regression equation based on full factorial design sets for the proposed TEG is given:

Output Power = 1.038 – 0.007162 (Al Thickness) – 0.000225 (Al Width) + 0.000408 (Al Thickness*Al Width) (7)

The predictive equation (7) is the mathematical representation that useful to get an instant evaluation of the proposed TEG output power. This predictive equation is really helpful especially for those who are building the prototype of the proposed TEG, where the calculated output power can be correlated with the measured data from the prototype. Thus, any discrepancy or offset between the calculation and the measurement can be used to determine the losses that might occur in the practical application of proposed TEG.

IV. CONCLUSION

The design and modeling process of simple construction of TEG with Al plate is built using finite element analysis (FEA) software of ANSYS. The effect of two factors namely Al plate thickness and width are analyzed towards the performance of TEG. It is found that the changes of Al plate thickness and width has different behavior on the thermal and electrical performances of TEG. Based on the design of experiment with full factorial method that has been conducted, it is noted that design set 1 with the lowest value of Al plate thickness and width has the highest or optimum performance of heat rate, current, output power and conversion efficiency. It is noted that the reduction in performance for the design set 3 (with highest value of Al plate thickness and lowest value of width) can be compensated by increasing the value of Al plate width as being applied by design set 4. This is because of the reduction of thermal resistance as shown in design set 4. The efficiency obtained from the current analysis also has a value of around 9% as compared to that of normal BeTi alloy based TEG. It is also found that the Al thickness is the most sensitive factor on changing the performance of TEG compared to that of Al width.

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