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THERMAL PERFORMANCE OF BECOOL-ROOF COATING IN REDUCING HEAT GAIN ON FISHERMAN'S SETTLEMENT OF GORONTALO CITY

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Introduction

- Tanjung Kramat in Gorontalo, Indonesia is a village fostered by the department of Architecture, Universitas Negeri Gorontalo.
- The village is home to around two hundred families whose majority job is fishing.
- The people suffer from the uncomfortable condition of tropical coastal environment due to the high air temperature, humidity, and wind speed [1]
- People prefer to cover their upper structure using metal zincalume roof since they are more affordable but the roof accounts for excessive heat gain to the house.

Literature Review

- To obtain comfortable conditions inside the building, one of the approaches is to apply a passive cooling strategy [2]
- Cool paint applied on the roof on a single storey house in Jamaica reduces surface temperature of 2.5–5.5 °C and gained energy saving of 7.5% [3]
- The Becool roof paint has showcase its performance in reducing heat gain on the roof all over the cities of Indonesia [4]
- Becool Cool Roof Coating is applied on the roof with the purpose of reducing heat gain and elevating thermal comfort in the village

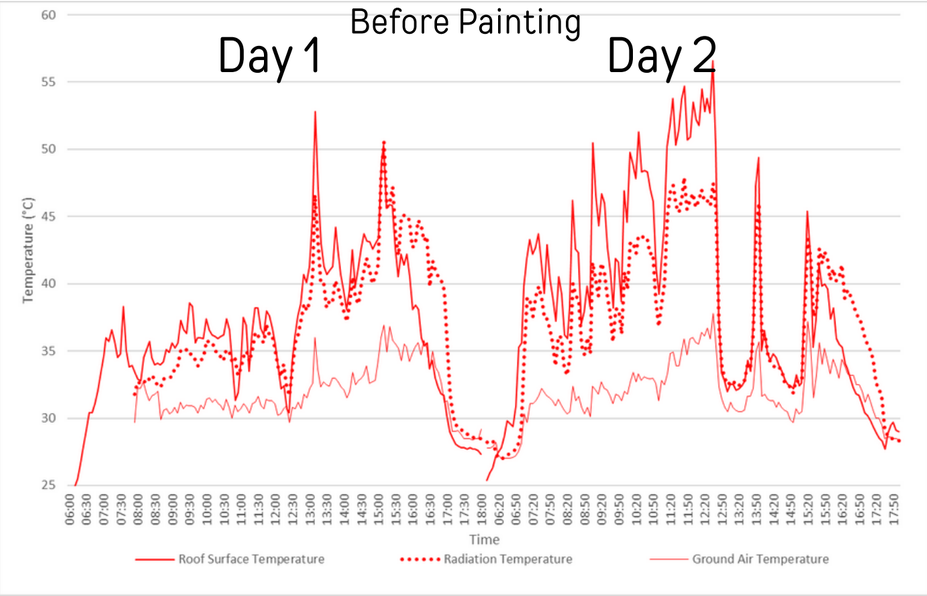
Method

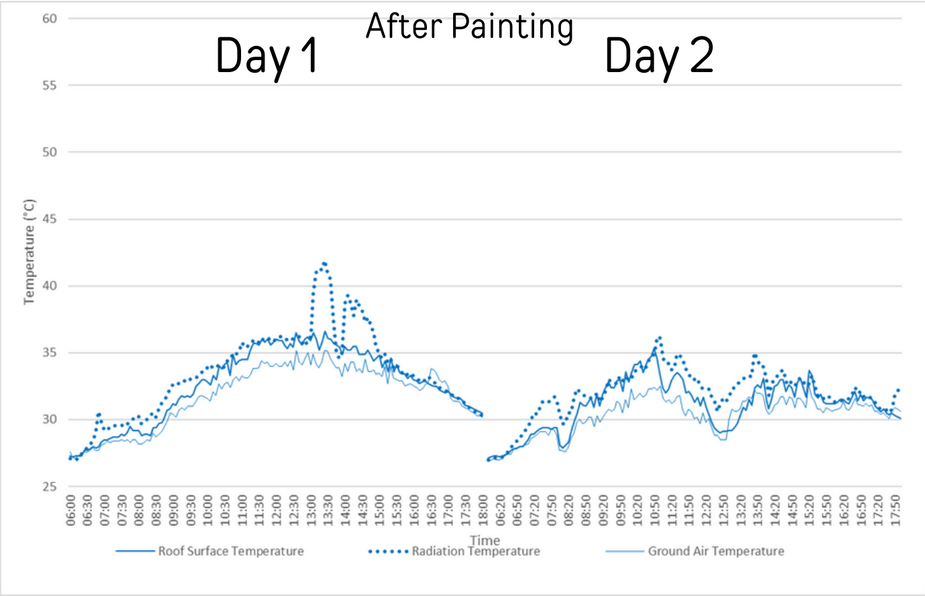
- Thermal perfomance of the cool roof coating is evaluated by comparing the environment condition before and after the painting.
- Roof surface temperature, solar radiation temperature, and near ground air temperature, are variables compared to explain the changes in the environment condition.
- Measurement conducted on two houses in four days. Two days before the application of cool roof coating, and two days after the application.
- Data is collected from 6 AM to 6 PM.
- The measured data is plotted on a graph to see the change of temperature from the morning until the afternoon

Result and Discussion

Measurement Result for House 1

- Maximum temperature of the roof surface is lower by about 20°C
- Average roof surface temperature is 5.9 °C lower
- On average, air ground temperature recorded a decrease of 0.8°C

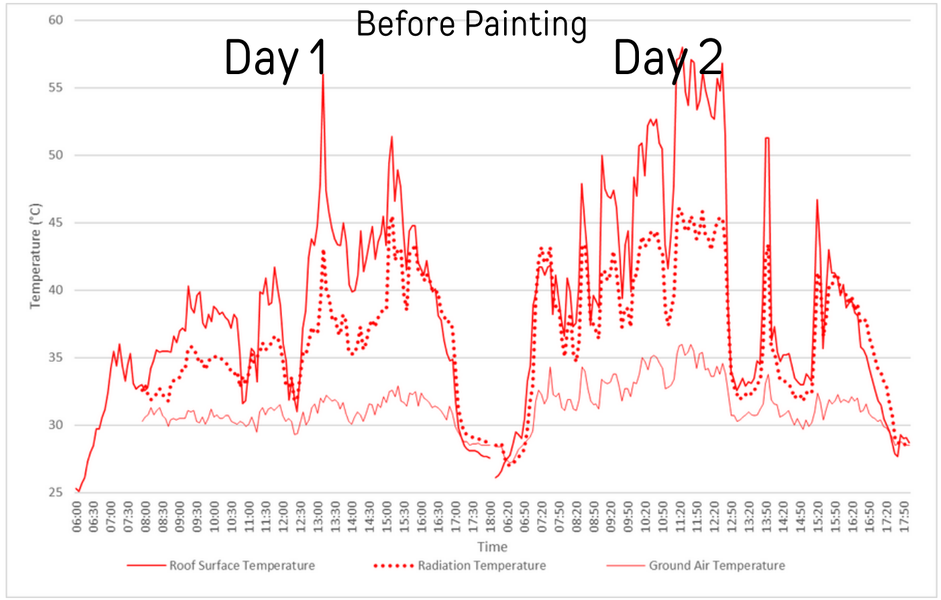


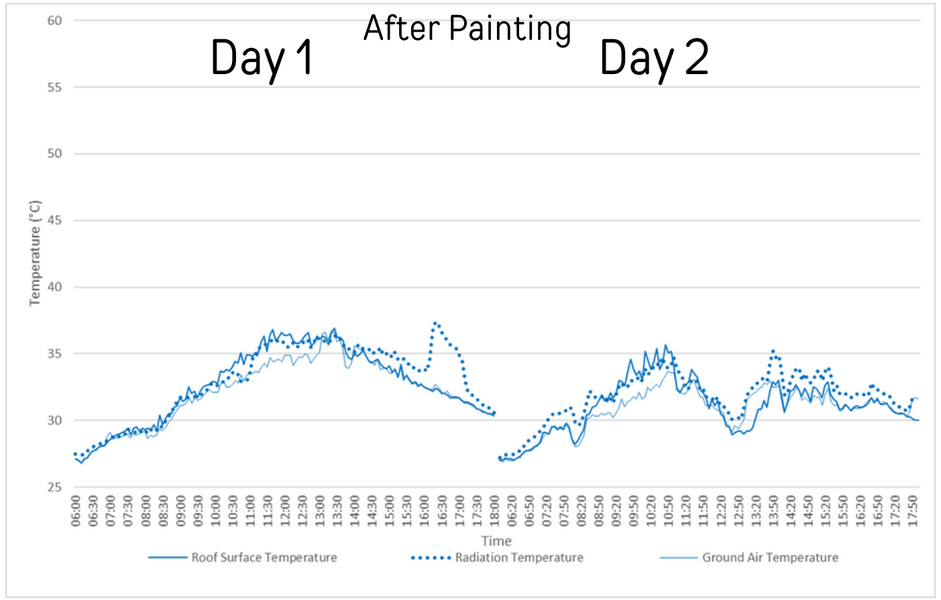


Result and Discussion

Measurement Result for House 2

- Maximum temperature of the roof surface is lower by about 21.1°C
- Average roof surface temperature is 6.9 °C lower
- Meanwhile, average air ground temperature has a slight increase of 0.16°C





Conclusion

- Cool roof coating is applied on the fisherman's settlement roof to tackle the heat gain on metal zincalume roof.
- The application of cool roof coating can greatly reduce roof heat gain, indicated by the low roof surface temperature
- Even though the trend result of ground air temperature in house 2 is a bit different among the measured houses, the cool roof coating still poses a beneficial result to the environment.
- Overall, it can be concluded that the cool roof coating has succeeded in improving the environment of Tanjung Kramat village.

References

1. A. Kaharu, J. Kindangen, and J. Waani, “Analisis Kenyamanan Thermal pada Rumah di atas Pantai Tropis Lembab Studi Kasus Rumah Atas Pantai Desa Kima Bajo, Kabupaten Minahasa Utara,” Jurnal Arsitektur DASENG, vol. 6, no. 1, 2017.
2. M. A. Kamal, “An overview of passive cooling techniques in buildings: design concepts and architectural interventions,” Acta Technica Napocensis: Civil Engineering \& Architecture, vol. 55, no. 1, pp. 84–97, 2012.
3. M. Kolokotroni et al., “Cool roofs: High tech low cost solution for energy efficiency and thermal comfort in low rise low income houses in high solar radiation countries,” Energy Build, vol. 176, 2018, doi: 10.1016/j.enbuild.2018.07.005.
4. B. Paramita, R. Srinivasan, and A. Nurul Hanissa, “progress cool roof 31012020.” Jan. 2020.