

Date 11/03/2007

Subject : Evaluation of Scalewatcher installation in hotel having rooms

Scalewatcher (Thailand) Co., Ltd. installed three Scalewatchers at Charoentahni Hotel (320 rooms) in Khon Khaen on February 17, 2007. Three water using systems were treated.

1. Cooling tower/chiller, 350 Tons
2. Water boiler
3. Fire tube steam boiler

Result of installation

- Chiller system. A heavy industrial unit was installed on top of the hotel with one coil wrapped over the outgoing and incoming pipes of the cooling tower. (Hot and cold side). It was noted that the chillers were working better, there was no scale. Savings in electricity expenses have been achieved and the chiller worked longer last year. Guests did not complain about the air conditioning like before.

- Before the installation of the Scalewatcher the chiller load was 170A.

$$P = \sqrt{3} * V * I * PF \text{ Watt}$$

$$= 1.732 * 384 * 170 * 0.80 \text{ Watt}$$

$$D = 90,451.968/1,000$$

$$KWh = 90.451968$$

$$1 \text{ Month} = 90.451968 * 24 * 30 = 65,125.416 \text{ kWh}$$

- After install Scalewatcher 160 AMP

$$P = \sqrt{3} * V * I * PF \text{ Watt}$$

$$= 1.732 * 384 * 160 * 0.80 \text{ Watt}$$

$$D = 85,151.264/1,000$$

$$KWh = 85.131264$$

$$1 \text{ Month} = 85.131264 * 24 * 30 = 61,294.51008 \text{ kWh}$$

Savings: 3,910.90688 kWh monthly.

Cost of electric 3.09 Baht/unit: $3,910.90688 * 3.09 * 12 = 145,016.427$ Baht/year

- 1.1 Cooling tower. Scalewatcher prevents scale and no scale was found. Also the differential temperature increased. Scale inhibitors were not used any longer. Inside the in and outgoing pipes no scale was found so the system can run longer with less maintenance. The following is a calculation of savings for the cooling tower and chiller.

Chemical usage two tanks/month. Price 3,500 Baht/tank

1 month 7,000 Baht

1 year 84,000 Baht

Total energy savings $145,016.427 + 84,000 = 229,016.427$ Baht/year

Water savings????

2. Water boiler system. Scalewatcher was installed before the water softener with three coils around three pipes in the basement. Hard scale forming at the heat exchangers was prevented. Water was heated faster, saving energy. Less corrosion was noted hence less chance of broken pipes. Fuel oil savings counted from 2006 at 15,000 liter/month to 2007 13,000 liter/month. The hot water boiler system maintained the normal flow of water where before pressure dropped. Yellowish colored water disappeared and became clear. Temperature of water was maintained better. This can be a significant water saving as guests will enjoy hot water quicker so do not have to wait for the water to become hot. Less maintenance was experienced. Chemical usage for the boiler in the past was 3,300 Baht/tank per quarter and cleaning cost was 6,000 Baht/year

$$\begin{aligned}\text{Total savings for a year} &= 3,300 \times 4 + 6,000 \\ &= 19,200 \text{ Baht/year}\end{aligned}$$

The cost of fuel is not included.

$$\begin{aligned}\text{Total savings achieved by the Scalewatcher installation:} &= 229,016.427 + 19,200 \\ &= 248,216.427 \text{ Baht}\end{aligned}$$

Water savings not included. However it can be expected that at least 50 % on water usage for the cooling tower can be achieved because less blow down is necessary and the cooling tower can run on a higher cycles of concentration.

Savings for steam boiler is not included.