

## Performance Comparison Of Reusable Launch Vehicles

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Reusable launch vehicles are seen as the key to cost reduction through various benefits including increased reliability, incremental testing and maintenance, operations and materials savings. Much work has been conducted worldwide in reusable launch vehicle performance comparison [2,3,4]. Performance comparison requires that design and

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reusable launch vehicle performance comparison design point ssto system optimal vehicle type payload delivery subsequent effect high speed flight path angle orbiter model sled mechanism performance evaluation marginal positive payload performance launcher initial mass performance perspective vehicle concept performance result parameterised generic launch vehicle design

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## Performance Comparison Of Reusable Launch Vehicles

Performance comparison of reusable launch vehicles - CORE ...

## Performance comparison of reusable launch vehicles - CORE ...

This study investigated the performance of five Two-Stage-To-Orbit reusable launch vehicles (RLV), with stages propelled by rocket engines, turbojet engines and Rocket Based Combined Cycle (RBCC ...

## Performance Study of Two-Stage-To-Orbit Reusable Launch ...

Introduction. The Ambu ® aScope™ (Ambu, Ballerup, Denmark) is a single use videoscope for fiberoptic intubation that entered anaesthetic practice in ~2010. The first randomised trial comparing the Ambu aScope with a reusable video fibrescope in patients with predicted difficult intubation reported few differences in performance, except for patients with acutely compromised airways 1.

## Cost comparison of reusable and single use fibrescopes in ...

References Reference 1: Life-Cycle Cost Comparison of Reusable Launch Systems; Paper IAA-95-IAA.1.1.02, October 1995; W. Berry Reference 4: Studies on a Scrainjet-Propelled, Horizontal Launch and Landing, Single-Stage-To-Orbit Launcher; AIAA Paper 93-5053, November 1993; H-L Weinreich, H. Grallen, R. Parkinson, W. Berry Reference 5: Winged Launcher Configuration Study: Synthesis Report for Study ...

## Performance and technical feasibility comparison of ...

Reusable first stages in combination with expendable upper stages are a first step towards fully reusable launch vehicles. The goal of the present study is to analyze and compare reusable first stage concepts and their respective return options in terms of both feasibility and payload performance. While this paper deals with stage

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## Comparison of Return Options for Reusable First Stages

Performance Comparison of RBCC- and TBCC-based Reusable Launch Vehicles with Enhancing Technologies. George Culver; 39th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit June 2012. Research on TSTO Reusable Launch Vehicle (RLV) Powered by Turbo-aided RBCC Engine.

## Comparison Study of RBCC Powered Suborbital Reusable ...

The paper presents a synthesis of the performance and technical feasibility assessment of 7 reusable launcher types, comprising 13 different vehicles, studied by European Industry for ESA in the ESA Winged Launcher Study in the period January 1988 to May 1994. The vehicles comprised single-stage-to-orbit (SSTO) and two-stage-to-orbit (TSTO) vehicles, propelled by either air-breathing/rocket ...

## Performance and technical feasibility comparison of ...

Although most endoscopists believe reusable forceps are less expensive, this is not always the case when reprocessing costs are added to purchase price. Our study compared the performance, safety and cost of disposable versus reusable biopsy forceps. Performance. Disposable biopsy forceps were superior to reusable forceps in all categories assessed.

## A performance, safety and cost comparison of reusable and ...

Stappert, Sven und Wilken, Jascha und Bussler, Leonid und Sippel, Martin (2019) A Systematic Assessment and Comparison of Reusable First Stage Return Options. In: Proceedings of the International Astronautical Congress, IAC. 70th International Astronautical Congress, 21.10. - 25.10.2019, Washington DC, DC, USA.

## A Systematic Assessment and Comparison of Reusable First ...

A few companies are developing reusable launch systems intended to cut costs. A reusable launch vehicle, such as the SpaceX Falcon 9 first-stage booster, may be flown in “ expendable configuration ” to increase performance, although this is unusual. The now-retired Space Shuttle was one of the earliest RLVs.

## The history of reusable launch systems - Space Legal Issues

Reusable launch systems have the highest development costs and technical risks, but the technology is within current state of the art. Current efforts to economically recover and reuse launch vehicle elements are more promising than they have ever been. A reusable system has extremely low direct operating costs.

## Reusable launch vehicle - SlideShare

The reusable Falcon 9 ' s performance to GTO is listed at 5,500 kilograms. The same rocket in fully expendable version can lift 50 percent more payload — 8,300 kilograms. For the Falcon Heavy, the...

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SpaceX's new price chart illustrates performance cost of ...

The Falcon Heavy rocket, with reusable side boosters, costs \$90 million. For a fully expendable variant of the rocket, which can lift a theoretical maximum of 64 tons to low-Earth orbit, the price ...

Previously, the Air Force has been investigating high performance salt-based, liquid monopropellants for low thrust spacecraft applications. The focus of this effort has been on finding a reduced toxicity monopropellant with a predicted density performance impulse greater than 50% over hydrazine. During this same period of time, NASA has been investigating reusable launch vehicle (RLV) concepts and has considered using monopropellants in this application. Anticipating a possible RLV payoff, NASA and the Air Force are working on a trade study to gauge the potential applicability of the salt-based monopropellants in booster applications. This study will include a performance comparison of salt-based monopropellants; a list of minimum safety, hazard, and physical property requirements based on operational and logistical support environments for an RLV.

On June 15, 2011, the Air Force Space Command established a new vision, mission, and set of goals to ensure continued U.S. dominance in space and cyberspace mission areas. Subsequently, and in coordination with the Air Force Research Laboratory, the Space and Missile Systems Center, and the 14th and 24th Air Forces, the Air Force Space Command identified four long-term science and technology (S&T) challenges critical to meeting these goals. One of these challenges is to provide full-spectrum launch capability at dramatically lower cost, and a reusable booster system (RBS) has been proposed as an approach to meet this challenge. The Air Force Space Command asked the Aeronautics and Space Engineering Board of the National Research Council to conduct an independent review and assessment of the RBS concept prior to considering a continuation of RBS-related activities within the Air Force Research Laboratory portfolio and before initiating a more extensive RBS development program. The committee for the Reusable Booster System: Review and Assessment was formed in response to that request and charged with reviewing and assessing the criteria and assumptions used in the current RBS plans, the cost model methodologies used to frame [frame?] the RBS business case, and the technical maturity and development plans of key elements critical to RBS implementation. The committee consisted of experts not connected with current RBS activities who have significant expertise in launch vehicle design and operation, research and technology development and implementation, space system operations, and cost analysis. The committee solicited and received input on the Air Force launch requirements, the baseline RBS concept, cost models and assessment, and technology readiness. The committee also received input from industry associated with RBS concept, industry independent of the RBS concept, and propulsion system providers which is summarized in Reusable Booster System: Review and Assessment.

As a result of technological progress, we are now on verge of developing cost-effective reusable launch vehicles (RLV) for space. This study reviews the

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strategic implications of the emerging vision within the U.S. Department of Defense for using these vehicles. Although the U.S. Air Force is making the transition to a force that relies increasingly on space, the best path does not necessarily involve replicating the traditional air missions in space. This study of potential missions for RLVs concludes that, while these are capable of numerous missions (e.g., reconnaissance, global strike, cargo and personnel transport), the most important mission for the immediate future for both the U.S. military and commercial firms is in the area of traditional spacelift. The two broad conclusions that emerge from this study are that the U.S. military should move away from the spacelift business by obtaining spacelift through commercially procured launch services, and second, that the U.S. military should not develop militarized RLVs that are designed to perform the traditional air operations in space.

Originally published in 1981, the completely revised and updated second edition of the Dictionary of Space Technology illustrates the advances of the last 20 years and makes accessible nearly every word, concept, and event relating to this branch of science. It guides lay persons and professionals alike through humankind's activities in space, the beginnings of our extraterrestrial society, and the increasingly important role of space sciences in everyday life. Defines more than 1,500 terms, including: science basics; historic events; defence and armed forces terminology; and planetary sciences. Enhanced by more than 175 photographs and drawings, this Dictionary covers the past, the present and the future of space, space flight, and space technology.

Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database.

As part of NASA's focused technology programs for future reusable launch vehicles, a task is underway to study the feasibility of using the polymer matrix composite feedlines instead of metal ones on propulsion systems. This is desirable to reduce weight and manufacturing costs. The task consists of comparing several prototype composite feedlines made by various methods. These methods are electron-beam curing, standard hand lay-up and autoclave cure, solvent assisted resin transfer molding, and thermoplastic tape laying. One of the critical technology drivers for composite components is resistance to foreign objects damage. This paper presents results of an experimental study of the damage resistance of the candidate materials that the prototype feedlines are manufactured from. The materials examined all have a 5-harness weave of IM7 as the fiber constituent (except for the thermoplastic, which is unidirectional tape laid up in a bidirectional configuration). The resin tested were 977-6, PR 520, SE-SA-1, RS-E3 (e-beam curable), Cycom 823 and PEEK. The results showed that the 977-6 and PEEK were the most damage resistant in all tested cases.

Nettles, A. T Marshall Space Flight Center  
COMPOSITE MATERIALS; CURING; DAMAGE; TECHNOLOGY ASSESSMENT; HARNESSSES; MANUFACTURING; POLYMER MATRIX COMPOSITES; AUTOCLAVES; COSTS; ELECTRON BEAMS; FEED SYSTEMS; LAY-UP; PROPULSION SYSTEM CONFIGURATIONS; PROPULSION SYSTEM PERFORMANCE; PROTOTYPES; RESIN TRANSFER MOLDING; REUSABLE LAUNCH VEHICLES; THERMOPLASTICITY; WEIGHT REDUCTION

This report documents recent improvements to the acoustic and thermal control systems of the Thermal Acoustic Fatigue Apparatus (TAF), a progressive wave tube test facility at the NASA Langley Research Center, Hampton, Virginia. A brief summary of past acoustic performance is given first to serve as a

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basis for comparison with the new performance data using a multiple-input, closed-loop, narrow-band controller. Performance data in the form of test section acoustic power spectral densities and coherence are presented in three of six facility configurations for a variety of input spectra. Tested spectra include uniform, two cases of pink noise, three cases of narrow-band random, a simulated launch payload bay environment for an expendable launch vehicle, and a simulated external acoustic load for the aft section of a reusable launch vehicle. In addition, a new closed-loop temperature controller and thermocouple data acquisition system are described. Rizzi, Stephen A. Langley Research Center PERFORMANCE TESTS; TEST CHAMBERS; TEST FACILITIES; RESEARCH AND DEVELOPMENT; EXPERIMENTATION; RESEARCH FACILITIES; LAUNCHING; SPECTRA; SIMULATION

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