The NewSpace industry is seeing an increase in space launches and new entrants to the field.

Technological advances are driving growth, including a steady pace of new innovations. Companies engaged in this progressive market need to protect the tech innovations that give them a competitive edge.

"NewSpace" Defined

Prior to the turn of the millennium, government entities and a handful of large aerospace companies conducted or controlled nearly all space launch and exploration activities. As a result, the technology advanced at a relatively slow pace, with the focus on evolution of existing launch systems and concepts, rather than innovation of entirely new systems and what previously had been considered radical new launch concepts. In the past two decades, however, smaller and more agile private companies, startups powered by investors, as well as larger,

more traditional space companies have developed systems and methods that make access to space faster and cheaper. These advances are driving new tourism and manufacturing industries, as well as new opportunities for satellite and exploration technologies. What was once a slow-moving industry driven mostly by military and civilian government activity is now an accelerating competitive field, commonly referenced as the "NewSpace" industry. Reusable launch vehicle systems, rocket engines, rocket components, specialized satellites, and their component technologies are receiving attention from investors and customers around the world.

The Importance of Patents in the NewSpace Industry

Many technological innovations in NewSpace, particularly the hardware, are best protected by patents. These include flight hardware, tools, devices, machines, assemblies, components, launch and manufacturing processes, associated software, and ornamental designs. New compositions of matter, like pharmaceuticals made in a space environment, can also receive patent protection.

In many cases, the advances in NewSpace can receive protection that is broader than just a space application. For example, tools, valves, containers, control systems, and methods for making or assembling space vehicle components can have broader terrestrial uses or implementations, such as in land vehicles or industrial applications. Innovators in the NewSpace sector may find value in protecting both the space and terrestrial aspects of their inventions.

The need to protect NewSpace innovations via patents has increased over the last several years for a number of reasons. Principal among these is that emerging private companies with a commercial customer base now play a bigger role than they used to, compared to companies reliant on government-funded projects. As competitors continue to enter the market, putting pressure on margins, these companies need to protect the exclusivity of their technology and show their shareholders a return on their investment if they want to maintain their investment streams.

Filing Patent Applications

The U.S. Patent and Trademark Office (USPTO) is an obvious choice for filing patent applications, in view of the scale of the U.S. space effort, and particularly for U.S.-based companies. Figure 1 below shows the trend in U.S. filings in the field of space technology (red line) compared to overall filings at the USPTO (gray line). Each line is normalized (from zero to 1.0), based on the maximum number of filings in each category over the period from 2006 to 2021.

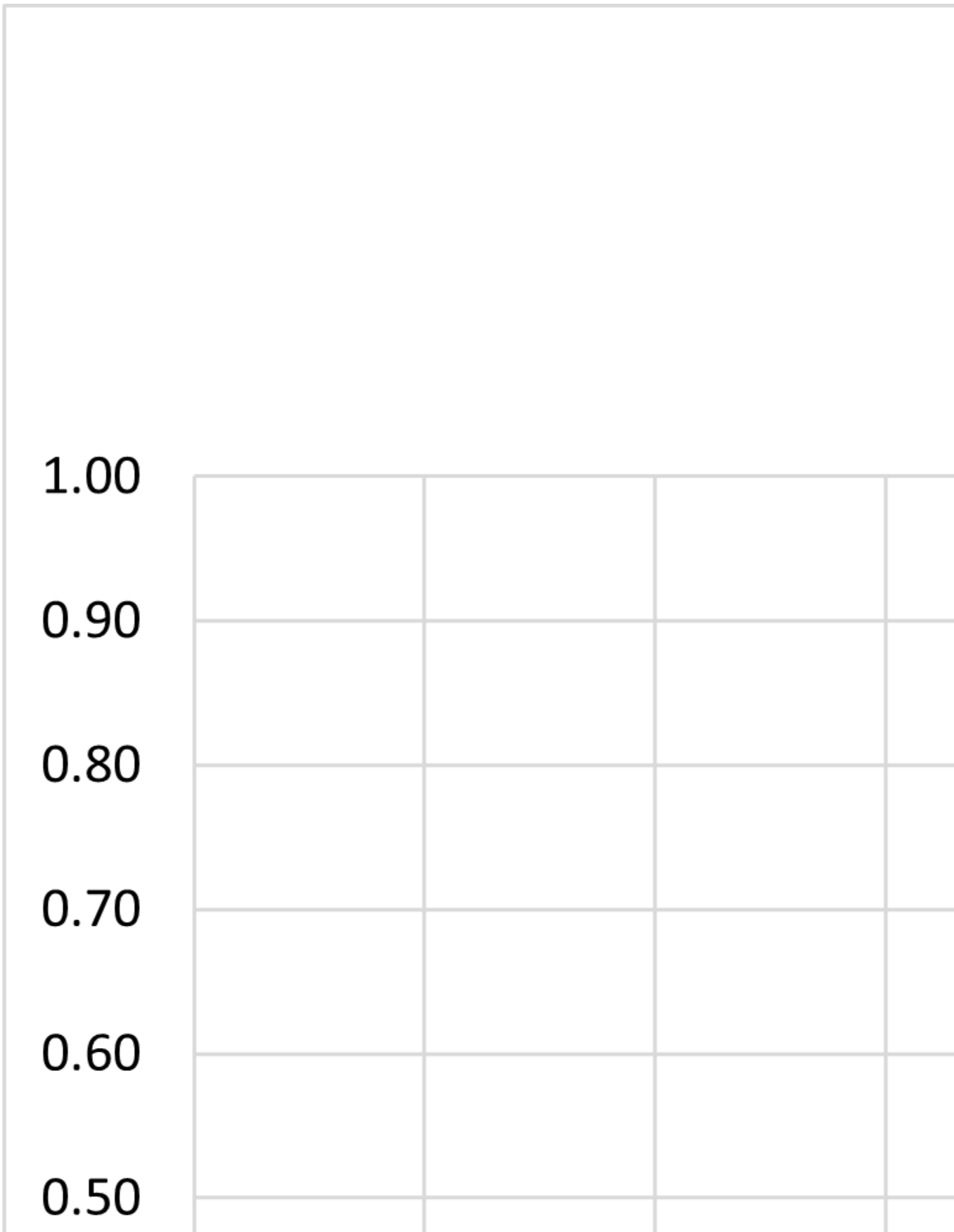
1.00
0.90
0.80
0.70
0.60
0.50

Figure 1

Space-related filings increased significantly in the early 2000s and have continued a steady upward trend since 2012. While the overall filings dipped before and during the COVID-19 pandemic, space-related filings numbers continued to rise through mid-2021.

U.S. Patent Jurisdiction Above the Earth

A U.S. patent is generally only effective within the jurisdiction of the United States. So, what happens when someone practices a U.S. patent in space? The relevant patent statute (35 U.S.C. §105) gives a patent owner a cause of action under limited circumstances. Under §105, "[a]ny invention made, used or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States shall be considered to be made, used or sold within the United States." U.S. patent law applies unless the space object or component is registered to a foreign state (under the international "Convention on Registration of Objects Launched into Outer Space"), or unless there is a separate agreement that involves the United States.

Another option, which avoids the need to invoke §105, is to draft patent claims so that they are infringed while the spacecraft is on the ground. For example, draft claims to a controller that is preprogrammed to carry out procedures that ultimately occur in space. Because the controller is already programmed before it is launched, it infringes while on the ground.

Filing Patents Abroad

A potential infringer can avoid liability under a U.S. patent by conducting terrestrially infringing activities outside of the United States, and by conducting space-based infringing activities on a space object registered to a foreign jurisdiction. To avoid this outcome, many companies selectively file patent applications outside the United States.

Figure 2 below identifies the top 10 countries from which currently active patent assets (pending and issued patents) *originated*. Almost 60% of space-related patent assets active in 2022 *originated* in either the United States or China.

EPO & European Countries
5362, 24%

Figure 2

Figure 3 below shows the *total number of active assets* in the top 10 countries as of 2022.

EPO & European Countries, 3985, 20%

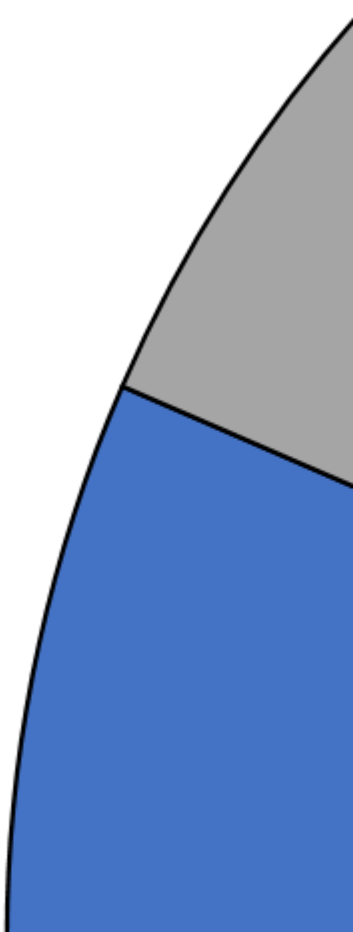

Figure 3

On a country-by-country basis, the greatest fraction of the world's space-related patent assets were filed in China—over 40% more than in the United States. Note that this data excludes Chinese "utility model" applications (often called "registrations"), to provide an apples-to-apples comparison with countries that do not have an equivalent form of patent registration. Figure 3 indicates that, despite concerns about enforcement of intellectual property (IP) rights in China, especially the rights of non-Chinese entities, such entities are nevertheless actively filing patent applications in China. This is evident from the fact that China has a greater fraction of the active assets (34%) than it originated (29%). Patentees are also actively filing patent applications on space technology in Europe, Russia, Japan, and Korea.

Deciding Where To File Patents

Given that most commercially relevant foreign countries have stricter prefiling nondisclosure requirements than the United States, the time to consider foreign patent protection is well in advance of any public disclosure of the invention. Because patents are territorial, you must get a patent in every country in which you may want to prevent others from making, using, and/or selling your invention. However, obtaining and maintaining patent protection in foreign countries can be expensive, so it pays to be strategic about which countries and regions you select for patent filing. In deciding where to file, consider filing in countries in which competitors may make, use, sell, or offer to sell competing systems. Such countries may include, for example, countries in which competing systems and components are manufactured, as well as countries where competitors may operate or use launch facilities.

Filers can employ strategies to defer some of the upfront costs associated with filing and prosecuting patent applications in multiple foreign countries. For example, rather than file a separate application in each of the foreign countries of interest at the outset, one commonly used option is to file a single international application under the Patent Cooperation Treaty (PCT). An international "PCT application" must be filed within 12 months from the filing date (the priority date) of the earliest corresponding national patent application, and it works like a placeholder application that allows filers to subsequently seek patent protection in any of the PCT contracting states for up to 30 months from the priority date. The PCT application itself will not result in the grant of a patent and must be followed up by the filing of an individual patent application in each of the desired countries or regions (e.g., Europe) by the 30-month date. However, filing a PCT application can defer costs and buy time to see how prosecution of the initial U.S. patent application is progressing, as well as how well the invention is doing commercially.

When Inventions Are Developed in Space

Astronauts often conduct scientific experiments and other technical activities in space. As the number of people working in space and the amount of time they spend there continues to increase, this naturally will produce an increasing number of inventions.

Some international agreements (e.g., the Intergovernmental Agreement on the International Space Station) state that registered space objects are treated as quasi-territory for the purpose of intellectual property (IP) law in the absence of explicit international rules to the contrary. While the Space Station Agreement is a specific case, it seems reasonable that as the NewSpace industry continues to grow, other countries and regions will also explicitly extend their patent laws to space objects registered in those countries. This will likely be a piece of the greater international law network addressing a multitude of transnational issues, such as space debris, increased orbital traffic, and communications.

Takeaways

Patents have an increased importance as the market for NewSpace products and services continues to grow and more private companies enter this competitive field. The strongest and most efficient patent portfolios are strategically developed as inventions are claimed from multiple angles, and international protection is carefully weighed and considered.

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