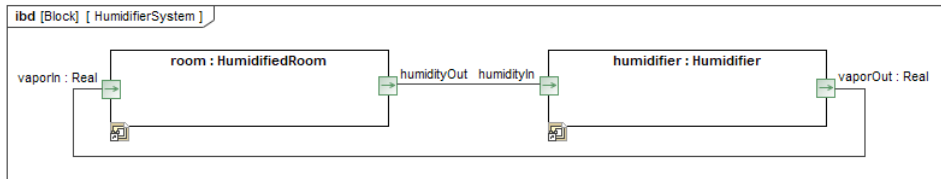


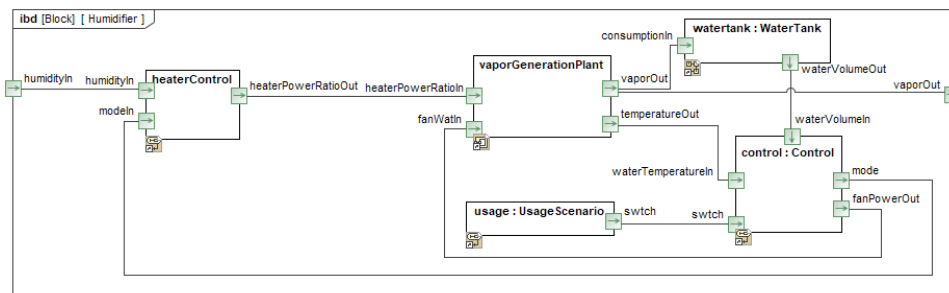
# Description of State Machines used in this model

In this model, there are two main components that interacted with each other: the room and the humidifier system. The purpose of the humidifier is to control the humidity of the room once a user has selected a humidity level for the room. State machines are used to show the control of humidity in the room, both to depict the user's input and the humidifier's control system. For the sake of brevity, the following SysML diagrams form only the core set of diagrams from the SysML model, and include all three state machines used in this example.

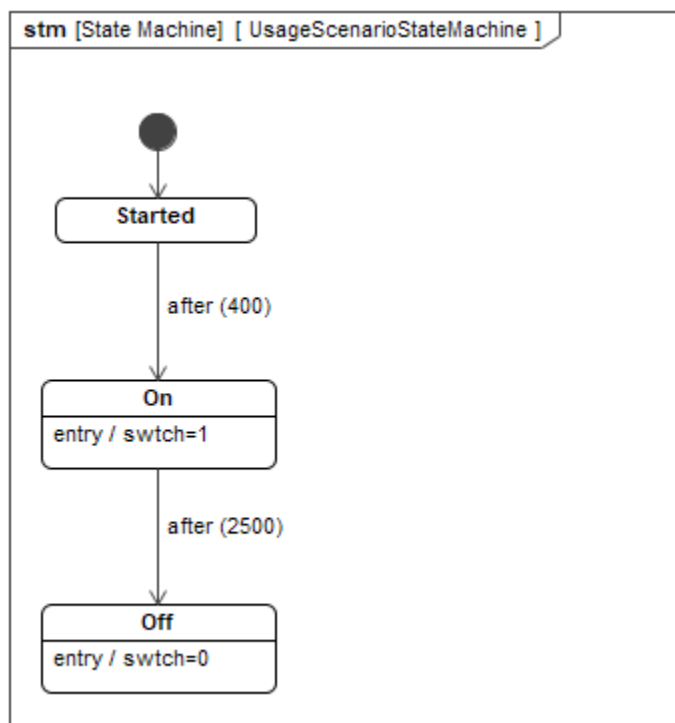
1. **HumidifierSystem Internal Block Diagram:** This diagram is part of the *HumidifierSystem* block. The flow between the part properties *room* (typed by *HumidifiedRoom*) and *humidifier* (typed by *Humidifier*) are shown to be going through ports. These ports are the interfaces between the two system components, and contain numeric information about the humidity and vapor going between the two components.



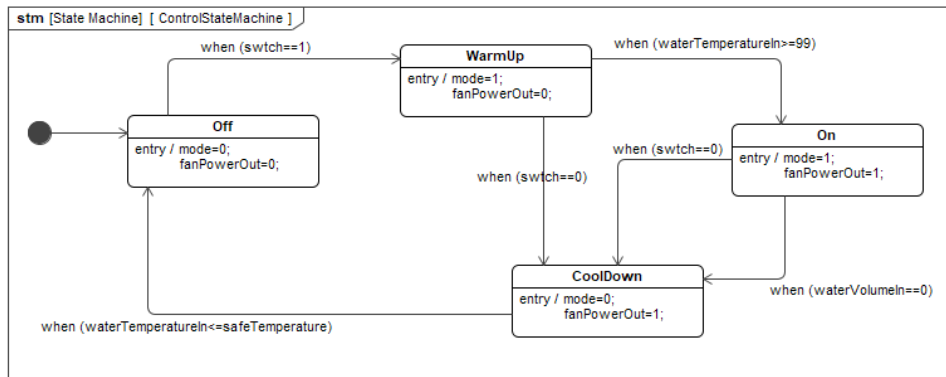
2. **Humidifier Internal Block Diagram:** This diagram is part of the *Humidifier* block. The flow within the humidifier system are depicted in this diagram. With information about the room's current humidity from the *humidity\_in* port, and control signal from the humidity control system from the part property *control* (typed by *Control*), the part property *heaterControl* (typed by *HeaterControl*) uses a state machine to decide whether or not to turn on the heater control system in order to generate vapor in the part property *vaporGenerationPlant* (typed by *VaporGenerationPlant*). The part property *vaporGenerationPlant* also uses information from the part property *control* to determine the amount of vapor released into the room (and consumed from the part property *waterTank*, typed by *WaterTank*) as well as let *control* know the temperature of water in the vapor generation system. The part property *control* also uses information from when the user wants to turn on the humidifier from the part property *usage* (typed by *UsageScenario*) and information about the amount of water in the water tank from the part property *waterTank*.



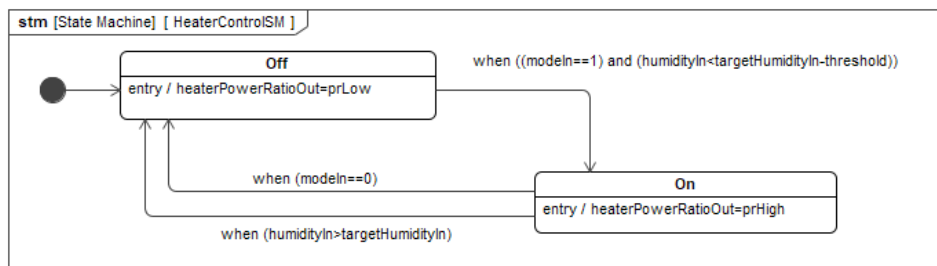
3. **UsageScenarioStateMachine State Machine Diagram:** This state machine diagram depicts the behavior of the part property usage in the *Humidifier* internal block diagram and it determines when (as in, at which times) the humidifier system should humidify the room.



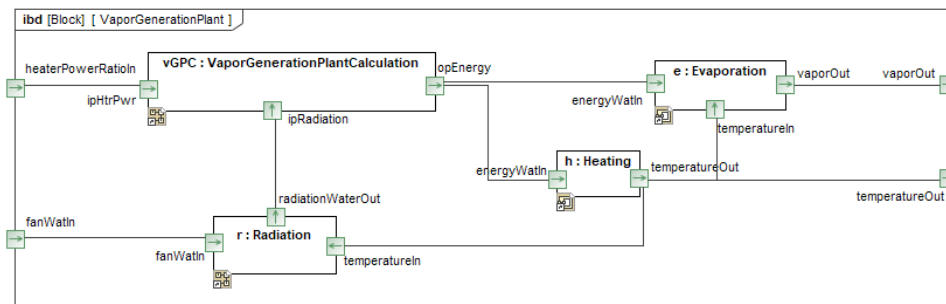
4. **ControlStateMachine State Machine Diagram:** This state machine diagram depicts the behavior of the part property *control* in the *Humidifier* internal block diagram and it determines the operation of the heater control system *heatercontrol* and the vapor generation plant *vaporgenerationplant* based on information about the water levels in the tank from the *watertank*, the temperature of vaporization from the *vaporgenerationplant*, and the operation of when the humidifier system should be started from *usage*.



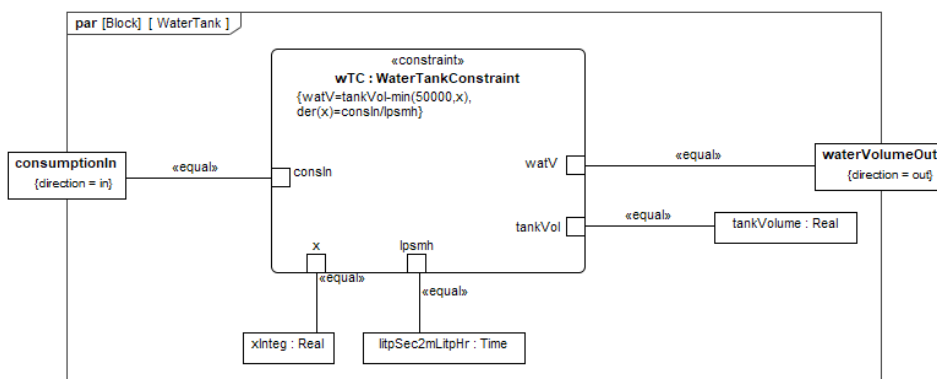
5. **HeaterControlISM State Machine Diagram:** This state machine diagram depicts the behavior of the part property *heaterControl* in the *Humidifier* internal block diagram. It uses information from the room's current humidity from the *humidity\_in* pin, the target humidity from the part property *targetHumidity*, and the control signal from *control* in order to decide whether or not to turn on the heater control system for the generation of vapor with *vaporgenerationplant*.



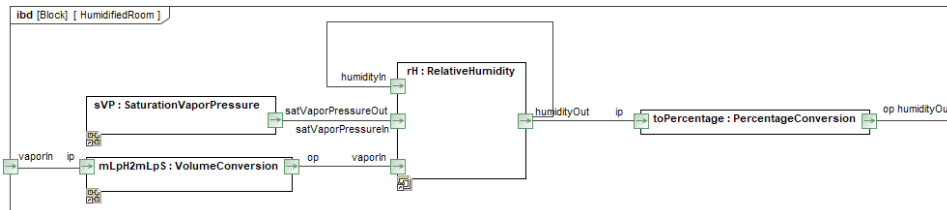
6. **VaporGenerationPlant Internal Block Diagram:** This internal block diagram depicts numerical calculations for the informational flow associated with the part property *vaporgenerationplant* in the *Humidifier* internal block diagram. Given the control signal from *control* for its water fan and the control signal from the *heaterControl*, after the numeric calculations it gives information about the water temperature to the *control* as well as information about the generated vapor from the *watertank* and for the room.



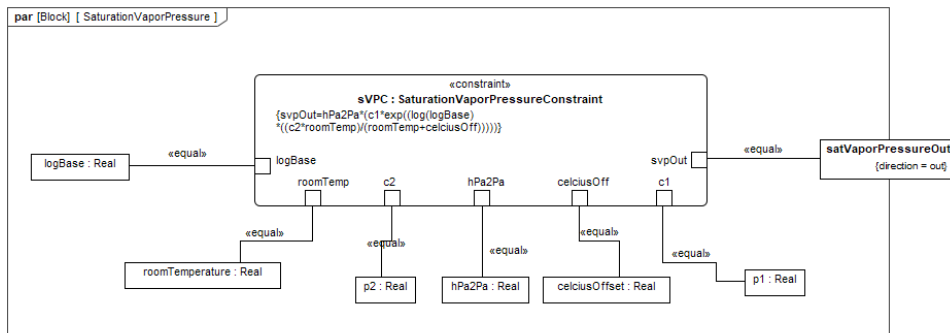
7. **WaterTank Parametric Diagram:** This parametric diagram depicts numerical calculations for the informational flows associated with the part property *watertank* in the *Humidifier* internal block diagram. Given the information about water consumed for vapor generation from *vaporgenerationplant*, numeric calculations provide information about the volume of remaining water and this new information is sent to the *control* part property.



8. **HumidifiedRoom Internal Block Diagram:** This diagram is part of the *HumidifiedRoom* block. This internal block diagram depicts the information flow of the vapor going into the room and the humidity that results from this vaporization. The information about the vapor being inputted into the room goes through a unit conversion with the part property *mLpH2mLpS* (typed by block *VolumeConversion*) before passing on the information to part property *rH* (typed by *RelativeHumidity*). This information, along with information about current relative humidity of the room from part property *rH* and information about the saturated vapor pressure from part property *sVP* (typed by *SaturationVaporPressure*), is used to calculate the amount of humidity in the room. The part property *toPercentage* (typed by *PercentageConversion*) converts the signal about room humidity from fractions into a percentage value and sends this new information about the percentage value back to the humidifier system.



9. **SaturationVaporPressure Parametric Diagram:** This parametric diagram depicts numerical calculations for the informational flows associated with the part property *sVP* (typed by *SaturationVaporPressure*) in the *HumidifiedRoom* internal block diagram. Numerical calculations in this diagram provide information about the room's vapor pressure to be sent as a signal used to calculate current room humidity in the *HumidifiedRoom* internal block diagram.



10. **RelativeHumidity Internal Block Diagram:** This internal block diagram depicts numerical calculations for the informational flows associated with the part property *rH* (typed by *RelativeHumidity*) in the *HumidifiedRoom* internal block diagram. It calculates the current humidity of the room given the room's vapor pressure levels as well as the incoming vapor coming from the humidifier system.

