

Radiant Showcase



Commercial and Industrial Applications

Presented by:



The Electro Plastics facility is a 35,000 sqft LEED registered building designed and built to optimize energy efficiency and performance.



The Electro Plastics facility has a total of 34,725 square feet distributed as follows:

- 15,000 sqft., on the lower level with dock and overhead access, which is used for manufacturing.
- 15,000 sqft., on the upper level also with a dock and overhead access for assembly, handling and shipping.
- 4,725 sqft., attached to the upper level with the main entrance to the offices, conference room, kitchen and showroom.

LOCATION

The property is located in Central St. Louis, is on top of a hill, and is surrounded by open space. It is in an industrial area, near hotels, restaurants and shops, adjacent to main interstates and the Lambert International Airport. The planning process began with the property purchase in 2004. The building was completed in July 2009.



BUILDING MATERIALS

The building's design and materials used were chosen for their sustainability, efficiency and environmental friendly properties. The building is a showcase of energy efficiency, personnel productivity and wellbeing. In 2013, 87 PV solar panels for a total of 21.6 kWp were installed on the building.

HEATING SOLUTION

The facility is exclusively heated with STEP Warmfloor® – a unique, energy efficient, low-voltage (24V), AC/DC, semi-conductive polymer, the radiant heating system uses environmentally friendly, non-hazardous and recyclable materials.

The Butler building insulation systems chosen provide a high performance building envelope.

ThermaLiner™ System

- The ThermaLiner™ Insulation System is a state-of-the-art insulated liner system that can be used with most Butler roof systems (MR-24®, VSR™, and Butlerib®). It provides superior thermal efficiency, condensation control, and noise reduction. ThermaLiner™ is a very efficient system, producing R-values from R-20 to R-40.

MR-24® Roof System

- The MR-24® roof system is specifically designed for consistent weather tight performance under demanding conditions and to accommodate roof movement. Because the MR-24® roof system is metal and moves freely under the forces of expansion and contraction, additional insulation thickness will not cause roof deterioration, as commonly happens with conventional built-up roofs.

Texturewall™ Panel System

- The TextureWall™ system's factory-installed foam-core insulation and thermal break joint design deliver excellent energy efficiency, with a tested U value of .067. The factory-applied joint sealant provides a complete wall-system weather barrier. Panels are offered in 2- to 4-inch thicknesses.



	Office (4,725 ft ²)		Warehouse (15,000 ft ²)		Factory (15,000 ft ²)	
	R-Values	Area	R-Values	Area	R-Values	Area
Floor		Perim. 201 ft	Heated below	15000 ft ²		15,000 ft ²
Ceiling	30	4725 ft ²	30	15000 ft ²	Heated above	15,000 ft ²
Wall	32.3	2060 ft ²	32.3	7032 ft ²	32.3	4472 ft ²
Wall B.G					2.9	2800 ft ²
Window	3.3	256 ft ²	3.3	728 ft ²	3.3	416 ft ²
Door	2	96 ft ²	2	240 ft ²	2	312 ft ²

The STEP Warmfloor® radiant heating system is the only heat source installed in the facility.



INSTALLED WATTAGE

To ensure sufficient heat output during cold peak periods a total of 143,011 watts was installed providing a maximum capacity of 411,840 kWh* (4.1 w/sqft.) :

- 24,119 watts in the office (5.0 w/sqft.)
- 60,291 watts in the warehouse (4.0 w/sqft.)
- 58,599 watts in the factory (3.9 w/sqft.)

Installed w/sqft



* Maximum capacity calculated based on 120 heating days (2880 hours)

APPLICATIONS

A total of 15,890 feet of heating element was installed in the building: 2,680 feet in the offices, 6,699 feet in the warehouse on the upper level, and 6,511 feet in the factory on the lower level. A variety of installation methods was used:

- Lower level factory - heating elements over thermal insulation and under 6" Slab
- Upper level warehouse - heating elements between 2 layers of concrete
- Office – heating elements
 - over thermal insulation in poured concrete
 - under rubber mats on concrete
 - under floating boards, bamboo, and wood
 - on concrete between two layers of cushion and under carpet
 - on concrete and under floor leveling compound and covered with vinyl

Energy Consumption 2009 -2015

The building has a dedicated electric meter to measure the actual heating consumption. Consumption was measured during the respective heating seasons.

Heating Season			Metered Consumption		Average Power		
Season	HDD	Hours	kWh	kWh/ft ²	Watts/ft ²	Btu/ft ²	W/m ²
2009-2010	3632	2880	85244	2.45	0.85	2.90	9.15
2010-2011	3679	2976	72800	2.1	0.70	2.93	7.53
2011-2012	2749	3000	53001	1.53	0.51	1.74	5.49
2012-2013	3505	3600	63644	1.83	0.51	1.74	5.49
2013-2014	4749	4056	95336	2.75	0.68	2.32	7.32
2014-2015	4170	3624	77160	2.22	0.61	2.08	6.56

INDOOR TEMPERATURE SETTINGS

To maintain a comfortable indoor working environment the ambient indoor temperature was set to 72°F (22°C) in the office area and 65°F (18°C) in the warehouse and factory.

HEATING DEGREE DAYS

Heating degree days (HDD) is defined as any day the temperature dropped below 65°F (18°C). Temperature data received from wunderground.com.



Commercial Building 34,725 sq. ft.



Offices, Warehouse & Factory



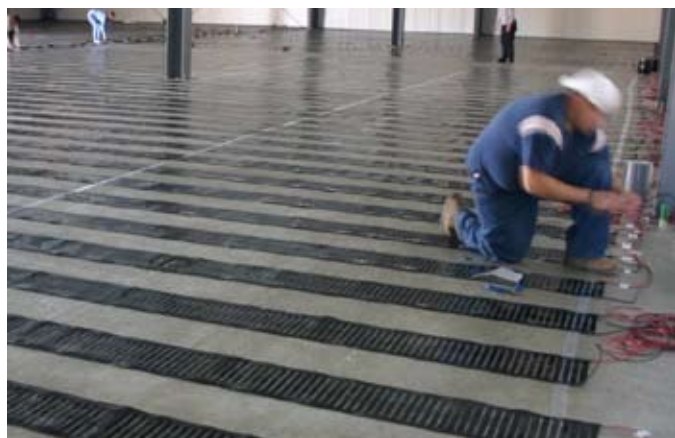
Lower Level Factory 15,000 sq. ft.



Heating Elements Over Insulation and Under 6" Slab



Upper Warehouse & Assembly Area
15,000 sq. ft.



Heating Element Between Two Layers
of Concrete

Radiant Showcase - Commercial and Industrial Facility



Open Office - elements in concrete and under rubber mats



Heating elements over insulation and under 4" slab



Showroom



Elements on concrete, under sound barrier and bamboo



Confrence room



Elements on insulated concrete between two layers of carpet cushion and under carpet



Work room - finished floor is floating wood boards



Elements on insulated concrete covered by a sound barrier



Break Room - marmoleum (recycled resilient)



Element covered by floor leveler



Bathroom



Heating on the floor and the bench