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SUPER THERM RESULTS & APPLICATION TEST PATCHES FOR ONTARIO HYDRO

SUPER THERM has been in test applications with Ontario Hydro in Toronto, Canada for several years, beginning in 1993. Test patches were placed in critical heat areas that experienced problems from excessive heat.

Pipes carrying water throughout the plant for the cooling of the reactors were primed with RUST GRIP then top coated with SUPER THERM to prevent condensation. As the water entered the pipes inside the plant and encountered the warm atmosphere of the plant, the cool water created condensation on the pipes which created numerous problems. SUPER THERM stopped the condensation from happening by stablizing the surface temperature of the pipes and, therefore, stopping the condensation due to the impact of cold pipes meeting warm, ambient temperature.

SUPER THERM was applied over the protective plates guarding the electrical components of auxiliary jet engines that were used to supplement the power requirements of down reactors. The jet engines would create heat to the point of melting the electrical switches which controlled the operation of the engines. SUPER THERM applied over the plate's facing side to the engine reduced the heat build up to prevent the melt down of the wiring.

SUPER THERM has been seen as a coating for the internal tubing of the reactors to coat the tubing to control the loss of heat and improve efficiency. A plate painted with SUPER THERM is presently hanging inside a reactor to show its tolerance to gamma radiation.

Coating fuel storage tanks, roofing, air conditioner units and ducting have also been identified as areas for the use of SUPER THERM to reduce heat penetration to vastly improve efficiency.

One very important area was tested and is being monitored to identify an immediate use for SUPER THERM to savc money, improve efficiency and protect equipment as described below:

In the Pickering Plant, eight reactors are located under a single roof, four on each of the two wings. There are approximately 200 pumps and valves that service these four reactors. Pumps and valves, because of their configuration, cannot be insulated with the standard insulation materials, leaving them exposed to corrosion and deterioration. The most important exposure is that the interior temperature of the pump and valve is 232 C (450F) while the outside ambient temperature is 27 C (80F), which creates tremendous stress on the metal. SUPER THERM coated over this exposed area will stablize the metal surface temperature to give a longer life and efficiency to the pumps and valves. Several other points are that the negative air vacuum system used in the plant to prevent hazards is

easier to maintain when the plant temperature is controlled by painting all the tubes, pipes, walls and equipment with SUPER THERM. Painting the piping with SUPER THERM improves the efficiency of the steam from the generator to the reactor which allows the reactor to operate longer on the same amount of produced steam, giving tremendous efficiency and cost savings to the plant operation. On the pump painted over one year earlier, SUPER THERM still adhered and appears to be as fresh as the day it was applied without cracking and peeling. All other tested paints have peeled and cracked on the pumps and valves. It was determined that a single valve loses 5 hp of energy, and that when painted with SUPER THERM, the loss was reduced to 3.5 hp or a 30% savings or savings of 1.5hp or 1.25KW. Each valve has approximately 15 sq.ft..

One pump was painted with SUPER THERM and studied for increased efficiency and cost savings. Using a BTU gun, the heat emission was 1000 BTU per square foot on the unpainted pump. The following is a chart of the energy and dollar loss per square foot per year of a given valve substrate, and then the resulting savings from using SUPER THERM as an insulator:

UNIT:	Hot Water return valve
SUBSTRATE:	Cast Iron
SURFACE TEMPERATURE:	235 C or 455 F
HEAT EMISSIONS PER SQUARE FOOT:	1000 BTU
HORSEPOWER LOST PER SQUARE FOOT:	.393
WATTS LOST PER SQUARE FOOT:	293
KILOWATTS LOST PER SQUARE FOOT:	.293
COST PER KILOWATT HOUR:	.04c
COST PER SQUARE FOOT PER HOUR:	.01171c
COST PER SQUARE FOOT FOR 24 HOURS:	.2810c
COST PER SQUARE FOOT PER YEAR:	$102.57

Reduction in emissivity after applying SUPER THERM ceramic coating at 14 mils thickness is approximately 30%.

30% of $102.57 equals $30.77 savings per square foot per year.

Cost per square foot to achieve the above savings is calculated as follows:

SUPER THERM cost is $100.00 per gallon Canadian.

Coverage of SUPER THERM is 100 sq.ft. per gallon to achieve 7 mils. thickness, so two coats are

recommended.

Cost of SUPER THERM:	$2.00 per square foot
Application cost:	$2.00 per square foot
Total cost.	$4.00 per square foot

PROJECTED ANNUAL SAVINGS PER SQUARE FOOT:	$30.77
COST OF MATERIAL & APPLICATION PER SQUARE FOOT:	- 4.00
PROJECTED NET SAVINGS FIRST YEAR PER SQUARE FOOT:	**$26.77**

Estimated Life of SUPER THERM coating is 10 years.

Projected savings over the 10 years of operation:

Savings over the life of SUPER THERM:	$307.70 per sq.ft.
Cost of SUPER THERM & application:	- 4.00 per sq.ft.
Net savings over the life of SUPER THERM:	**$303.70 per sq.ft.**

Each Valve has 15 sq.ft. of area.

Savings per valve each year:	**15 sq.ft./valve X $26.77 savings/sq.ft. =**	**$401.55**
Savings per 200 valves (one wing)	**200 valves X $401.55 =**	**$80,310.00**

With the cost of application fixed, the benefit savings will escalate the longer the operational period.

Savings per 200 valves over 10 year Life span:

15 sq.ft. X $303.70/ 10yr. period = $4555.50 X 200 = $ 911,100 in savings.

In the Pickering Plant, there are 400 valves servicing the eight reactors so savings would total: $1,822,200 for just the valves.

Equipment such as the valves and other parts, pipes, etc are manufactured with an Optimum Operating Temperature for peak efficiency. In most cases and in the case of the valves, the optimum operating temperature is 350 degrees F. The steam is running through the valves at nearly 500 degrees F which creates stress problems for the metal. SUPER THERM reduces the surface temperature of the metal by 30% or reducing to 350 degrees, which is the optimum operating temperature. This fact alone allows better efficiency and longer performance from the equipment without replacement or repair.

As seen from a very small study of only the valves at only one Plant, SUPER THERM's ability to save and make money in efficiency, labor, replacement and maintenance of plant equipment and fixturing is as progressional as its extent of usage.