



Energy Management
Solutions

Energy Audit Report

Inspection site:

XYZ Company
ABC Road
City, TX 77777

Site Contact:

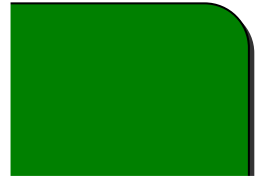
J Davis

Date of Audit:

December 18, 2007

Audit Engineer:

Jaymar Davis



Energy Management
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Introduction

This report discusses the potential Energy Conservation Opportunities (ECO) of XYZ Company. XYZ Company is a manufacturer of finished wood mold products. The author performed an energy audit of the facility identifying energy savings opportunities of:

Bill Analysis

- 12-Month load analysis
- Analysis of energy consumption by area

Lighting

- Inventory existing lighting systems.
- Selection of alternate products for more energy efficient replacements.
- Determine potential energy cost savings from implementing selected products.
- Obtain pricing for replacement cost.

Energy Audit Checklist

Energy Procurement

- Load Profile Analysis
- Energy Products

Lighting

- Lighting Survey
- Occupancy Sensors
- Task Lighting

HVAC

- Chiller
- Air Handling Units
- Rooftop Units
- Blowers
- Variable Frequency Drive Opportunities

Motors

- High Efficiency Motors
- Variable Frequency Drive Opportunities

Air Compressors

- Air Compressor Efficiency
- Heat Recovery Opportunities
- Air Leaks

Thermal Imaging

- Switchgear
- Breaker Panels
- Windows
- Roof

Boilers Power Factor Correction

- IDR Analyzer
- Switchgear Data Collection

Predominant Usage

- Electricity Sales Tax Exemption
- Gas Sales Tax Exemption

Primary Transformer

- Secondary vs. Primary Transformer Savings

Building Automation System

- System Types
- DDC vs. Pneumatic
- VAV
- Control Algorithms

Background

Facility Description

XYZ Company manufactures products located.

The facility has one building with a total area of approximately 41,500 square feet.

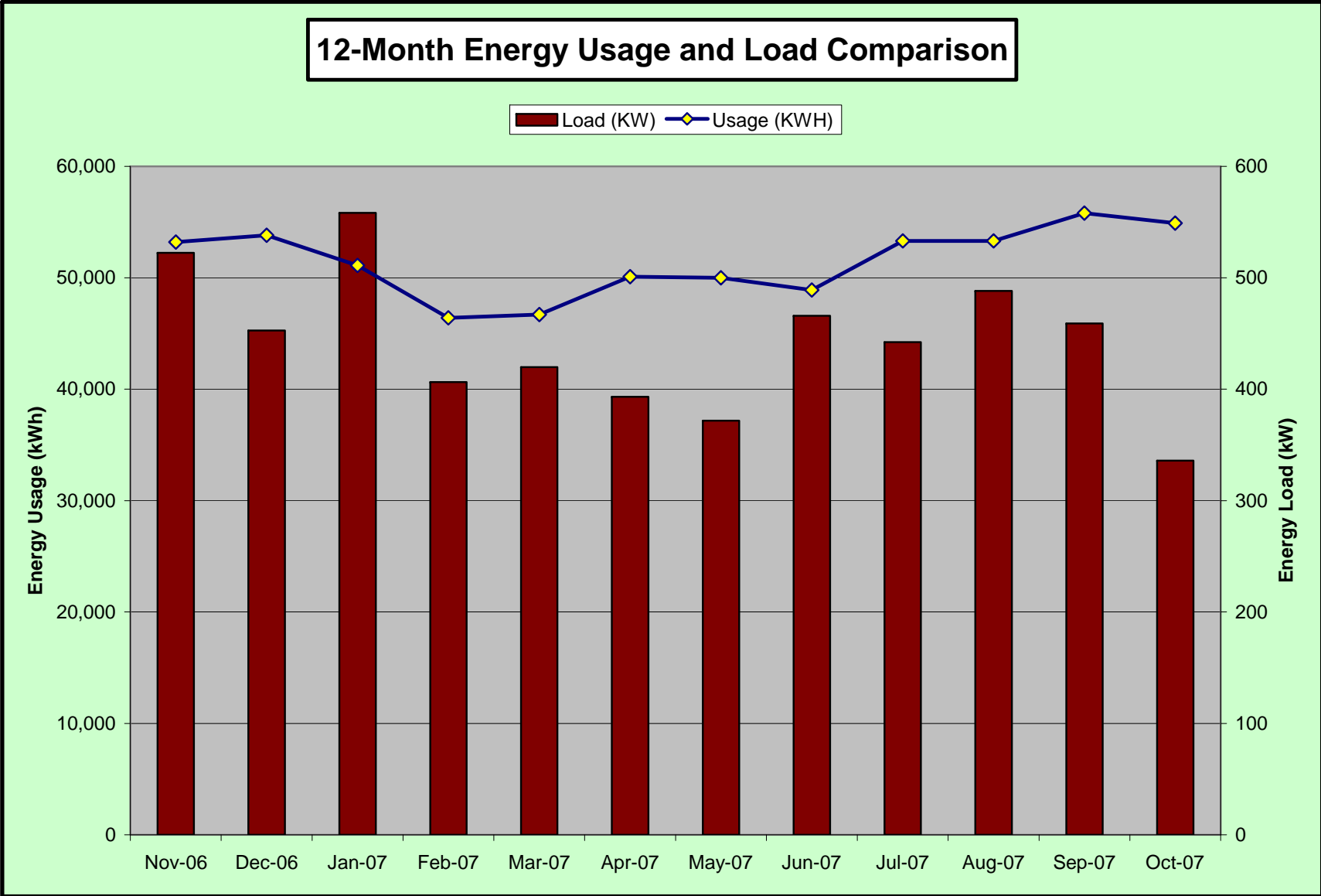
The production hours of the manufacturing area operates 10 hours a day 6 days a week, and office support hours are 7am – 4pm Monday through Friday.

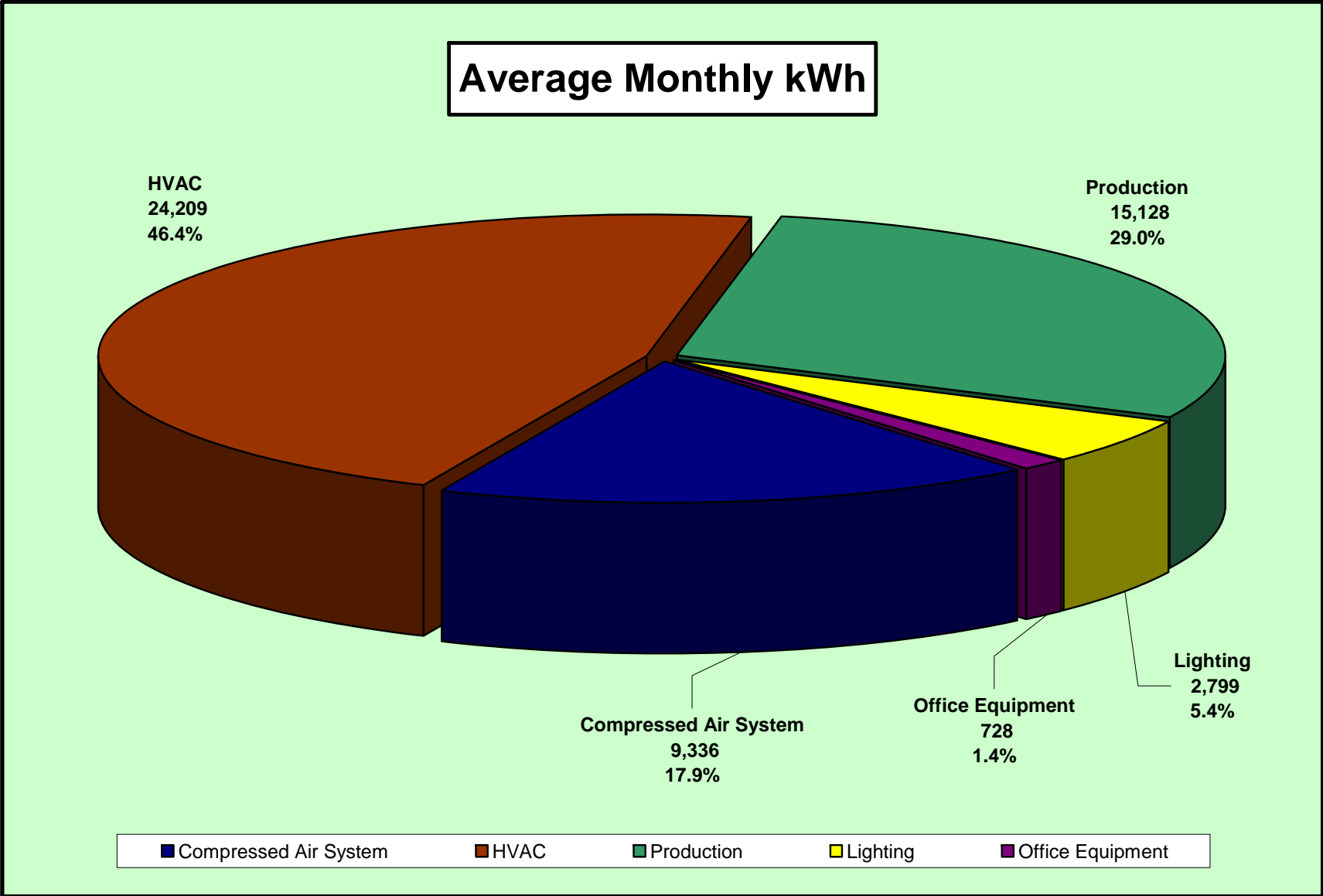
Energy Use

The electricity total bills for XYZ Company from November 2006 to October 2007 were approximately \$73,876 for 531,480 KWH. This is an average cost of \$.139 per KWH. The average monthly demand was 515 KW.

The energy usage study showed HVAC consumed the largest amount of energy monthly at the facility at 46.6% or 24,209 kWh; second was Production at 29.0% of 15,128 kWh, third was the Compressed Air System at 17.9% or 9,336 kWh. Lighting represents 5.4% or 2,799 kWh of the total monthly energy consumption.

Month	Billed KW	Actual KWH	Service Cost (\$)	Avg. Cost per KWH (\$)
Nov-06	532	52,230	\$7,259.97	\$0.139
Dec-06	538	45,270	\$6,292.53	\$0.139
Jan-07	511	55,830	\$7,760.37	\$0.139
Feb-07	464	40,620	\$5,646.18	\$0.139
Mar-07	467	41,970	\$5,833.83	\$0.139
Apr-07	501	39,300	\$5,462.70	\$0.139
May-07	500	37,170	\$5,166.63	\$0.139
Jun-07	489	46,590	\$6,476.01	\$0.139
Jul-07	533	44,220	\$6,146.58	\$0.139
Aug-07	533	48,810	\$6,784.59	\$0.139
Sep-07	558	45,900	\$6,380.10	\$0.139
Oct-07	549	33,570	\$4,666.23	\$0.139
Totals	515	531,480	\$73,875.72	\$0.139





Energy Conservation Opportunities (ECOs)

Table I summarizes the energy conservations recommendations made by the Rapid Power Management team. If XYZ Company implements the recommended measures, it will realize an annual energy reduction of approximately 47,893 KWH (9.0% of total Annual KWH usage) for an energy cost savings of approximately \$6,315 per year. The total cost of implementing these projects, which is reduced by applicable utility rebates¹ and EPC Act Tax deduction, is approximately \$38,392 and a simple payback of 6.08 years or 73 months.

Table I. Energy Conservation Opportunities: Summary of Savings and Costs

Description of ECO	Potential Savings (\$/yr)	Project Cost (\$)	Simple Payback Period (yrs)	Energy Savings (KWH/yr)	Demand Reduction (KW)
Lighting Improvements					
Lighting Retrofit entire facility	\$6,315	\$48,851	7.74	47,893	64.1
Totals	\$6,315	\$48,851	7.74 years	47,893	20.2
Rebate Incentives					
1. TXU Utility Rebate (50% of Total)		\$2,343			
Total Incentives		\$2,343			
Payback with Incentives		\$46,508	7.36 years		
EPC Act Tax Deduction					
1. EPC Act 2005 Lighting Tax Deduction		\$8,116 ²			
Total Incentives		\$8,116			
Payback with Tax Deduction		38,392	6.08 years		

¹ TXU Rebate funds are sent directly to RPM (TXU sponsor) after project completion and TXU requirements are met. Client will receive a check in the amount of 50% of total TXU Rebate funds. TXU funds are limited and can only be secured with signed approval from client. Rebate funds will be received an estimated 6-8 weeks after project completion.

² EPC Act 2005 Lighting Tax Deduction; Please consult you accountant on how to obtain this tax deduction. Reference: IRS Notice 2006-52

ECO #1: Lighting Upgrades

We surveyed the lighting of the facility and recommend installing F54T5HO fixtures with MIRO reflectors to increase the light output in the production areas. In the office areas, RPM recommends retrofitting the four-lamp and 3-lamp F32T8 fixtures with a MIRO reflector, the number of lamps per fixture can be reduced to 2-lamps without decreasing the lighting level significantly.

To further increase the lighting savings, we also recommend the replacement of 32 watt T8 lamps with 25 watt T8 lamps. The 25 watt T8 provide a higher Color Rendering Index (CRI) and 20% long lamp life based on 12 hours starts.

Location	Fixture Types	Fixture Qty.	Minimum Light Level Measured	Maximum Light Level Measured	Average Light Level	Proposed Light Level	Comments
Production Area	400MH		9.9	13.9	11.9	30-75fc	Some lights were off; 24ft centers
Prod. Area Task Lighting	2L, F96T12HO		49.8	78.4	64.1	75-150fc	
Pre-Stain Sanding Area	2L, F96T12HO		46.0	76.0	61.0	75-15fc	
Receiving Area	250MH; 400MH		29.3	32.2	30.8	7-15fc	With skylights some areas 43fc

* Illumination Engineering Society of North America

Typical Light Levels**

LUX	Foot Candles		LUX	Foot Candles	
	Factories			Home	
20-75	2-7	Emergency Stairs, Warehouse	100-150	10-15	Washing
575-150	7-15	Exit/Entrance Passages	150-200	15-20	Recreational Activities
150-300	15-30	Packing Work	200-300	20-30	Drawing Room, Table
300-750	30-75	Visual Work: Production Line	300-500	30-50	Makeup
750-1,500	75-150	Typesetting: Inspection Work	500-1,500	50-150	Reading, Study
1,500-3,000	150-300	Electronic Drafting	1,000-2,000	100-2,000	Sewing
	Office			Restaurants	
75-100	7-10	Indoor Emergency Stairs	75-150	7-15	Corridor Stairs
100-200	10-20	Corridor Stairs	150-300	15-30	Entrance, Wash Room
200-750	20-75	Conference, Reception Room	300-750	30-75	Cooking/Dining Room
750-1,500	75-150	Clerical Work	750-1,500	75-150	Show Window
1,500-2,000	150-2,000	Typing, drafting			
	Store			Hospital	
75-150	7-15	Indoors	30-75	3-7	Emergency Stairs
150-200	15-20	Corridor/Stairs	75-100	7-10	Stairs
200-300	20-30	Reception	100-150	10-15	Sick Room, Warehouse
300-500	30-50	Display Stand	150-200	15-20	Waiting Room
500-750	50-75	Elevator	200-700	20-75	Medical Exam Room
750-1,500	75-150	Show Window, Packing Table	750-1,500	75-150	Operating Room
1,500-3,000	150-300	Storefront, Show Window	5,000-10,000	500-1,000	Eye Inspection

** Recommended lighting levels from the IESNA Lighting Handbook

Electric Usage Survey Data

Location	Equip. Name	Qty.	HP	Volts	Amps	kW/ Unit	Total kW	Demand Factor	Demand kW	Avg. Monthly kWh	Description/ Function Use
Shipping Area/RR	Lights	4				0.11	0.45	0.5	0.22	36	4L, F32T8
Shipping Area/RR	Lights	2				0.11	0.22	0.5	0.11	18	4L, F32T8
Shipping	Lights	7				0.27	1.87	0.5	0.93	150	250MH; with Skylights
Small finishing room	Lights	4				0.46	1.82	0.5	0.91	146	400MH
Small finishing room	Spray Booth Blower	2	5			4.33	8.65	0.5	4.33	519	
Small finishing room	Spray Booth Blower	1	5			4.33	4.33	0.5	2.16	260	
Small finishing room	Booth Lights	2				0.14	0.29	0.5	0.14	23	4L, F40T12
Small finishing room	Booth Lights	4				0.14	0.58	0.5	0.29	46	4L, F40T12
Small finishing room	Booth Lights	1				0.21	0.21	0.5	0.10	17	2L, F96T12/HO
Small finishing room	Oven Blower	1	10			8.65	8.65	0.5	4.33	346	
Small finishing room	Oven Exhaust Blower	1	5			4.33	4.33	0.5	2.16	173	
Small finishing room	Oven Conveyor Motor	1	5			4.33	4.33	0.5	2.16	173	
Solvent Storage	Lights	4				0.27	1.07	0.5	0.53	85	250MH; explosion proof
Solvent Storage	Lights	3				0.07	0.20	0.5	0.10	16	65W; explosion proof; emergency
Solvent Room Office	Lights	1				0.11	0.11	0.5	0.06	9	4L, F32T8
Solvent Room Office	CPU	1				0.23	0.23	0.5	0.11	18	
Solvent Room Office	Printer	1				0.18	0.18	0.5	0.09	5	
Air Compressor Room	Air Compressor	1	75			61.55	61.55	0.5	30.78	3693	
Air Compressor Room	Air Compressor	1	20			17.31	17.31	0.5	8.65	1039	Quincy QMB20ACA3518F
Air Compressor Room	Air Compressor	1	50			41.03	41.03	0.5	20.52	2462	

Location	Equip. Name	Qty.	HP	Volts	Amps	kW/ Unit	Total kW	Demand Factor	Demand kW	Avg. Monthly kWh	Description/ Function Use
Air Compressor Room	Air Compressor	1	40			32.83	32.83	0.5	16.41	1970	Sullair 10B 40AC
Air Compressor Room	Air Dryer	1		230	16	1.48	1.48	0.5	0.74	89	
Air Compressor Room	Air Dryer	1		230	6.9	1.40	1.40	0.5	0.70	84	
Air Compressor Room	MUAU	2	15			12.98	25.96	0.5	12.98	1558	ICE; Industrial Commercial EQ.
Production Area	Lights; overhead	24				0.46	10.94	0.5	5.47	876	400MH
Prod. Line 1	Feed Belt	1	2			1.73	1.73	0.5	0.87	104	
Prod. Line 1	Lathe	1	2			1.73	1.73	0.5	0.87	104	
Prod. Line 1	Buffer	1	4			3.46	3.46	0.5	1.73	208	
Prod. Line 1	Sander	1	4			3.46	3.46	0.5	1.73	208	
Prod. Line 1	Blower	1	4			3.46	3.46	0.5	1.73	208	
Prod. Line 1	Stain Feed Motor	1	2			1.73	1.73	0.5	0.87	104	
Prod. Line 1	Wipe Brush Motor	4	4			3.46	13.85	0.5	6.92	831	
Prod. Line 1	Overspray Blower	1	2			1.73	1.73	0.5	0.87	104	
Prod. Line 1	Sealer Feed Motor	1	1			0.87	0.87	0.5	0.43	52	
Prod. Line 1	Sealer Overspray Blower	1	1			0.87	0.87	0.5	0.43	52	
Prod. Line 1	Cure Oven Blowers	4	2			1.73	6.92	0.5	3.46	415	Makor FTT
Prod. Line 1	UV Feed Motor	1	1			0.87	0.87	0.5	0.43	52	
Prod. Line 1	UV Dryer	1				7.60	7.60	0.5	3.80	456	IHF
Prod. Line 1	UV Dryer	3	2			1.73	5.19	0.5	2.60	312	Makor FTL
Prod. Line 1	UV Exhaust Blower	2	5			4.33	8.65	0.5	4.33	519	
Prod. Line 1	Varnish Oven Blowers	2	3			2.60	5.19	0.5	2.60	312	
Prod. Line 1	Lights; Task	7				0.21	1.45	0.5	0.72	87	2L, F96T12/HO
Prod. Line 1	Plywood Spray mach.	1	0.08			0.07	0.07	0.5	0.03	4	
Production Area	Fladder Sander	1		460	25	10.12	10.12	0.5	5.06	101	
Production Area	Giardina Sander	1				15.00	15.00	0.5	7.50	150	
Production Area	Giardina Oven	1		460	61	24.69	24.69	0.5	12.35	247	
Production Area	Giardina Outfeed	2	1			0.87	1.73	0.5	0.87	17	
Production Area	COSTA	1	79			64.83	64.83	0.5	32.42	648	

Location	Equip. Name	Qty.	HP	Volts	Amps	kW/ Unit	Total kW	Demand Factor	Demand kW	Avg. Monthly kWh	Description/ Function Use
Prod. Line 2	Sander	1		480	224	94.62	94.62	0.25	23.65	1419	
Prod. Line 2	Sander Exhaust Blower	1				22.00	22.00	0.25	5.50	330	
Prod. Line 2	Sander Exhaust	1	1			0.87	0.87	0.25	0.22	13	
Prod. Line 2	Barberan Sanders	2	4.8			4.15	8.31	0.25	2.08	125	BRN-1400-T
Prod. Line 2	Stain Brushes	1	5			4.33	4.33	0.25	1.08	65	Barberan IBX-3-3000/1400
Prod. Line 2	Stain Brushes exhaust	2	5			4.33	8.65	0.25	2.16	130	Barberan IBX-3-3000/1400
Prod. Line 2	Stain Cure Oven	1				2.50	2.50	0.25	0.63	38	Koch
Prod. Line 2	Fill Mach.	2	3			2.60	5.19	0.25	1.30	78	
Prod. Line 2	HOK 14-1	1	5			4.33	4.33	0.25	1.08	65	Barberan HOK-14/1- Basic
Prod. Line 2	Stain Denibber	1	15			12.98	12.98	0.25	3.25	195	SB74-2AH
Prod. Line 2	Conveyer Motor	4	1			0.87	3.46	0.25	0.87	52	
Prod. Line 2	HOK 14-1	1	5			4.33	4.33	0.25	1.08	65	Barberan HOK-14/1- Basic
Prod. Line 2	Brushes	2	5			4.33	8.65	0.25	2.16	130	Barberan BRN-1400
Prod. Line 2	Conveyer Motor	1	0.37			0.32	0.32	0.25	0.08	5	
Prod. Line 2	HOK 14-2	1	5			4.33	4.33	0.25	1.08	65	Barberan HOK-14/2- Basic
Prod. Line 2	Top Sand Feed	1	1			0.87	0.87	0.25	0.22	13	
Prod. Line 2	DMC Top Sand	1		480	130	54.91	54.91	0.25	13.73	824	
Prod. Line 2	DMC Top Sand Exhaust	1				18.30	18.30	0.25	4.58	275	
Prod. Line 2	Time Saver	1	15			12.98	12.98	0.25	3.25	195	SB74-2AH
Prod. Line 2	LPD	1				0.00	0.00	0.25	0.00	0	
Prod. Line 2	Conveyor	1	1			0.87	0.87	0.25	0.22	13	
Prod. Line 2	Brushes	1	5			4.33	4.33	0.25	1.08	65	Barberan BRN-1400
Prod. Line 2	Conveyor	1	1			0.87	0.87	0.25	0.22	13	
Prod. Line 2	Brushes	1	5			4.33	4.33	0.25	1.08	65	Barberan BRN-1400
Prod. Line 2	Final Cure	1				2.50	2.50	0.25	0.63	38	
Prod. Line 2	Outfeed	1	1			0.87	0.87	0.25	0.22	13	
Prod. Line 2	Lights	12				0.21	2.48	0.25	0.62	37	2L, F96T12/HO;1-covered
Receiving Area	Pre-stain Sander	7	4			3.46	24.23	0.5	12.12	485	makor LT8-1-10
Receiving Area	Pre-stain Sander	2	5			4.33	8.65	0.5	4.33	173	makor LT8-1-10

Location	Equip. Name	Qty.	HP	Volts	Amps	kW/ Unit	Total kW	Demand Factor	Demand kW	Avg. Monthly kWh	Description/ Function Use
Receiving Area	Pre-stain Sander	2				3.40	6.80	0.5	3.40	136	makor LT8-1-10
Receiving Area	Lights	7				0.21	1.45	0.5	0.72	116	2L, F96T12HO
Receiving Area	Lights	6				0.27	1.60	0.5	0.80	128	250MH
Receiving Area	Lights	8				0.46	3.65	0.5	1.82	292	400MH
Maintenance	Lights	8				0.46	3.65	0.5	1.82	292	400MH
Maintenance	Lights	1				0.21	0.21	0.5	0.10	17	2L, F96T12HO
Maintenance	Radial Saw	1	1			0.87	0.87	0.5	0.43	26	
Maintenance	Table Saw	1	1			0.87	0.87	0.5	0.43	26	
Maintenance	Planer	1				4.40	4.40	0.5	2.20	132	
Maintenance	Lights; parts	5				0.07	0.36	0.5	0.18	29	2L, F40T12
Maintenance	Mill	1	3			2.60	2.60	0.5	1.30	78	
Maintenance	Lathe	1	3			2.60	2.60	0.5	1.30	78	
Maintenance	Band Saw	1	0.75			0.65	0.65	0.5	0.32	19	
Office	Lights	2				0.11	0.22	0.5	0.11	18	4L,T8
Office	CPU	2				0.23	0.45	0.5	0.23	36	
Office	Printer	1				0.18	0.18	0.5	0.09	5	
Office	Lights	2				0.11	0.22	0.5	0.11	18	4L,T8
Office	CPU	2				0.23	0.45	0.5	0.23	36	
Office	Printer	1				0.18	0.18	0.5	0.09	5	
Office	Minifridge	1				0.08	0.08	0.8	0.06	43	
Break Area	Lights	6				0.11	0.67	0.8	0.54	86	4L, T8
Break Area	Microwaves	4				0.90	3.60	0.8	2.88	58	
Break Area	Fridge	1				0.18	0.18	0.8	0.14	97	
Break Area	Coffeemaker	1				0.90	0.90	0.8	0.72	14	
Break Area	Icemaker	1		115	12.9	1.31	1.31	0.8	1.04	167	
Lobby Area	Lights	3				0.11	0.34	0.8	0.27	43	4L, T8
Lobby Area	CPU	1				0.23	0.23	0.8	0.18	29	
Lobby Area	Fax	1				0.18	0.18	0.8	0.14	22	
Lobby Area	Copier/Printer	1				1.10	1.10	0.8	0.88	141	
RR Hall	Lights	1				0.14	0.14	0.8	0.12	18	4L,T12
RR	Lights	4				0.14	0.58	0.8	0.46	74	4L,T12
Bldg. Perimeter	Dust Collector	1	15			12.98	12.98	0.5	6.49	779	
Bldg. Perimeter	Dust Collector	2	20			17.31	34.62	0.5	17.31	2077	
Bldg. Perimeter	Dust Collector	3	1			0.87	2.60	0.5	1.30	156	
Bldg. Perimeter	AC Units	2	230	41.5		188.76	377.51	0.5	188.76	22651	

Location	Equip. Name	Qty.	HP	Volts	Amps	kW/ Unit	Total kW	Demand Factor	Demand kW	Avg. Monthly kWh	Description/ Function Use
Office Area	Lights	5				0.11	0.56	0.5	0.28	45	4L, T8
Office Area	CPU	1				0.23	0.23	0.5	0.11	18	
Office Area	Printer	1				0.18	0.18	0.5	0.09	5	
Office Area	Lights	2				0.11	0.22	0.5	0.11	18	4L, T8
Office Area	Printer	1				0.18	0.18	0.5	0.09	5	
Office Area	Lights	2				0.11	0.22	0.5	0.11	18	4L, T8
Office Area	CPU	1				0.23	0.23	0.5	0.11	18	
Office Area	Printer	1				0.18	0.18	0.5	0.09	5	
2 nd Floor Conf.	Lights	5				0.09	0.43	0.5	0.21	34	3L, F32T8
Hall	Lights	4				0.11	0.45	0.5	0.22	2	4L, T8;empty
RR	Lights	1				0.11	0.11	0.5	0.06	1	4L, T8;empty
Office	Lights	4				0.11	0.45	0.5	0.22	2	4L, T8;empty
Office	Lights	2				0.11	0.22	0.5	0.11	1	4L, T8;empty
Office	Lights	2				0.11	0.22	0.5	0.11	1	4L, T8;empty
Elec/AC Room	Lights	1				0.11	0.11	0.5	0.06	1	4L, T8;empty
Elec/AC Room	Lights	4				0.11	0.45	0.5	0.22	2	4L, T8;empty
Total									535.3	52,200	

General Recommendations and Comments

In general, 65% of XYZ Company's energy consumption was HVAC and the compressed air system.

RPM recommends full audit on the compressed to assess compressed air leakage and to assess the efficiency of the system. Exhaust heat from the compressed air system could be piped into the HVAC system to reduce the cost of heating during the winter months when controlling the environment conditions is critical.

RPM also recommends assessing any possible Variable Speed Drive (VSD) applications for the HVAC system and the compressed air system.

Thermal imaging scans are also recommended on an annual basis to reduce instantaneous failure of switchgear and breaker panels.

Utility rebates and Energy tax deductions are still available for additions projects.

Please contact Rapid Power for any questions.

JD Dodson – CEM, CLEP, MBA

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