

I02081: Team T P-A-1 Assignment

Cooler is better

DE-IO-TUDELFT

2012-2013

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Fiction case study, for education only

IO2081: TEAM T - P-A-1 ASSIGNMENT

Cooler is better

Curver® Benelux BV (better known as Curver®) is a Dutch manufacturer of household plastic products. Curver® wants to put a children's beaker on the market that keeps a portion of juice nicely cool from home until morning break. They have a 0.5 L cup that serves as a starting point and they ask you to test this cup for its insulating qualities and give advice on the design of the beaker. The 0.5 L cup is obviously too big. They want to know the (dis)advantages of each of your improvements. More fundamental understanding is needed, complete with actual (measured) values for our material's heat resistance and specific heat capacity.



Courtesy of www.curver.com

Suggested steps (general)

1. Think – how does it work? (cause – effect);
2. Thought simulation, what parameters do you need to model its operation? Can you find the input via research or measurements?
3. Draft a time-dependent abstract model, either on paper or in Maple®, and list your own assumptions;
4. Set up an experiment to:
 - a. Find the unknown parameters (if available);
 - b. Verify the draft abstract model;
5. Finish your abstract model in Maple® or any tools which are necessary;
6. Verify it with your own thoughts and verify it with another experiment, this time under different conditions;
7. Evaluate it (and advise on improvement of the design), and point out the sources of discrepancies between your models and your measurements.

Setting up your experiment (practical)

For your measurements the following items are available:

1. Product (Curver® cup);
2. Hot water from boiler and/or cold water from tap;
3. Wired temperature sensors (3 sets, why?) with a multimeter;
4. Tapes;
5. Other measuring tools (for volume, length, time, etc.).

Set up your experiment goals, strategy and steps well in advance, since the time and space in the lab is limited!

Suggestions:

1. To accelerate the experiments, use water from the fridge and/or from the boiler;
2. Clean the bottle and use water for the experiment (why?);
3. The temperature of the water should not be higher than 65 degrees;
4. Use one multimeter to read all the values by switching the sockets of the temperature sensors;
5. Be sure the sensors are attached well and stay in the same place during the experiment;
6. Clean up afterwards.

Hand in:

1. Report – No more than 15 pages, featuring:
 - a. A logical order;
 - b. Descriptions: each steps in the modeling cycle as applied to your assignment and your actions;

- c. Abstract model with Maple file; Results of abstract model with the comparisons of the experiments; New designs;
 - d. Conclusions & Recommendations.
2. Presentations.