

“ENERGY SAVING ASPECTS- THE METHOD OF REDUCING CARBON FOOTPRINT IN CEMENT PLANTS”



NATIONAL ENERGY EFFICIENCY INNOVATION AWARD

Presented by: Ketan Goel

ABOUT US

- IISPL was inceptioned in year 2016 with a noble thought that how we can help cement and power industry to mitigate energy loss and make best use of available resources so as to achieve optimum results and reduce manufacturing cost. By doing this, we will not only help cement and power industry but also address Global Warming, Energy Conservation and Environmental issues.

Our Vision

“Advancement through Innovation”

We are committed to the relentless pursuit of innovation in compact, energy saving, high precision technologies.



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DPIIT CERTIFICATE- recognized as a startup by the Department for Promotion of Industry and Internal Trade

The image shows three certificates. The first is a TCCPL Certificate of Registration for Quality Management Systems of INVOTECH INDUSTRIAL SOLUTIONS PVT. LTD., certified to ISO 9001:2015. The second is a DPIIT Startup Registration Certificate for INVOTECH INDUSTRIAL SOLUTIONS PRIVATE LIMITED, issued on 02-07-2019. The third is a DPIIT Certificate of Recognition for INVOTECH INDUSTRIAL SOLUTIONS PRIVATE LIMITED, also issued on 02-07-2019, recognizing it as a startup in the 'Chemicals' and 'Specialty Chemicals' sectors.

CERTIFICATE OF RECOGNITION

This is to certify that **INVOTECH INDUSTRIAL SOLUTIONS PRIVATE LIMITED** incorporated as a Private Limited Company on **02-07-2019**, is recognized as a startup by the Department for Promotion of Industry and Internal Trade. The startup is working in 'Chemicals' Industry and 'Specialty Chemicals' sector as self-certified by them.

This certificate shall only be valid for the Entity up to Ten years from the date of its incorporation only if its turnover for any of the financial years has not extended ₹ 100 Cr.

11-03-2022 DATE OF ISSUE 01-07-2029 VALID UPTO



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ENERGY EFFICIENCY IN CEMENT INDUSTRY

- India is reckoned as the second largest cement producer in the world.
- Do you know what the second most consumed substance is after water? Cement!
- Professionals engaged in cement plants today want innovative solutions that will help improve plant utilization, optimize processes & reduce energy consumption.

PROBLEMS ADDRESSED BY IISPL FOR ATTAINING ENERGY EFFICIENCY



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- 1: False Air
- 2: System Leakages (Compressed Air & False Air)
- 3: Corrosion & Radiation Losses.
- 4: Ineffective usage of Compressed Air for Cooling Applications.
- 5: Inefficient feeding of Liquid AFR.



PROBLEM 1: FALSE AIR CAUSING THERMAL AND ELECTRICAL POWER LOSSES



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SOLUTION:

- IDENTIFY AND MARK THE LEAKAGES BY ULTRASONIC LEAK DETECTOR.
- MEASURE THE LOSSES DUE TO FALSE AIR IN THE SYSTEM BY O2 ANALYZER.
- SEAL THE LEAKAGES WITH PROPER LONGLASTING PRODUCTS.
- CROSS CHECK THE SEALED AREA BY ULTRASONIC LEAK DETECTOR.
- MEASURE THE SAVINGS ACHINVED AFTER SEALING BY O2 ANALYZER.

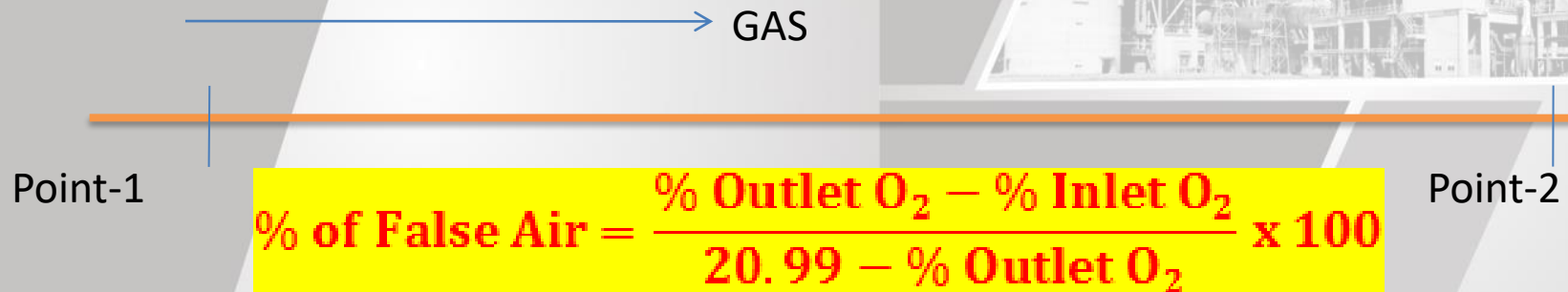
WHAT IS FALSE AIR



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False air is any unwanted air entering into the system.

The exact amount of false air is difficult to measure. An indicator of false air amount can be the oxygen increase between two points (usable for gas stream containing less than 21% of oxygen).



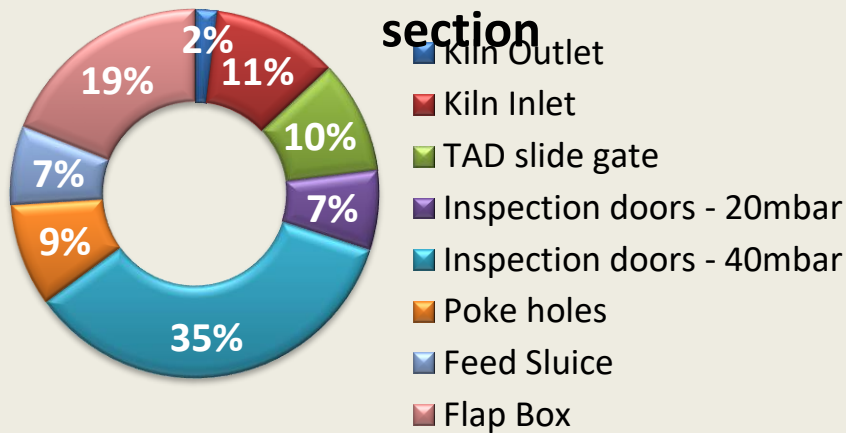
DISADVANTAGES OF FALSE AIR:

- (1) Increase in Electrical Energy Consumption**
- (2) Increase in Thermal Energy Consumption**
- (3) Reduction in Productivity**
- (4) Unstable and disturbed operation**

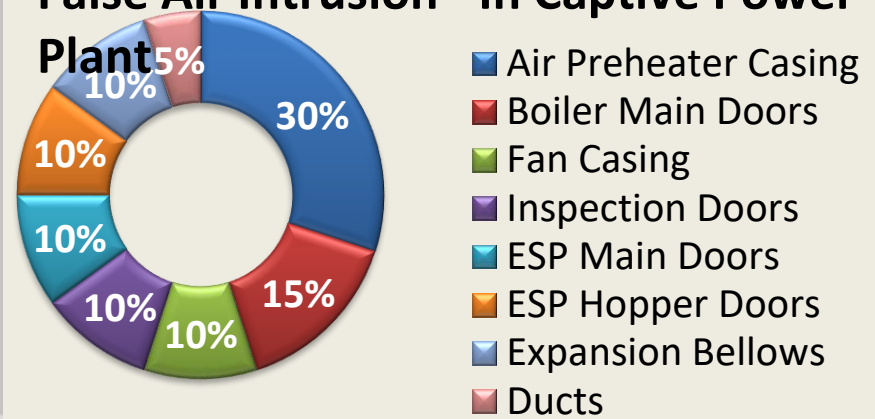


False air intrusion points in Kiln, Mill, CPP, WHRS section.

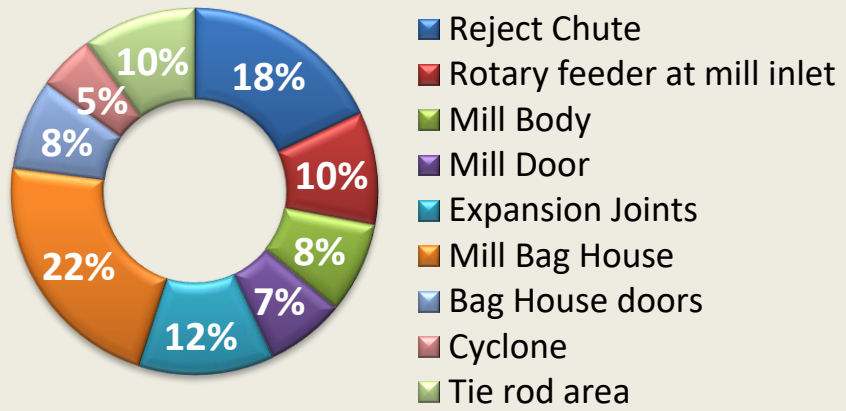
False air Intrusion - In Pre-heater section



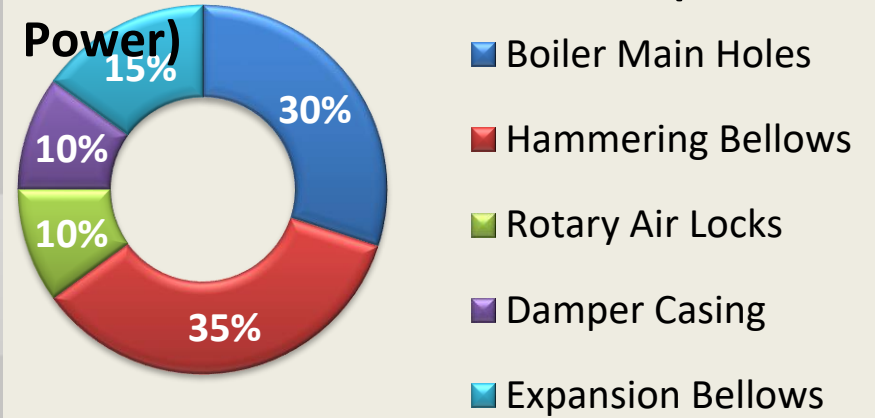
False Air Intrusion - In Captive Power Plant



False air Intrusion - In Mill Section



False Air Intrusion - In WHRS (Green Power)



Leak Arresting by Conventional Methods



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Innovative Solutions



Products for FALSE AIR ARRESTING



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- Arrest Master 1001: For Upper Cyclones, VRM's & Power plants up to 180°C
- Arrest Master 1002: For Bag-house & Bag-filters of (Raw Mill, Cement Mill, Coal Mill).
- Arrest Master 1003: Temp. Resistance: upto 500°C
- Arrest Master 1004: Temp. Resistance: upto 500°C
- Arrest Master 1005: Temp. Resistance: upto 500°C
- Arrest Master 2001: For areas having vibrations upto 7mm/Sec.

APPLICATION SECTORS: CEMENT PLANTS, POWER PLANTS, GREEN POWER PLANTS/WHRS & STEEL PLANTS.

ENERGY SAVING RANGE OF PRODUCTS



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SAVINGS THROUGH FALSE AIR REDUCTION

CASE STUDY- 1

- Double String, 5-Stage ILC Pre-heater
- Annual losses due to False Air- 56.22 Lacs
- Products used- 2.09 Lacs
- Payback Period- Within 1-Month

S No	Particulars	Plant Details			
1	Type Of plant	Double string ILC			
1.1	Kiln length	67	Mtrs		
1.2	Kiln Dia	4.4	Mtrs		
1.3	Heat Consumption	690-710	KCal/Kg - Clinker		
1.4	Type of Cooler	Static-grate cooler(KHD)	Grate		
1.5	Calciner Type	ILC	ILC/SLC		
1.6	PH Make	KHD Humboldt	KHD/FLS/Polysius		
1.7	PH Stages	5	Nos		
S No	Parameters	Unit	Values		
2	Plant Data				
2.1	Kiln Feed	TPH		391	
2.2	Clinker Factor			1.54	
2.3	Clinker production	TPD		6094	
2.4	Barometric Pressure at site	mmWg		9832	
2.5	Barometric Pressure at sea level	mmWg		9781	
2.6	Ambient Temperature	Deg C		29	
2.7	Power Cost	Rs/Unit		7	
2.8	Coal CV	K Cal/Kg Coal		4700	
2.9	Coal Cost	Rs/Kg		8.5	
3	Reduction in False air after using " ARREST MASTER 1001"				
3.1	Reduction in False air	%		1.99	
	Parameters	Unit	Kiln string	Pyro string	Total
4	Preheater outlet				
4.1	Temperature	deg c	309	307	
4.2	Draft	mmWG	-690	-685	
4.3	Flow	M3/h	385000	390000	
4.5	Flow	Nm3/h	168795	171670	340465
5	False air = 1.99 %				
5.1	False air volume	Nm3/h	3359	3416	6775
5.2	False air = 1.99 %	M3/h	7710	7810	
6	LOSS				
6.1	Loss on account of Power in SG fan	kwh	17	23	40
6.2	Loss in money	Rs./hr	120	159	279
6.3	Loss on account of heat	Kcal/hr	333174	336376	669550
6.4	Loss in money	Rs./hr	250	252	502
6.5	Total Loss in money	Lacs per annum	26.64	29.58	56.22
6.6	Cost of Arrest Master used 1001 & 1003	Lacs		2.09	
6.7	Payback period	Month		0.37	
Note: Considering 300 days run plant in a year					
Conclusion: Arrest Master 1001 - Cost-effective Industrial Solution					

PROBLEM 2: SYSTEM LEAKAGES (COMPRESSED AIR & FALSE AIR



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FALSE AIR/COMPRESSED AIR AUDIT

Leak Detection by ULTRASONIC LEAK DETECTOR



PROBLEM 3: CORROSION & RADIATION LOSSES FROM KILN SHELL.



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**SOLUTION: ARREST MASTER 3001:
HRP 500**

Product Highlights

- Temp. Resistance: 500°C
- Application Areas: Kiln shell
- Nano Calcium Silicate based paint along with Vinyl acetate copolymers, Polyacrylates, Epoxy esters, copolymers and Other Constituents 15-25% in aqueous medium for application on surface of running Kiln.
- Not affected by UV Rays present in sunlight.
- Contains no Volatile Solvents & Hazardous Fibers.

Kiln Shell Paint



HRP 500- Kiln Shell Paint

After



After



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Kiln Shell Paint

PROBLEM 4: INEFFECTIVE USAGE OF COMPRESSED AIR FOR SPOT COOLING APPLICATIONS AT KILN & BEARING.



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SOLUTION: ARREST MASTER ABS

Air Boost Solution

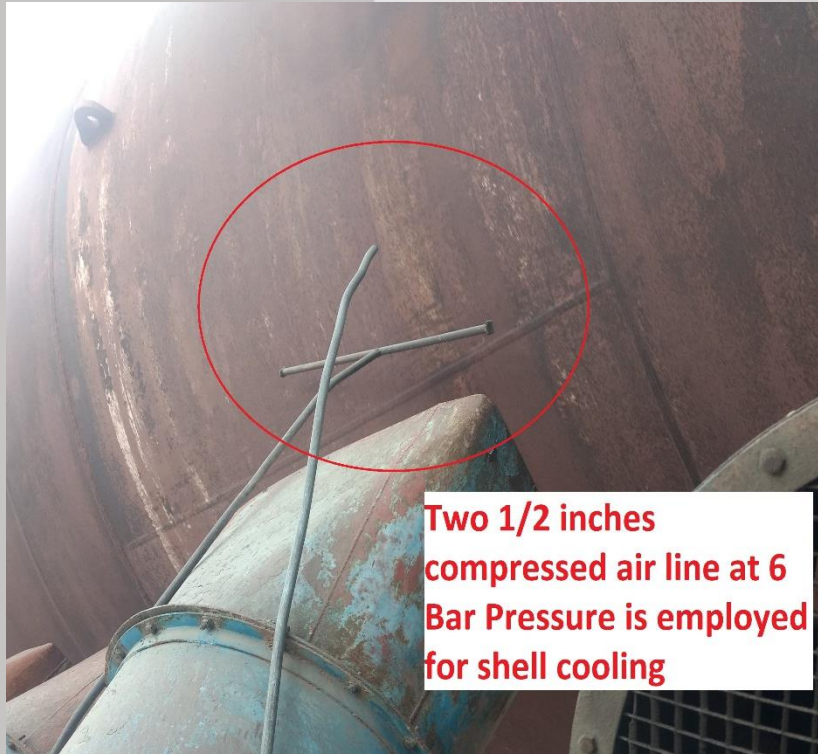
Product Highlights

- Energy efficient device for- Kiln shell cooling, Cooling Bearing Housing.
- **Works on Coanda Principle**
- **Amplifies the air output by 7 times.**
- **Air requirement reduced by 1/10.**
- Flexible usage for hot-spots.
- Ready-to-use modules.
- Easy installation & relocation.



KILN AND BEARING COOLING SYSTEM BY AIR BOOST SOLUTION

Before



Consumption= 100 CFM Air
Output= 100 CFM Air

After



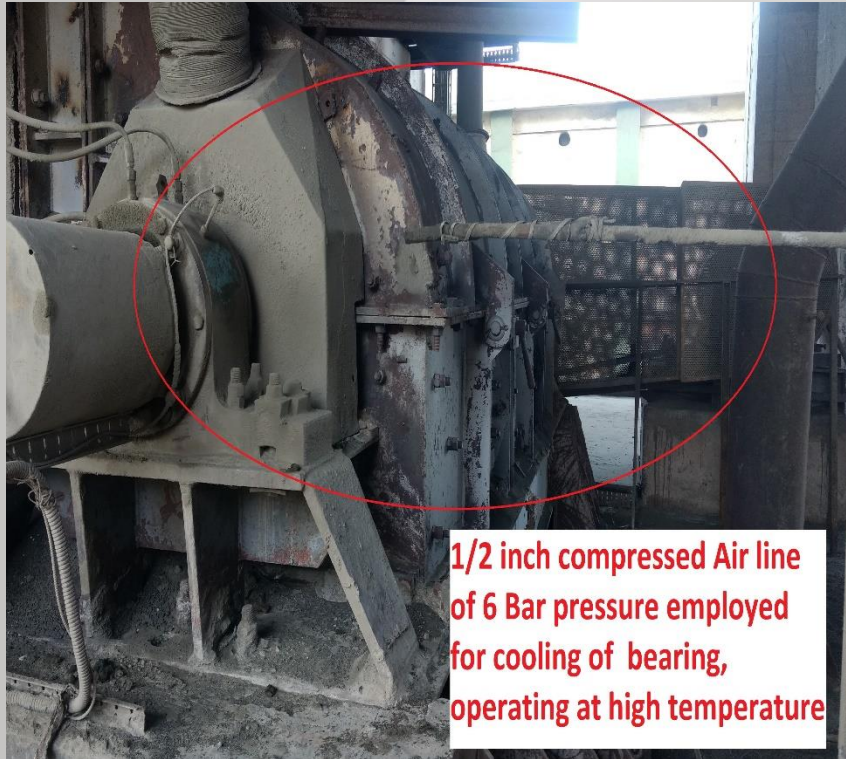
Consumption= 33 CFM Air
Output= 231 CFM Air



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KILN SHELL COOLING SYSTEM BY AIR BOOST SOLUTION

Before



1/2 inch compressed Air line
of 6 Bar pressure employed
for cooling of bearing,
operating at high temperature

Consumption= 100 CFM Air
Output= 100 CFM Air

After



Consumption= 11 CFM Air
Output= 77 CFM Air, Cooling Effect
greater than conventional method.

BEARING HOUSING COOLING SYSTEM BY AIR BOOST SOLUTION

Power consumption comparison ABS V/S FAD & Axial Fan

	Cooling By	Consumption	Power cons.	Per day Cons.	Rate of power	Cost of power	Yearly cost
A	1/2 inch pipe (With compressed air)	100 CFM	20 KW	480	6	2880	950400
B	By Axial fan (5.5 KW motor)		5 KW	120	6	720	237600
C	ABS	11 CFM	0.2 KW/CFM	52.8	6	317	104544
	ABS saving V/S FAD 1/2 inch pipe	9 times less power cons with compare 1/2 inch pipe line air					
	ABS saving V/S Axial fan	2.25 times less power consumption with compare with Axial fan					
	Pay back period	22 Days (Compare ABS V/S Axial fan)					
	Pay back period	3 Days (Compare ABS V/S FAD 1/2 inch)					

Applications

- 1 Bearing cooling
- 2 Kiln Shell cooling
- 3 Tool Room

PROBLEM 5: INEFFICIENT FEEDING OF LIQUID AFR IN CALCINER.



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SOLUTION: ARREST MASTER AFR 1250 (V2.0)

Product Highlights

- Length- 1250 mm, OD- 50 mm, ID- 16 mm
- Compressed air passage orifice- 0.2 mm
- Compressed Air requirement- Constant 5.5 - 6.0 Bar
- Material of Construction SS-316
- Pocking Hole size required to insert the nozzle- 160 mm
- Flow- 0.2 to 3.0 KL/Hr
- Variable spray length with bypass system to clean the nozzle.
- By Atomization through compressed air, the uniform stream of atomized particles of AFR liquid burn effectively and CO % is reduced.

AM- Liquid AFR Charging Nozzle



Conventional Liquid AFR Nozzle



ARREST MASTER AFR 1250- LIQUID AFR CHARGING NOZZLE

Our Product Portfolio- LIQUID AFR CHARGING NOZZLE



ENERGY SAVING RANGE OF PRODUCTS



PAYBACK of Arrest Master AFR 1250 V2.0 Nozzle

Parameters	Conventional 0.5 KL/Hr	AM AFR @ 2.2 KL/Hr
Negative cost of liq. AFR (RS/KL)	2200	2200
Monthly consumption (KL)	360	1584
Benefit RS/Month (Lacs)	7.92	34.85
Difference RS/Month (Lacs)	26.93	
Cost of Arrest Master ARF Nozzle (Lacs)	0.50	
Payback (Hours)	13.32	

NOTE: Major benefit into coal when High CV Liq. AFR material is consumed.

OUR PRODUCT PORTFOLIO



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- **FALSE AIR ARRESTING COMPOUNDS-->> ARREST MASTER 1001-2-3-4-5 & 2001**
- **KILN SHELL PAINT & THERMAL ALUMINUM SPRAY COATINGS-->> ARREST MASTER 3001 L & HRP 500.**
- **COMPRESSOR AIR SAVING DEVICE FOR COOLING APPLICATIONS-->> ARREST MASTER ABS.**
- **LIQUID AFR CHARGING NOZZLE-->> ARREST MASTER AFR 1250 & 1250- V2.0, V3.0**
- **INSTRUMENTATION RANGE-->> Water-Cooled Gas Analyzer Probe, Dry Probes, Kiln Camera Tip, Thermocouples & RTD's, Ultrasonic Leak Detectors.**
- **AUDIT SERVICES-->> False Air / Compressed Air Audit.**

APPLICATION SECTORS:

CEMENT PLANTS, POWER PLANTS

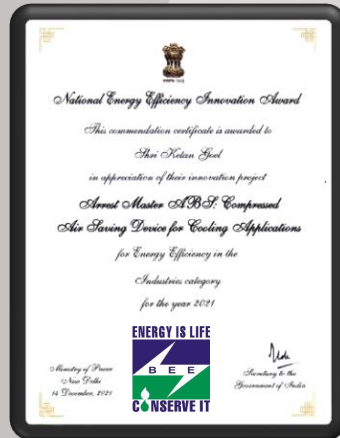
GREEN POWER PLANTS/WHRs &

STEEL PLANTS



ARREST MASTER RANGE OF PRODUCTS

NATIONAL ENERGY EFFICIENCY INNOVATION AWARD- 2021



On 14th December, 2021

Hon'ble Shri RK Singh, Minister of Power given
"Energy Efficiency Innovation Award- 2021"
to Ketan Goel at Vigyan Bhawan, New Delhi, On
14th Dec, 2021



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UPCOMING ENTREPRENEUR IN THE FIELD OF ENERGY EFFICIENCY



IISPL has been felicitated with an award
"Upcoming entrepreneur in the field of
energy efficiency" by Hon'ble Mr Pankaj
Sharma, Secretary, Bureau of Energy
Efficiency.

ARTICLES PUBLISHED IN PRESTIGIOUS PUBLICATIONS



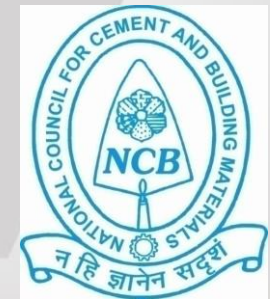
CMA TECHNICAL JOURNAL: CEMENT ENERGY & ENVIRONMENT

- “ENERGY SAVINGS THROUGH FALSE AIR REDUCTION”, Vol. 17 No. 1 (Jan – Jun 2018).
- “ENERGY SAVINGS BY REDUCTION OF THERMAL LOSSES FROM KILN SHELL”, Vol. 18 No. 1 (Jan – Jun 2019).
- “COMPRESSED AIR SAVING DEVICE “A PORTABLE, ECONOMIC HOT SPOT COOLING SOLUTION TO PLUG AND ELIMINATE ROUTINE ENERGY WASTE IN CEMENT PLANTS”, Vol. 20 No. 1 (Jan – Jun 2021).
- “USE OF AFR IN CEMENT INDUSTRY: NEED OF THE HOUR”, Vol XXI-I (Jan – Jun 2022).



NATIONAL COUNCIL FOR CEMENT & BUILDING MATERIALS

- “FALSE AIR REDUCTION- THE METHOD OF REDUCING CARBON FOOTPRINT IN CEMENT PLANTS” 16th NCB International Seminar on Cement, Concrete and Building Materials, Dec- 2019.
- “ENHANCEMENT OF LIQUID AFR BY OPTIMIZATION OF NOZZLE SYSTEM” 17th NCB International Seminar on Cement, Concrete and Building Materials, Dec- 2023.



INDIAN CEMENT REVIEW

- “ENERGY EFFICIENCY THROUGH FALSE AIR REDUCTION” VOLUME 35, April 2021, NO 9.



ARAB UNION FOR CEMENT AND BUILDING MATERIALS, UAE

- “THE METHOD OF REDUCING CARBON FOOTPRINT IN CEMENT PLANTS”, No. 84, June 2021.





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OUR ESTEEMED CUSTOMERS





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Overseas Customer (MALAYSIA)



Upcoming Overseas Customer



شركة أسمنت الاتحاد (ش.م.خ.)
UNION CEMENT COMPANY (Pr.J.S.C)

CONCLUSION



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- Substantial potential for energy efficiency improvement/cost cutting by adopting innovative ways exist in the Cement industry.
- Persistent efforts are also being made by Cement industry to continue to improve energy efficiency and reduce the energy cost for survival and growth. Our baby step towards saving "Energy Saving" can contribute immensely towards cost cutting of Cement Industry.
- It is needless to mention that our efforts to improve energy efficiency will also minimize greenhouse gas and mitigate the environmental problems associated with cement production.



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**Thanking You & Assuring you
of our best attention &
Service Always.**



एक कदम स्वच्छता की ओर