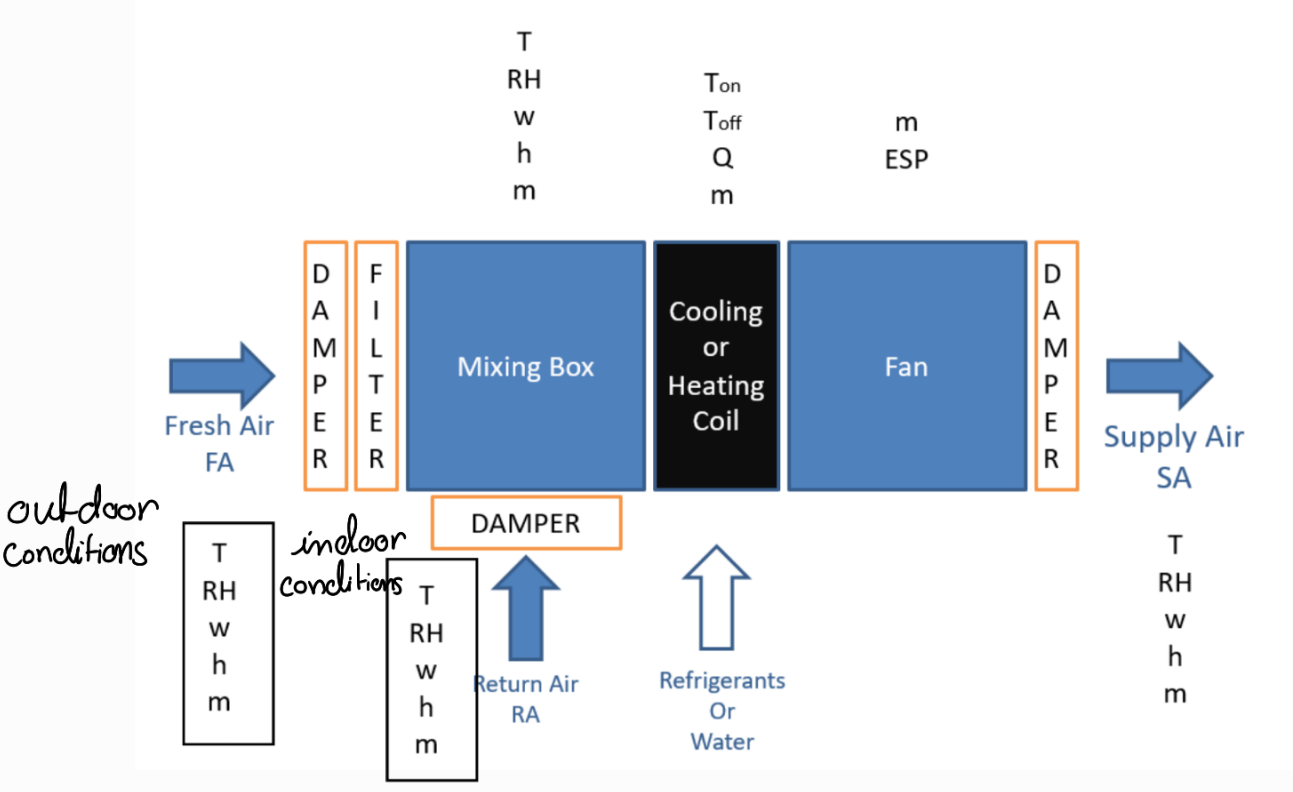
Air handling Unit

- AHU with No heat Recovery (Basic)
- AHU with heat Recovery (Double deck AHU)

• AHU with no heat Recovery



1. Damper: Controls air Quantity

2. Mixing Box: Return air is mixed with Fresh air They are out with T_{mixing} at $\dot{m} = \dot{m}_{FA} + \dot{m}_{RA}$
Now we can calculate h, w (mixing law) and obtain T_{mixing} (Tdb) & RH

3. Cooling or heating coil

- The total enters with Ton which is same as T mixing
  $\dot{m}$ is still $\dot{m}$ total

Q of the coil = $Q_{Room} + Q_{ventilation}$

Toff can be calculated using $Q = \dot{m}\, cp\, \Delta T$ (ΔT = Ton − Toff)

1.23

4. Fan

$\dot{m}_{tot}$ is the Fan flow rate

ESP = Dynamic losses + Static losses

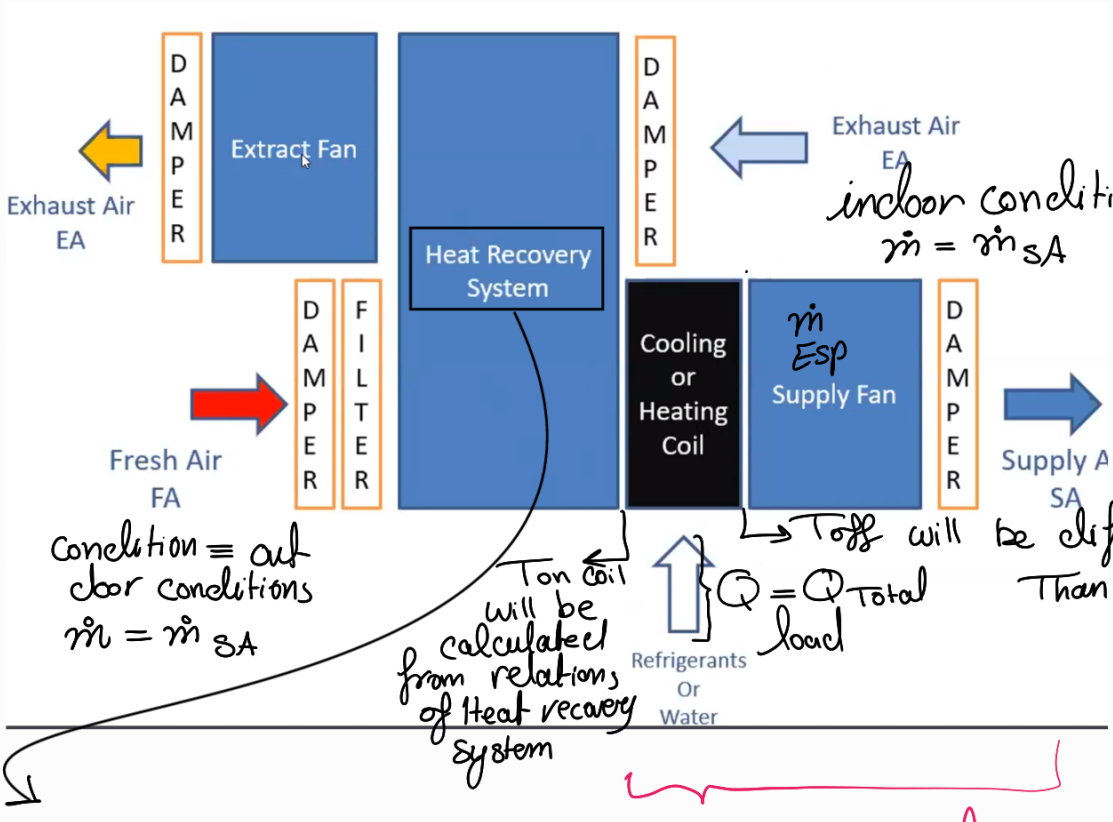
fittings — Ducts

Supply air is provided by the Fan and its conditions are:

- Toff = T supply
- $\dot{m}$ total

To find other properties, ω is assumed to be constant → يعني خط مستقيم من Ton ويوقف عند Toff (Sensible Cooling)

• AHU with heat- Recovery (Total fresh air)



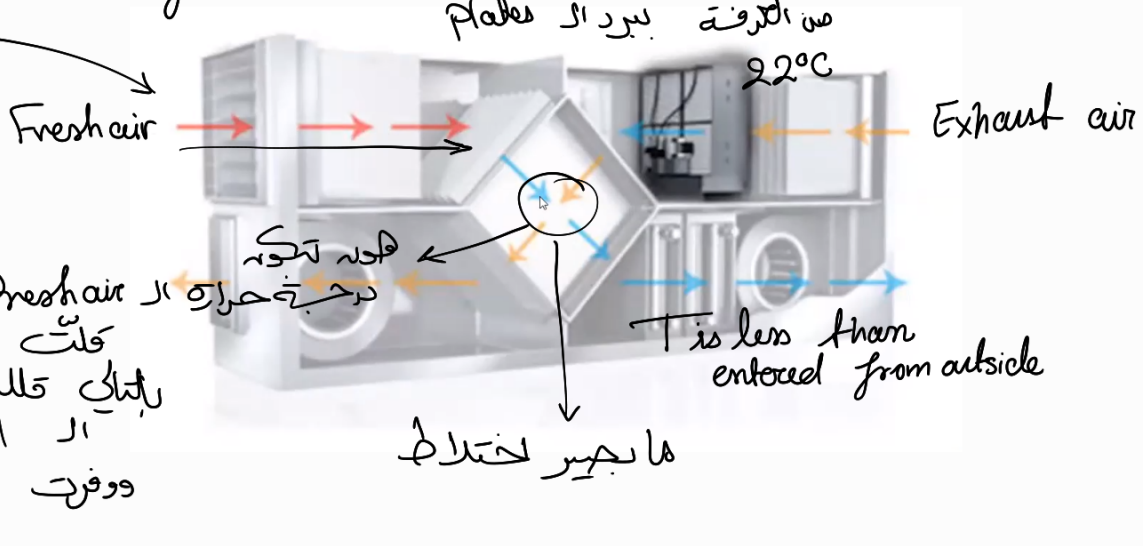
These can be:

1. Plate heat- Exchanger
2. Energy wheel
3. Run around coil

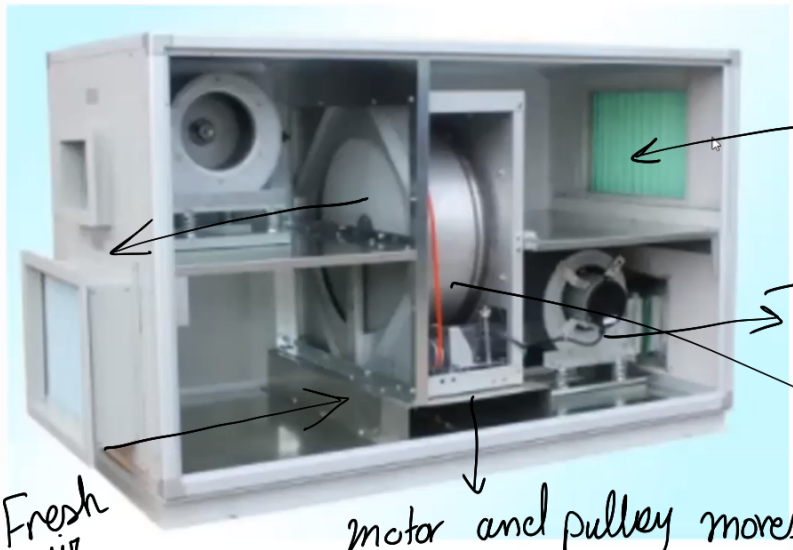
Now Explaining each:

1. Plate heat exchanger (75% sensible load)

In Cooling:



2. Energy wheel



- To find Q recovery and new fresh air temperature

1. $Q_{recovery} = 0.75 \times Q_{sensible}$ (0.75: efficiency; Q sensible: Capacity of wheel)

Note that:
$Q_{sen} = SHR \times Q_{Total}$
الي Recovery الي بدنا

2. New T or T_1

$$0.75 \times Q_{Sensible} = (\dot{m}_{Fresh})(C_{p\,air})(T_{out} - T_1)$$

$Q_{recovery}$

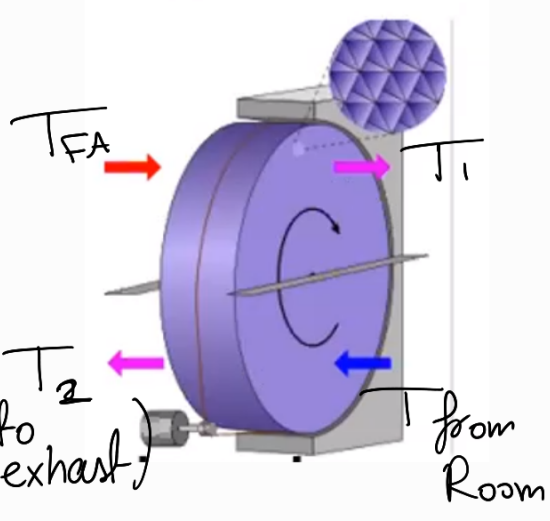
الي جاي من برا

Also

$$0.75 \times Q_{Sensible} = (\dot{m}_{Fresh})(C_{p\,air})(T_{Room} - T_2)$$

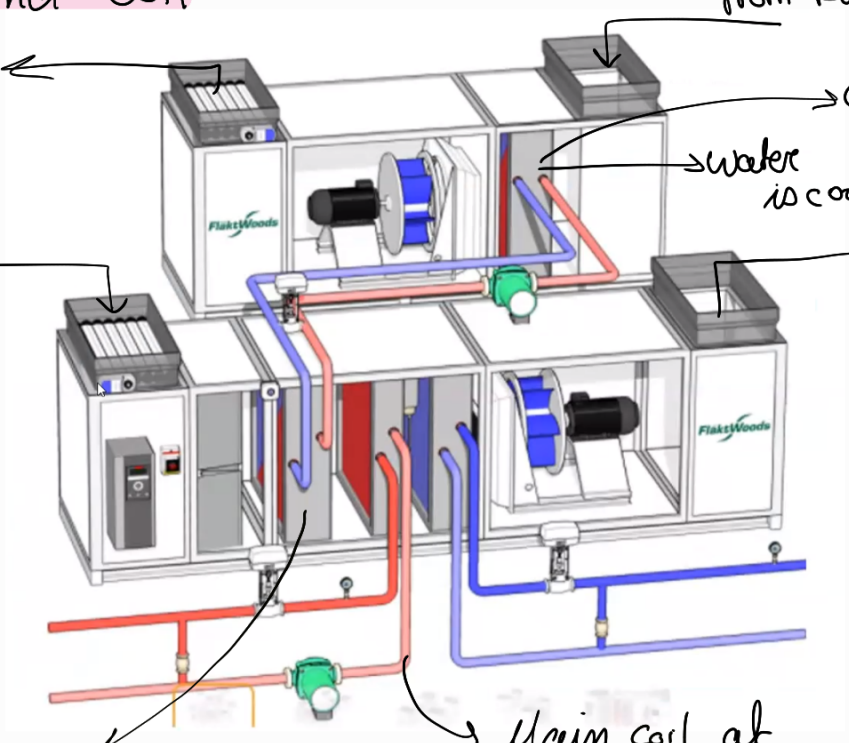
الي جاي من الغرفة

Recovery الي بدنا من الجهة الثانية



Note: $COP = \frac{\text{heat recovered}}{\text{Electrical saved}}$ → from using heat recovery System

3. Run around coil



Medium used is water and a pump is used
Coil 1 is identical to coil 2

- To find temperatures

$\dot{m}_{water} C_{p\,water} \Delta T_{water} = \dot{m}_{air} C_{p\,air} \Delta T_{air}$

This is applied for coil 1 & 2