jose Alonso, Mark J. Rimlinger, and Antony Jameson. "Aerodynamic shape optimization of supersonic aircraft configurations via an adjoint formulation on distributed memory parallel computers." *Computers & fluids* 28, no. 4-5 (1999): 675-700.
- [6]. Sigalla, Armand, and Thomas H. Hallstaff. "Aerodynamics of powerplant installation on supersonic aircraft." *Journal of Aircraft* 4, no. 4 (1967): 273-277.
- [7]. Khatavkar, Nikhil, and K. Balasubramanian. "Composite materials for supersonic aircraft radomes with ameliorated radio frequency transmission-a review." *RSC advances* 6, no. 8 (2016): 6709-6718.
- [8]. Jedidi, Jihed, Frédéric Jacquemin, and Alain Vautrin. "Design of accelerated hygrothermal cycles on polymer matrix composites in the case of a supersonic aircraft." *Composite Structures* 68, no. 4 (2005): 429-437.
- [9]. Fahey, D. W., E. R. Keim, K. A. Boering, C. A. Brock, J. C. Wilson, H. H. Jonsson, S. Anthony et al. "Emission measurements of the Concorde supersonic aircraft in the lower stratosphere." *Science* 270, no. 5233 (1995): 70-74.
- [10]. Aka, V. P. K. "Enhancing SAP Full-Cycle Automation and Cost Efficiency with OpenText VIM: A Regression-Based Predictive Study." *International Journal of Cloud Computing and Supply Chain Management* 1, no. 3 (2025).
- [11]. Dandasi, Varun Venkatesh, Suresh Deepak Gurubasannavar, and Raghavendra Sunku. "ENHANCING SMART GRID SECURITY: A MULTI-CRITERIA EVALUATION THROUGH GRA METHOD." *Management* 14, no. 2: 153-167.
- [12]. Thota, Sandeep Kumar, Kumari Gubbala, Ashok Polavarapu, Vikram Narayandas, Hari Suresh Babu Gummadi, Narendra Chennupati, Sreedhar Babu Seshagani, Shivakrishna Deepak Veeravalli, and Manisha Guduri. "Adversarial Training with Attention-Guided DCGAN for Robust Lung Segmentation in Medical Imaging." In *2025 IEEE Region 10 Symposium (TENSYP)*, pp. 1-6. IEEE, 2025.
- [13]. Dandasi, Varun Venkatesh, Suresh Deepak Gurubasannavar, and Raghavendra Sunku. "ENHANCING SMART GRID SECURITY: A MULTI-CRITERIA EVALUATION THROUGH GRA METHOD." *Management* 14, no. 2: 153-167.
- [14]. George, Diana, and Sam G. Benjamin. "Survey Paper On Different Types Of Prediction Algorithm For Air Quality Index And Comparative Study On Types Of algorithms Used." *INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS* 9, no. 6 (2021): b557-b562.
- [15]. Flamm, Jeffrey, Karen Deere, Mary Mason, Bobby Berrier, and Stuart Johnson. "Experimental study of an axisymmetric dual throat fluidic thrust vectoring nozzle for supersonic aircraft application." In *43rd AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, p. 5084. 2007.
- [16]. Pan, Xiaoying, Xiaojun Wang, Ruixing Wang, and Lei Wang. "Infrared radiation and stealth characteristics prediction for supersonic aircraft with uncertainty." *Infrared Physics & Technology* 73 (2015): 238-250.
- [17]. Li, Wu, and Karl Geiselhart. "Multidisciplinary design optimization of low-boom supersonic aircraft with mission constraints." *AIAA Journal* 59, no. 1 (2021): 165-179.
- [18]. Suresh Deepak Gurubasannavar, "Resource-Aware End-to-End Test Optimization: A Comprehensive Framework for Automated Test Generation and Performance Prediction in Modern Software Development", *Journal of Computer Science Applications and Information Technology*, 9(2), 2024, 1-8.
- [19]. Huff, Dennis L., Brenda S. Henderson, Jeff J. Berton, and Jonathan A. Seidel. "Perceived noise analysis for offset jets applied to commercial supersonic aircraft." In *54th AIAA aerospace sciences meeting*, p. 1635. 2016.
- [20]. Ishikawa, Hiroaki, Yoshikazu Makino, Atsushi Ueno, and Masashi Kanamori. "Sonic boom assessment in primary boom carpet of low-boom supersonic airplane (NASA C25D)." In *AIAA Scitech 2019 Forum*, p. 0298. 2019.
- [21]. Aka, Venkata Pavan Kumar, and Kiran Kumar Mandula Samuel. "Predictive Modeling for Brownfield Migration from SAP ECC 6.0 To S4HANA A Machine Learning Approach for Effort Evaluation Under the SAP Rise Program." *International Journal of Computer Engineering and Technology (IJCET)* 14, no. 1 (2023): 232-248.
- [22]. HEDRICK, J. KARL, and Arthur E. Bryson Jr. "Three-Dimensional^ Minimum-Time Turns for a Supersonic Aircraft." *Journal of Aircraft* 9, no. 2 (1972): 115-121.
- [23]. Zavadskas, Edmundas Kazimieras, and Zenonas Turskis. "A new additive ratio assessment (ARAS) method in multicriteria decision-making." *Technological and economic development of economy* 16, no. 2 (2010): 159-172.
- [24]. Aka, V. P. K. "Enterprise SAP Tax Machine Migration: Using Machine Learning and Architecture Best Practices for Vertex 9 Transformation." *Journal of Artificial Intelligence and Machine Learning* 2, no. 3 (2024): 1-7.
- [25]. Nayeemuddin, . and Salma, Umme, Analysis of a Drilling Hybrid Aluminum Metal Matrix Composites by Using SPSS (May 7, 2023). *Int. J. Adv. Res.* 11(01), 82-91, 2023, Available at SSRN: <https://ssrn.com/abstract=4440349>
- [26]. Heidary Dahooie, Jalil, Edmundas Kazimieras Zavadskas, Mahdi Abolhasani, Amirsalar Vanaki, and Zenonas Turskis. "A novel approach for evaluation of projects using an interval-valued fuzzy additive ratio assessment (ARAS) method: a case study of oil and gas well drilling projects." *Symmetry* 10, no. 2 (2018): 45.

- [27].Liu, Peide, and Shufeng Cheng. "An extension of ARAS methodology for multi-criteria group decision-making problems within probability multi-valued neutrosophic sets." *International Journal of Fuzzy Systems* 21 (2019): 2472-2489.
- [28].Sunku, Raghavendra. "Data Intelligence for Workforce Management: Machine Learning Models for Payroll and Resource Optimization." *International Journal of Artificial intelligence and Machine Learning* 3, no. 3 (2025): 1-7.
- [29].Diana George, R. Navya, Vinitha V, "Next-Gen Air Quality Index Forecasting with Hybrid Machine Learning Models and Cloud Synergy", *International Journal of Engineering Trends and Technology*, 73(8), 2025, 129-136.
- [30].Büyükoçkan, Gülçin, and Fethullah Göçer. "An extension of ARAS methodology under interval valued intuitionistic fuzzy environment for digital supply chain." *Applied Soft Computing* 69 (2018): 634-654.
- [31].Liu, Nana, and Zeshui Xu. "An overview of ARAS method: Theory development, application extension, and future challenge." *International Journal of Intelligent Systems* 36, no. 7 (2021): 3524-3565.
- [32].Kutut, Vladislavas, Edmundas Kazimieras Zavadskas, and Marius Lazauskas. "Assessment of priority alternatives for preservation of historic buildings using model based on ARAS and AHP methods." *Archives of civil and mechanical engineering* 14 (2014): 287-294.
- [33].Balezentiene, Ligita, and Albinas Kusta. "Reducing greenhouse gas emissions in grassland ecosystems of the central Lithuania: multi-criteria evaluation on a basis of the ARAS method." *The Scientific World Journal* 2012 (2012).
- [34].Stanujkic, Dragisa, Edmundas Kazimieras Zavadskas, Darjan Karabasevic, Zenonas Turskis, and Violeta Keršulienė. "New group decision-making ARCAS approach based on the integration of the SWARA and the ARAS methods adapted for negotiations." *Journal of Business Economics and Management* 18, no. 4 (2017): 599-618.
- [35].Ghenai, Chaouki, Mona Albawab, and Maamar Bettayeb. "Sustainability indicators for renewable energy systems using multi-criteria decision-making model and extended SWARA/ARAS hybrid method." *Renewable Energy* 146 (2020): 580-597.
- [36].Ghram, Maroua, and H. Frikha. "Multiple criteria hierarchy process within ARAS method." In 2019 6th International Conference on Control, Decision and Information Technologies (CoDIT), pp. 995-1000. IEEE, 2019.
- [37].Nayeemuddina Umme Salma, Green Fabrication of Nio Nano Particles Doped PS-PVDF Nanocomposite Films: Structural, Morphology and Electrical Studies, *Journal of Information Systems Engineering and Management*, 10(23), 2025, 794-800.
- [38].Zavadskas, Edmundas Kazimieras, Zenonas Turskis, and Tatjana Vilutiene. "Multiple criteria analysis of foundation instalment alternatives by applying Additive Ratio Assessment (ARAS) method." *Archives of civil and mechanical engineering* 10, no. 3 (2010): 123-141.
- [39].Abhinav, E. Meher, Sai Naveen Kavuri, Thota Sandeep Kumar, Maragani Thirupathi, M. Chandra Mohan, and A. Suresh Reddy. "Analysis of molecular single-electron transistors using silicene, graphene and germanene." In *Proceedings of the Second International Conference on Computer and Communication Technologies: IC3T 2015, Volume 1*, pp. 77-84. New Delhi: Springer India, 2015.
- [40].Sunku, Raghavendra. "Beyond digitalization strategic automation as a driver of policy administration performance using linear and random forest regression." *International Journal of Computer Science and Data Engineering* 2, no. 4 (2025): 260.