

Creating the Optimal Environment for the Hatchery

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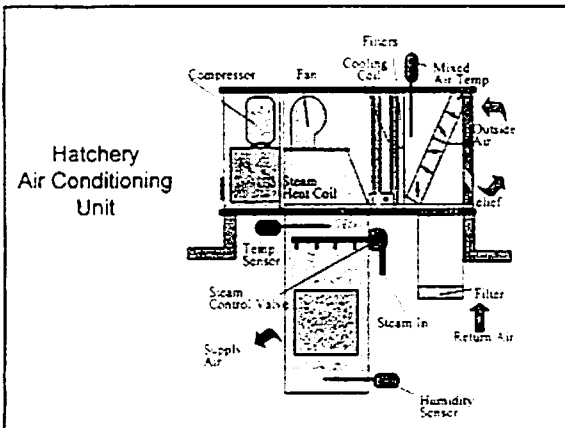
• Ventilation-(Webster)

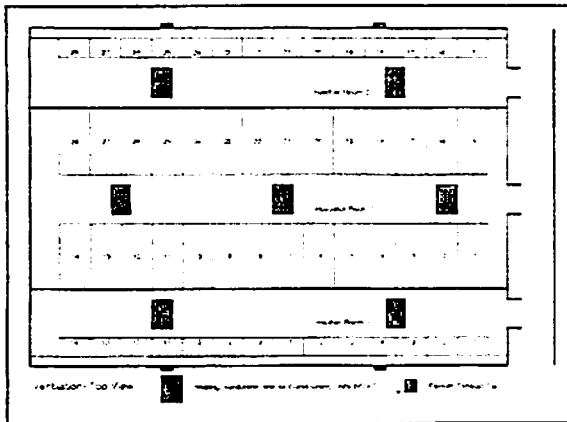
– To provide an environment to cause fresh air to circulate through a room & Exchange gases in the lungs for respiration.

The problems our industry has with hatchability and quality associated with ventilation is not primarily an air quality issue (Oxygen deprivation/CO2 buildup)—as it is an air volume issue restricted by improper room conditions and/or incubation equipment operation, limiting air flow necessary to hold egg/chick temperatures within the acceptable range.

Successful room ventilation—(Cooling) is composed of several pieces of equipment properly designed to fit the application.

- Cooling—HVAC or Evaporative Cool./Reznor combination
- Humidity—Steam or Water Atomization
- Controls—Environmental and Pressure





Advantages of HVAC

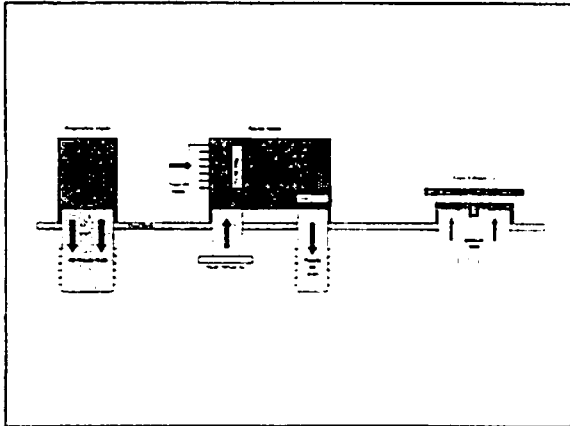
- Minimum equipment purchases
- Less Cost Vs. Evaporative Cooling/Reznor
- Minimum roof openings
- Reduced maintenance time and cost
- Ease of balance in each environmental area—modulating dampers contained in unit
- De-humidification capabilities as needed

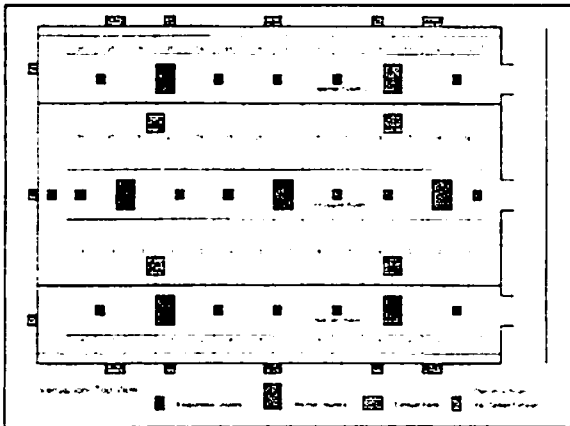
Disadvantages of HVAC

- Management is Critical! —Less than optimum room environment can be created (too cool or hot) *Because we can!*
- Retro-fit cost can be detrimental
- Electrical upgrades may be necessary
- New roof openings may be required or retro-fitted
- Operations cost slightly elevated—comparison slide later in presentation

Required Equip. & Cost of HVAC (28 machine installation)

Incubator	Description	Cost
3	20 ton units 0-100% Outside Air Cap.	\$38,400
Hatcher Room #1		
2	15 ton units 0-100% Outside Air Ca.	\$18,600
2	Plenum Varib. Speed Exh. Fans	600
1	Plenum Varib. Speed Controller	350
Hatcher Room #2		
2	15 ton units 0-100% Outside Air Ca.	\$18,600
2	Plenum Varib. Speed Exh. Fans	600
1	Plenum Varib. Speed Controller	350
	Total	\$77,500
Installation Notes		
	Total number of roof openings	7
	Total number of wall openings	4
	Total number of electrical services	5





Advantages of Evaporative Cooling

- Slightly less operational costs
- Until extreme room temperatures are attained (86 Deg. F. or higher) incubation machines will operate in the *cooling mode of operation* which has the effect of opening dampers and purging more air volume through the machines

Disadvantages of Evaporative Cooling

- Extensive # of roof and wall penetrations vs. HVAC
- More expensive initial cost vs. HVAC
- Rooms must be balanced—supply with exhaust—must have a 1 ½ to 2 minute room air exchange to be effective.
- No dehumidification capabilities—relative humidity is elevated by the operation of equipment—potentially above incubation equipment set point—reduces internal machine cooling effect
- Maintenance is extensive—belts, pad adjustments, motors etc.
- Sanitation control more difficult to manage—Asper., Pseudomonas, E.Coli issues etc.
- Not easily managed in changing seasons—back-flow dampers, when to install pads/remove pads etc.

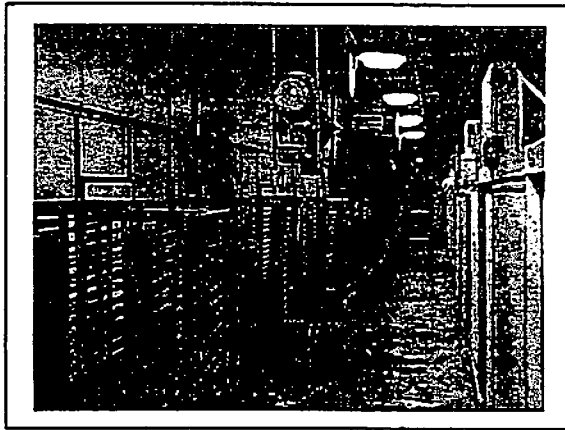
Required Equip. & Cost of HVAC (28 machine installation)

<u>Incubator</u>	<u>Description</u>	<u>Cost</u>
	3-400,000 BTU Reznor heaters, 0-100% O.A. Cap.	\$ 27,600
	7-2 speed Evap. Coolers	14,700
	4-2 speed Roof Mount Exhaust fans	3,200
	1-Room variable speed exhaust fan	500
Matcher Room # 1		
	2-300,000 BTU Reznor Heaters, 0-100% O.A. Cap.	\$ 16,600
	5-2 speed Evap. Coolers	10,500
	3-2 speed Wall mount exhaust fans	2,400
	2-Plenum variable speed exhaust fans	600
	1-Room variable speed exhaust fan	350
Matcher Room # 2		
	2-300,000 BTU Reznor Heaters, 0-100% O.A. Cap.	\$ 16,600
	5-2 speed Evap. Coolers	10,500
	3-2 speed Wall mount exhaust fans	2,400
	2-Plenum variable speed exhaust fans	600
	1-Room variable speed exhaust fan	350
	Total	\$106,100

Installation Notes:
 Total number of roof openings 28
 Total number of wall openings 13
 Total number of electrical services 39

Comparison of Required Equipment & Cost HVAC Vs. Evaporative Cooling (28 machine installation)

<u>Cost:</u>	<u>HVAC</u>	<u>Evaporative</u>
<u>Cooling</u>	\$ 77,500.00	\$106,100.00
Installation:		
Total number of roof openings	7	28
Total number of wall openings	4	13
Total number of electrical services	9	39

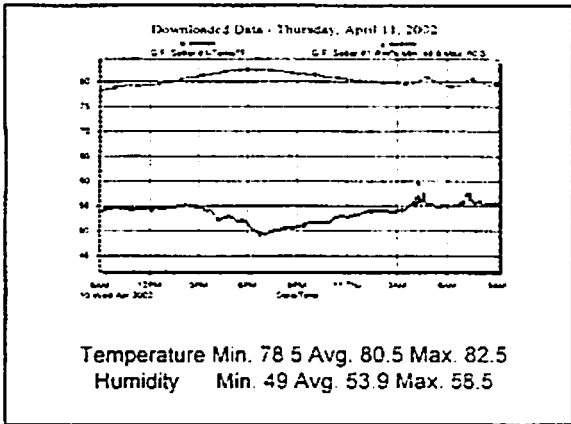


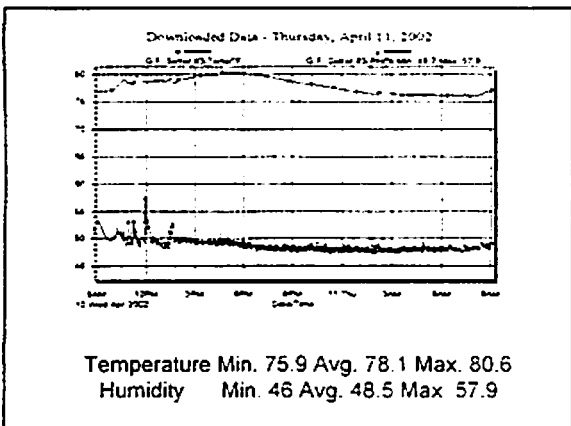
Controls

- Mercury or Digital
- Manual or Programmable
- Monitored by personnel on a varied routine or monitored by computer with trending capabilities
- Wall mount location or properly located in close proximity to incubation equipment air intake

Example of proper thermostat placement

- Setter Room #1 has the sensor located in the middle of the room just above the machines.
- Setter Room #3 has the sensor located on the wall next to the door.
- Both have set points 80 degrees and 50% relative humidity





Successful daily operation of HVAC

Goal maximize air flow through the incubation equipment

- Room set-points 80-82 Deg. F. (no lower) & 50% to 55% Relative Humidity (no higher)—Dehumidification is possible
- Room pressure .005 + to .01+ (Pos.), potentially slightly higher room pressure set-point in cooling season vs. heating season
- Monitor and trend temperature, humidity and pressure preferably on a computerized control package system

Successful daily operation of Evaporative Cooling
Goal maximize air flow through the incubation equipment

- Faithfully keep equipment balanced—air input @ air output. Recommendation as shown earlier is to have balanced output controlled by a variable speed fan
- Room set points 80-82 Deg. F. (no lower) and hold Relative Humidity as low as possible by controlling room pressure.
- Room pressures .001+ (Pos.) to .005+ (Pos.) to maximize air exchange, increase airflow speed and increase static pressure through the Evap.Coolers. Remember water must evaporate to cool.
- Stage the coolers:
 - 1st stage—air cool only to keep room humidity low as long as possible and reduce cycling early in the day or night
 - 2nd stage—air and water cool to take advantage of evaporation during the lowered atmospheric humidity time of the day.

Conclusion

- The exchange of adequate air through the egg pack and or chicks to stay within the optimum temperature range as they develop and hatch is essential.
- All multi-stage incubation equipment on the market today must be operated primarily in a *cooling* mode year round for successful incubation.
