

Advantages and Disadvantages of Building Prototype-Style Growth Chambers

Advantages

- They cost much less to build than to buy. The manufacturer's profit is no longer a factor.
- The electrical energy consumption is less than with a traditional chamber.
- They will need less maintenance because of the uncomplicated design and fewer unique components. The original prototype has proven to be very reliable over the past 4 years.
- Most chambers will not need refrigerants, eliminating the potential for leaks of CFC's and related reporting and compliance duties.
- The valves, pumps, and heat exchangers are the same in all chamber sizes, requiring a small spare parts inventory. This helps reduce chamber downtime and time spent sourcing, ordering, and stocking parts.
- The prototype-style design can maintain very tight temperature control, on par or better than commercially available chambers.
- Eliminating compressors at each chamber results in a much quieter chamber room.
- Fewer people would be needed in the chamber crew if prototype-style chambers became the Cornell standard. Probably only 3 people instead of 4 or 5 people.
- Lifetime manufacturer support for the controls system (Argus). Traditional chamber control systems generally become outdated and require costly upgrades every 5-10 years.
- The time to build a prototype style chamber is less than or equal to the time it takes a commercial vendor to spec, build, and deliver/install a chamber.
- Half of the chambers managed by CUAES are between 45-55 years old. Chamber breakdowns are a problem, and spare parts are becoming increasingly difficult to obtain. Investment in new growth chambers needs to happen soon, and the prototype-style chamber gives Cornell the most cost effective way not only to save money on getting new chambers, but also to save money on energy and maintenance costs for years to come.

Disadvantages

- The investment in infrastructure modification is substantial. The cost of installing chilled water and heating water loops could be mitigated if dozens of new chambers are made to share the same heating and cooling loops, especially if connecting to existing building heating and cooling infrastructure is feasible (e.g., Bradfield, Plant Science, and V/N lab chamber rooms).
- We don't know the actual cost for labor to build a chamberyet.
- No all-inclusive warranty on the chamber; however, many individual chamber components (e.g., pumps, valves, fans) are under replacement warranty by the manufacturers and the Argus control system (the most costly component of the chamber) comes with lifetime manufacturer support.