Design And Fabrication Of Frosty Bike Seat Cover

Dr.A.Mohan Kumar, M.Gowthaman, M.Harikrishnan, A.Kesava nanthanan

Abstract: Nowadays, Motor bikes are used as the most common vehicle. People majorly used to park their vehicle in closed parking lot. Sometimes people even also used in open parking lot. While parking the motor bike in open space the seat of the bike gets heated easily due to exposure of sun. In this situation, people used their vehicle it is not convenient for people who ride the bike comfortable. It also causes irritation to riders as well as passengers who sits back of the rider. So this project has been planned to reduce the heat of the Motor bike seat and make comfortable feel for people with less cost.

Keywords: motor bike seat, copper tubes, heat conductivity , nozzle

1 INTRODUCTION

In developing countries, Motor-bikes are the most utilised vehicle because it is considered due to lower price and greater fuel economy when compared to other vehicles. Of all the motor-bikes in the world, 60% are in the Asian countries. According to US Department, motor- bikes are travelled 37 times higher than cars. So, the heat of the Motor-bike seat is considered as one of the major problem in the sweltering countries. Nowadays, the weather is getting too hot especially in summer season. When the motor bikes are supposed to expose in sunlight, the seats get overheated. This may cause irritation or trouble to the drivers as well as the person who is sitting back. People use indoor parking lot to park the two wheelers, Sometimes the vehicle are parked in open space. So, the seat gets easily heated. To overcome this, seat covers are used. There are varieties of bike seat covers are available in the market. Most bikers go for long rides or long travels. In this case, seat covers can get hot easily and there might be chances of heating human body easily. Normally, seat covers are used to make comfort and protect thebike seat. But, it cannot reduce the heat of motorbike seat. Net type seat covers are majorly used to reduce the heat. After certain period, it will damage the bike seat. It is also not easy to clean the dust inside the seat. It catches fire easily. Net- type seat covers are majorly used to reduce the heat. After certain period, it will damage the bike seat. It also was not easy to clean the dust inside the seat, catches fire easily and a lot of slippery. So this project has planned to design and fabricate the cooling seat cover.

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2 MATERIALS

COPPER TUBES

Copper is soft, malleable and ductile metals with high thermal conductivity material among other metals. Copper 6mm diameter tubes are widely used in heat transfer units such as evaporator, condenser, refrigerator etc due to unique combination of relative strength, corrosion resistance and high thermal conductivity. U bent copper 6mm diameter tubes are welded to join one tube another.

Fig. 2.1*. copper tubes*

NOZZLE

A nozzle is often a pipe or tube of varying cross sectional area, and it can be used to direct or modify the flow of a fluid (liquid or gas). The convergent nozzle used in this project. This nozzle has converges its area with respect to its length. Due to decreases its area, fluid pressure also decreases. This will increase the velocity of the fluid. connections are made by 6mm diameter fluid plastic tubes.

Fig. 3.1*. Experimental setup*

3.2 WORKING PROCESS

2.3 PUMP

***Fig. 2.2**. Convergent nozzle*

Water is used as a fluid. The 9 volt battery is supplied power to the pump. Due to external power supply to the pump, the pump sucks the water from the tank, it delivers to the inlet of the nozzle. The pressure of fluid gets decreases and the temperature of the fluid decreases. Due to itsMini submersible pump are used to pumpthe water from low head to high head.The major advantage to a submersible pump is that it never has to be primed, because it is already submerged in the fluid. Submersible pumps are also very efficient because they don't really have to spend a lot of energy moving water into the pump. Water pressure pushes the water into a submersible pump, thus "saving" a lot of the pump's energy. These pumps are quiet and very efficient. pressure decreases, the velocity of the fluid increases in the nozzle. This velocity is sufficient to flow the water inside the copper tube without any leakage. The other end of the copper tube is connected to the tank. This process works continuously in cyclic process. Due to cyclic process the temperature of the seat reduces.

***Fig. 2.3**. Mini submersible pump*

3 EXPERIMENTAL PROCEDURE

3.1 EXPERIMENTAL SETUP

Nozzle
Storage tank with pump

Copper tube
Plastic tubes
The copper tubes are bended like condenser coils. Its placed above the top layer of the motor bike seat. The convergent nozzle is joined with inlet of the copper tube by using bracing operation. The storage tank with pump is fixed below the motor bike seat. pump outlet is fitted with the inlet of the nozzle. Other end of the copper tube is connected in the tank. These

***Fig. 3.2**. Water flow process in setup*

4 DESIGN AND CALCULATIONS

DESIGN
The 3D Model of the frosty bike seat cover is shown below. This 3D model has been drawn

using SOLIDWORKS version 2019 software package.

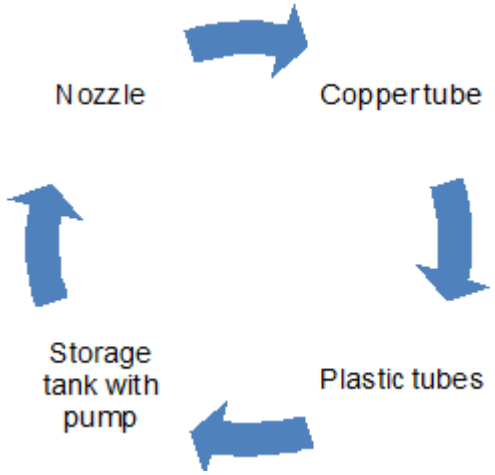

***Fig. 4.1**. Design of Frosty bike seat cover*

SAMPLE CALCULATIONS

Calculation of pressure

P= (h * SG) / 10

minutes the temperature of the bike seat reduces was shown in the below table.

Table 1

Classifier	Unimodal	FAR	FRR	EER(%)	GAR
KNN	Palmprint	0.07	0.015	4.25	0.985
	Fingerprint	0.05	0.0373	4.365	0.9627
	Face	0.07	0.0172	4.36	0.9828
SVM	Palmprint	0.04	0.0251	3.255	0.9749
	Fingerprint	0.04	0.0348	3.74	0.9652
	Face	0.05	0.0204	3.52	0.9796

S
. N O

TIME TAKE N FOR BIKE SEAT HEATI NG (min)

BIKE SEAT TEMPER ATURE (°C) AFTER USE OF WORKING FLUID (WATER)

TIME TAKE N FOR COO LING (min)
TEMPER ATURE OF COPPER TUBES(°C)
TEMPER ATURE OF BIKE SEAT(°C)

1	0	34	0	80	80
2	5	46	3	77	77
3	10	49	6	73	74
4	15	55	9	67	70
5	20	68	12	59	67
6	30	77	15	51	64

Temperature of the bike reading using water at 300C

P = (0.12 * 1) / 10 P = 0.012 bar.
Calculation of velocity

V1= (Q / (A * 3600)) A = (Π * d2) / 4
A = (3.14 * 62) / 4 A = 28.26 mm2
V1= (80 * 10-3 / (28.26 * 10-6 * 3600))

V1= 0.786 m/s

V2= V1 * (1+ ((2 * X) / L))

V2= 0.786 * (1+ ((2 * 0.05) / 0.05))

V2= 2.358 m/s

5. RESULTS AND COST ESTIMATION

RESULTS

It is possible to reduce the temperature of the seat. By using water at room temperature, consider room temperature is 300C. Every 5The water from the tank is circulated continuously due to continuous power supply from battery to the pump. Due to high thermal conductivity of copper, this transfers this water temperature to the seat. To provide cushioning above the copper tube the silicone gel foam is fixed.

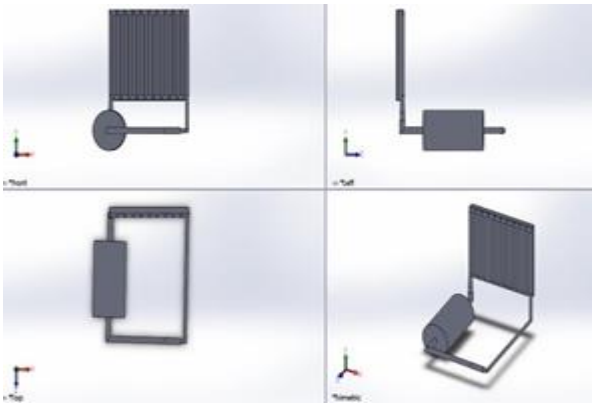

Fig. 5.*1. Graph between temperature of the seat and seat*

COST ESTIMATION

The estimated cost of this bike seat was shown in the below table

Table 2
Cost estimation

S. NO	TIME TAKE N FOR BIKE SEAT HEATI NG (min)	BIKE SEAT TEMPER ATURE (°C)	AFTER USE OF WORKING FLUID (WATER)		
			TIME TAKE N FOR COO LING (min)	TEMPER ATURE OF COPPER TUBES(°C)	TEMPER ATURE OF BIKE SEAT(°C)
1	0	34	0	80	80
2	5	46	3	77	77
3	10	49	6	73	74
4	15	55	9	67	70
5	20	68	12	59	67
6	30	77	15	51	64

S.NO.	MATERIAL NAME	COST IN (Rs.)
1	Copper tube	2000
2	U bent copper tubes (32 U bent tubes used)	850
3	Seat with foam	500
4	Storage tank	100
5	Pump	100
6	Point nozzle	40
7	Connecting tubes	10
8	Allowance	400
	Total	4000

6 CONCLUSION

ABBREVIATIONS

Table 3 *Units measured*

Symbols	Units
P	Pressure (bar)
h	Distance between pump centre and nozzle(m)
SG	Specific gravity of water
V_1	Inlet velocity (m/s)
V_2	Outlet velocity (m/s)
A X	Area of the nozzle

REFERENCES

[1] Dehne, T., Lange, P., Volkmann, A., Schmeling, D., Konstantinov, M., & Bosbach, J. (2018). Vertical ventilation concepts for future passenger cars. Building and Environment,129(August2017),142–153. https://doi.org/10.1016/j.buildenv.2017.11. (Dehne et al., 2018)

[2] Zhou, J., Yan, L., Tang, J., Sun, Z., & Ma, L. (2018). Interactive effect of ant nest corrosion and stress corrosion on the failure of copper tubes. Engineering Failure Analysis, 83(June 2017), 9–16. https://doi.org/10.1016/j.engfailanal.2017.09.013 (Zhou, Yan, Tang, Sun, & Ma, 2018)

[3] Nienhaus, V., Smith, K., Spiehl, D., & Dörsam, E. (2019). Investigations on nozzle geometry in fused fi lament fabrication. Additive Manufacturing, 28(May), 711–718 https://doi.org/10.1016/j.addma.2019.06.019 (Nienhaus, Smith, Spiehl, & Dörsam, 2019)

[4] Carrier, W., York, N., & Berkeley, L. (2019). Mini condensate pump evolution. (February), 24–26. https://doi.org/10.1016/S0262-1762(19)30073-2 (Carrier, York, & Berkeley, 2019)

[5] Cited, R., & Documents, U. S. P. (1992). United States Patent (19) Aldi 11 Patent Number : Date of Patent : (19). (Cited & Documents, 1992)

[6] Bom, R., Sales, C., & Rodrigues, R. (2017). Thermal comfort of seats by infrared thermography62,142–149. https://doi.org/10.1016/j.apergo.2017.03.003 (Bom, Sales, & Rodrigues, 2017)

[7] Liu, Y., & Su, Y. (2018). Experimental investigations on COPs of thermoelectric module frosting systems with various hot side cooling methods. Applied Thermal Engineering,144(January),747–756. https://doi.org/10.1016/j.applthermaleng.2018.08.056 (Liu & Su, 2018)

[8] Akbar, A., Arani, A., & Moradi, R. (2019). Shell and tube heat exchanger optimization using new baffle and tube configuration. 157(April). https://doi.org/10.1016/j.applthermaleng.2019.113736 (Akbar, Arani, & Moradi, 2019)