ENERGY SAVING SOLUTIONS FOR CHILLER PLANT

Project Reference: British American Tobacco

Special Standard Requested by Owner: International Standards: Environmental, Health and Safety (EHS)

Project Name : British American Tobacco – Vinataba Factory in Viet Nam



PROJECT INFORMATION

Owner : **BRITISH AMERICAN TOBACCO (BAT) – VINATABA Factory in Viet Nam**

Website : www.bat.com

The Objective of Project : Energy Saving

- Reducing Power Consumption Maintenance Cost
- Improving Quality of Production
- Less Stress of Mechanical and Expanding Life Cycle of Equipment

Location: Long Binh Ward - Dong Nai Province – Vietnam

Delivering Time:

+ Starting Time: 18th October, 2015
+ Finished Time: 20th December, 2015
+ Installing Time total: 2 months
+ Non – Stop Production's Operation During Working Time

Scope of Supply: Turn Key Project – Energy Saving Solutions for Chiller Plant

Site Survey and System Engineering Consultant
Designing Custom System for Optimizing Energy Consumption
Proposal and Energy Saving Estimation
Installation & Supervisor
Project Management
Testing and Commissioning System
Performance of System
Operator Training
Documentation
Yearly Service Contract (maintenance, spare parts, troubleshooting)

Main Equipments Supply:

One **SMARDT Chiller** (520 RT - 4 compressors – Magnetic Bearing – Oil free Technology)
iCPECS System (Intelligent Central Plant Energy Control System)
Piping System Including Field Devices and Instruments

Project Pictures:







Removing York Chillers out



Moving Smardt chiller to site by 50 tons crane



Wiring power cables to Chiller



Installing VFD for Pump



Commissioning for Chiller



Wiring power cables to iCPECS control Panel



Chiller Operating Training



iCPESC Operating Training



Control Panel of Smardt chiller / Performance of Chiller



Accurating the Smardt Chiller position



iCPECS system



I. Background

British American Tobacco Corporation is one of the largest conglomerate in the tobacco word"s market which has 46 factories in 39 countries. British American Tobacco factory in Dong Nai-Vietnam has been presenting since 2004. In 2015, after 11 years of operating, British American Tobacco owner decided to establish a modernization on the factory system.

One of the factory's main objectives is saving energy. Along with this purpose, there are many solutions from the consultants for chiller plant sent to the owner.

York Chiller performs a very low COP around ~ 3.0, chiller water pump system with NO VFD, 2,552,000 kwh/year for chiller plant next to annual maintenance cost is very high.

II. Project Scope:

APC Industry Corporation designed and managed the project to:

» Replace the site's two YORK chillers by the Smardt Chiller with high efficiency watercooled 1828 kWr.
» Supply iCPECS (Central Plant Energy Control System) for chiller water pump, Condenser Water pump, and cooling tower system along a turnkey solution for chiller plant
» Testing and commissioning system
» Project Management



Chiller room has three existing chillers. Before installing the Smardt Chiller, we need to remove two determined York Chillers within 24 hours to not effect the factory's operation, but the process must be ensure the EHS Procedure's Labor Safety.

III. Outcomes:

The Factory now has optimized the energy by modern control system for Chiller, Pump, and Cooling tower system.
This revolution technology has helped the factory saving energy 3100 kWe / day .It saved 50 % costs than the old system.
The project has also delivered significant maintenance saving and selected components from the decommissioned chiller are being used as spare parts for the site's remaining chillers of same type.

Achieved Savings Overview	
Chiller Smardt saving percent	50%
iCPECS saving percent	50%
Achieved electricity savings	3100kWe/day
Total saving per year	1,131,500 kWe/year

IV. Achievements:



BRITISH AMERICAN TOBACCO vinataba

CERTIFICATE OF APPRECIATION

Presented To

APC INDUSTRY CORPORATION

10 Road 22, Linh Chieu Ward, Thu Duc District, HCM City, Vietnam

In recognition of their outstanding performance in

SUCCESSFUL COMPLETION

Of contract "Providing a turn-key project for Chiller Plant (Oil-Free Chiller and Central Plant Energy Control Saving)" with stringently following the Health, Safety and Environment standards.

Ngo Ngoc Thanh
Technical Manager, Facility
BAT VINATABA (JV) LTD.

Van Duc Hieu
Head of Technical Services & EHS
BAT VINATABA (JV) LTD.

On January 12, 2016

Technical consultant for energy saving solution of chiller Plant
TƯ VẤN GIẢI PHÁP KỸ THUẬT TIẾT KIỆM NĂNG LƯỢNG CHO HỆ THỐNG CHILLER
CONSULTANT
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SMARDT CHILLER GROUP

APC INDUSTRY CORPORATION

TIME	No. Comp On	Load Percentage (%)	Chiller Capacity (kWr)	Chiller Input (kWe)	COP	CW Inlet Temp (oC)	CW outlet Temp (oC)	CHW Inlet Temp (oC)	CHW outlet Temp (oC)	CHW Flow %
12:30	3	59%	941	125	7.53	28.9	32.8	14.2	11.0	93.6
12:30	3	59%	937	125	7.49	28.9	32.8	14.2	11.0	93.1
12:29	3	59%	938	125	7.52	28.9	32.8	14.2	11.0	93.2
12:29	3	59%	940	124	7.55	28.8	32.8	14.2	11.0	93.4
12:28	3	59%	938	124	7.57	28.8	32.7	14.2	11.0	93.2
12:28	3	59%	940	124	7.59	28.7	32.7	14.2	11.0	93.4
12:27	3	59%	938	123	7.61	28.7	32.7	14.2	11.0	93.2
12:27	3	59%	940	124	7.58	28.7	32.7	14.2	11.0	93.4
12:26	3	59%	938	123	7.63	28.7	32.7	14.2	11.0	93.2
12:26	3	59%	933	123	7.57	28.7	32.7	14.2	11.0	92.8
12:25	3	59%	933	123	7.57	28.7	32.6	14.2	11.0	92.8
12:25	3	59%	933	122	7.63	28.7	32.6	14.2	11.0	92.8
12:24	3	59%	938	122	7.70	28.7	32.7	14.2	11.0	93.2
12:24	3	59%	933	122	7.63	28.8	32.7	14.2	11.0	92.8
12:23	3	59%	932	123	7.61	28.8	32.7	14.2	11.0	92.7
12:23	3	59%	937	123	7.61	28.8	32.7	14.2	11.0	93.1
12:22	3	59%	937	123	7.63	28.8	32.7	14.2	11.0	93.1
12:22	3	59%	937	121	7.72	28.8	32.7	14.2	11.0	93.1
12:21	3	59%	937	121	7.74	28.8	32.7	14.2	11.0	93.1
12:21	3	59%	940	122	7.72	28.9	32.8	14.2	11.0	93.4
12:20	3	59%	937	123	7.63	28.9	32.8	14.2	11.0	93.1
12:20	3	59%	933	122	7.63	28.9	32.8	14.2	11.0	92.8
12:19	3	59%	938	121	7.74	28.9	32.8	14.2	11.0	93.2
12:19	3	59%	933	122	7.65	28.9	32.8	14.2	11.0	92.8
12:18	3	59%	938	122	7.70	28.9	32.8	14.2	11.0	93.2
12:18	3	59%	932	122	7.65	29.0	32.8	14.2	11.0	92.7
12:17	3	59%	938	121	7.77	29.0	32.8	14.2	11.0	93.2
12:17	3	59%	930	121	7.70	29.0	32.8	14.2	11.0	92.6
12:16	3	61%	963	121	7.96	28.9	32.8	14.2	10.9	92.8
12:16	3	59%	933	123	7.62	28.9	32.8	14.2	11.0	92.8
12:15	3	59%	932	122	7.64	28.9	32.8	14.2	11.0	92.7
12:15	3	59%	933	121	7.73	28.9	32.8	14.2	11.0	92.8
12:14	3	59%	933	121	7.73	29.0	32.8	14.2	11.0	92.8
12:14	3	61%	963	121	7.94	29.0	32.8	14.2	10.9	92.8
12:13	3	61%	960	121	7.92	29.0	32.9	14.2	10.9	92.6
12:13	3	61%	963	121	7.94	29.0	32.9	14.2	10.9	92.8
12:12	3	61%	960	120	7.98	29.0	32.9	14.2	10.9	92.6
12:12	3	59%	932	122	7.67	29.0	32.9	14.1	10.9	92.7
12:11	3	59%	933	123	7.59	29.1	33.0	14.1	10.9	92.8
12:11	3	59%	933	123	7.59	29.1	33.0	14.1	10.9	92.8
12:10	3	59%	938	124	7.60	29.1	33.0	14.1	10.9	93.2
12:10	3	59%	933	124	7.54	29.1	33.0	14.1	10.9	92.8
12:09	3	59%	933	122	7.63	29.1	32.9	14.1	10.9	92.8
12:09	3	59%	937	121	7.72	29.0	32.9	14.1	10.9	93.1
12:08	3	59%	930	122	7.61	29.0	32.9	14.1	10.9	92.4
12:08	3	59%	930	122	7.65	29.0	32.9	14.1	10.9	92.6
12:07	3	59%	932	121	7.68	29.1	33.0	14.1	10.9	92.7
12:07	3	59%	933	123	7.62	29.1	33.0	14.1	10.9	92.8
12:06	3	59%	933	123	7.62	29.1	33.0	14.1	10.9	92.8
12:06	3	59%	938	124	7.58	29.1	33.0	14.1	10.9	93.2
12:05	3	59%	933	124	7.51	29.1	33.0	14.1	10.9	92.8
12:05	3	59%	932	124	7.51	29.1	33.0	14.1	10.9	92.7
12:04	3	59%	930	124	7.52	29.1	33.0	14.1	10.9	92.6
12:04	3	59%	933	123	7.59	29.1	33.0	14.1	10.9	92.8
12:03	3	59%	932	123	7.58	29.1	33.0	14.1	10.9	92.7
12:03	3	59%	937	124	7.55	29.1	33.1	14.1	10.9	93.1
12:02	3	61%	963	125	7.69	29.2	33.1	14.2	10.9	92.8
12:02	3	61%	967	126	7.69	29.2	33.2	14.2	10.9	93.1
12:01	3	61%	963	126	7.62	29.2	33.2	14.2	10.9	92.8
12:01	3	61%	963	127	7.59	29.2	33.2	14.2	10.9	92.8
12:00	3	61%	967	129	7.51	29.2	33.2	14.2	10.9	93.2
12:00	3	61%	963	129	7.46	29.3	33.2	14.2	10.9	92.8
11:59	3	61%	967	129	7.51	29.3	33.2	14.2	10.9	93.2
11:59	3	61%	967	129	7.51	29.3	33.3	14.2	10.9	93.1
11:58	3	61%	960	130	7.41	29.3	33.3	14.2	10.9	92.7
11:58	3	63%	995	131	7.62	29.3	33.3	14.2	10.8	93.1
11:57	3	63%	992	131	7.56	29.3	33.3	14.2	10.8	92.8
11:57	3	63%	992	133	7.48	29.3	33.3	14.2	10.8	92.8

SMARDT CHILLER GROUP

APC INDUSTRY CORPORATION

TIME	No. Comp On	Load Percentage (%)	Chiller Capacity (kWr)	Chiller Input (kWe)	COP	CW Inlet Temp (oC)	CW outlet Temp (oC)	CHW Inlet Temp (oC)	CHW outlet Temp (oC)	CHW Flow %
22:07	3	43%	680	75	9.12	26.3	29.0	13.4	11.0	90.2
22:07	3	45%	706	74	9.55	26.3	29.1	13.4	10.9	89.9
22:06	3	45%	709	74	9.56	26.3	29.1	13.4	10.9	90.2
22:06	3	43%	680	75	9.12	26.3	29.1	13.4	11.0	90.2
22:05	3	43%	680	74	9.18	26.4	29.1	13.4	11.0	90.2
22:05	3	45%	709	74	9.63	26.4	29.2	13.4	10.9	90.2
22:04	3	45%	710	76	9.37	26.4	29.2	13.4	10.9	90.3
22:04	3	43%	679	75	9.01	26.4	29.1	13.4	11.0	89.9
22:03	3	45%	709	74	9.56	26.4	29.2	13.4	10.9	90.2
22:03	3	45%	710	76	9.34	26.4	29.2	13.4	10.9	90.3
22:02	3	43%	679	75	9.04	26.4	29.2	13.4	11.0	89.9
22:02	3	45%	706	75	9.40	26.4	29.2	13.4	10.9	89.9
22:01	3	45%	710	75	9.46	26.4	29.2	13.4	10.9	90.3
22:01	3	43%	683	76	8.98	26.4	29.2	13.4	11.0	90.7
22:00	3	45%	710	75	9.43	26.4	29.2	13.4	10.9	90.3
22:00	3	45%	709	75	9.44	26.4	29.2	13.4	10.9	90.2
21:59	3	45%	710	76	9.37	26.4	29.2	13.4	10.9	90.3
21:59	3	43%	680	76	8.91	26.4	29.2	13.4	11.0	90.3
21:58	3	43%	680	75	9.03	26.4	29.2	13.4	11.0	90.3
21:58	3	45%	709	76	9.35	26.4	29.3	13.4	10.9	90.2
21:57	3	43%	683	77	8.90	26.4	29.3	13.4	11.0	90.7
21:57	3	43%	680	77	8.86	26.4	29.3	13.4	11.0	90.3
21:56	3	45%	713	76	9.38	26.5	29.3	13.4	10.9	90.8
21:56	3	43%	680	77	8.86	26.5	29.3	13.4	11.0	90.3
21:55	3	43%	683	76	8.95	26.5	29.3	13.4	11.0	90.7
21:55	3	45%	713	75	9.47	26.5	29.3	13.4	10.9	90.8
21:54	3	45%	713	76	9.35	26.5	29.3	13.4	10.9	90.7
21:54	3	43%	680	78	8.77	26.5	29.3	13.4	11.0	90.3
21:53	3	43%	683	77	8.90	26.5	29.3	13.4	11.0	90.7
21:53	3	45%	713	76	9.35	26.5	29.3	13.4	10.9	90.7
21:52	3	45%	713	78	9.20	26.5	29.3	13.4	10.9	90.8
21:52	3	43%	685	77	8.92	26.5	29.3	13.4	11.0	90.8
21:51	3	45%	713	77	9.32	26.5	29.3	13.4	10.9	90.7
21:51	3	45%	713	77	9.29	26.5	29.4	13.4	10.9	90.7
21:50	3	45%	715	77	9.25	26.5	29.4	13.4	10.9	91.0
21:50	3	45%	713	77	9.23	26.5	29.4	13.4	10.9	90.8
21:49	3	43%	680	78	8.72	26.5	29.4	13.4	11.0	90.3
21:49	3	43%	683	79	8.70	26.5	29.4	13.4	11.0	90.7
21:48	3	43%	685	79	8.69	26.5	29.4	13.4	11.0	90.8
21:48	3	43%	683	78	8.78	26.5	29.4	13.4	11.0	90.7
21:47	3	45%	713	77	9.26	26.5	29.4	13.4	10.9	90.7
21:47	3	43%	683	78	8.73	26.5	29.4	13.4	11.0	90.7
21:46	3	43%	685	79	8.72	26.5	29.4	13.4	11.0	90.8
21:46	3	43%	687	77	8.91	26.5	29.4	13.4	11.0	91.1
21:45	3	45%	717	79	9.12	26.5	29.4	13.4	10.9	91.1
21:45	3	43%	683	78	8.76	26.5	29.4	13.4	11.0	90.7
21:44	3	44%	690	79	8.78	26.5	29.4	13.4	11.0	91.4
21:44	3	43%	687	79	8.74	26.5	29.4	13.4	11.0	91.1
21:43	3	43%	685	78	8.80	26.5	29.4	13.4	11.0	90.8
21:43	3	43%	687	78	8.82	26.5	29.4	13.4	11.0	91.0
21:42	3	43%	687	78	8.80	26.5	29.4	13.4	11.0	91.0
21:42	3	43%	687	78	8.82	26.5	29.4	13.4	11.0	91.0
21:41	3	45%	713	77	9.26	26.5	29.4	13.4	10.9	90.7
21:41	3	45%	715	78	9.16	26.6	29.4	13.4	10.9	91.0
21:40	3	43%	687	79	8.71	26.6	29.4	13.4	11.0	91.1
21:40	3	43%	687	78	8.82	26.6	29.4	13.4	11.0	91.1
21:39	3	45%	713	78	9.17	26.6	29.4	13.4	10.9	90.7
21:39	3	43%	687	78	8.77	26.6	29.4	13.4	11.0	91.0
21:38	3	43%	685	78	8.80	26.6	29.4	13.4	11.0	90.8
21:38	3	45%	713	78	9.20	26.6	29.4	13.4	10.9	90.7
21:37	3	43%	687	78	8.77	26.6	29.4	13.4	11.0	91.1
21:37	3	43%	683	78	8.73	26.6	29.4	13.4	11.0	90.7
21:36	3	43%	687	78	8.80	26.6	29.4	13.4	11.0	91.1
21:36	3	45%	713	78	9.17	26.6	29.4	13.4	10.9	90.7
21:35	3	45%	715	77	9.25	26.6	29.5	13.4	10.9	91.0
21:35	3	43%	683	78	8.73	26.6	29.5	13.4	11.0	90.7
21:34	3	43%	688	79	8.71	26.6	29.5	13.4	11.0	91.2
21:34	3	43%	687	78	8.77	26.6	29.5	13.4	11.0	91.0