



Phone Forum Discussion Summary

August 11, 2003

THIS DOCUMENT summarizes the discussion during the Labs21 phone forum, "Optimizing Laboratory Ventilation Design."

Q: *In your presentation you mentioned that every air change rate that was reduced had a maximum fan energy savings of 3 percent. This number seems fairly low—can you explain how you came to that rate of savings?*

A: There was a floor-to-floor height restriction of 11 feet, with small ducts running vertically. This increased the amount of static in the room and resulted in a 3 percent savings rate.

Q: *Have the buildings been tested to see how accurate the modeling was? Has anyone taken measurements in the completed facilities?*

A: The Princeton University Guyot Hall Addition has not yet been built, and the lab construction is currently underway. We do have anecdotal evidence that shows a close correlation between the accuracy of CFD modeling in helping to predict and plan ventilation design. There are several cases where CFD modeling was able to predict what would happen once the facilities were built.

Q: *During the design process, you often don't know how the space will be used. How do you address this variable?*

A: Modeling or trying to predict every scenario is expensive and can be very time consuming. Often the best way to address this concern is by modeling a worst-case scenario or a scenario that you know will be particularly challenging such as high heat loads, user concerns, or fume hood placement. We were able to test different layouts in some of the models, which was the most cost-effective way to address multiple scenarios.

Q: *Were the fume hoods variable volume?*

A: No, in this case they were not. The fume hood selection was not up to RWDI, though CFD modeling can allow for variable volume. The design itself was variable volume.

Q: *What costs should be planned for if you want to include CFD modeling in the budget?*

A: There is a large range of possible costs depending on the sophistication of the model. For example, it can range anywhere from \$6,000 to \$50,000 depending on the configuration of the model. It is worth noting, however, that we did research the payback of modeling and it pays back in approximately one year.

Q: *With CFD modeling, is it more efficient to have equipment (such as fume hoods) equally distributed throughout a room, or to consolidate all the equipment into one corner? Which scenario would save the most energy?*

A: In general, when you're in cooling mode, it would be more efficient to have the equipment consolidated, and when you're in heating mode, to have the equipment equally distributed. It is possible to determine through CFD modeling which scenario would be more efficient. That being said, it is important to note that those kinds of questions really should be included early on in the conversations about the specifications for the models. Our experience shows that CFD models can contribute better—and less expensively—to a design project if they are set up all at once, instead of creating two separate models as questions arise.

Q: *What code(s) did you use for this project?*

A: We focused on several different codes and in the end went with the Fluent Code, from New Hampshire. We also considered the Task Flow Code, and a version of the Phoenix Code. There is also a code called Flomerics that we considered.