

**Preliminary Energy Study Conducted at  
SUNLIT INDUSTRIES**

By

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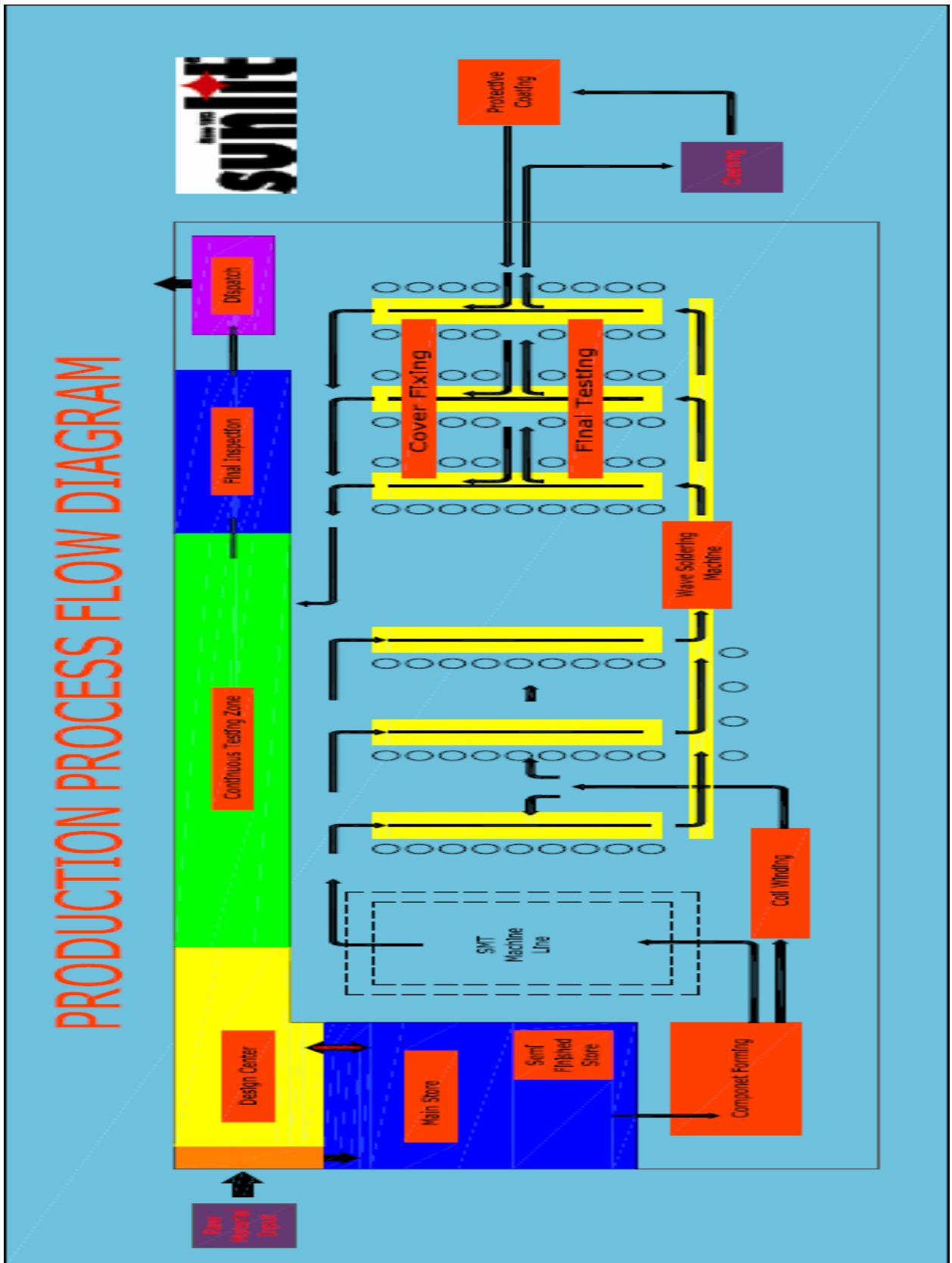
**As part of the course EE6401 Energy Audit and Management,  
Instructed by Dr Ashok S, NIT Calicut during monsoon semester  
2015**

## About Company:

- Came into existence in 1993. Electronic choke (ballasts) production. Situated in Ernakulam dist. nearby Puthencruz. Working hours from 8.30am- to 5.30pm (9hrs).
- INDUSTRY IS PROVIDED WITH **LT-4A TARIFF**
- CONNECTED LOAD – **75,763WATTS**
- TRANSFORMER RATING - 400 kVA, 3PHASE
- DG SETS - 100 kVA
- MANUALLY SWITCHED TO LINE AND DG SET.
- **DG SET**
  - ✚ GENLITE(KIRLOSKAR)
  - ✚ 415V,3PHASE,50Hz
  - ✚ 125/100KVA
  - ✚ 1500RPM
  - NOISE LIMIT 75db at 1mts in free field condition
- **TARIFF-----LOW TENSION – IV A (LT- IV A) – INDUSTRY**

Tariff applicable for general purpose industrial loads (single or three phase)  
 .Electricity duty payable = 'D'= 10 % of the energy charges payable

<b>LT - IV Industrial</b>	
Fixed Charge Rs. per kW or part thereof per Month	45
Energy Charge (Paise/kWh)	325



**DETAILS OF CONNECTED LOAD**

SLNO	Equipment	Qty	Rated I/P Power Approx	Total I/P Power
Front Office 1				
1	Tube light	5	40	200
2	Fan	2	100	200
3	Computer	2	300	600
4	Printer	2	110	220
5	Laptop	1	125	125
Front Office 2				
1	Coffee maker	1	60	60
2	Water Purifier	1	60	60
3	Tube light	1	40	40
4	Fan	1	100	100
5	Computer	3	300	900
Main Store & Sub store				
1	Tube light	2	40	80
2	Fan	1	80	80
Assembly Line 1				
1	Tube light	6	40	240
2	Fan	3	100	300
3	CFL	1	15	15
4	TORCH 13A Reflowoven	1	8832	8832

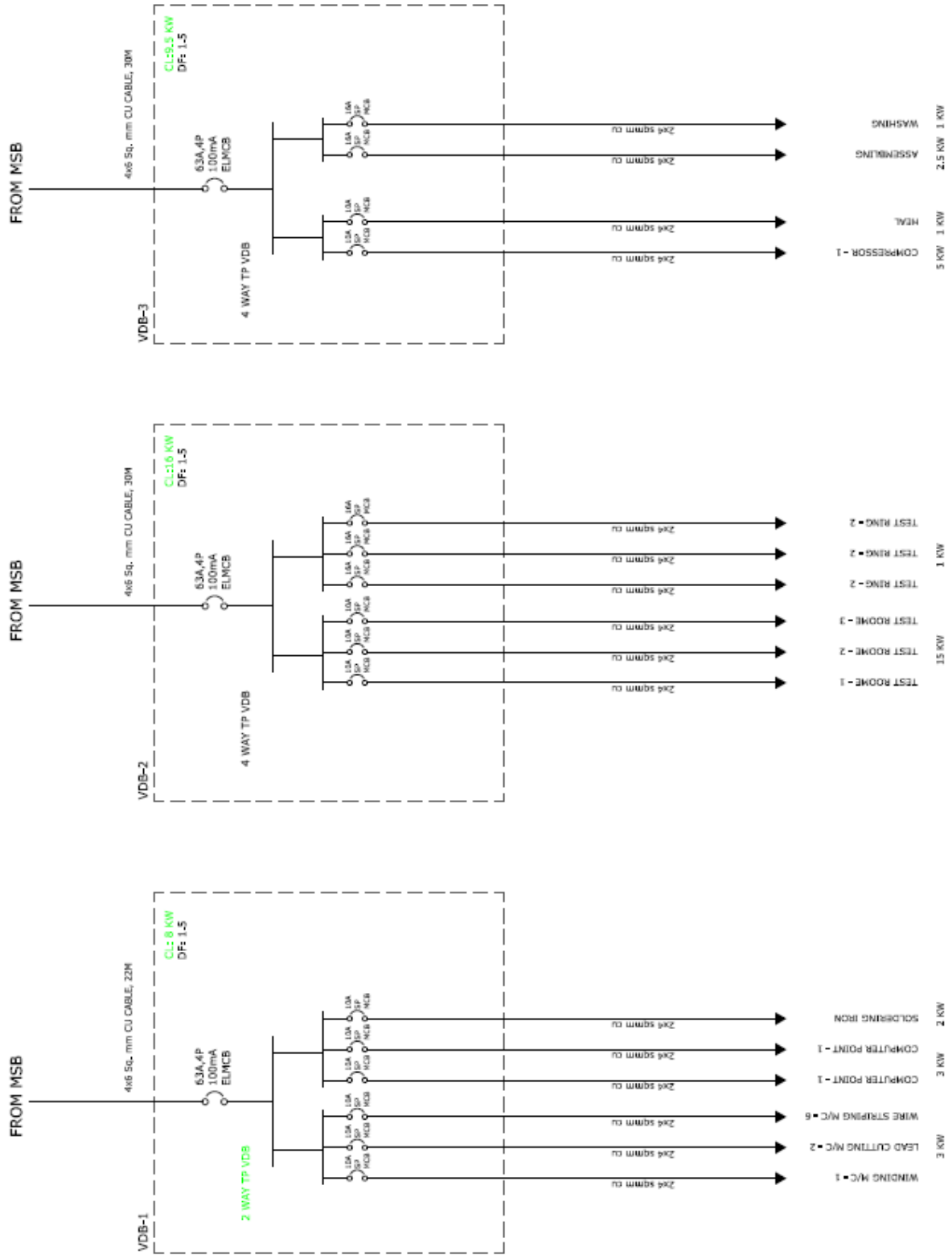
5	Dip Soldering M/C	2	809.6	1619.2
6	Stallion 321 $\mu$ c Wave Soldering M/C	1	11776	11776
7	Conveyors	3	750	2250
Choke Winding				
1	Winding unit	2	60	120
Assembly Line 2 & Inspection				
1	Tube Light	3	40	120
2	Fan	4	100	400
3	Soldering Iron I	30	25	750
4	Soldering Iron II	25	50	1250
Testing				
1	Test Rig	6	100	600
2	On-Line Tester	1	60	60
Misc				
1	Wire Stripping M/C	6	40	240
2	Air vent suction ,motor	1	1500	1500
3	Compressor motor	1	5000	5000
4	Lead Cutting M/C	2	1500	3000
5	Solder dip	1	60	60
Continuos Testing				
1	T.Light	200	40	8000

2	T.Light	100	36	3600
3	T.Light	40	38	1520
4	T.Light	30	14	420
5	LED	50	13	650
6	LED	30	18	540
5	T.Light	30	24	720
Quality Control				
1	PC w CRT	1	300	300
HEAL				
1	Test Rig	4	100	400
2	Window AC	1	1496	1496
3	Tube light	6	36	216
4	Fan	2	240	480
ELTECH Testing				
1	T.Light	8	40	320
2	LED	20	18	360
3	LED	20	5	100
4	Soldering Iron	1	50	50
5	Cutter	1	1150	1150
Packing				
1	T.Light	5	40	200
2	Fan	6	120	720
Conference				

Room				
1	A/C	2	1496	2992
2	T.Light	3	40	120
3	Fan	3	120	360
Misc				
1	Compressor Unit	1	1496	1496
	Plugpoints			4900
Design Center				
1	Computer	4	300	1200
2	Laptop	1	125	125
3	T.Light	4	40	160
4	Split AC	1	1496	1496
5	Printer	2	125	250
6	DSO	1	100	100
7	Test Rig	3	100	300
8	Electronic Ballast Analyzer	1	225	225
Total Approx. I/P Power Consumption				75763







**LOAD ANALYSIS**

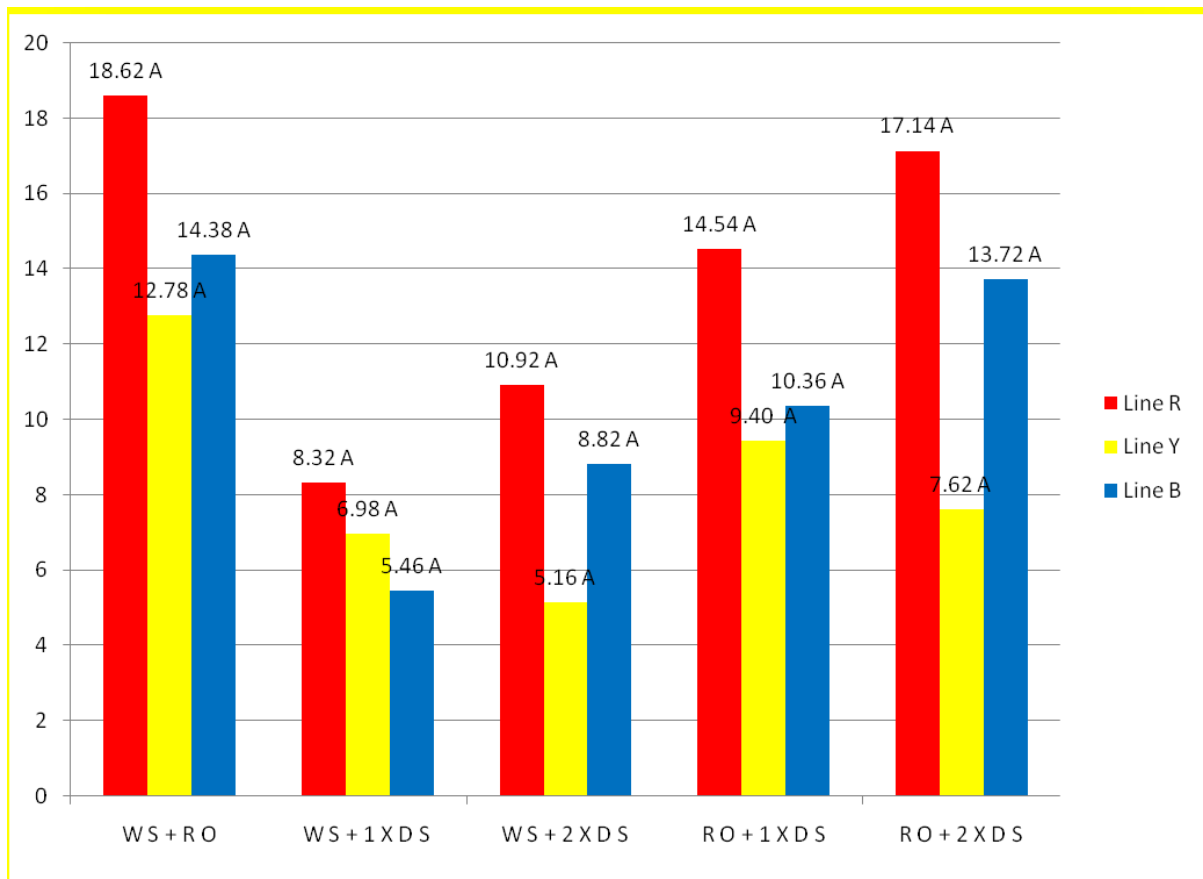
Date of inference	Load	Line	R	Y	B	
<b>24-10-2015 SATURDAY</b>	Normal	Line Voltage V	419.1620	416.0444	420.8942	
		Line Current A	6.66	6.28	5.6	
	With Wave Soldering M/C	Line Voltage V	413.0820	410.1553	415.1784	
		Line Current A	12.86	11.44	10.34	
	With Reflow Oven	Line Voltage V	408.5965	405.8250	409.2893	
		Line Current A	19.08	13.9	15.24	
	With 1 X Dip Solder M/C	Line Voltage V	409.6357	410.8481	412.7535	
		Line Current A	8.78	8.1	6.32	
	With 2 X Dip Solder M/C	Line Voltage V	412.9088	414.9872	412.0606	
		Line Current A	11.38	6.28	9.68	
				R	Y	B
	Total Line Current	W S + R O + 2 X D S		43.32	31.62	35.26

Increase From Normal Values	M/C	Load Current I <sub>L</sub> A		
		R	Y	B
	Wave Soldering	6.2	5.16	4.74
	Reflow oven	12.42	7.62	9.64
	1 X Dip Solder	2.12	1.82	0.72
	2X Dip Solder	4.72	0	4.08


Sl. No	Connected M/C on Load	A1	A2	A3
1.	W S + R O	18.62	12.78	14.38
2.	W S + 1 X D S	8.32	6.98	5.46
3.	W S + 2 X D S	10.92	5.16	8.82
4.	R O + 1 X D S	14.54	9.44	10.36
5.	R O + 2 X D S	17.14	7.62	13.72

Date	Connected M/C on Load	A1	A2	A3
24-10-2015	W S + R O + 1 X D S	13.9	14.52	10.2

## 3 $\phi$ Load Current Vs Machines on Load



**CALCULATIONS:**

## Assembly line1 Load Calculation

- Lightning loads - 1 \* 15W CFL = 15W  
- 6 \* 40W =240W

T8 fluorescent lamps. These TFL uses electronic chokes.

- Fan - 3 \* 100W =300W
- Plug points - 10 \* 60 = 600W
- Reflowoven - 1\*12hp\*.8\*736=7065.6W
- Dip Soldering m/c - 2\*1hp\*.8\*736=1177.6W
- WaveSoldering m/c- 1\*16hp\*.8\*736=9420.8W
- Conveyor motors - 3\*1hp\*.8\*736=1766.4W
- **TOTAL LOAD** - 20,585.4W =**20.6kW**

## Assembly line1 Energy Calculation

- Lightning loads - 1 \* 15W\*9 CFL = 135Wh  
- 6 \* 40W\*9 =2160Wh

T8 fluorescent lamps. These TFL uses electronic chokes.

- Fan - 3 \* 100W\*9 =2700Wh
- Plug points - 10 \* 60\*4 = 2400Wh
- Reflowoven - 1\*12hp\*.8\*736\*4=28,262.4Wh
- Dip Soldering m/c - 2\*1hp\*.8\*736\*7=8,243.2Wh
- WaveSoldering m/c- 1\*16hp\*.8\*736\*7=65,945.6Wh
- Conveyor motors - 3\*1hp\*.8\*736\*9=15,897.6Wh
- **TOTAL ENERGY** - 125,743.8Wh =**125.7kWh**

## LIGHTING

- They are using conventional florescent lamp. This lamp can be replaced by energy efficient lamps
- Rating of available florescent lamp=40W
- Rating of T5 florescent lamp=28W
- Difference in energy=12W
- Total number of lamps in the company=43
- Total units saved in a month when working for 9 hours(for 26 taken as working days)= $12*9*26*43/1000$  units  
 $=120.74$ units
- **Savings per month =(cost per units) \*(units saved) =Rs 3.25\*120.74**  
**=Rs 392.40per month**

## MOTORS

- OVERALL SYSTEM PF IS MAINTAINED AT 0.8 BY AN EFFICIENT CAPACITORS.
- THE STARTER USED HERE IS STAR-DELTA STARTER.

## **SUGGESTIONS FOR EFFECTIVE ENERGY UTILISATION:**

- Using solar energy , promote renewable energy usage
- Proper maintenance of machinery.
- They are using conventional florescent lamp. This lamp can be replaced by energy efficient lamps.
- Activate sleep mode on computer instead of screen savers.
- By providing translucent roofing sheets, the light loads could be deduced.