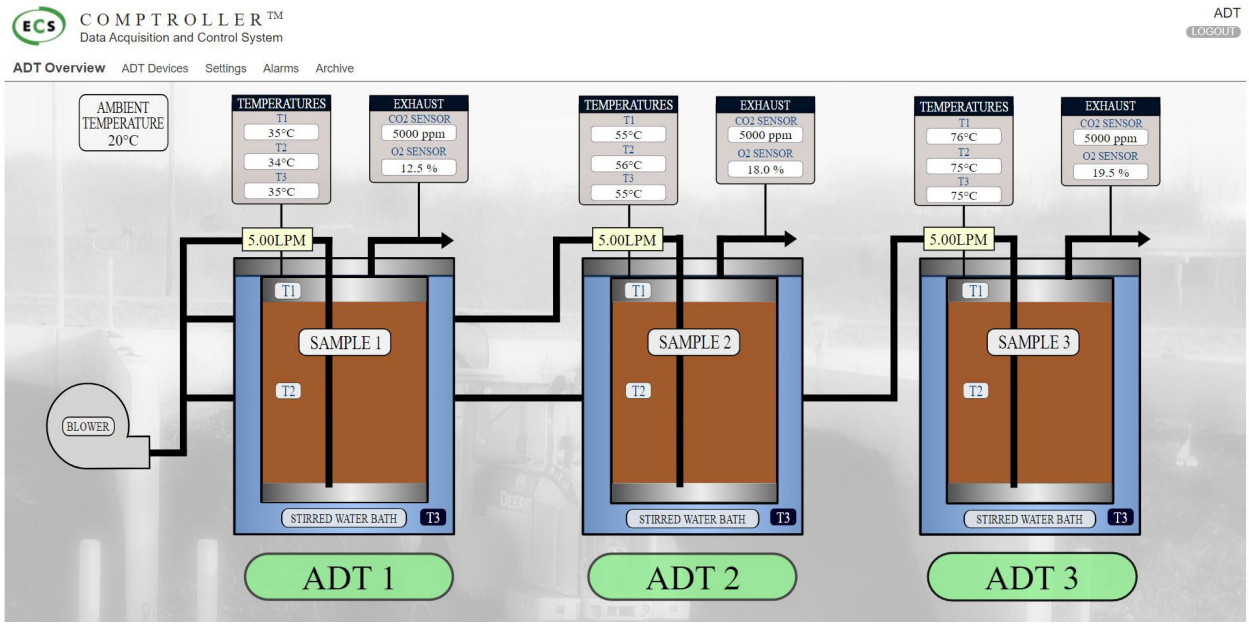
engineered COMPOST systems

ECS Compost Process Lab: *Taking the Guesswork out of facility optimization*

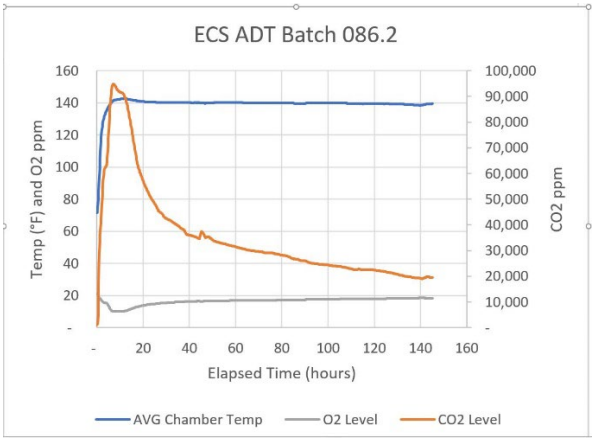
We developed the ECS Compost Process Lab to provide facility designers and developers a scientific basis to optimize their composting operations for their specific feedstocks, regulations, and process goals. The lab is equipped to continuously measure the relationship between realistic process conditions, such as temperature, oxygen levels, and feedstock characteristics, and the rate of biological degradation of the organic matter. By analyzing this data, we can quantify the expected performance that different facility design and operating parameters will produce. These insights provide a basis to make informed choices on economically important parameters such as: mix composition, retention time, process sequence and aeration system design.

The primary instruments in the Process Lab are three independently controlled and monitored Aeration Demand Testers (ADTs) that provide precise air flow and temperature control. The ADT's measure the real-time consumption of oxygen and generation of CO2, which are stoichiometrically dependent on one another and determine the instantaneous generation of heat. By assessing the total volatile solids and respiration (stability) at the beginning and end of the process using standard techniques, we can correlate the continuous CO2 production curve to both stability and to heat production over time. This allows us to test both high and low levels of process control, assess the costs and advantages of each, and provide clients a data-backed series of options so they can choose their best value.



CompTroller™ GUI main screen for the three ADT vessels

Three ADT Test Bench



Continuous CO2 & O2 Data

Questions We Answer in the ECS Process Lab:

- What retention time is required to achieve my stability goal?
- How does amending my impact the biodegradation rate?
- What is the worst-case odor generation rate?
- What is the best time to transfer material from primary to secondary composting?
- How fast will a specific bio-polymer degrade at specific temperature and oxygen level?
- What are the specifications of the most cost-effective aeration system for my feedstocks?
- When and how much water will I need to add to avoid over-drying feedstocks?
- How long should my process maintain mesophilic conditions to insure that food waste will reliably shift from acidic to neutral pH early in the process?
- What capacity aeration system (cfm/cubic yard of mix) will be most cost effective?
- How much cooling aeration will be required to maintain oxygen saturation in the water film layer above 3ppm?
- What temperature dependent biodegradation rate constants represent my specific feedstock so my process can be accurately thermodynamically modelled?