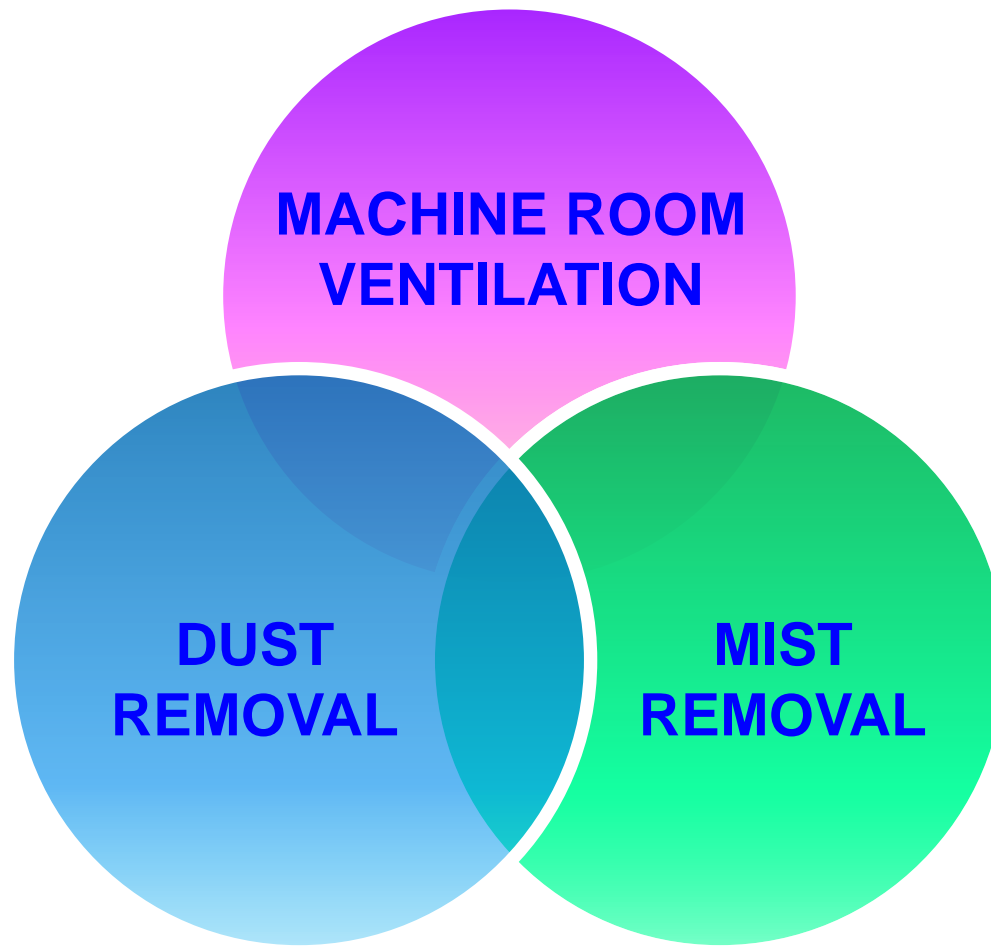


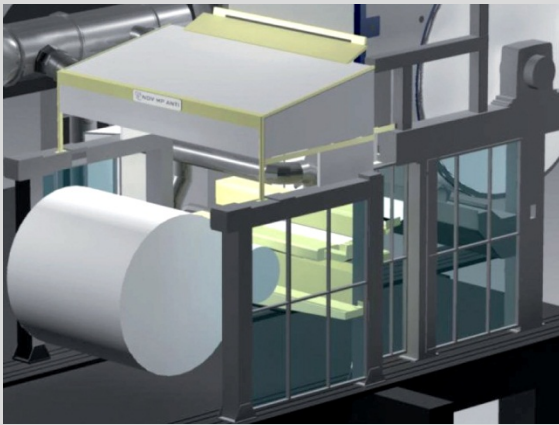
ROOM VENTILATION SYSTEM

TITLE

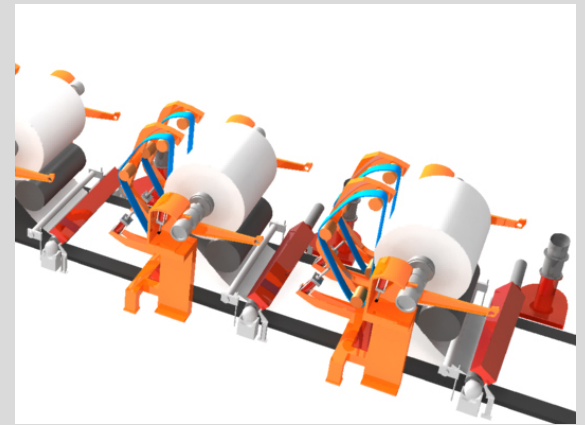
- Main target of this product is to decrease the energy/steam consumption of a Tissue Machine
- Insulation applied to Yankee headers is NOT new to the market
- Innovation supplied by Novimpianti is the concept of a static application that guarantees a reliable and safety solution



**Room Ventilation, Dust and Mist Removal are deeply connected:
Each system can't be studied without considering the others.**

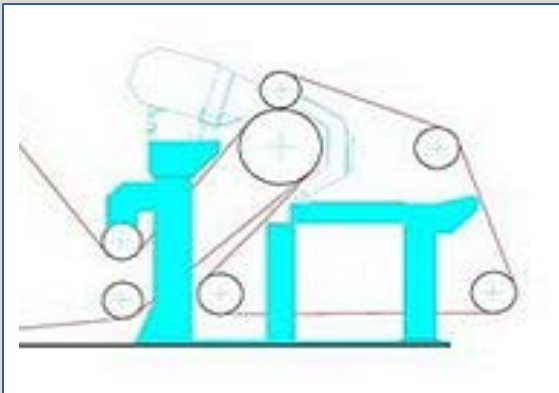


TM Dust Removal

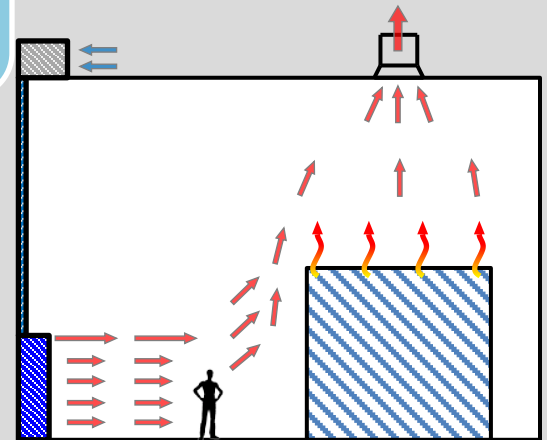


Rewinder Dust Removal

TISSUE MACHINE VENTILATION

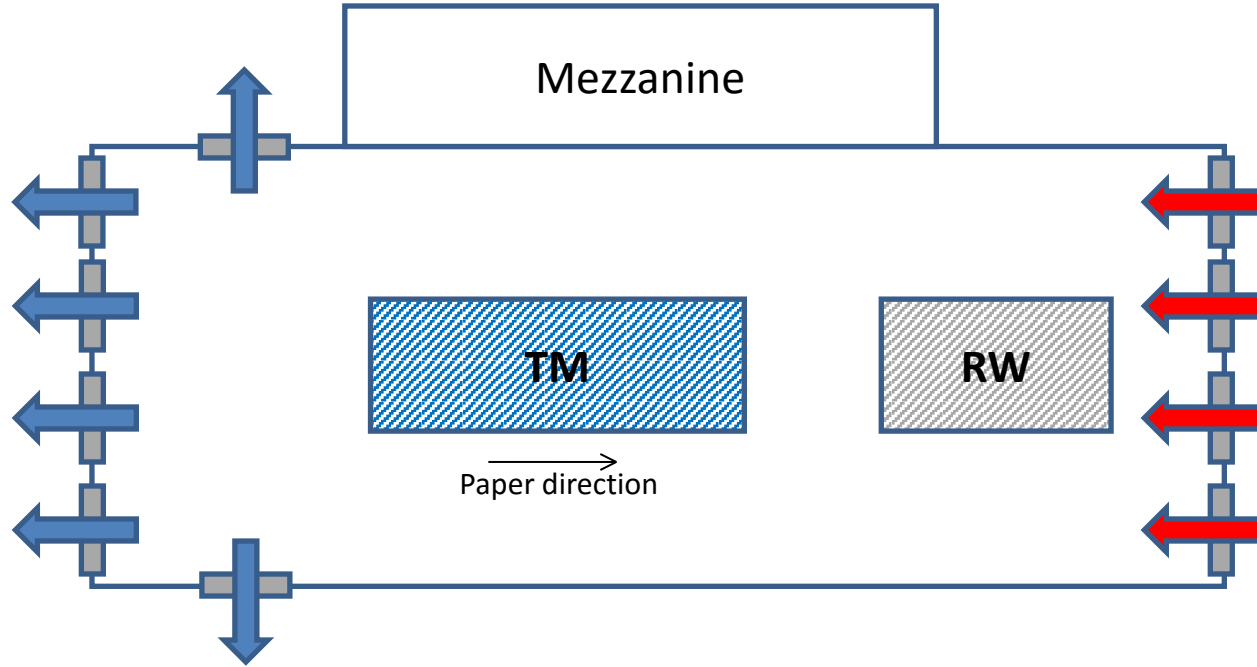


Mist Removal



Room Ventilation

LONGITUDINAL VENTILATION CONCEPT

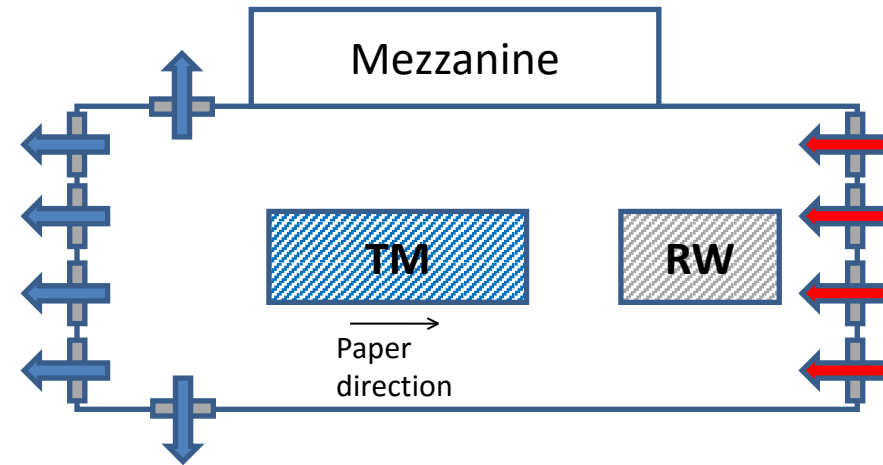


- Air is blown from the dry zone towards the wet zone
- Longitudinal flow prevents from moisture migration to the dry zone
- Air blown is heated in order to warm the roof avoiding condensation effects in the room
- System is designed with air change rate number (number of complete changes per hour)

LONGITUDINAL VENTILATION CONCEPT

Longitudinal Ventilation shows different problems:

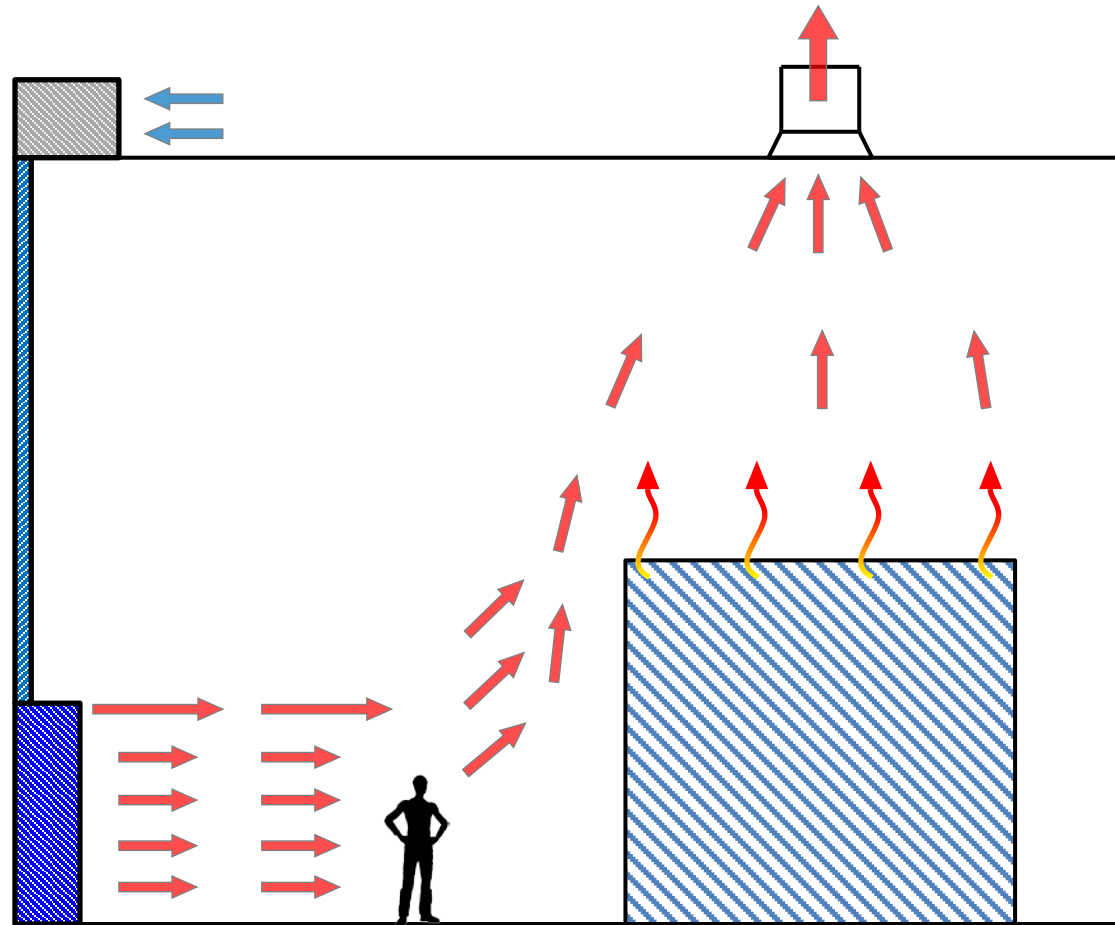
- Longitudinal flows carries dust generated in the dry zone to the wet zone: dust can accumulate on machine (Hood top, ducts...) rising the probability of fire accidents
- Temperature of insufflated air decreases along pattern from dry zone ending with not enough heating to the roof on the wet zone
- Convictional flows from the machine break the longitudinal flow pattern
- Air change rate is not the only/right indicator for performance of building ventilation



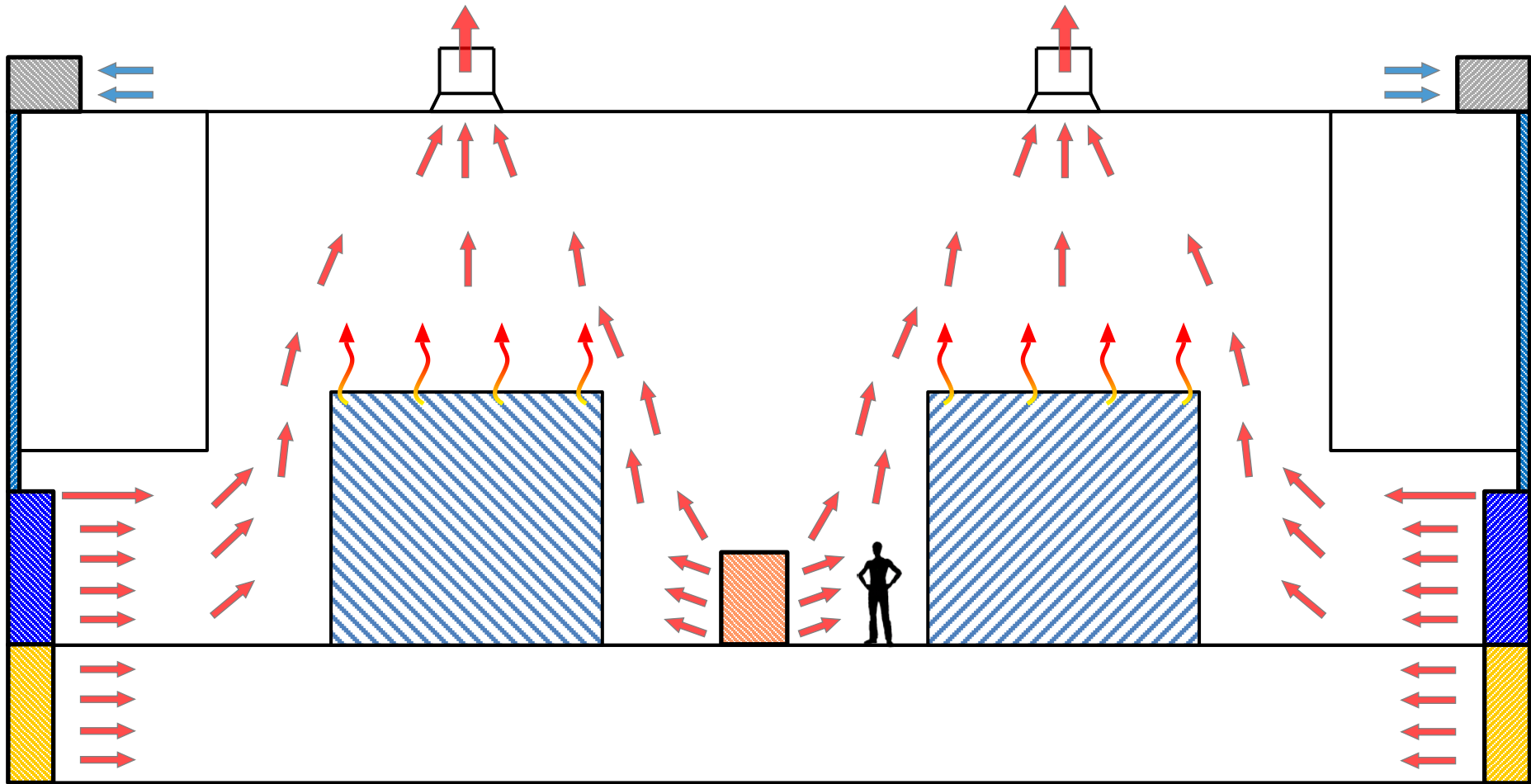
Longitudinal ventilation is not efficient ➡ A new concept is needed

SECTIONAL VENTILATION CONCEPT

- Room ventilation is divided in different transversal sections
- Heating and blowing in each section is adjustable to control the air flow and stream lines
- Takes advantage of natural convectional flow from the machine
- Avoids problems of moisture and dust displacements in the room



SECTIONAL VENTILATION CONCEPT

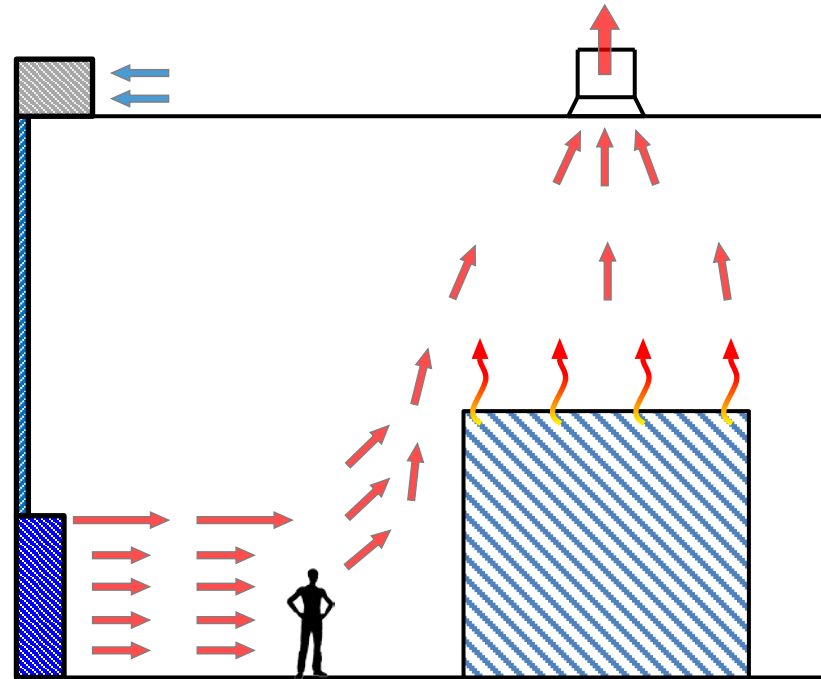


TWO MACHINES IN THE SAME ROOM

ROOM VENTILATION DESIGN

OBJECTIVES

- to avoid moisture damages to process, machinery and building
- to remove and discharge thermal and airborne chemical pollutants in the machine area
- to assure a healthy and comfortable working environment for operators
- to control air flows in the room
- to heat the building during wintertime and refresh on summertime



ROOM VENTILATION DESIGN

The following **KEY FACTORS** should be taken in account when designing the room ventilation system

PRODUCTION

- Product
- Capacity
- Machine Speed
- Grammage

BUILDING

- Geometry
- Layout
- Construction

TISSUE MACHINE

- Configuration
- Former, press, dryers
- Pulpers, filters, screens
- Calenders, reel, winders
- Coating

CLIMATE

- Annual temperatures
- Location
- Elevation

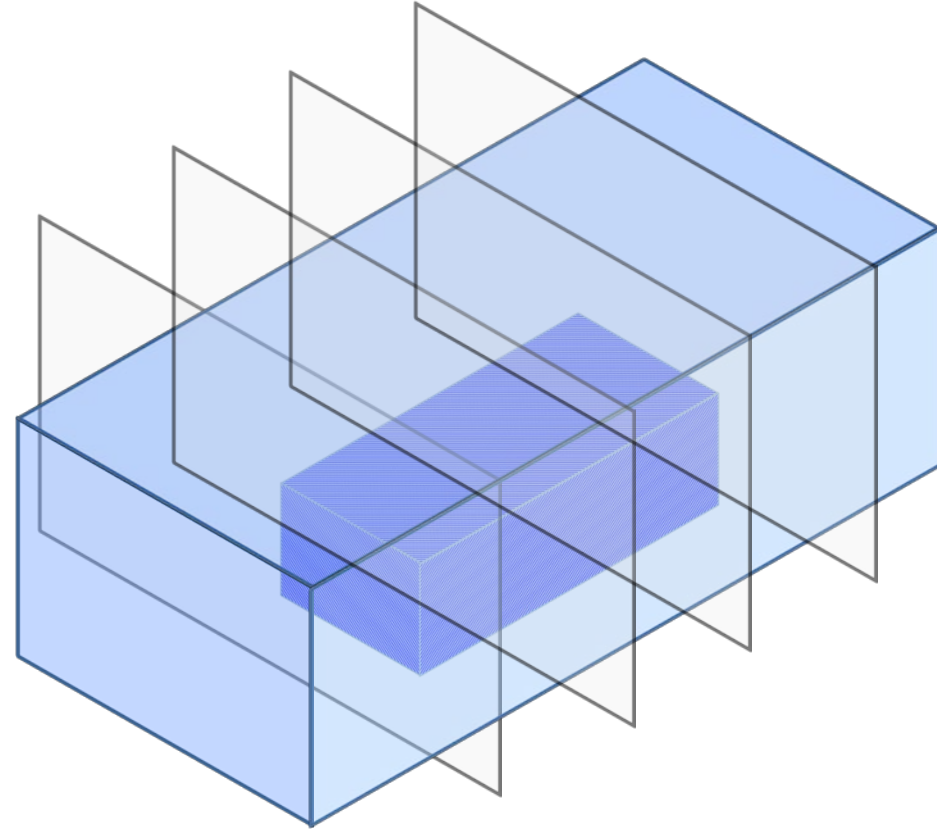
ROOM VENTILATION DESIGN

AIR FLOW CONTROL in the room is obtained through:

- Dividing building length in several transversal sections
- Each section should be then balanced in terms of calculated:
 - Mass flow
 - Heat / Energy

Depending on the equipment in the section

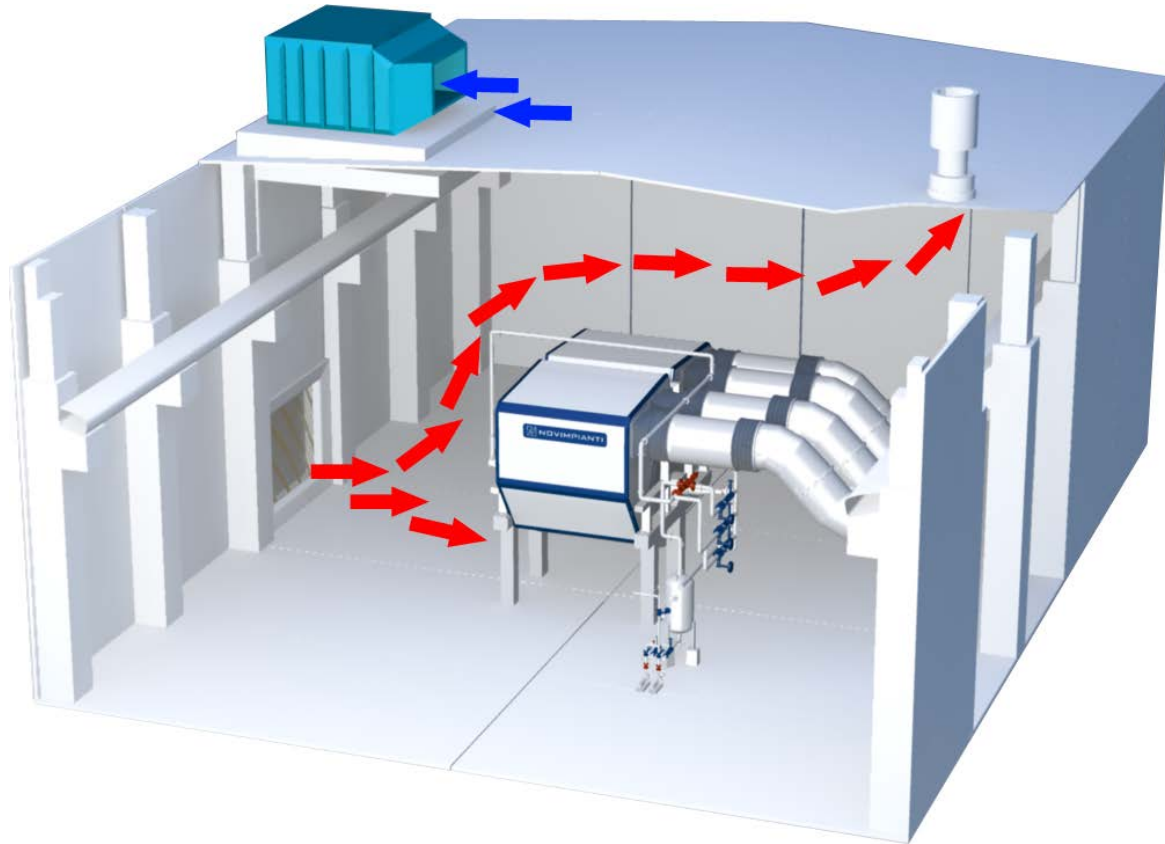
- Air flowing inlet and outlet each section is balanced



ROOM VENTILATION DESIGN

AIR FLOW CONTROL in each section is studied to:

- Create a flow from operator side to drive side
- Dry zone to Wet zone air migration is eliminated balancing each section
- Location of outlets is studied to avoid flow stagnation points and to efficiently discharge moist in atmosphere

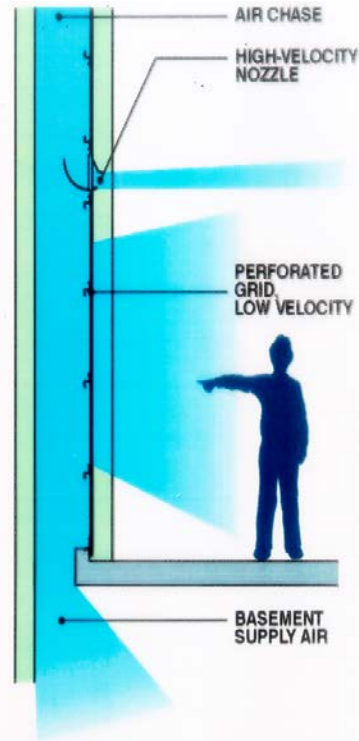
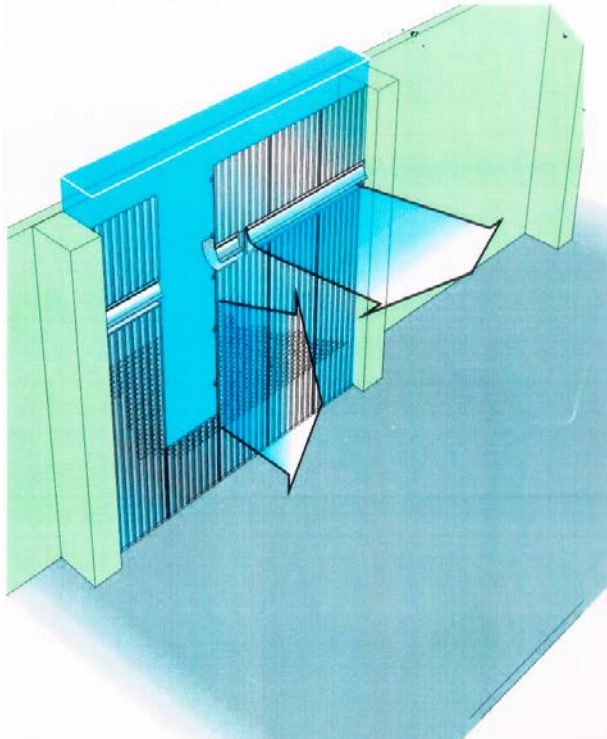


ROOF VENTILATION UNITS

- To be installed on roof top
- Are provided with fan, filter, water coil
- Live steam coil can be added for temperature correction



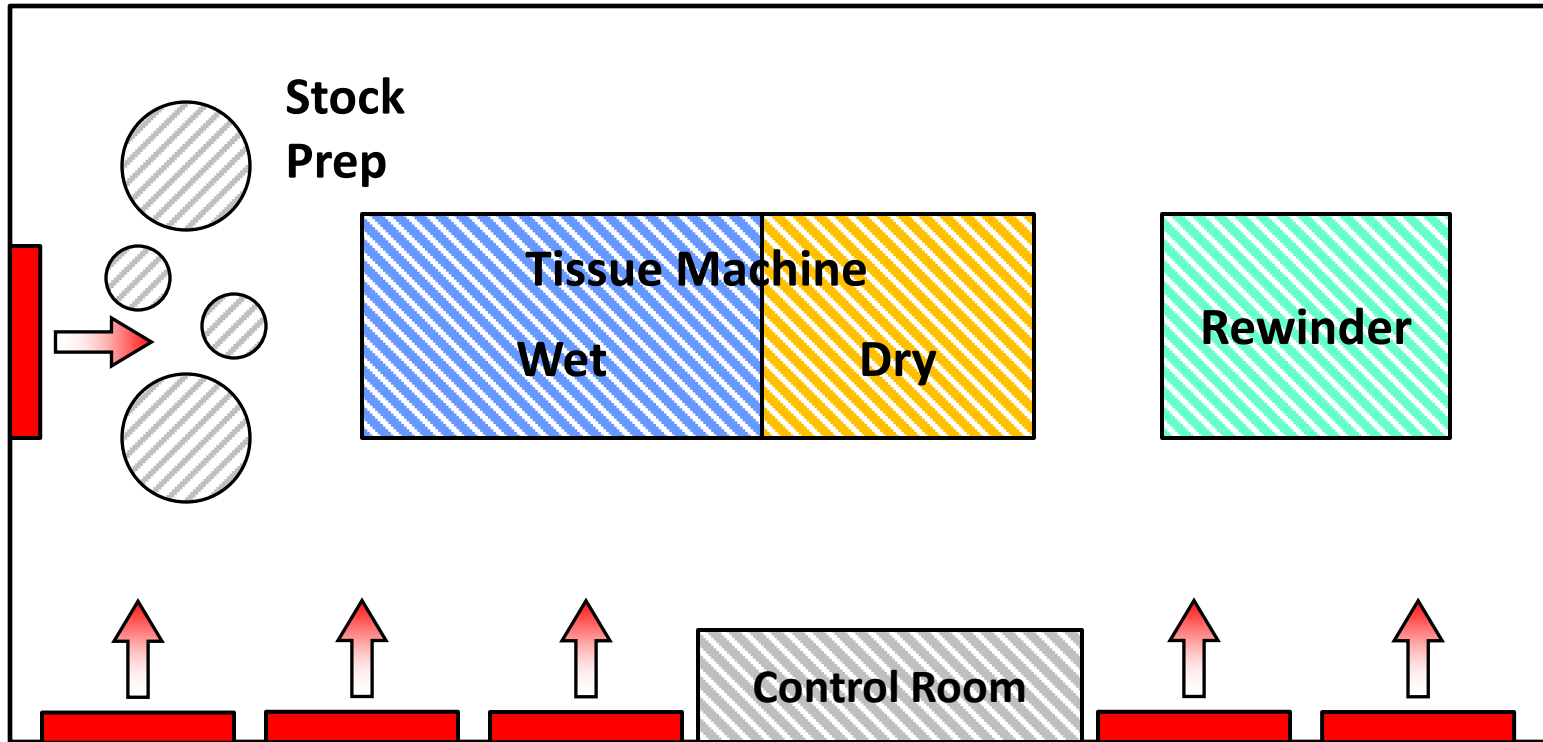
DISTRIBUTION CHAMBER



Technical data

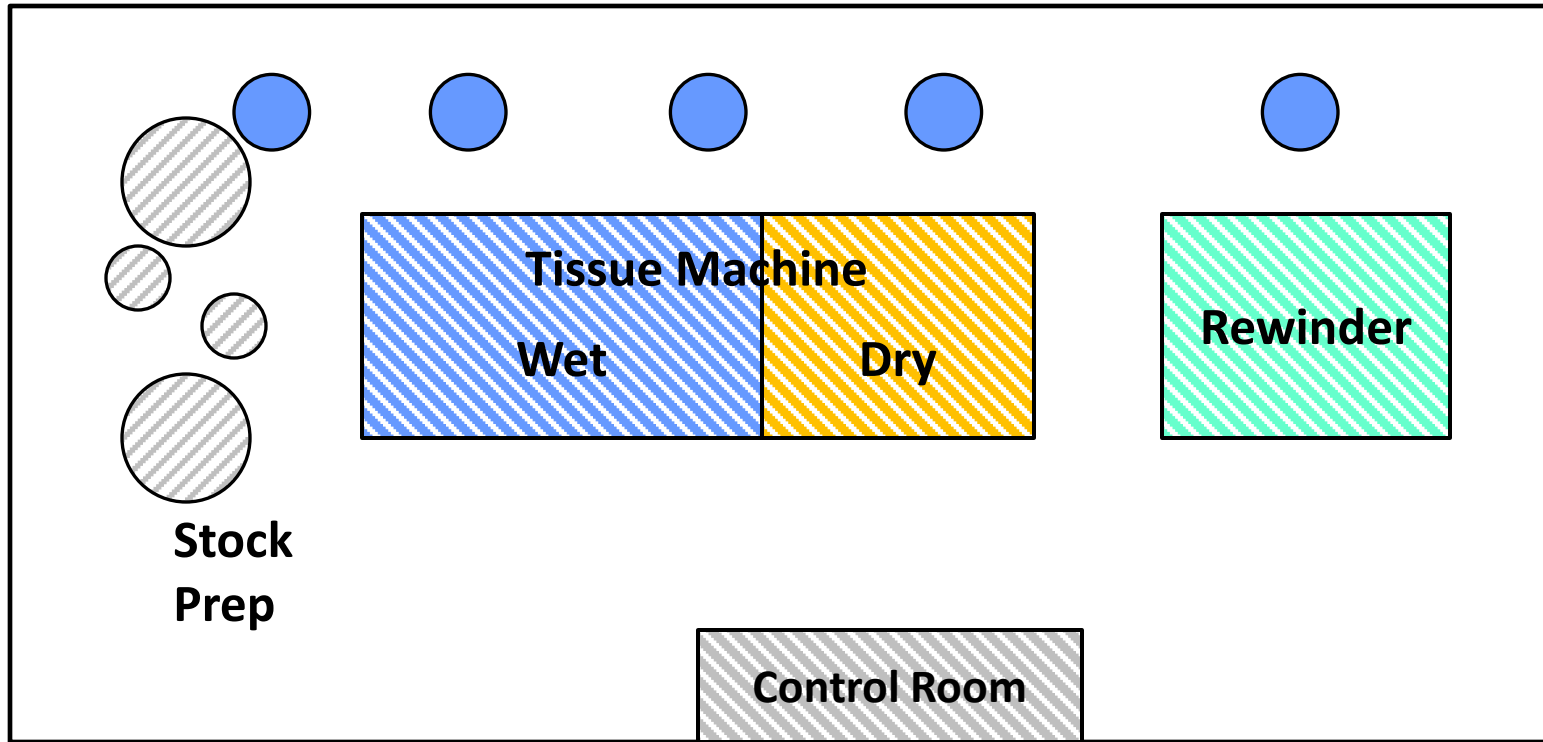
- velocity from the upper nozzle ab. 5-6 m/s
- velocity from perforated plate ab. 2-3 m/s
- holes in the perforated plate 8/10 mm
- open area ab 15-20%

DISTRIBUTION LAYOUT



- Distribution units are located on operator side of the tissue machine and of the rewinder
- Air distribution can be done in the stock preparation area

DISTRIBUTION LAYOUT

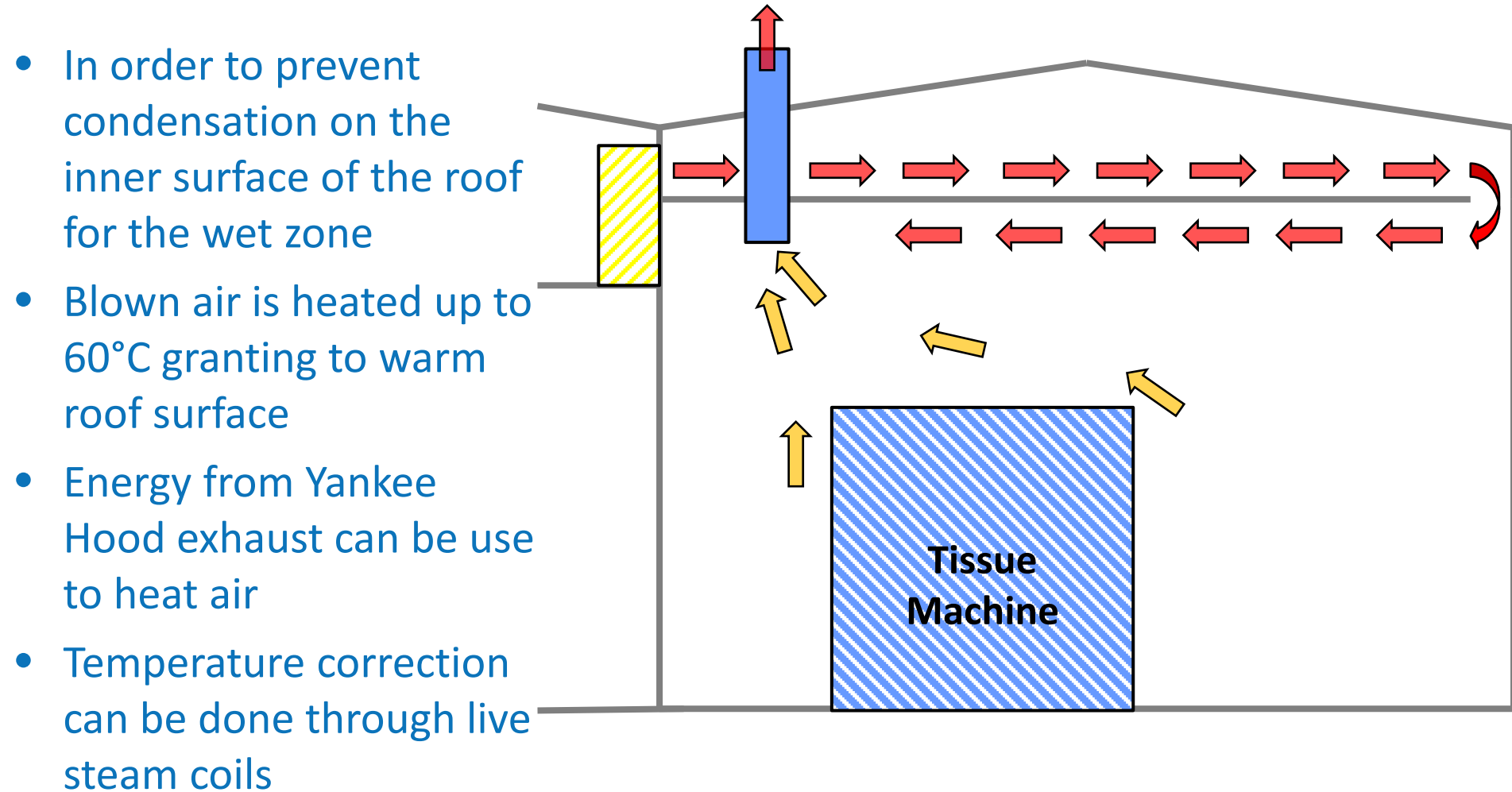


Exhaust units should be located:

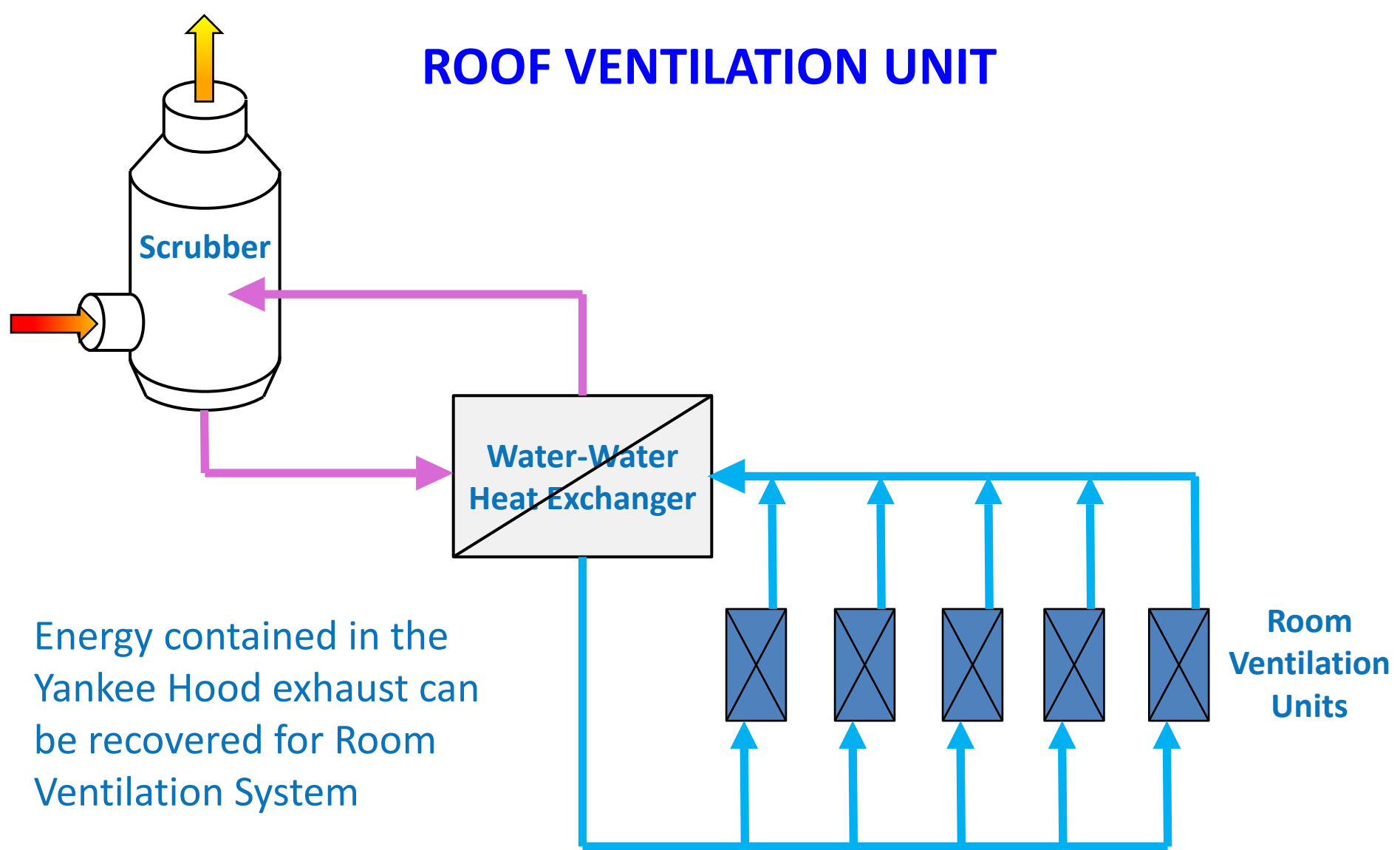
- N.1 over stock preparation area
- N.2 over former section of the machine
- N.1 over dry end of the machine
- N.1 over the rewinder

More units can be added on tender side too depending on the particular application

FALSE CEILING



ROOF VENTILATION UNIT

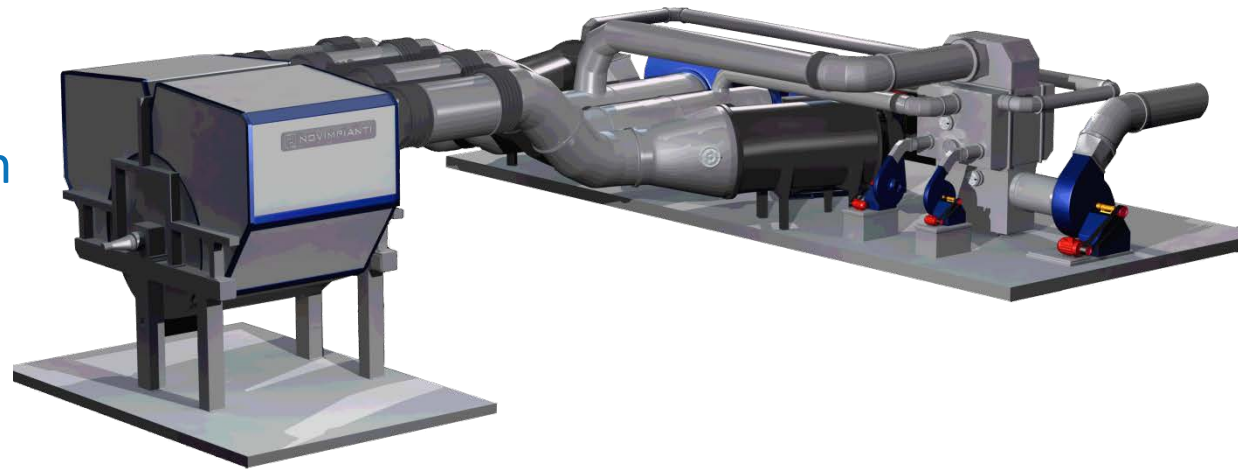


ROOM VENTILATION FOR EXISTING TM

Designing of Room ventilation system need be related to existing equipments and building layout.

In particular tissue machine environment and ventilation depends on:

- Dust Removal System
- Mist Removal System
- Yankee Hood System (leakages)
- Vacuum System Exhaust
- Motor Cooling System



ROOM VENTILATION FOR EXISTING TM

Room Ventilation System needs to be designed being aware of:

- Air flow measurements
- Air change rates
- Temperature and humidity levels
- Analysis of units location
- Analysis of system efficiency

