

Thesis Project Portfolio

Project ATLAS Hybrid Rocket Engine

(Technical Report)

The Apollo Program: Vanity Project or National Voyage of Discovery?

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

What is the importance of undertaking engineering projects with no immediate practical purpose? While such projects serve as excellent practice for engineers and may inadvertently lead to advances, it is important to consider whether trivial works are worth time, money, and human resources that could be spent on more meaningful pursuits.

Despite being an economical choice of engine, hybrid rocket motors have seen little widespread adoption, in part due to a lack of efficiency compared to liquid motors. If performance were to be improved, space launches could be made significantly cheaper. The UVA ATLAS capstone team aimed to test various oxidizer injectors and fuel grain geometries to improve the efficiency of hybrid motors. To do this, a small-scale motor was designed and built, and ABS was chosen as the fuel grain material, allowing for rapid prototyping of different designs via 3D-printing. The team was unsuccessful in achieving proper thrust in hot-fire tests, though success would have proved the viability of additively-manufactured fuel grains and the efficiency of hybrid rocket engines.

Though widely celebrated as a great success, Project Apollo faced criticism throughout the 1960s due to its low financial and technological returns on investment. The program attracted broad, bipartisan support both in Washington and across the American electorate. To an unusual cluster of fiscal conservatives and social justice progressives, however, the moon mission was a wasteful display of national prowess that burdened taxpayers and diverted public resources away from worthier purposes. I contend that the Apollo Program was validly criticized by social advocates and that the resulting growth in technology and industry could have been accomplished through more cost-effective methods.