EA report of a sintered cutting tool manufacturing company from Pune with 5.5MW running load and around Rs.220Lacs per month electricity bill.

Client : M/S XXX Pune

Audit Period : Feb – March 2015

Executive summary and possible savings.

1) We advise you to confirm that air conditioning is required for almost all the processes as per recommended SOPs. (Auditors could not get any reference)

2) We advise you to confirm that major manufacturing activities need uninterrupted and ultraclean power supply generated by huge capacity ONLINE UPS systems?

3) XXX is spending **Rs. 24000 per day in losses in the UPS** while conditioning the power and will spend around Rs.15000 per day on their comprehensive annual maintenance. This amounts to Rs,39000 per day or Rs. 117 Lacs per year.

4) Out of total energy consumption, substantial part is spent on comfort air conditioning. This results into average energy bill of about Rs.40 Lacs per month. It is noticed that there is lot of scope for energy conservation in this area. These shop floor comfort / process HVAC systems have grown with need. A detail modification plan can yield substantial saving in running load. Each system will have to be taken up as independent project.

5) Lux levels observed at various shops are in excess of 300Lux. XXX at present is consuming **309KW on illumination** and cost of the electrical energy towards this is **Rs.56000 per day or Rs.1.75Cr per year.** XXX has already started activity of replacing the light fittings by LEDs and Induction lamps. This may be finished on priority. We expect that these higher lux levels are required as per process SOPs. This will help reducing electrical power consumption by at least 75 KW and will result into saving of **Rs.3900000.00 per year.**

6) Most of the offices and shop floors are air conditioned and do not use natural light. As a result artificial lighting is used in all three shifts. Use of natural light where ever possible, can bring in saving of at least **Rs.500000.00 per year.**

7) We advice that all the luminaries may be connected to UPS output immediately so that they will receive regulated voltage. This will result into regulating power consumption and will also increase life of these luminaries. This can bring in saving of at least **Rs.500000.00 per year.**

8) About 200KW UPS output is supplied to HVAC applications. We recommend that XXX should cross check this requirement. Thermal inertia of such systems does not allow temperatures to change quickly. If power failures are very rear, and of short duration, such systems can receive power from properly sized DG sets during such power failures. At present about 30KW are spent in UPS – 24x7 to achieve this clean and uninterrupted power. This costs XXX around **Rs1500000.00 a year.**

9) All UPS systems should be put OFF from input side during holidays, if processes are not ON during these days. Total installed capacity of UPS systems is over 5MVA. If no load loss is assumed to be 1%, still it will be 50KW. Across Sunday, these systems will not deliver output for at least 36 hours. So actual loss per year would be 50 x 36 x 50 x 7 = **Rs.630000.00**

10) XXX setup must be having around 100 cabins for various executives and around 50 conference rooms of various sizes. At present, unwanted lights and air conditioners

are put off during non occupancy, only if the occupants remember. We advice active controls for these areas. Such controls can put off unwanted consumption automatically and may be fixed immediately or during next renovation. Gas charging of these dedicated systems should be checked during every preventive maintenance. This also would result into saving of at least 50KW at it's minimum and will result into saving **Rs.1000000.00 per year**.

11) During shop visits we observed that almost all shops have large size mechanized doors which allow entry of material movement vehicles as well as persons. During day time frequent movement of persons was observed. Due to this various air conditioned areas get blast of fresh / at times hot air, which requires extra cooling. We recommend separate doors for persons and vehicles. This will result into saving of at least 50KW worth air conditioning and will result into saving **Rs.1000000.00 per year**.

12) XXX has installed Active harmonic filters at various locations. Following table shows contribution of these filters at various transformers.

Tr	Actual Amps	Filter Amps	% filter Amps	Filter Loss
Tr 1	750	33	4.40	1.34
Tr 2	900	21	2.33	1.18
Tr 5	750	110	14.67	4.28
Tr 8	600	72	12.00	2.48
Tr 7	300	106	35.33	0.16
Total	**3300**	**342**	**10.36**	**9.44**

These are actual readings when these filters were connected and respective load was on. We are of the opinion that the effectiveness of these filters is negligible as they are contributing hardly 10% of total current while consuming 10KW continuously, the energy spent within is costing XXX RS. 525000 per year. These filters must be offering some relief to internal electrical distribution, when Large capacity UPS systems were not installed. Now isolated power sources (UPS outputs) are supplying power to individual loads. All these UPS systems are harmonic compensated at Input and also offer almost unity power factor at input. These filters can be put OFF without significant effect on the system and save almost **Rs 500000.00 per year.**

13) All APFC panels are in reasonably good condition and supplying required reactive power to maintain power factor at unity.

14) HVAC and compressed air systems were audited for possible energy savings and the detailed report is presented independently. The conclusions are included in this summary.

Summary of annual energy savings proposed in electrical systems:

Sr	Energy Saving Opportunity	KW Saving	Cost of energy saved Rs in Lacs	Payback period
1	Shop floor and office Lighting modifications	75	39	24 months with LEDs
2	Use of natural light on shop floor		5	Negligible
3	Connecting light fittings through UPS KW and saving in replacement cost		5	Negligible
4	200KW HVAC load, shifting on DG sets	30	15	Negligible
5	Putting OFF UPS on holidays from input side	50	6.3	Negligible
6	Active power controllers in cabins and conference rooms	50	10	18 months
8	Disconnecting Active harmonic filters	10	5	Negligible
		Total	**85.3**	

Summary of annual energy savings proposed in HVAC and Compressed air systems

SR	Value of possible capital released in Rs Lacs	Possible Savings per year in Rs. Lacs	Required Investment in Rs. Lacs.	Payback in Months
1	HVAC savings in all areas except area TAPS			
	376 *	220	140	8
2	HVAC related savings in TAPS process chiller			
	90 *	65	20	4
3	Taps building ventilation - comfort Airwasher related savings			
		51	Negligible	Immediate
4	CVD process chiller			
	Possible savings of Rs. 20 L per year. The implementation appears to be difficult. Needs additional study.			
5	Compressed air			
	It is observed that different pressures / quantities are required for different applications. Cost of compressed air per day is around Rs.1L. Compressed air is generated centrally at maximum pressure plus line loss. Detail demand study, relocation of different compressors etc can bring in annual saving of about Rs. 100L.			
This report suggests quantified savings of Rs.336 L per year at an average payback of 6 months Note * : Demand analysis suggests that post modification equipment worth this value may get released from this set up without affecting the required end results.				
This audit recommends energy cost saving of approximately Rs. 421L per annum or 60L Kwh per annum which is around 16% of present annual energy consumption.				

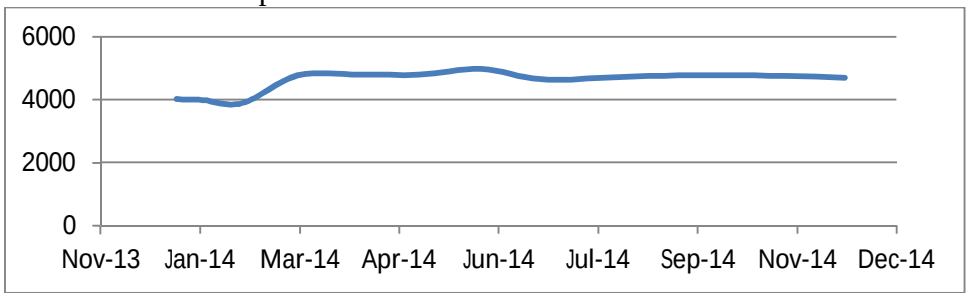
Energy infrastructure at M/S XXX

M/S XXX is a leading multinational cutting tool manufacturer. Setup of the company started more than 50 years ago and has grown with time and need. At present major source of energy used is electricity. XXX receives 22KV from MSEDCL substation. At present contract demand is 4990KVA and the same is getting enhanced to 7500KVA. At main incomer – after MSEDCL metering, XXX has installed HT circuit breaker with auxiliary metering. This line is further distributed to various transformers through 22KV distribution breakers. The transformer capacities, % utilization and area served is as follows.

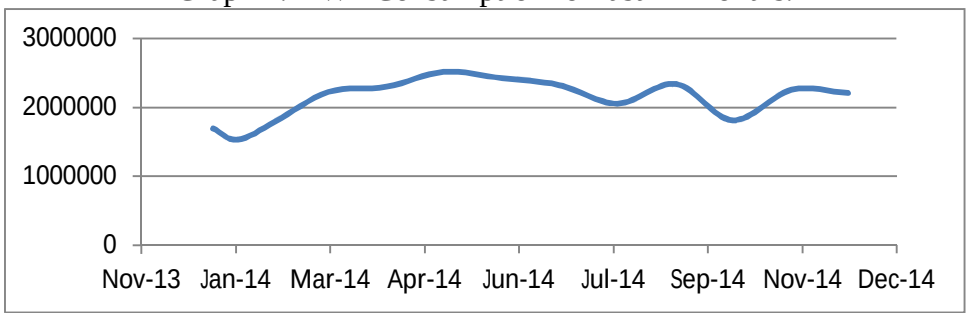
Table 1:

Transformer	KVA Rating	Avg KW	Max KW	Max KVA	% Utilization	Shop Name
Transformer No-7	1000	136.59	237.92	264	26	OLD R&D
Transformer No-1	1500	224.36	501.86	558	37	Shop -37
Transformer No-4	1500	196.4	222.09	247	16	Press Shop + Tool Room + Titex
Transformer No-8	2000	362.69	482.92	537	27	Taps
Transformer No-6	1000	497.59	626.4	696	70	TCC
Transformer No-10	2000	943	1113	1237	62	GAC + Grinding
Transformer No-9	2000	156.76	195.83	218	11	Kenfilt Machines
Transformer No-5	1000	431.58	561.86	624	62	Soft Tools
Transformer No-2	1500	354.9	638.74	710	47	Shop -37
Transformer No-3	1000	358.99	405.36	450	45	Press Shop + Tool Room
Total	**14500**	**3662.86**	**4985.98**	**5540**	**38**	

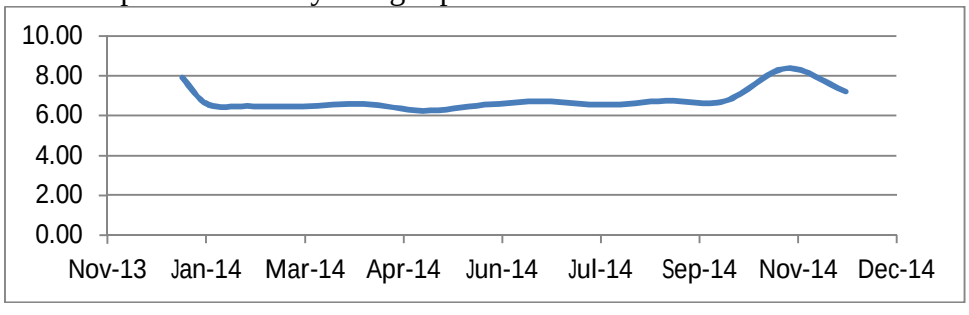
Graph 1: KVA demand for last 12 months.



Graph 2: KWh Consumption for last 12 months.



Graph 3: Electricity charges paid in Rs./Kwh for last 12 months.



Graph 4 KW / KWh Consumption recorded during the audit for typical 24 hours.

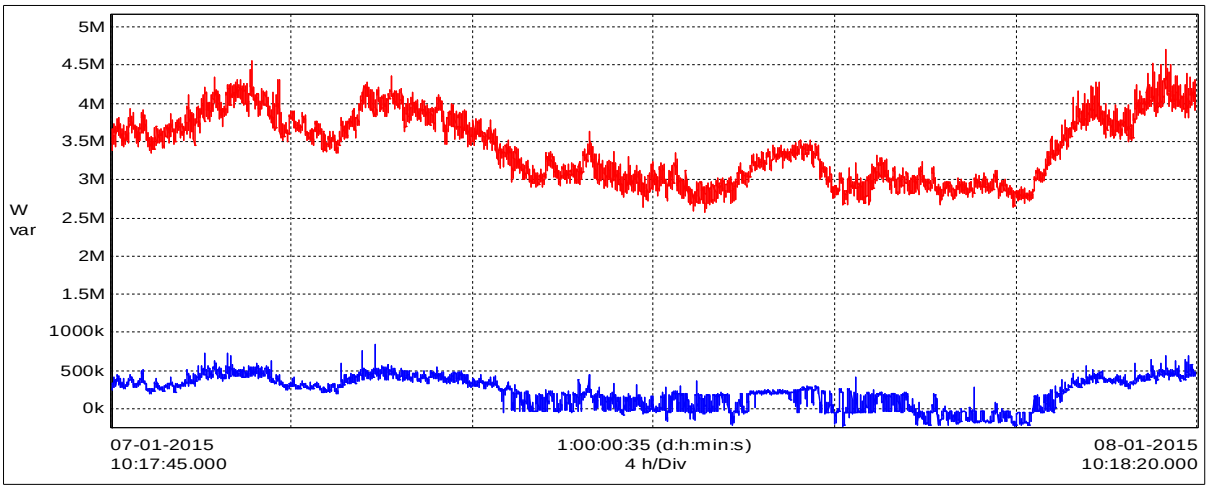


Table 2:

Status	Date	Time	Watt Hour
Stop	08-01-2015	10:18:15	82109765
Start	07-01-2015	10:17:45	5733.38
Watt Hour consumed in 24 hour			82104032
KWH consumed in 24 hours			**82104.03**

- Graphs 1,2,3 show historical trends of electrical energy consumption based on data collected by us during audit.
- Graph 4 shows Kw consumption recorded over 24 hours on a typical working day.
- Table 2 shows typical KWh recorded during above 24 hours.
- These observations confirm daily and monthly consumption of electrical energy as per historical data.
- Graph 2 typically shows that the consumption goes up during March / April / May.
- The graph also shows increase during November / December.
- Major energy consumption in utility area is due to various comfort and process HVAC systems.This implies that the same will be more during summer.
- Increase during November and December may be due to increase in production.
- This needs to be confirmed by knowing production figures or sales figures for this period

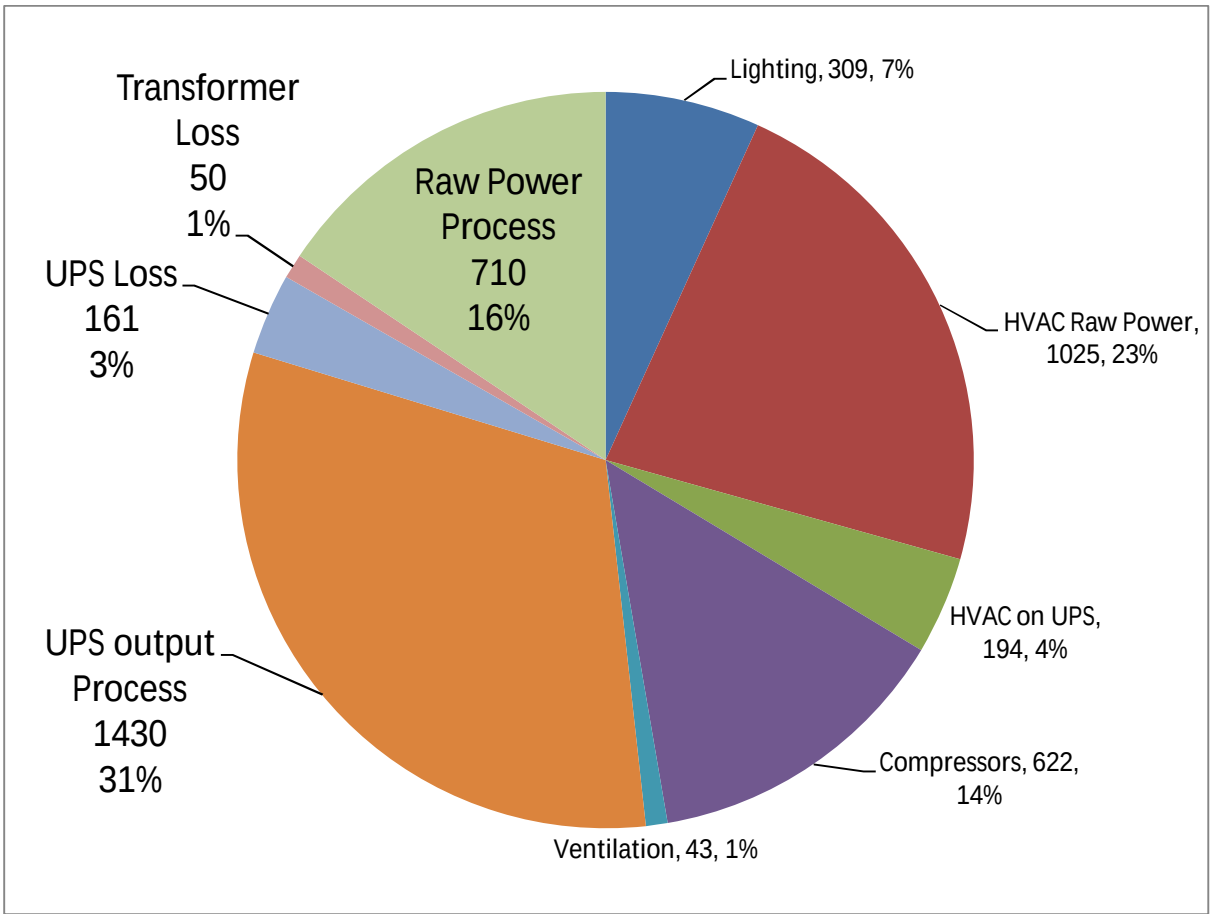
Table 3

Month	Actual demand, KVA	KWh / Month	Unit rate RS/Kwh	% change against lowest
Dec-13	4014	1693037	7.90	10.96
Jan-14	3990	1525777	6.56	0.00
Feb-14	3888	1790773	6.48	17.37
Mar-14	4770	2222233	6.47	45.65
Apr-14	4800	2298978	6.60	50.68
May-14	4794	2514341	6.25	64.79
Jun-14	4974	2422847	6.54	58.79
Jul-14	4644	2323800	6.73	52.30
Aug-14	4692	2053140	6.55	34.56
Sep-14	4764	2338440	6.75	53.26
Oct-14	4782	1810560	6.73	18.66
Nov-14	4752	2253480	8.36	47.69
Dec-14	4698	2207340	7.21	44.67

This shows that % variation over lowest is 64% in case of maximum increase.

The generic Pie chart and loading details at most upstream level

We carried out extensive measurements at various strategic locations throughout the plant and prepared a KW Piechart and Kwh table to know % contribution of various utilities and process load at most upstream level.

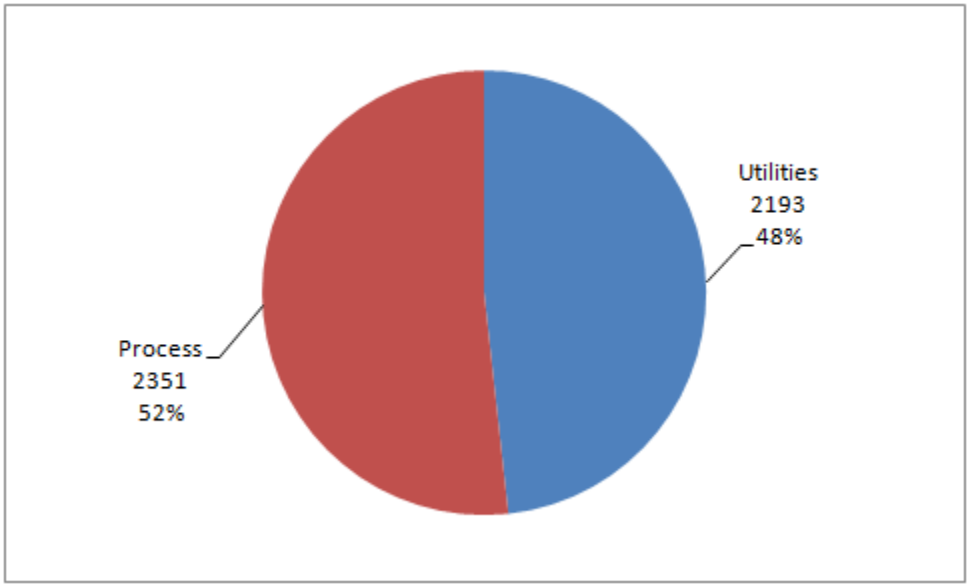


Head	Max KW	% Load	KW with divercity	Kwh with divercity	Rs. Per day
Lighting	309	6.80	309	7107	56856
HVAC Raw Power	1025	22.56	820	18860	150880
HVAC on UPS	194	4.27	155.2	3569.6	28557
Compressors	622	13.69	559.8	12875.4	103003
Ventilation	43	0.95	43	989	7912
UPS output Process	1430	31.47	1144	26312	210496
UPS Loss	161	3.54	128.8	2962.4	23699
Transformer Loss	50	1.10	50	1150	9200
Raw Power Process	710	15.63	568	13064	104512
Total	**4544**	**100.00**	**3777.80**	**86889.40**	**695115**

Lighting, HVAC and Compressors form 46% of total consumption. As such optimization and close monitoring can result into substantial energy saving. According to our opinion XXX should keep this as thrust area always to achieve energy conservation targets.

Another way of representing the above data.

Head	KW
Utilities	2193
Process	2351



48% energy is consumed by utilities and 52% energy is consumed by various manufacturing processes. The energy required by utilities for a product manufacturing company like XXX, appears to be on higher side compared to typical Indian bench marks. XXX uses few exclusive manufacturing processes developed by own R & D efforts and is extremely sensitive about delivering right quality to end customers. Extensive use of various utilities delivering specific process requirements are seen to be used in the plant. They should be substantiated by certified internal SOPs.

Our observations based on above data:

Energy cost centres at XXX

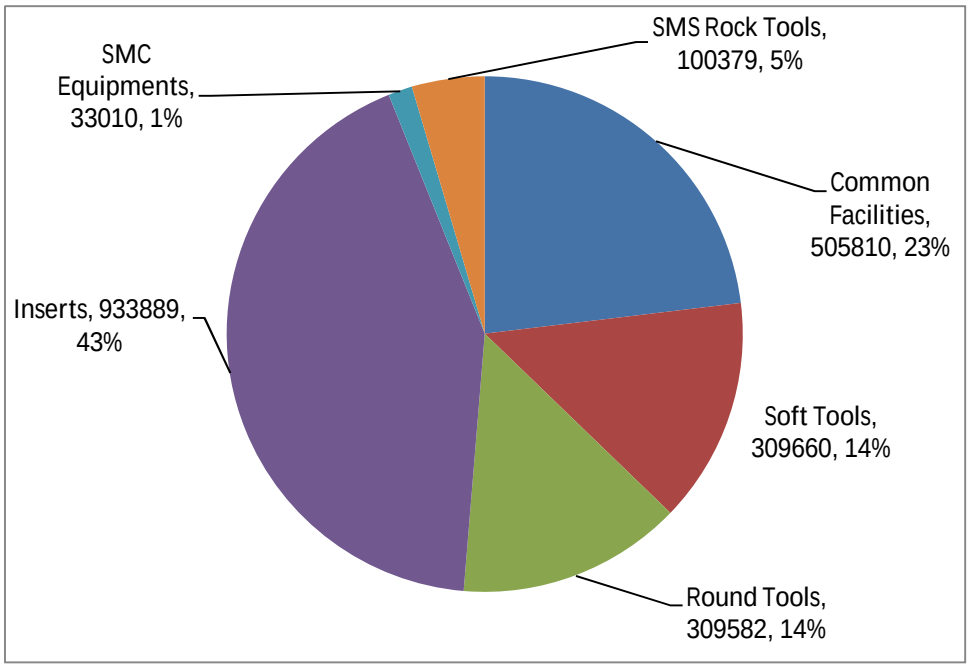
XXX specializes in sintered carbide cutting tools and inserts. The tools weigh 1.5grams to 300 grams or even more.

1) Common consumption
2) XXX Soft tools and Cartridges
3) XXX Round tools.
4) XXX Inserts
5) XXX Mining and construction Equipments
6) XXX Mining and Rock tools.

Area	Kwh EMS	Hrs/day	days/ month	KW HVAC measured	KW Lighting Measured	Other Load	Group Totals
COMMON Facilities							
Main Building	23241	10	22	17	45	43	
Canteen	35363	10	26	50	17	69	
Travel Desk	1642	10	22	5		1.6	
H2 Plant	89105	24	26	11		131	
Datacenter	21648						
ETP	5363						
UPS Loss	100464	24	26			161	
Transformer Loss	31200	24	26			50	
Loss in APFC Panels	9360						
Water Pumping	12000	4	30			100	
Compressors	100000					635	
New Coromant Mkt	40565	16	22	32	17	66	
SMT R&D Old	5867	10	22	15	7	4	
OLD Coromant Bldg	8525	10	22	11	6	22	
SMC Sales and design common	21467	16	26	36	20	39	
							505810
SOFT Tools							
TCC Building	90473	24	26	62	9.3	57.7	
Soft Tools	80000	24	26	110	13	115	
Soft tools HVAC	68640						
Soft Tools H.T.	70547	24	26		3.1	110	
							309660
Round Tools							
TAP Process	248430	24	26	98	47	350	
TAP HVAC	61152						
							309582
Inserts							
IVG 4	5796	24	26	52	3	7	
IVG 4 HVAC	32448						
Titex Shop	92641	10	26	9.8		346	
Boro Grinding	94603	24	26	61	2.3	149	
Boro Grinding HVAC	38064						
GAC Process	347211	24	26	63	1.4	550	
GAC Process HVAC	39312						
FETE and Insert Grinding	182726	24	26	162	3.6	289	
FETE and Insert Grinding HVAC	101088						
							933889
Mining and construction Equip							
SMC AC 1,2,3	25855	18	26		3.8	8	
Share of Office building	7155	18	26		3.4	3.8	
							33010
Rock Tools							
SMS Rock Tools	100379						**100379**
Total	**2192330**			**794.8**	**201.9**	**3307.1**	**2192330**

The table and Pie Chart bellow shows cost centre wise consolidated energy consumption in Kwh / Month.

Area	Energy Consumption
Common Facilities	**505810**
Soft Tools	309660
Round Tools	309582
Inserts	933889
SMC Equipments	33010
SMS Rock Tools	100379
	2192330



Observations:

1) This chart clearly indicates that most significant area consuming maximum energy is "Inserts manufacturing." 10% saving in this area will bring in 5% saving in overall energy consumption.
2) Common facilities consume about 20% energy, while soft tools and round tools consume 15% each.
3) Each section produces large variety of tools, which vary substantially in weight. We are of the opinion that in each section one can get good approximation of specific energy consumption by calculating energy consumption per kg of material processed.

Area	Kwh EMS	Hrs/day	days/ month	KW HVAC measured	KW Lighting Measured	Other Load	Group Totals
COMMON Facilities							
Main Building	23241	10	22	17	45	43	
Canteen	35363	10	26	50	17	69	
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H2 Plant	89105	24	26	11		131	
Datacenter	21648						
ETP	5363						
UPS Loss	100464	24	26			161	
Transformer Loss	31200	24	26			50	
Loss in APFC Panels	9360						
Water Pumping	12000	4	30			100	
Compressors	100000					635	
New Coromant Mkt	40565	16	22	32	17	66	
SMT R&D Old	5867	10	22	15	7	4	
OLD Coromant Bldg	8525	10	22	11	6	22	
SMC Sales and design common	21467	16	26	36	20	39	
							505810

Area	Kwh EMS	Hrs/day	days/ month	KW HVAC measured	KW Lighting Measured	Other Load	Group Totals
SOFT Tools							
TCC Building	90473	24	26	62	9.3	57.7	
Soft Tools	80000	24	26	110	13	115	
Soft tools HVAC	68640						
Soft Tools H.T.	70547	24	26		3.1	110	
							309660

Area	Kwh EMS	Hrs/day	days/ month	KW HVAC measured	KW Lighting Measured	Other Load	Group Totals
Round Tools							
TAP Process	248430	24	26	98	47	350	
TAP HVAC	61152						
							309582

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Inserts							
IVG 4	5796	24	26	52	3	7	
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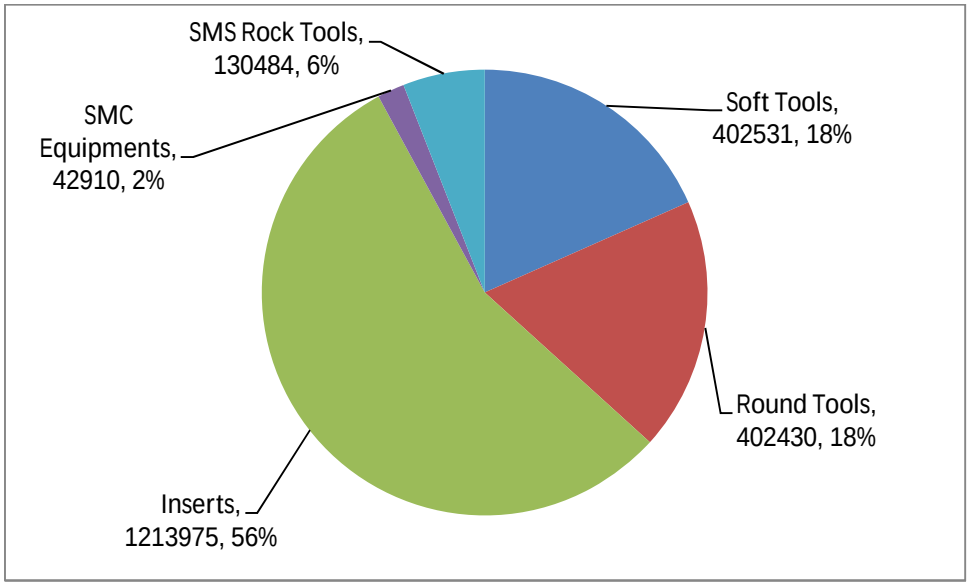
SMC AC 1,2,3	25855	18	26		3.8	8	
Share of Office building	7155	18	26		3.4	3.8	
							33010

Area	Kwh EMS	Hrs/day	days/ month	KW HVAC measured	KW Lighting Measured	Other Load	Group Totals
Rock Tools							
SMS Rock Tools	100379						**100379**

Product Area	Energy Consumption	Contribution from common	Total Energy Consumption
Soft Tools	309660	92871	402531
Round Tools	309582	92848	402430
Inserts	933889	280086	1213975
SMC Equipments	33010	9900	42910
SMS Rock Tools	100379	30105	130484
Total	**1686520**	**505810**	**2192330**



UPS performance

UPS Input & Output					
	Output		Input		Efficiency
Tr-9 (300KVA X 1) Kenfilt M	Avg KW	Max KW	Avg KW	Max KW	@ Average
300KVA UPS -Output	105.27	119.78	113.27	129.69	92.94
TR-10 (400KVA X 3) GAC Shop					
UPS-6-400KVA-Output	136.47	165.63	143.48	175.34	95.11
UPS-5-400KVA-Output	89.42	103.41	99.85	113.98	89.55
UPS-8-400KVA-Output	130.71	137.59	139.42	146.56	93.75
TR-4 (400KVA X 3) Press Shop + Tool Room + Titex Shop					
UPS-1-2- & 9 Total Output	182.66	250.147	205.92	275.9	88.70
TR-3 (400KVA X 2) Press Shop + Tool Room					
UPS-4 & 3 Total Output	240.82	359.79	258.94	385.76	93.00
TR-10 (250KVA X 1) Grinding Shop					
UPS-7 -250KVA - Output	129.58	151.7	142.91	166.76	90.67
Tr-8 (250KVA X 3) Taps terrace					
UPS-3-250KVA-Output	85.08	90.45	101.58	111.73	83.76
UPS-2-250KVA-Output	72.84	80.47	90.54	105.62	80.45
UPS-1-250KVA-Output	76.58	84.45	88.25	100.57	86.78
TR-6 (250KVA X 1) TCC Shop					
UPS-2-250KVA-Output	44.03	60.81	52.86	72.25	83.30
UPS-1-250KVA-Output	44.16	55.1	51.37	63.63	85.96
TR-5 (250KVA X 2) Soft tools					
250KVA X 2 -Total Output	112.47	161.98	129.2	174.1	87.05

1) XXX Mining and construction Equipments

This cost centre manufacturers huge truck or trailer mounted equipments. They perform cutting, grading, sizing operations in mines and on construction sites. Heavy fabrication and major parts manufacturing of these equipments are outsourced and subcontracted. Assembly and final testing of these equipments is done in house. The facility has two assembly centres, a painting facility, a spares depot and utility equipment like overhead cranes, compressors. Paint booths have ventilation blowers and one assembly centre has evaporative cooling, which is not used regularly.

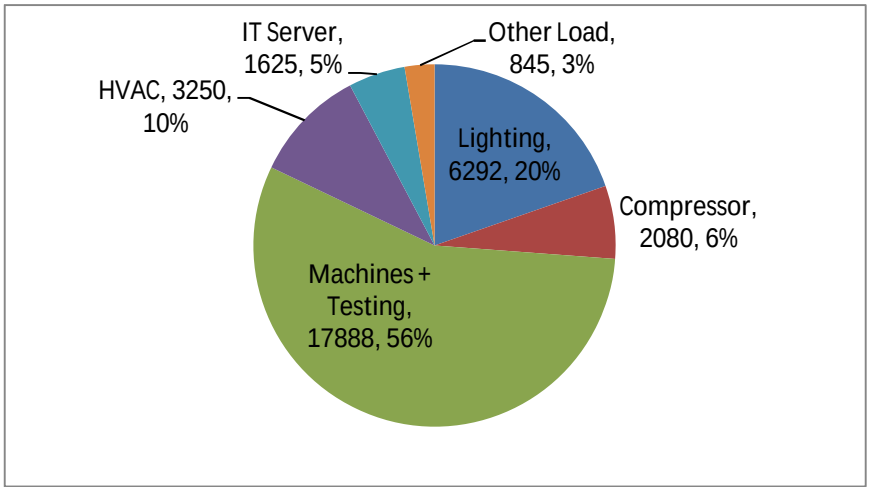
The office building of this section is shared by common activities like design centre and sales office.

SMC Assembly centers			SMC sales and design			SMC Share
Head	**KW**	**Kwh**	**Head**	**KW**	**KWh**	**KWh**
Total	60	24960	Total	108	28080	7020
Lighting	12	4992	Lighting	20	5200	1300
Compressor	5	2080	HVAC	50	13000	3250
Machines + Testing	43	17888	IT / Server	25	6500	1625
		24960	Other load	13	3380	845
					28080	7020
SMC sales and design is a four storied building and has been extended. The enegy consumption as measured above is for entire buiding. As per our observation about 1/4th infrastructure is used by SMC section and rest is common for Sandvik activities						
We suggest energy consumption of SMC Assembly and 1/4th of SMC sales and design should be appropriated to SMC section of Sandvik.						
Applying above, average SMC section energy consumption is 24960 + 7020 = 31980 KWh / Month						
Balance 21060 Kwh per month should be accounted for in common consumption						

(Above figures do not include energy consumption by common utilities loaded to this section. They also assume 1/4th office building consumption to SMC section account, as such these figures will not match with the data you receive internally)

Division of Energy consumption among various heads in SMC

Head	SMC AC	SMC Sales	Total
	Kwh	Kwh	Kwh
Total	**24960**	**7020**	**31980**
Lighting	4992	1300	6292
Compressor	2080		2080
Testing	17888		17888
HVAC		3250	3250
IT Server		1625	1625
Other Load		845	845



Lighting and Assembly centre load constitutes 76% Load in this area.
It was noticed that emergency light – tube lights are connected to UPS output and are ON 24 x 7. These may be replaced with energy efficient light sources namely LED source so that the consumption may be reduced.
We also recommend soft starters for final machine testing as the motor HPs are in excess of 100 and star delta starts are normally used in panels, which you supply with machines.

UPS efficiency

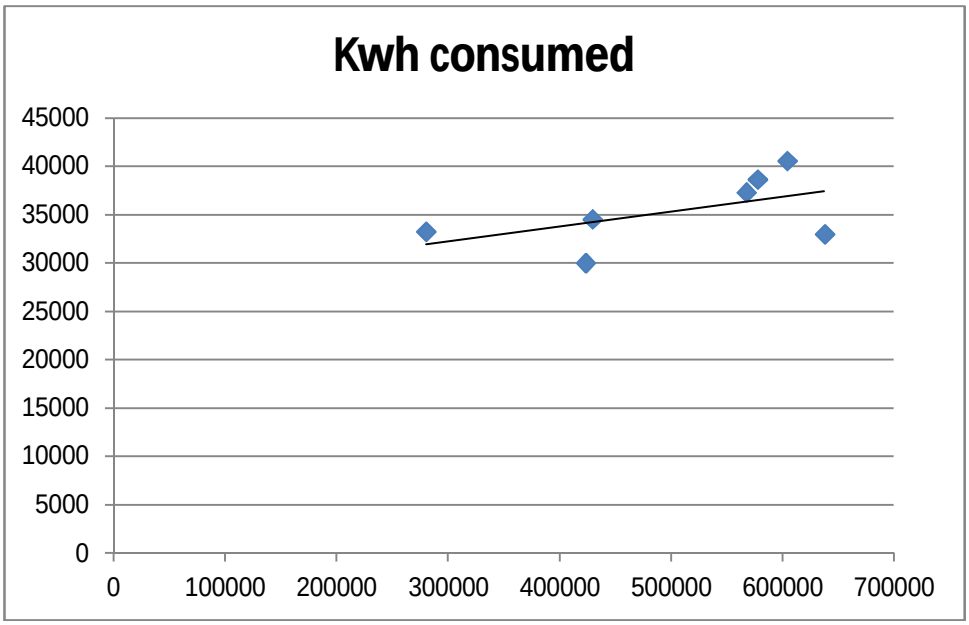
UPS Assesment	Input		Output	
	Avg KW	Max KW	Avg KW	Max KW
60KVA UPS	21.836	26.015	19.558	23.468
UPS -No-4-7.5KVA Input	1.594	1.611	1.173	1.189
UPS -No-5-7.5KVA Input	0.783	0.788	0.466	0.475
	24.213	28.414	21.197	25.132
Efficiency	**87.54**	**88.45**		

Above table and Pie chart shows that UPS input power is hardly 5% of total consumption. Average overall UPS efficiency is more than 85% as measured. As such we do not recommend any energy saving majors in this area.

Following calculations and data compilation is done to calculate specific energy consumption.

Month	Kwh SMC AC	KWh SMC Sales	SMC AC Share	SMC AC Total Kwh	Weight Processed Kg
June	26588	48355	12089	38677	577335
July	26557	43132	10783	37340	567235
Aug	25455	36404	9101	34556	429074
Sept	30117	41910	10477	40594	603784
Oct	21117	35651	8913	30030	423095
Nov	24879	33595	8399	33278	279946
Dec	25856	28623	7156	33012	637411

Month	Weight Processed in Kg	Kwh consumed	KWh / Ton
June	577335	38677	66.99
July	567235	37340	65.83
Aug	429074	34556	80.54
Sept	603784	40595	67.23
Oct	423095	30030	70.98
Nov	279946	33278	118.87
Dec	637411	33012	51.79



Lot of variation is observed in specific energy consumption, while maximum appears in the month of Nov 2014. This may be due to variable testing time of equipments manufactured.

Except for modifying office lighting to LED and shop floor lighting to Induction lamps (If already not done), we do not see any possibility of energy saving in this area.

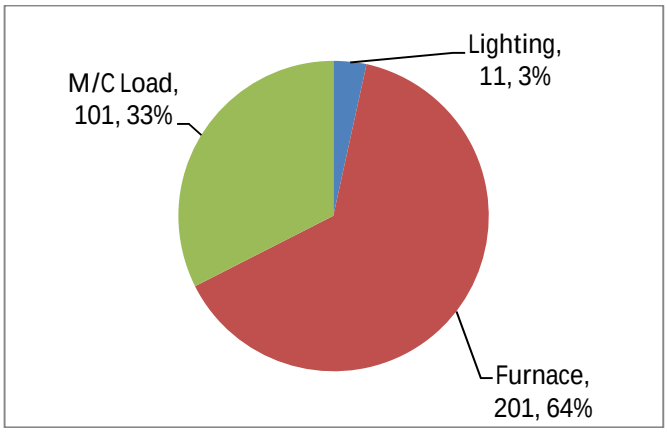
2) XXX Mining and Rock tools.

These tools are made using bars, hollow tubes etc. Cutting, grinding, machining, brazing, hardening, heat treatment, tempering are the main manufacturing processes used in this section. Induction heating, electrical heating etc is used here. Ventilation systems and induction heating machine chillers are major utilities here.

Month	SM Rock Tools Kwh
June	169134
July	132858
August	145174
September	163889
October	107065
November	74981
December	100379

These readings are collected from EMS report. These figures do not include consumption allocation from common utilities. This section works in two shifts. Considering the variety of tools manufactured and their varying quantities, it is difficult to calculate specific energy consumption. If we get weight or length of raw material processed per month there is a possibility of arriving at these figures. Exact method would be to decide a method to know equivalent tools manufactured in any given month.
Pre-treatment of finished products and waxing consumes considerable energy.
Some induction hardening machines in this section still use motor generator sets to generate high frequency AC. These should be replaced with efficient electronic generators.

Rock Tool		
Head	**AVG KW**	**KWh**
Lighting	11	2746
Furnace	201	78238
M/C Load	101	42153
Total	**313**	**123137**



Consumption of furnaces	Avg KW	Max KW
Westman Tempering Furnace	58	61
Westman Furnace	48	109
Carbon Potential Controller Furnace	75	152
Wesman Qte Furnace	20	52
Total	**201**	**374**

The division of load in this section shows that 64% energy consumption is related to various furnaces installed in this section. Following measures are recommended
Periodic inspection of thermal insulation of these furnaces
Record of Individual furnace energy consumption and weight of material processed should be maintained on daily basis. This data can be used for calculating specific energy consumption. Any variation should trigger furnace maintenance.
Total weight processed in the section and total energy consumption could be another set of information which will calculate specific energy consumption on monthly basis.

3) XXX Soft tools and Cartridges.

This section manufactures support systems for XXX cutting tools and inserts

4) XXX Inserts

These inserts are made using special powder formulations. The major processes involved are pressing, sintering, grinding, surface coating, **c**hemical **v**apour **d**eposition, and **p**hysical **v**apour **d**eposition. These are special processes developed by XXX. Almost all machines used in this section are special purpose machines. Quantities handled are huge and lot of robotics is used to handle these quantities. This manufacturing is done in air conditioned and controlled atmosphere. Utilities have major energy consumption in this area. Comfort air conditioning, controlled indoor air quality especially in pressing and grinding section, Exhaust of particle dust, Oil fumes, Large number of electrical panel coolers etc are main utilities here. Apart from this CVD and PVD are very complex processes and need vacuum pumps, chillers, heat exchangers, temperature controlled electrical heaters etc. Surface coating also involves special blasting machines, which require large quantity of compressed air.
Internally this section is subdivided in following activities.

a) Pressing and sintering
b) Grinding
c) Surface coating
d) CVD and PVD

5) XXX Round tools.

This section manufacturers drills and taps of various sizes. Recently “Carbide” section is also shifted to this building. These drills and taps are manufactured from “Bright Bars” of various sizes. The manufacturing process involves lot of special purpose / CNC machines which perform cutting, fluting, grinding etc. This is followed by heat treatment, numbering, QC and despatch. This section has a “Coolant Oil” filtration system, which consumes major part of the energy. Apart from this the plant has ventilation system, various exhaust and ESP systems.
Most of the machines here have hydraulic power packs. The oil used here is cooled using two chillers.

Following table shows month wise electrical consumption.

Month	Round tools
June	127863
July	209565
August	177518
September	203226
October	149335
November	233531
December	238745

Head	KW
HVAC	100
Lighting	47
Coolent Filteration	170
Machines	161