

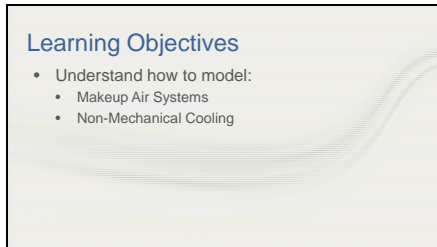
Slide 1



Hello, my name is Haley Goslinga and I'm a marketing engineer in the C.D.S. group at TRANE.

Today, we will be talking about modeling Make-up Air Systems and Non-mechanical Cooling in TRACE™ 700.

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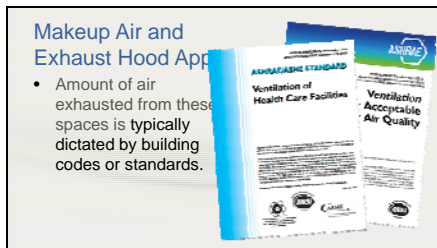


In this video we will discuss how to model makeup air systems to replenish air being exhausted in TRACE 700.

I will then demonstrate new features within the program to support applying non-mechanical cooling.

We'll begin by discussing different applications of makeup air systems.

Slide 3



Makeup air units replenish the amount of air exhausted from buildings or spaces. The amount of air exhausted from these spaces is typically dictated by building codes or standards.

Slide 4



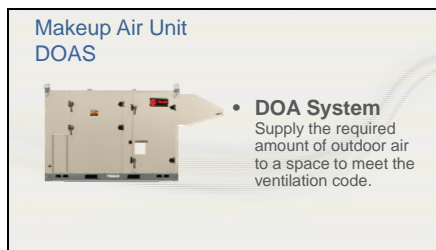
These systems are often found in hospitals and laboratories, as they require air to be exhausted at a high rate to maintain a sterile and safe environment. They are also applied to commercial kitchens where there is a high volume of air leaving through the exhaust hoods to rid the kitchen of contaminants and odors. We will walk through examples on how to model these makeup air scenarios in TRACE 700.

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A makeup air unit is sometimes also called a dedicated outdoor air unit. Sometimes they may be the same thing, but it can be important to distinguish between these terms. The primary function of a makeup air system is to replace the amount of air being exhausted from a space, due to code requirements.

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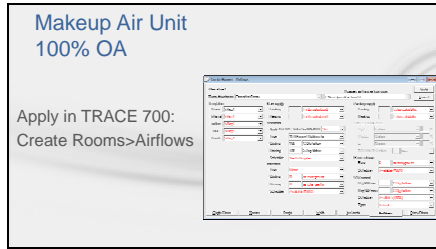
The primary function of a dedicated outdoor-air air system is to supply the required amount of outdoor air to a space to meet the ventilation code.

Modeling a dedicated outdoor air unit was discussed in a past newsletter video and we will not be covering this today. Instead, we will focus on modeling makeup air systems that are used to replace the amount of air being exhausted from a building due to code.

To view this video, you can see the link in the video description on YouTube or select the option to view More eLearning Videos.

<http://www.trane.com/commercial/north-america/us/en/products-systems/design-and-analysis-tools/c-d-s--help/elearning-library/modeling-dedicated-outdoor-air-systems-in-trace-700.html>

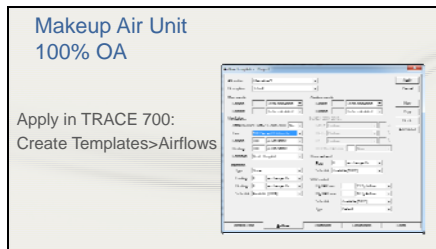
Slide 7



If you are modeling a single system that is 100% outdoor air, and has separate cooling or heating system, this can be done on a room-by-room basis on Create Rooms – Airflows tab...

It might be helpful to show a schematic of this type of system, to help the users understand better.

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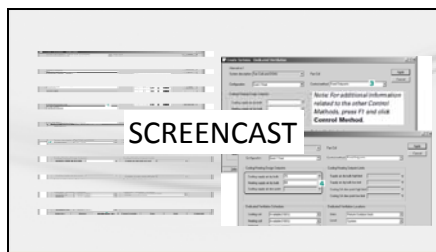


....or it can be done for all the rooms at once on the Create Templates-Airflow tab. *Note: For a system to be 100% outdoor air, all rooms assigned to the system must be specified as 100% outdoor air.*

Keep in mind, this method does not incorporate building pressurization and the rooms will have balanced airflows.

I will now demonstrate how to model a 100% Outdoor Air System in TRACE 700

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To model a 100% outdoor-air system without the use of the DOA tab, complete the following steps:
 Step 1: Access the Airflow tab of Create Rooms or Create Templates. In this example I will apply to all of the rooms in the file through Create Templates

Step 2: In the Ventilation section, select the dropdown in the **Type** field and change the Type from Hospital Room to 100 Percent Outdoor Air. The **Cooling** and **Heating** fields default to 100% Clg Airflow and 100% Htg Airflow, respectively.

Step 3: If a minimum airflow must be supplied to the space, input the minimum airflow rate under the Main Supply section, using the units of air changes/hour, cfm/sq ft, L/s/sq m, cfm/person, or L/s/person. By default, TRACE will calculate the supply airflow based on the loads for the space.

Step 4: If a VAV system is being modeled, input the heating minimum airflow rate in the **Rate** field in the VAV Minimum section.

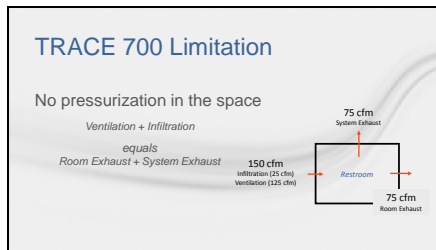
Step 5: If 0% return air is being modeled, enter 100% Clg and 100% Htg Airflow in the **Rate** field in the Room Exhaust section to exhaust the air at room level.

Step 6: In Create Systems, select the appropriate airside system, associated fans, static pressures, and supply-air temperature ranges for the system.

Step 7: Assign the rooms to the airside system and calculate the design results for the air handler

What if the room doesn't have balanced airflows? Let me first mention a limitation that must be considered in TRACE 700

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1. Spaces are not positively or negatively pressurized. In other words, outdoor airflow entering a room must be equal to the exhaust airflow. The equation TRACE uses is:
ventilation airflow + infiltration = room exhaust + system exhaust

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Makeup Air Exhaust Hood

Removes contaminants and odors from kitchens and industrial or manufacturing processes.



Why are we concerned about pressurization?

Exhaust Hoods are commonly applied in kitchens to remove airborne grease, combustion products, fumes, smoke, odors, heat, and steam by evacuation of the air from the space. They can negatively pressurize a space which will prevent contaminants from entering adjacent spaces, like the dining room.

They may also be used for industrial or manufacturing processes to remove contaminants and odors from the air, specifically in painting booths and where chemicals are heavily used.


I will demonstrate how to model a kitchen exhaust hood but first must mention a limitation that must be considered in TRACE 700 for exhaust hoods.

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Exhaust Hood TRACE 700 Limitation

- Room assigned to only one system in TRACE 700
- Transfer air from 'dummy' space needed

ventilation + infiltration + adjacent air transfer = room exhaust + system exhaust



2. TRACE 700 will not allow a room to be assigned to more than one system. If the room has a cooling and/or heating supply airflow in addition to the hood, then the supply air for the hood will need to be transferred from another room.

It is necessary to model the kitchen exhaust hood with transfer air to simulate the pressurization in the space.

If you model the scenario shown in this slide using the DOA tab with room direct to create two systems or coils, the program won't negatively pressurize the space. You would also be forced to transfer air from an adjacent space which may give you undesirable results.

The easiest way to do this is to create a "dummy" room and then transfer the air from that room, as I will now explain in an example. You cannot simply transfer air from an adjacent room because there is not sufficient air to be exhausted from the hood.

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How to model a kitchen exhaust hood

Step 1: We will first create a room with a 1' x 1' dimension. Do not assign any internal loads to the space. This will act as a 'false' or 'dummy' room transferring air to the kitchen.

Step 2: Enter a cfm value for the **Main Supply Cooling** and **Heating** airflow that matches the kitchen hood exhaust cfm value.

Step 3: Set the **Ventilation Type** to **100 Percent Outdoor Air** as was done in the last example. Do not enter anything for **Adjacent Air Transfer From Room** or **Room Exhaust** on this screen.

Step 4: Create a new system (VAVRH 30% w fixed SA temps, VAV min=100% to avoid airflow ramping down. Choosing CV system will cause the coil to modulate upwards because there is no load in the false space.) This will represent the unit supplying air to the exhaust hood. Assign the false/dummy room to this system.

Step 5: In the kitchen, set up the room as usual with the main system information, any ventilation requirements that are in addition to the kitchen hood, and infiltration if so desired. This room has already been created.

Step 6: Enter the value of the hood exhaust in the **Room Exhaust** field of the Kitchen. This should equal the ventilation airflow you set up in the dummy room.

Step 7: Select the dummy room in the **Adjacent Air Transfer From Room** field.

Step 8: Calculate the file. After doing so, airflows can be viewed on the **Airflow Balance** report found on the **Detailed Reports** page.

This report shows how the airflows are being delivered to, or transferred from, the rooms.

In this example, *8000 cfm (may change based on diagram in previous slide)* of OA is being supplied to the dummy room. This air is then transferred to the kitchen where it is exhausted at the room level, allowing the exhaust hood to be accounted for.

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Non-mechanical cooling is the process of supplying outdoor air to cool a space without the use of a water chiller or mechanical refrigeration.

This functionality was recently added to TRACE 700 v6.3.1 to comply with 90.1-2010 section G3.1.2.9.2 to provide non-mechanical cooling in heating-only systems.

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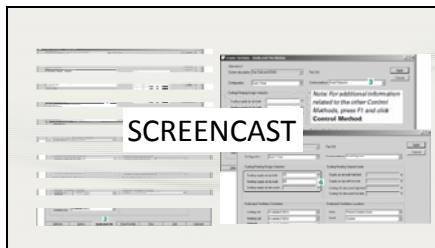


Non mechanical cooling is often modeled in combination with Heating and Ventilation systems

for buildings or spaces where occupant comfort is less critical, such as warehouses , parking garages, or factories.

I will now demonstrate how to apply NMC to a TRACE 700 model.

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The "cooling" ventilation airflow must be provided by the user via the Room Exhaust airflow on the Create Rooms - Airflows screen.

The Room Exhaust schedule needs to reflect of the "90.1 NMC on above 80\85\90" which only turns the room exhaust fan on when the room temperature exceeds the temperature selected. The Reset Lockout Table in the Libraries, Schedules Utilization determines when the room exhaust will occur. <<Show this is library!>>

When setup properly, the room exhaust fan comes on drawing outdoor air directly into the room equal to the amount it exhausts to the atmosphere.

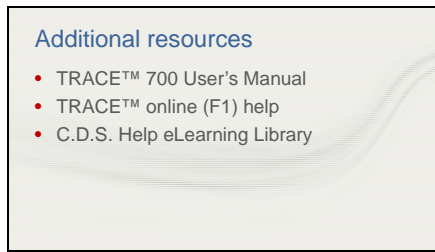
This requires the "90.1 Non-mechanical cooling fan" specified as the Room Exhaust fan on the Create System - Fans screen. We will set this when selecting our system.

Once we have set the Room Exhaust values in Create Rooms>Airflows and applied the Room Exhaust fan in Create Systems>Fans, we can calculate the file and see that the room is being cooled with no action by the cooling coil.

The infiltration is being increased to equal the Room Exhaust that was input.

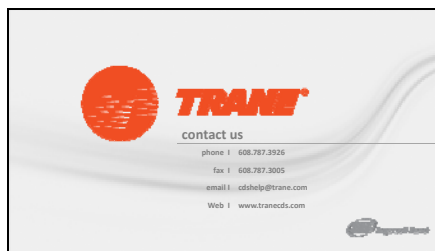
One thing you may want to be aware of is that applying this strategy on a system with a cooling coil may cause the systems to challenge each other. It is typically recommended to apply this with a heating and ventilation system to avoid this conflict.

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This completes our discussion on makeup air, exhaust hoods, and non mechanical cooling. Hopefully, we've answered any questions you have on these features but if you would like more detail on this or any other elements of TRACE™ 700, here are some additional resources available to you.

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As always, please feel free to contact the C.D.S. Support Center by phone or email with any comments, questions or modeling issues you may be experiencing.

Thank you for your time and we wish you continued success.