ASHRAE Chapter Technology Awards

Application Form:

Radio Flyer Corporate Headquarters and Product Development Lab

6515 West Grand Avenue
Chicago, IL 60707

Owner: Radio Flyer
Architect: Gensler
Engineer of Record: dbHMS

Illinois Chapter, Region VI

CHAPTER/REGIONAL TECHNOLOGY AWARD - SHORT FORM

1. Category (Check one and indicate New or Existing, if applicable)

(●) Commercial Buildings	New or	(●) Existing
Institutional Buildings:		
( ) Educational Facilities	New or	( ) Existing
( ) Other Institutional	New or	( ) Existing
( ) Health Care Facilities	New or	( ) Existing
( ) Industrial Facilities or Processes	New or	( ) Existing
( ) Public Assembly	New or	( ) Existing
( ) Residential (Single and Multi-Family)		

2. Name of building or project: Radio Flyer Corporate Headquarters and Product Development Laboratory

City/State: Chicago, Illinois

3. Project Description: 60,000 sq. ft. manufacturing facility conversion into LEED Platinum corporate headquarters

Project Study/Design Period: 11/2007 (Begin date (mm/yyyy)) to 04/2008 (End date (mm/yyyy))

Percent Occupancy at time of submission: 100%

4. Entrant (ASHRAE member with significant role in project):

a. Name: Anand (Last) Sachin (First) (Middle)

Membership Number: 5184161

Chapter: Illinois

Region: VI

b. Address (including country): 303 W. Erie St., Suite 510

Chicago (City) Illinois (State) 60654 (Zip) United States (Country)

c. Telephone: (O) (312) 915-0557 d. Email: sanand@dbhms.com

e. Member's Role in Project: Design Engineer

f. Member's Signature: 

5. Engineer of Record: dbHMS

By affixing my signature above, I certify that the information contained in this application is accurate to the best of my knowledge. In addition, I certify that I have discussed this entry with the owner and have received permission from the owner to submit this project to the ASHRAE Technology Awards Competition.

The project is a conversion of 60,000 sf of Radio Flyer's turn of the century manufacturing facility and warehouse into corporate offices and a prototyping model shop. The project is poised to achieve LEED platinum under LEED V3 CI.

Energy Efficiency

The building systems are designed to exceed the ASHRAE 90.1-2007 Appendix G Baseline systems by more than 30% and achieve 10 points under LEED CI EAc1. Table 1 lists the building energy consumption before and after the space renovation.

Table 1: Summary of Energy Performance

	Post Renovation - 2012	Pre Renovation - 2011
Electricity Consumption	3 kWh/sf	4 kWh/sf
Gas Consumption	4 therms/sf	11 therms/sf
Utilitiy Cost	0.64 $/sf	1.36 $/sf

Note that the equipment usage in the space (i.e. prototyping shop equipment) was similar before and after the renovation and most of the energy savings are reasonably attributed to the renovation work. The previous space conditioning was via gas-fired equipment.

The new HVAC system consists of distributed, packaged ground-source heat pumps served by a ground heat-exchanger comprised of 72 boreholes at 450 feet deep spaced 20 feet on center. Outside air is ducted directly to the heat pumps from a central, energy recovery unit. A portion of the building has shop space and requires a significant amount of make-up air for exhaust. A solar duct is provided on the south wall to preheat outside air (by-pass intake is provided for economizer mode). New high-efficiency condensing gas boilers provide back-up heat.

The existing saw-tooth roof provides generous daylight throughout the space. Daylighting studies were performed to optimize the space lighting resulting in a 48% reduction in the connected lighting power over ASHRAE 90.1-2007. Daylighting controls are provided for 70% of the connected load and occupancy sensor control is provided for 50% of the connected load.

Indoor Air Quality

The system outside air intake exceeds the ASHRAE 62.1-2007 requirements by 30%. The required out-door air intake was calculated via the system Ventilation Rate Procedure for a multi-zone recirculating systems with a system efficiency of 0.8. Exhaust requirements were determined per ASHRAE 62.1-2007 and local code.

CO2 sensors monitor CO2 concentrations in densely occupied spaces. Airflow monitoring is provided for the ERV exhaust and outside air intake.

Innovation

Adaptive re-used of the existing warehouse facility is a hallmark of the project. Through preliminary energy modeling and pre-design planning, the project team identified major energy end-uses and synergies with the existing building. The existing saw-tooth roof was an opportunity to provide natural light. Restrictions on the existing building limited the possibility of renovating the envelope. This made an efficient HVAC system critical.

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Cost Effectiveness

The reduction in the existing lighting energy and the efficiency of the new HVAC system reduced the facility operating cost by more than 50%. This reduction offset the additional capital cost for the renovation.

Environmental Impact

Table 2 summarizes the reduction in the building CO_2 emissions after the renovation:

Table 2: CO2 Reduction from Pre-Renovation Year			
	Post Renovation - 2012	Pre Renovation - 2011	Reduction
LBs CO2 Emitted per Square Foot	9	19	10
Estimated Building Energy Intensity (kBtu/sf)	49	120	71

*1.54 lbs CO2/ kWh and 116.97 lbs CO2/MMBtu- EPA 2009

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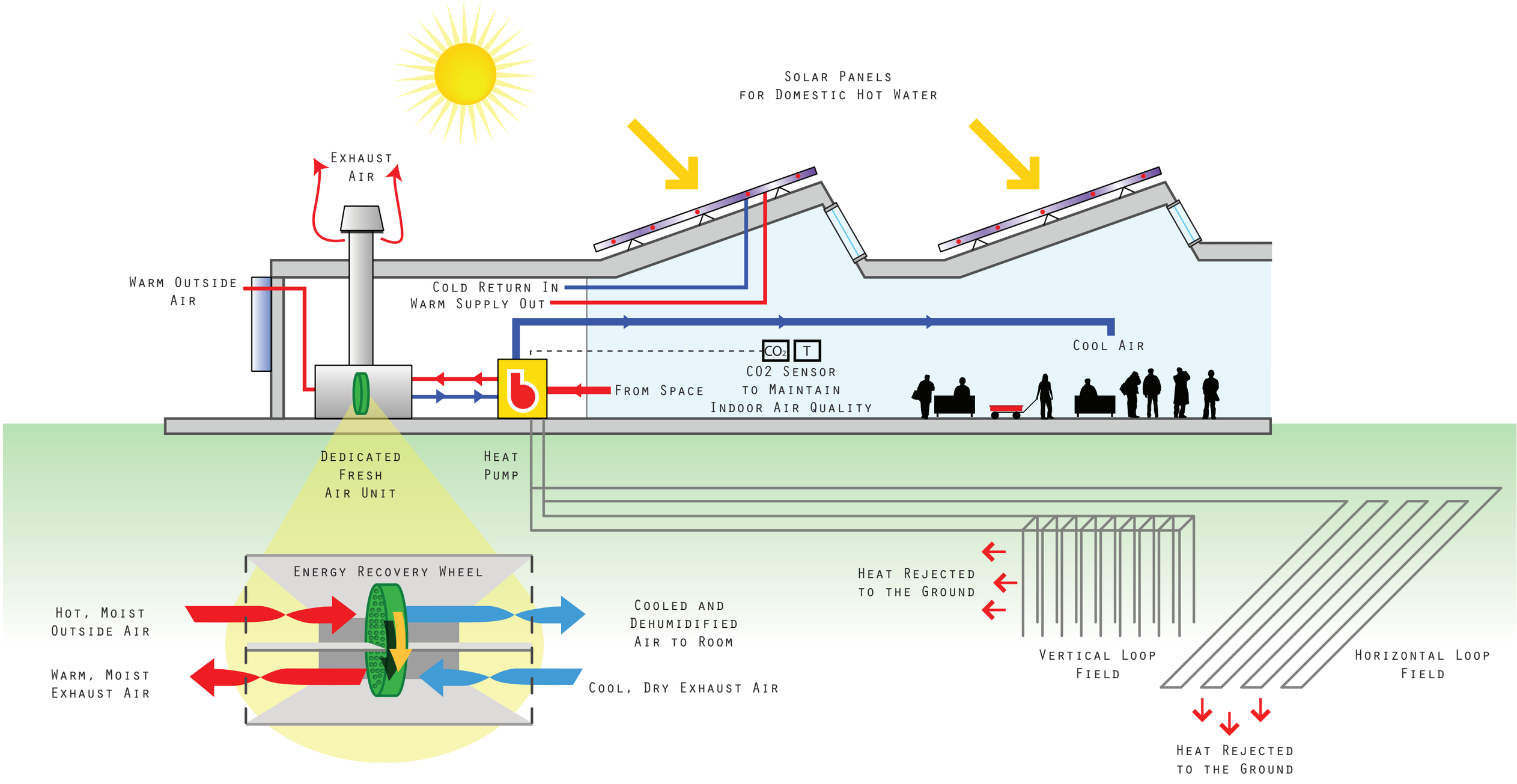
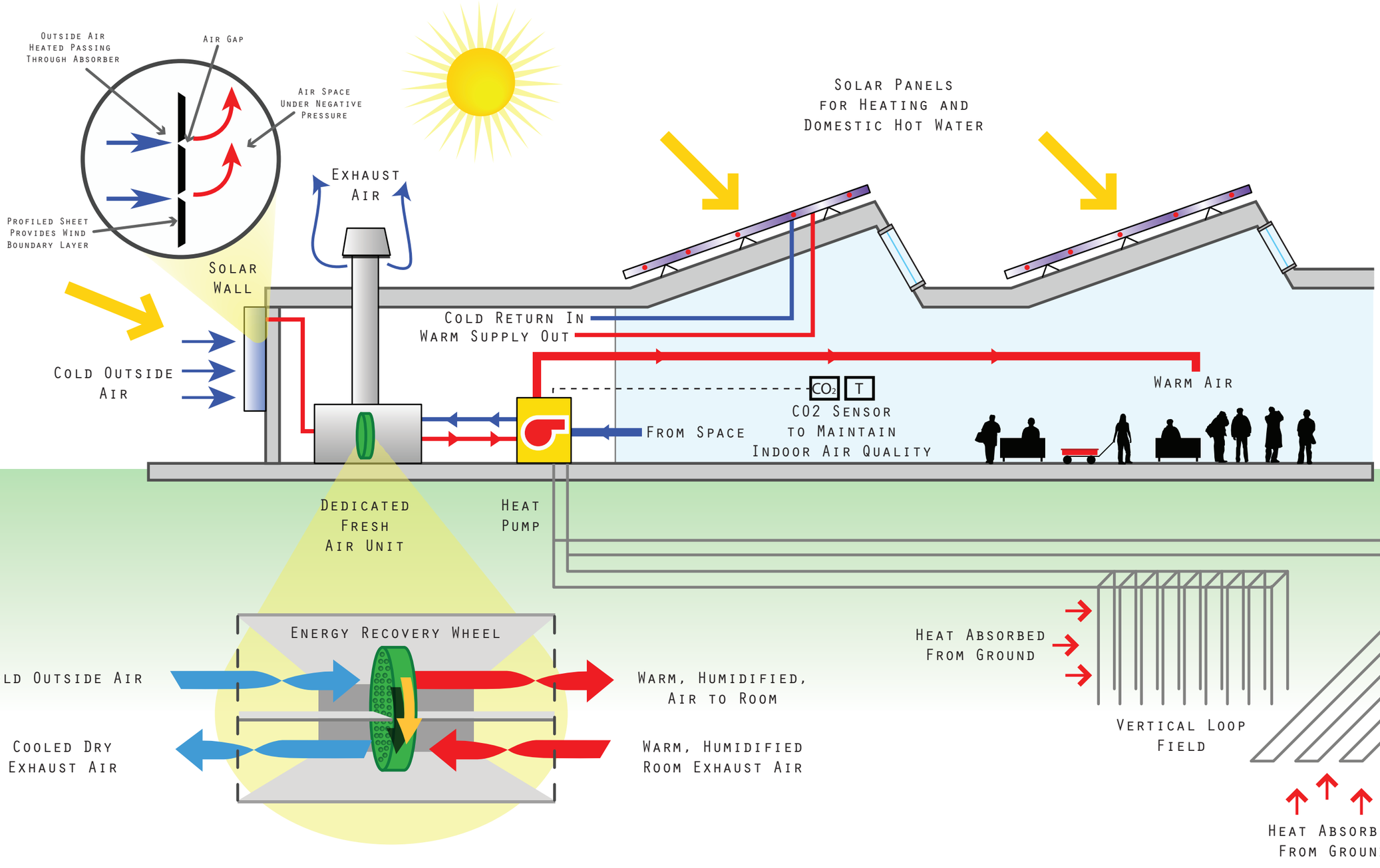


Radio Flyer - Summer Operation

Chicago, IL

Gensler

dbHMS
design build engineering



Radio Flyer - Winter Operation

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