

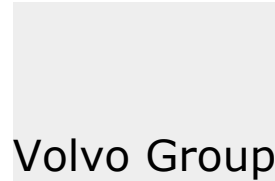


GALAXY ENERGY SOLUTIONS LLP
Simply Green

PRODUCT:



COMPANY:



Volvo Eicher Commercial Vehicles (VECV) India

SITE:

VE Commercial Vehicles



Industrial Area No. 1,

Pithampur -454775
Distt. Dhar M.P.

Usharma

Dr. K.C. Sharma
Fellow: FIE, ISTE, SAE
B.E.(Mech.), M.Tech.(IIT Mumbai)
Ph.D., UNQC-QIP (Japan)

DATE OF INSTALLATION: 16th August, 2018

CONTENTS

Executive Summary	3
About Hydromx	4
Company name – Project	7
Company name – Site	9
Methodology	10
Hydromx Installation at Site	11
Data Summary	13
Data Sheet	13
Conclusion	18
Case study Prepared by	19

EXECUTIVE SUMMARY

The report presents saving analysis for the use of Hydromx (from 16TH August, 2018 to 2nd September 2018), a heat transfer fluid, in Blue Star – Chiller – II (36 TR) installed at the VE Commercial Vehides, Pithampur, M.P. This facility is part of their service units that is meant to provide cold water to the electrode head of the welding machines in the fabrication shop.

On the basis of observations made through a data logger installed on the system for 17 days when system was running on water (26 July to 11 August 2018) and for 17 days (17 August to 02 September 2018) after upgrade to Hydromx, it was seen more than **27% Saving in energy consumption** was achieved and the **improvement in system performance was more than 37%**. *It may be noted that there are two ways of looking at energy savings – visible energy savings and invisible energy saving*

Highlights:

>27%	Reduction in Energy consumption (> indicates more than)
> 37%	Increase in CHILLER EFFICIENCY
22%	Reduction in CHILLER RUN TIME PER DAY
20452.80 kWh	SAVING in average ANNUAL ENERGY CONSUMPTION
1,43,169.57 INR	SAVING in average ANNUAL ENERGY COST
33 Months	Return on Investment (ROI)

ABOUT HYDROMX

GALAXY ENERGY SOLUTIONS LLP, (GES) is the exclusive distributor of **Hydromx** (an Energy saving Solution) in India.

WHY HYDROMX?

A need of the hour: the energy saved is energy produced

HYDROMX **reduces energy bills** by reducing energy consumption

The **reduction in CO₂ emission** depends on energy saved

The reduction in CO₂ emission helps in bringing **harmony in**

Ecological System and Sustainable Growth by reducing global warming

PRODUCT: WHAT IS HYDROMX?

HYDROMX is **a red colour fluid empowered with Nano-particles**

HYDROMX contains stably suspended Nano-particles **to increase the speed of heat transfer.**

HYDROMX is the **TRADE MARK for this energy saving heat transfer fluid**

HYDROMX is **most suitable for closed-loop hydronic heating and Cooling systems**

pH value:	8.2 – 8.6
Freezing point:	- 61°C
Boiling point:	118°C
Density:	6% denser than water

“No matter what the energy source, or how efficient the boiler and chiller is, the product improves the efficiency of the whole system by transferring energy more efficiently.”

HOW HYDROMX IS USED?

HYDROMX is an organic solution which works in 50:50 ratio with water in heating / cooling system. Hydromx is best suited for closed loop heating and cooling systems. The efficiency of the system increases due to diminishing run-time of associated equipment. Hence drastic increase in equipment life is achieved along with lesser maintenance cost.

Hydromx when used with water in the ratio of 50:50 enhances the capacity of water to transfer heat. Thus, makes it more efficient in terms of energy consumption.

The Schematic diagram showing the working of Hydromx in the chiller is presented in the figure given below.

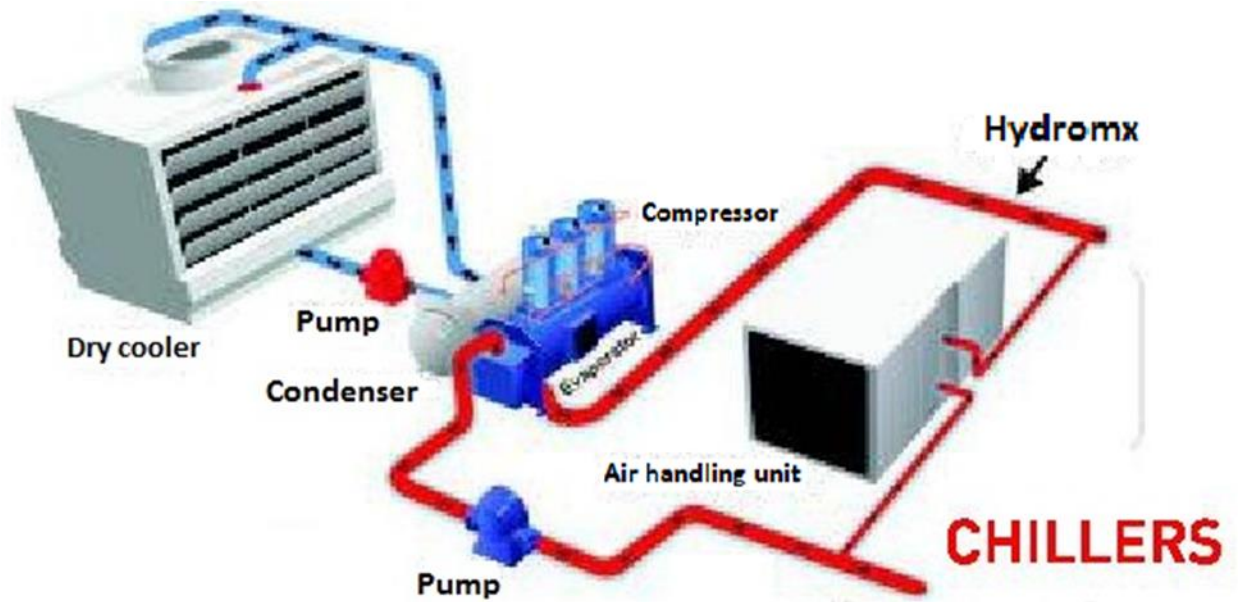


Fig.: Schematic diagram showing the working of Hydromx in the chiller

The heat available at the condenser of the chiller unit is utilized for heating the water in the storage tank.

BENEFITS:

Hydromx provides great benefits on environmental impacts calculated when compared to brine/water and ethylene glycol systems due to energy savings achieved during the use phase.

The Hydromx provides the multiple benefits mentioned in the table given below; in addition to the fact that it is a better heat transfer medium in comparison to water.

Table: Multiple Benefits of Hydromx

One Solution - Many Solutions				
Features	Water	Chemical Inhibitor	Antifreeze	
Energy Saving Up To 35%	X	X	X	✓
System Protection	X	✓	X	✓
Freezing Protection	X	X	✓	✓
Bacteria, Corrosion, Calcification	X	✓	X	✓

Additional Advantages:

- *Anti-corrosive and Anti-calcification*: protects the system from corrosion and scaling; thereby life cycle increases
- *Anti-freeze*: protects the system against freezing
- *Faster heat transfer*: when used with water in the ratio of 50:50 enhances the capacity of water to transfer heat.
- *Life cycle*: Thus, product has 15-20 years life cycle for its 1st use.
- *No shut down is required*: The equipment does not need any frequent shut-downs for dosing of inhibitors, which were otherwise happening when water was used as heat transfer medium.
- *No inhibitor is required*: Hydromx itself also acts as an inhibitor.
- *No retrofit is required*: Hydromx can be used in the system without any rectification or modification in the equipments.
- *Can be reused again and again*: Hydromx used in one system can be reused / transferred on another system, if required.
- This product is ready for reuse after its life cycle by processing it through
- **Safety Instruction** at Site: **PLEASE DON'T DRAIN HYDROMX**

This is because the **expected life of the product is around 15 years**

Project -



Volvo Group

Location - VE Commercial Vehicles

Plot No. 102-102A, Industrial Area No. 1, Pithampur -454775, Distt. Dhar M.P., India

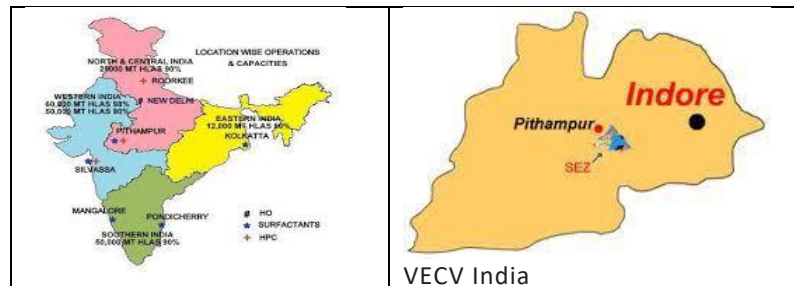
INTRODUCTION

VE COMMERCIAL VEHICLE Plant



Corporate Profile: VECV India

Joint Venture of **Eicher** Motors India and Volvo, “Volvo Eicher Commercial Vehicles (VECV) India” has become one of the top automakers in India.



The town of Pithampur near Indore, is home to the commercial vehicle manufacturing plant of Eicher Trucks and Buses. The joint venture with the Volvo Group (VECV), this plant has expanded vastly from where it began in 1986 and now also produces Euro6 compliant engines that power Volvo trucks in Europe.

ABOUT COMPANY “Volvo Eicher Commercial Vehicles (VECV) India”

HISTORY & MILESTONES:

Eicher and Volvo’s five-year relationship with each other has finally seen the daylight when it comes to venturing together in India. The venture together is called VECV. An investment of Rs. 1800 crore is already done and more money will be pumped in the future. Volvo helped Eicher in bench-marking their facilities, technologies and utmost important are the idea’s that will make truck driving for drivers a less problematic experience. This venture between these two houses is so promising that they are calling it Go Pro.

MILESTONES:

About the growing demand, VECV has increased the production capacity of its Indore plant up to 7,000 units by adding a new assembly line.



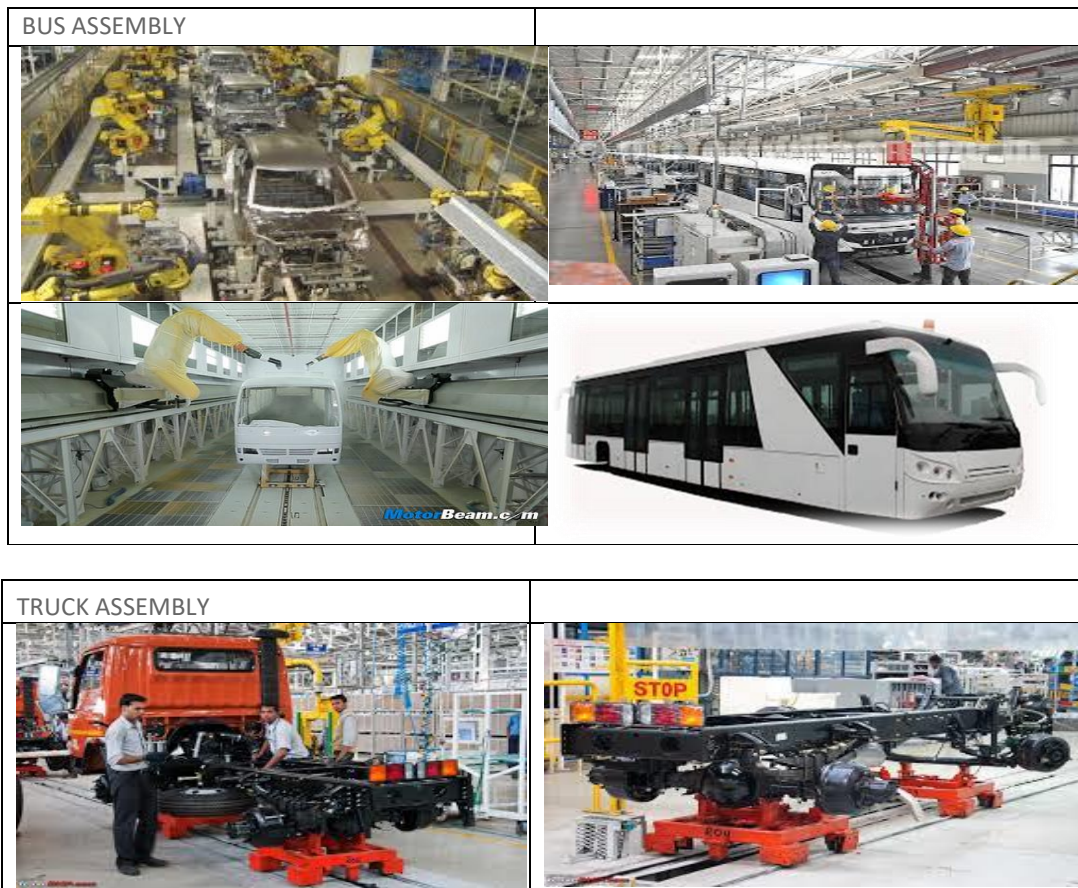
The industry is growing very well beyond recession, after three years of down-cycle. Also, the push given by the government in the area of infrastructure, and positive sentiments owing to an expected good monsoon, economic growth, spurt in ecommerce, have improved consumption. Demand has also been led by replacement of vehicles in the marketplace.”

BUSINESSES:

India looks set to emerge as an engine manufacturing hub with the Volvo Eicher engine plant going on stream.

According to VECV CEO Vinod Aggarwal, in terms of expanding their product spread, they are bullish on all segments—light and medium trucks, heavy duty trucks, and buses.

MANUFACTURING – SOME ACTIVITIES



VE COMMERCIAL VEHICLE Plant – THE SITE

The chillers units are providing cooling effect in the primary loop through PHE to the demand of the water in the storage tank. This storage tank water circulates in the secondary loops up to the machines for keeping the various production units at desired working temperature for continuous smooth manufacturing operations in the plant.

The company has installed two chiller units with following details:

Chiller units:



Make: Blue Star

Production unit temp: 30 °C

Chiller status: Temperature Supply to chiller 25 - 27 °C;



Return from chiller 26 – 28 °C

System volume: 1000 Litres

(system volume includes Make-up tank)

Make-up tank capacity 500 litre

Hydromx used: Hydromx 500 litre + water 500 litre
(Hydromx: water: 50:50)

Type of Data Logger used: TSMB – 14

Installation date: Data Logger 9 July, 2017

Installation date: Hydromx 15 August, 2018

SITE DESCRIPTION

The VECV. has installed three chiller units of 39 TR and 36 TR and 25 TR of Blue Star make. Two operating units 39TR and 36TR are considered for the present study. These units are providing *cooling effect to the demand of the various production units of VECV manufacturing operations.*

The production units are the spot /continuous welding machines. The welding electrodes are made of copper and generates lot of heat during the operation. This heat is removed by the cold water circulating in the loop from the storage tank. The water in the secondary loop keeps the storage water at desired operating temperature. The fluid in the primary loop takes away this heat through PHE and keeps the system in uninterrupted smooth operation.

The system consists of the chiller units, the PHE unit and the storage tank. The primary loop operates between the chillers and the PHE, whereas the secondary loop is operative between the PHE and the storage tank. The chiller unit extracts the heat of the medium at the PHE in the primary circuit, whereas the heat of water being cooled is passed on to the PHE through the secondary loop. Thus, the whole system provides the controlled cooling effect to the production units so as to maintain the temperature at the desired level for continuous quality production. One unit of the two chillers is operative at a time while the other is standby.

METHODOLOGY

This document reports on the findings and data analysis relating to the performance data before and after installation of Hydromx as the heat-transfer fluid in the secondary closed loop system of the Chiller unit. The Chiller unit is providing cooling effect to the medium of heat transfer (originally water and subsequently replaced by Hydromx) in circulation in the secondary closed loop at the PHE. The cold water is supplied to meet the demand of heat extraction in the secondary system. This report specifically investigates the performance data trends, before and after installation of Hydromx, and utilize academic knowledge and expertise to verify the saving in energy consumption and cost calculations with an overall aim of delivering a view of the system's performance before and after Hydromx was installed.

The data collected had been monitored and acquired in two stages:

1. Before Hydromx was installed, and
2. After the Hydromx was installed

The energy saving assessment methods are examined to compare the normal operating condition of the system, when water was used as heat transfer fluid in the cooling system with that of the system using Hydromx as heat transfer fluid, in order to identify overall trends in energy savings and assess, an indication of whether significant changes have occurred in the operation of the system affecting the energy consumption. The financial and energy benefits of installing the product have been looked at.

HYDROMX INSTALLATION AT SITE

The original design and construction of piping system; for supply and make-up of heat transfer fluid for its loss during the process operation, was done keeping in view that water is a medium of heat transfer and can be discharged and recharged as required. However, with replacement of water by Hydromx as heat transfer fluid, we cannot afford to lose Hydromx in discharge from the system. Hence a modification in the system is necessary. The water supply pipe-line directly to the loop system for making up the deficiency was disconnected and sealed to ensure that no water is supplied directly to the system even by mistake. This is because water has been replaced by Hydromx. To make-up the deficiency, if any, in the system a make-up tank is introduced in the loop. The make-up tank has been marked for minimum and maximum level for Hydromx to be maintained in the tank. This is to ensure automatic recharge of the Hydromx in the loop, if required. The life of Hydromx solution is expected for around 15 years.

The data logger was installed on 9th of July 2018 in consultation with the company management. The raw data has been collected from 26th July to 11th August 2018 for parameters related to temperature, RH, Run time and fuel consumption etc. During this period, water was the medium of heat transfer for supply heat to the PHE.

The Hydromx was introduced as a heat transfer medium in the system on August 16th, 2018 and data are recorded through data logger from 17th August, 2018.

The various activities of installation are presented in the photographs below.

HYDROMX INSTALLATION UNDER PROCESS

GALAXY Team at Site



Team of GALAXY and VOLVO People at work

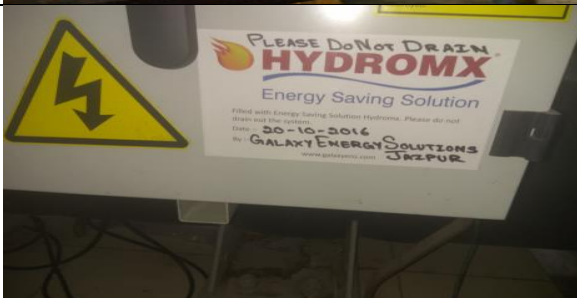


Team of GALAXY and VOLVO People at work



Safety Instruction at Site:

Please Don't Drain Hydromx



Hydromx samples

DATA SUMMARY SHEET

The logger data received were analyzed for possible direct savings (by using Hydromx in place of water as heat transfer medium) in terms of Energy consumed in the chiller operation. At the same time, the heat energy transferred from PHE to the system is evaluated. The summarized data are presented in the table and also represented graphically to understand the impact of Hydromx. The comparison has been made for similar conditions and duration of operation of the system.

DATA SHEET - RESULTS:

VOLVO, PRITAMPUR, INDORE			
BLUE STAR chiller	CHILLER -II		
	UNIT	WATER	HYDROMX
DAYS	No.	17	17
RUN TIME PER DAY	HR	210.5	164
TOTAL ENERGY CONSUMED	kWH	1850	930
RUN TIME PER DAY	HR	12.4	9.6
ENERGY CONSUMED PER HOUR	kWH/HR	8.79	5.67
SUPPLY TEMP. °C	°C	26.4	26.26
RETURN TEMP °C	°C	27.80	27.5
DELTA °C	°C	1.4	1.24
FLOW RATE GPM	GPM	100	100
COOLING LOAD(TR)	TR	10.50	9.30
TOTAL COOLING LOAD (TRH)	TRH	2210.3	1525.2
ENERGY CONSUMED per UNIT COOLING LOAD (IKW/TRH)	IKW/TRH	0.84	0.61
COP (SYSTEM PERFORMANCE)		4.20	5.77

22.1%

27.2%

37.3%

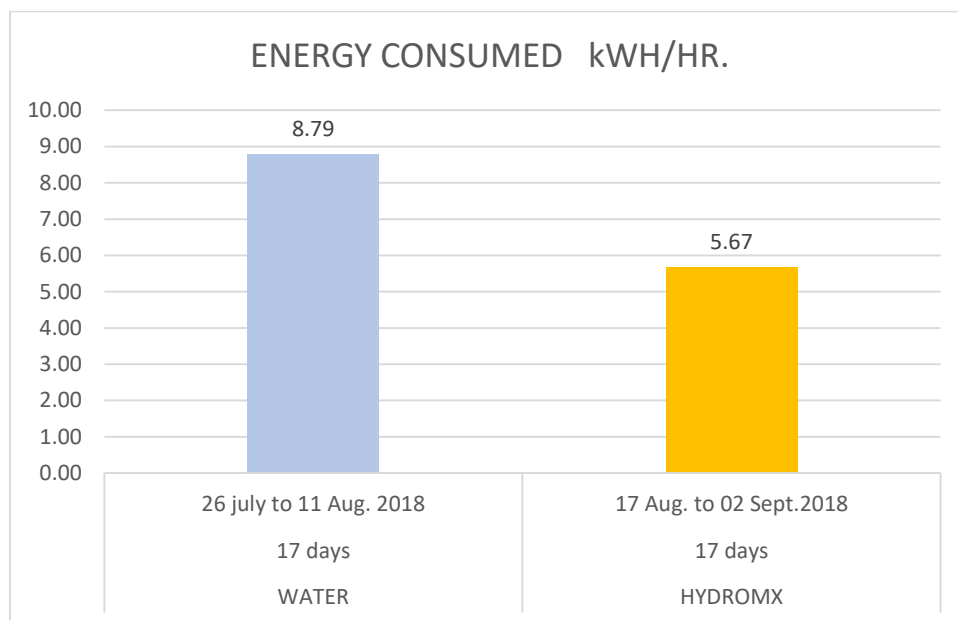
DIRECT SAVINGS AS PER ACTUAL POWR CONSUMPTION DATA		
Note: the average cooling load /hour is considered 20 TR/HR; the normal working hours 15 per day and 300 days a year		
CHILLER II	WATER	HYDROMX
IF WE TAKE AVERAGE COOLING LOAD PER HR.	20 TR	20 TR
ENERGY CONSUMPTION per TR IKW/TR	0.84	0.61
ENERGY CONSUMPTION for 20 TR kWH	16.74	12.20
AVERAGE RUN TIME PER DAY HR	15	15
ENERGY CONSUMPTION per day kWH	251.10	182.93
ENERGY CONSUMPTION PER YEAR kWH	75330.84	54878.05
YEARLY ENERGY SAVINGS kWH		20452.80
RATE OF ELECTRICITY INR/kWH		7.00
AMOUNT SAVED IN A YEAR INR		143169.57

SYSTEM PERFORMANCE:

ENERGY CONSUMPTION IKW/TR	REDUCED	27.2%
COP	INCREASED	37.3%
CHILLER RUN TIME PER DAY	REDUCED	22%
EMMISSION CO2 REDUCTION PER YEAR	REDUCED	16362 kg /year

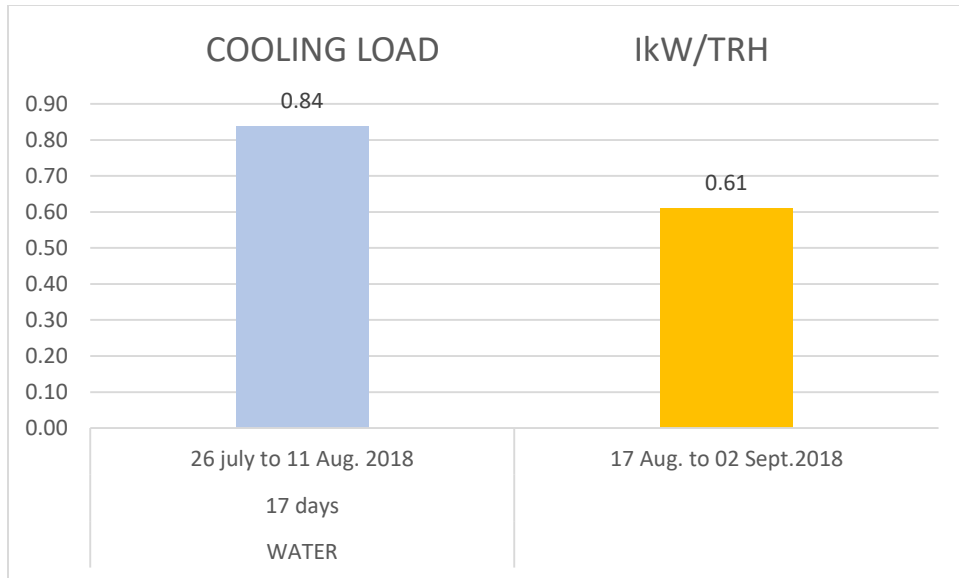
1. ENERGY CONSUMPTION: kW / HR

		WATER	HYDROMX
		17 days	17 days
		26 july to 11 Aug. 2018	17 Aug. to 02 Sept.2018
ENERGY CONSUMED	kWH/HR.	8.79	5.67



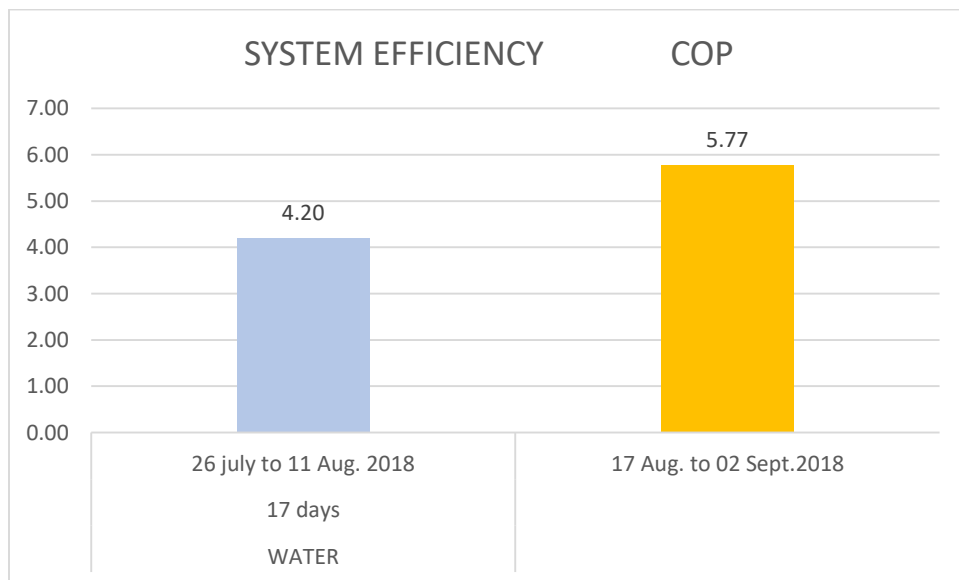
2. COOLING LOAD: IKW / TRH

		WATER	HYDROMX
		17 days	17 days
		26 july to 11 Aug. 2018	17 Aug. to 02 Sept.2018
COOLING LOAD	IKW/TRH	0.84	0.61



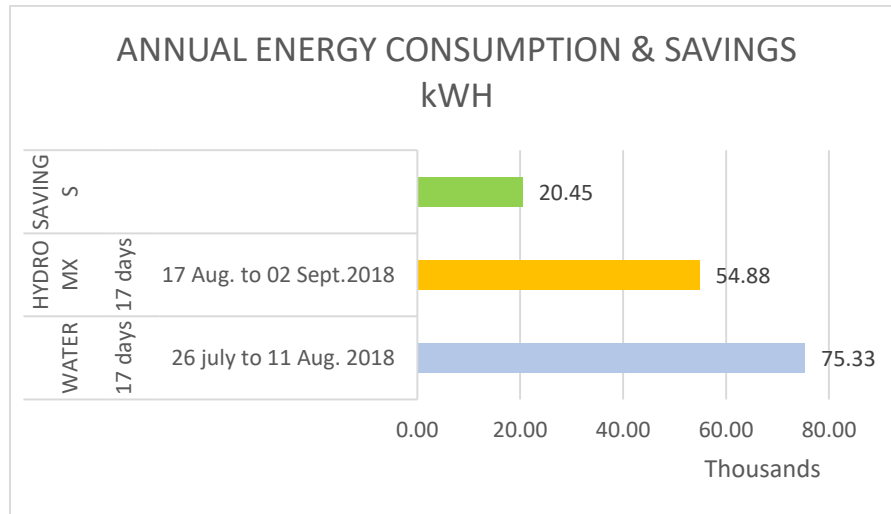
3. SYSTEM EFFICIENCY: COP

		WATER	HYDROMX
		17 days	17 days
		26 July to 11 Aug. 2018	17 Aug. to 02 Sept. 2018
SYSTEM EFFICIENCY	COP	4.20	5.77



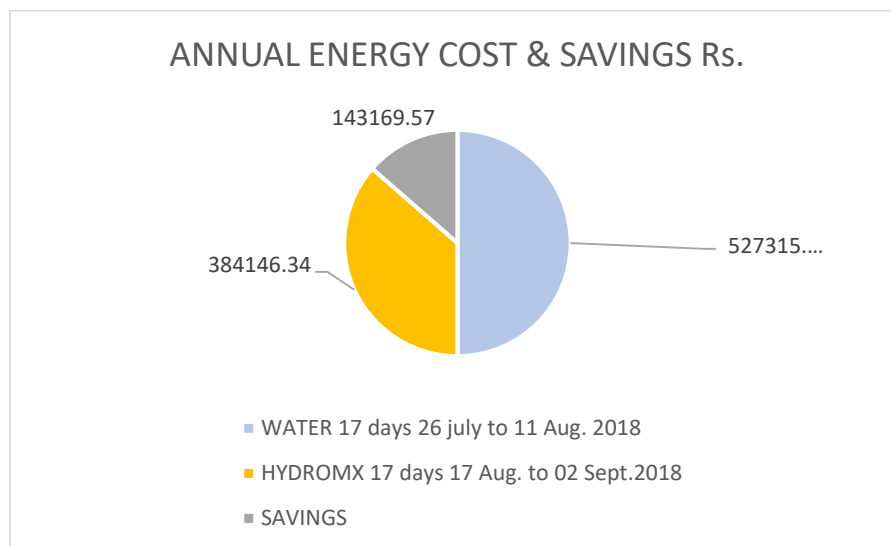
4. ANNUAL ENERGY CONSUMPTION & SAVINGS

		WATER	HYDROMX	SAVINGS
		17 days	17 days	
		26 july to 11 Aug. 2018	17 Aug. to 02 Sept.2018	
ANNUAL ENERGY CONSUMPTION & SAVINGS	kWH	75330.84	54878.05	20452.80



5. ANNUAL ENERGY COST & SAVINGS

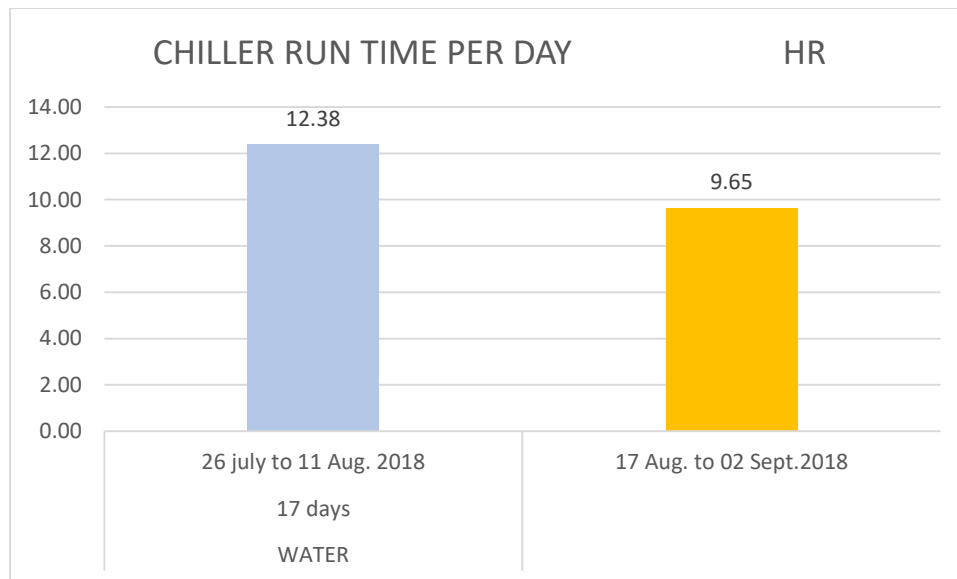
		WATER	HYDROMX	SAVINGS
		17 days	17 days	
		26 july to 11 Aug. 2018	17 Aug. to 02 Sept.2018	
ANNUAL ENERGY COST & SAVINGS	Rs.	527315.91	384146.34	143169.57



1. INVISIBLE ENERGY SAVINGS: IMPACT ON CHILLER RUN TIME:

There is reduction of 22% in RUN TIME per day of the chiller. This reduction in run time will indirectly made an impact on the life cycle of the chiller by reducing the requirement on maintenance. Thus, an invisible saving is achieved in addition to the direct savings.

		WATER	HYDROMX
		17 days	17 days
		26 july to 11 Aug. 2018	17 Aug. to 02 Sept.2018
CHILLER RUN TIME PER DAY	HR	12.38	9.65



2. TOTAL CO2 REDUCED IN ONE YEAR = 16362 KG

3. ADDITIONAL BENEFITS

ADDITIONAL BENEFITS OF HYDROMX AFTER INSTALLATION.
VERY NEGLIGIBLE TOP UP OF WATER IS REQUIRED
NO SHUT OF PLANT FOR FLUSHING IS REQUIRED
NO CHEMICAL DOSING IN PLANT FOR CORROSION/SCALING IS REQUIRED
AS NO CHEMICAL IS DOSSING IS REQUIRED, LIFE OF PIPE LINES AND PLANT INCREASED
NO EXTRA MEN POWER IS REQUIRED
NO PROBLEM OF FREEZING AS HYDROMX CAN GO UPTO - 60 °C
AMOUNT SAVED YEARLY ON MAINTENANCE WILL FURTHER REDUCE THE ROI.

CONCLUSION

1. The results indicated are for the duration of 17 days period, while using water and Hydromx in the system as heat transfer fluids under similar conditions of operation.
2. Energy Consumption per unit cooling load (1kW / TR) is reduced more than 27% in case of Hydromx as medium of heat transfer vs. water
3. Consumption of Energy per hour (kW / HR) is reduced around 35% in case of Hydromx as medium of heat transfer vs. water

4. The Chiller Run time per day has decreased by 22%.

This is the indicator of visible saving, but there is indirect saving as well. This saving is in terms of reduced maintenance of CHILLER and related equipment because of less run time.

5. Based on the observed data and assuming the average cooling load of 20 TR, 15 hour/day run for 300 days working in a year; the average savings per year are

Saving in energy consumption	27%
Annual energy saved	20452.80 kWH
Annual energy cost saved @ INR 7/kWH	INR 143169.57
ROI	33 months

Therefore, taking an overall view of the system the savings are more than 27% and the system performance has improved more than 37% when Hydromx is used as heat transfer fluid in place of water.

CASE STUDY PREPARED BY



Dr. K.C. Sharma

B.E.(Mech.), MTech. (IIT, Mumbai), Ph.D., UNQC-QIP(Japan)

Fellow: FIE, ISTE, SAE

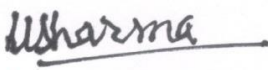
Consultant

Galaxy Energy Solutions, Jaipur

Dr. K.C. Sharma, consultant to Galaxy Energy Solutions, is a retired Professor of Mechanical engineering with more than 45 years of experience in the areas of academics and industries. The experience relates to the disciplines of Research and Development, Production processes, Quality management, and consultancy services

As an academician, he served over 22 years in various institutions including SVNIT Surat. He was Director of the Engineering Faculty in MGCG University, Chitrakoot (MP).

Mr. Sharma acquired quality management skill through international courses organized by Govt. of Japan and UNIDO. He attended number of national seminars and workshops as well. He also has to his credit number of papers published in national and international seminars and journals. He is a member / fellow of technical societies and institutions.


Dr. K.C. Sharma
Fellow: FIE, ISTE, SAE
B.E.(Mech.), M.Tech.(IIT Mumbai)
Ph.D., UNQC-QIP (Japan)

THANKS