

The aerospace revolution: development, intellectual property, and value

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From flying cars to billionaires in outer space, the aerospace industry is revolutionizing daily air travel and effectuating a new space race. In an industry traditionally dominated by government entities like the United States, the European Union, China, and Russia, private industry is now gaining independent standing, and in some cases, leading the way. In order to secure their place in this revolution, players in private industry are pursuing the important relationships between research and development, intellectual property, and revenue potential.

The number of active satellites in orbit has almost quintupled since 2010.

Private industry's involvement has already resulted in more economical and wider access to space and air travel, expanded technological development, and a renewed global public interest.

Players in the private aerospace industry are developing technology in numerous areas, including propulsion, robotics, fabrication, materials, communications, and autonomous systems. Private industry also led the way to reusable orbital class rockets, robotic spacecraft capable of asteroid redirection, satellite internet constellations, and autonomous electric vertical take-off and landing (eVTOL) aircraft.

Along with these technological developments come new market opportunities such as low-cost launch services, commercial space tourism, space mining, high-speed internet services, and urban air mobility. For instance, the number of active satellites in orbit has almost quintupled since 2010.¹ And by 2040, the global space industry is expected to generate revenue of more than \$1 trillion.²

Even in the face of major intellectual property litigation, funding continues to flow in the aerospace industry. For example, Boeing invested another \$450 million in Wisk Aero in January 2022. Wisk is a leader in the eVTOL aircraft area and previously filed suit³ in April 2021 against competitor Archer Aviation, alleging patent infringement and trade secret misappropriation.

With these new market opportunities, revenue streams, and available funding for established and new players in the private

aerospace industry, shrewd companies and their investors and partners are leveraging intellectual property protection — including patents and trade secrets.

Patents offer one route for intellectual property protection, while trade secrets offer another. Patents and trade secrets can both protect technological innovation. In fact, patents and trade secrets can protect the exact same information. But certain characteristics of patents and trade secrets differentiate when and how they should be utilized.

Patents can be issued for utilitarian, design, and plant innovations. Utility patents protect new and useful processes, machines, articles of manufacturer, compositions of matter, or their improvements. Design patents protect new, original, and ornamental designs. And plant patents protect asexual reproductions of distinct and new plants.

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Patents allow for civil enforcement against competitors, even if a competitor independently developed the technology, and provide predictable value to a patent owner. Patents offer protection for fifteen to twenty years, depending on the type of patent. Additionally, in exchange for the exclusive right to make, use, offer for sale, or sell an innovation, patents advance technological development in the industry through public disclosure.

Trade secrets can be any information that, when held as secret, provides an economic advantage over competitors. This can include patentable information, but can also include information like customer lists and market strategies. Because of this broad scope, trade secrets often protect an aerospace company's most valuable assets.

Trade secrets do not reveal the details of a technological development to the public, provide for civil and criminal penalties at the state and federal levels, avoid the costs incurred when filing and maintaining patents, and last in perpetuity, or at least as long as the company makes reasonable efforts to keep the information secret.

As two connected options for intellectual property protection, patents and trade secrets must be carefully considered and pursued to fully protect company assets for competitive advantage. However, with the rapid pace of technological development in the aerospace industry and the economic value potential of patent licensing, patents offer a unique route for promoting technological development while providing increased economic value for established and new industry players.

New players in the space field appear to recognize the important relationships between technological development, intellectual property strategy, and business strategy. In fact, an increase in probability of raising venture capital funding was shown for new companies after approval of their first patent.⁴

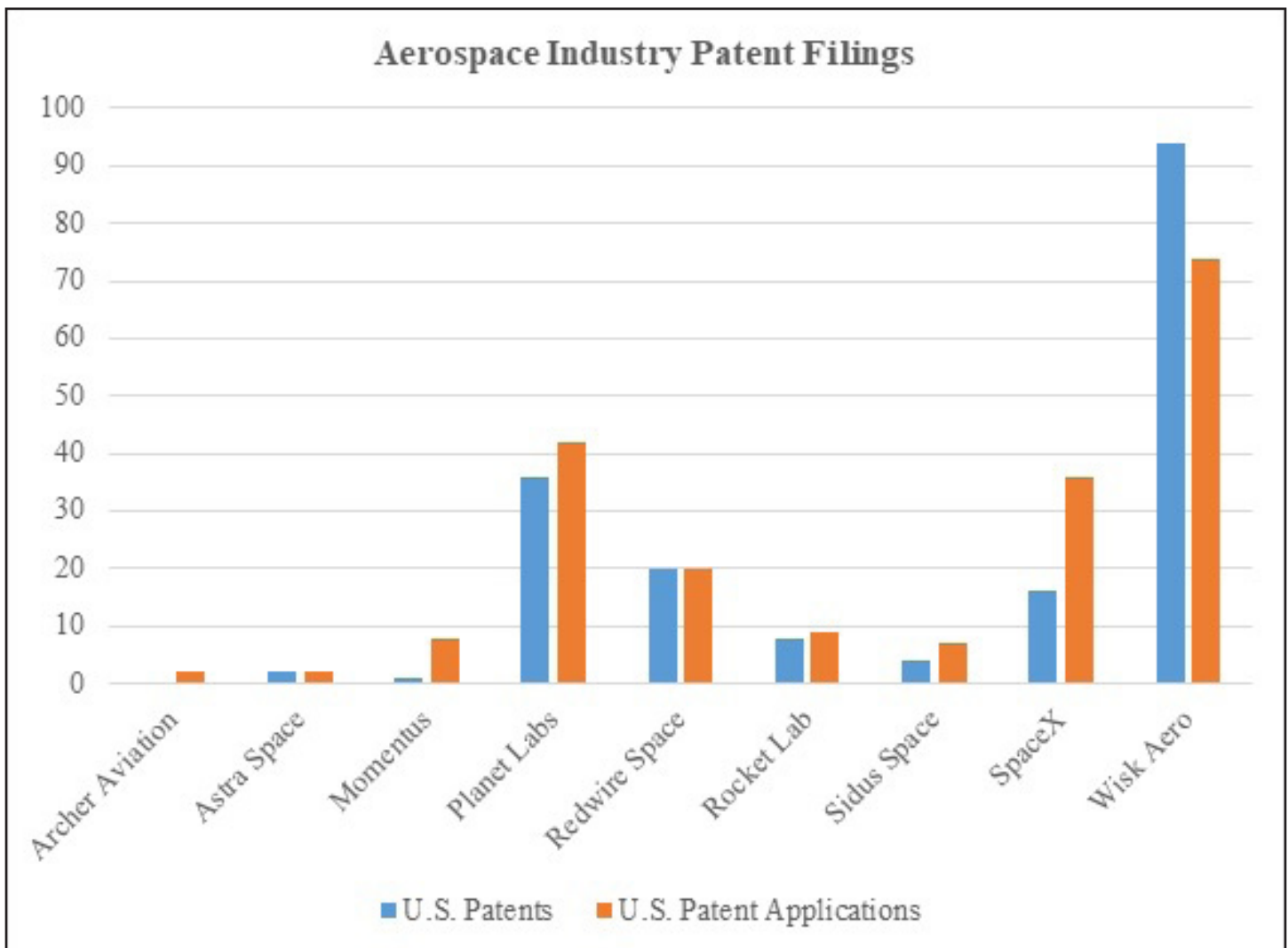
This is certainly true for companies like Astra Space, Momentus, Rocket Lab, Redwire Space, Planet Labs, and Sidus Space, where

their patent portfolios have developed in line with their special purpose acquisition company (SPAC) mergers or initial public offerings (IPO). The same can be said for aviation companies like Wisk Aero and Archer Aviation.

One space startup company, Sidus Space, provides commercial satellite design, manufacturing, launching, and data collection for a global customer base. Sidus Space had several patents issued in 2021, including patents directed to vacuum chamber motion feedthrough systems, a wastewater bioreactor environment, and a vertical takeoff and landing pad interlocking paver.

On December 14, 2021, Sidus Space (SIDU) went public via a traditional IPO on the Nasdaq Stock Exchange. With a valuation of nearly \$200 million, Sidus Space raised about \$15 million during its IPO.

Planet Labs is another upcoming player in the satellite area. Planet Labs provides geospatial data for use in agriculture, government, and commercial mapping. This company deployed over 200 satellites and uses these satellites to continuously collect millions of miles of satellite imagery that Planet Labs in turn provides as a data subscription service to customers.



Going Public in the Aerospace Industry

Company	Date	Type
<i>Archer Aviation</i>	9/17/2021	SPAC
<i>Astra Space</i>	7/1/2021	SPAC
<i>Momentus</i>	8/13/2021	SPAC
<i>Planet Labs</i>	12/8/2021	SPAC
<i>Redwire Space</i>	9/3/2021	SPAC
<i>Rocket Lab</i>	8/25/2021	SPAC
<i>Sidus Space</i>	12/14/2021	IPO
<i>SpaceX</i>	N/A	Private
<i>Wisk Aero</i>	N/A	Private

As of February 2022, Planet Labs has nearly 100 patent filings, largely directed towards satellite imagery technology. For example, a recently issued Planet Labs patent is directed towards a satellite communication system for sending image acquisition commands to a selected satellite by a certain communication pathway.⁵

After ten years of business, Planet Labs (PL) went public on the New York Stock Exchange on December 8, 2021. Unlike Sidus Space, Planet Labs went public via a SPAC merger with dMY Technology Group IV. A SPAC, or blank-check company merger, is one where a private enterprise merges with a shell company that is already public.

Planet Labs was valued at \$2.8 billion and, by going public, Planet Labs CEO Will Marshall noted that their SPAC merger would provide the company capital to invest back into further developments, such as software, analytics, and marketing.⁶

SPAC mergers have assisted many aerospace companies in going public. For example, Astra Space, Momentus, and Rocket Lab have all gone public via a SPAC merger.

SpaceX, now a household name, also exemplifies the importance of patent protection in the satellite area. SpaceX's founder, Elon Musk, once said, "[w]e have essentially no patents in SpaceX. Our primary long-term competition is in China — if we published patents, it would be farcical, because the Chinese would just use them as a recipe book."⁷ While this certainly makes the case for trade secret protection, SpaceX no longer appears to heed this mantra in the satellite area.

In 2018, SpaceX began testing and launching Starlink, its high-speed satellite internet constellation. There is a clear correlation with this product launch and the corresponding launch of SpaceX's patent portfolio.

Since 2018, SpaceX has 50 public patent filings (possibly more), with a majority of them directed to antenna systems, satellite constellations, and metal honeycomb materials. For example, a recently issued SpaceX patent is directed towards an antenna system that can transmit and receive signals in certain directions.⁸ Such patenting certainly supports the company's increasing valuation. While SpaceX remains a private company, its current valuation stands at over \$100 billion.

The relationships shown between technological development, patent filings, and increased company value evidence the role the patent system can play in the new space race.

Mentioned above, aviation companies Wisk Aero and Archer Aviation are developing eVTOL aircraft for passenger use.

Wisk Aero, owned by Boeing and Kitty Hawk, has focused its efforts on development of Cora, an autonomous eVTOL. Wisk successfully flew this aircraft in 2017 and is continuing development. To date, Wisk has secured over 80 patents, covering a broad range of eVTOL technologies, such as aircraft architecture, propulsion systems, battery design, power distribution, and thermal management.

While still a private company, Wisk's growth continues at a rapid pace, with the \$450 million investment from Boeing.

Archer Aviation, another eVTOL aircraft manufacturer, developed its autonomous eVTOL air taxi, Maker. In December 2021, Archer successfully flew Maker for the first time. Archer is also continuing development and is expected to unveil a four-seat prototype in 2022. Archer has several patent filings directed to electric aircraft power distribution and eVTOL aircraft.

Similar to Planet Labs, Archer (ACHR) went public via a SPAC merger with Atlas Crest Investment Corporation in September 2021, months after Wisk filed its lawsuit against Archer.

In April 2021, Wisk sued Archer in the U.S. District Court for the Northern District of California, alleging patent infringement and trade secret misappropriation. Wisk alleges that technical details disclosed by Archer in its February 2021 investor materials allegedly incorporate multiple trade secrets and also meet limitations of one or more claims of several Wisk patents. Essentially, Wisk is claiming that Archer's Maker is an improper copy of Wisk's next-generation aircraft.

To support its allegations, Wisk detailed several previous patent disclosures and its filing of a confidential patent application

in January 2020 directed towards an eVTOL aircraft design. In response, Archer denied any infringement or misappropriation, alleged that Wisk's patent application was only filed after Archer disclosed the design to Wisk, and sued Wisk for \$1 billion in damages, alleging that Wisk has defamed the company with its allegedly false smear campaign.

With at least hundreds of millions of dollars at stake in this litigation, the important relationships between technological development, intellectual property strategy, and business strategy are clear.

In the coming years, players in the private space industry will continue to develop new technologies. Companies like SpaceX, Blue Origin, and Virgin Galactic will press forward with space tourism. Other companies, like Axiom, will continue developing their private space station. And while Sidus Space, Planet Labs, and SpaceX continue to have an impact in everyday areas like high-speed internet and GPS, companies like Wisk and Archer will continue developing autonomous and electric aircraft that will revolutionize urban travel.

Clearly, players in the private aerospace industry are rapidly expanding technological development. As such, those in the industry should remain focused on intellectual property protection.

Trade secret protection is important to consider when secrecy and costs are at issue. And patent protection offers a unique opportunity for creating economic value, especially when considering the increased competition in the private aerospace industry. We expect patent filings in the aerospace industry to continue to increase along with the valuations of these innovative companies.

Notes

¹ Eric Mack, *In 2022, The New Space Race Will Get More Heated, Crowded and Dangerous*, CNET (Jan. 4, 2022), <https://cnet.co/3J2YEik>.

² *Space: Investing in the Final Frontier*, Morgan Stanley (July 24, 2020), <https://mgstn.ly/3J23ZX2>.

³ *Wisk Aero LLC v. Archer Aviation Inc.*, No. 21-cv-02450, *complaint filed* (N.D. Cal. Apr. 6, 2021).

⁴ Joan Farre-Mensa *et al.*, *Do Patents Facilitate Entrepreneurs' Access to Venture Capital?*, Drexel (Oct. 6, 2016), <https://bit.ly/3627Nck>.

⁵ U.S. Patent No. 10,979,137 B2 to Miranda *et al.* (issued Apr. 13, 2021).

⁶ *Planet Labs Goes Public via SPAC*, Bloomberg (Dec. 8, 2021), <https://bloom.bg/3tMmMzg>.

⁷ Chris Anderson, *Elon Musk's Mission to Mars*, Wired (Oct. 21, 2012), <https://bit.ly/3hSlMnF>.

⁸ U.S. Patent No. 11,146,323 B2 to Apaydin *et al.* (issued Oct. 12, 2021).

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