Shangri-La Construction, L.P.

Burbank Hangar 25 Project Summary

Shangri-La Construction, L.P.'s Hangar 25 at Burbank Airport was designed to be the most sustainable aviation facility in the world. The approximately 60,000 square feet of hangar space and just over 10,000 square feet of office space at Hangar 25 were designed to house private aircraft ranging in size from the smallest of corporate jets to as large as a Boeing Business Jet 757-200, as well as their maintenance crews and staff. Financed by Shangri-La Industries, LLC, Shangri-La Construction (SLC) set out to design and build a space that would elevate environmental consciousness in a previously uncharted sector of the green building movement.

The motivation behind Shangri-La Construction's Hangar 25 came from the desire to offset the carbon emissions of the planes by using renewable solar energy to power the facility and its ground operations, in addition to the elimination of the majority of toxic chemicals from an industry known for its propensity to pollute. Through proper construction management SLC was able to accomplish all of the above while maintaining a tight bottom line which proves that building sustainably is a cost-competitive alternative to traditional construction.

The hangar is located at a medium-sized commercial airport bordering an urban residential neighborhood in Burbank, CA. The site originally housed Lockheed operations in World War II and was the former Tiger Air site. Prior to entering into the ground lease with the Airport Authority, Shangri-La went thru extensive drilling and testing to confirm that the site was clear of any contaminants in the soil. In cooperation with local government Shangri-La Construction designed a facility that would bring new life to an area with the hope of inspiring further developments and/or renovations of the area.

The goal of the project was to achieve a LEED Platinum rating, making Hangar 25 the first LEED Platinum hangar in the world and the first private aviation hangar to achieve a LEED certification of any kind. To reach this goal, the project team looked for innovative sustainable strategies, and new ways to design and build a private airplane hangar. Some of the many options we pursued include:

- Using a cool roof to reduce heat gain and urban heat island effect
- Creating an energy efficient building envelope with high performance glazing
- Efficient building ventilation and air conditioning strategies
- Emphasis on local materials and materials with recycled content
- Drought Tolerant Landscaping
- High SRI site paving and concrete to further reduce urban heat island
- Water conserving plumbing fixtures
- Effective filtration of storm water runoff
- New state of the art fire suppression system.

Beyond the design of the building, the team also wanted to ensure that the building operations and management adhered to principles of sustainability once the facility is in operation.

The most impressive green achievement was in renewable energy. We wanted this building to be a net-zero importer of power so we installed 225 kW of photovoltaic panels on the roof of the building. In addition to providing power, the panels significantly reduce the radiant heat gain of

the building by shading over 50% of the roof, which is a bright white reflective surface, further reducing the heat gain. These panels generate about 125% of the power (including process loads) needed to operate this hangar. The local utility grid still has coal in its generation mix, so this solar generation represents an important reduction of emissions due to grid electricity. Excess power production goes back out into the grid, providing unsolicited clean energy for other residents in the community. Despite generating more energy than we could ever use, we have purchased RECs based on anticipated energy usage of the building in accordance with LEED guidelines. We recognized that a large part of the building's carbon footprint would come not from the building itself, but from the flights of the planes housed within and so we wanted to take steps to mitigate the life cycle impacts of the building and its operations.

Because we set a lofty goal for renewable energy from the outset, we were able to find even more exciting uses for this clean energy that we are producing from our PV panels. Instead of running the Jet Auxiliary Power Units in preparation for flights and burning Jet A to power the aircraft systems, the aircraft residing in this hangar will be plugged into ground power units that are charged by the PV panels. This will greatly reduce the amount of Jet A fuel used and will also eliminate emissions. We are also able to run all of our electric ground support vehicles off of the Solar Power. Instead of using diesel-run equipment for daily operation in the hangar, we will be using aircraft tow tractors, boom lifts, scissor lifts, forklifts, golf carts, boarding stairs, toilet service carts and ground air conditioning carts that are electric and run off of the PV power as opposed to diesel fuel that would result in emissions.

A significant environmental consideration for a hangar of this size is the flooring system. Most aircraft hangars have floors that use toxic epoxy sealers and finishes. Epoxy floors in a setting such as a hangar would need to be reapplied every 3-4 years introducing consistent harmful contaminants into the building environment. After a great deal of research and testing, we opted to use a different application that would not have this negative environmental impact. We have taken the existing natural concrete floor in our space and polished it with diamond blades, exposing the aggregate and hardening and densifying the concrete in the process. The final product is a chemical-free concrete that will only require soap and water cleaning for at least 20 years. The inhabitants of this space will not have to worry about the hazardous chemicals that would need to be reapplied to an epoxy application every few years and the environmental impacts associated with production of toxic degreasing agents are avoided. Additionally, the reflectivity of the diamond polished concrete spreads more light through the space, which allowed us to eliminate every third light fixture and on most days to eliminate the use of any hangar lighting during daylight hours.

Another exciting and revolutionary new application on this project is the Hi-Fog fire suppression system. While most foam fire suppression systems drop mass quantities of toxic and ozone-depleting chemicals to suppress fires, we have installed a system that uses water converted to fog to suppress the fire. This system is designed to use far less water than a conventional sprinkler system while dissipating heat more rapidly, which minimizes secondary damage to the building and airplanes if a fire were to break out. This reduces the amount of waste that would occur from the damage of a fire. This also eliminates the dumping and disposal of a great deal of hazardous waste and allows for fire suppression to begin immediately after detection because there is no

need to wait for occupants to get out of the area prior to the hi-fog system beginning the process of fire suppression.

When we looked at the buildings conditioning needs, we realized that although the small office portion of the building was suited for efficient rooftop HVAC units, we came up with a different solution for the open space of the hangar. We installed seven “Big Ass Fans” that reduce the temperature in the hangar by 10-20 degrees and draw their power from the PV panels. When combined with the high performance cool roof and building envelope design, these fans can provide the thermal comfort required in the hangar with much lower energy use than traditional approaches. In cooler weather, running the fans on a slower setting will help to take the heat loads generated by occupants and equipment at ground level and re-circulate that heat throughout the space.

There are many other areas that we have worked on to eliminate or reduce our impact on the environment with this building and to improve the workspace for those who will be working in this space. We have provided daylighting to 95% of spaces in the building through glazing in the offices and through skylights in the hangar without having to turn lights on. High gloss floors in the office space help to distribute daylighting throughout the offices. We have also ensured that our water consumption is kept at a minimum through low-flow faucets, toilets and urinals as well as using sustainable landscaping on a drip system that reduces usage and runoff.

The design and construction of Shangri-La’s Hangar 25 at Burbank Airport is an example of what can be achieved when the project team sets high goals and keeps an open mind to new possibilities. We exceeded LEED requirements in more areas than there were Innovation points to be had. SLC’s goal was to create the most sustainable, efficient building possible and to open the door to green construction in a sector that typically would not give it a second thought. We believe that the future of construction is rooted in building high performance sustainable buildings. We hope that this project can become not only an inspiration to others, but an example of how to build green and maintain a responsible fiscal bottom line simultaneously.