



Encon opportunities in Foundry- Case study for KBL, K'vadi



Enriching Lives

Presentation by ,

KIRLOSKAR BROTHERS LIMITED
Kirloskarvadi Plant



Water is Life , We give life to water



Enriching Lives

MISSION

Kirloskar Brothers Limited shall be known globally as a reliable, innovative and cost effective solution provider in hydraulic machines & systems and in water business.

VISION

Kirloskar Brothers Limited shall be amongst the first five pump companies in the world by the year 2015 and become the preferred choice of customers as well as employees.

VALUES

- Developing and working with mutual trust.
- Building and nurturing teamwork.
- Assessing and enhancing employee satisfaction level.
- Giving the best to customer and giving value for the money.
- Enhancing relation with stakeholders.
- Maintaining fairness in dealing with customers and suppliers.





Products – Pumps for Various Applications



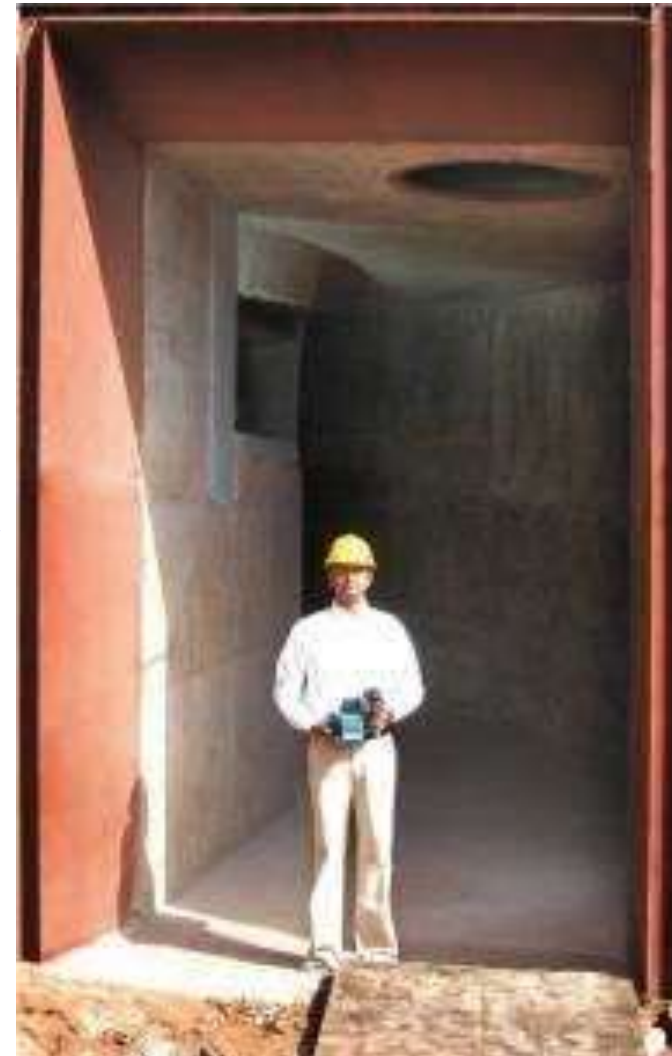
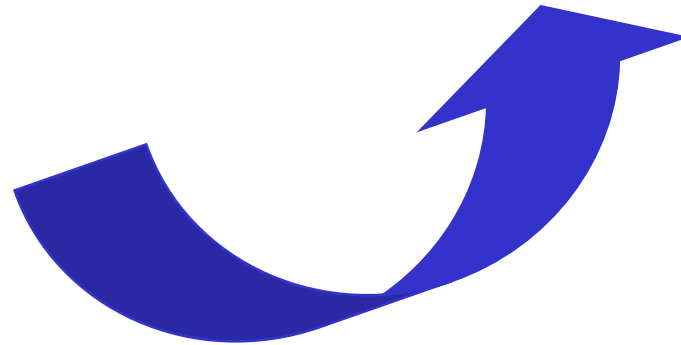
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Pumps range from $1/10$ kW to 12,000 kW

A man standing at the discharge pipe of a Concrete Volute Pump, KBL's biggest pump (126000 m³/hr), holding KBL's smallest pump (0.28 m³/hr.)



Monobloc Domestic Pumps
Capacity up to 0.28 m³/hr.



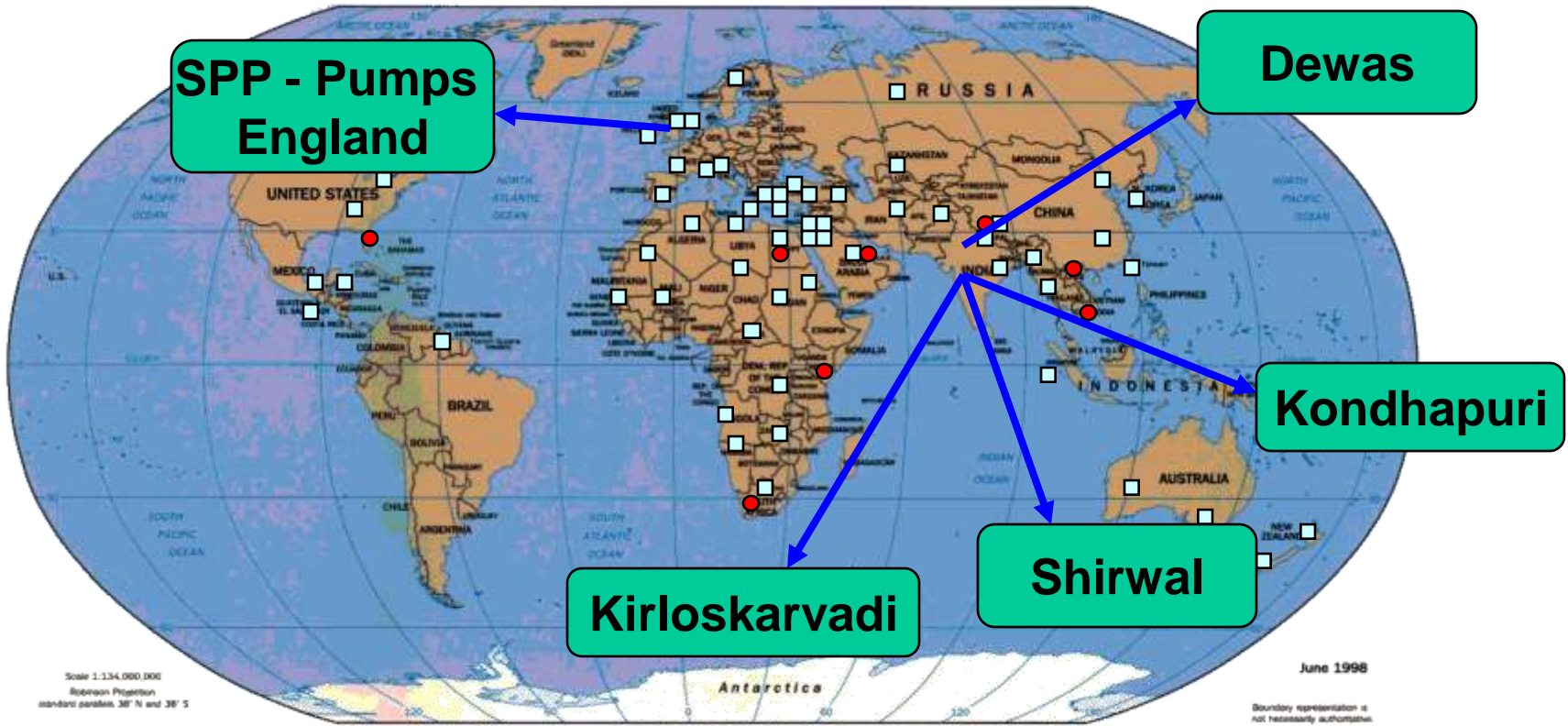


Manufacturing Plants



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Global Presence Over 70 Countries Worldwide



□ Overseas Customers

● Overseas Offices



Integrated Plant (Processes)



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- **Research and Engineering**
- **System Engineering**
- **Procurement**
- **Manufacturing – Pattern Shop, Foundries , Machining**
- **Testing - Asia's biggest Pump Testing Lab**
- **Quality Assurance**
- **Project management**
- **Erection and Commissioning**
- **Operation and Maintenance**
- **After Sales & Product Support**

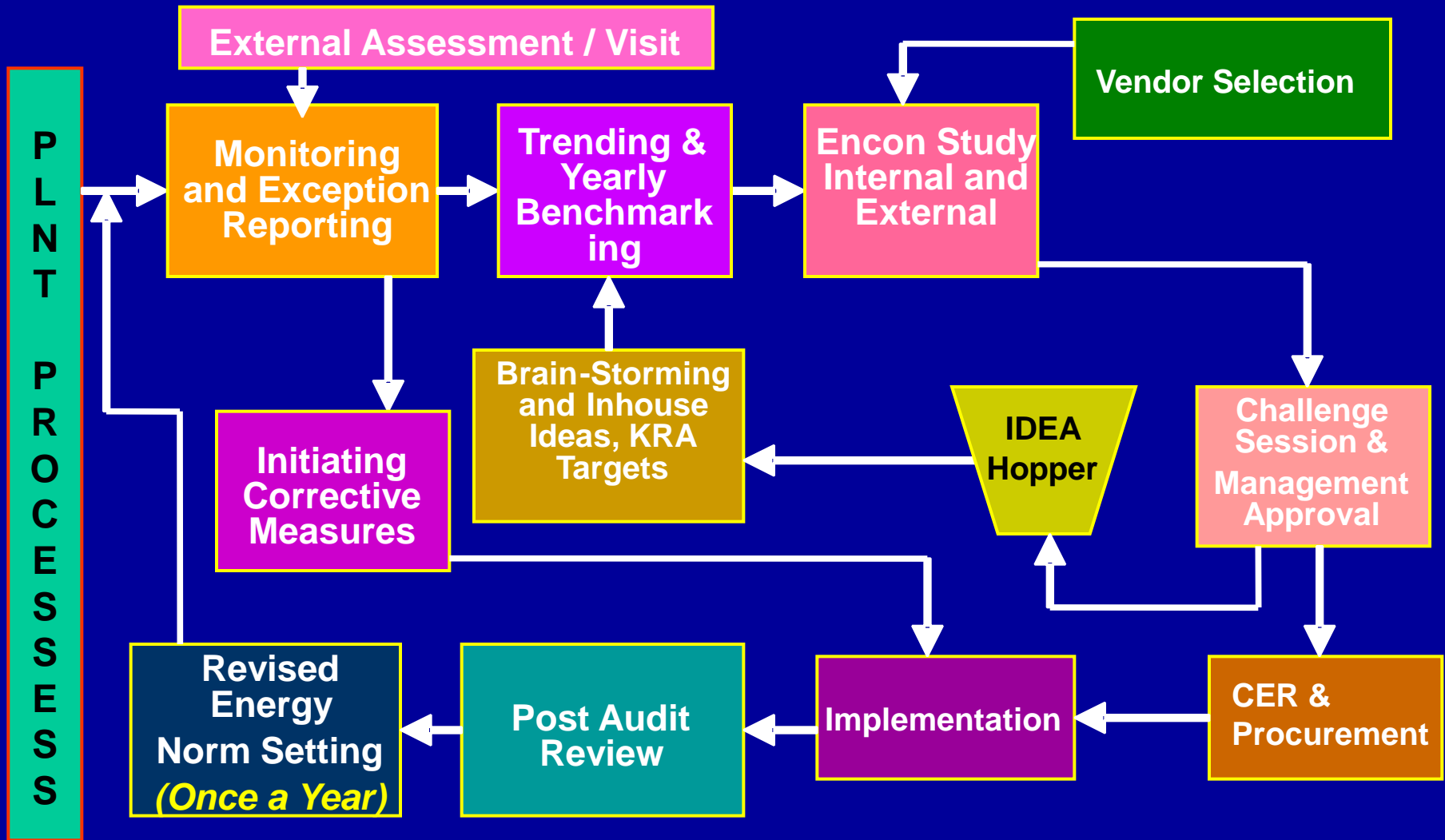


Approach

ENERGY CONSERVATION



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Energy Policy



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We at Kirloskar Brothers Limited , Kirloskarvadi , involved in manufacture of Pumps , Pumping systems , Turbines and application of Anti corrosion coating to pumps & piping system , are committed to optimize use of energy in our operations & bring about improvement in the energy efficiency of our processes & products. We will fulfill our commitment by,

- Striving to reduce specific energy consumption by continuously taking energy efficiency improvement measures & minimizing energy waste
- Ensuring that new appliances ,equipment & building projects are energy efficient
- Recognizing efforts of our employees in energy conservation initiatives.

Contd.....



Energy Policy



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- Effective dissemination of information related to energy management to all employees
- Bench mark energy consumption norms & initiating programs to achieve these norms
- Enhancing utilization of renewable energy resources , wherever feasible
- Knowledge sharing within Group companies and outside experts to bring about continuous improvement in the energy efficiency of our processes & products

Issue No. :1

Issue Date : 20.01.2008

Review Date : 20.01.2010



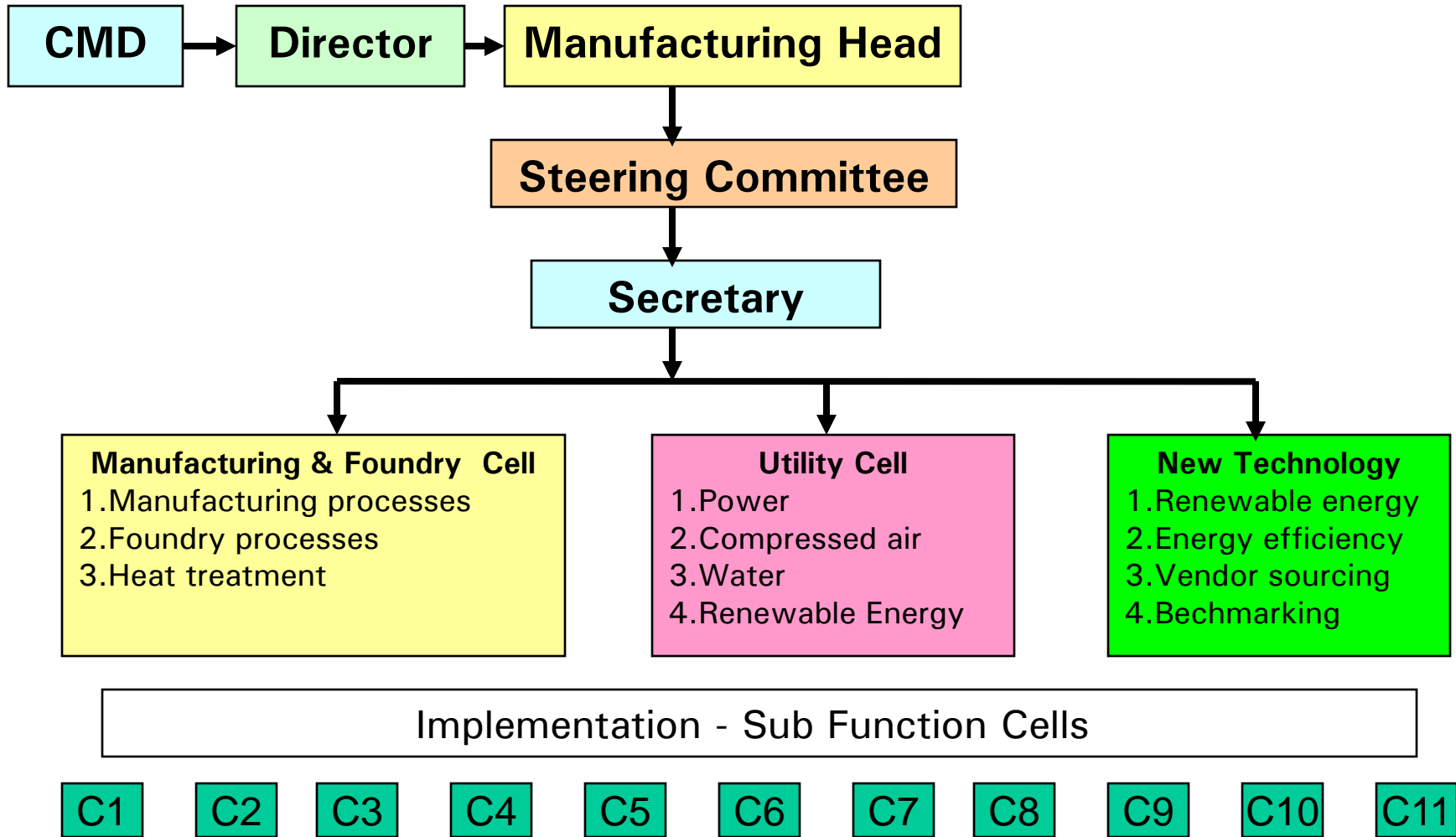
R.K.Srivastava
Director & Occupier



Energy Conservation - Team



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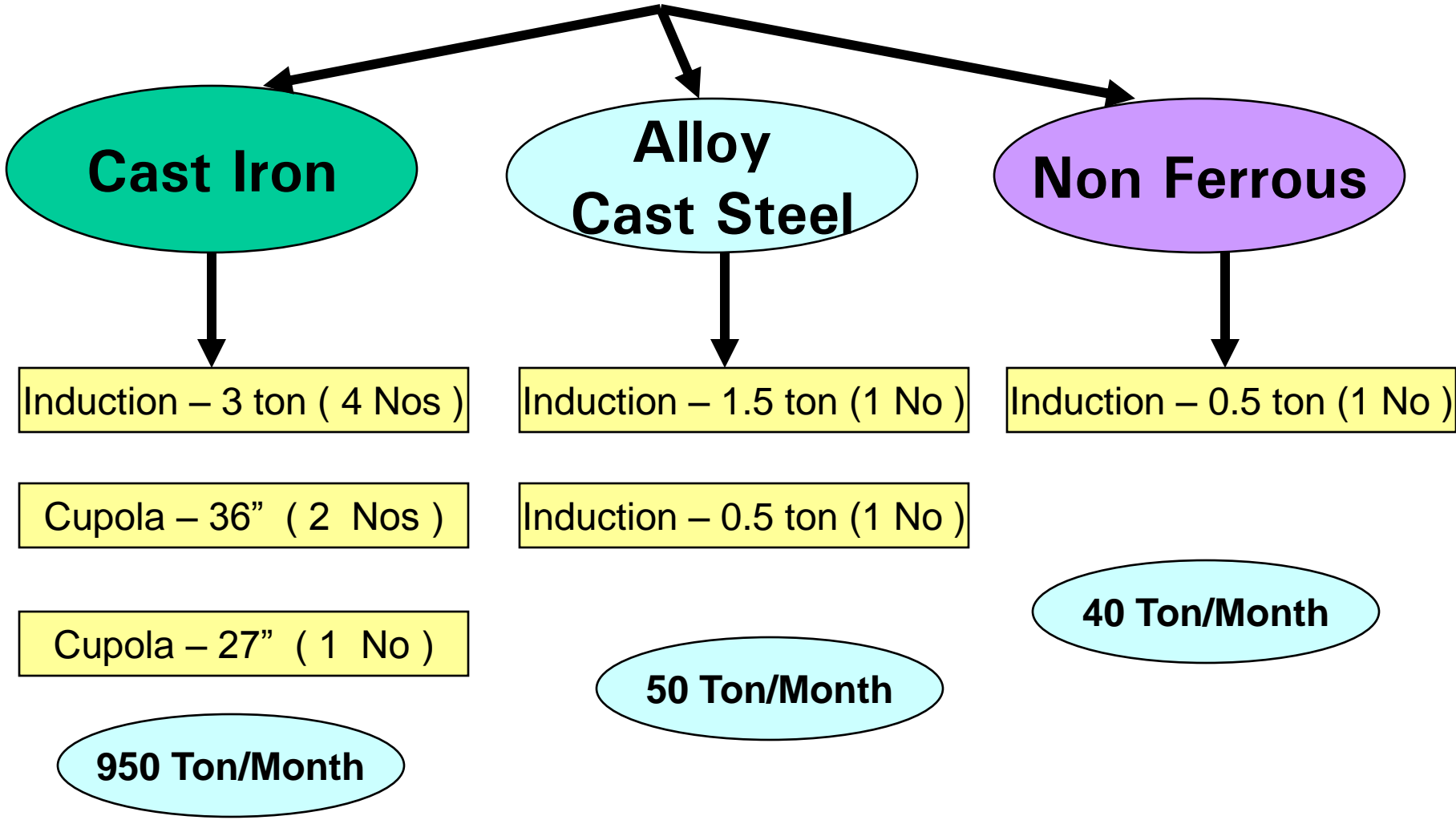




Foundries



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Benchmarks



Sr	Parameter	Unit	Theoretical	International 2008		National Best	KBL Target 08-09	Achieved 08-09		Target Mean 09-10
				Best	Mean			Best	Mean	
A1	Foundry Power Consumption									
1	Cast Iron small castings	kWh/ton	398	595	772	650	600	550	610	595
2	Cast Iron Heavy Casting	kWh/ton	398	595	772	650	700	648	678	650
3	Alloy Cast Steel	kWh/ton	406	620	872	750	700	644	715	700
4	Non Ferrous	kWh/ton	327	400	530	*	450	383	585	475
5	Coke to metal ratio	Ratio	**	1:12	**	1:10	1:6	1:6.5	1:5	1:7.5
A2	Foundry Yield									
1	Cast Iron small casting	%	**	84	66	65	75		74	75
2	Cast iron Heavy Casting	%	**	84	66	75	75		67	75
3	Alloy steel casting	%	**	57	58	**	57		54	55
4	Non ferrous	%	**	73	53	**	70		66	70
A3	Foundry productivity									
1	Cast Iron small casting	t/man/month	**	18.7	9.9	3	6.5		6.01	6.5
2	Cast iron Heavy Casting	t/man/month	**	18.7	9.9	3	3.5		2.8	2.9
3	Alloy steel casting	t/man/month	**	11.4	5.4	**	1		0.7	0.8
4	Non ferrous	t/man/month	**	10.8	4.1	**	4.1		1.2	1.3
A4	Foundry rejection									
1	Cast Iron small casting	%	0	**	**	**	2		2.2	1.8
2	Cast iron Heavy Casting	%	0	**	**	**	2		2.9	2.7
3	Alloy steel casting	%	0	**	**	**	1		1.4	1.4
4	Non ferrous	%	0	**	**	**	2		2.31	2.2
B	Others									
9	Power kWh/Pump (Total)	kWh/Pump	**	**	**	**	470	**	456.5	450
10	Compressed Air	kW/CFM	**	**	**	**	0.14	**	0.14	0.13
11	Compressed Air Leakage	%	0	**	**	8-10'	8	**	9	5
12	HSD Consumption for H.treatment	L/Ton	**	**	**	**	100	**	71	65
13	Power Cons kWh/Ton H.Treatment	kWh/Ton							512	300
14	Water consumption	KL/Pump	**	**	**	**	7.2	**	6.9	6.5
15	% Energy Cost w.r.t Production value	%	**	**	**	**	2	**	2	1.8

Source: http://oee.nrcan.gc.ca/cipec/ieep/newscentre/foundry/5/5_2.cfm
SMI News letter Sept 2004



Share of foundry



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- Out of total energy consumption 45% share is of foundry

CI foundry – 42%

Heavy foundry – 41%

ACS foundry – 13%

NF foundry – 4%

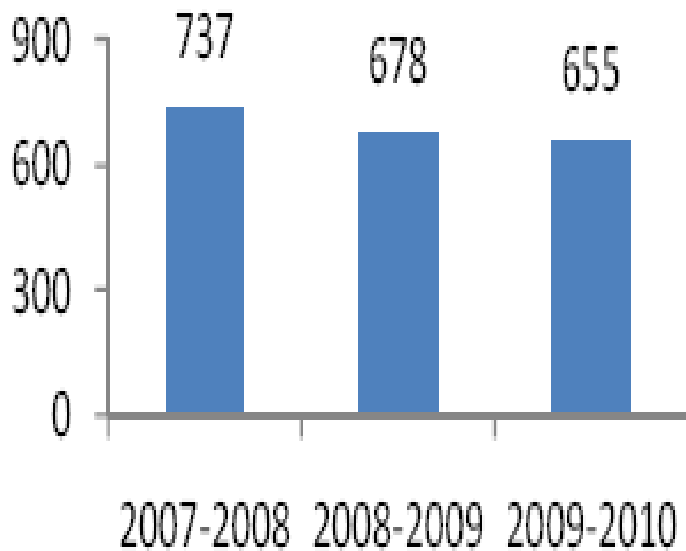


Specific Energy Consumption

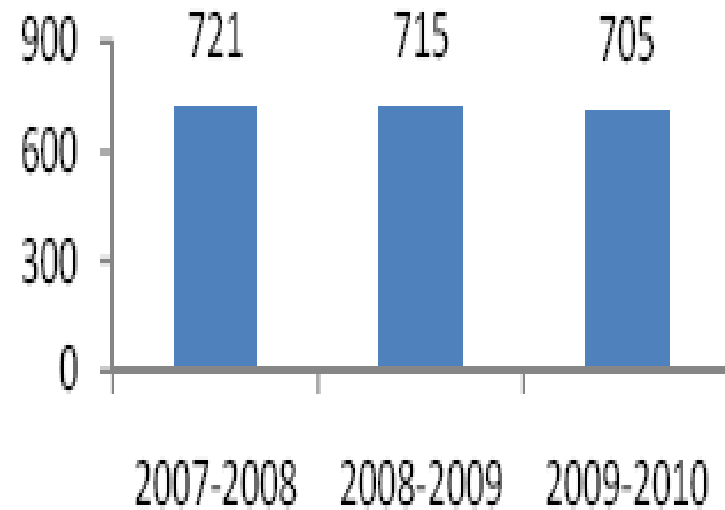


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Heavy Foundry kWh/TON



ACS Foundry kWh/TON

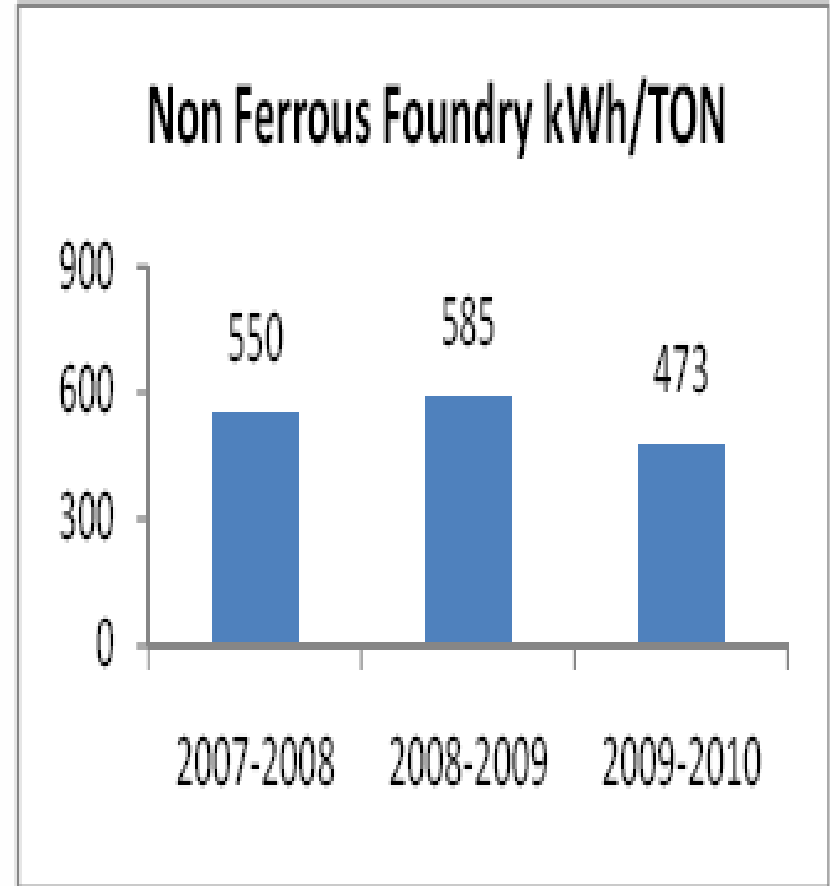
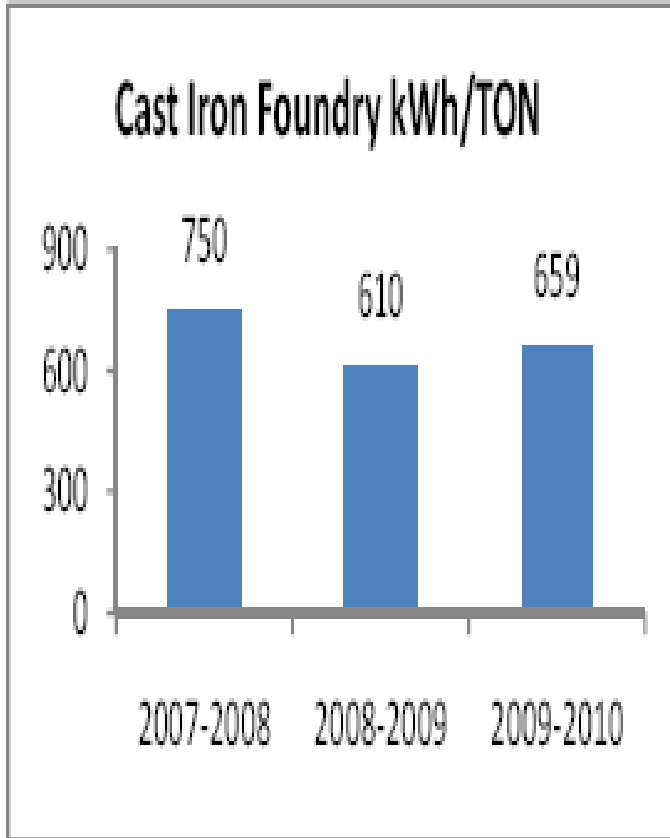




Specific Energy Consumption



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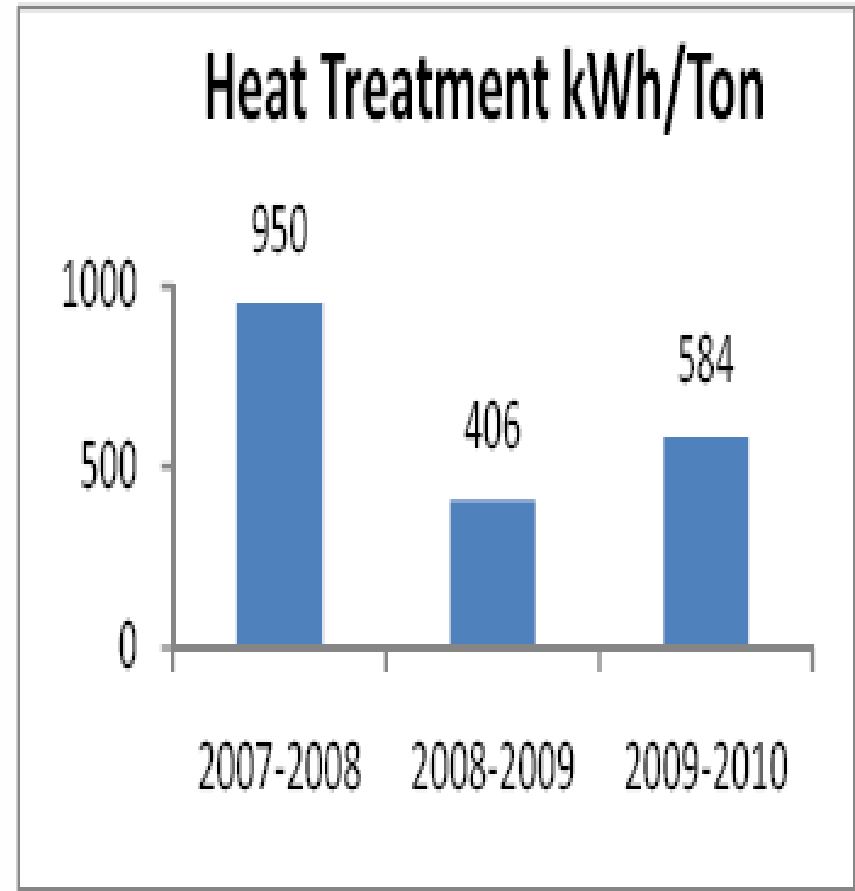
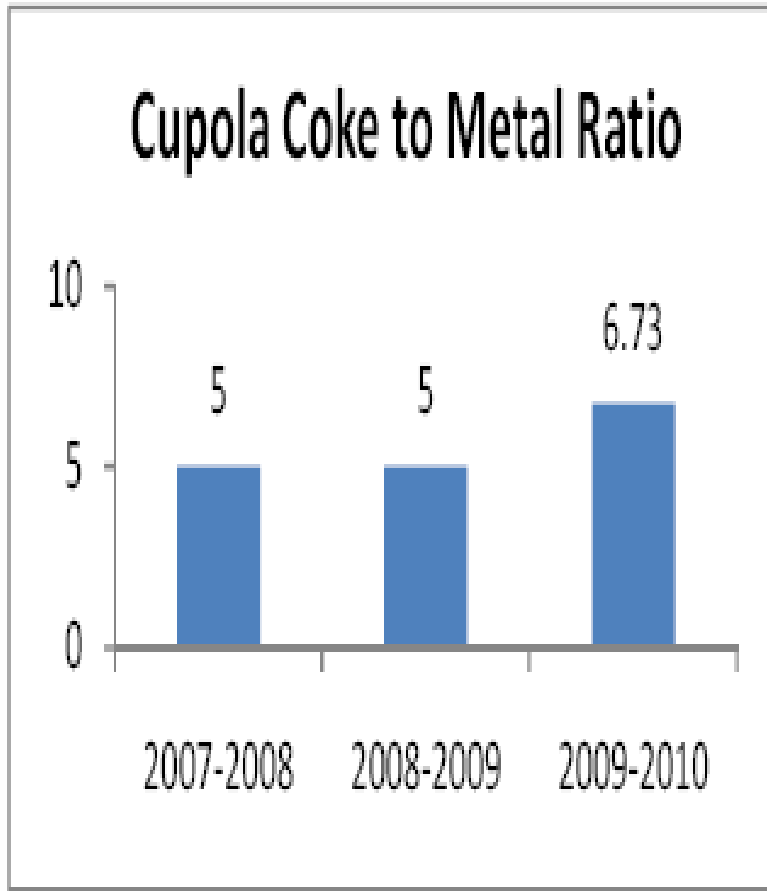






Specific Energy Consumption





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Multiple Pattern

Before	After
	
<ul style="list-style-type: none">• Box size 16" * 16"• No. of machines – 6 Nos• Total boxes per month - 3800	<ul style="list-style-type: none">• Box size 24" * 24"• No. of machines – 2 Nos• Total boxes per month - 2000

Annual Energy Saving in Rs Million : 1.05

Before	After
	
<ul style="list-style-type: none">• Oil fired Furnace• High melting cost• Rejection levels – 5%	<ul style="list-style-type: none">• Induction furnace• Low melting cost• Rejection levels – 3%


Annual Energy Saving in Rs Million : 3.6



Replacement of Wood fired core oven by Electric



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Before	After
Wood fired Core Oven	
<ul style="list-style-type: none">• Rejection due to blow defect 35%• Moderate core handling cost	<ul style="list-style-type: none">• Rejection due to blow below 10%• No handling cost – online



Annual Saving in Rs Million : 0.2



Adoption of Divided blast Cupola



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Before	After
	
<ul style="list-style-type: none">• Coke to metal ratio 1:5• Temp range 1350 to 1400	<ul style="list-style-type: none">• Coke to metal ratio 1:7• Temp range 1400 to 1450



Annual Energy Saving in Rs Million : 3.0



Energy Saving in Felling Operation





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Before	After
	
<ul style="list-style-type: none">• High rejection due to breakage• Poor surface finish• High Handling cost	<ul style="list-style-type: none">• Zero rejection• Best surface finish• Low handling cost

Annual Energy Saving in Rs Million : 0.5




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Project No: A1		Title of the Project: Substitution of Fuel from HSD to LPG for Core Baking			Area: HF / ACSF / NFF	
Description of the energy conservation measure: Initially Core Baking was done with help of HSD. It is replaced by LPG for Fuel cost Saving, Oil leakage problems, Smooth operations, new Technology.						
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification			
Diesel consumption - 200 Lit/Month Cost in Rs 200 X 12 X35 =84000.00 per annum 			LPG consumption - 4 Cylinder / 1.5 Months Cost in Rs 4 X 8 X 740 = 23680.00 Other Benefit - Rejection percentage reduced up-to 0.5% 			
Equipment Supplier Name : M/s. Kulkarni Gas Agency, Sawantpur Vasahat						
Total investment, Rs.450000/-			Implementation Date: October 2009			
Annual energy cost savings, Rs. 60000.00						
Other benefits :: Reduction in GHG emission						
On annual basis	kWh	Coal (Tonnes)	Gas kg	Oil (kL)	Other	
Energy consumption before				24		
Energy consumption after			608			
Energy tariff, Rs/ kWh/ Tonnes/ kg/ kL ...			41			
Team Members :						
ARG/RL/SVY						



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Project No: A4	Title of the Project: Quality improvement for Furnace Raw maintenance	Area: CIF			
Description of the energy conservation measure: Runners & riser were cleaned by manually. It affects on Furnace Consumption as well as lining & decreases furnace efficiency.					
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification				
TOTAL QUANTITY OF RUNNER & RISER IN TON USED PER YEAR = 8400 REQUIRED ENERGY FOR MELTING IN KWH = 5040000	TOTAL QUANTITY OF RUNNER & RISER IN TON USED PER YEAR = 8223 REQUIRED ENERGY FOR MELTING IN KWH = 4951579 				
Equipment Supplier Name : In-house					
Total investment, Rs.50000/-	Implementation Date: October 2009				
Annual energy cost savings, Rs. 460000					
Other benefits:					
On annual basis	kWh	Coal (Tonnes)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	5040000			24	
Energy consumption after	4951579				
Energy tariff, Rs/ kWh/ Tonnes/ Nm ³ / kL ...	5.69				
Team Members :					
NNK/SNK/ARG/HSM/RKD					



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Project No: A28	Title of the Project: Replacement of MS fabricated elevator buckets by FRP buckets.	Area: CI Foundry
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Description of the energy conservation measure:
 Before – 1) MS Elevator bucket weight = 15.280kg
 2) Extra Self weight on belt(Tension) Due to MS bucket = 1.0Ton.
 3) Power consumption = 3.98kWh.
 4) Material cost = Rs 5500*74 = Rs.4,07,000
 After – 1) FRP bucket weight = 2.280kg.
 2) Extra self weight minimized by 1 Ton
 3) Power cons = 3.18 (0.80*10*25*12 = 2640kWh * Rs.6 = 15840 /Annum.
 4) Material cost = Rs.750*74 = Rs.55500/

Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification
	

Equipment Supplier Name: Patil Thermoplast, Palus.

Total investment, Rs. 58000/-	Implementation Date: 18-08-2009
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Annual energy cost savings, Rs. 15,000/-

Other benefits : Material cost Saving Rs.351000/-

On annual basis	kWh	Coal (Tonnes)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	3.98				
Energy consumption after	3.18				
Energy tariff, Rs/ kWh/ Tonnes/ Nm ³ / kL ...	5.69				



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Project No: A27	Title of the Project: Automation for fresh sand conveying in H/F & ACS sand Plant.	Area: H/F & ACS FDY.
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Description of the energy conservation measure:
Reduction in Energy cost as well as eliminated manual operation

Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification
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Equipment Supplier Name: In House.

Total investment, Rs.3,17,000 /-

Implementation Date: 17-08-2009.

Annual energy cost savings, Rs. 4, 17,776 /-

Other benefits Rs. 95,952 /-

On annual basis	kWh	Coal (Tonnes)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	69696				
Energy consumption after	Nil				
Energy tariff, Rs/ kWh/ Tonnes/ Nm ³ / kL ...	6.00				



Synchronization of melting zone to reduce power demand



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Before	After
4800 KVA	3500 KVA
<ul style="list-style-type: none">• All furnaces in first shift• Low utilization of furnaces	<ul style="list-style-type: none">• Melting zone staggered in 3 shifts• Optimum utilization

Annual Energy Saving in Rs Million : 1.8



Additives to improve coke to metal ratio





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Before	After
Ratio 1:4.9	Ratio 1:5.5
<ul style="list-style-type: none">• Low temp• Low melting rate• Metal pigging	<ul style="list-style-type: none">• High temp• High melting rate• No metal pigging

Annual Energy Saving in Rs Million : 2.5

Gas operated mould box heater

Before	After
	
<ul style="list-style-type: none">• Fuel - HSD• High Fuel cost• Pollution	<ul style="list-style-type: none">• Fuel – LPG• Low Fuel cost• No pollution



Annual Energy Saving in Rs Million : 0.2



Medium Frequency Induction Furnace



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Before	After
<p>Mains Frequency Induction Furnace</p> 	<p>Medium Frequency Induction Furnace</p> 
<ul style="list-style-type: none">• Operates at 50 Hz• Diode Technology• Power factor 0.94• Efficiency of equipment 80-85 %• Melting rate 2 ton / Hour• Specific Energy - kWh/ton – 850	<ul style="list-style-type: none">• Operates at 500 Hz• IGBT Technology• Power Factor 0.987• Efficiency of equipment 96-98 %• Melting rate 3.2 ton/Hour• Specific Energy - kWh/ton – 615

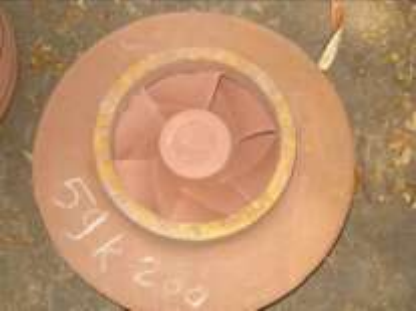

Annual Saving Rs Million : 8.80



Energy Saving thru New Pattern



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Before	After
<p>No Centre hole in Core</p> 	<p>Centre Hole in Core print</p> 
<ul style="list-style-type: none">• Energy consumption in Drilling• Additional set up for drilling• Additional 0.85 kWh power for melting	<ul style="list-style-type: none">• No Energy for Drilling• No set up , direct boring• No additional power for core material

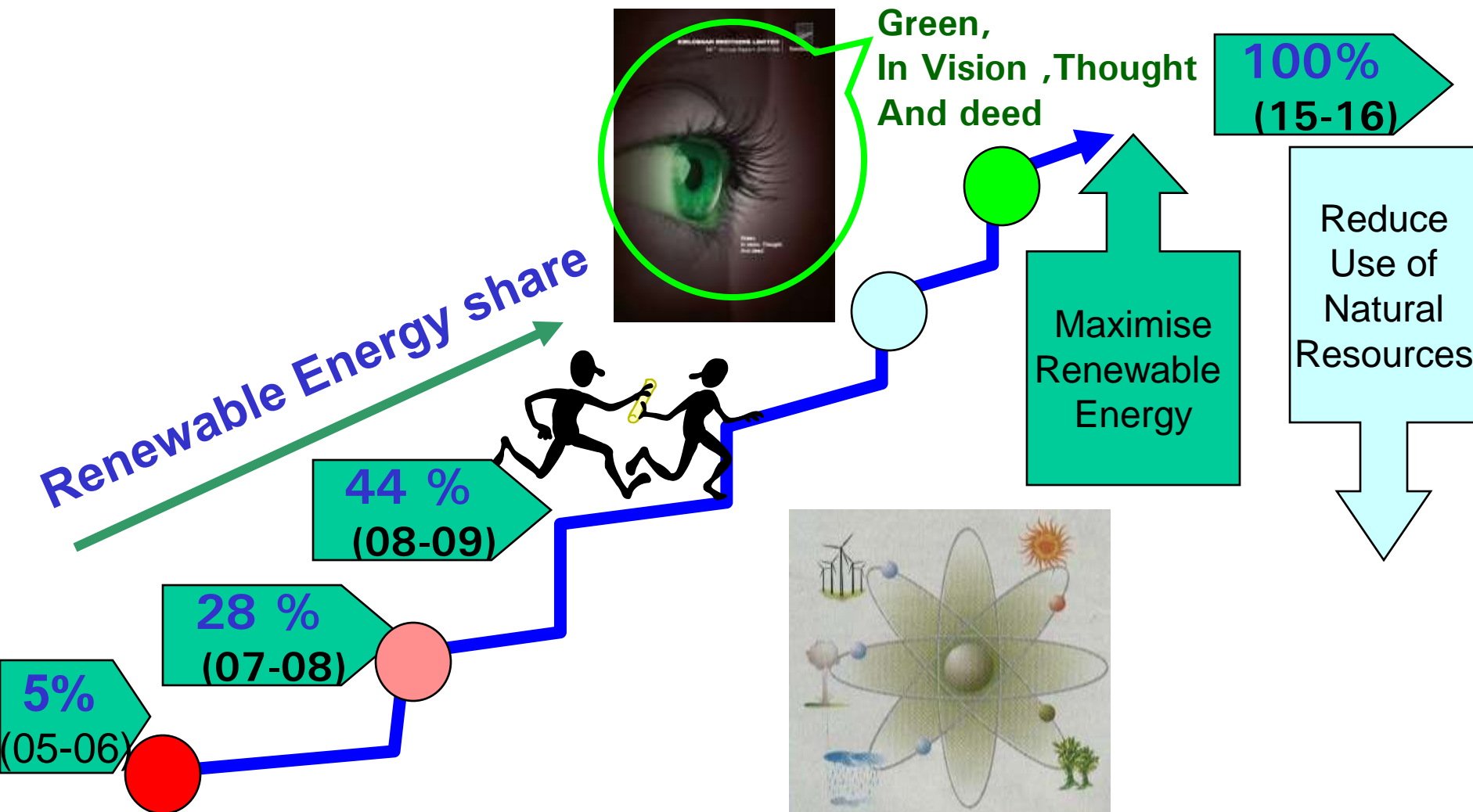
Annual Energy Saving in Rs Million : 0.75



Energy Milestone



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THANK YOU



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Energy Conservation

