Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

5. semester
CIW I
20.09.2017

Mario Stucki : E 113 Tel 3 60 68 mario.stucki@chem.ethz.ch
Fredy Mettler: D 182.5 Tel 2 45 27 fredy.mettler@chem.ethz.ch

Cooling of a processor

Aim of experiment:
This experiment is focused on the study of all three forms of heat transport (convection, conduction, radiation). There are several different coolers with which you can show the different heat transport phenomena. At first think about how you can show heat radiation and heat conduction. How would you show convection?

Experimental setup

There are different coolers available:

- Original processor cooler
- „Super-silent“ ventilator
- Heat exchanger without ventilator
- Radiator (black and white)
- Water cooler
- Thermal mass (copper)

Task

How much heat does the processor radiate. Normal / full load?
What is the efficiency of the processor? Determine the efficiency by the required energy use of the computer and the measured heat production

How does the heat transfer coefficient change using different flow rates.

Which cooler is the most efficient? Compare therefore the heat transfer coefficient with each other. Try to estimate the measuring error (Error of temperature sensor). Interpret the received data, especially the differences between the heaters, the heating power of the processor measured with water cooler and thermal mass and the influence of the error on your results. What is the limiting step?

The received results can be saved on the computer and saved on the provided Memory stick.

Report

Write a report explaining why you have made the experiments and what you wanted to show. Then evaluate your data and do the interpretation.

Structure of Report:
Abstract: Summary of what you have done approximately a half a page (Write this at the end of the report)
Theory: Explain the problems of heat transport and how heat transport occurs from a solid to the gas phase as an example. Try to get enough information therefore from the scripts and the Internet.
Experimental : Show how the experiment was built up and what you have done
Results and discussion: The obtained results should be worked into the text as a graph and explained why it has that shape as well as comparing the cooling systems with each other and show advantages and disadvantages.
Summary/Outlook: Sum up the most important results and explain what could be done to improve the efficiency to cool the processor