



**PRESENTATION ON TECHNOLOGY OF
MIST CREATION SYSTEM FOR INDUSTRIAL WATER COOLING REQUIREMENT
BY
MIST RESSONANCE ENGINEERING PVT. LTD.**

Pune 411002 INDIA .



History



The ultimate Mist Creation Technology was invented & developed by our company's founder Late Mr. Arvind S. Chitale in 1980 and was recognized at various international platforms. Now, we have a growing family of satisfied clients spread across various countries in many industries. They are benefited by the technology rooted in Eco-friendly base, energy conservation and quality production. The systems are eco-friendly and Energy conservation is achieved at the highest level.

Board of Directors

The present Directors of the Company are :

- **Mrs. Madhuri A. Chitale : Managing Director**
- **Mr. Makarand A. Chitale : Director – Technical**
- **Mr. Bhupendra P. Shroff : Director**



Mist Resonance Engineering Pvt. Ltd.

Member : CTI



COOLING TECHNOLOGY INSTITUTE

PO Box 73383, Houston, TX 77273 / 2811 FM 1980 Rd., W, Ste A-101 / Houston, TX 77068
Phone: 281.583.4087 / Fax: 281.537.1721 / email: vmanser@cti.org / <http://www.cti.org>

June 19, 2007

Mr. Makarand Arvind Chitale
Mist Resonance Engg. (P) Ltd.
1304-1/7, Shukrawap Peth, Bajirad Road
Pune 411002 Maharashtra INDIA

Dear Mr. Chitale:

It is indeed a pleasure to inform you that your application for Corporate Membership in the Cooling Technology Institute has been acknowledged and approved by the Cooling Technology Institute.

A complimentary set of CTI Standard Specifications and Research Reports, a membership directory, and the Bylaws are enclosed. You are now eligible to receive the updated pages of the directory once a year. Your firm will be listed in the manufacturers section of the directory with you as the voting delegate.

All employees of your firm will receive member discounts on publications and meeting fees. We encourage you to use the CTI logo on your letterhead, business cards and sales brochures. A copy is enclosed. The word "member" must accompany the logo.

An attractive walnut membership plaque engraved with your company name is available,

We look forward to your active participation in the meetings and committees. The next CTI Committee Workshop is scheduled for July 7-12, 2007, at The Westin, La Cantera, San Antonio, Texas. Information is posted on our website www.cti.org. We hope that you will find it convenient to attend. Please call me if you have any questions, or if we may be of service to you.

Sincerely,

CTI Administrator




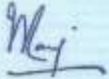
VAM/
Enclosures

cc: w/o enclosures
Steve Chaloupka, President
Thomas Bugler, Vice President
Ken Kozelski, Board Member
Frank Foster, Membership Chairperson
File



Mist Ressonance Engineering Pvt. Ltd.

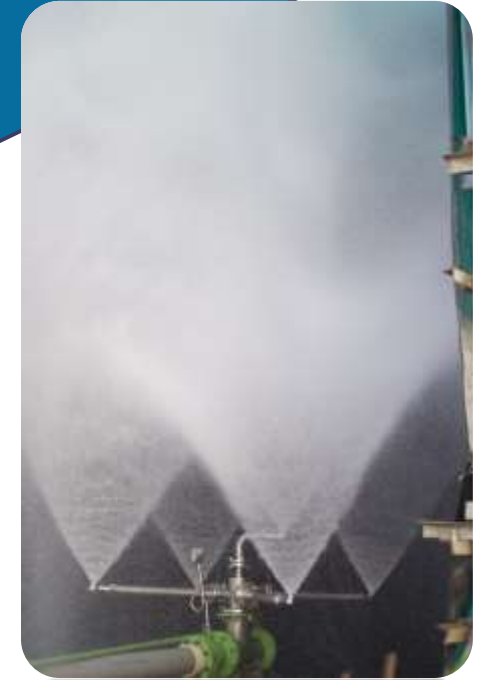
Patented Technology

संमोह Sl. No.	022 4316		
		भारत सरकार GOVERNMENT OF INDIA	INTELLECTUAL PROPERTY INDIA PATENTS / TRADE MARKS GEOGRAPHICAL INDICATORS
		पेटेंट कार्यालय THE PATENT OFFICE	
		पेटेंट प्रमाणपत्र Patent Certificate <i>(Rule 74 of Patents Rules)</i>	
Patent No.	: 211652		
Application No.	: 298/MUM/2004		
Date of Filing	: 10/03/2004		
Patentee	: CHITALE MAKARAND ARVIND		
<p>It is hereby certified that a patent has been granted to the patentee for an invention entitled AN IMPROVED MIST PRODUCING NOZZLE as disclosed in the above mentioned application for the term of 20 years from the 10 day of MARCH 2004, in accordance with the provisions of the Patents Act,1970.</p>			
Date of Grant:	06/11/2007		Controller of Patents
<p>Note.-The fees for renewal of this patent,if it is to be maintained , will fall / has fallen due on 10 day of MARCH 2006 and on the same day in every year thereafter.</p>			



Mist Resonance Engineering Pvt. Ltd.

Mist Creation Technology



MIST COOLING SYSTEM is a high efficiency system, which ensures an approach of 1°C to Wet bulb temperature. MCS is the only system which ensures a ΔT of 50°C in one stroke. No other cooling system can operate with such efficiency & it makes cooling tower/spray pond systems obsolete.

MCS induces water to intensive atomization- i.e. water particles are sub-divided to around 5 microns. The atomized particles shoot out of MIST-CREATOR nozzles at immense speed and rise to a height of 5-6 meters above the nozzles.

This ensures extensively large surface area for a longer interval and at high velocity providing a mist formation. Surface evaporation is very fast, faster than the time needed for reaching equilibrium.

This is similar to phenomenon of formation of hailstone, when rainwater reaches temperatures much lower than wet-bulb.

BASED ON ABOVE TECHNOLOGY, WE HAVE DEVELOPED SEVERAL MODELS TO CATER THE WATER COOLING REQUIREMENT AS PER SPECIFIC NEED & INDUSTRY TYPE.



MIST COOLING SYSTEM MODEL-1

Open Type Mist Cooling System



OPEN TYPE MIST COOLING SYSTEM :

Our MIST COOLING SYSTEM is a marvel of a design, which ensures an Approach of 1°C to prevailing Wet Bulb Temperature and can cool hot water of say about 45°C to less than 30°C in one stroke. Our Patented Mist Creator Nozzles operate with a choke-less design (min bore size inside the nozzle is 26mm in diameter) & break the water particles to less than 5-micron size thus exposing it to the huge surface area.

Here, Water loss due to drift is 0.1 to 0.25% depending on wind load.



Photo Gallery...

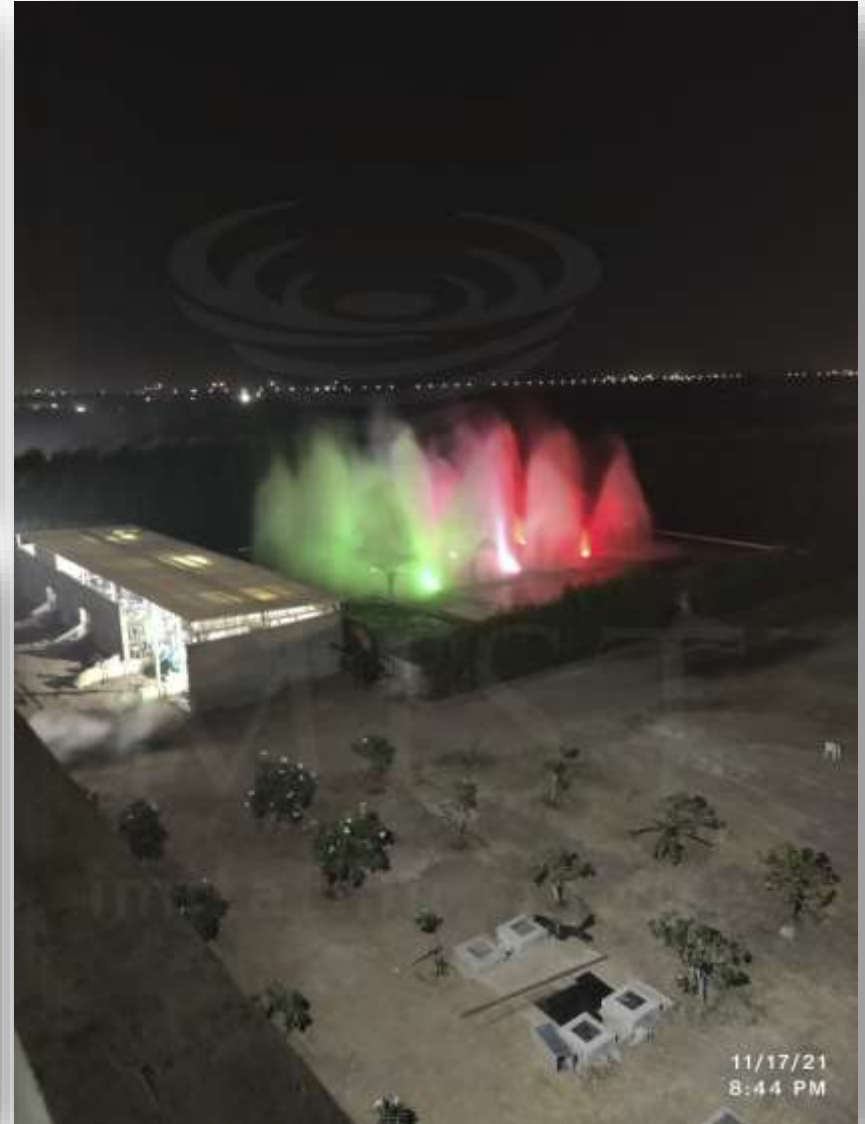
OPEN TYPE MIST COOLING SYSTEM





Photo Gallery...

OPEN TYPE MIST COOLING SYSTEM





MIST COOLING SYSTEM MODEL-2

Louver Type Mist Cooling System



LOUVER TYPE MIST COOLING SYSTEM :

Here MCS pond is closed from sides, up to a height of 8 to 10 mtrs. by louver type cover sheeting. This reduces the plot size by 60% of open pond design. MCS ensures an approach of 1°C to WBT with a ΔT of 10°C. Drift loss comes down to 0.02%.

This model of MCS has maximum client base from all sectors of the industry where plot size requirement is considerably lower in comparison to open design.



Photo Gallery...

LOUVER TYPE MIST COOLING SYSTEM





Salient Features of MCS

MCS has an unmatched features. Briefly they are as follows:

1. COLD WATER TEMPERATURE

Mist Cooling System ensures an approach of 1°C to WBT with a temperature drop of 10°C to 12°C.

2. PROCESS BENEFITS & ENERGY SAVINGS

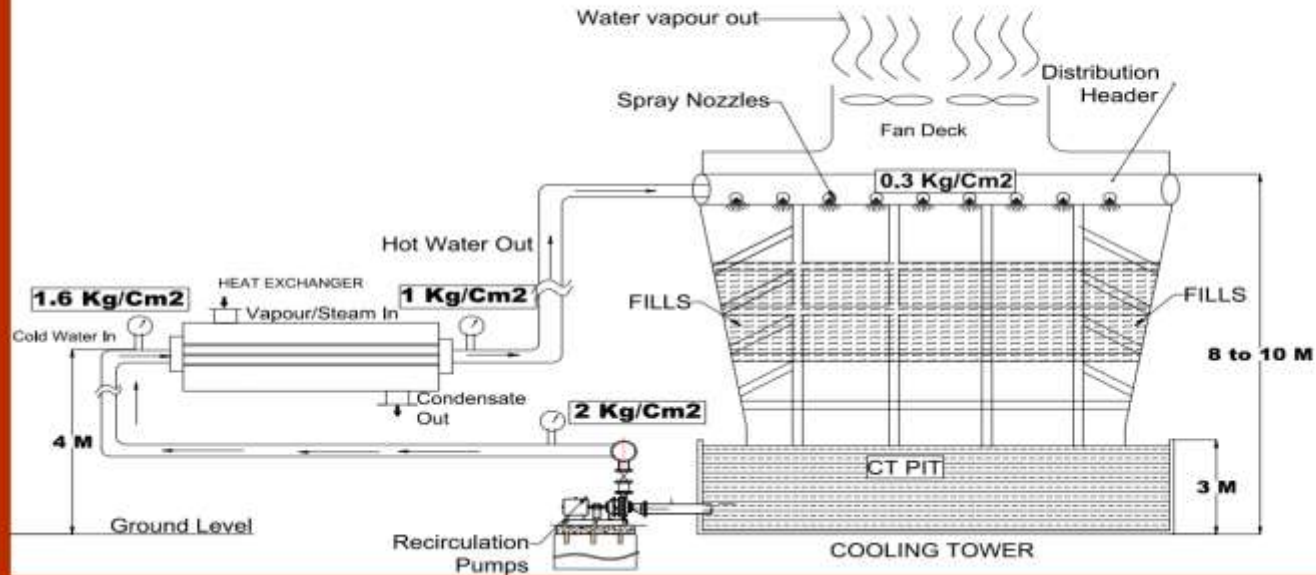
A) ON CHILLER:

Mist Cooling System ensures an approach of 1°C to WBT, that means availability of cold water at a temp. of 3°C lower than cooling tower. This reduces ΔT (Heat of pumping) for chiller. A direct saving of about 10% or more is obtained due to this on compressor motor power. (Please refer case study)

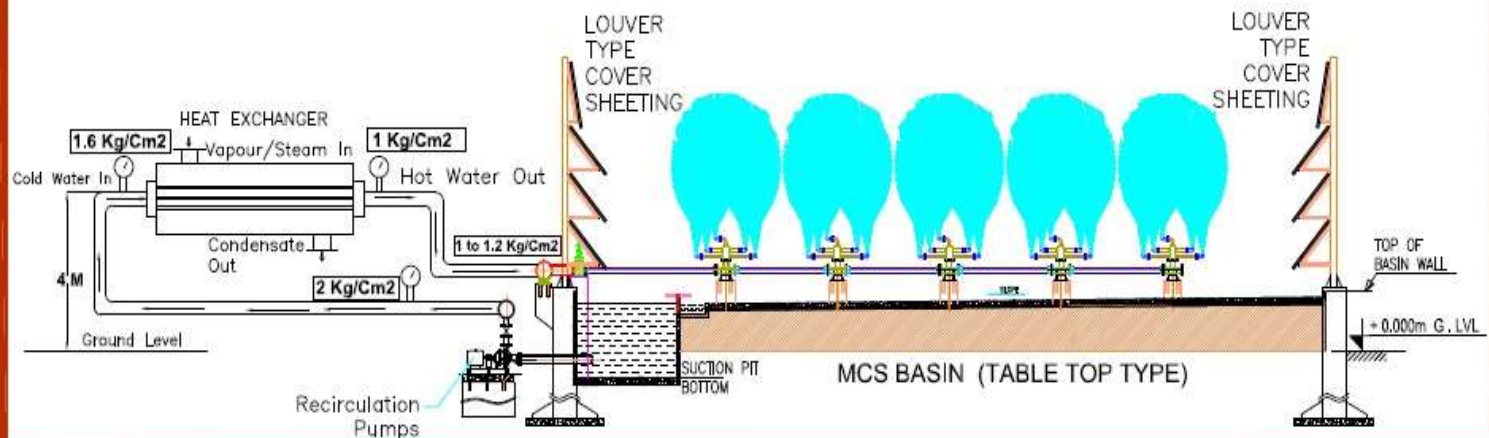
B) ON COOLING WATER SIDE :

Due to increase in DT, water quantity required at the process side is much less. MCS requires water pressure equivalent to the height of cooling tower as shown in the following diagrams. Hence, considerable amount of energy is saved on circulation water pumping. Also, MCS does not require any fans for cooling. Thus, a huge amount of energy is saved on circulation and cooling.

PLAN A : HEAT EXCHANGER WITH COOLING TOWER



PLAN B : HEAT EXCHANGER WITH MIST COOLING SYSTEM





Salient Features of MCS

3. MAINTENANCE

MCS has no moving parts. Also the material used in the mist cooling system is special grade saran polymer, a highly non-corrosive material having a life of more than 15+ years. This makes MCS absolutely maintenance free. As against this, cooling towers require a heavy maintenance in form of replacement of louvers, fan blades, clamps etc. every year.

4. CHOKELESS DESIGN

MCS operates with a choke less design. Size of smallest opening in MCS is more than one inch (25 MM) in diameter. Hence chances of particles choking the system are minimum.

Salient Features of MCS

5. TABLE TOP DESIGN TO PREVENT ALGAE FORMATION

Latest table top design of MCS pond does not allow formation of water level inside the pond and all water passes to suction pit which is covered from top thus minimizing chances of algae formation.





Salient Features of MCS

6. MAKE-UP WATER REQUIREMENT

Due to latest Louver Type design, drift loss through MCS is reduced to 0.02% while maintaining an approach of around 1°C to wet bulb temperature. Hence, Overall make-up water quantity required is approximately same as compared to cooling towers.

7. PAY BACK PERIOD

The Pay Back period of the MCS will be less than **ONE** year only.

However, plot size requirement for Louver Type Mist Cooling System is also 2 to 4 times in comparison to conventional Induced Draft Cooling Towers. Hence to eliminate this limitation recently a revolutionary model of Induced Draft Mist Cooling Tower is launched.



MODEL-3

Induced Draft Mist Cooling Tower (Fill-Less Design)



Our **Induced draft Mist cooling tower (IDMCT)** has NO Fills inside. Here, we have combined the technology of Mist creation with Induced draft to achieve the desired effect without help of any Fills. Water sprayed from Mist Creator Nozzles in the form of fine mist particles provides a huge surface area exposed to air for heat and mass transfer. Air shall come in contact with the fine mist water particles in counter-current direction and thus desired water cooling is achieved.



General Arrangement Drawing

Induced Draft Mist Cooling Tower (Fill-Less Design)

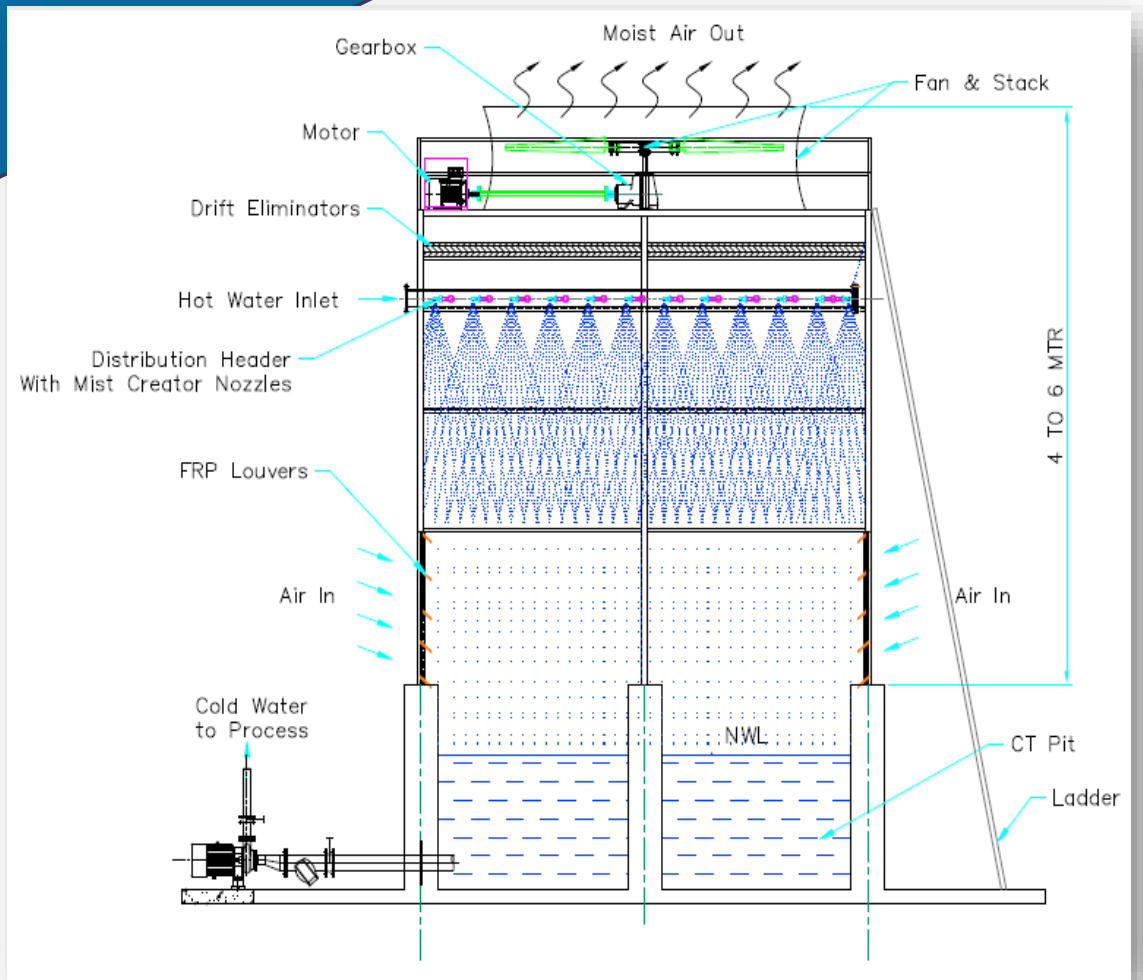




Photo Gallery...

INDUCED DRAFT MIST COOLING TOWER





Photo Gallery...

INDUCED DRAFT MIST COOLING TOWER





Salient Features of IDMCT

There are several advantages of Induced Draft Mist Cooling Tower Vs Conventional Induced Draft Cooling Tower.

❑ **APPROACH AND TEMPERATURE DROP**

An approach of 3 to 4°C is ensured to design WBT with a temperature drop up to 10°C.

❑ **FILL LESS OPERATION**

IDMCT does not require any Fills. The required surface area is obtained by creation of fine mist with an average particle size of 50 microns combined with induced air through small axial fans.

❑ **ENERGY SAVING**

Fan power required is reduced up to 50% due to combination of 2 technologies & minimum pressure drop across the system. This saves huge energy on cooling.

❑ **LIFE EXPENTANCY & MAINTENANCE**

Rugged structure with Pultruded FRP/ HDGI MOC and FRP casing with Stainless Steel 304 Nozzles, ensuring a life of 15 years plus. Choke less design of our Mist Creator Nozzles ensures a maintenance free operation for lifetime.

❑ **FOOTPRINT**

Footprint required is same as compared to Conventional IDCT.

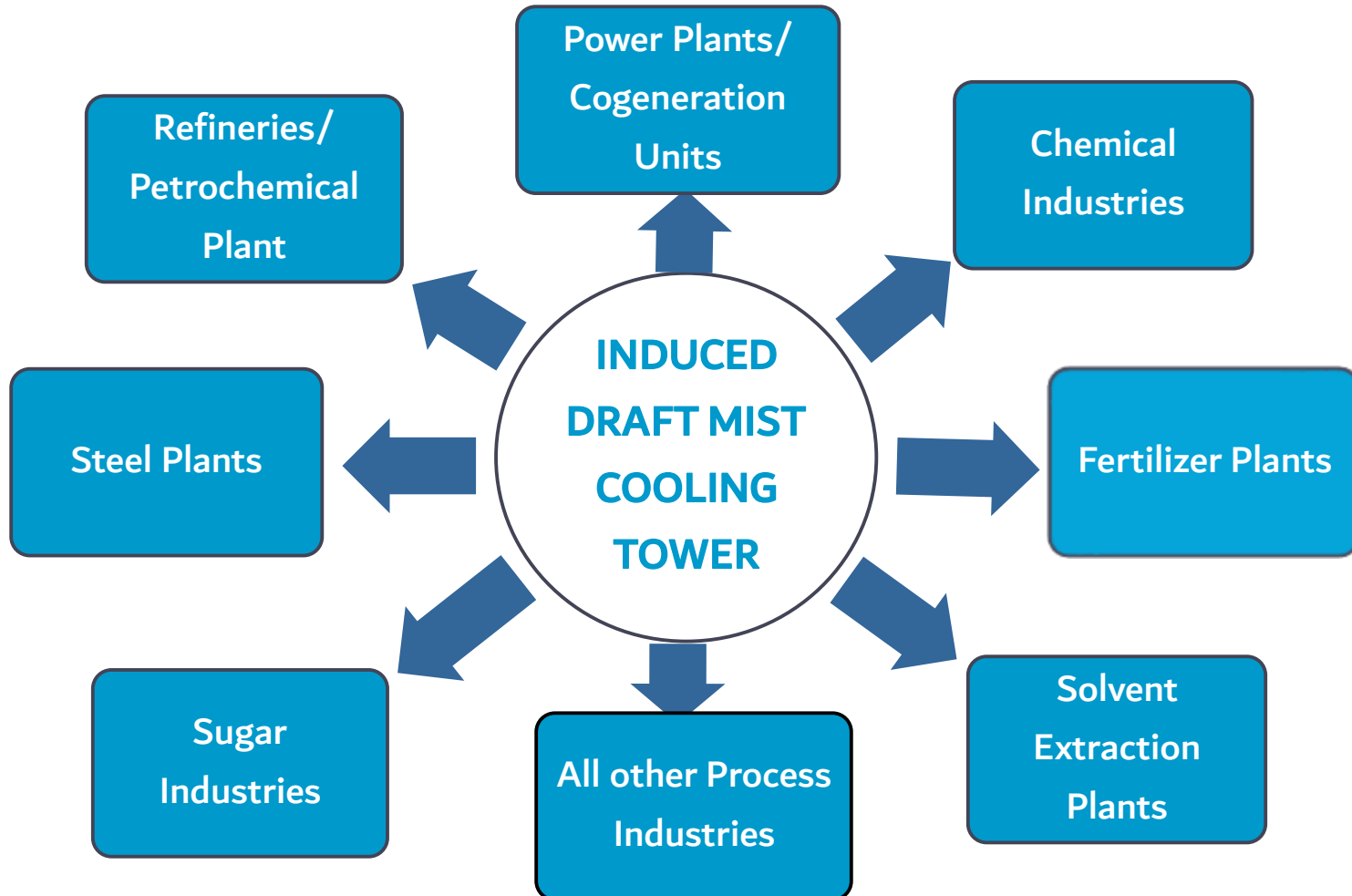
❑ **OTHER FEATURES**

Due to use of latest drift eliminators, drift loss through IDMCT is limited upto 0.02%. Hence, Overall make-up water quantity is same as Conventional IDCT.

❑ **GAURANTEEE**

Guaranteed designed performance even in summer & monsoon.

APPLICATION OF MCS & IDMCT IN VARIOUS INDUSTRIES





Mist Ressonance Engineering Pvt. Ltd.

Our Prominent Clients



DETOX INDIA





Mist Resonance Engineering Pvt. Ltd.

**Case Study of Installation of
MIST COOLING SYSTEM
at M/S. SHRI BAJRANG POWER & ISPAT LTD.,
RAIPUR.**



Mist Resonance Engineering Pvt. Ltd.

CLIENT NAME: - M/S. SHRI BAJRANG POWER & ISPAT LTD., RAIPUR.

CASE STUDY OF REPLACEMENT OF INDUCED DRAFT COOLING TOWER BY MIST COOLING SYSTEM
INSTALLED IN YEAR 2008 FOR THEIR 16 MW POWER PLANT

Design Parameters:

a) Design MCS Capacity : 4000 M³/Hr

b) Approach to WBT: 2°C

c) Design inlet water pressure : 1.5 kg/cm²

d) Type and Area of pond : Closed, 72 M X 30 M

Sr. No.	Process Parameters	Conventional Cooling Tower used earlier	Existing Mist Cooling System	
			Designed	Actual Status
1)	Capacity (M ³ /Hr)	4000 (M/S Paharpur Make Induced Draft Cooling Towers)	4000	4000
2)	Designed WBT (Deg C)	28	28	28
3)	Approach to WBT(Deg C)	4	2	2
4)	Cold Water Temperature (Deg C) in Summer/ Monsoon	35°C +	30°C ±1°C	30 to 31°C
5)	ΔT (Deg C)	8	8	8
6)	Circulation Flow, Power & Head	Same	Same	Same
7)	Fan Power (Kw/Hr) Consumed	100 Kw/Hr (50 Kw/Hr x 2 Fans)	Nil	Nil
8)	Make up water quantity	50 M ³ /Hr	50 M ³ /Hr	48 M ³ /Hr
9)	Fan Power Saving (Kw/Hr)	-----	100	100
10)	Maintenance issues reported by Client	a) Frequent failure of gear box b) Choking of Fills due to dusty atmosphere	Negligible	Negligible
11)	Type of Pond	-----	Louver Type (Closed)	Partially Closed



Mist Resonance Engineering Pvt. Ltd.

INSTALLATION OF MIST COOLING SYSTEM AT M/S. SHRI BAJRANG POWER & ISPAT LTD., RAIPUR.





Mist Resonance Engineering Pvt. Ltd.

Performance Certificate from M/S. Shri Bajrang Power & Ispat Ltd.

**SHRI BAJRANG
POWER & ISPAT LTD.**

Office / Works : VIII, Berjhara, Urla Indl. Area, Raipur (C.O.) Ph. : (0771) 4286019 / 29 / 39
Fax : (91-771) 2323601 / 802, 4288123, E-mail : sbpi@goelmt.com, sbpilinfo@goelmt.com

Date : 12th March 2009

PERFORMANCE CERTIFICATE FOR MIST COOLING SYSTEM
TO WHOM SO EVER IT MAY CONCERN

We hereby confirm that M/S.Mist Resonance Engg.Pvt.Ltd (MREPL), Pune has designed, supplied, installed and commissioned Mist Cooling System(MCS) for our 8 MW and 16 MW power plants in Raipur in the year 2008. MCS from MREPL has been preferred by us due to its high efficiency and energy saving.

We are happy to state that Mist Cooling System is operating entirely to our satisfaction since last one year. We have noted that MCS has been maintaining an approach of around 2^oC to WBT with a ΔT of 10 to 12^oC throughout the year. We have saved around 175 Kw/hr on fan power as MCS does not require any fans for cooling. The system is working trouble free and without any maintenance till date.


Availability of cold water temperature is around 30^oC / 31^oC constantly. We are not facing any problem of vacuum due to cooling water temperature.

We find that make up water required for MCS is at par with conventional cooling towers.

We have no hesitation to recommend MCS from MREPL for power plant application as a superior alternative to conventional RCC Cooling Towers.

Thanking you,

For M/s Bajrang Power & Ispat Ltd/Bajrang Metallics & Power Ltd


R.N.Singh
G.M (PP)



Mist Ressonance Engineering Pvt. Ltd.

**Case Study of Installation of
Mist Cooling System
At M/S. RUKMINI POWER & STEEL LTD.,
RAIGARH.**



Mist Resonance Engineering Pvt. Ltd.

CASE STUDY OF REPLACEMENT OF INDUCED DRAFT COOLING TOWER BY MIST COOLING SYSTEM INSTALLED IN YEAR 2012 FOR THEIR 10 MW POWER PLANT

Design Parameters:

a) Design MCS Capacity : 2600 M³/Hr

b) Approach to WBT: 2°C

c) Design inlet water pressure : 1.5 kg/cm²

d) Type and Area of pond : Closed, 49 M X 28 M

Sr. No.	Process Parameters	Conventional Cooling Tower used earlier	Existing Mist Cooling System	
			Designed	Actual Status
1)	Capacity (M ³ /Hr)	2600 (M/S Paltech Make Induced Draft Cooling Towers)	2600	2600
2)	Designed WBT (Deg C)	28	28	28
3)	Approach to WBT(Deg C)	4	2	2
4)	Cold Water Temperature (Deg C) in Summer/ Monsoon	36 to 37°C	30°C ±1°C	30 to 31°C
5)	ΔT (Deg C)	10	10	10
6)	Circulation Flow, Power & Head	Same	Same	Same
7)	Fan Power (Kw/Hr) Consumed	80 Kw/Hr (40 Kw/Hr x 2 Fans)	Nil	Nil
8)	Make up water quantity	39 M ³ /Hr	39 M ³ /Hr	37 M ³ /Hr
9)	Fan Power Saving (Kw/Hr)	-----	80	80
10)	Maintenance issues reported by Client	a) Frequent Damage to Fills b) Choking	Negligible	Negligible
11)	Type of Pond	-----	Louver Type (Closed)	Partially Closed



Mist Resonance Engineering Pvt. Ltd.

INSTALLATION OF MIST COOLING SYSTEM AT M/S. RUKMINI POWER & STEEL LTD.





Mist Resonance Engineering Pvt. Ltd.

Performance Certificate from AT M/S. RUKMINI POWER & STEEL LTD.

Rukmani Power & Steel Ltd.

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 P.O. Bhanu
 Dist.-Raigarh (C.G.)
 Ph. # 0332229636
 Fax # 031-7785-23130
 E-mail : rukminipwr@rediffmail.com
 CIN: 02750021 2094 PUC 016562

Regd. Office:
 Agrawal Gokuldas Factory Campus
 Ganesh Nagar, BHILAIK (C.G.)
 Ph. # 031-7752-257152, 436011, 838801
 Fax # 031-7752-427701
 E-mail : rukminipwr@vsnl.com
 E-mail : akshay@rpsl.com

**CERTIFICATE OF APPRECIATION FOR PERFORMANCE OF LOUVER TYPE MIST COOLING SYSTEM INSTALLED FOR OUR 10 MW POWER PLANT AT RAIGARH, CHHATTISGARH.
TO WHOMSOEVER IT MAY CONCERN**

We are glad to confirm that M/S Mist Resonance Engg. Pvt. Ltd., Pune has designed, supplied, installed & commissioned Louver Type Mist Cooling System of Capacity 2600 M³/hr for our 10 MW Power Plant in the year 2012.

The performance of LTMCS is better than expected.


The LTMCS was installed in replacement of Induct Draft Cooling Tower and the results obtained are much better than cooling tower which is shown in below table.


Sr.	Process Parameters	Conventional Cooling Tower used earlier	Louver Type Mist System (Actual Status)
1	Capacity (M ³ /hr)	2600 (M/S Patilch Mabe Induced Draft Cooling Towers)	2600
2	Designed WBET (Deg C)	29	28
3	Approach to WBET (Deg C)	4	2
4	Cond. Water Temperature (Deg C) in Barometer Manoon	36 to 37°C	30 to 31°C
5	ΔT (Deg C)	10	10
6	Vacuum at Condenser	0.15 ATA	0.1 ATA
7	Circulation Flow, Power & Head	Same	Same
8	Fan Power (Kw/hr) Consumed	80 Kw/hr (40 Kw/hr x 2 Fans)	69
9	Make up water quantity	39 M ³ /hr	37 M ³ /hr
10	Fan Power Saving (Kw/hr)	---	80
11	Maintenance Issues	a) Frequent Damage to PEB b) Choking	Nil

The payback of LTMCS is obtained within 2 years.

We strongly recommend MCS for power plants as a superior alternative to any other type of cooling towers.

For, Rukmani Power & Steel Ltd.,


C.R. VISHNOI
 Sr. Vice President


Robinson & Co.



Case Study of Installation of IDMCT at M/s. Detox India Pvt. Ltd. (M/s. DIL)



Case Study of Installation of IDMCT at M/s. Detox India Pvt. Ltd. (M/s. DIL)

- IDMCT was installed at existing IDCT pit in the year 2021 & it recorded remarkable performance improvement in systems as follows-
 1. Constant CWT of 32°C to 33°C was obtained with ΔT of 8 to 9°C & an approach of 3 to 4°C to design WBT.
 2. Smooth and trouble-free operation of IDMCT due to absence of Fills.
- From the above improvement in performance of plant, M/s. DIL decided to replace the remaining 4 Nos IDCT's with IDMCT.



Case Study of Installation of IDMCT at M/s. Detox India Pvt. Ltd. (M/s. DIL)

Design and operating Parameters:

Sr. No	Process Parameters	Existing Conventional Induced draft Cooling Tower		Induced Draft Mist Cooling Tower	
		Designed	Working	Designed	Working
1	Capacity (M ³ /Hr)	327	327	327	327
2	Hot Water Temperature(°C)	40	42	40	42
3	Cold Water Temperature(°C)	32	37	32	33
4	ΔT (°C)	8	5	8	9
5	WBT (°C)	28	29	28	29
6	Approach to design WBT(°C)	4	8	4	4
7	Circulation Flow, Power & Head	Same	Same	Same	Same
8	Fan Power Consumed (kW/Hr)	15 kW/hr	13 kW/hr	11 kW/hr	9 kW/hr
9	Make up water quantity	Same	Same	Same	Same
10	Maintenance issues reported by Client	-	Frequent Choking of Fills due to dirty water	NA	None



MIST RESSONANCE ENGINEERING PVT. LTD.

Thank You!!!

OFFICE ADDRESS

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