



General Description

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1 Introduction:

The commercial space industry in the United States is in the middle of a major transformation. It was once solely in the hands of the National Aeronautics and Space Administration (NASA) and large aerospace companies, which provided appropriate vehicles and payloads for research and development, and for experiments and testing. Today, the industry is also home to small entrepreneurial companies that have the capabilities to provide new technologies to serve commercial and government customers.

There are several spaceports located across the United States, which are primarily designed to serve large, expensive, expendable launch vehicles for various orbital and sub-orbital operations. Some of those spaceports are especially designed to facilitate new orbital vehicles for the upcoming suborbital space tourism, and to transport cargo and crews to and from the ISS.

By nature, these operations are very expensive and of a magnitude that is, most of the time, not necessary for the basic needs of research and development, experiments and testing.

This situation presents an opportunity to develop a new spaceport that is more agile and far less expensive than any other facility.

Space Port Indiana™ is designed to provide military, commercial customers and educational institutions low cost access to airspace up to and including the near space environment. The advantages of testing certain pharmaceuticals, hardware and other products in 1% Earth's atmosphere is significant and can create new and better products across a wide spectrum of industries. These industries are specialized in the fields of microgravity research, remote sensing, spaceflight hardware qualification, and or other scientific research. Essentially, anything which will work in the harsh near-space environment will also work in space itself.

Space Port Indiana™ will also have an educational outreach that offers K-12 and college students an opportunity to explore engineering and aerospace sciences as a career choice. Overall, the educational value of the spaceport will do more to expand the understanding of the sciences beyond the classroom.

Space Port Indiana™ will be the premiere Space Port of the Midwest.

2 Indiana's Space Assets:

2.1 History

Indiana has a history of leading the world into space. The tradition dates back to 1859 with the first airmail delivery in the U.S., originated by hot air balloon in Lafayette. A balloon, flown by John Wise, carried letters and circulars for approximately 25 miles to Crawfordsville, Indiana, until forced to land by lack of buoyancy. Mr. Wise also conducted experiments for a local resident to detect the presence of ozone in the upper atmosphere during his flight. This was the start, based in Lafayette, of using that new technology for scientific exploration.

Ten years after the historic flight Purdue University was founded and its School of Aeronautics and Astronautics was formally established in 1945. Largely because of the influence of Purdue University, Indiana has contributed more than its share of men and women to the U.S. space program. The Hoosier state has been a launch pad to many astronauts, like Neil Armstrong and Gus Grissom, who made their way to Houston by way of West Lafayette, where Purdue University's world class engineering school has trained thousands of aerospace engineers in such areas as spacecraft design and rocket propulsion.

With the State of Indiana centrally located in the Midwest, backed by know-how and excellent infrastructure, Space Port Indiana™ provides an opportunity to build upon and enhance the legacy with environment friendly balloon launch technology.

2.2 Location

The main location for Space Port Indiana™ is Columbus Municipal Airport at the City of Columbus in South Central Indiana approximately 45 miles south of Indianapolis, Indiana; 80 miles west of Cincinnati, Ohio; and 75 miles north of Louisville, Kentucky.

Set on the northern fringe of a progressive and architecturally fascinating city, this former Air Force Base now serves as a support facility to many local businesses, including two Fortune Five Hundred companies.

Space Port Indiana's™ operations are in the secure and safe environment of the Columbus Municipal Airport. The Airport provides a controlled Class D airspace under direct supervision of Air Traffic Control (ATC) and the Federal Aviation Administration (FAA), ensuring direct communication for pre and post launch coordination.

Due to the nature of Columbus Municipal Airport (including precision instrument approach), Space Port Indiana™ can be easily accessed by air, as well by car via I-65, US-31.

In addition to the benefits of its geographic location, the area around the Airport offers a superb infrastructure for the expansion of commercial space industry, including small businesses, research laboratories, and universities, with Purdue College of Technology Columbus as well as Indiana University-Purdue University Columbus already located next to the Airport.



2.3 Operations Description

Space Port Indiana™ will be the facility from which to prepare and set up payloads, launch operations, and conduct evaluations and debriefings.

Space Port Indiana™ will provide engineering support to all aspects of operations including (but not limited to) planning, provisioning, execution (conduct), analyzing, reporting, and closeout.

Space Port Indiana™ will operate in the same manner as an airport. Multiple operators will use and pay for the services they require to launch their payloads. Space Port Indiana™ and third party suppliers provide the following facilities, programs, and services to its launch customers:

- Scheduling of Launches
- Laboratory and Shop Support
- Communications
- Meteorological Support
- Coordination of Airspace Clearance (if necessary)
- Launch of Payloads (including Propellants and Gas Handling)
- Data Logging
- Voice and Data Relay
- Tracking and Recovery of Payloads
- Institutional Support
- Environmental Management
- Safety (including Launch Site and Public Safety)
- Security

Space Port Indiana™ will provide a full service launch, tracking and recovery including all required goods and services for the full range of space launch activities at reduced cost and scheduled time, which gives customers the opportunity to concentrate on their experiments.

3 Capabilities:

3.1 Service Provider

Main space launch and test flight service provider for the space port is Space Port Indiana, Inc., founded by Mr. Brian Tanner. Mr. Tanner has operated a DOD contracting company in Indiana for over 15 years. His work has been as a developer, integrator, producer and supporter of manned and unmanned aircraft, microelectronics autonomous controlling, collision avoidance and other systems and subsystems critical to advancing and maintaining science and technology initiatives in the United States. These systems are used, primarily by government customers, in many different mission areas including intelligence, surveillance and reconnaissance; communications; battle management; strike operations; electronic warfare; earth observation; and space science.

Space Port Indiana, Inc. systems include unmanned surveillance aircraft which provide situational awareness data and sensor capabilities like day/night camera and position reporting technologies, aircraft that provide advanced targeting and battle management capabilities; managing air operations and providing tactical information to ground combat troops and controlled communications relay capabilities to aid in events like Katrina or other critical environments. The Aerospace business is composed of the company’s Integrated Systems and Space Technology sectors. Space Port Indiana, Inc.™ provides launch services and personnel to the Space Port.

3.2 High Altitude Balloon Launches

Space Port Indiana, Inc.™, through its development of the spaceport facility, offers the most comprehensive experience in high altitude launches in the industry, using balloons and “Rockoons” (which is basically a rocket that deploys a balloon to higher altitude). The company’s Space Technology sector develops a broad range of systems for use in high altitude balloons, balloon drop return vehicles, “dropsondes” (metrological measuring devices), weather related studies and communications relay. Space Port Indiana, Inc.™ provides payloads that can range from several ounces to 100 pounds or more depending on mission requirements and lifting mechanism.



Figure 1: View from payload at 98000 feet launched from Space Port Indiana March '08

The staff of Space Port Indiana, Inc.™ has extensive experience with near space vehicles and propulsion systems.

For example, Space Port Indiana, Inc.™ Senior Engineer for Aerospace Systems and leading pioneer of balloon launch technology, Mr. Bill Brown, has over 20 years experience and 300 launches both within the Continental United States (CONUS).

“In 1987 Mr. Brown began launching balloons from Findlay, OH and over the years has tested a variety of payloads. These include video for television feeds, a variety of RF capabilities and recently been leading the effort at Space Port Indiana, Inc.™ to launch Payload Return Vehicles (PRVs) with sensitive data gathering payloads”, states Brian Tanner, President/Chairman Space Port Indiana, Inc.™

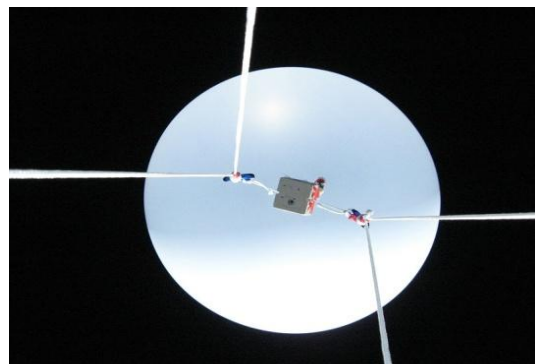


Figure 2: View of balloon from payload at 98602 feet (space)

3.3 Balloon Launched Return Vehicles (BLRV)

The Balloon Launched Return Vehicle (BLRV) adds a variety of capabilities for the user while retaining a moderate cost compared to using other launch mechanisms. Most payload developers are keenly aware of the cost associated with a rocket launch or aircraft launched system. There is high risk inherent with such launches and can end in catastrophic payload losses for the customer.

Using the BLRV System is much less expensive and offers a “safety net” for the customer. The primary payload is loaded on the Payload Return Vehicle (PRV) so that during ascent, flight and descent the payload can be detached and sent back to the launch point using autonomous flight and control. Once the mission is programmed, the operator can observe conditions and status, while retaining human interactions such as abort or mission profile changes in flight.

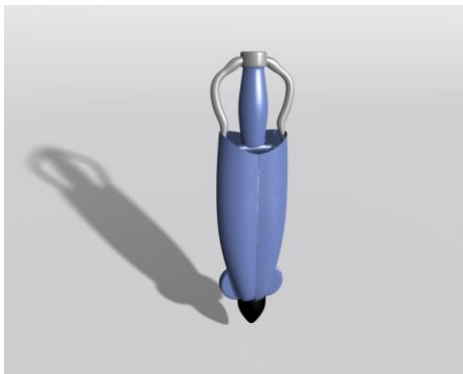


Figure 3: BLRV System

The other significant benefit is the re-use of the payload. Use of the BLRV System significantly reduces the risk of payload loss and is designed to keep the payload from unfriendly or hostile hands by returning it to the launch site or other designated recovery points. This is particularly important in operations outside the Continental United States in non-permissive environments but is also important if the payload is competitively sensitive.

The need for a PRV is indicated by the requirement to return payloads to launch points when the buoyant lifting device cannot remain on station for long duration. The development of the PRV can substantially increase not only payload recovery but be re-tasked to fly without a primary lifting device as any other Unmanned Aircraft Systems (UAS) would. It can fly autonomously, be re-tasked in flight and be net centric, agent based, etc. Space Port Indiana, Inc.TM has been working with Raytheon to allow hand-off capability from the primary ground controller to a forward deployed unit using a ruggedized PDA or computer tablet. Currently, PRV use requires a restricted range which can be provided through Space Port Indiana TM.



Figure 4: BLRV System

3.4 Rocket Test Capability

Space Port Indiana™ is offering the capability of ground-testing rocket motors and other components for those who need to collect important performance data. Space Port Indiana, Inc.™ can offer a team of consultants who have extensive experience in propulsion, telemetry,



Figure 5: Ground Test

guidance, and have flown components in space. This is a unique capability in Indiana and important as we look forward at commercial space flight and transportation needs. In many cases Space Port Indiana™ can be an early T/E or R/D facility for programs associated with a variety of nationwide programs. For companies that are a commercial DoD or NASA contractor looking to save money on early development, but still want real test data, Space Port Indiana™ can be a low cost solution that can meet an urgent requirement.

Space Port Indiana™ offers a secure environment that allows customers to test fully without jeopardizing security. Space Port Indiana™ is located within a controlled airspace environment and can securely track and report any data customers need as part of their test. Although at Space Port Indiana™ full-up launches cannot be conducted, working relationships with ranges in the United States are established, allowing them to take the customers technology to a more suitable facility and reduce user's range costs.

4 Educational Workshops:

Space Port Indiana™ is a conduit for learning at all ages.

In Spring 2008 Space Port Indiana™ conducted a STEM (Science, Technology, Engineering, and Mathematics) workshop for college and high school students interested in exploring near space. During the workshop students learned about the mechanisms for getting into near space, the research required to successfully design a payload and participated in an actual launch. These environments for learning are crucial to sustaining Indiana's brain power.

“The purpose of this workshop is to educate students with hands-on applied technology training and to encourage all students to consider careers in engineering and science,” said Margaret Ratcliff, assistant professor of Mechanical Engineering Technology at the Purdue College of Technology at Columbus. *“We are grateful that Space Port Indiana, Inc.™ the Indiana Space Grant Consortium and the College of Technology are working together to provide science, technology, engineering and math (STEM) training and work force for Indiana students.”*



Figure 6: Young students hold their experiments created during workshop

It really doesn't matter what type of payload is launched. There is a large learning curve that students cannot get in a classroom environment alone. Space Port Indiana, Inc.TM works with high schools, colleges and universities to promote learning and encourage interaction with Space Port Indiana TM.

The cost of these educational balloon launches is very affordable and utilizes low cost, innovative approaches to payload design. In most cases, students can utilize off the shelf materials to create exciting experiments. In

spring of 2008 students launched cameras, video and other experiments along with a Space Port Indiana, Inc.TM payload. Because of donated facilities and other support, the entire workshop, including planning, instruction, payload design and fabrication, launching, tracking and recovery, was accomplished within a total budget of \$5,000 - \$6,000.

A comparable commercial endeavor would have been much less expensive (less than 5%) than the cost of any other launch system that would reach an altitude of 98000 feet.



Figure 7: Student holds payload just before launch at Space Port Indiana

"In commercial or military applications, we could fly a payload of up to 50 pounds on this platform and collect data for over two hours. During the above mentioned flight we were flying over two hours, established a communications link of over 700 miles and had line of site for over 400 miles. In fact, people were communicating between St Louis, MO and Lake Erie within ten minutes of launch." Martin Baier, Director of Operations for Space Port Indiana, Inc.TM

5 Space Port Camps

Early 2008 Space Port Indiana, Inc.TM announced that it would be home to Indiana's annual Space Port Camp. Because Indiana has not held a science fair or space camp in the past, this is a unique opportunity for Hoosiers and others across the country who wish to engage in the sciences for the purpose of learning and a future career. In 2009, the Indiana Space & Science Foundation, Inc. was created to manage the camps, workshops and educational outreach component of Space Port Indiana, Inc.

The purpose of the Space Port Camps is to supervise and educate students in the history and technology of the space & aeronautical program. Instructors assist students in their experience of space exploration; and motivate, stimulate, teach and supervise students in a variety of aerospace related topics, to include but not limited to Mission Planning, Space Simulation, Launch of Payloads, Flight Monitor and Mission Debrief.

All programs are set in a traditional as well as a non-traditional academic environment and/or in the Space Port Indiana™ facility.

Through hands-on activities, Campers learn the mechanisms for getting into near space, the research required to successfully design a payload and participate in an actual launch. Campers are assigned to a team, based on his/her grade level during the actual school year. Each team will design grade-specific payloads.

The inaugural event, held in summer 2008 with this year's theme: *"Sending Payloads into Near Space"*, was a huge success. The theme revolved around the ways in which Space Port Indiana™ provides an opportunity to build upon and enhance the legacy with environment friendly balloon launch technology.



Figure 8: Space Port Camp Class of 2008

The Camp was filled to capacity with students aged 11-18 and focused on a variety of topics that would culminate in a successful launch of payloads.

"Speakers from NASA, Raytheon and TMGLabs (to name a few) brought unique insight and knowledge to students who didn't know what to expect on day one but didn't want to leave in the end", Brian Tanner, President/Chairman Space Port Indiana, Inc.™

Model rockets, science experiments and a launch made it easy for students to understand what it takes to colonize, work and travel in an environment much different from here on Earth. The Columbus Republic and QMIX 107.3 both covered activities during the Camp and reported very positively on the week's events. Purdue College of Technology at Columbus, IMAX, The Indiana State Museum, Raytheon, and Indiana Space Grant Consortium were sponsors of this year's Camp and made immeasurable contributions to its success.

Martin Baier, Director of Operations for Space Port Indiana, Inc.™: *"The launch on August 8th took off at 1400 hrs and reached an altitude of 92733 feet landing in Madison Indiana. The payload consisted of cameras, video and other payloads created by the students. Camp participants tested batteries, plastics, foods and other materials to see what radiation and cold would have on different items."*



Figure 9: Campers hold their own payloads just before launch at Space Port Indiana

The success of the launch was directly tied to spending four days with students, teaching all the principles and practices beforehand. You could see the knowledge learned in the days preceding the launch as they prepared the payloads.

There have already been a number of requests to sign up for Space Port Camp 2009. Dates for Space Port Camp are proposed dates but Space Port Indiana™ will offer two camps in 2009. Camp Week 1 is June 9-12, 2009 and Camp Week 2 is August 4-7, 2009.



6 Contact Information for Space Port Indiana, Inc.™

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