Dry cooler model

**Inputs :**

* Water supply temperature
* Water volume flow rate
* Air supply temperature (ambiant temperature)
* Air volume flow rate (found in the datasheet of the dry cooler)

**Outputs:**

* Water exhaust temperature
* Air exhaust temperature
* Fan consumption???

**Dry cooler model**

**Parameters:**

* Geometrical parameters of the dry cooler.
* C1, C2, C3 and C4 which are correction terms for the thermal resistance.

# Simulation model

## Dry cooler class

The dry cooler is composed of 8 heat exchangers and 4 fans placed as in XXXA diagram of a fan system

Description automatically generated

The dry-cooler class link the different Heat Exchanger via a sub-class named “Exchanger”. The heat exchanger are linked in two ways: by the water flow rate and the air flow rate.

Iteration on the outlet water temperature.

## Main equation

For each heat exchanger:

## Air flow rate

There are two ways of modelling the air flow:

* Fan = ON: forced convection
* Fan = OFF: natural convection

Forced convection : m\_dot\_a constant

C\_dot\_a = simplement cp\_a\*m\_dot\_a

Natural convection : m\_dot est estimé pour déterminer le C\_dot\_a

C3 = C1 en théorie

Convection naturelle n’a pas bcp d’impact mais certainement que la radiation si.

# Calibration

There are two ways of calibrating the model:

* Calibration with all of the experimental points to fit C1, C2, C3 and C4.
* Calibration with first the experimental points where all of the fans are on and only the forced calibration is used (to calibrate C1 and C2). Once C1 and C2 are determined, all the other experimental points are used to calibrate C3 and C4 for the natural convection.