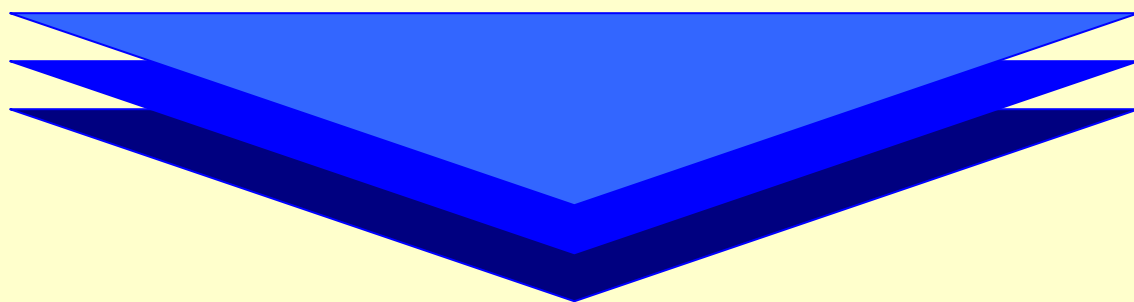


CombVent

by Ing. Gennaro Nasuti



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Generality

CombVent is a software that allows the design of a plant for the production of *bricks* or *tiles* and the processing of related reports, prints and drawings in DWG format, through simple and short steps.

It was developed, combining the passion for information technology and the experience gained in the field, by Ing. Gennaro Nasuti former Director of Operations at Alpina Industriale Spa of Asti, a company specialized in the design and construction of plants for the production of bricks and tiles all over the world.



This software, born as a simple didactic exercise in the field of programming in Visual Basic, has over time assumed dimensions and importance such as to suggest to the author the idea of using it within the company in order to speed up the work time of the Office Technician and at the same time to avoid any errors in calculation, calculation of materials and drawing up of drawings, the latter mainly concerning the kiln and the dryer.

The software has also proved to be a valuable help for the commercial sector as it allows the drafting, in a few minutes, of reports in the language complete with data, tables and graphic images to be presented to the customer.

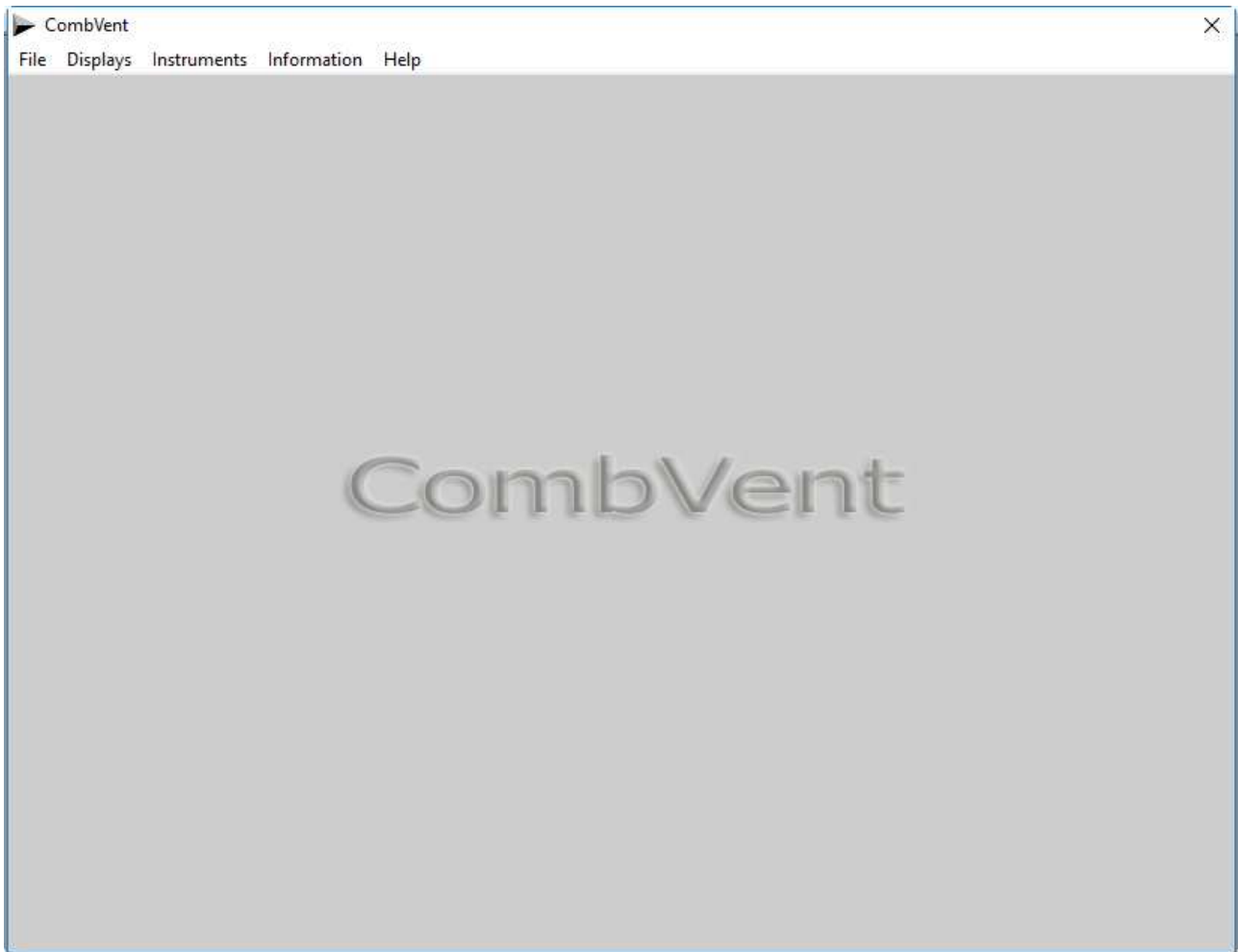
CombVent has been developed with the aim of facilitating and speeding up the work of data introduction, paying particular attention to graphics, and proposing a lot of input data by default. These values can obviously be accepted or modified at any time.

In a few minutes you can define a project in detail and obtain, in addition to the various reports, computations and prints, even 1: 1 scale drawings in DWG format (this requires the presence of AutoCAD 2014-2019 in the user's PC). Each project file can be stored on the hard disk and resumed at any time for any changes.

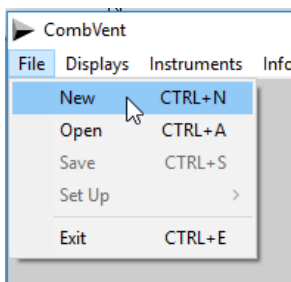
NOTE: The software can be customized by inserting its own logo in all the printouts that the program produces (in the following printed examples the logo of the software author is shown).

Main menu

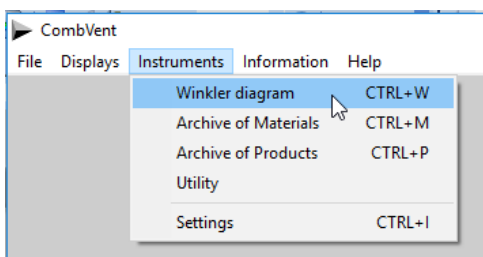
Initial program screen:



In this phase it is possible to start a *new* project or *open* a file related to a project already defined and saved on the hard disk.



NOTE: The drop-down menu can also be displayed by pressing the right mouse button with the pointer positioned anywhere in the window. This feature is present in almost all sections of the program.



NOTE: in this phase, in addition to the File drop-down menu, the *Instruments* drop-down menu is also active (see *Section 7.1 – INSTRUMENTS → Winkler* - page 161).

In the case of a *new* project, the following main menu is displayed:

CombVent

File Displays Instruments Information Help

Customer

Country

Order

Plant for production of

Type of document

Document

Layout

Language

BASIC DATA

PRODUCTS

KILN

DRYER

REPORTS

COSTS

INSTRUMENTS

You start a new project by entering all the identification data of the same. In particular, the type of plant that can be: Plant for the production of *brick* in general; Plant for the production of *tiles*.

NOTE: It is not expected that the same plant can produce bricks and tiles together.

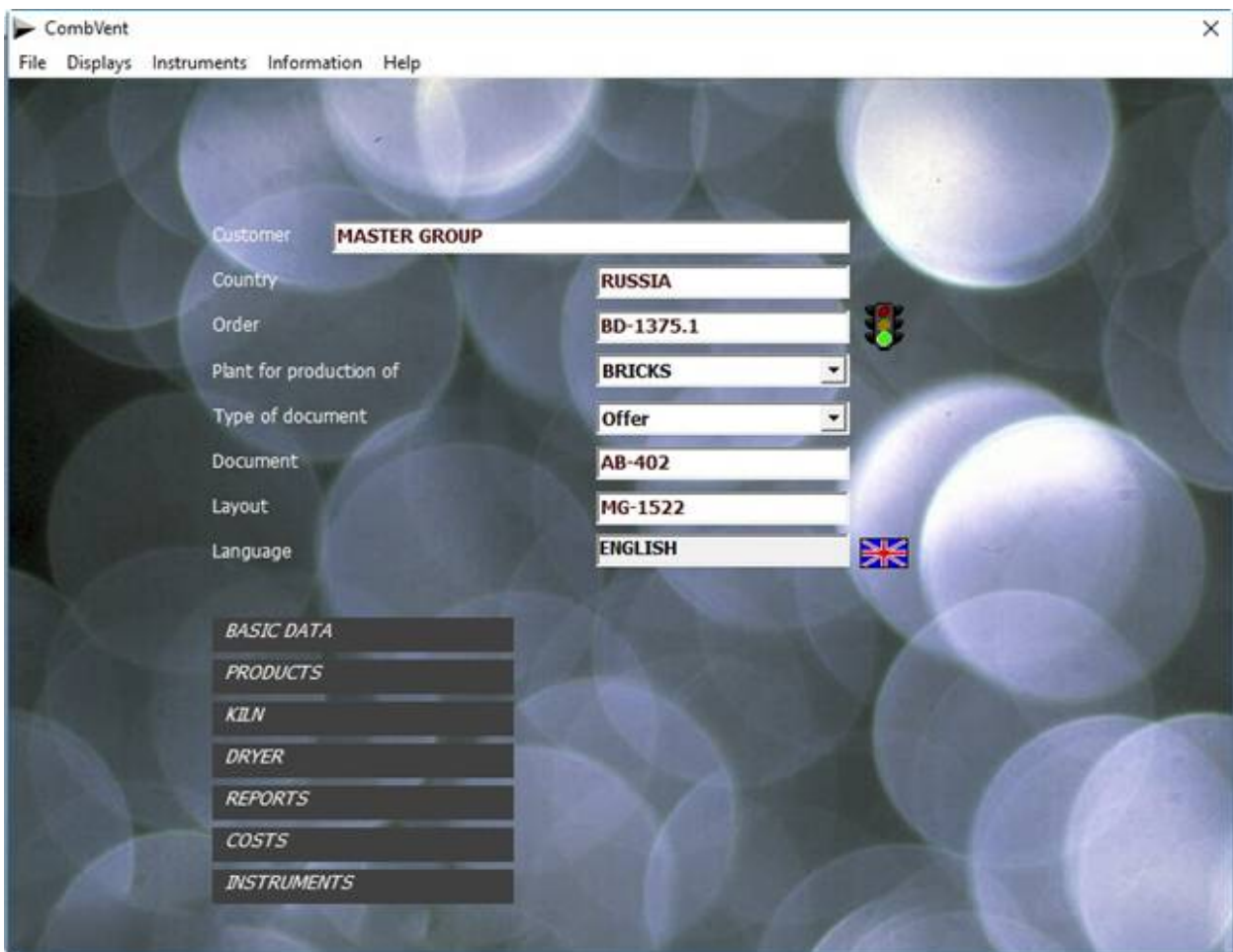
Initially the language proposed by the program is Italian. There is the possibility to select the language to be used in the *Settings* Section 7.5 at page 173, as we will see later. There are 4 languages: Italian; English; French; Spanish.

NOTE: if the data in the project identification boxes are not complete, the Main Menu is not enabled, except for the *INSTRUMENTS* item.

The main menu is structured in such a way as to follow a logical process in the introduction of the project data and therefore in the elaboration of the same. In any case it is the program itself, through messages, to direct the user.

NOTE: When saving a project, the program assigns the name of the Job *Order* to the file to be saved (third box from the top).

In the case of opening an existing project, the main menu will appear as shown below (example):

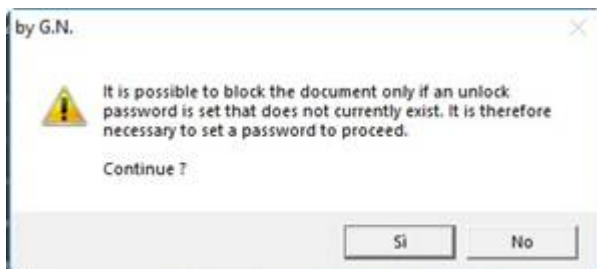


To prevent someone having access to the same PC can open a file of an existing project and modify it, the program gives the possibility to make the file not editable, simply preventing it from being saved.

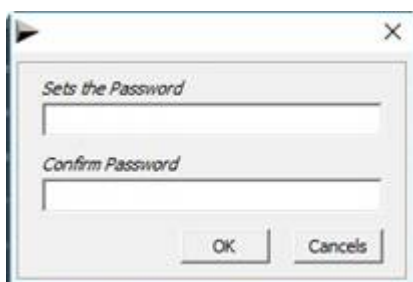
As you can see, to the right of the Job Order box (by default, the Order name is used as the name of the project file to be saved) there is an icon showing a traffic light. In the case of the example shown, the semaphore turns green. This simply means that the project file is *not locked* and therefore is editable by anyone. To make it non-editable (*locked*), simply click on the traffic light icon and proceed with saving.



However, it is possible to lock the file only if a password is set by the main user.



In the case of an affirmative answer, the following window is displayed for generating the password.



Section 1 - BASIC DATA



Indication of the annual production quantity and production times

This is the first step in defining a new project. In this case the window that appears is the following:

	weeks/ year	days/ week	days/ year	shifts/ day	hours/ shift	net hours/ shift
Preprocessing	50	6	300	3	8	6.4
Production	50	6	300	3	8	6.4
Dryer loading / unloading	50	6	300	3	8	6.4
Dryer	50	7	350	3	8	8
Kiln cars loading	50	6	300	3	8	6.4
Kiln	50	7	350	3	8	8
Kiln cars unloading	50	6	300	3	8	6.4

Reductive coefficient hours/shift: .0

Net annual production capacity of the plant: 0 tons of fired product/year

Daily net production [on 350 days]: 0 tons of fired product/day

Margin kiln sizing: 0 %

Gross daily production of fired product [on 350 days]: 0.0 tons of fired product/day

Margin dryer sizing: 0 %

Gross daily production of dried product [on 350 days]: 0.0 tons of fired product/day

Increase coefficient for machines: 0 %

Products List

Kiln loading

Dryer loading

Unloading & Packaging

Exit

The program proposes by default *work* times that can be accepted or modified. A reduction coefficient hours / shift is introduced for the calculation of the hours actually worked. It then goes on to indicate the production capacity of the plant. The net production capacity can be indicated both as *tons of fired product / year* and as *tons of fired product / day*.

The input data are completed by setting the *sizing margins* for both the kiln and the dryer. The sizing margin identifies the gross production (both for the kiln and for the dryer) which allows to obtain the final net one. Basically it therefore represents the percentage of waste.

NOTE: you can also indicate a coefficient of increase to the machines (optional) in case you want to have machines with a potential greater than the minimum necessary to obtain the project production.

In the case in which a file relative to an existing project is opened, the same window is presented as follows:

Work organization

	weeks/ year	days/ week	days/ year	shifts/ day	hours/ shift	net hours/ shift
Preprocessing	50	7	350	3	8	6.4
Production	50	7	350	3	8	6.4
Dryer loading / unloading	50	7	350	3	8	6.4
Dryer	50	7	350	3	8	8
Kiln cars loading	50	7	350	3	8	6.4
Kiln	50	7	350	3	8	8
Kiln cars unloading	50	7	350	3	8	6.4

Default times Reductive coefficient hours/shift:

Production

Net annual production capacity of the plant: tons of fired product/year
Daily net production [on 350 days]: tons of fired product/day
Margin kiln sizing: %
Gross daily production of fired product [on 350 days]: tons of fired product/day
Margin dryer sizing: %
Gross daily production of dried product [on 350 days]: tons of fired product/day
Increase coefficient for machines: %

Basic Product

Basic Product
Net production capacity of the plant: pieces/year

Product list
 pieces/year
Production coefficient: %

WALL BLOCK NOTCHED LT

Product Name	Width cm	Height cm	Length cm	Fired weight kg
10.7NF	39,5	25,0	21,9	14,80

Products List
Kiln loading
Dryer loading
Unloading & Packaging

Exit

In addition to the times and the production, the *Base Product* is also displayed with its dimensional and production characteristics in *Pieces / year*.

If there are other products, there is the possibility to see, for each of them, the annual production in Pieces / year and the relative production coefficient (see *Section 2.1 – PRODUCTS → Products List* - page 12).

Basic Product
Net production capacity of the plant: pieces/year

Product list
 pieces/year
Production coefficient: %

Products List

Kiln loading

Dryer loading

Unloading & Packaging

It is possible to go directly to sections 1, 2, 3 and 4 without returning to the main menu.

Section 2 - PRODUCTS

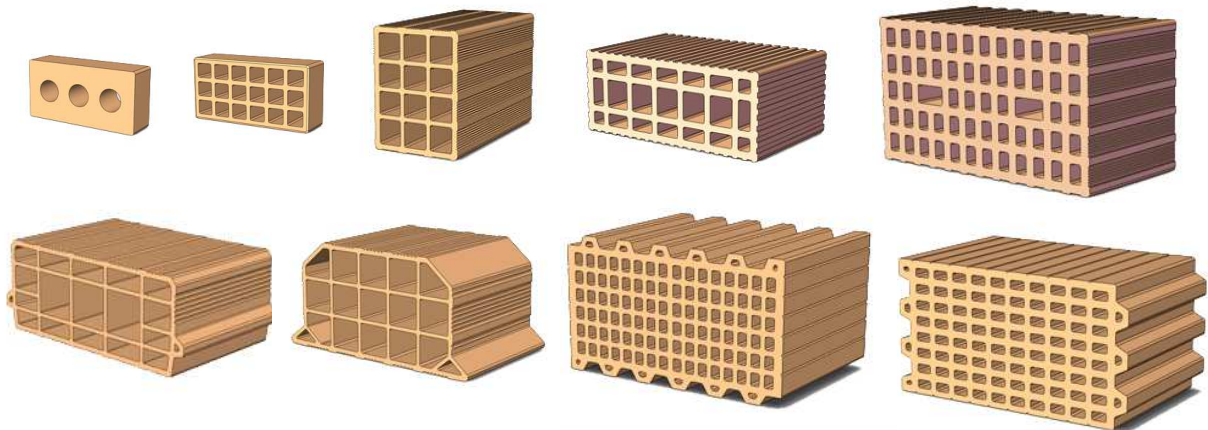
Given that the program includes two types of systems:

- Plant for the production of bricks in general
- Plant for the production of tiles.

The products that can be considered are the following.

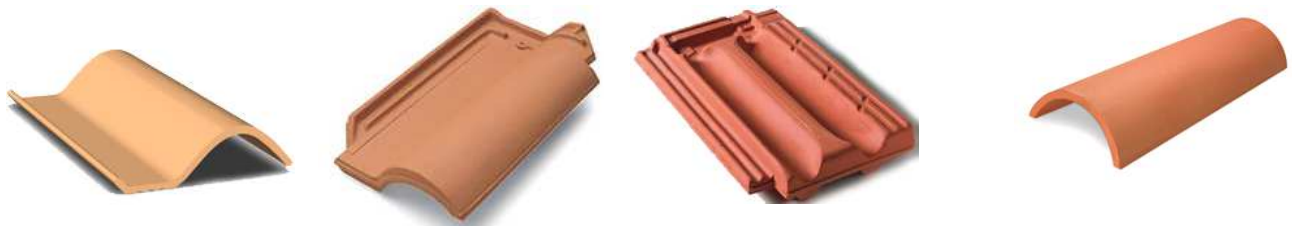
for bricks:

- common brick
- facing brick
- light perforated block
- heavy holed block
- ceiling block with wings
- interposed ceiling block
- heavy block from the wall
- wall block with upper and lower interlocking teeth
- wall block with lateral teeth



for tiles

- extruded tile
- Portuguese tile
- Marseilles tile
- extruded 'Coppo'
- pressed 'Coppo'

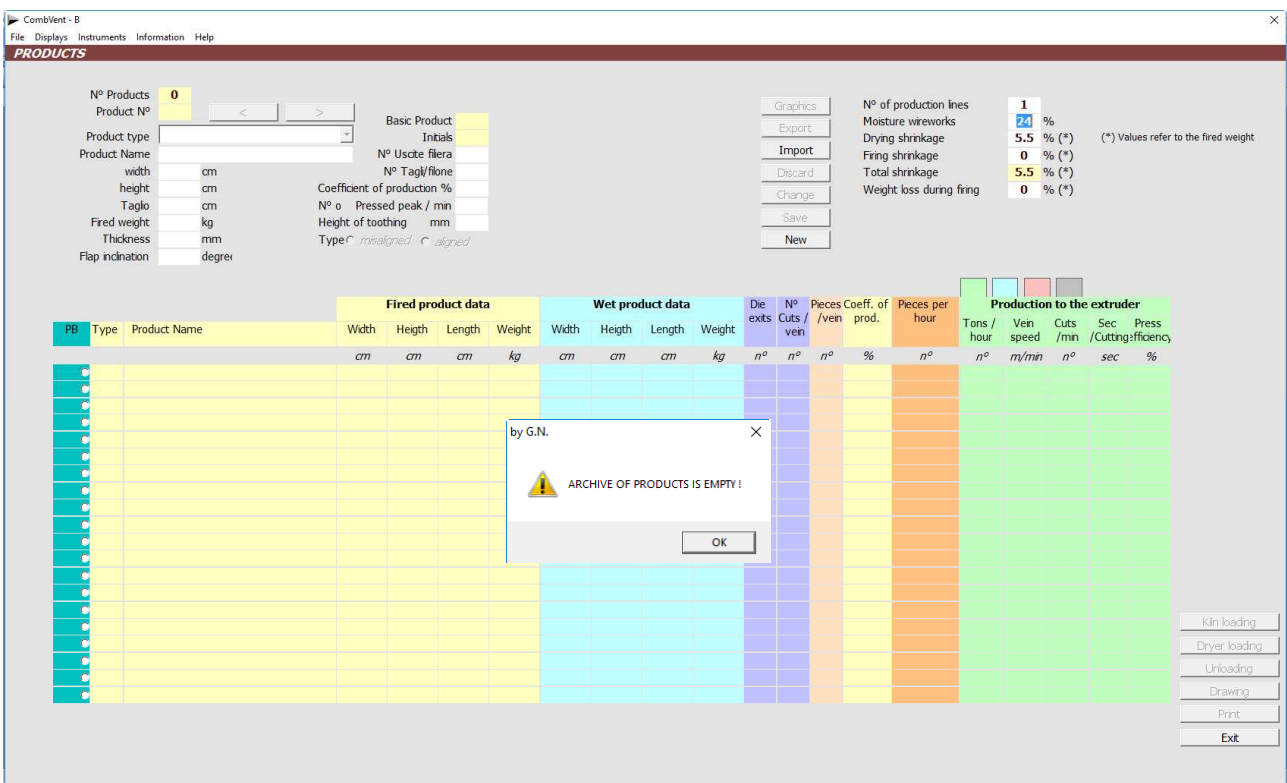


Section 2.1 – PRODUCTS → Products List



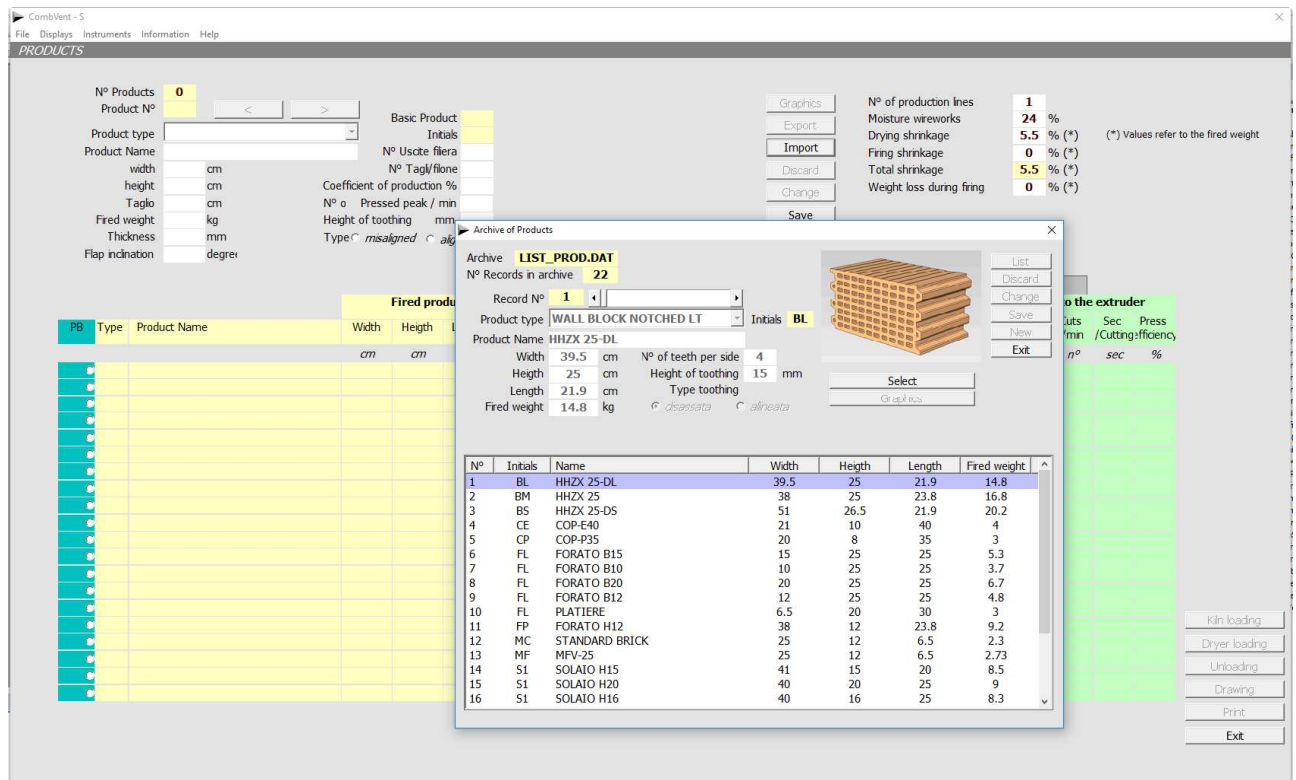
Definition of products with their characteristics

If you start a new project, a message is displayed stating that the archive is empty, the window that appears is as follows:



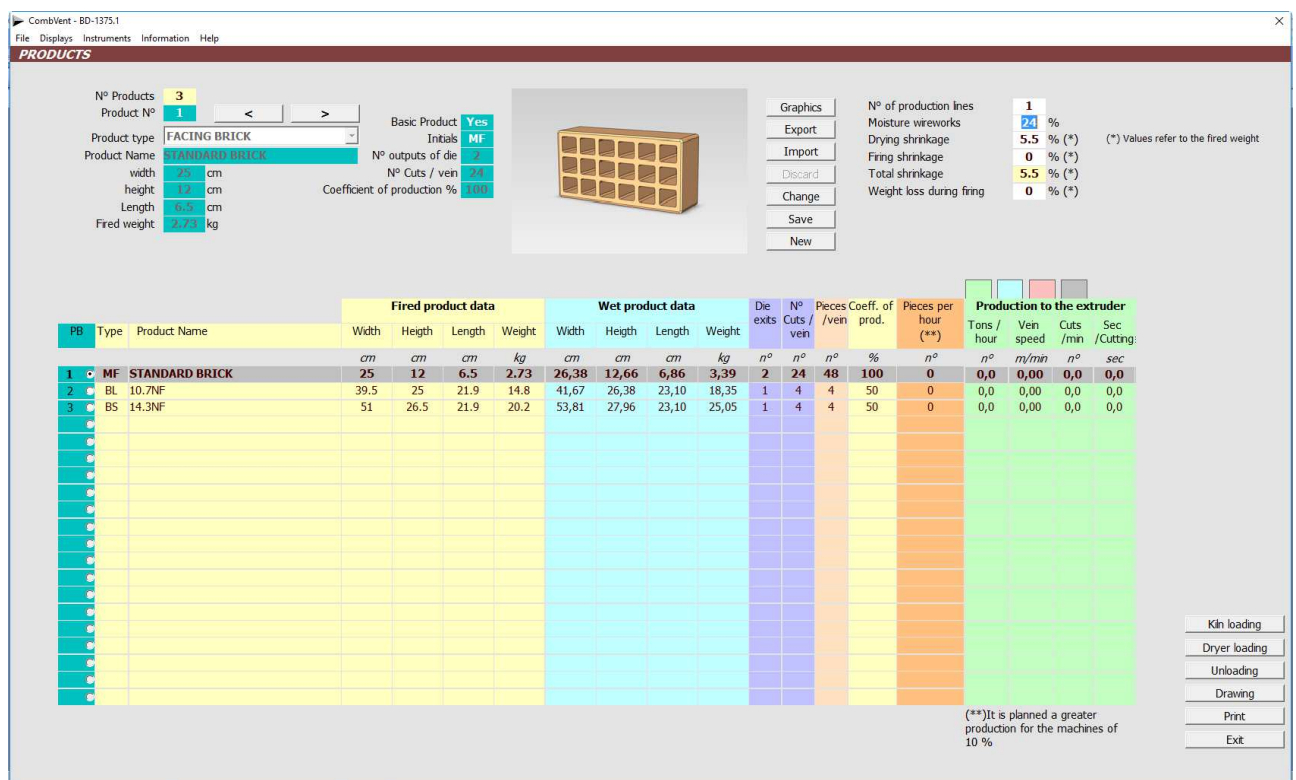
In this section it is necessary to indicate to the program which products the new plant will have to produce (a maximum of 20 products can be introduced). The possibilities (as seen from the active commands) are two:

- *Import* the new product from the *Archive of Products* (Section 7.3 – *INSTRUMENTS* → *Archive of Products* - page 164). This command involves viewing the *Archive of Products* where there are various products of different types and sizes to be used for the current project.



In this case, once you have chosen the product among the various ones, simply press the **Select** key. The data of the selected product are shown on the main window and must be completed with other data such as (in this example a *brick plant* was considered):

- number of outputs from the die
- n° cuts / vein
- production coefficient (in the case of a product that is not a *Base Product*, this coefficient can also be less than 100%)



Once the required data have been completed and if only one product is present, the latter is automatically considered as *Base Product* and highlighted. In this case, the production coefficient is set equal to 100%.

CombVent - A-ESS-CAMERE-RACK

File Displays Instruments Information Help

PRODUCTS


N° Products: 1
 Product N°: 1
 Product type: INTERPOSED CEILING BLOCK
 Product Name: HOURSIS H15
 width: 41 cm
 height: 15 cm
 Length: 20 cm
 Fired weight: 9,05 kg

Basic Product: Yes
 Initials: S1
 N° outputs of die: 2
 N° Cuts / vein: 4
 Coefficient of production %: 100

Graphics
 Export
 Import
 Discard
 Change
 Save
 New

N° of production lines: 1
 Moisture wireworks: 24 %
 Drying shrinkage: 5,5 % (*)
 Firing shrinkage: .5 % (*)
 Total shrinkage: 6 % (*)
 Weight loss during firing: 8 % (*)

(*) Values refer to the fired weight



PB	Type	Product Name	Fired product data				Wet product data				Die exits	Cuts / vein	Pieces / vein	Coeff. of prod.	Pieces per hour	Production to the extruder			
			Width	Height	Length	Weight	Width	Height	Length	Weight						Tons / hour	Vein speed	Cuts /min	Sec /Cutting
1	S1	HOURSIS H15	41	15	20	9,05	43,46	15,90	21,20	11,95	2	4	8	100	0	0,0	0,00	0,0	0,0

Kiln loading
 Dryer loading
 Unloading
 Drawing
 Print
 Exit

NOTE: The production data shown are still zero because the kiln and the dryer have not yet been sized.

After the sizing of the kiln and the dryer it will be possible to see the calculated production values in the various windows present:

Production to the extruder					
Pieces per hour (**)	Tons / hour	Vein speed	Cuts /min	Sec /Cutting	Press efficiency
n°	n°	m/min	n°	sec	%
4.874	18,1	0,09	14,0	4,3	67,7
3.341	14,5	11,75	7,0	8,6	-
3.079	14,5	0,06	9,0	6,7	42,8
3.250	14,5	0,06	9,0	6,7	45,1

(**)It is planned a greater production for the machines of 5 %

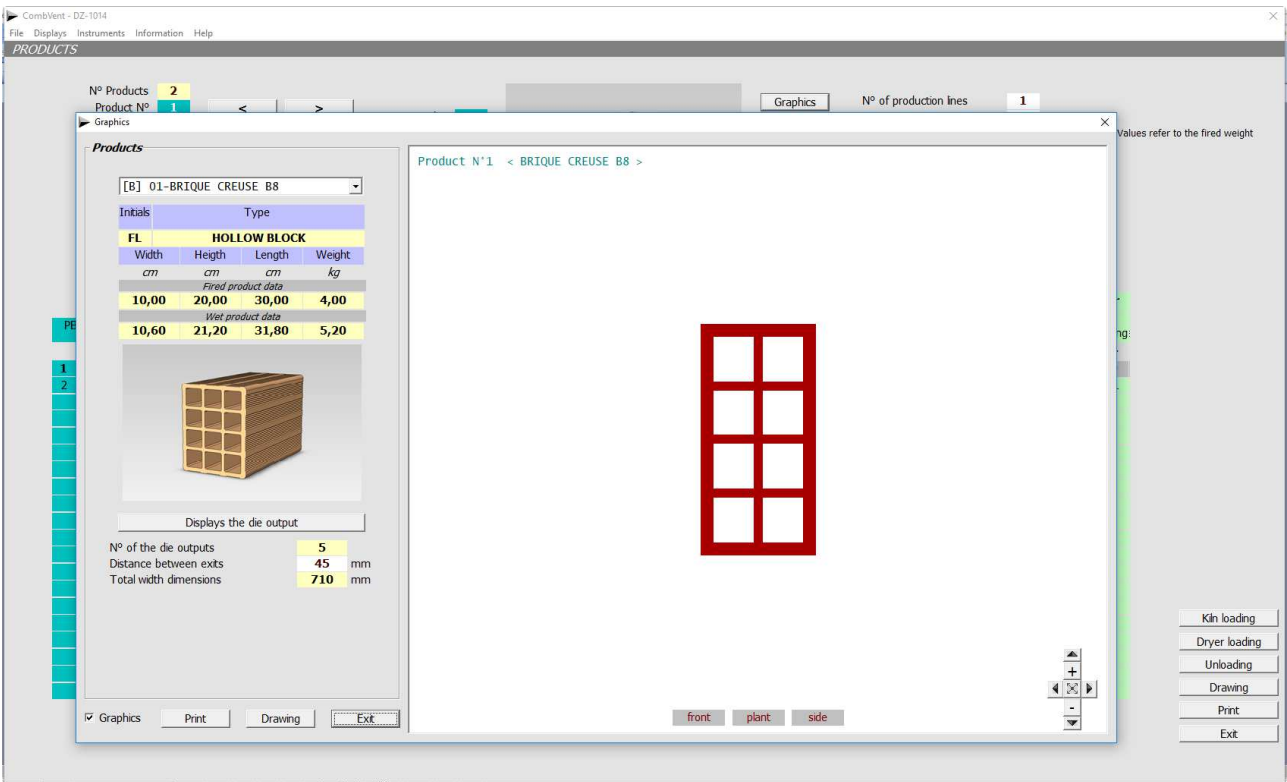
Loading - Unloading	
Layers /hour	Trolley /hour
n°	n°
121,9	8,1
104,4	7,0
128,3	8,6
116,1	7,7

Dryer Production		
Pieces Trolley	Cycle of drying	Trolley /day
n°	hours	n°
600	23 h 16'	148,5
480	27 h 8'	127,3
360	22 h 6'	156,4
420	24 h 25'	141,5

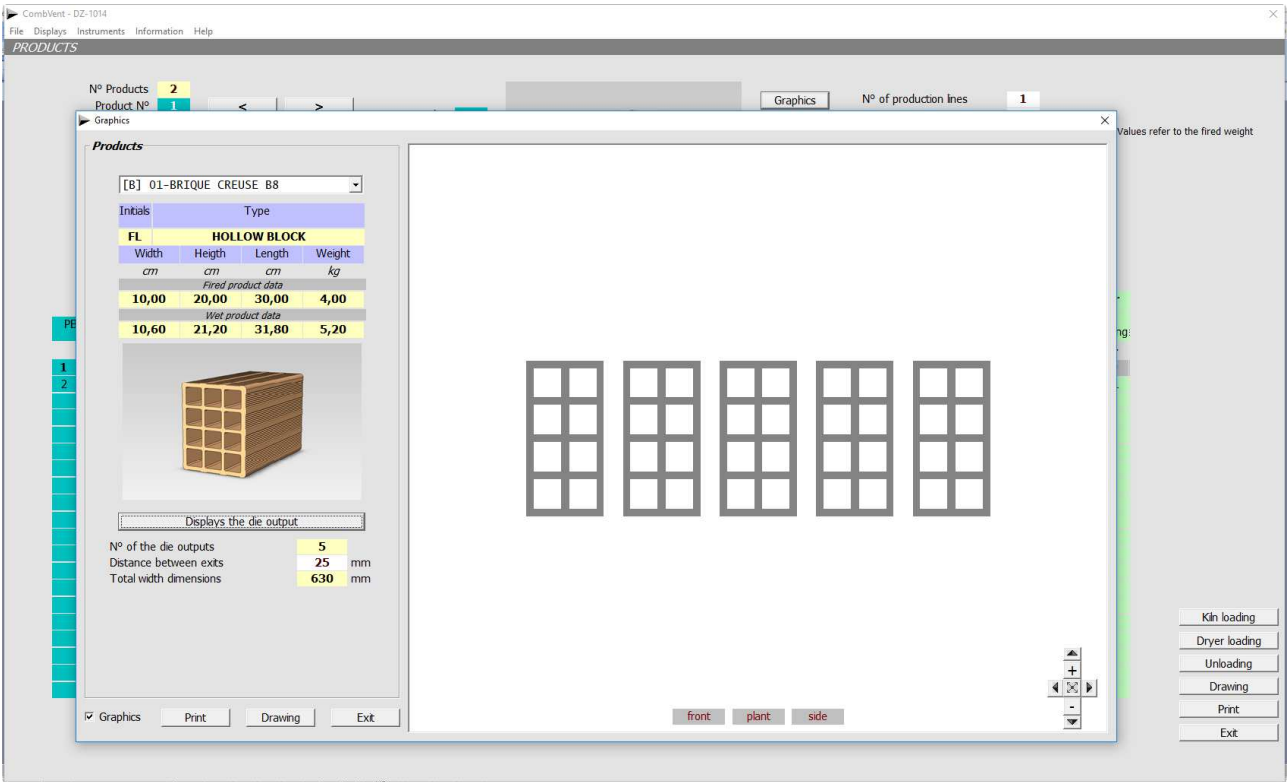
Kiln Production		
Pieces /kiln car	Cycle of firing	Kiln cars /day
n°	hours	n°
5.760	34 h 48'	15,2
10.080	88 h 49'	5,9
2.250	21 h 31'	24,5
3.750	33 h 59'	15,5

NOTE: The *Export* command allows you to add a product defined and present in the product list to the *Product Archive*. If a product with the same name is present in the *Products Archive*, it is reported.

It is also possible to view the *Graphic* of the product:



In this example, since this is an extruded product and as more outputs are provided, it is also possible to view the *die output* and, if necessary, modify the distance between the individual outputs.



Both from the main window and from the latter it is possible to obtain (*Drawing key*) a drawing in DWG format where the orthogonal views of all the products present in the project are reported.


In the case of tiles, there are other data to be introduced such as the *thickness* and, in the case of 'Coppo' tile or Portuguese tile, the *degrees of inclination of the flap*.

CombVent - TEGOLET
File Displays Instruments Information Help

PRODUCTS

N° Products: 5
Product N°: 4
Product type: PORTUGUESE TILE
Product Name: PORTUGUESE 1
width: 27 cm
height: 7.8 cm
length: 40 cm
Fired weight: 4.2 kg
Thickness: 15 mm
Flap inclination: 3 degree

Basic Product: No
Initials: TP
N° moulds/ press: 3
N° presses: 2
Coefficient of production %: 100
Pressed peak / min: 18



Graphics
Export
Import
Discard
Change
Save
New

N° of production lines: 1
Moisture wireworks: 24 %
Drying shrinkage: 5.5 % (*)
Firing shrinkage: .8 % (*)
Total shrinkage: 6.3 % (*)
Weight loss during firing: 5 % (*)
(*) Values refer to the fired weight

PB	Type	Product Name	Fired product data				Wet product data				Molds for press	N° presses	N° resses tiles	Coeff. of prod.	Pieces per hour	Press production				
			Width	Heigh	Length	Weight	Width	Heigh	Length	Weight						Tons / hour	Wafers speed	Beats /min	Sec /beat	Press efficiency
1	TM	MARSIGLIA 1	29.6	5.75	38	3.8	31.46	6.11	40.39	4.90	3	2	6	100	0	0,0	0,00	0,0	6,0	0,0
2	CE	COPPO 1	20	8	38	3.2	21,26	8,50	40,39	4,13	2	4	8	100	0	0,0	0,00	0,0	10,1	-
3	TE	USTILE 1	25	7	40	3.5	26,58	7,44	42,52	4,51	2	4	8	100	0	0,0	0,00	0,0	0,0	-
4	TP	PORTUGHESE 1	27	7.8	40	4.2	28,70	8,29	42,52	5,42	3	2	6	100	0	0,0	0,00	0,0	0,0	0,0
5	CP	COPPO 2	20	8	38	3	21,26	8,50	40,39	3,87	3	2	6	100	0	0,0	0,00	0,0	0,0	0,0

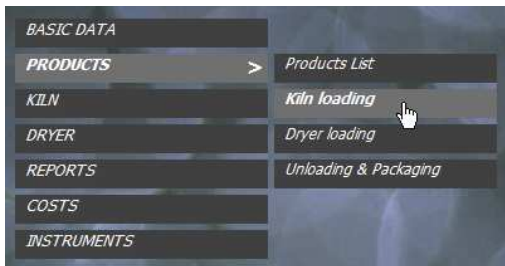
Kln loading
Dryer loading
Unloading
Drawing
Print
Exit

Example of drawing in DWG format (1: 1 scale) of a product list.



NOTE: if the *Drawing* command is given by the Graphics window, only the dimensional characteristics of the products are indicated in the drawing. If you want to have the *production data* of each product, the *Drawing* command must be given from the main window of Section 2.

Section 2.2 – PRODUCTS → Kiln loading



Definition of the stacking of the kiln cars

Since the program develops the project and size the kiln with exclusive reference to the *Base Product*, it is good to start with the configuration of the kiln charge relative to the latter and then continue with the other products if present. The following is displayed.

Dried product data				
Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	12.06	25.12	25.12	5.04

Kiln car stacking ☒ Preview

N° Setting machines: 1
N° heads / stacker: 6

Overturned product: ☐ No ☐ Yes
Crossed layers: ☐ Yes ☐ No
Pack whole in front: ☐ Yes ☐ No

Stacking in stacks

Layer Type: Layer A Layer B

N° pieces [front x side]: 0 x 0 0 x 0

N° pieces for single layer: 0 0

N° of layers for each stack: 0 0

Double layers: ☐ Yes ☐ No
Double pack: ☐ Yes ☐ No

External dimensions pack: 0 x 0 mm
Height of charge on the kiln car: 0 mm
N° pieces per pack: 0
N° packs per module: 6
Center distance between packs: 70 mm
Step / module: 1400 mm
Kiln car length in modules: 3 n°
N° pieces per car: 0
Material weight per car: 0 kg

PACK: Front of pack KILN:

Refractory supports: ☐ Yes ☒ No ☐ Prefabricated kiln ☒ Traditional kiln

Product: [B] 01 - HOLLOW BLOCK B12

NOTE: in the drop-down list of the expected products the *Base Product* is identified with [B]

There are some options for configuring stacking:

- the possibility of stacking the product in an *overturned* position (or commonly called '*standing*', in the case of ceiling block);
- whether or not the various product layers are *crossed*;
- define or not a '*whole front*' package if you want to make a pile that covers the entire front of the kiln car.

NOTE: the last two options are in antithesis because if the layers are crossed, you can not have a '*whole-front*' stacking and vice-versa.

A *non-overturned* product is proposed by default, with *crossed layers* and *packaged stacking*.

NOTE: in general, input data is typed in text boxes with a white background. All the others with a different background are output boxes that display only the calculation values.

Enter the stacking conformation data. In the case of the following example, it is a pack of crossed layers.

CombVent - A
File Displays Instruments Information Help

KILN CAR LOADING

Product: [B] 01 - HOLLOW BLOCK B12

Dried product data

Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	12.06	25.12	25.12	5.04

Kiln car stacking ☒ Preview

N° Setting machines: 1
N° heads / stacker: 6

Overturned product: ☐ No ☐ Yes
Crossed layers: ☒ Yes ☐ No
Pack whole in front: ☐ Yes ☒ No

Stacking in stacks

Layer Type	Layer A	Layer B
N° pieces [front x side]	7 x 4	4 x 7
N° pieces for single layer	28	28
N° of layers for each stack	4	4

Double layers: ☐ Yes ☒ No
Double pack: ☐ Yes ☒ No

External dimensions pack: 1005 x 1005 mm
Height of charge on the kiln car: 2010 mm
N° pieces per pack: 224
N° packs per module: 6
Center distance between packs: 1075 mm
Step / module: 1400 mm
Kiln car length in modules: 3 n°
N° pieces per kiln car: 4.032
Material weight per kiln car: 20.321 kg

Product: HOLLOW BLOCK B12
Dimensions pack [LxPxH]: mt 1,005 x 1,005 x 2,010
Layers in height: n° 8
Pieces / pack: n° 224
Material weight / pack: kg 1.129

X = -1.668 Y = 2.433

STACKING

Net pieces / hour	n° 4.427
Stacked packs / hour	n° 19.8
Stacked layers / hour	n° 158.1
Operations / hour	n° 26.4
Seconds / operation	n° 136.6

PACK: Front of pack KILN: Refractory supports: ☐ Yes ☒ No ☐ Prefabricated kiln ☒ Traditional kiln

NOTE: there are a lot of input data that the program automatically calculates by simply setting its value equal to zero (remember to always press the Enter key ← every time you input a value in an input box, following this event the program is enabled to perform various background operations that support the user).

A first example of what has been said in the preceding note is presented in the current example with regard to the *paraxial spacing of the packs*. By pressing the *Enter* key ← (thus accepting the zero value), the program automatically calculates the *minimum center distance* that can occur between the packages and displays it in the relevant text box. This value can be changed but can not be less than that proposed by the program.

The other values are proposed by default by the program, as can be seen, and in most cases are accepted as proposed.

There are two other options:

- *Double layers*, a same layer is proposed twice;
- *Double pack*, the packaged pack is repeated on itself.

Double layers: ☐ Yes ☒ No
Double pack: ☐ Yes ☒ No

Given all the data, the program already offers a possible section of the tunnel kiln:

CombVent - A
File Displays Instruments Information Help

KILN CAR LOADING

Product: [B] 01 - HOLLOW BLOCK B12

Product: HOLLOW BLOCK B12
Dimensions pack [LxPxH] mt 1,005 x 1,005 x 2,010
Layers in height n° 6
Pieces / pack n° 224
Material Weight / pack kg 1.129

Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	12.06	25.12	25.12	5.04

Kiln car stacking ☒ Preview

N° Setting machines 1
N° heads / stacker 6

Overturned product ☒ No ☐ Yes
Crossed layers ☒ Yes ☐ No
Pack whole in front ☒ Yes ☐ No

Stacking in stacks

Layer Type Layer A Layer B
N° pieces [front x side] 7 x 4 4 x 7
N° pieces for single layer 28 28
N° of layers for each stack 4 4

Double layers ☐ Yes ☒ No
Double pack ☐ Yes ☒ No

External dimensions pack 1005 x 1005 mm
Height of charge on the kiln car 2010 mm
N° pieces per pack 224
N° packs per module 6
Center distance between packs 1075 mm
Step / module 1400 mm
Kiln car length in modules 3 n°
N° pieces per kiln car 4.032
Material weight per kiln car 20.321 kg

Height above the loading base to ceiling 2130 mm
Internal width of gallery 6680 mm
Free space under the ceiling 120 mm
Free space between pack and wall 150 mm

PACK KILN Cross section

Refractory supports ☒ Yes ☐ No ☐ Prefabricated kiln ☐ Traditional kiln

NOTE: By default the program proposes a *traditional* masonry type kiln but it is possible to switch to a *prefabricated* kiln with a simple mouse click.

CombVent - A
File Displays Instruments Information Help

KILN CAR LOADING

Product: [B] 01 - HOLLOW BLOCK B12

Product: HOLLOW BLOCK B12
Dimensions pack [LxPxH] mt 1,005 x 1,005 x 2,010
Layers in height n° 6
Pieces / pack n° 224
Material Weight / pack kg 1.129

Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	12.06	25.12	25.12	5.04

Kiln car stacking ☒ Preview

N° Setting machines 1
N° heads / stacker 6

Overturned product ☒ No ☐ Yes
Crossed layers ☒ Yes ☐ No
Pack whole in front ☒ Yes ☐ No

Stacking in stacks

Layer Type Layer A Layer B
N° pieces [front x side] 7 x 4 4 x 7
N° pieces for single layer 28 28
N° of layers for each stack 4 4

Double layers ☐ Yes ☒ No
Double pack ☐ Yes ☒ No

External dimensions pack 1005 x 1005 mm
Height of charge on the kiln car 2010 mm
N° pieces per pack 224
N° packs per module 6
Center distance between packs 1075 mm
Step / module 1400 mm
Kiln car length in modules 3 n°
N° pieces per kiln car 4.032
Material weight per kiln car 20.321 kg

Height above the loading base to ceiling 2130 mm
Internal width of gallery 6680 mm
Free space under the ceiling 120 mm
Free space between pack and wall 150 mm

PACK KILN Cross section

Refractory supports ☐ Yes ☒ No ☐ Prefabricated kiln ☐ Traditional kiln

NOTE: it is possible to make dimensional changes to the kiln section only if the *Base Product* is displayed. Please note that the project is elaborated with reference to the *Base Product*, therefore, any dimensional change becomes possible only if referring to the latter.

In the case of *tile plants*, the possibilities of charging the kiln car are as follows:

- ***H cassettes***

with H Cassette

Filling and stacking cassettes H

N° stackers / Robots
1

N° Heads / stacker-Robot
1

Spacing between cassettes

Front
30
mm

Side
80
mm

Cassettes arrangement

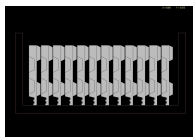
N° cassettes [front x side]
20
x
2

N° cassettes in height
15

Sizing H Cassette

- ***U cassettes***

there are 3 different positions of the tiles inside the box.



hor-cutting



vert-cutting



hor-plan

with U Cassette

Tiles arrangement

☐ hor-cutting
☐ vert-cutting
☒ hor-plan

N° pieces / cassettes
6
x
3

N° pieces / row x N° horizontal rows
18

Filling and stacking cassettes U

N° stackers / Robots
1

N° Heads / stacker-Robot
1

Front spacing between cassettes
10
mm

Side spacing between cassettes
80
mm

Cassettes arrangement

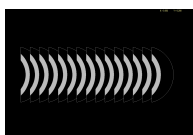
N° cassettes [front x side]
7
x
2

N° cassettes in height
4

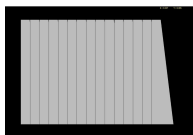
Sizing U Cassette

- ***groups***

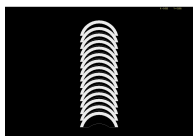
there are 3 different shapes group depending on the position of the tile.



hor-cutting



vert-cutting



hor-plan

to Groups of tiles

N° pieces/group of tiles
24

Groups of tiles arrangement

☒ hor-cutting
☐ vert-cutting
☐ hor-plan

N° stackers / Robots
1

N° Heads / stacker-Robot
1

Spacing between groups of tiles

Front
80
mm

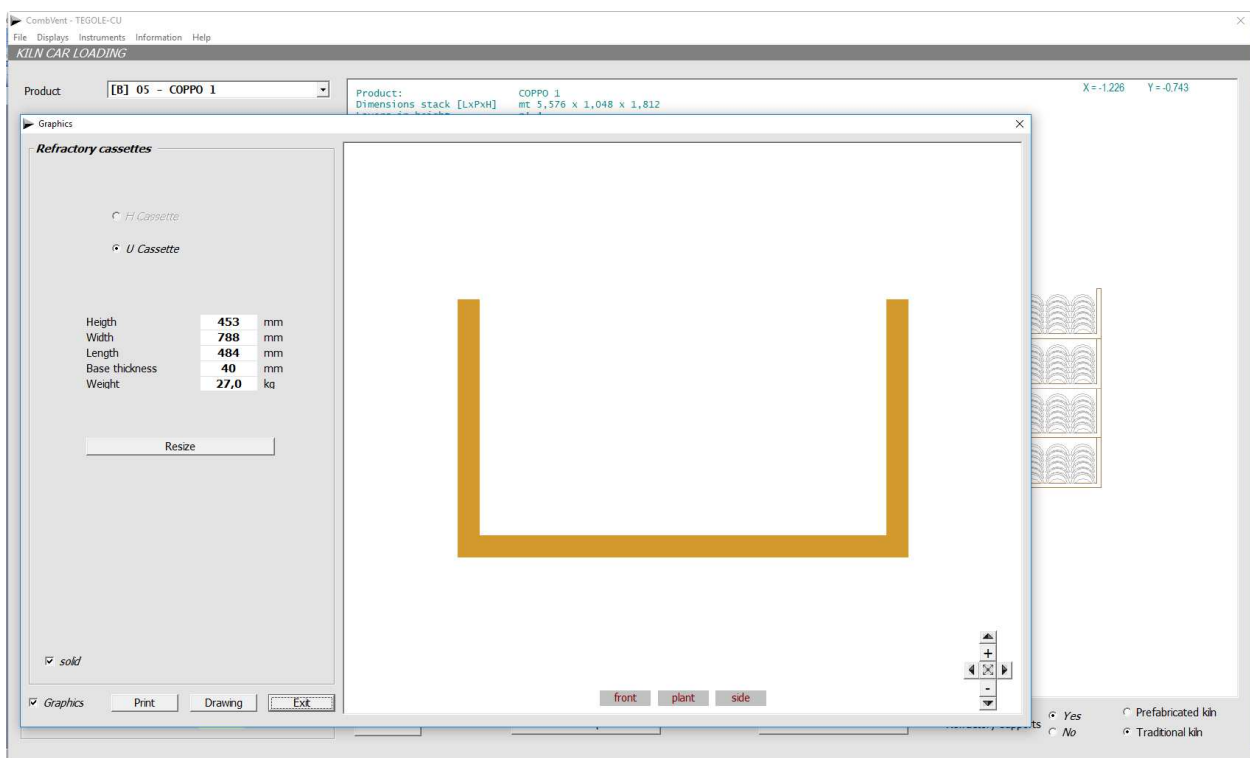
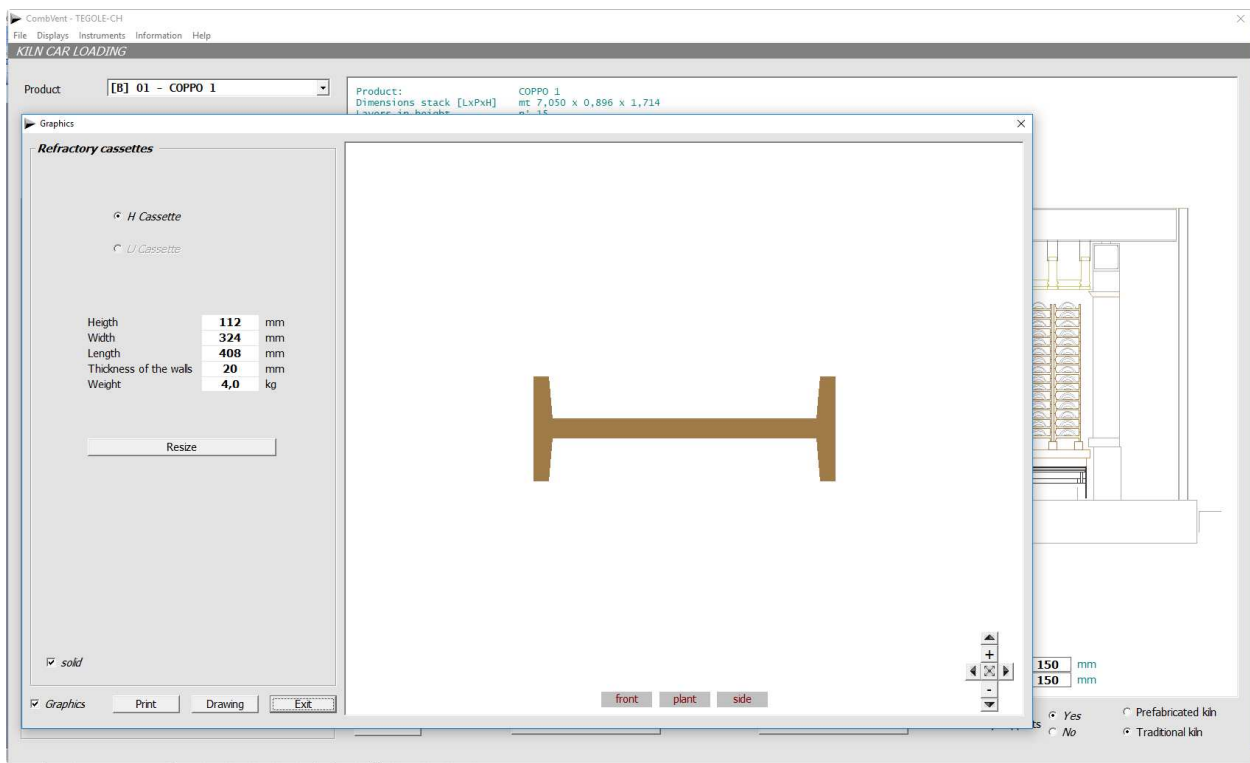
Side
80
mm

Groups of tiles arrangement

N° groups of tiles [front x side]
5
x
2

N° groups of tiles in height
8

In the first two cases there is the *Cassette Sizing* command which displays the following screens.



When defining a charge of the kiln car with refractory supports such as H or U-shaped, the program automatically determines the dimensions of the same according to the dimensions of the *Base product*. The calculated dimensions can be changed. If you want to automatically update the minimum size of the refractory media, after modifications, use the *Resize* command.

EXAMPLES OF CHARGE OF THE KILN CAR

Packet stacking: Block from toothed wall, not overturned, in uncrossed layers offset in the direction of travel of the carriage.

CombVent - BD-1373.1
File Displays Instruments Information Help

KILN CAR LOADING

Product: 03 - 14.3NF

Dried product data

Type	Width cm	Height cm	Length cm	Weight kg
WALL BLOCK NOTCHED	51	26.5	21.9	20.2

Product: 14.3NF
Dimensions pack [LxPxH] mt 1,020 x 0,906 x 1,341
Layers in height n° 5
Pieces / pack n° 40
Material Weight / pack kg 808

Kiln car stacking ☒ Preview

N° Setting machines 1
N° heads / stacker 9

Overturned product ☐ No ☒ Yes
Crossed layers ☐ Yes ☒ No
Pack whole in front ☐ Yes ☒ No

Front offset between layers 0 mm
Lateral offset between layers 30 mm

Stacking in stacks

Layer Type Layer A Layer B
N° pieces [front x side] 2 x 4 2 x 4
N° pieces for single layer 8 8
N° of layers for each stack 2 3

Double layers ☐ Yes ☒ No
Double pack ☐ Yes ☒ No

External dimensions pack 1020 x 906 mm
Height of charge on the kiln car 1341 mm
N° pieces per pack 40
N° packs per module 9
Center distance between packs 1150 mm
Step / module 1400 mm
Kiln car length in modules 3 n°
N° pieces per kiln car 1.080
Material weight per kiln car 21.816 kg

Height above the loading base to ceiling 1540 mm
Internal width of gallery 10500 mm
Free space under the ceiling 199 mm
Free space between pack and wall 140 mm

PACK KILN Cross section

Packet stacking: Ceiling block, overturned, crossed layers and uncrossed fins.

CombVent - LV-1528
File Displays Instruments Information Help

KILN CAR LOADING

Product: 06 - CELERSAP

Dried product data

Type	Width cm	Height cm	Length cm	Weight kg
CEILING BLOCK	42.4	17	26.5	10.2

Product: CELERSAP
Dimensions pack [LxPxH] mt 1,020 x 1,020 x 2,120
Layers in height n° 8
Pieces / pack n° 96
Material Weight / pack kg 979

Kiln car stacking ☒ Preview

N° Setting machines 1
N° heads / stacker 5

Overturned product ☐ No ☒ Yes
Crossed layers ☒ Yes ☐ No
Pack whole in front ☐ Yes ☒ No
Cross-tabs ☒ No ☐ Yes

Stacking in stacks

Layer Type Layer A Layer B
N° pieces [front x side] 6 x 2 2 x 6
N° pieces for single layer 12 12
N° of layers for each stack 4 4

Double layers ☐ Yes ☒ No
Double pack ☐ Yes ☒ No

External dimensions pack 1020 x 1020 mm
Height of charge on the kiln car 2120 mm
N° pieces per pack 96
N° packs per module 5
Center distance between packs 1150 mm
Step / module 1400 mm
Kiln car length in modules 3 n°
N° pieces per kiln car 1.440
Material weight per kiln car 14.688 kg

Height above the loading base to ceiling 2230 mm
Internal width of gallery 5960 mm
Free space under the ceiling 110 mm
Free space between pack and wall 170 mm

PACK KILN Cross section

Stacking in bundles: Interposed ceiling block, not overturned, with crossed layers and uncrossed fins.

CombVent - MA-1248
File Displays Instruments Information Help
KILN CAR LOADING

Product: **05 - HOURDIS H15**

Product: **HOURDIS H15**
Dimensions pack [LxPxH] **mt 1,005 x 1,005 x 1,812**
Layers in height **n° 12**
Pieces / pack **n° 120**
Material Weight / pack **kg 1.200**

Type	Width cm	Height cm	Length cm	Weight kg
CEILING BLOCK	50.2	15.1	20.1	10

Kiln car stacking ☒ Preview

N° Setting machines **1**
N° heads / stacker **5**

Overturned product ☐ No ☐ Yes
Crossed layers ☐ Yes ☐ No
Pack whole in front ☐ Yes ☐ No
Cross-tabs ☐ No ☐ Yes

Stacking in stacks

Layer Type **Layer A** **Layer B**
N° pieces [front x side] **2 x 5** **5 x 2**
N° pieces for single layer **10** **10**
N° of layers for each stack **6** **6**

Double layers ☐ Yes ☐ No
Double pack ☐ Yes ☐ No

External dimensions pack **1005** x **1005** mm
Height of charge on the kiln car **1812** mm
N° pieces per pack **120**
N° packs per module **5**
Center distance between packs **1110** mm
Step / module **1400** mm
Kiln car length in modules **2** n°
N° pieces per kiln car **1.200**
Material weight per kiln car **12.000** kg

Height above the loading base to ceiling **1915** mm
Internal width of gallery **5780** mm
Free space under the ceiling **103** mm
Free space between pack and wall **168** mm

PACK KILN Cross section

Packet stacking: Light hollow block, overturned, cross-layered, double layers.

CombVent - TN-4864-CATHAGO-CGB
File Displays Instruments Information Help
KILN CAR LOADING

Product: **[B] 05 - PLATIERE**

Product: **PLATIERE**
Dimensions pack [LxPxH] **mt 1,000 x 1,000 x 1,820**
Layers in height **n° 28**
Pieces / pack **n° 420**
Material Weight / pack **kg 1.386**

Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	6.5	20	30	3.3

Kiln car stacking ☒ Preview

N° Setting machines **1**
N° heads / stacker **5**

Overturned product ☐ No ☐ Yes
Crossed layers ☐ Yes ☐ No
Pack whole in front ☐ Yes ☐ No

Stacking in stacks

Layer Type **Layer A** **Layer B**
N° pieces [front x side] **5 x 3** **3 x 5**
N° pieces for single layer **15** **15**
N° of layers per pack **7** **7**

Double layers ☐ Yes ☐ No
Double pack ☐ Yes ☐ No

External dimensions pack **1000** x **1000** mm
Height of charge on the kiln car **1820** mm
N° pieces per pack **420**
N° packs per module **5**
Center distance between packs **1200** mm
Step / module **1400** mm
Kiln car length in modules **3** n°
N° pieces per kiln car **6.300**
Material weight per kiln car **20.790** kg

Height above the loading base to ceiling **1920** mm
Internal width of gallery **6000** mm
Free space under the ceiling **100** mm
Free space between pack and wall **100** mm

PACK KILN Cross section

Refractory supports ☐ Yes ☐ No ☐ Prefabricated kiln ☐ Traditional kiln

Packet stacking: Light hollow block, overturned, with uncrossed layers offset frontally and lateral.

CombVent - TN-4864-CATHAGO-CGB
File Displays Instruments Information Help

KILN CAR LOADING

Product: **01 - BRIQUE CREUSE B12**

Product: BRIQUE CREUSE B12
Dimensions pack [LxPxH] mt 1,025 x 0,930 x 1,800
Layers in height n° 12
Pieces / pack n° 180
Material Weight / pack kg 1.188

Dried product data				
Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	15	20	30	6.6

Kiln car stacking ☒ Preview

N° Setting machines **1**
N° heads / stacker **5**

Overturned product ☐ No ☒ Yes
Crossed layers ☐ Yes ☒ No
Pack whole in front ☐ Yes ☒ No

Front offset between layers **25** mm
Lateral offset between layers **30** mm

Stacking in stacks

Layer Type **Layer A** **Layer B**
N° pieces [front x side] **5** x **3** **5** x **3**
N° pieces for single layer **15** **15**
N° of layers for each stack **6** **6**

Double layers ☐ Yes ☒ No
Double pack ☐ Yes ☒ No

External dimensions pack **1025** x **930** mm
Height of charge on the kiln car **1800** mm
N° pieces per pack **180**
N° packs per module **5**
Center distance between packs **1150** mm
Step / module **1400** mm
Kiln car length in modules **3** n°
N° pieces per kiln car **2.700**
Material weight per kiln car **17.820** kg

Height above the loading base to ceiling **1920** mm
Internal width of gallery **5800** mm
Free space under the ceiling **120** mm
Free space between pack and wall **88** mm

PACK KILN Cross section

Stacking whole in front: Ceiling block, not overturned, with cross tabs staggered frontally and sideways.

CombVent - TN-4864-CATHAGO-CGB
File Displays Instruments Information Help

KILN CAR LOADING

Product: **04 - HOURDIS 16**

Product: HOURDIS 16
Dimensions pack [LxPxH] mt 5,450 x 0,930 x 1,760
Layers in height n° 11
Pieces / pack n° 594
Material Weight / pack kg 4.871

Dried product data				
Type	Width cm	Height cm	Length cm	Weight kg
INTERPOSED CEILING	33	16	30	8.2

Kiln car stacking ☒ Preview

N° Setting machines **1**
N° heads / stacker **5**

Overturned product ☐ No ☒ Yes
Crossed layers ☐ Yes ☒ No
Pack whole in front ☐ Yes ☒ No
Cross-tabs ☐ No ☒ Yes

Blocks wheelbase **300** mm
Front offset between layers **20** mm
Lateral offset between layers **30** mm
Front space between the pieces **0** mm every **0**

Stacking whole front

N° pieces [front x side] **18** x **3**
N° pieces per layer **54**
N° of layers for each stack **11**

Double layers ☐ Yes ☒ No
Double pack ☐ Yes ☒ No

External dimensions pack **5450** x **930** mm
Height of charge on the kiln car **1760** mm
N° pieces per pack **594**
N° packs per module **1**
Center distance between packs **0** mm
Step / module **1400** mm
Kiln car length in modules **3** n°
N° pieces per kiln car **1.782**
Material weight per kiln car **14.612** kg

Height above the loading base to ceiling **1920** mm
Internal width of gallery **5800** mm
Free space under the ceiling **160** mm
Free space between pack and wall **175** mm

PACK KILN Cross section

Stacking whole in front: Light hollow block, overturned, in double layers offset from the front and side.

CombiVent - TN-4864-CATHAGO-CGB
File Displays Instruments Information Help

KILN CAR LOADING

Product: 02 - BRIQUE CREUSE B8

Dried product data				
Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	10	20	30	4.4

Product: BRIQUE CREUSE B8
Dimensions pack [LxPxH] mt 5,630 x 0,940 x 1,800
Layers in height n° 18
Pieces / pack n° 1.512
Material Weight / pack kg 6.653

Kiln car stacking ☒ Preview

N° Setting machines: 1
N° heads / stacker: 5

Overturned product: ☐ No ☒ Yes
Crossed layers: ☐ Yes ☒ No
Pack whole in front: ☒ Yes ☐ No

Front offset between layers: 30 mm
Lateral offset between layers: 40 mm
Front space between the pieces: 0 mm every 0

Stacking whole front

N° pieces [front x side]: 28 x 3
N° pieces per layer: 168
N° layers per pack: 9

Double layers: ☐ Yes ☒ No
Double pack: ☐ Yes ☒ No

External dimensions pack: 5630 x 940 mm
Height of charge on the kiln car: 1800 mm
N° pieces per pack: 1512
N° packs per module: 1
Center distance between packs: 0 mm
Step / module: 1400 mm
Kiln car length in modules: 3 n°
N° pieces per kiln car: 4.536
Material weight per kiln car: 19.958 kg

Height above the loading base to ceiling: 1920 mm
Internal width of gallery: 5800 mm
Free space under the ceiling: 120 mm
Free space between pack and wall: 85 mm

PACK: [] KILN: [] Cross section: []

Stacking whole in front: Heavy hollow block, not overturned, in layers offset frontally and sideways and with front spacing every 6 pieces.

CombiVent - TN-4864-CATHAGO-CGB
File Displays Instruments Information Help

KILN CAR LOADING

Product: 02 - BRIQUE CREUSE B8

Dried product data				
Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	10	20	30	4.4

Product: BRIQUE CREUSE B8
Dimensions pack [LxPxH] mt 5,430 x 0,940 x 1,800
Layers in height n° 18
Pieces / pack n° 1.296
Material Weight / pack kg 5.702

Kiln car stacking ☒ Preview

N° Setting machines: 1
N° heads / stacker: 5

Overturned product: ☐ No ☒ Yes
Crossed layers: ☐ Yes ☒ No
Pack whole in front: ☒ Yes ☐ No

Front offset between layers: 30 mm
Lateral offset between layers: 40 mm
Front space between the pieces: 200 mm every 6

Stacking whole front

N° pieces [front x side]: 24 x 3
N° pieces per layer: 72
N° of layers for each stack: 18

Double layers: ☐ Yes ☒ No
Double pack: ☐ Yes ☒ No

External dimensions pack: 5430 x 940 mm
Height of charge on the kiln car: 1800 mm
N° pieces per pack: 1296
N° packs per module: 1
Center distance between packs: 0 mm
Step / module: 1400 mm
Kiln car length in modules: 3 n°
N° pieces per kiln car: 3.888
Material weight per kiln car: 17.107 kg

Height above the loading base to ceiling: 1920 mm
Internal width of gallery: 5800 mm
Free space under the ceiling: 120 mm
Free space between pack and wall: 185 mm

PACK: [] KILN: [] Cross section: []

Stacking with "U" cassettes: Marseille tile arranged horizontally 'cutting'.

CombVent - TEGOLE-1
File Displays Instruments Information Help

KILN CAR LOADING

Product: [B] 01 - MARSIGLIA 1

Product: MARSIGLIA 1
Dimensions stack [LxPxH] mt 6,374 x 1,048 x 1,812
Layers in height n° 4
Pieces / stack n° 640
Material Weight / stack kg 2.554

Type	Width cm	Height cm	Length cm	Weight kg
MARSIGLIESE TILE	29.84	5.8	38.3	3.99

Kiln car stacking ☒ Preview

Tipo di impilaggio
☐ with H Cassette
☒ with U Cassette
☐ to Groups of tiles

with U Cassette

Tiles arrangement
☒ hor-cutting ☐ vert-cutting ☐ hor-plan

N° pieces / cassettes **10**

Filing and stacking cassettes U
 N° stackers / Robots **1**
 N° Heads / stacker-Robot **1**
 Front spacing between cassettes **10** mm
 Side spacing between cassettes **80** mm

Cassettes arrangement
 N° cassettes [front x side] **8** x **2**
 N° cassettes in height **4**

Sizing U Cassette

External dimensions pack **6374** x **1048** mm
 Height of charge on the kiln car **1812** mm
 N° pieces per stack **640**
 N° stacks per module **1**
 Center distance between stacks **0** mm
 Step / module **1400** mm
 Kiln car length in modules **3** n°
 N° pieces per kiln car **1.920**
 Material weight per kiln car **7.661** kg

Height above the loading base to ceiling **1912** mm
 Internal width of gallery **6674** mm

Free space under the ceiling **100** mm
 Free space between pack and wall **150** mm

PACK KILN Cross section

Refractory supports ☒ Yes ☐ No
☐ Prefabricated kiln ☒ Traditional kiln

Stacking with "U" cassettes: Extruded tiles 'Coppo' arranged horizontally.

CombVent - TEGOLE-1
File Displays Instruments Information Help

KILN CAR LOADING

Product: [D5] - COPPO 1

Product: COPPO 1
Dimensions stack [LxPxH] mt 6,374 x 1,048 x 1,812
Layers in height n° 4
Pieces / stack n° 1.152
Material Weight / stack kg 4.838

Type	Width cm	Height cm	Length cm	Weight kg
EXTRUDED COPPO	21.17	10.08	40.32	4.2

Kiln car stacking ☒ Preview

Tipo di impilaggio
☐ with H Cassette
☒ with U Cassette
☐ to Groups of tiles

with U Cassette

Tiles arrangement
☐ hor-cutting ☐ vert-cutting ☒ hor-plan

N° pieces / cassettes **6** x **3**
 N° pieces / row x N° horizontal rows **18**

Filing and stacking cassettes U
 N° stackers / Robots **1**
 N° Heads / stacker-Robot **1**
 Front spacing between cassettes **10** mm
 Side spacing between cassettes **80** mm

Cassettes arrangement
 N° cassettes [front x side] **8** x **2**
 N° cassettes in height **4**

Sizing U Cassette

External dimensions pack **6374** x **1048** mm
 Height of charge on the kiln car **1812** mm
 N° pieces per stack **1152**
 N° stacks per module **1**
 Center distance between stacks **0** mm
 Step / module **1400** mm
 Kiln car length in modules **3** n°
 N° pieces per kiln car **3.456**
 Material weight per kiln car **14.515** kg

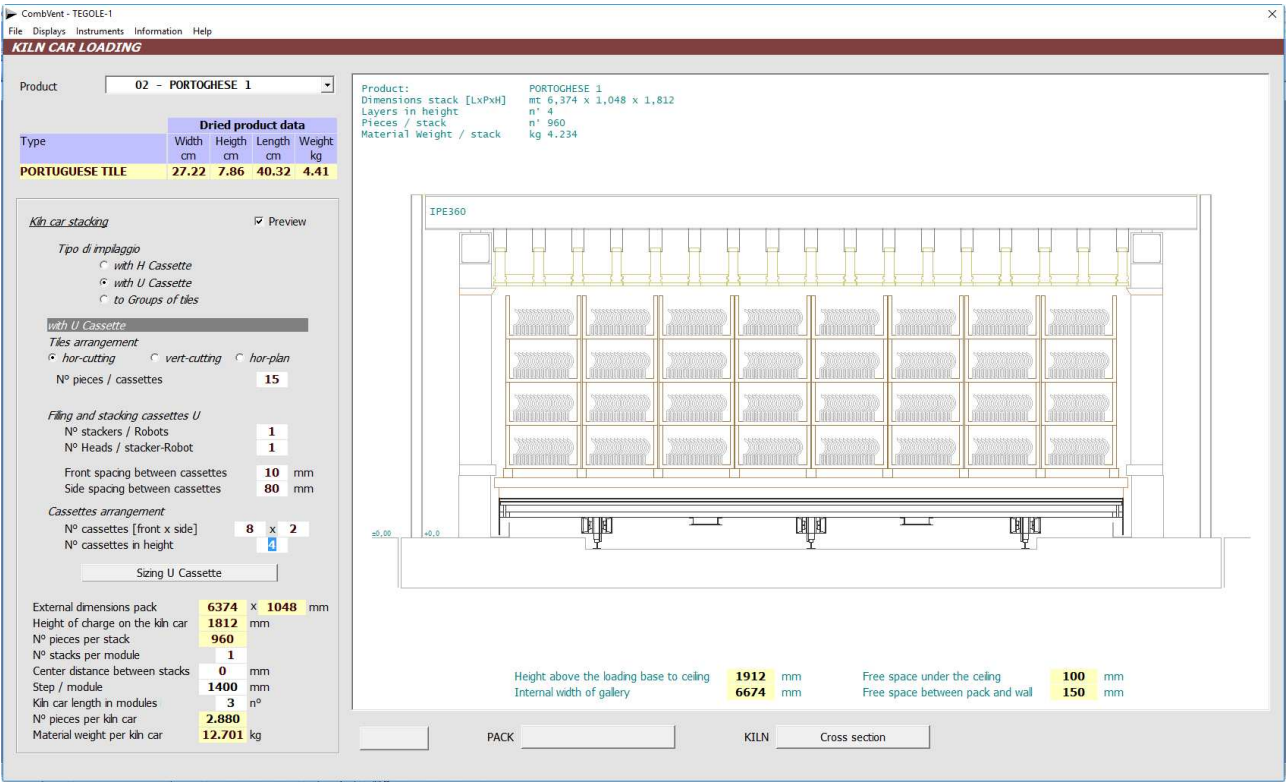
Height above the loading base to ceiling **1912** mm
 Internal width of gallery **6674** mm

Free space under the ceiling **100** mm
 Free space between pack and wall **150** mm

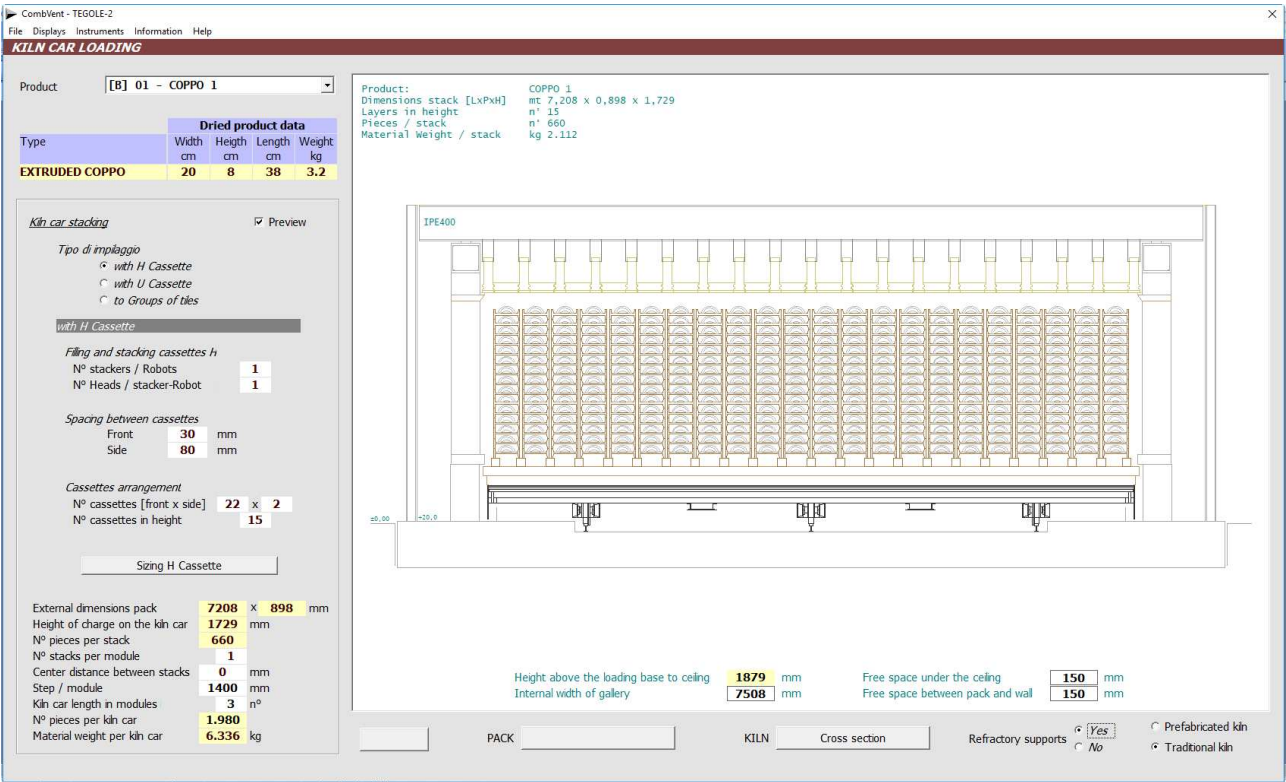
PACK KILN Cross section

Refractory supports ☒ Yes ☐ No
☐ Prefabricated kiln ☒ Traditional kiln

Stacking with "U" cassettes: Portuguese tile arranged horizontally 'cutting'. The cassettes are arranged with a front and a side spacing.



Stacking with "H" cassettes: extruded 'Coppo'. The cassettes are arranged with a front and a side spacing.



Stacking with groups: 'Coppo' pressed. The bundles are arranged horizontally and are offset both from the front and from the side.

CombiVent - TEGOLE-3
File Displays Instruments Information Help

KILN CAR LOADING

Product: [B] 01 - COPPO 2

Dried product data				
Type	Width cm	Height cm	Length cm	Weight kg
PRESSED COPPO	20	8	38	3

Product: COPPO 2
Dimensions pack [LxPxH] mt 4,936 x 0,840 x 1,430
Layers in height n° 8
Pieces / pack n° 1.920
Material weight / pack kg 5.760

Kiln car stacking ☒ Preview

Tipo di impilaggio
☐ with H Cassette
☐ with U Cassette
☒ to Groups of tiles

to Groups of tiles
 N° pieces/group of tiles **24**
 Groups of tiles arrangement
☒ hor-cutting
☐ vert-cutting
☐ hor-plan

N° stackers / Robots **1**
 N° Heads / stacker-Robot **1**

Spacing between groups of tiles
 Front **80** mm
 Side **80** mm

Groups of tiles arrangement
 N° groups of tiles [front x side] **5** x **2**
 N° groups of tiles in height **8**

External dimensions pack **4936** x **840** mm
 Height of charge on the kiln car **1430** mm
 N° pieces per stack **1920**
 N° stacks per module **1**
 Center distance between stacks **0** mm
 Step / module **1400** mm
 Kiln car length in modules **3** n°
 N° pieces per kiln car **5.760**
 Material weight per kiln car **17.280** kg

Height above the loading base to ceiling **1530** mm
 Internal width of gallery **5236** mm
 Free space under the ceiling **100** mm
 Free space between pack and wall **150** mm

PACK KILN Cross section

Refractory supports ☒ Yes ☐ No
☐ Prefabricated kiln
☒ Traditional kiln

Stacking with groups: Portuguese tile. The bundles are arranged horizontally and are offset both from the front and from the side.

CombiVent - TEGOLE-3
File Displays Instruments Information Help

KILN CAR LOADING

Product: [04] - PORTOGHESE 1

Dried product data				
Type	Width cm	Height cm	Length cm	Weight kg
PORTUGUESE TILE	27	7	40	3.6

Product: PORTOGHESE 1
Dimensions pack [LxPxH] mt 4,945 x 0,850 x 1,314
Layers in height n° 5
Pieces / pack n° 1.250
Material weight / pack kg 4.500

Kiln car stacking ☒ Preview

Tipo di impilaggio
☐ with H Cassette
☐ with U Cassette
☒ to Groups of tiles

to Groups of tiles
 N° pieces/group of tiles **25**
 Groups of tiles arrangement
☒ hor-cutting
☐ vert-cutting
☐ hor-plan

N° stackers / Robots **1**
 N° Heads / stacker-Robot **1**

Spacing between groups of tiles
 Front **60** mm
 Side **50** mm

Groups of tiles arrangement
 N° groups of tiles [front x side] **5** x **2**
 N° groups of tiles in height **5**

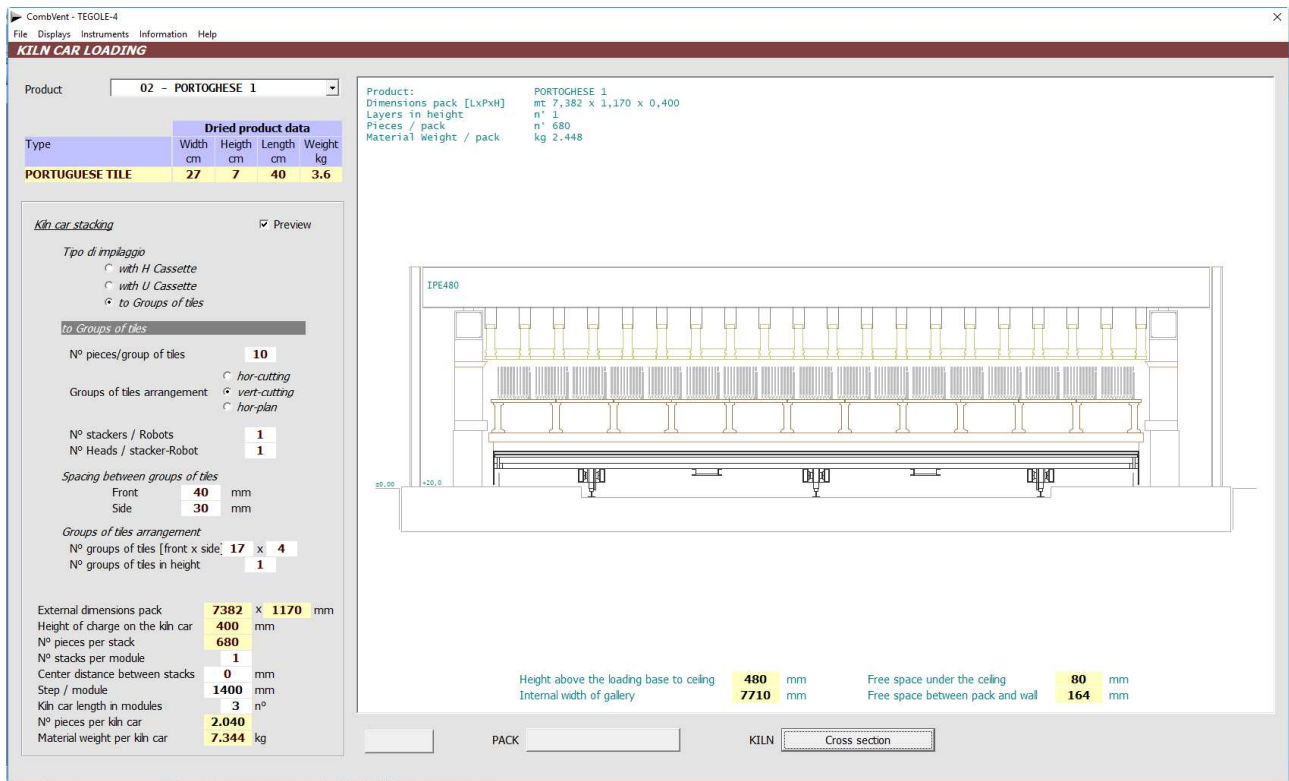
External dimensions pack **4945** x **850** mm
 Height of charge on the kiln car **1314** mm
 N° pieces per stack **1250**
 N° stacks per module **1**
 Center distance between stacks **0** mm
 Step / module **1400** mm
 Kiln car length in modules **3** n°
 N° pieces per kiln car **3.750**
 Material weight per kiln car **13.500** kg

Height above the loading base to ceiling **1530** mm
 Internal width of gallery **5236** mm
 Free space under the ceiling **216** mm
 Free space between pack and wall **146** mm

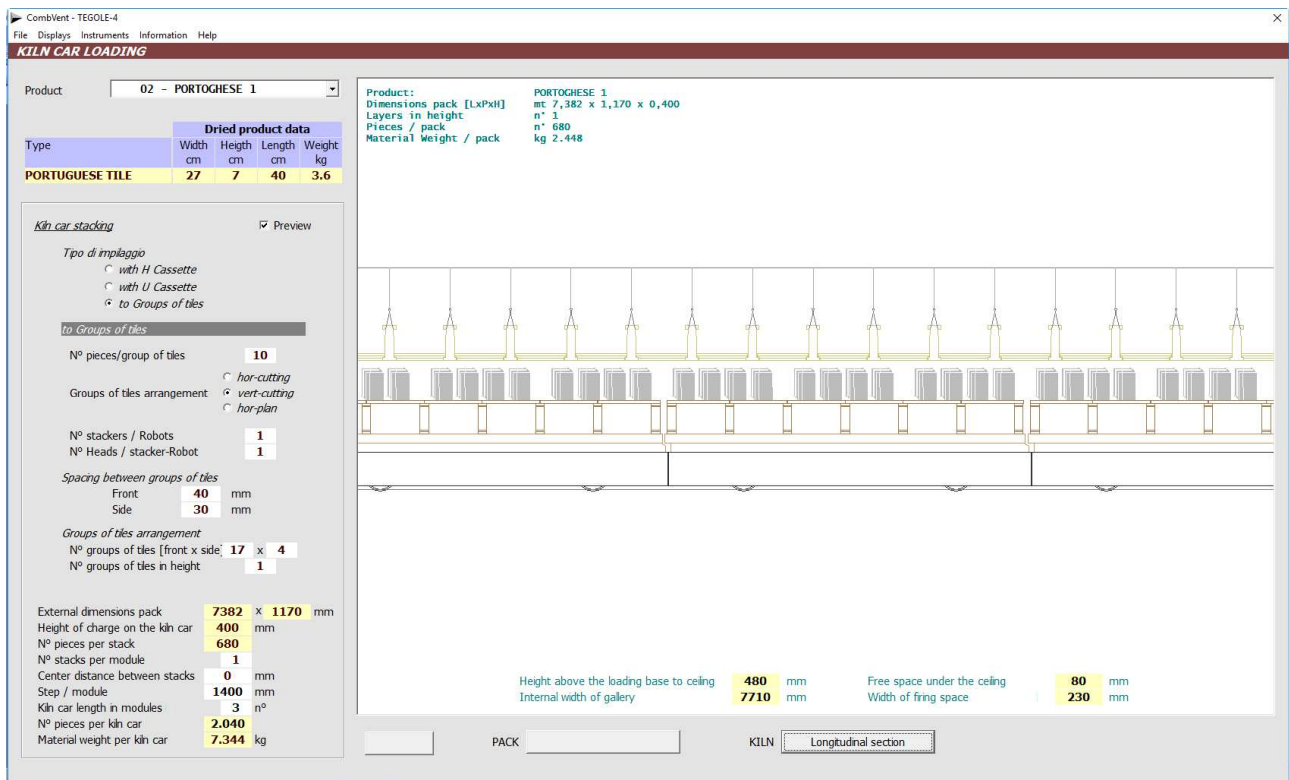
PACK KILN Cross section

Refractory supports ☒ Yes ☐ No
☐ Prefabricated kiln
☒ Traditional kiln

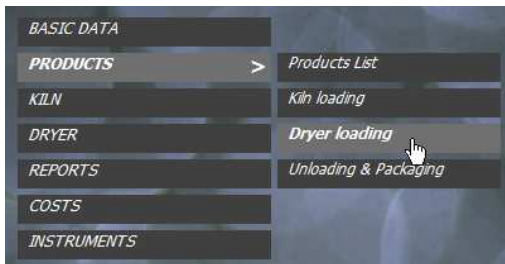
Stacking with groups: Portuguese tile. The bundles are arranged vertically and are offset both from the front and from the side (this is a typical arrangement in a *single-layer* kiln).



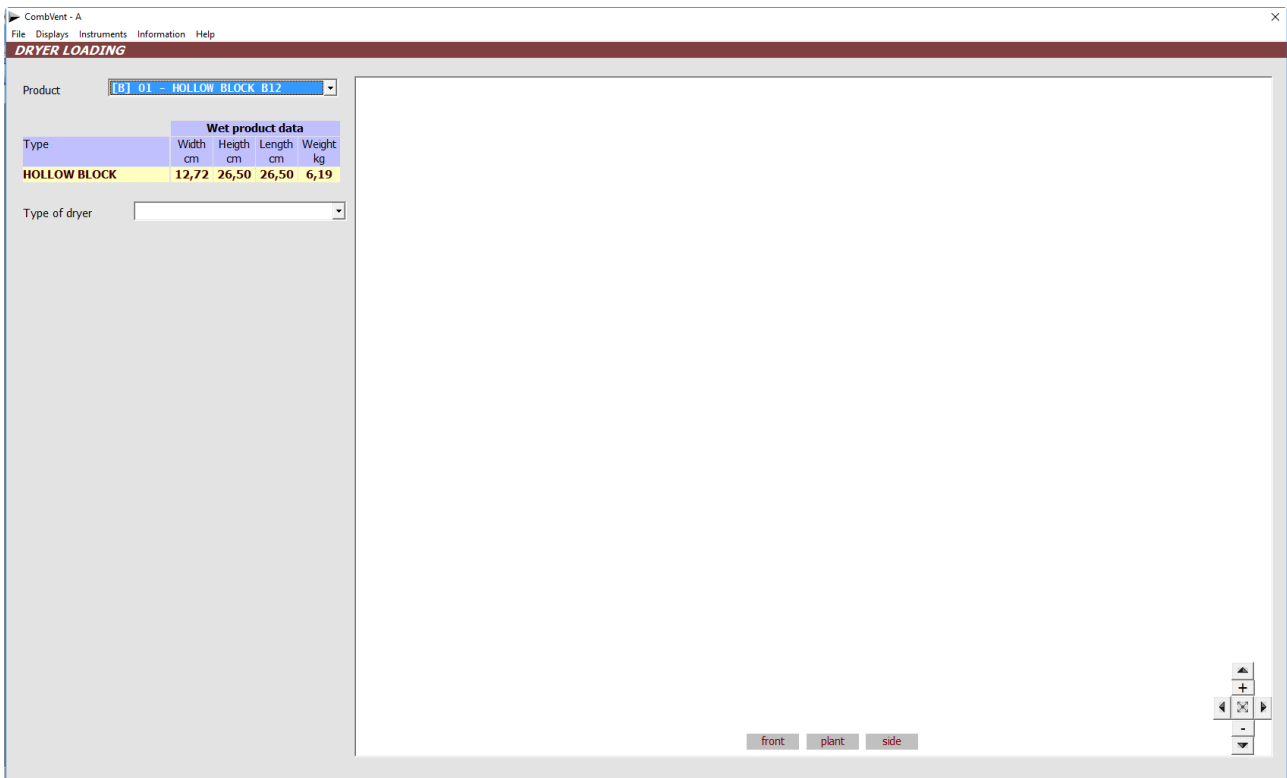
Longitudinal view of the tunnel of the single-layer kiln of the previous example.



Section 2.3 – PRODUCTS → Dryer loading



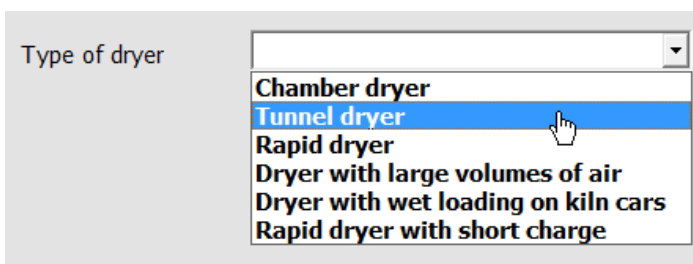
Choice of the type of dryer and definition of the dryer's charge



From the drop-down list you select first of all the product for which you want to define the charge of the dryer, then proceed to indicate the type of dryer.

NOTE: since the program develops the project and sizes the dryer with exclusive reference to the *Base Product*, the choice of the type of dryer is allowed only if this product is taken into consideration. With any other products present it will not be possible to change the type of dryer.

The following types of dryer are provided:

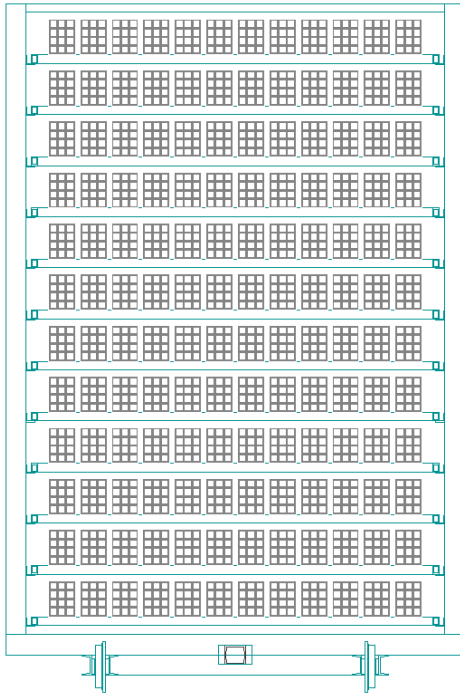


Before proceeding with the definition of the dryer's charge, it is necessary to open a short parenthesis concerning the various types of *support* of the material to be dried used by the program.

SUPPORTS

The main support can be:

- **Trolley** - Metal structure on wheels where the material placed on various floors is placed; The trolley can have a number of fixed or variable pitches depending on the heights of the various products foreseen in production.



Normally, the material placed on the carriages is hit by lateral ventilation, that is to say perpendicular to the direction of travel of the trolley.

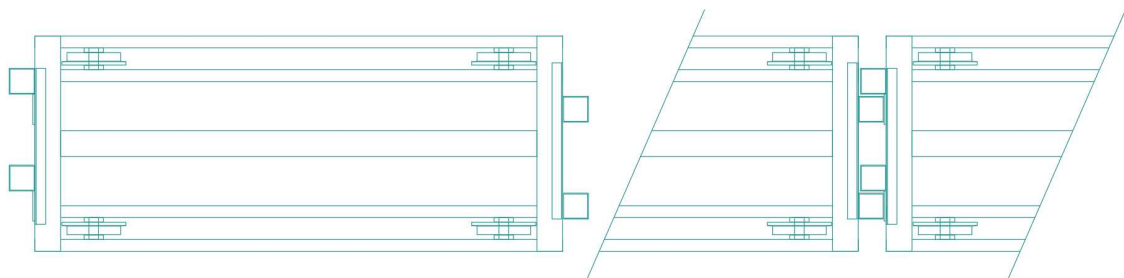
90° rotation of movement direction ☒ No ☐ Yes

The option *Rotation of the direction of travel* actually involves a rotation of the arrangement of the material, which in this case is hit by the ventilation frontally to the direction of travel of the trolley (see figure aside).

This configuration of the trolley is used in *driers in countercurrent to large volumes of air* where the mass of ventilation air acts parallel to the direction of advancement of the carriages.

Interlocking of the side uprights ☐ No ☒ Yes

This option allows a staggered arrangement of the uprights in such a way as to allow a joint between the carriages, in the direction of advancement, which limits the overall dimensions of the carriages when they are coupled.



- **Rack** - this is a fixed metal structure that serves as a support for the secondary supports where the material to be dried is placed. As for the trolley, the structure can have a fixed or variable pitch.

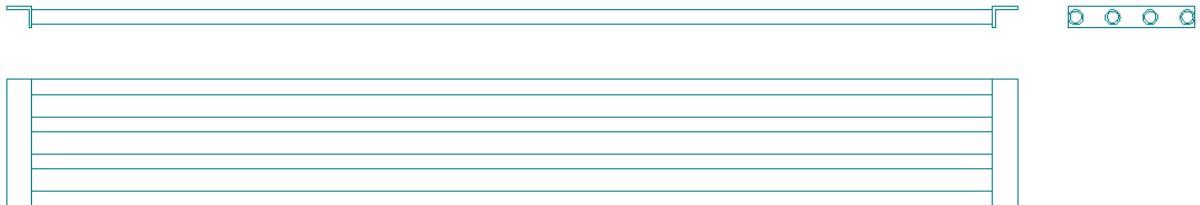
Secondary supports:

- *Fixed pallet*
- *Mobile pallet*
- *Bars*
- *Trays*

When you opt for the *fixed pallet*, it is assumed that the main support is a *trolley* which in this case has a *fixed step* between the floors so that generally the floor is one with the structure of the trolley itself.

All other secondary supports can be used both with the trolley and with the rack.

Example of a mobile pallet made using 4 tubes Ø 35 thickness 4 and 2 angles 70x50x8 for the ends.



EXAMPLES OF CHARGE OF CHAMBER DRYER / TUNNEL DRYER / DRYER WITH LARGE VOLUMES OF AIR

Type of support ☒ **Fixed pallet** ☐ *Mobile pallet*
☐ *Bars* ☐ *Trays*
on ☒ *Trolley* ☐ *Fixed frame*

In the case of chamber, tunnel and large air driers, there are various types of material support that can be foreseen on *Trolley* or *Rack* (this last one in case of chamber dryers only).

After choosing the type of support, it will be necessary to provide other data for the complete definition of the charge. As an example, by choosing the *fixed pallet* on a *trolley* as a support, the following windows will be displayed.

Load type ☒ *by sends* ☐ *by single row*
Pallet dimensions (Front x side) x mm
N° sends per pallet 0
N° of rows in-depth 0
Free lateral distance 100 mm
N° of pieces per pallet 0
Material weight on the pallet 0 kg

For the introduction of the pallet data.

Variable step between the storeys ☒ *No* ☐ *Yes*
Number of storeys
Distance between storeys mm
N° of storeys allocated to the product 420 mm
Level of the 1st load storey from 0.00 420 mm
Trolley width (front ventilated) mm
Trolley length mm
Trolley height from 0.00 level mm
N° pieces per trolley

For the introduction of data related to trolley.

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DRYER LOADING

Product: [B] 01 - FORATO 10

Wet product data				
Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	10,55	26,38	26,38	4,90

Type of dryer: Chamber dryer

Dryer with chambers / tunnel

Type of support: ☐ Fixed pallet ☒ Mobile pallet
☐ Bars ☐ Trays
on ☒ Trolley ☐ Fixed frame

Location on support: ☒ Standing ☐ Lay down
Rotated: ☒ No ☐ Yes

Load type: ☐ by sends ☒ by single row

Pallet dimensions (Front x side): x mm
N° pieces on pallet (front x side): x
Center distance between rows: mm
Free lateral distance: mm
N° of pieces per pallet:
Material weight on the pallet: kg

☒ Preview

Variable step between the storeys: ☒ No ☐ Yes

Number of storeys:
Distance between storeys: mm
N° of storeys allocated to the product:
Level of the 1st load storey from 0.00: mm
Trolley width (front ventilated): mm
Trolley length: mm
Trolley height from 0.00 level: mm
N° pieces per trolley:

☐ Preview

front plant side

The first additional data to indicate concerns the *type of load*. The choice of the type of product load, whether in *sends* or *single rows*, depends on the operating system of the loading-unloading system.

Load type ☐ by sends ☒ by single row

In the first case, the pallet is expected to be loaded with a certain number of product sends. By delivery is meant the set of pieces (frontal) that come from the cutter at each beat and is therefore a function of the number of outputs of the die.

It is advisable, in this case, for greater efficiency and simplification of the loading-unloading system, that the number of rows for each send coincides with the number of outputs from the die. All the sends are positioned equidistant from one another.

The program proposes, after entering the dimensions of the pallet, the maximum number of sends that the pallet can receive and a number of rows in depth equal to the number of cuts per strand. Moreover, it places a lateral free distance of 100 mm (between the material and the lateral edge of the floor).

Load type ☒ by sends ☐ by single row

Pallet dimensions (Front x side) **2500** x **1800** mm

N° sends per pallet **3**

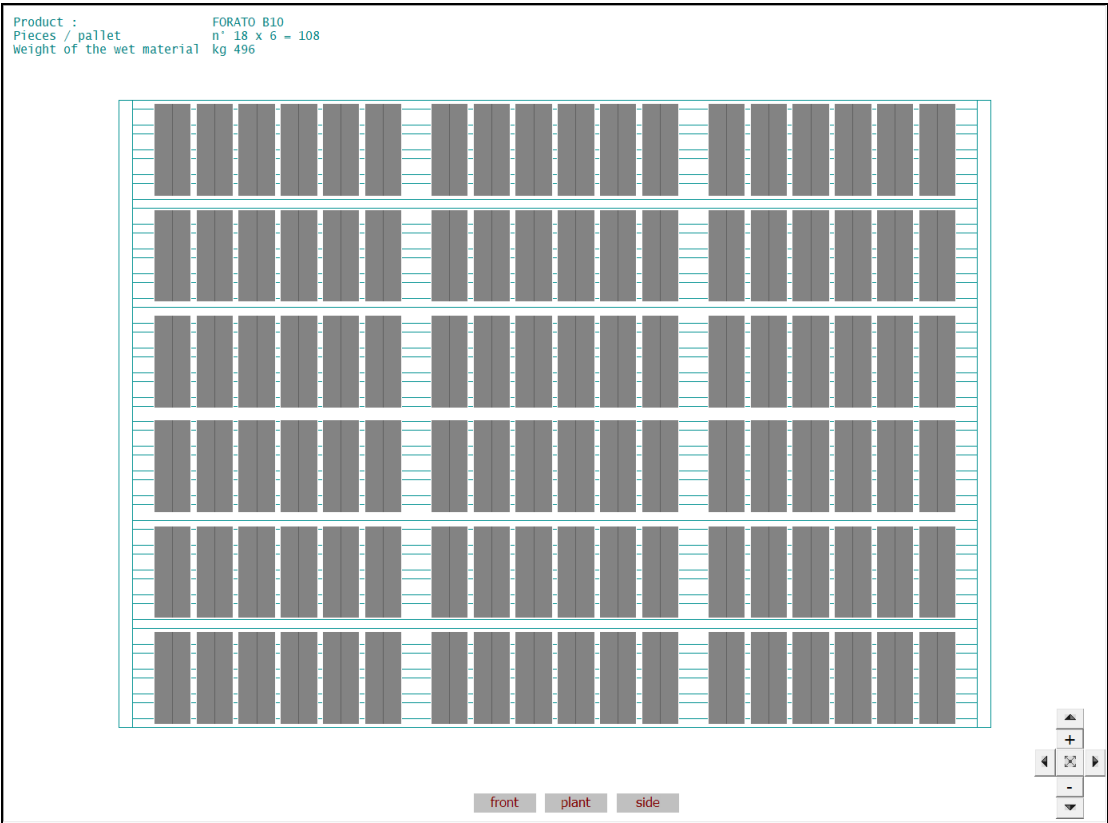
N° of rows in-depth **6**

Free lateral distance **100** mm

N° of pieces per pallet **108**

Material weight on the pallet **496** kg

Plan view



Front View



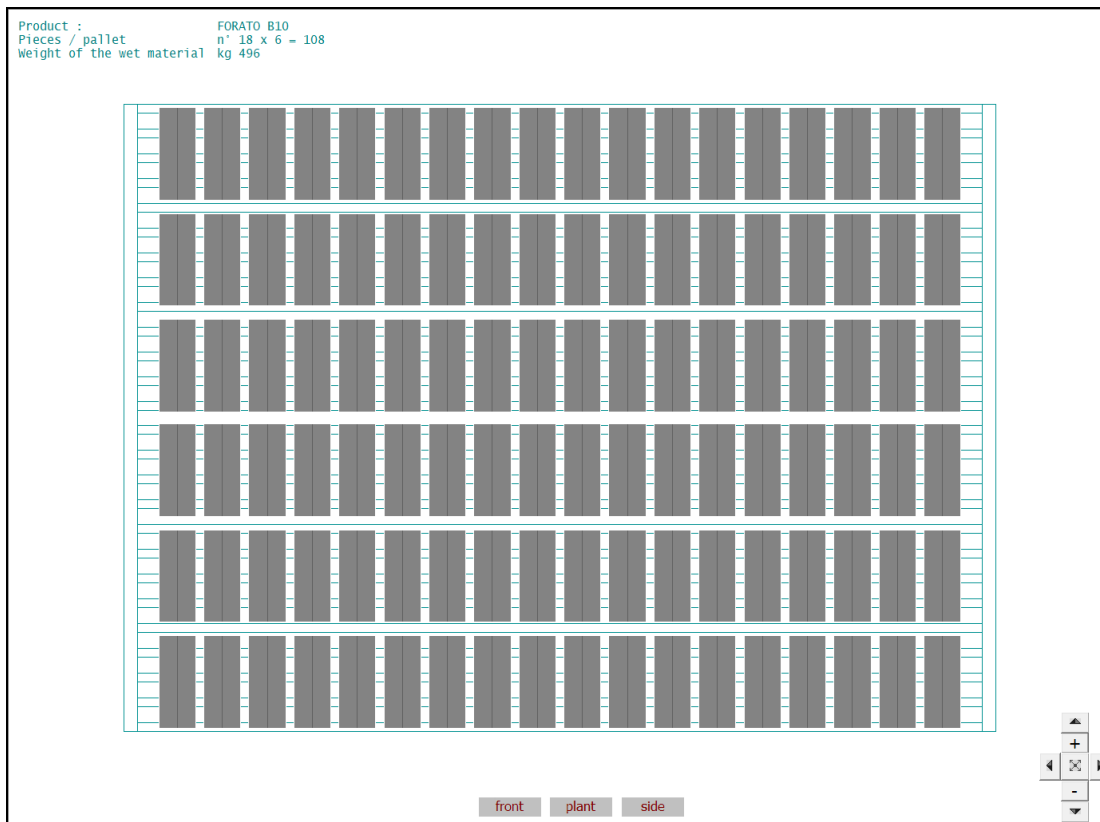
The second type of load can be chosen if the loading-unloading system provides for the programming of the individual product rows to be loaded. Also in this case all the individual rows are arranged equidistant with each other.

Load type	<input type="radio"/> by sends	<input checked="" type="radio"/> by single row
Pallet dimensions (Front x side)	2500	x 1800 mm
N° pieces on pallet (front x side)	18	x 6
Center distance between rows	129	mm
Free lateral distance	100	mm
N° of pieces per pallet	114	
Material weight on the pallet	523	kg

NOTE: The displayed input boxes change depending on the type of load selected.

In this case, the program proposes the maximum number of rows that the pallet can receive, taking into account the lateral free distance and a minimum distance between the pieces fixed at 15 mm (the distance between the pieces displayed shows this minimum distance added to the width of the wet material).

Plan view



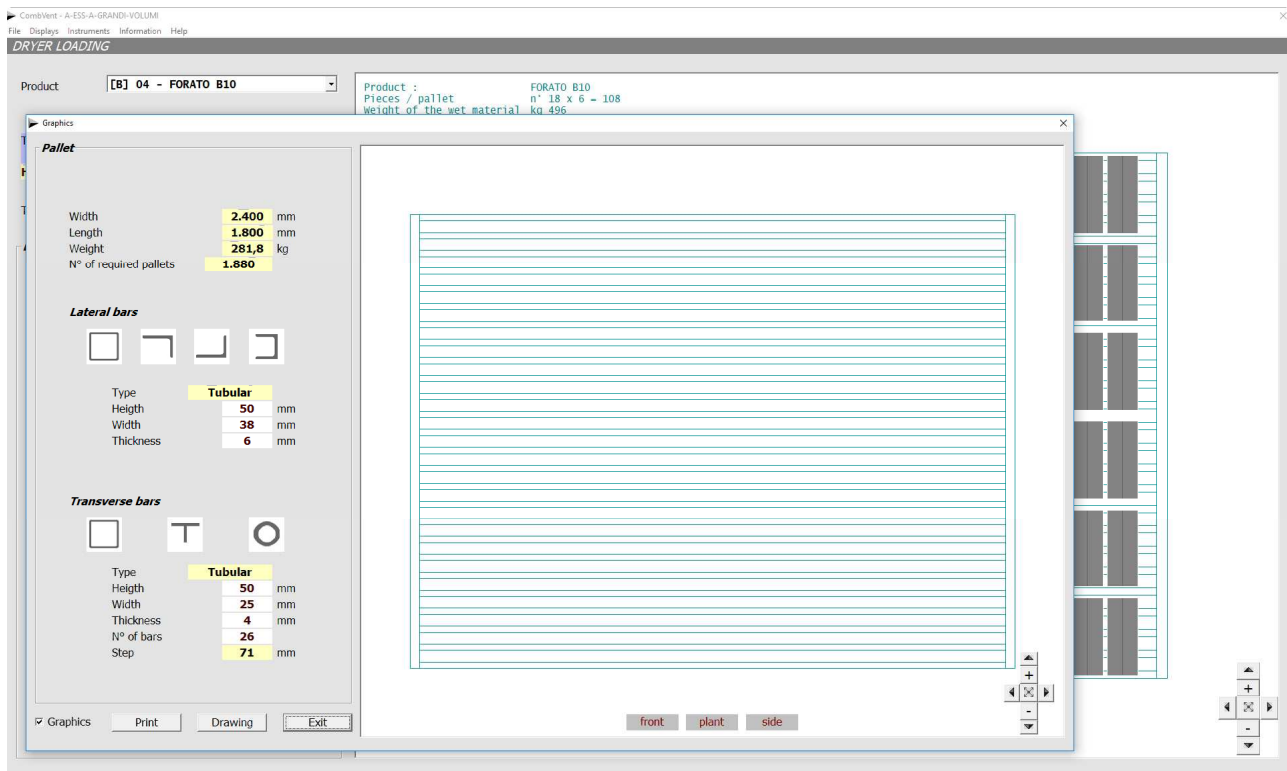
Front View



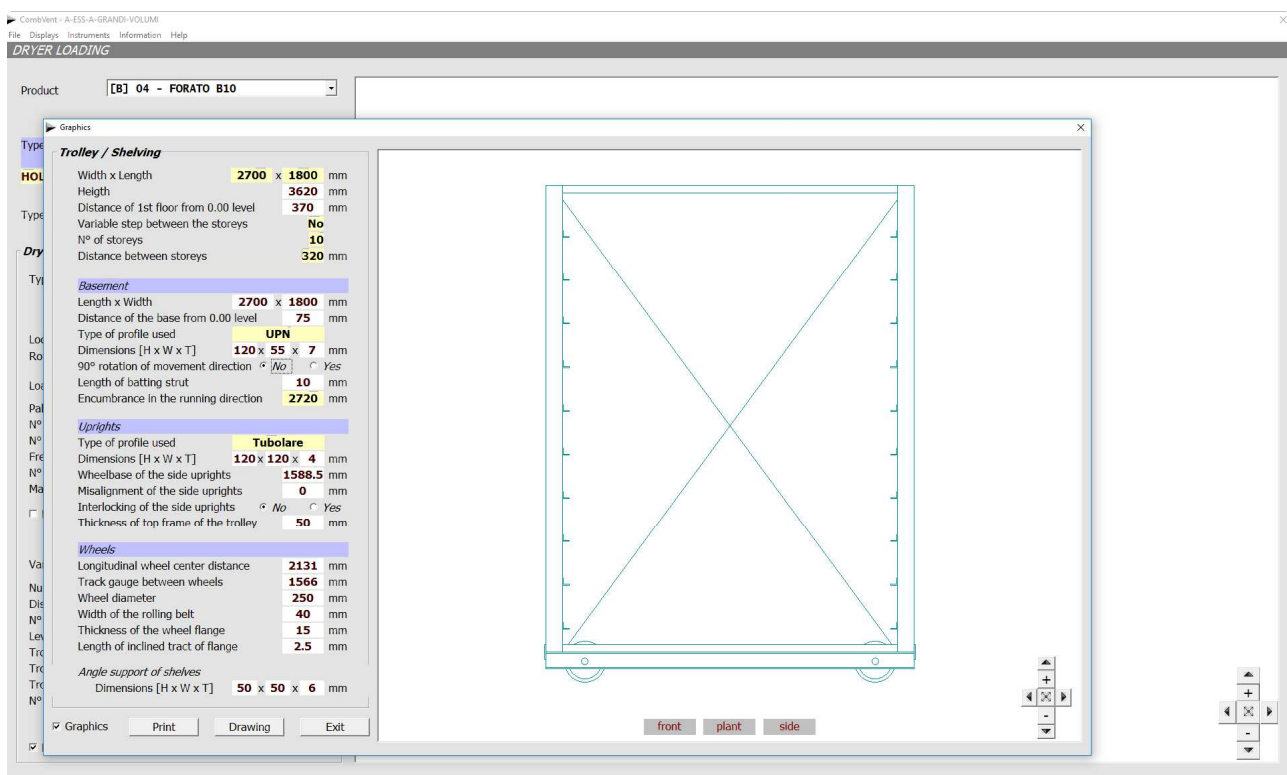
In both types of load, the trolley is defined by introducing the number of floors and the step between them. The ground clearance of the first floor is proposed as default. Accepted or modified this last input, the program immediately displays the loaded trolley.

The dimensions of the trolley indicated take into account the dimensions of both the pallet and the carpentry established by default.

In both cases, it is possible to view and modify both the carpentry of the pallet by pressing the *Edit the pallet* button and the trolley by pressing the *Edit the trolley* button.



From the pallet display window you can also have a drawing in DWG format and in 1: 1 scale of the pallet carpentry (*Drawing* command) or a *Print* of the same.



From the display window of the trolley you can have a drawing in DWG format and in 1: 1 scale of the trolley's carpentry (*Drawing* command) or a *Print* of the same.

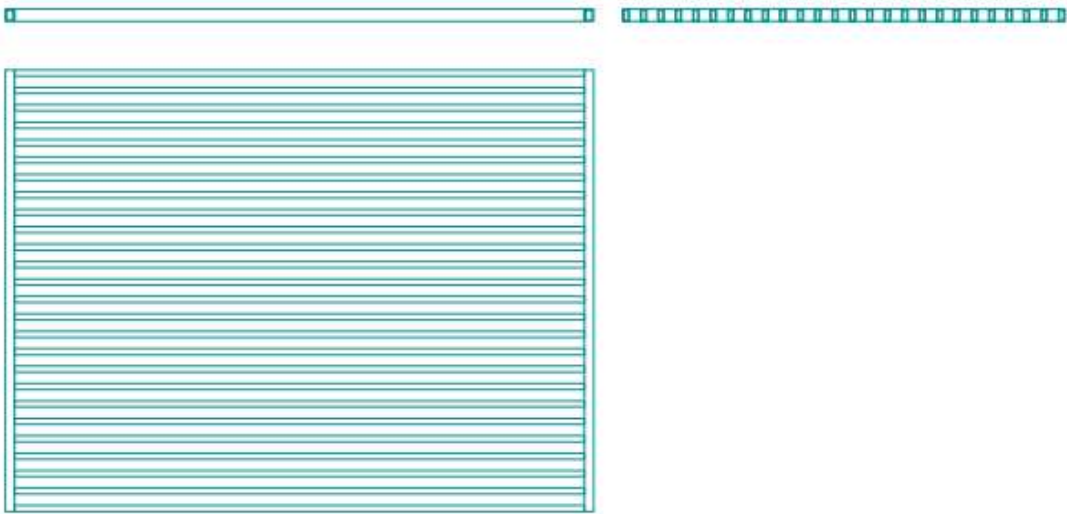
Example of printing a mobile pallet



Ing. Gennaro Nasuti
gni@supertecweb.com

Customer : AKAY
Order : A-ESS-A-GRANDI-VOLUMI

PALLET



Pallet dimension:
- length mm 2.400
- width mm 1.800
- Weight kg 281,8

Lateral bars
Type Tubular
Height mm 50
Width mm 38
Thickness mm 6

Transverse bars
Type Tubular
Height mm 50
Width mm 25
Thickness mm 4
Bars n° 26
Bars step mm 71,0

Example of printing a trolley with mobile pallets

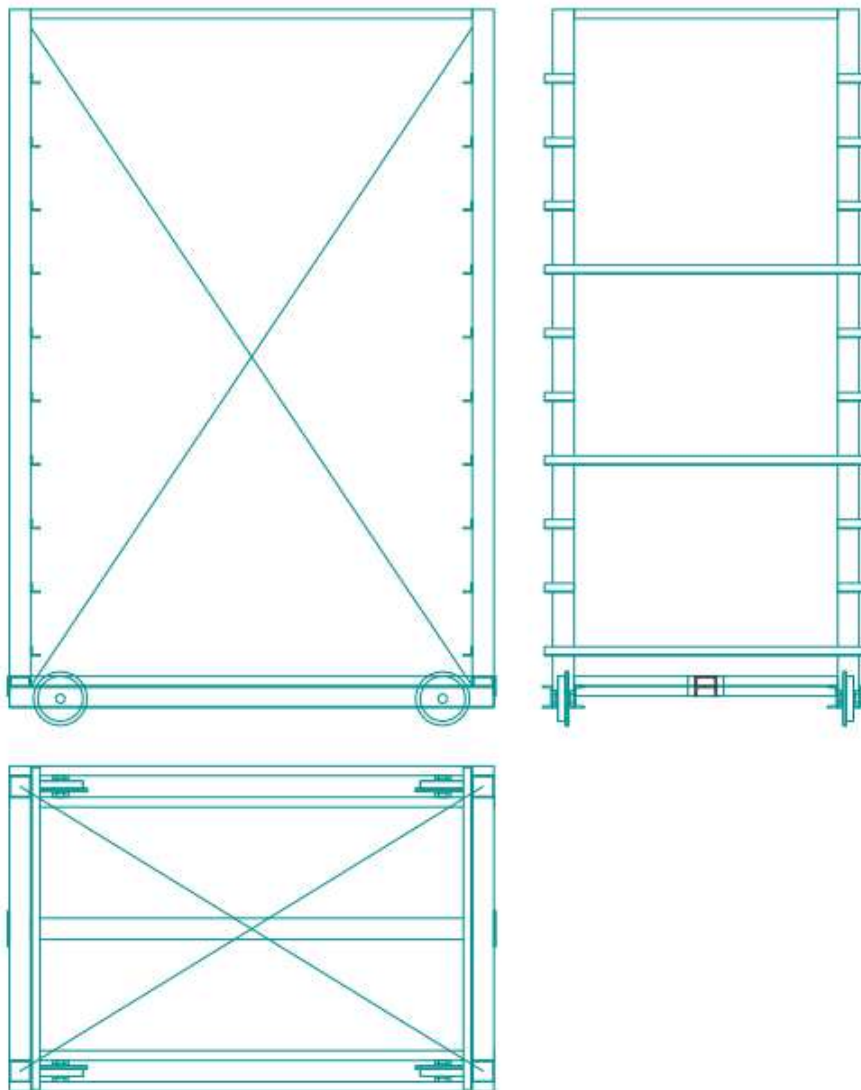


Ing. Gennaro Nasuti
gn@supertecweb.com

Customer : AKAY

Order : A-ESS-A-GRANDI-VOLUMI

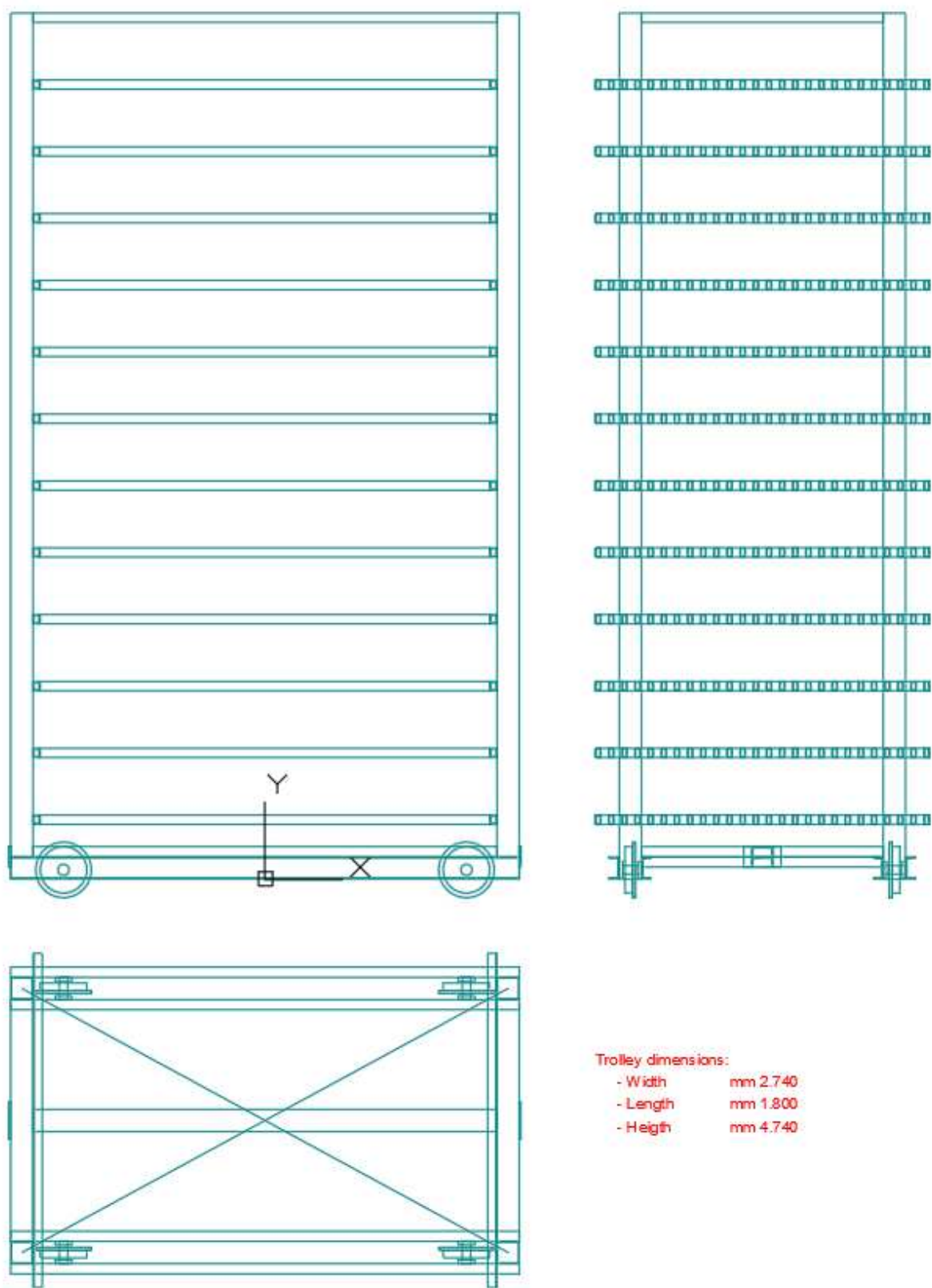
TROLLEY



Trolley dimensions:

- length mm 2.700
- width mm 1.800
- Height mm 3.970

Example of drawing in DWG format and 1: 1 scale of a fixed pitch trolley and fixed pallets.



If you take into consideration the mobile pallet on a trolley and there are other products with a height very different from the Base Product, you can opt for a *variable step* between the storeys to optimize the charge of the trolley. This last option allows you to have the values of the secondary steps automatically.

In the following example two loading situations of the same trolley are shown with two materials that are very different in size.

CombiVent - 80-1375.1
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DRYER LOADING

Product: **[B] 01 - STANDARD BRICK**

Wet product data				
Type	Width cm	Height cm	Length cm	Weight kg
FACING BRICK	26,40	12,70	6,90	3,40

Type of dryer: **Tunnel dryer**

Dryer with chambers / tunnel

Type of support: ☐ Fixed pallet ☒ Mobile pallet
on: ☐ Bars ☐ Trays ☒ Trolley ☐ Fixed frame

Location on support: ☒ Standing ☐ Lay down
Rotated: ☐ No ☐ Yes

Load type: ☐ by sends ☒ by single row

Pallet dimensions (Front x side): **2600 x 2000** mm
N° pieces on pallet (front x side): **24 x 6**
Center distance between rows: **93** mm
Free lateral distance: **100** mm
N° of pieces per pallet: **144**
Material weight on the pallet: **490** kg

☐ Preview

Variable step between the storeys: ☐ No ☒ Yes

Number of storeys: **16** **11**
Distance between storeys: mm **240** **360**
N° of storeys allocated to the product: **16**
Level of the 1st load storey from 0.00: **420** mm
Trolley width (front ventilated): **2900** mm
Trolley length: **2000** mm
Trolley height from 0.00 level: **4380** mm
N° pieces per trolley: **2304**

☒ Preview

Product : STANDARD BRICK
Pieces / storey n° 144
N° of storeys n° 16
Weight of the wet material kg 7.834

front plant side

CombiVent - 80-1375.1
File Displays Instruments Information Help

DRYER LOADING

Product: **03 - 14.3NF**

Wet product data				
Type	Width cm	Height cm	Length cm	Weight kg
WALL BLOCK NOTCHED	53,80	28,00	23,10	25,00

Type of dryer: **Tunnel dryer**

Dryer with chambers / tunnel

Type of support: ☐ Fixed pallet ☒ Mobile pallet
on: ☐ Bars ☐ Trays ☒ Trolley ☐ Fixed frame

Location on support: ☒ Standing ☐ Lay down
Rotated: ☐ No ☐ Yes

Load type: ☐ by sends ☒ by single row

Pallet dimensions (Front x side): **2600 x 2000** mm
N° pieces on pallet (front x side): **4 x 0**
Center distance between rows: **621** mm
Free lateral distance: **100** mm
N° of pieces per pallet: **0**
Material weight on the pallet: **0** kg

☐ Preview

Variable step between the storeys: ☐ No ☒ Yes

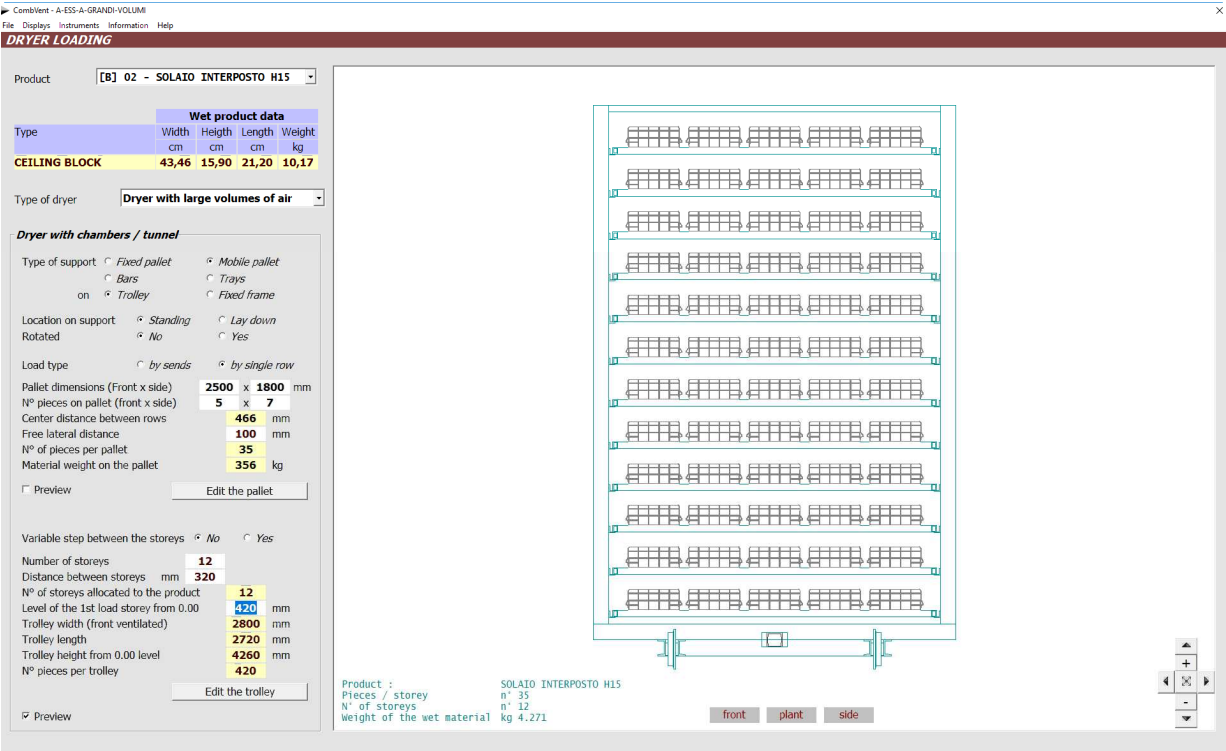
Number of storeys: **16** **11**
Distance between storeys: mm **240** **360**
N° of storeys allocated to the product: **8**
Level of the 1st load storey from 0.00: **420** mm
Trolley width (front ventilated): **2900** mm
Trolley length: **2000** mm
Trolley height from 0.00 level: **4380** mm
N° pieces per trolley: **0**

☒ Preview

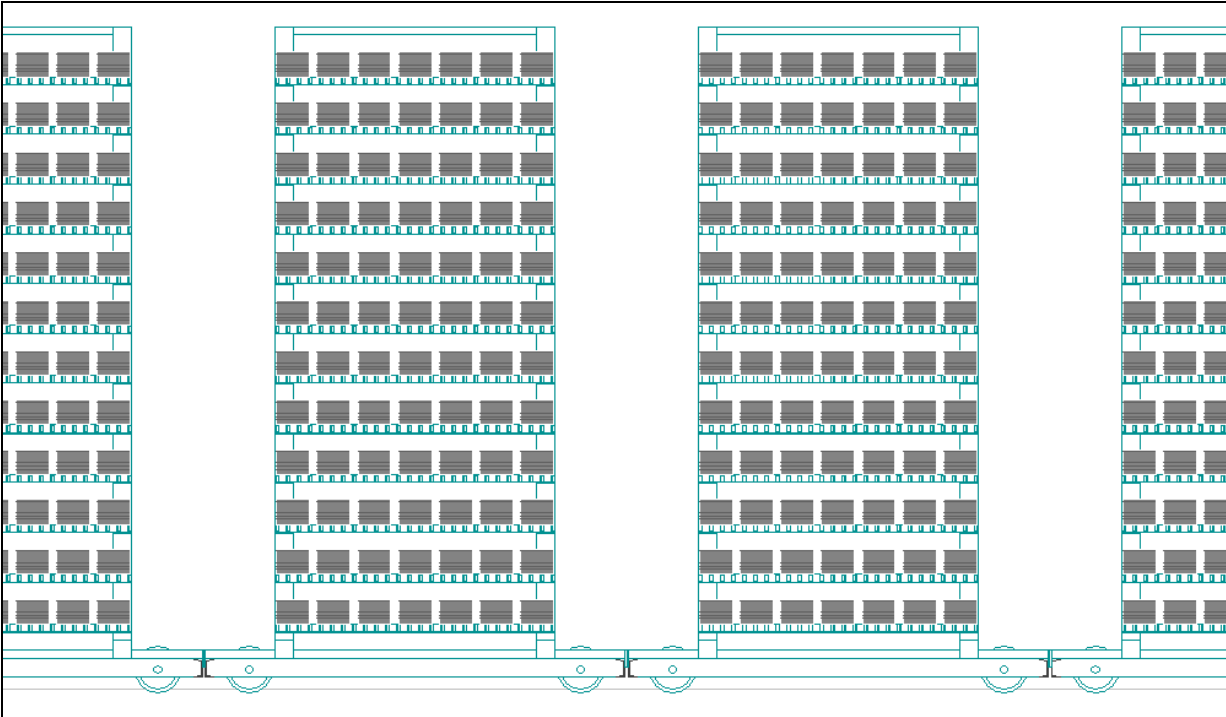
Product : 14.3NF
Pieces / storey n° 0
N° of storeys n° 8
Weight of the wet material kg 0

front plant side

In case of *dryer with a large volume of air*, the procedure does not change and the only difference concerns the *direction of advancement* of the trolley on the rails which is orthogonal to the previous example. In this case, in fact, the train of trolleys is expected to be hit by air in the direction of advancement of the same and then in the direction of the holes of the product along the length of the dryer.

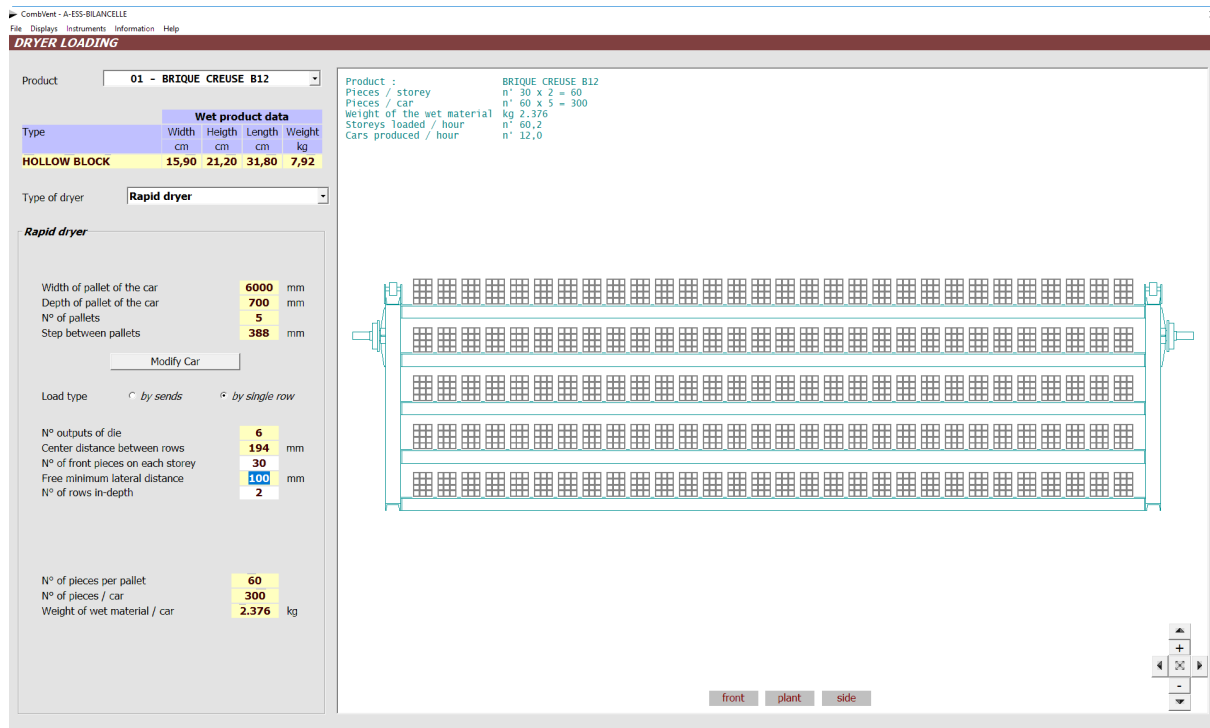


Detail of the longitudinal view of *drier with a large volume of air* (Section 4-1 - DRYER → Graphics).

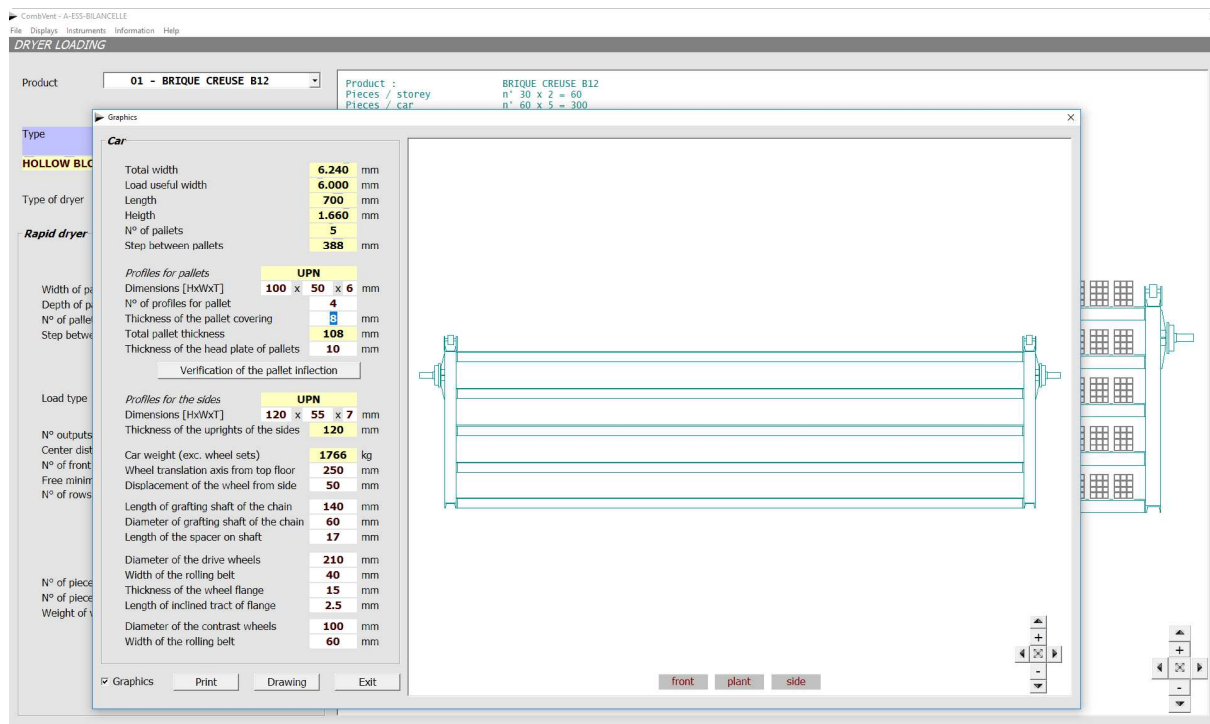


EXAMPLES OF CHARGE OF RAPID DRYER

Immediately after choosing the type of dryer, since by default the dimensions of the cabinet are provided, the program processes and displays the solution of maximum possible charge compatible with the dimensions of the car itself and of the product under examination. Obviously the proposed values can be modified.

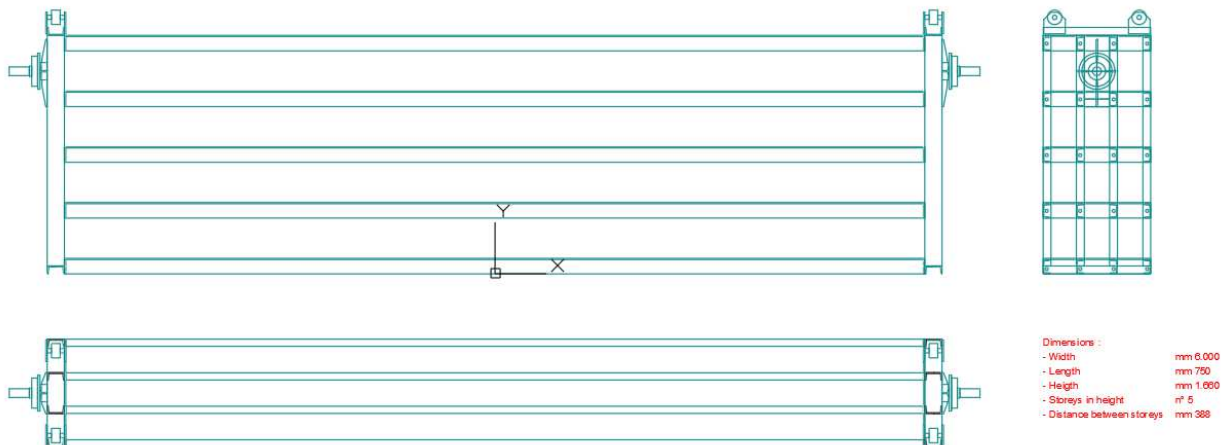


It is also possible to make some changes to the car carpentry. By pressing the relative key, a window is displayed, showing the characteristics of the carpentry of the car:

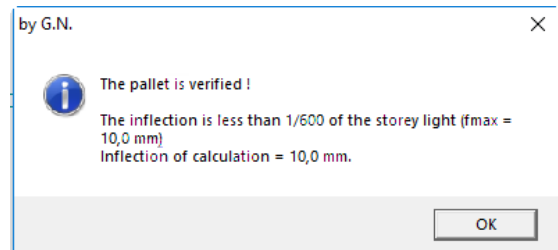


The *Drawing* command allows to obtain the 1: 1 scale drawing of the car.

Example of drawing in DWG format and 1: 1 scale of the car.

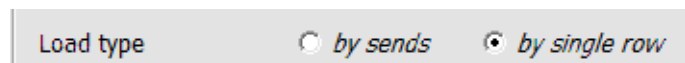


The inflection arrow of the pallet is also provided.
This example displays the message on the side.



NOTE: if you want to change the basic dimensions of the car, that is to say, the *width, length, height* and *pitch* of the car it is necessary to display the *Base Product*, otherwise the input boxes of the above data are disabled. In any case, the quantities mentioned above can not be modified in the window to change the screed (previous figure) but in the window of Charge Dryer.

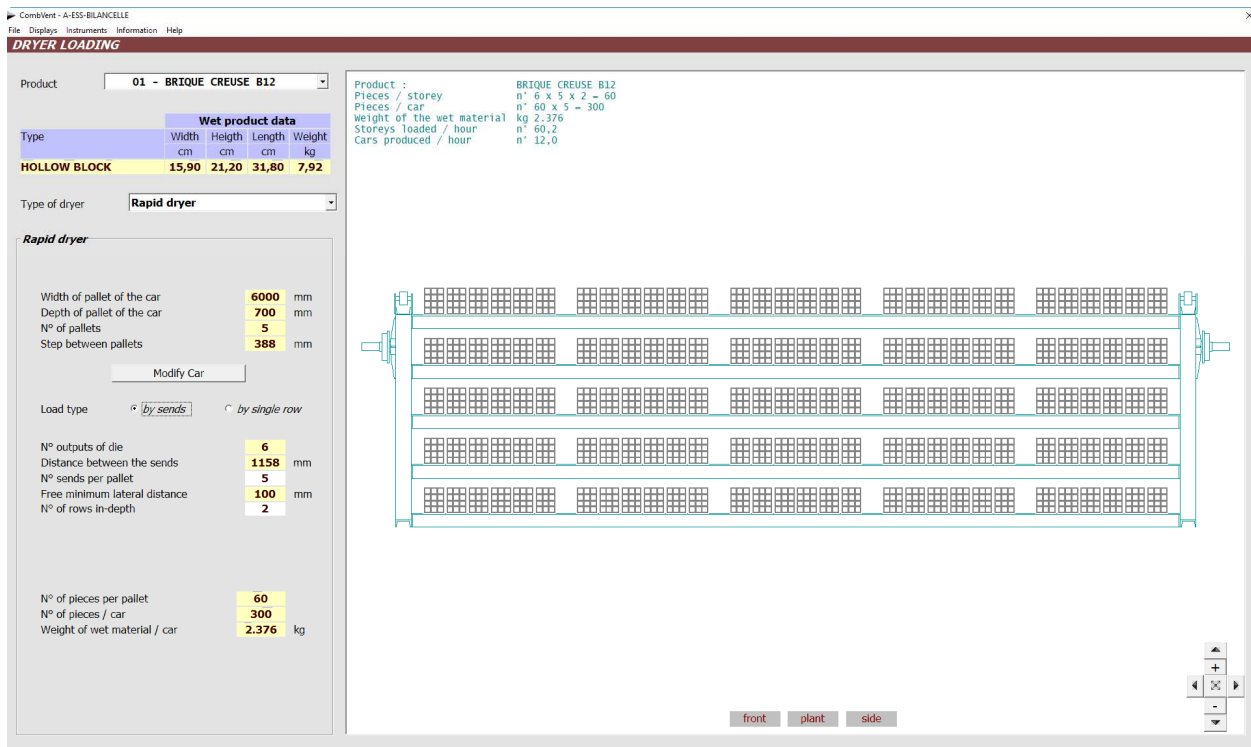
As for the type of load of the storeys, there are the same two options seen in the case of the trolley:



Also in this case, the type of load that can be adopted depends on the loading / unloading system. If the loading / unloading system provides for the programming of the individual product rows to be loaded, the second option can be chosen.

The first option, on the other hand, concerns the case in which the storey of the car is loaded with a certain number of product sends. By send we mean the set of front pieces that come from the cutter.

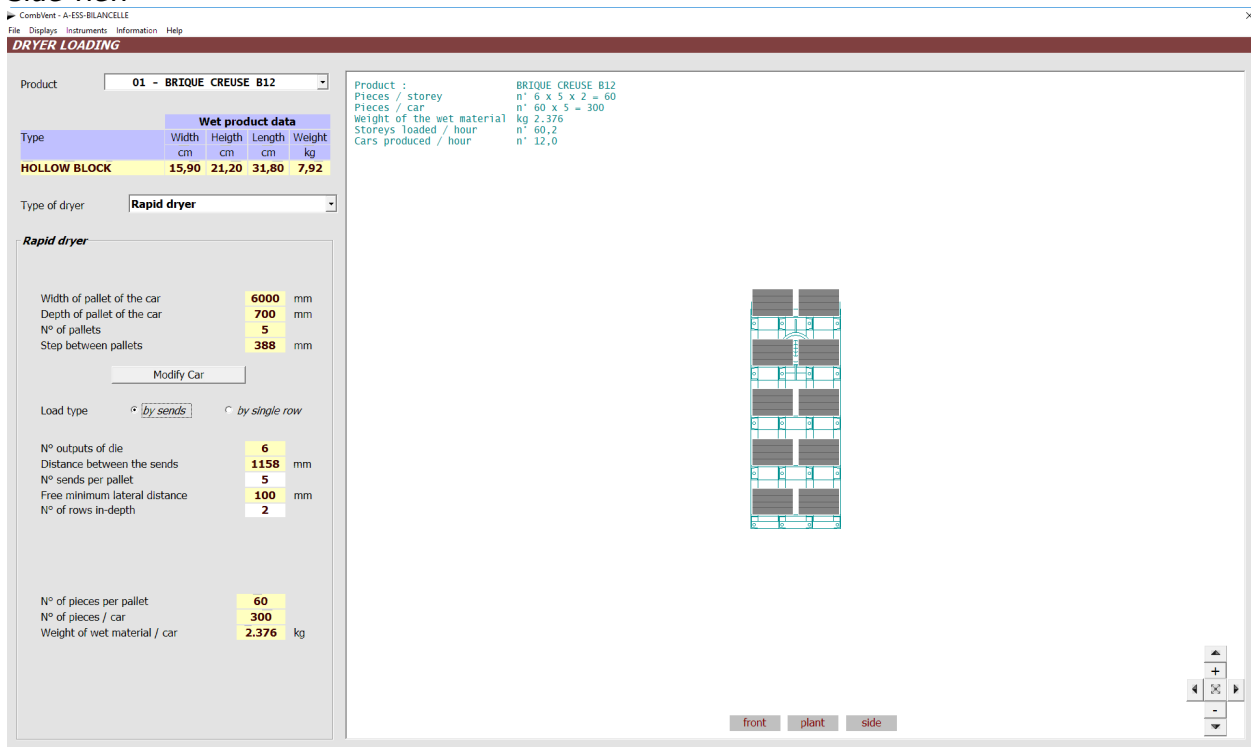
It is therefore obvious that the number of front pieces of each send corresponds to the number of die outputs of the product in question (see example below).



NOTE: in general, in the graphic windows there are commands that allow you to view other views of the present figure (**Front, Plant, Side**) and buttons that allow movement, enlargement and restoration of the starting image.



Side view



EXAMPLE OF CHARGING DRIER WITH LOAD ON KILN CAR

In the case of wet (green) material loaded directly on the kiln car, the program displays the following window:

The screenshot shows the 'DRYER LOADING' window. On the left, there is a sidebar with product data and a 3D visualization of the kiln car loading on the right.

Product: 01 - COMMON BRICK1

Wet product data

Type	Width cm	Height cm	Length cm	Weight kg
COMMON BRICK	26,50	12,72	6,89	3,55

Type of dryer: Dryer with wet loading on kiln cars

Dryer with wet loading on kiln car

Stacking in stacks:

N° packs / car	18
Front pack axis	1,100 mt
Side pack axis	1,400 mt
N° layers / pack	10
N° pieces / pack	520
N° total pieces / car	9.360
Total weight of the wet material	33.228 kg

Size of the wet material pack

width	1.060 mm
length	1.060 mm
height	1.272 mm

The 3D visualization shows a kiln car with two stacks of bricks. The left stack is a long row of bricks, and the right stack is a shorter row of bricks. The kiln car is shown from a top-down perspective.

Navigation buttons: front, plant, side

As you can see, in this case no input is required because the whole is coincident with the kiln car charge already defined previously (*Section 2.2 – PRODUCTS → Kiln loading* - page 18).

In general this solution is not always possible because it is decisively conditioned by the type of raw material and the type of product. First of all, the clay mixture, constituting the raw material, must have sufficient mechanical strength despite the water content. Furthermore, the product must have a deformation-resistant structure, that is to say that the empty / full ratio must be minimal. In practice it is a technology suitable for solid or semi-hollow bricks and not suitable for light hollow blocks in general.

EXAMPLES OF CHARGE OF RAPID DRYER WITH SHORT CHARGE

The screen is the same as already seen for the tunnel or chamber dryer. In fact, the substantial difference, as regards the charge, is represented by the depth of the same.

Front view

CombVent - A-ESS-WINENB

File Displays Instruments Information Help

DRYER LOADING

Product: [B] 01 - BLOCK B15

Wet product data				
Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	15,90	21,20	26,50	13,42

Type of dryer: Rapid dryer with short charge

Dryer with chambers / tunnel

Type of support: ☐ Fixed pallet ☒ Mobile pallet
☐ Bars ☐ Trays
☒ Trolley ☐ Fixed frame

Location on support: ☒ Standing ☐ Lay down
Rotated: ☒ No ☐ Yes

Load type: ☐ by sends ☒ by single row

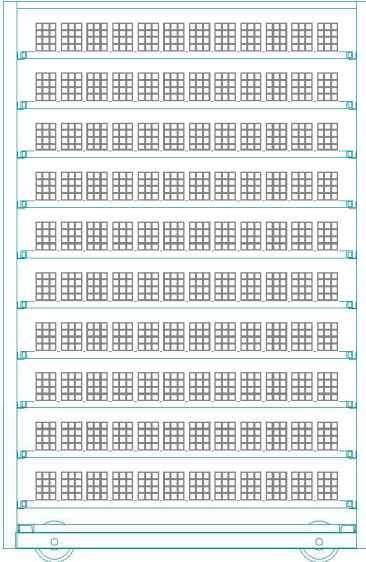
Pallet dimensions (Front x side): 2400 x 600 mm
N° pieces on pallet (front x side): 12 x 2
Center distance between rows: 186 mm
Free lateral distance: 100 mm
N° of pieces per pallet: 24
Material weight on the pallet: 322 kg

☐ Preview

Variable step between the storeys: ☒ No ☐ Yes

Number of storeys: 10
Distance between storeys: 360 mm
N° of storeys allocated to the product: 10
Level of the 1st load storey from 0.00: 420 mm
Trolley width (front ventilated): 2660 mm
Trolley length: 600 mm
Trolley height from 0.00 level: 4020 mm
N° pieces per trolley: 240

☒ Preview



Product : BLOCK B15
Pieces / storey n° 24
N° of storeys n° 10
Weight of the wet material kg 3.221

front plant side

All the front of the trolley is hit by the ventilation whose effect is effective, for the purpose of drying, if the quantity of product according to the direction of ventilation is contained.

Side view

CombVent - A-ESS-WINENB

File Displays Instruments Information Help

DRYER LOADING

Product: [B] 01 - BLOCK B15

Wet product data				
Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	15,90	21,20	26,50	13,42

Type of dryer: Rapid dryer with short charge

Dryer with chambers / tunnel

Type of support: ☐ Fixed pallet ☒ Mobile pallet
☐ Bars ☐ Trays
☒ Trolley ☐ Fixed frame

Location on support: ☒ Standing ☐ Lay down
Rotated: ☒ No ☐ Yes

Load type: ☐ by sends ☒ by single row

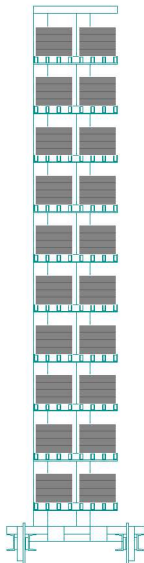
Pallet dimensions (Front x side): 2400 x 600 mm
N° pieces on pallet (front x side): 12 x 2
Center distance between rows: 186 mm
Free lateral distance: 100 mm
N° of pieces per pallet: 24
Material weight on the pallet: 322 kg

☐ Preview

Variable step between the storeys: ☒ No ☐ Yes

Number of storeys: 10
Distance between storeys: 360 mm
N° of storeys allocated to the product: 10
Level of the 1st load storey from 0.00: 420 mm
Trolley width (front ventilated): 2660 mm
Trolley length: 600 mm
Trolley height from 0.00 level: 4020 mm
N° pieces per trolley: 240

☒ Preview



Product : BLOCK B15
Pieces / storey n° 24
N° of storeys n° 10
Weight of the wet material kg 3.221

front plant side

The definition of the charge of the material to be dried is therefore identical to that already seen for the tunnel dryer. The substantial differences concern the geometric configuration of the dryer and the ventilation mode, as will be seen below.

Plan view

CombiVent - A-ESS-WINENB

File Displays Instruments Information Help

DRYER LOADING

Product

[B] 01 - BLOCK B15

Wet product data

Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	15,90	21,20	26,50	13,42

Type of dryer

Rapid dryer with short charge

Dryer with chambers / tunnel

Type of support

☐ Fixed pallet

☒ Mobile pallet

☐ Bars

☐ Trays

☒ Trolley

☐ Fixed frame

Location on support

☒ Standing

☐ Lay down

☒ No

☐ Yes

Load type

☐ by sends

☒ by single row

Pallet dimensions (Front x side)

2400 x 600 mm

N° pieces on pallet (front x side)

12 x 2

Center distance between rows

186 mm

Free lateral distance

100 mm

N° of pieces per pallet

24

Material weight on the pallet

322 kg

☐ Preview

Edit the pallet

Variable step between the storeys

☐ No

☐ Yes

Number of storeys

10

Distance between storeys

mm 360

N° of storeys allocated to the product

10

Level of the 1st load storey from 0.00

420 mm

Trolley width (front ventilated)

2660 mm

Trolley length

600 mm

Trolley height from 0.00 level

4020 mm

N° pieces per trolley

240

☒ Preview

Edit the trolley



Product : BLOCK B15

Pieces / storey n° 24

N° of storeys n° 10

Weight of the wet material kg 3.221

front

plant

side

Navigation controls: arrows, zoom in (+), zoom out (-), reset (X), and a close (X) button.

OTHER EXAMPLES OF DRYER LOADING

Marseilles tiles on mobile pallets

CombiVent - TEGOLE-MA

File Displays Instruments Information Help

DRYER LOADING

Product

03 - MARSIGLIA 1

Type	Wet product data			
	Width cm	Height cm	Length cm	Weight kg
MARSIGLIESE TILE	31,20	6,10	40,10	4,70

Type of dryer

Tunnel dryer

Dryer with chambers / tunnel

Type of support

☐ Fixed pallet

☐ Mobile pallet

☐ Bars

☐ Trays

on

☐ Trolley

☐ Fixed frame

Location on support

☐ Standing

☐ Lay down

Rotated

☐ No

☐ Yes

Load type

☐ by sends

☐ by single row

Pallet dimensions (Front x side)

2500 x 1800 mm

N° pieces on pallet (front x side)

6 x 4

Center distance between rows

398 mm

Free lateral distance

100 mm

N° of pieces per pallet

24

Material weight on the pallet

113 kg

☐ Preview

Edit the pallet

Variable step between the storeys

☐ No

☐ Yes

Number of storeys

18

Distance between storeys

mm 200

N° of storeys allocated to the product

18

Level of the 1st load storey from 0.00

420 mm

Trolley width (front ventilated)

2800 mm

Trolley length

1800 mm

Trolley height from 0.00 level

4020 mm

N° pieces per trolley

360

☐ Preview

Edit the trolley

Product : MARSIGLIA 1
Pieces / storey n° 24
N° of storeys n° 18
Weight of the wet material kg 2.030

front

plant

side

↑

+

↶

↷

↓

-

Extruded 'Coppi' on mobile pallets

CombiVent - TEGOLE-MA

File Displays Instruments Information Help

DRYER LOADING

Product

01 - COPPO 2

Type	Wet product data			
	Width cm	Height cm	Length cm	Weight kg
PRESSED COPPO	21,10	8,40	40,10	3,70

Type of dryer

Tunnel dryer

Dryer with chambers / tunnel

Type of support

☐ Fixed pallet

☐ Mobile pallet

☐ Bars

☐ Trays

on

☐ Trolley

☐ Fixed frame

Location on support

☐ Standing

☐ Lay down

Rotated

☐ No

☐ Yes

Load type

☐ by sends

☐ by single row

Pallet dimensions (Front x side)

2500 x 1800 mm

N° pieces on pallet (front x side)

10 x 4

Center distance between rows

232 mm

Free lateral distance

100 mm

N° of pieces per pallet

40

Material weight on the pallet

148 kg

☐ Preview

Edit the pallet

Variable step between the storeys

☐ No

☐ Yes

Number of storeys

18

Distance between storeys

mm 200

N° of storeys allocated to the product

18

Level of the 1st load storey from 0.00

420 mm

Trolley width (front ventilated)

2800 mm

Trolley length

1800 mm

Trolley height from 0.00 level

4020 mm

N° pieces per trolley

720

☐ Preview

Edit the trolley

Product : COPPO 2
Pieces / storey n° 40
N° of storeys n° 18
Weight of the wet material kg 2.664

front

plant

side

↑

+

↶

↷

↓

-

Portuguese tiles on mobile pallet

CombVent - TEGOLE-MA

File Displays Instruments Information Help

DRYER LOADING

Product: **04 - PORTUGHESE 1**

Wet product data				
Type	Width	Height	Length	Weight
	cm	cm	cm	kg
PORTUGUESE TILE	28,50	7,40	42,20	4,50

Type of dryer: **Tunnel dryer**

Dryer with chambers / tunnel

Type of support: ☐ Fixed pallet ☒ Mobile pallet
☐ Bars ☐ Trays
on ☐ Trolley ☐ Fixed frame

Location on support: ☒ Standing ☐ Lay down
Rotated: ☒ No ☐ Yes

Load type: ☐ by sends ☒ by single row

Pallet dimensions (Front x side): **2500 x 1800** mm
N° pieces on pallet (front x side): **7 x 4**
Center distance between rows: **336** mm
Free lateral distance: **100** mm
N° of pieces per pallet: **28**
Material weight on the pallet: **126** kg

☐ Preview

Variable step between the storeys: ☐ No ☐ Yes

Number of storeys: **18**
Distance between storeys: **200** mm
N° of storeys allocated to the product: **18**
Level of the 1st load storey from 0.00: **420** mm
Trolley width (front ventilated): **2800** mm
Trolley length: **1800** mm
Trolley height from 0.00 level: **4020** mm
N° pieces per trolley: **420**

☒ Preview

Product : PORTUGHESE 1
Pieces / storey: n° 28
N° of storeys: n° 18
Weight of the wet material: kg 2.268

front plant side

Ceiling interposed block on the rack

CombVent - A-ESS-CAMERE-RACK

File Displays Instruments Information Help

DRYER LOADING

Product: **[B] 03 - SOLAIO H20**

Wet product data				
Type	Width	Height	Length	Weight
	cm	cm	cm	kg
INTERPOSED CEILING	42,40	21,20	26,50	10,96

Type of dryer: **Chamber dryer**

Dryer with chambers / tunnel

Type of support: ☐ Fixed pallet ☒ Mobile pallet
☐ Bars ☐ Trays
on ☐ Trolley ☐ Fixed frame

Location on support: ☒ Standing ☐ Lay down
Rotated: ☒ No ☐ Yes

Load type: ☐ by sends ☒ by single row

Pallet dimensions (Front x side): **2650 x 2000** mm
N° pieces on pallet (front x side): **8 x 4**
Center distance between rows: **289** mm
Free lateral distance: **100** mm
N° of pieces per pallet: **32**
Material weight on the pallet: **351** kg

☐ Preview

Variable step between the storeys: ☐ No ☐ Yes

Number of storeys: **10**
Distance between storeys: **400** mm
N° of storeys allocated to the product: **10**
Level of the 1st load storey from 0.00: **420** mm
Pile width (front ventilated): **2870** mm
Pile length: **2000** mm
Overall height of the pile: **4420** mm
N° pieces per stack: **320**

☒ Preview

Product : SOLAIO H20
Pieces / storey: n° 32
N° of storeys: n° 10
Weight of the wet material: kg 3.507

front plant side

Ceiling block on a mobile pallet (example of a ceiling block produced with a double output die and crossed wings, loaded on each storey with three sends).

CombiVent - A-ESS-A-GRANDI-VOLUMI

File Displays Instruments Information Help

DRYER LOADING

Product: 03 - SOLAIO H15

Wet product data				
Type	Width cm	Height cm	Length cm	Weight kg
INTERPOSED CEILING	34,98	15,90	31,80	8,68

Type of dryer: Chamber dryer

Dryer with chambers / tunnel

Type of support: ☐ Fixed pallet ☒ Mobile pallet
☐ Bars ☐ Trays
on ☐ Trolley ☐ Fixed frame

Location on support: ☐ Standing ☐ Lay down
Rotated: ☐ No ☐ Yes

Load type: ☒ by sends ☐ by single row

Pallet dimensions (Front x side): 2200 x 2000 mm
N° sends per pallet: 3
N° of rows in-depth: 5
Free lateral distance: 100 mm
N° of pieces per pallet: 30
Material weight on the pallet: 260 kg

☐ Preview

Variable step between the storeys: ☒ No ☐ Yes
Number of storeys: 10
Distance between storeys: 360 mm
N° of storeys allocated to the product: 10
Level of the 1st load storey from 0.00: 420 mm
Trolley width (front ventilated): 2500 mm
Trolley length: 2000 mm
Trolley height from 0.00 level: 4020 mm
N° pieces per trolley: 300

☒ Preview

Product : SOLAIO H15
Pieces / storey: n° 30
N° of storeys: n° 10
Weight of the wet material: kg 2,604

Ceiling interposed block on the car

CombiVent - A-ESS-BLANCCELLE

File Displays Instruments Information Help

DRYER LOADING

Product: [B] 02 - HOURDIS H15

Wet product data				
Type	Width cm	Height cm	Length cm	Weight kg
CEILING BLOCK	43,46	15,90	21,20	11,95

Type of dryer: Rapid dryer

Rapid dryer

Width of pallet of the car: 6000 mm
Depth of pallet of the car: 750 mm
N° of pallets: 5
Step between pallets: 388 mm

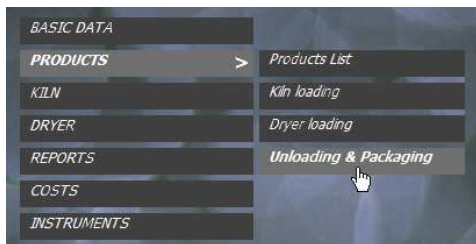
Load type: ☐ by sends ☒ by single row

N° outputs of die: 2
Center distance between the pieces: 488 mm
N° of front pieces on each storey: 12
Free minimum lateral distance: 100 mm
N° of rows in-depth: 8

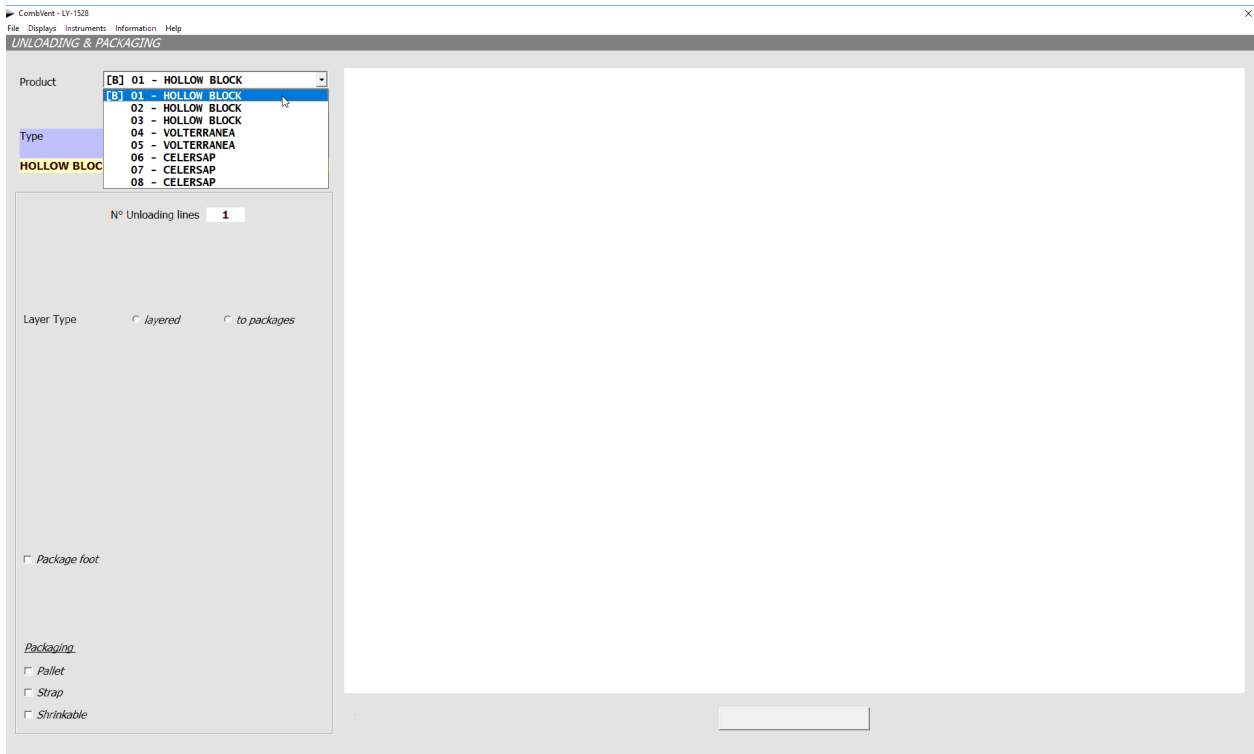
N° of pieces per pallet: 36
N° of pieces / car: 180
Weight of wet material / car: 2.151 kg

Product : HOURDIS H15
Pieces / storey: n° 12 x 3 = 36
Pieces / car: n° 36 x 5 = 180
Weight of the wet material: kg 2,151
Storeys loaded / hour: n° 66,5
Cars produced / hour: n° 13,3

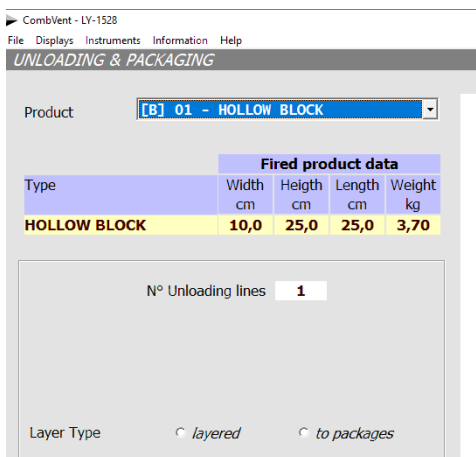
Section 2.4 – PRODUCTS→ Unloading & Packaging



Definition of the methods for unloading and packaging the fired product



From the drop-down list you select first of all the product for which you want to define the methods of *unloading and packaging*. Once selected, the dimensional characteristics of the fired product are displayed.



The first data requested concerns the number of discharge lines. This value is proposed by default equal to 1.

You must then opt for a discharge of the material according to the two possibilities provided:

- *layered*
- *to packages*

In the hypothesis of adopting a *layered* discharge, the following is displayed:

N° Unloading lines **1**

> Unloading.

N° of unloading gripper heads

N° layers in height downloaded / cycle

N° pieces downloaded / cycle

Layer Type ☒ *layered* ☐ *to packages*

> Reforming.

Crossed layers ☐ *Yes* ☐ *No*

Overturned product ☐ *No* ☐ *Yes*

Double layers ☐ *Yes* ☐ *No*

N° layers in height reformed / cycle

N° of reformation gripper heads

In this case it is assumed that, subsequently, a reformation of the material must be carried out to constitute the packaged packet of fired product.

For this purpose, some options are provided that allow to obtain crossed layers, overturned products and the possibility of having double layers.

An indication is also provided of the number of reformed layers in height for each cycle of the reformation clamp and the number of the gripper heads.

In the case of *packages* unloading:

N° Unloading lines **1**

> Unloading.

N° of unloading gripper heads

N° layers in height downloaded / cycle

N° pieces downloaded / cycle

Layer Type ☐ *layered* ☒ *to packages*

> Unloading to packages.

Layer Type ☐ *Layer A* ☐ *Layer B*

N° pieces [front x side]

N° pieces for single layer

N° layers downloaded per package

N° pieces per pack

If the conformation of the stacking on the kiln car allows it, it is possible to unload several layers at the same time. In this case it is sufficient only to indicate the number of height layers discharged because the pack thus packed inherits the configuration of the stacked pack.

> Unloading.

This command allows you to view the stacking of the kiln car for the current product.

CombVent - LV-1528

File Displays Instruments Information Help

UNLOADING & PACKAGING

Product **[B] 01 - HOLLOW BLOCK**

Fired product data				
Type	Width	Height	Length	Weight
	cm	cm	cm	kg
HOLLOW BLOCK	10,0	25,0	25,0	3,70

Product: HOLLOW BLOCK
 Dried dimensions [width]: cm 10 x 25 x 25
 Dried product weight: kg 4,00
 Front pack axis: mt 1,200
 Side pack axis: mt 1,400
 Layers / pack: n° 8
 Pieces / pack: n° 320
 Total pieces / car: n° 3.840
 Packs / car: n° 12
 Dried product weight: kg 15.360

N° Unloading lines **1**

> Unloading.

N° of unloading gripper heads **4**

N° layers in height downloaded / cycle **4**

N° pieces downloaded / cycle **640**

Layer Type ☐ *layered* ☒ *to packages*

> Unloading to packages.

Layer Type	Layer A	Layer B
N° pieces [front x side]	4 x 10	10 x 4
N° pieces for single layer	40	40
N° layers downloaded per package	4	
N° pieces per pack	160	

☐ Package foot

Packaging

☐ Pallet

☐ Strap

☐ Shrinkable

Stacking

> Unloading to packages.

This command allows you to redisplay the packaged package.

CombiVent - LV-1528

File Displays Instruments Information Help

UNLOADING & PACKAGING

Product: [B] 01 - HOLLOW BLOCK

Product : HOLLOW BLOCK
 Pack Dimensions [WxDxH] mt 1,000 x 1,000 x 1,000
 N° pieces per pack n° 160
 Material Weight kg 592

Fired product data				
Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	10,0	25,0	25,0	3,70

N° Unloading lines **1**

☒ Unloading.

N° of unloading gripper heads **4**
 N° layers in height downloaded / cycle **4**
 N° pieces downloaded / cycle **640**

Layer Type ☐ layered ☒ to packages

> Unloading to packages.

Layer Type	Layer A	Layer B
N° pieces [front x side]	4 x 10	10 x 4
N° pieces for single layer	40	40
N° layers downloaded per package	4	
N° pieces per pack	160	

☐ Package foot

DISCHARGE TO PACK

Pieces / hour	n° 8.533
Unloaded Packs/hour	n° 53,3
Unloaded Layers/hour	n° 213,3
Operations / hour	n° 13,3
Seconds / operation	n° 270,0

RECONSTRUCTION TO PACK

Net pieces / hour	n° 8.366
Reformed packs/hour	n° 52,3
Operations / hour	n° 13,1
Seconds / operation	n° 275,4

Front of pack

At this point we can foresee the insertion of a *foot* of the pack and the use of vertical and horizontal *straps*, as in the following example:

CombiVent - LV-1528

File Displays Instruments Information Help

UNLOADING & PACKAGING

Product: [B] 01 - HOLLOW BLOCK

Product : HOLLOW BLOCK
 Pack Dimensions [WxDxH] mt 1,000 x 1,000 x 1,250
 N° pieces per pack n° 180
 Material Weight kg 666

Fired product data				
Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	10,0	25,0	25,0	3,70

N° Unloading lines **1**

> Unloading.

N° of unloading gripper heads **4**
 N° layers in height downloaded / cycle **4**
 N° pieces downloaded / cycle **640**

Layer Type ☐ layered ☒ to packages

> Unloading to packages.

Layer Type	Layer A	Layer B
N° pieces [front x side]	4 x 10	10 x 4
N° pieces for single layer	40	40
N° layers downloaded per package	4	
N° pieces per pack	180	

☒ Package foot

N° rows **2 x 1**
 Centre distance between rows **500** mm
 N° of pieces in depth **10**
 Overturned product ☐ No ☐ Yes

DISCHARGE TO PACK

Pieces / hour	n° 8.533
Unloaded Packs/hour	n° 53,3
Unloaded Layers/hour	n° 213,3
Operations / hour	n° 13,3
Seconds / operation	n° 270,0

RECONSTRUCTION TO PACK

Net pieces / hour	n° 8.366
Reformed packs/hour	n° 46,5
Operations / hour	n° 13,1
Seconds / operation	n° 275,4

Front of pack

The choice of the strap involves the display of the following window.

Graphics

Strapping

☒ *Horizontal strapping*

Strap width mm

N° of horizontal straps

Strap N°

N° of the horizontal positioning

☒ *Vertical strapping*

Strap width mm

N° of straps / foot row

Distance between the straps / foot mm

☐ Graphics

The data to be inserted concern, in addition to the width of the strap to be used, for the horizontal ligatures the *number* and *position* of each.

For vertical ligatures, it is necessary to distinguish the case in which a package foot is present, as in the previous example, or not. In the case of the previous example, we indicate the *number* of ligatures for each row of the foot and the *distance* between ligatures if they are more than one.

Example of use of *wooden pallet*.

Comblent - LV-1528

File Displays Instruments Information Help

UNLOADING & PACKAGING

Product: [01 - HOLLOW BLOCK]

Product: HOLLOW BLOCK
Pack Dimensions [WxDxH] mt 1,000 x 1,000 x 1,000
N° pieces per pack n° 160
Material Weight kg 592

Type	Width cm	Height cm	Length cm	Weight kg
HOLLOW BLOCK	10,0	25,0	25,0	3,70

N° Unloading lines

> | *Unloading*

N° of unloading gripper heads

N° layers in height downloaded / cycle

N° pieces downloaded / cycle

Layer Type ☐ layered ☒ to packages

> | *Unloading to packages*

Layer Type ☐ Layer A ☐ Layer B

N° pieces [front x side] x x

N° pieces for single layer

N° layers downloaded per package

N° pieces per pack

☐ Package foot

Packaging

☒ Pallet Quantity / day n°

☐ Strap

☐ Shrinkable

DISCHARGE TO PACK

Pieces / hour	n° 8,533
Unloaded Packs/hour	n° 53,3
Unloaded layers/hour	n° 213,3
Operations / hour	n° 13,3
Seconds / operation	n° 270,0

RECONSTRUCTION TO PACK

Net pieces / hour	n° 8,366
Reformed packs/hour	n° 52,3
Operations / hour	n° 13,1
Seconds / operation	n° 275,4

Front of pack

Example of use of *wooden pallet* and the *straps*.

CombVent - LV-1528

File Displays Instruments Information Help

UNLOADING & PACKAGING

Product: [B] 01 - HOLLOW BLOCK

Product : HOLLOW BLOCK
 Pack Dimensions [WxDxH] mt 1,000 x 1,000 x 1,000
 N° pieces per pack n° 160
 Material Weight kg 392

Fired product data				
Type	Width	Height	Length	Weight
	cm	cm	cm	kg
HOLLOW BLOCK	10,0	25,0	25,0	3,70

N° Unloading lines: 1

> Unloading

N° of unloading gripper heads: 4
 N° layers in height downloaded / cycle: 4
 N° pieces downloaded / cycle: 640

Layer Type: ☐ layered ☒ to packages

> Unloading to packages

Layer Type	Layer A	Layer B
N° pieces [front x side]	4 x 10	10 x 4
N° pieces for single layer	40	40
N° layers downloaded per package	4	
N° pieces per pack	160	

☐ Package foot

Discharge to pack

Pieces / hour	n° 8.533
Unloaded Packs/hour	n° 53,3
Unloaded layers/hour	n° 213,3
Operations / hour	n° 13,3
Seconds / operation	n° 270,0

Reconstruction to pack

Net pieces / hour	n° 8.366
Reformed packs/hour	n° 52,3
Operations / hour	n° 13,1
Seconds / operation	n° 275,4

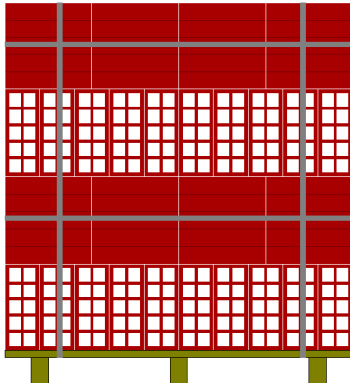
Side of pack

Packaging

☒ Pallet Change Quantity / day 627 n°

☒ Strap Change Quantity / day 10.540 m

☐ Shrinkable



When the pallet is selected, the following window is displayed, where the pallet suitable for the pack that has been packaged is already proposed. It will be sufficient only to *confirm the assignment*.

Graphics

Pallet

Type: 1

Width: 1000 mm
 Length: 1000 mm
 Height: 100 mm
 Weight: 12,0 kg

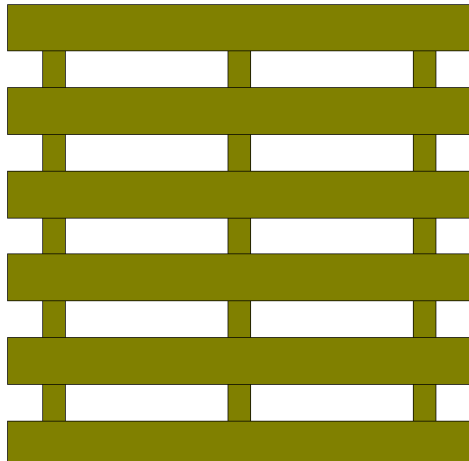
Add pallet

☐ Upper and lower crosspieces

N° crosspieces upper/lower: 6
 Width of crosspieces upper/lower: 100 mm
 Thickness of crosspieces upper/lower: 20 mm
 N° of lower crosspieces: 3
 Height of lower crosspieces: 80 mm
 Width of lower crosspieces: 50 mm
 Step of lower crosspieces: 400 mm

Confirmation of pallet assignment

☒ Graphics Print Drawing Exit



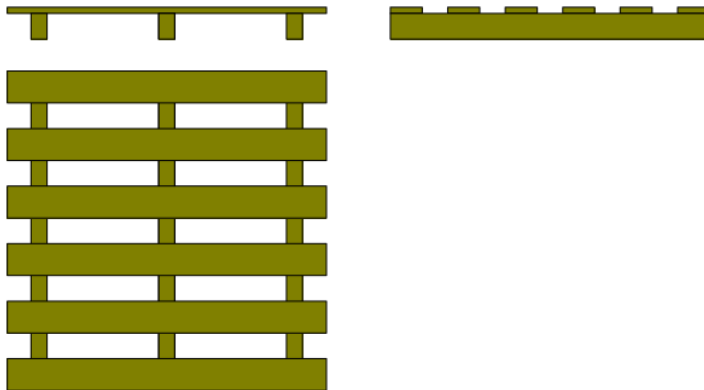
front plant side

The pallet size is automatically calculated based on the size of the packaged base. As you can see, the pallet can be customized in its entirety. You can also have a print or a 1: 1 scale drawing in DWG format of the pallet.

Example of printing of wooden pallet.

Customer : TRIGG CORPORATION
Order : LY-1528

PALLET

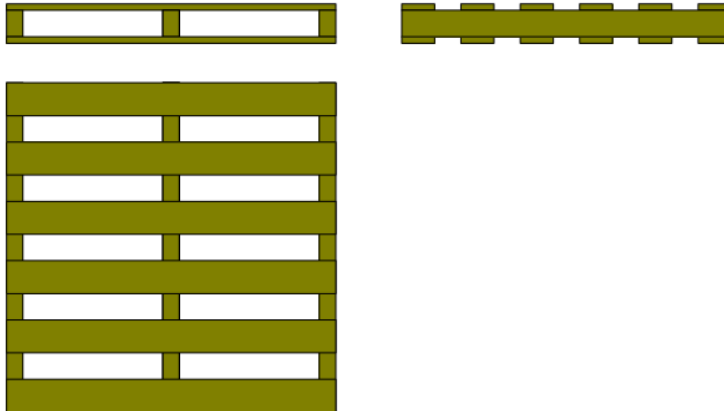


Dimensions of pallet:
- length mm 1.000
- width mm 1.000
- height mm 100
- Weight kg 12,0

Other type of pallet.

Customer : TRIGG CORPORATION
Order : LY-1528

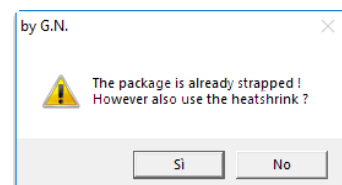
PALLET



Dimensions of pallet:
- length mm 1.000
- width mm 1.000
- height mm 120
- Weight kg 12,0

As a last option you can use the *shrink wrap* in which case the amount in square meters / day required is automatically indicated.

If in the previous case of pack on strapped pallet, we wanted to add the shrink wrap, the program would display the following message.



Section 3 – KILN

Section 3.1 – KILN → Sizing



Choice and sizing of the tunnel kiln

First of all, select the type of kiln. In the case of brick systems, the Standard type is proposed and can not be changed. In the case of a tile system, all four types are available.

Type of kiln

- ☒ Standard
- ☐ Monolayer
- ☐ With H cassettes
- ☐ With U cassettes

Then proceed to indicate, depending on the option chosen, the *firing cycle* or the *number of kiln cars* contained in the kiln. This second option is useful if you are dealing with an existing system to be renovated.

Minimum firing cycle h

☒ Sets the firing cycle

☐ Sets the number of cars in the kiln

Cars contained in the kiln n°

Firing cycle

☐ Sets the firing cycle

☒ Sets the number of cars in the kiln

The other required values are already proposed by default by the program and can be modified.

Combivent - LY-1528

File Displays Instruments Information Help

KILN - SIZING

N° of kilns

Gross daily production **378,9** ton of fired/day


Hourly production **15,786** kcal/kg of fired

Kcal specific request **320** kg of fired/hour

Basic Product **HOLLOW BLOCK**

Product type **HOLLOW BLOCK**

Fired weight **3,70** kg



Type of kiln

☒ Standard ☐ With H cassettes

☐ Monolayer ☐ With U cassettes

Inside width of the tunnel **4900** mm

Height of the charge on the kiln car **2000** mm

Height of the gallery above loading base **2106** mm

Useful load space on height **2006** mm

Step / module **1400** mm

Length of the kiln car into modules **3** n°

Preheating Zone **40,7** % **33** steps

Firing Zone **27,2** % **22** steps

Cooling Zone **32,1** % **26** steps

Total steps into the tunnel **81** n°

Total vents on the ceiling **121** n°

Composition of the vents on the ceiling **5+6**

kiln car width **4840** mm

kiln car length **4200** mm

Pieces per kiln car **3.840** n°

Duration of the weekend **32** h

Minimum firing cycle h

☒ Sets the firing cycle

☐ Sets the number of cars in the kiln

Total length **122,490** mt

Total width **6,580** mt

Total height **3,756** mt

Length of the pre-chamber **4,570** mt

Length of the baking tunnel **117,920** mt

Length of preheating Zone **46,200** mt

Length of firing zone **30,800** mt

Length of cooling zone **40,600** mt

Hourly specific production **1.553** kg/hour sqm

Number of kiln cars in the firing zone **345** kg/cum

Load per kiln car **15,360** ton

Cars in the pre-chamber **1** n°

Cars contained in the kiln **28** n°

Carri in zona cottura **8** n°

Spare kiln cars during the stop **33** n°

Technological spare **6** n°

Total number of kiln cars **68** n°

Time of the push/module **18,0** min.

Kiln cars out in 24 hours **26,7** n°

Thermal sizing

Ventilation

Graphics

Exit

NOTE: from this section it is possible to go directly to [Sections 3.2 \(Thermal Sizing\)](#), [3.3 \(Ventilation\)](#) and [3.4 \(Graphics\)](#).

Section 3.2 – KILN → Thermal Sizing



Choice and dimensioning of the combustion system

NOTE: after the thermal sizing, the program has already completely defined the kiln, as you can see in the next sections which will allow you to make the necessary changes to customize the project.

The following window is displayed where there are already some data that the program proposes by default.

A screenshot of the 'KILN - THERMAL SIZING' window. The 'Firing System' is set to 'on the ceiling'. The 'Ceiling Combustion System' section shows a diagram of a kiln with 9 firing points. The 'Groups on the ceiling 1' section shows 9 firing points in two rows. The 'Total available heat' is 6.365.000 kcal/h, and the 'Specific Kcal available' is 320 kcal/kg fired. The 'Total jets fed' is 171 n°. The 'Verifying energy' is 1.15 %.

The first datum to indicate refers to the *type of firing system* that can be chosen among three different types.

A screenshot of the 'Firing System' dropdown menu. The options are 'on the ceiling', 'on the ceiling lateral', and 'on the ceiling + lateral'. The 'on the ceiling' option is currently selected.

The data concerning the specific kcal required is a fixed datum which depends on the type of kiln. It is however possible to modify it by changing the value of the correction factor, set equal to 1 by default.

A screenshot of the 'Kcal specific request' section. The values are: Kcal specific request: 320 kcal/kg fired; Correction factor: 1.15; Correct specifications Kcal: 320,0 kcal/kg fired; Total theoretical heat to be supplied: 6.365.000 kcal/h; Amount to be allocated for recovery: 130 kcal/kg fired; Availability for the dryer: 2.586.000 kcal/h; Ambient temperature: 15 °C.

The selection of the *type of fuel* among the five types present is made.

A screenshot of the 'Fuel' dropdown menu. The options are 'Methane', 'GPL', 'Coal gas', 'Fuel oil', and 'Petroleum coke'. The 'Fuel oil' option is currently selected.

The Potential of each fire point is then established. A range of values ranging from 20,000 to 155,000 kcal / hour is expected.

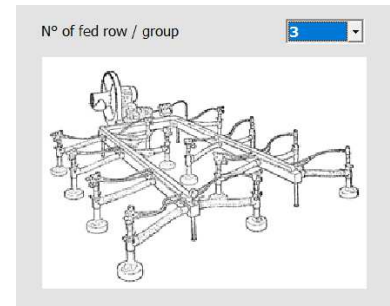
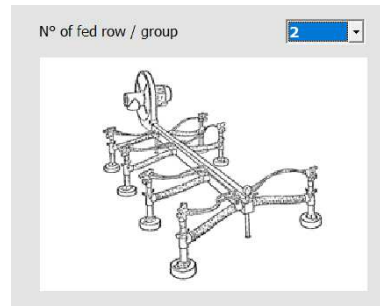
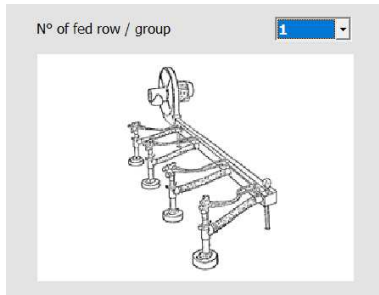
By default the program proposes combustion groups with 2 rows of injectors but you can also choose a group with 1 row or 3 rows.

Methane

N.C.V. of fuel 1 **8.250** Kcal/Ncu.m

Potential single point F.P. **45000** kcal/h

20000
25000
30000
35000
40000
45000
50000
55000



The program then automatically calculates the *number of combustion groups* necessary to supply the required Kcal.

CombVent - A-ESS-BILANCELLE

File Instruments Information Help

KILN - THERMAL SIZING

Firing System **on the ceiling**

Kcal specific request **320** kcal/kg fired

Correction factor **1**

Correct specifications Kcal **320,0** kcal/kg fired

Total theoretical heat to be supplied **5.441.000** kcal/h

Amount to be allocated for recovery **130** kcal/kg fired

Availability for the dryer **2.211.000** kcal/h

Ambient temperature **15** °C

☒ Only one type of fuel

Ceiling Combustion System

Methane

N.C.V. of fuel 1 **8.250** Kcal/Ncu.m

Potential single point F.P. **50000** kcal/h

N° of fed row / group **2**

Groups on the ceiling 1

N° firing points in two rows **13**

Total calories developed **5.850.000** kcal/h

N° groups **9**

Hourly consumption **709,1** Ncu/h

% Utilization energy **100,0**

Total available heat **5.850.000** kcal/h

Specific Kcal available **344,1** kcal/kg fired

Total jets fed **117** n°

Verifying energy **100,0** %

Exit

NOTE: the program establishes first, based on the internal width of the tunnel kiln, the number of nozzles every 2 rows. It is possible to modify this data by clicking on the relevant box with the mouse. The button on the right is used to bring the changed value back to the default value.

Groups on the ceiling 1

N° firing points in two rows **13**

Total calories developed **5.850.000** kcal/h

N° groups **9**

Hourly consumption **709,1** Ncu/h

% Utilization energy **100,0**

The *Single fuel option*, when not selected, allows you to have two different types of fuel for the combustion groups on the ceiling. You can deselect this option even when, while maintaining the same fuel, there is a need to distinguish the potential of groups on the ceiling.

☒ Only one type of fuel

CombVent - A-ESS-BILANCELLE
File Instruments Information Help
KILN - THERMAL SIZING

Firing System: **on the ceiling + lateral**

Kcal specific request: **320** kcal/kg fired
Correction factor: **1**
Correct specifications Kcal: **320,0** kcal/kg fired
Total theoretical heat to be supplied: **5.441.000** kcal/h
Amount to be allocated for recovery: **130** kcal/kg fired
Availability for the dryer: **2.211.000** kcal/h
Ambient temperature: **15** °C

☐ Only one type of fuel

Lateral Combustion System

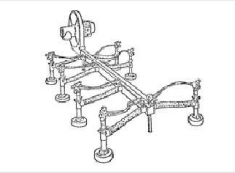
Methane
N.C.V. of fuel: **8.250** kcal/Ncu.m
Potential single point L.B.: **65000** kcal/h

Lateral burning
Total calories developed: **390.000** kcal/h
N° lateral burners: **6**
Hourly consumption: **47,3** Ncu.m/h
% Utilization energy: **7,3**

Ceiling Combustion System

Methane
N.C.V. of fuel 1: **8.250** Kcal/Ncu.m
Potential single point F.P.: **50000** kcal/h

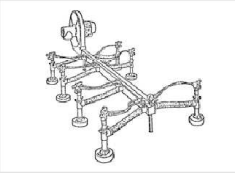
N° of fed row / group: **2**



Groups on the ceiling 1
N° firing points in two rows: **13**
Total calories developed: **1.300.000** kcal/h
N° groups: **2**
Hourly consumption: **157,6** Ncu.m/h
% Utilization energy: **24,4**

Petroleum coke
N.C.V. of fuel 2: **7.400** kcal/kg
Potential single point F.P.: **40000** kcal/h

N° of fed row / group: **2**



Groups on the ceiling 2
N° firing points in two rows: **13**
Total calories developed: **3.640.000** kcal/h
N° groups: **7**
Hourly consumption: **491,9** kg/h
% Utilization energy: **68,3**

Total available heat: **5.330.000** kcal/h
Specific Kcal available: **313,5** kcal/kg fired

Total jets fed: **117** n°
Verifying energy: **100,0** %

Exit

CombVent - A-ESS-BILANCELLE
File Instruments Information Help
KILN - THERMAL SIZING

Firing System: **on the ceiling**

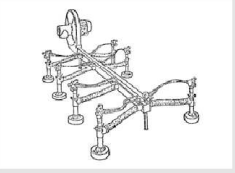
Kcal specific request: **320** kcal/kg fired
Correction factor: **1**
Correct specifications Kcal: **320,0** kcal/kg fired
Total theoretical heat to be supplied: **5.441.000** kcal/h
Amount to be allocated for recovery: **130** kcal/kg fired
Availability for the dryer: **2.211.000** kcal/h
Ambient temperature: **15** °C

☐ Only one type of fuel

Ceiling Combustion System

Methane
N.C.V. of fuel 1: **8.250** Kcal/Ncu.m
Potential single point F.P.: **45000** kcal/h

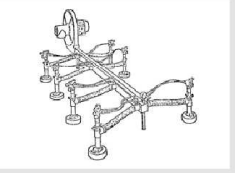
N° of fed row / group: **2**



Groups on the ceiling 1
N° firing points in two rows: **13**
Total calories developed: **4.095.000** kcal/h
N° groups: **7**
Hourly consumption: **496,4** Ncu.m/h
% Utilization energy: **66,3**

Methane
N.C.V. of fuel 2: **8.250** Kcal/Ncu.m
Potential single point F.P.: **80000** kcal/h

N° of fed row / group: **2**



Groups on the ceiling 2
N° firing points in two rows: **13**
Total calories developed: **2.080.000** kcal/h
N° groups: **2**
Hourly consumption: **252,1** Ncu.m/h
% Utilization energy: **33,7**

Total available heat: **6.175.000** kcal/h
Specific Kcal available: **363,2** kcal/kg fired

Total jets fed: **117** n°
Verifying energy: **100,0** %

Exit

NOTE: while the groups 1 are automatically calculated by the program, the number of groups 2 is entered manually (commands - +). Keep in mind that as the number of the latter increases, the number of groups on the ceiling 1 decreases, and vice versa, and this is because the total kcal / h provided by all groups must meet the required needs.

Section 3.3 – KILN → Ventilation



Automatic sizing of the kiln ventilation system

CombiVent - A-ESS-BILANCELLE
File Instruments Information Help

KILN - VENTILATION

Using	Total flow rates cum/h	Temp. °C	Preval. mmH2O	Single flow rates cum/h	Fan N°	eff. η	KW					Type fan	Model fan	Motoriz.	Or.	
							Pabs at 20°C	Pabs at Text	Pinst	Pinst total	Pabs total					
Smoke extraction	76.000	120	120	76.000	1	.7	35.5	26.5	45	45	26.5	Centrifugal	CHB 54 II	45 KW	7	
Balancing inspection tunnel	23.000	80	100	23.000	1	.7	8.9	7.4	9	9	7.4	Centrifugal	CHB 30 II	9 KW	15	
Cold recirculation of preheating																
Warm recirculation of preheating	31.000	250	100	15.500	2	.7	6	3.4	7	14	6.8	Centrifugal	CHB 27 II	7 KW	5-13	
Lateral burners																
Rapid cooling	7.000	29	600	2.400	3	.7	5.6	5.4	7	21	16.2	Centrifugal	N.C.	7 KW	5	
Low Temperature recovery	57.000	120	120	57.000	1	.7	26.6	19.8	37	37	19.8	Centrifugal	CHB 44 II	37 KW	9	
High Temperature recovery	34.000	250	110	34.100	1	.7	14.6	8.2	22	22	8.2	Centrifugal	CHB 36 II	22 KW	1	
Recovery																
Total counterpressure	86.000	29	100	43.100	2	.7	16.8	16.3	22	44	32.6	Centrifugal	CHB 36 II	22 KW	5-13	
Kiln cars cooling	25.000	70	20	25.100	1	.7	2	1.7	2.2	2.2	1.7	Axial	GAX 100	3 KW	A	
							194.2				119.2	kw				
							Specific consumption							7.01	kwh/ton	

Table of the orientations of the centrifugal fans

Exit

This section, when it is opened, is already almost completely defined thanks to the default values provided by the program. It remains only to indicate the orientation of the various fans (optional). For this it is sufficient to place the cursor in the relevant box and write the orientation to be chosen among the various ones in the figure that appears.



Table of the orientations of the axial fans



Instead of typing the orientation in the box, you can simply enter it by clicking on the relevant figure. It is also possible to indicate two different orientations together, separated by the sign "-".

NOTE: The tables of the orientations are visualized when the focus is given to one of the boxes related to the *orientations* (last row of boxes).

Section 3.4 – KILN → Graphics

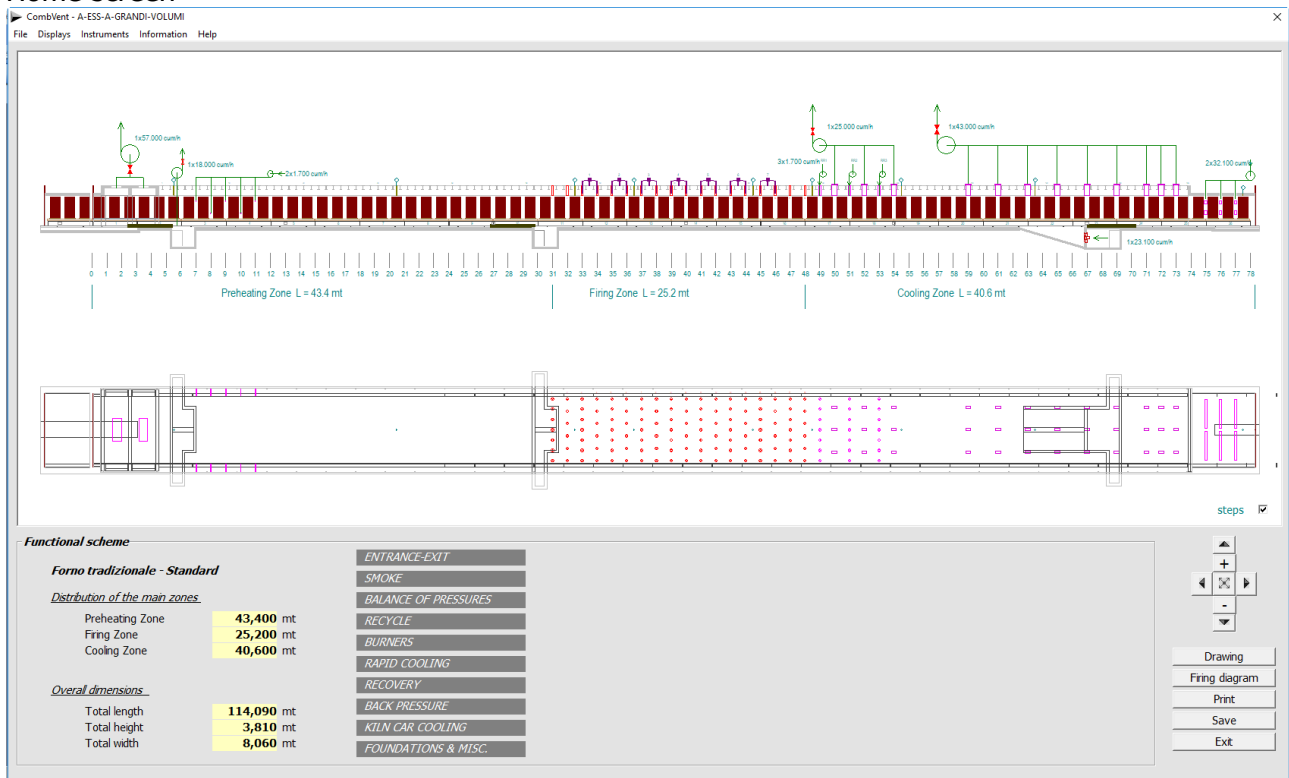
Section 3.4.1 – KILN → Graphics → Functional scheme



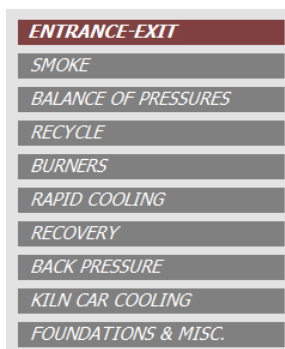
Completion of the graphic definition of the tunnel kiln functional scheme

Once the *kiln*, the *combustion system* and the *ventilation* have been sized, this section offers a complete *functional scheme* of the kiln.

Home screen



This scheme can be analyzed and customized as desired since there is a menu that provides the detail of each part of the kiln and from where it is possible to intervene and change the default settings.

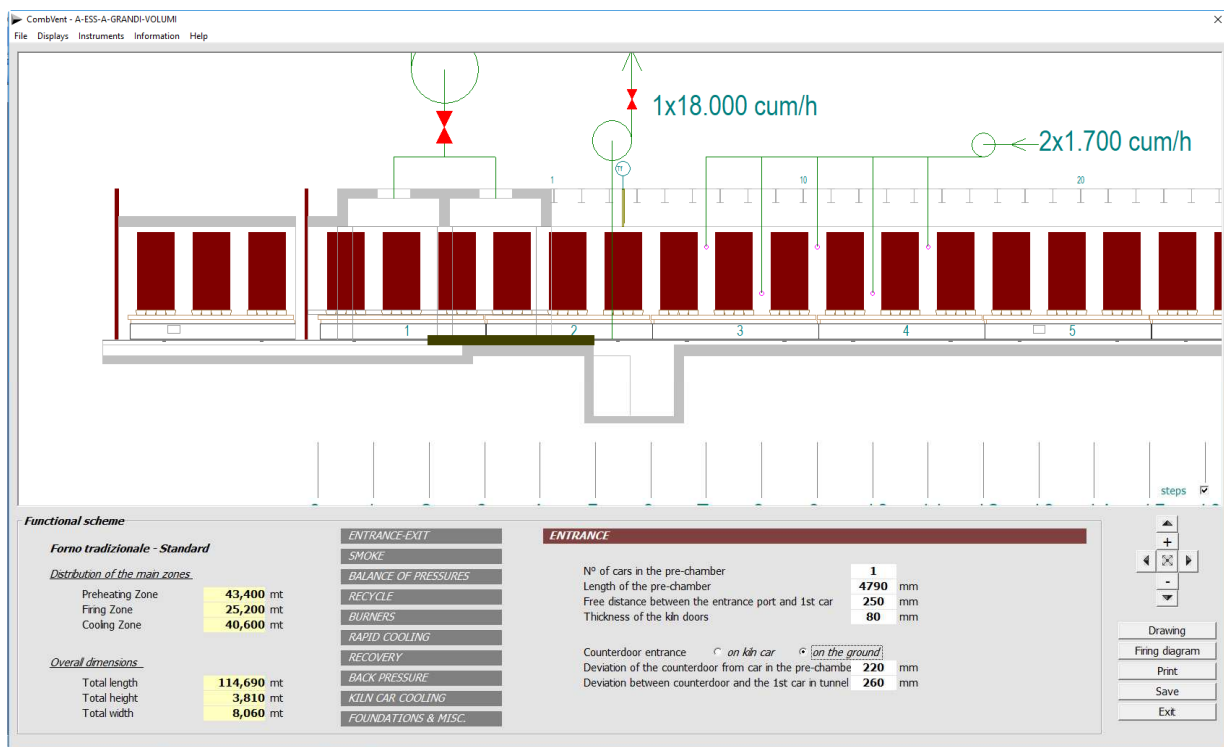
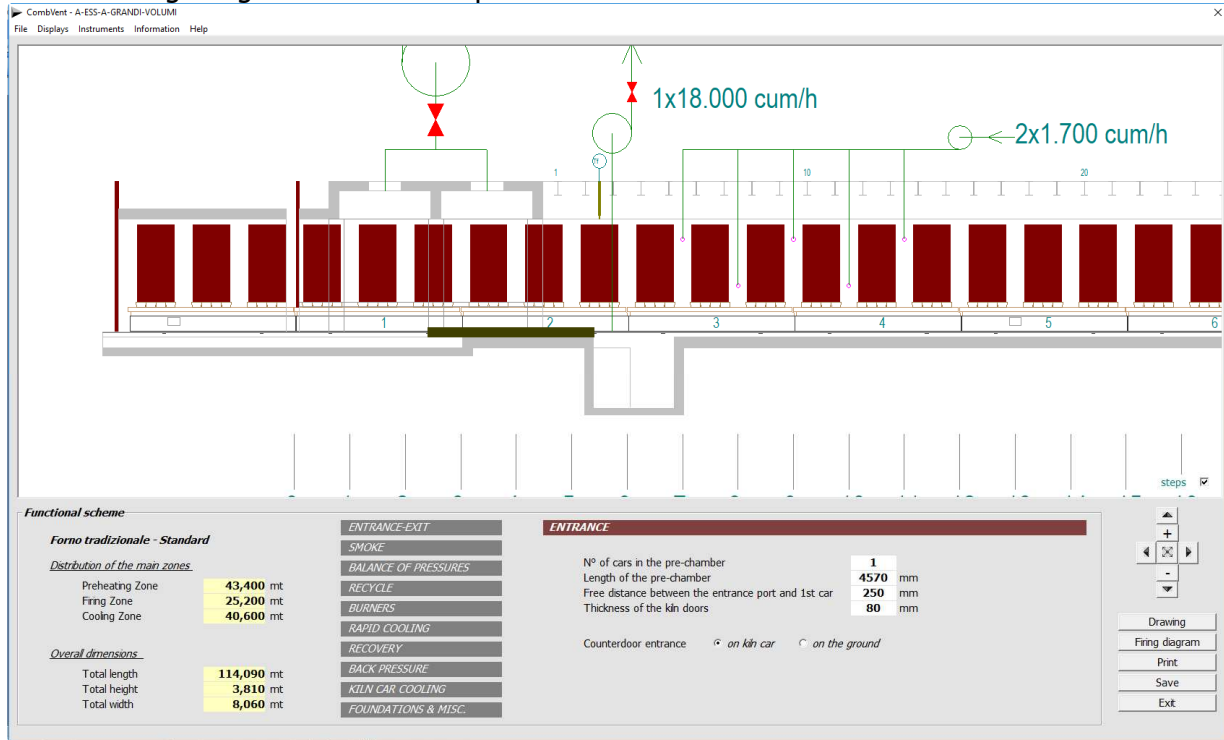


The various menu items are described below.

ENTRANCE-EXIT: Entrance

The first menu command displays the entrance side of the kiln where it is possible to modify the various values initially proposed by the program. From here it can be established to have the entrance door that closes on the kiln car (default solution) or a door that closes on the ground.

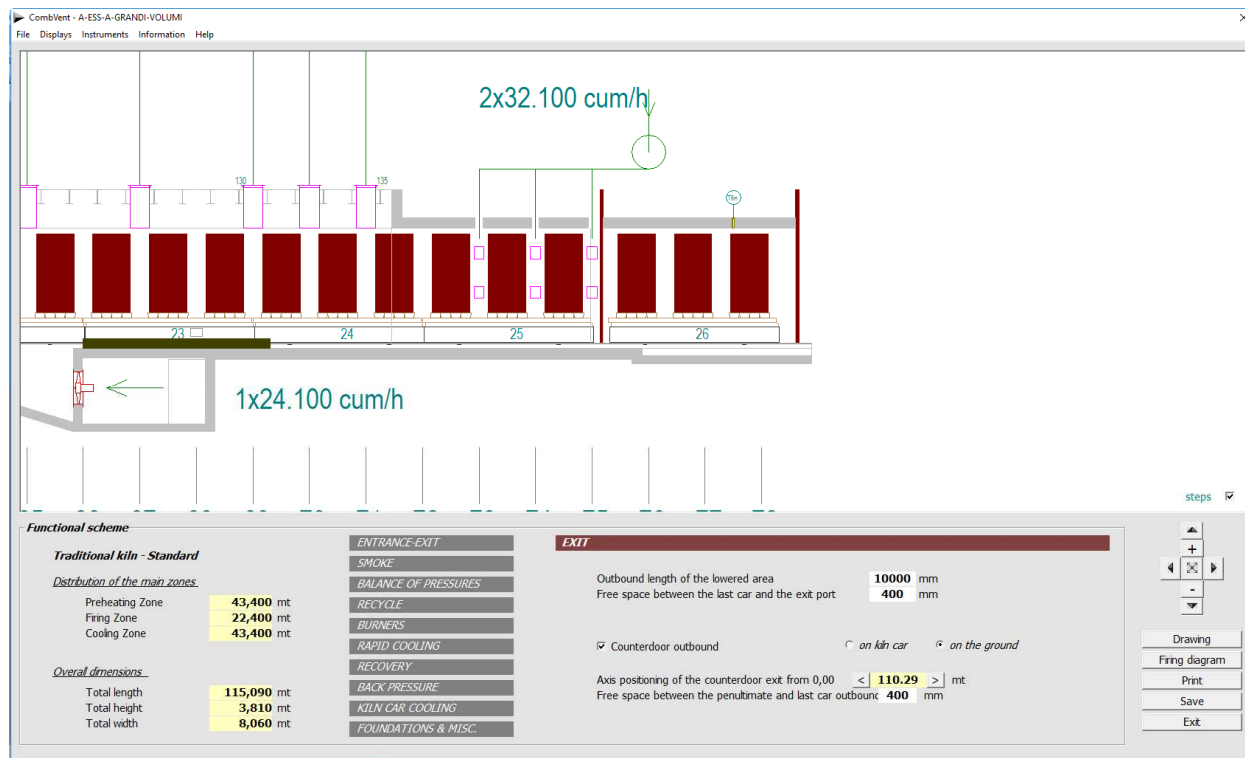
The following images show the two possibilities.



The latter solution, as can be seen, involves a change in the total length of the kiln. With a click of mouse on the word **ENTRANCE** you switch to display the **EXIT** side of the kiln.

ENTRANCE-EXIT: Exit

Also in this case the values proposed by the program can be modified. Moreover, there is the possibility of introducing a sealing door which, similarly to the previous case, can close on the ground or on the kiln car. In the first case the inner door is placed between the last and the second last kiln car and its position is fixed (commands \leftarrow \rightarrow disabled).



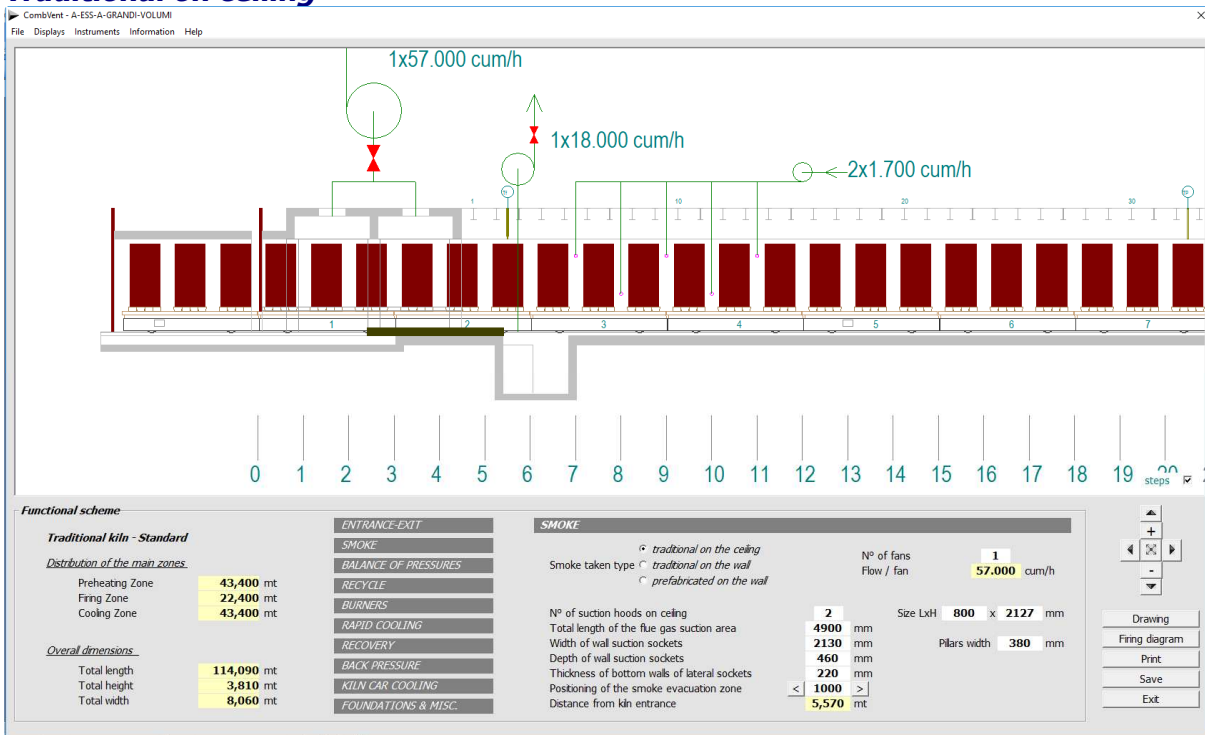
In the second case the door can be positioned with the commands \leftarrow \rightarrow . The movement takes place according to the longitudinal pitch of the packages.



SMOKE

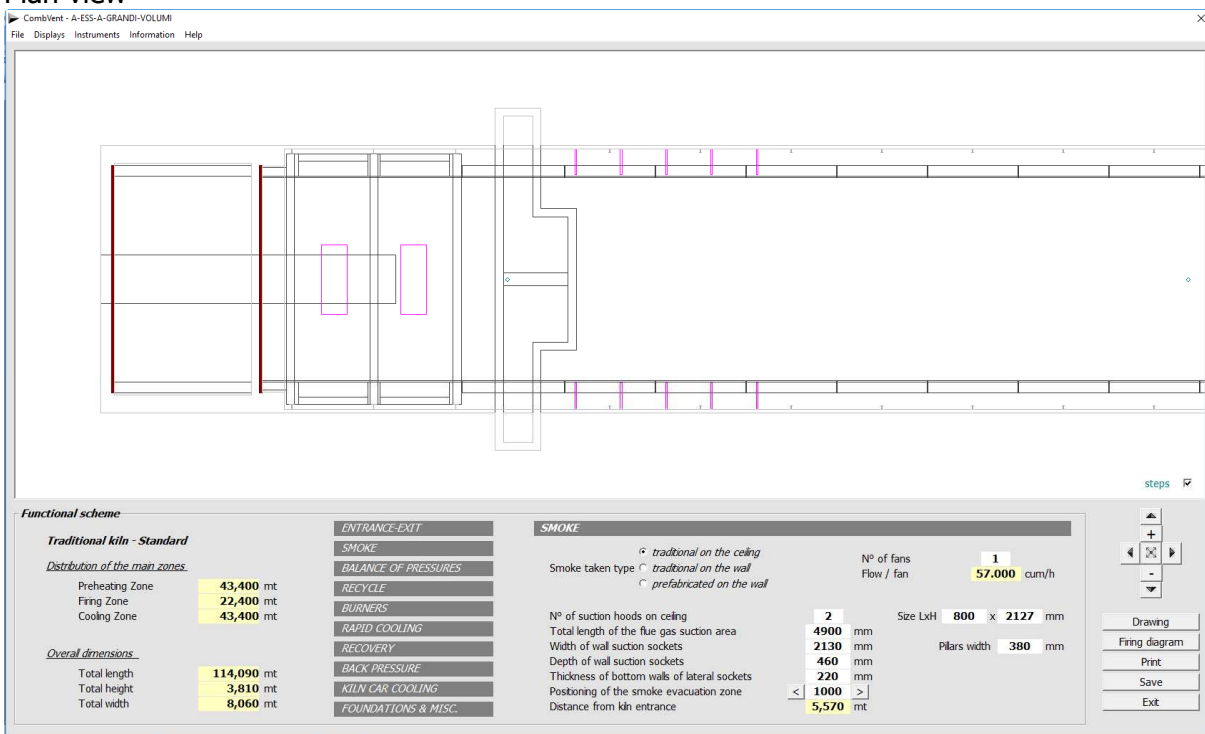
There are 3 different smoke sockets. The most common, according to the technology applied by the Industrial Alpina, is the *traditional on the ceiling* (default solution).

Traditional on ceiling

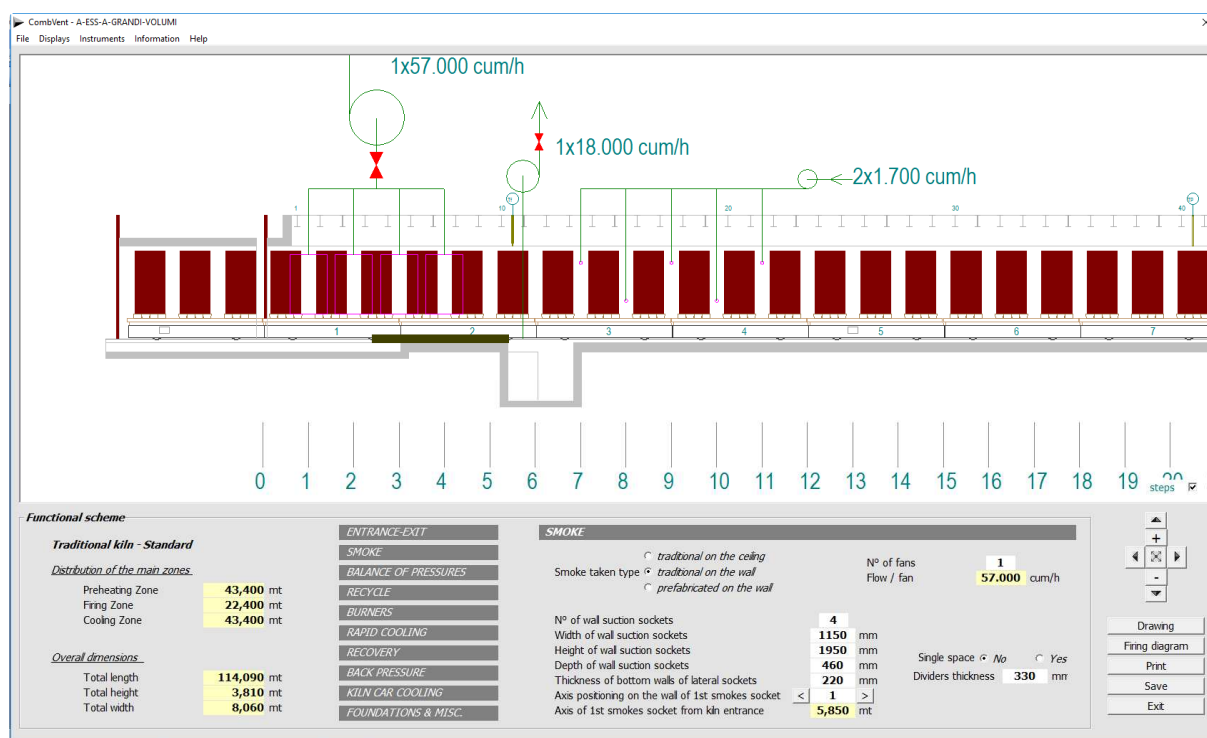


The smokes are sucked through side wall openings and conveyed to the upper part of the collection chamber. From here, through the openings in the slab of the chamber the fumes arrive in a collection box connected to the suction mouth of the fan.

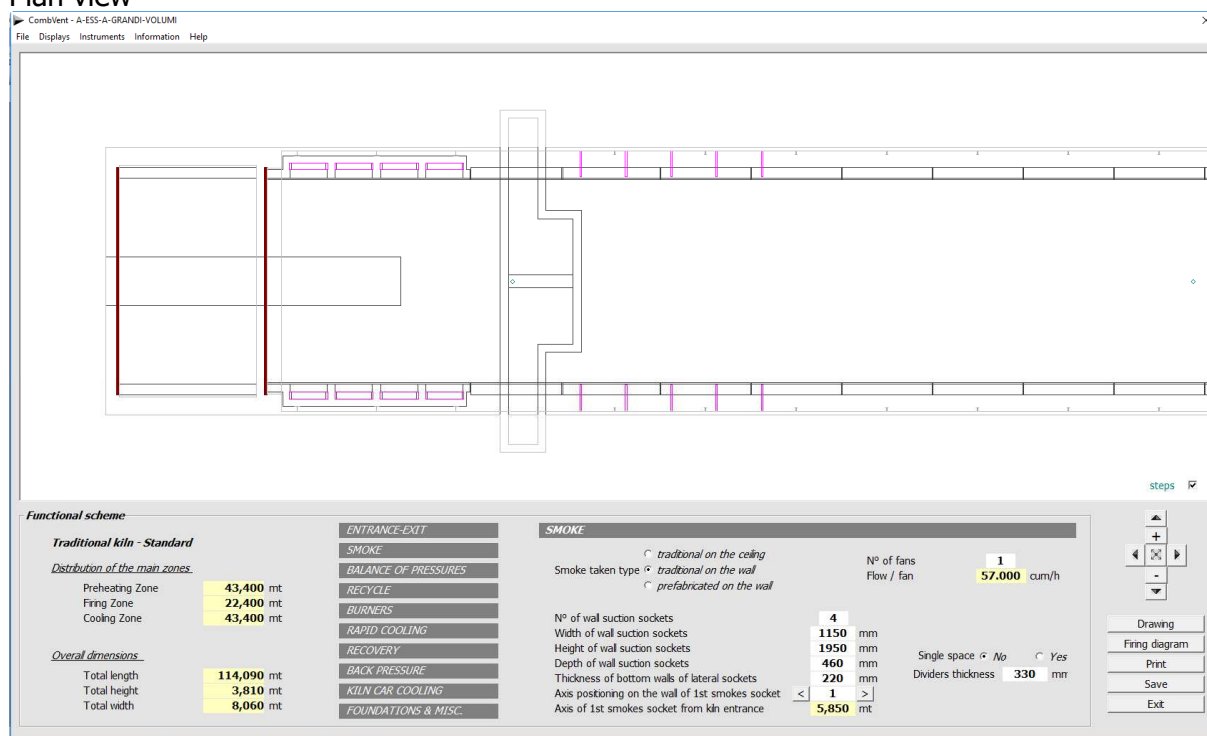
Plan view



Traditional on the wall



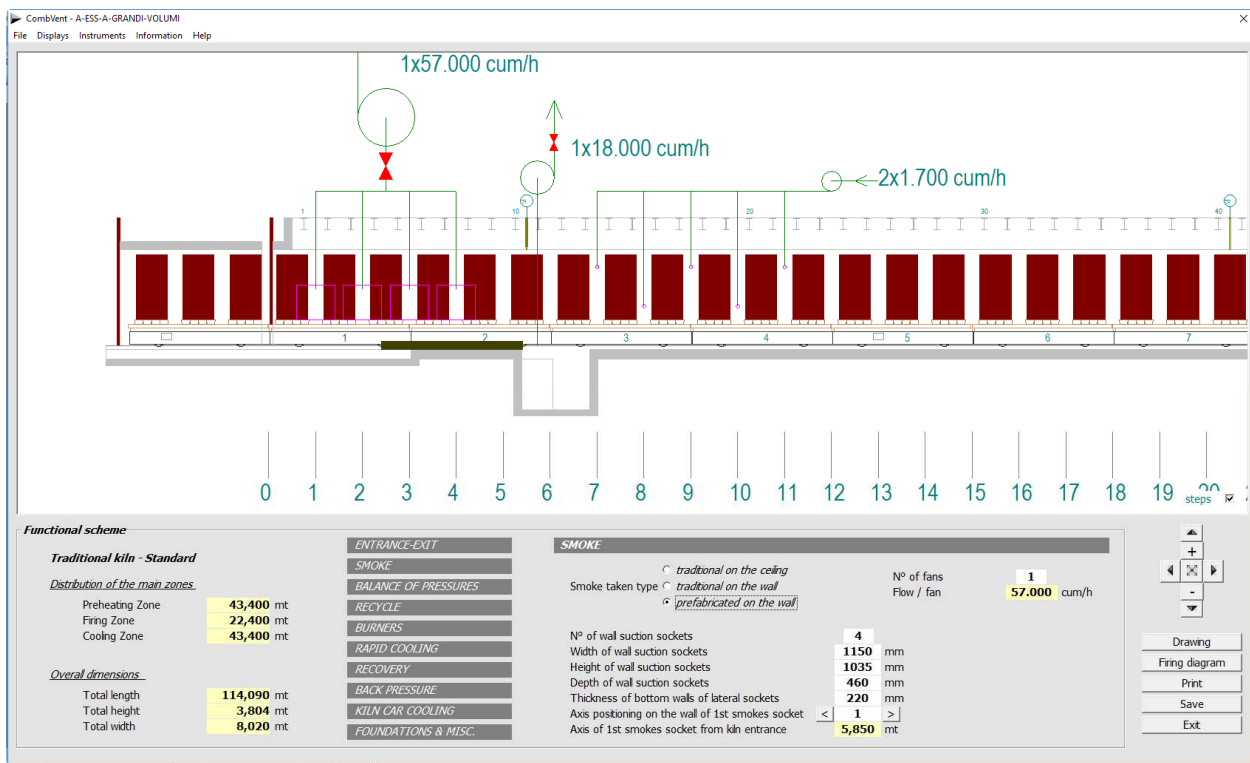
Plan view



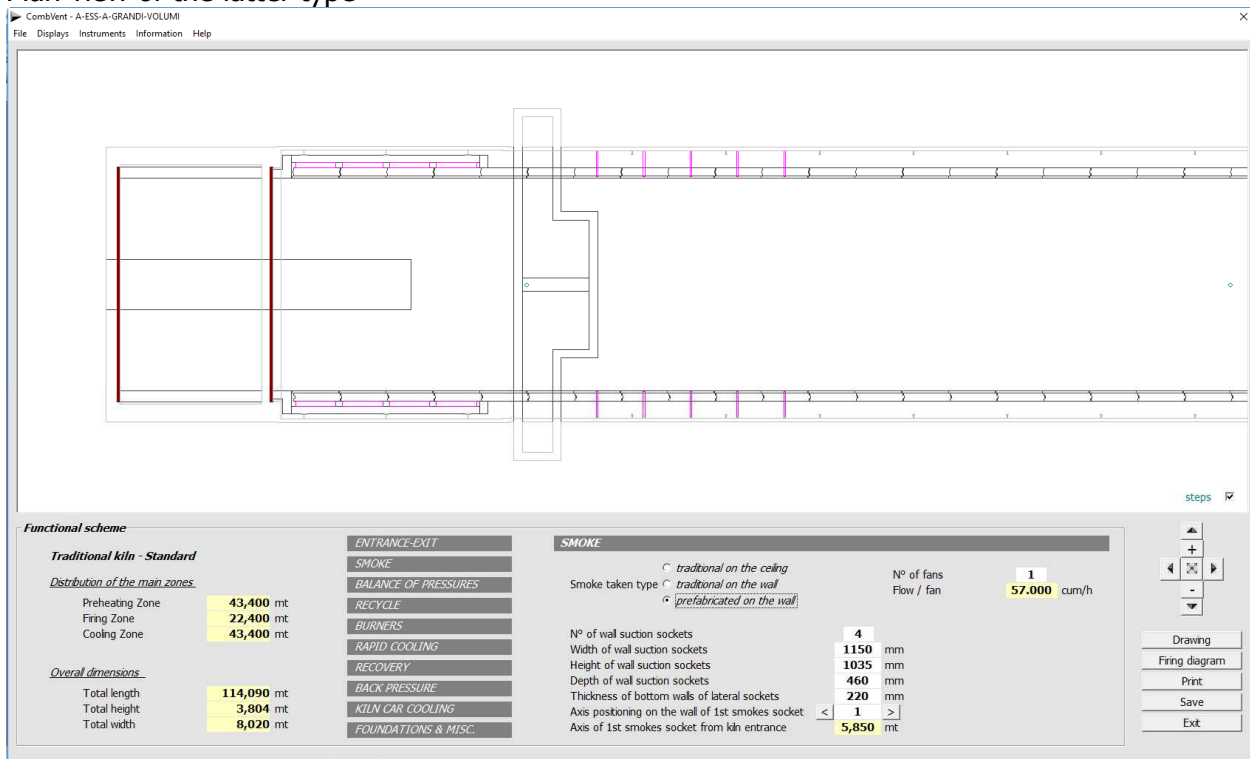
The smokes are sucked through openings in the walls of the tunnel and conveyed laterally into a collection box, generally made of sheet metal, to which the fan suction is connected.

The third type, *Prefabricated on the wall*, does not differ much from the previous one except for the fact that the inside of the tunnel is made of prefabricated panels and not with refractory bricks.

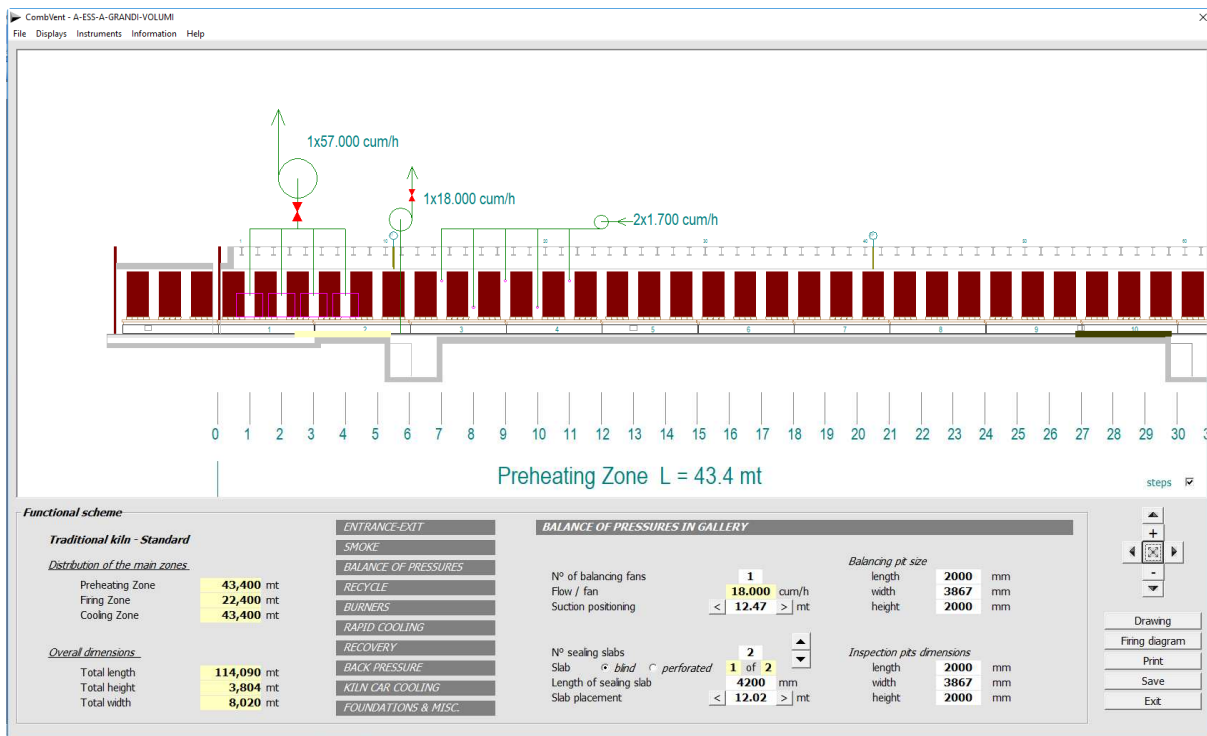
Prefabricated on the wall



Plan view of the latter type



BALANCING PRESSURES IN GALLERY





The function of this device is to make the diagrams of the pressures in the tunnel and the area below the kiln cars as similar as possible. In theory, if the two diagrams were perfectly equal, there would be no parasitic air passage.

This need is felt especially in the preheating area because the depression created by the fan of the fumes is felt more strongly. The balancing therefore reduces the parasitic air passages or warm air passages between the two environments through the kiln car seals and the sandboxes that are never perfect.

The balance is obtained by means of a fan placed near the smoke zone, generally controlled by an inverter, which draws air from the area below the kiln cars. The number of revolutions, and therefore the head generated by the fan, is controlled by a pressure probe that reads the difference in static pressure between the two environments mentioned above. The balance is, of course, how much this difference is minimal or even nothing.

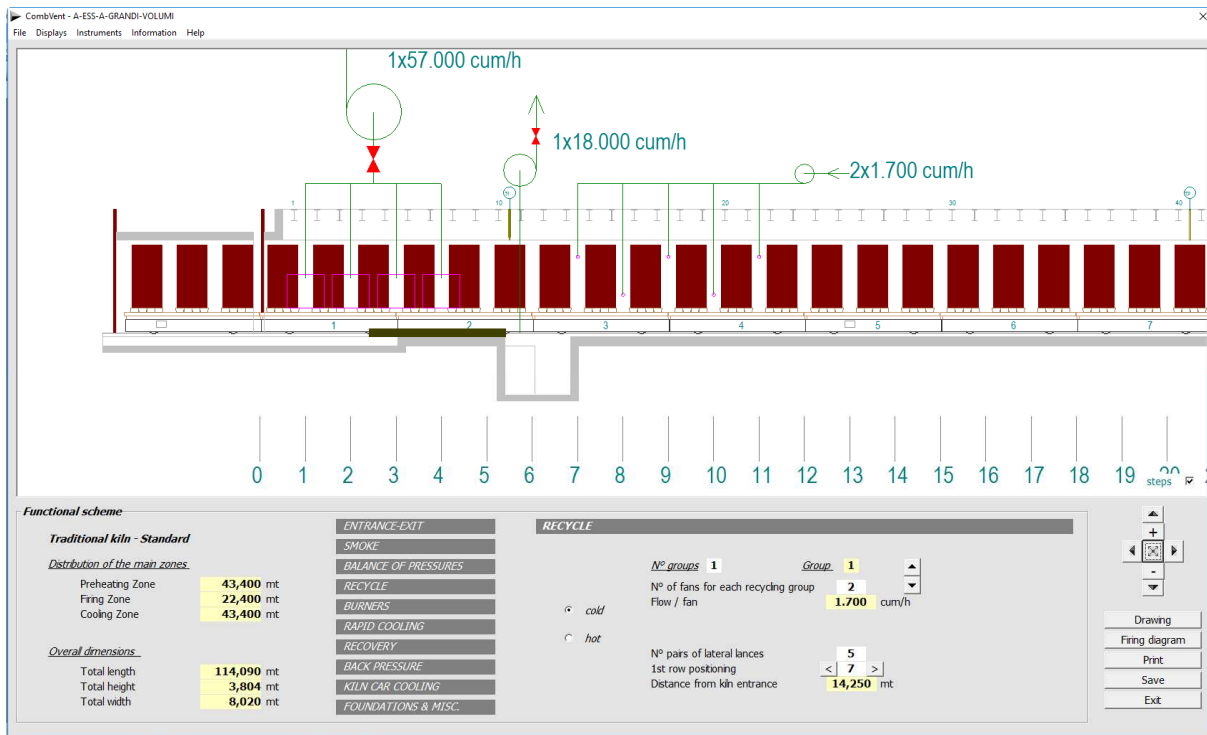
As mentioned previously, the area where the balancing is necessary is the one that goes from the area where the fumes are extracted until about the beginning of the firing zone.

Then, sealing insoles are necessary to circumscribe the area where the action of the fan will be felt. A first slab must be placed before the suction point of the balancing fan and has the function of isolating the area below the kiln cars from the depression created by the fan of the fumes. A second slab is placed at the beginning of the fire zone. Generally this last slab is perforated which makes it possible to vary the pressure losses suffered by the air flow and therefore to vary the pressure trend in the area below the kiln cars in order to get as close as possible to the pressures in the tunnel.

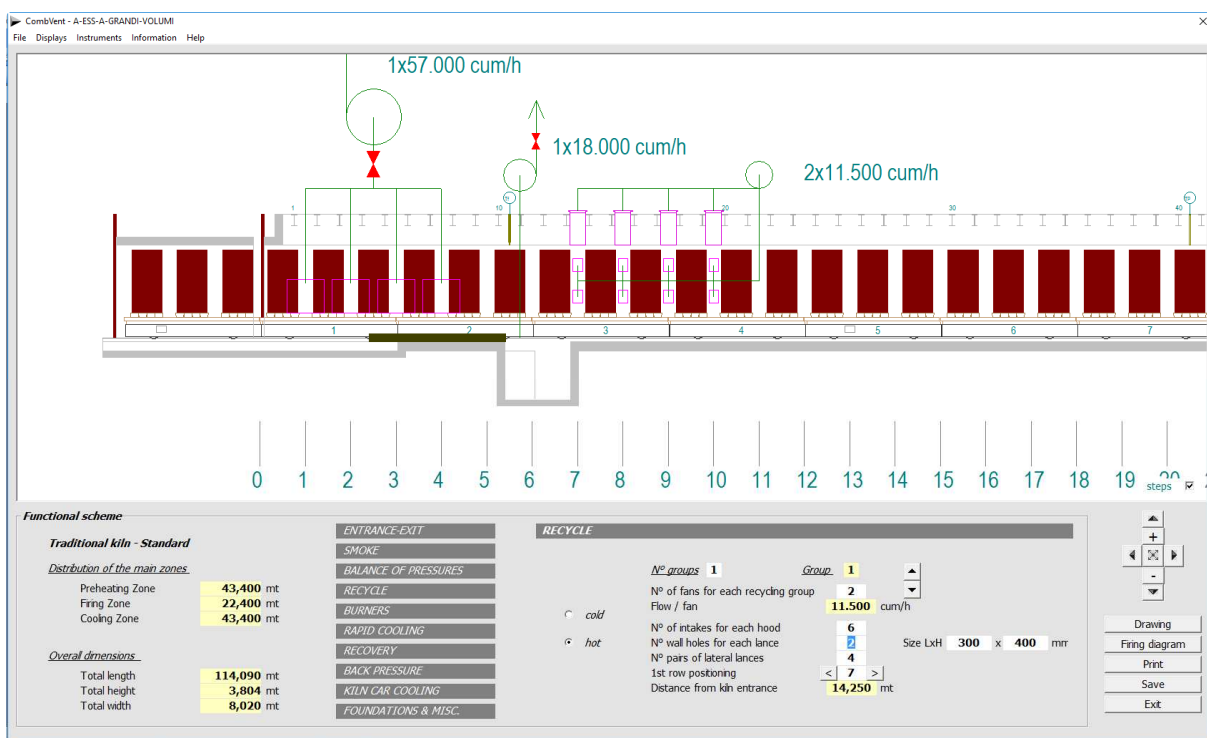
Each sealing slab can be resized and positioned using the commands  .

RECYCLE

There are two types of recycling: *cold* and *hot*.



In reality, cold recycling is not really a recycling as it takes in ambient air and injects it into the tunnel. The operating principle of cold recycling is based on the very high-speed injection of a small amount of ambient air (generally on the two sides of the tunnel with lances offset from each other). This injection causes turbulence in the tunnel section which improves the heat exchange by reducing the temperature difference between the low and the high.

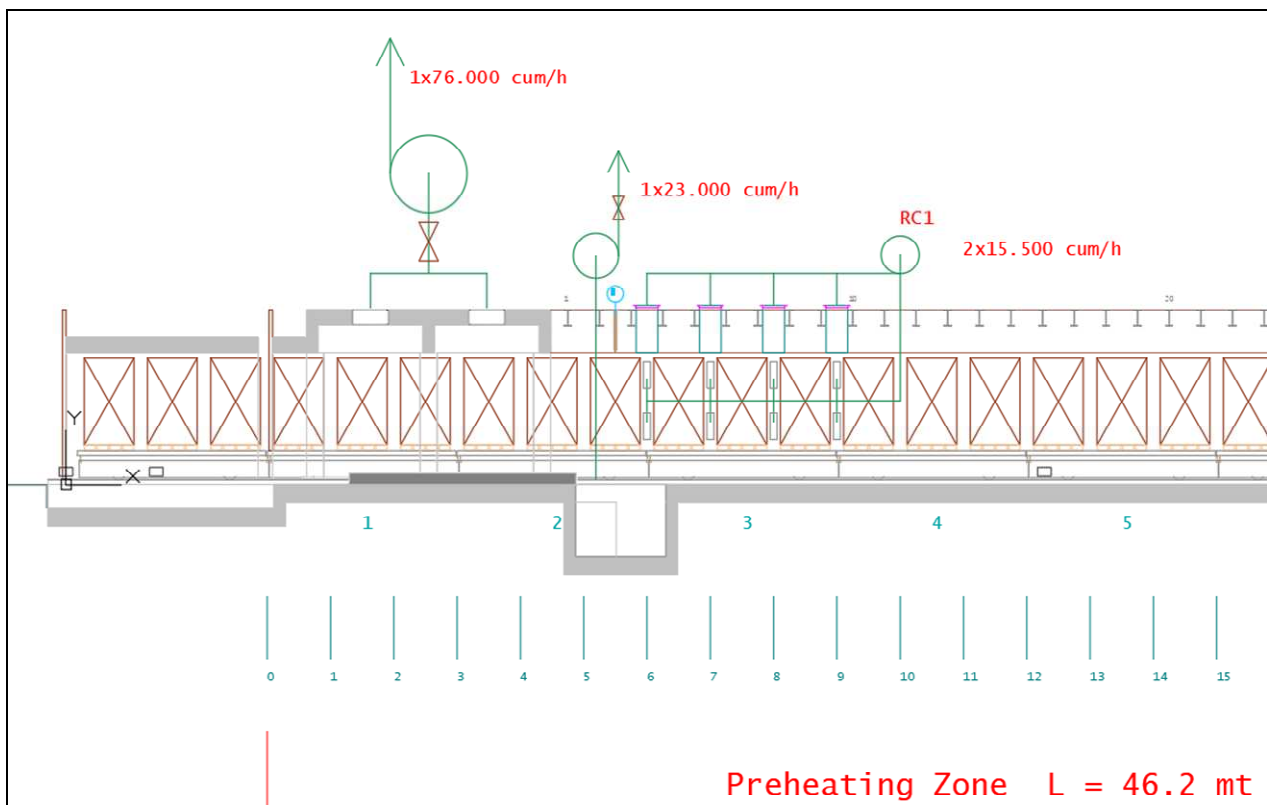


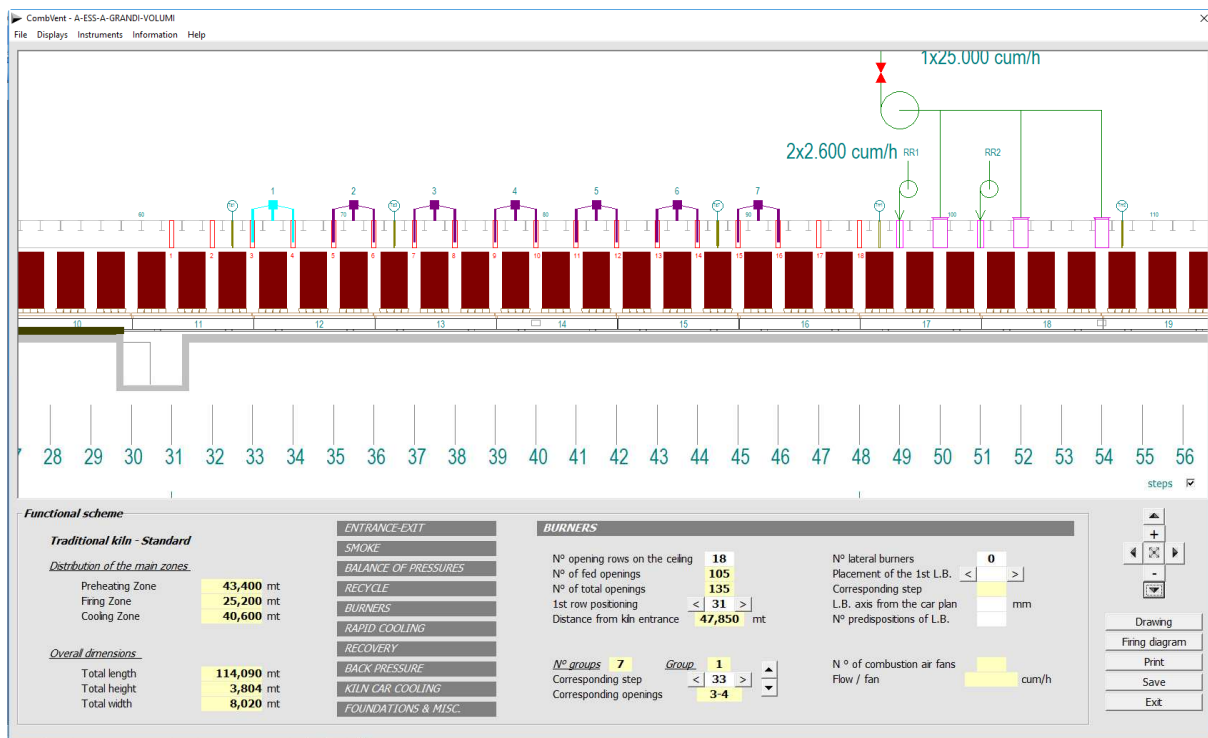
The real recycling is instead the so-called hot that does not introduce air into the kiln but produces only a movement of gas inside the tunnel, sucking, generally from the lower part, and entering the same amount of gas in the upper area.

This movement of gas, in addition to reducing the stratification of the gas flow, determines a reduction in the temperature difference that generally occurs between the lower part and the upper part in this area of the kiln.

In both cases there is the possibility to place the recycling with the commands \leq \geq .

Detail of the kiln and recycling entrance area extracted from the DWG drawing of a functional scheme.





The previous image refers to a combustion system on the ceiling with the addition of some side burners. It is possible to modify the number of rows of openings which entails a variation in the length of the firing zone and a consequent variation in the preheating and cooling zones. It is also possible to change the position of the focus zone by intervening on the positioning of the 1st row of openings (commands **< >**).

N° opening rows on the ceiling **18**
 N° of fed openings **105**
 N° of total openings **135**
 1st row positioning **< 31 >**
 Distance from kiln entrance **47,850 mt**

The combustion groups can be moved all together or individually (commands **< >**). Selecting the first group (by selecting a group it is highlighted in yellow) you can move all the groups at the same time. By selecting a group other than the first one, its movement involves the simultaneous movement of all the other groups to its right.

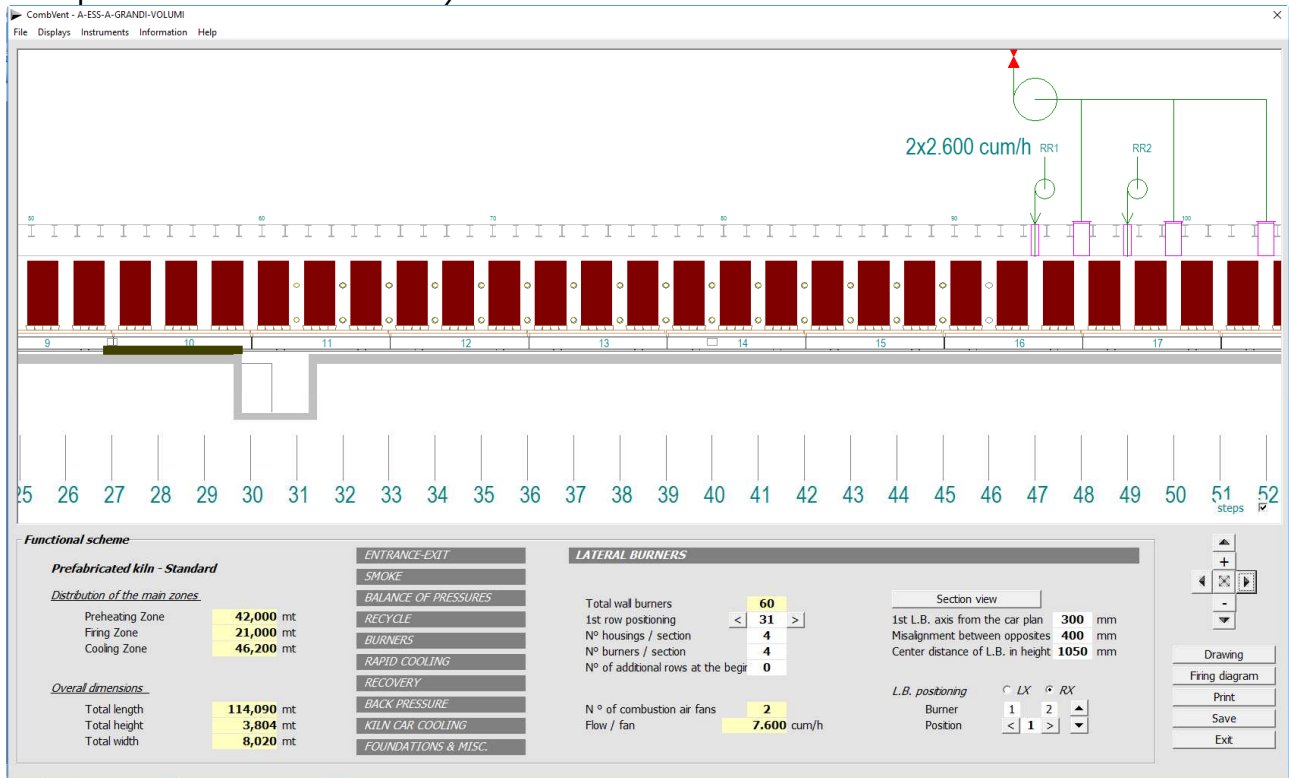
N° groups **7** Group **1**
 Corresponding step **< 33 >**
 Corresponding openings **3-4**

Even the side burners can be moved (commands **< >**).

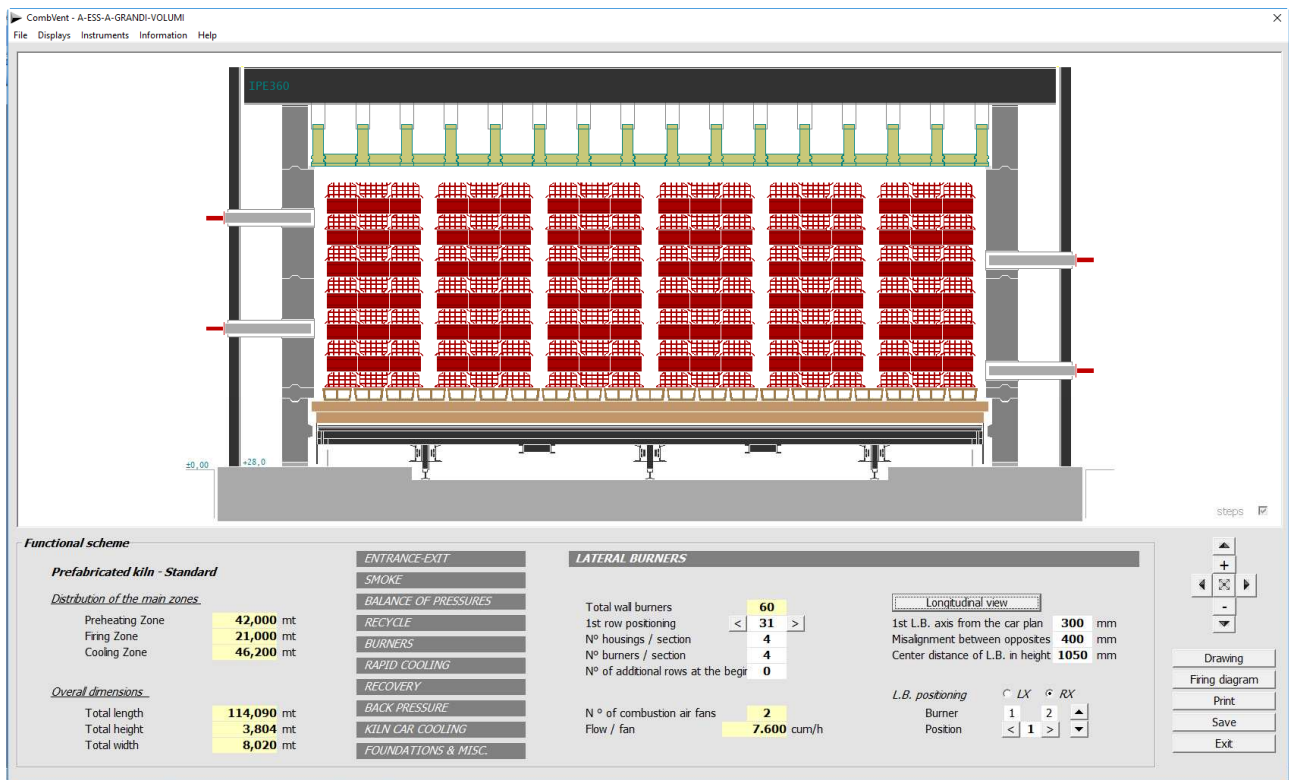
In this case the burners are moved all together. Depending on the arrangement you choose you can have all the burners placed at the bottom or one half at the bottom and the other half at the top, that is, where there is on one side a low burner, on the other side there is a top burner is opposed.

The height positions of each burner in the tunnel section are referred to the plane of the kiln car. In the example the bottom burner axis is placed 350mm from the kiln car level while the upper one is 1500mm.

Example of a *lateral combustion system*



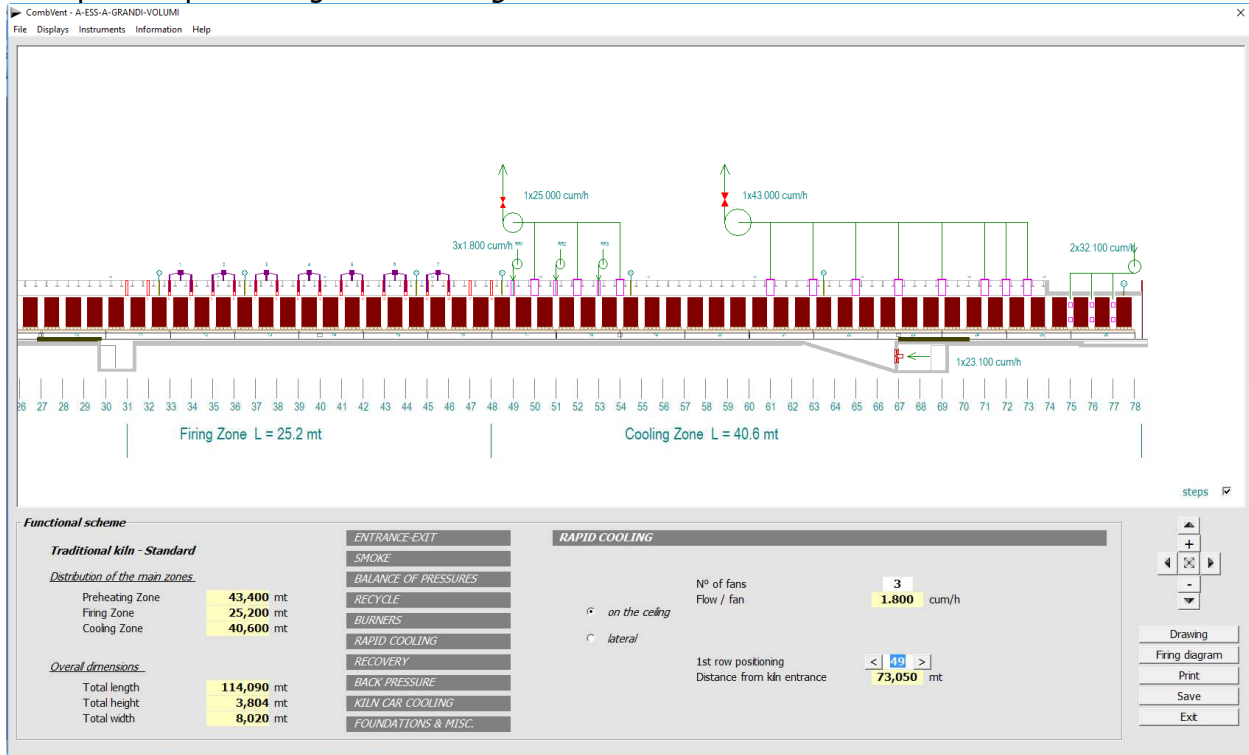
The *Section View* command allows you to view the arrangement of the side burners in the tunnel section of the kiln and, if necessary, make changes to their positioning.



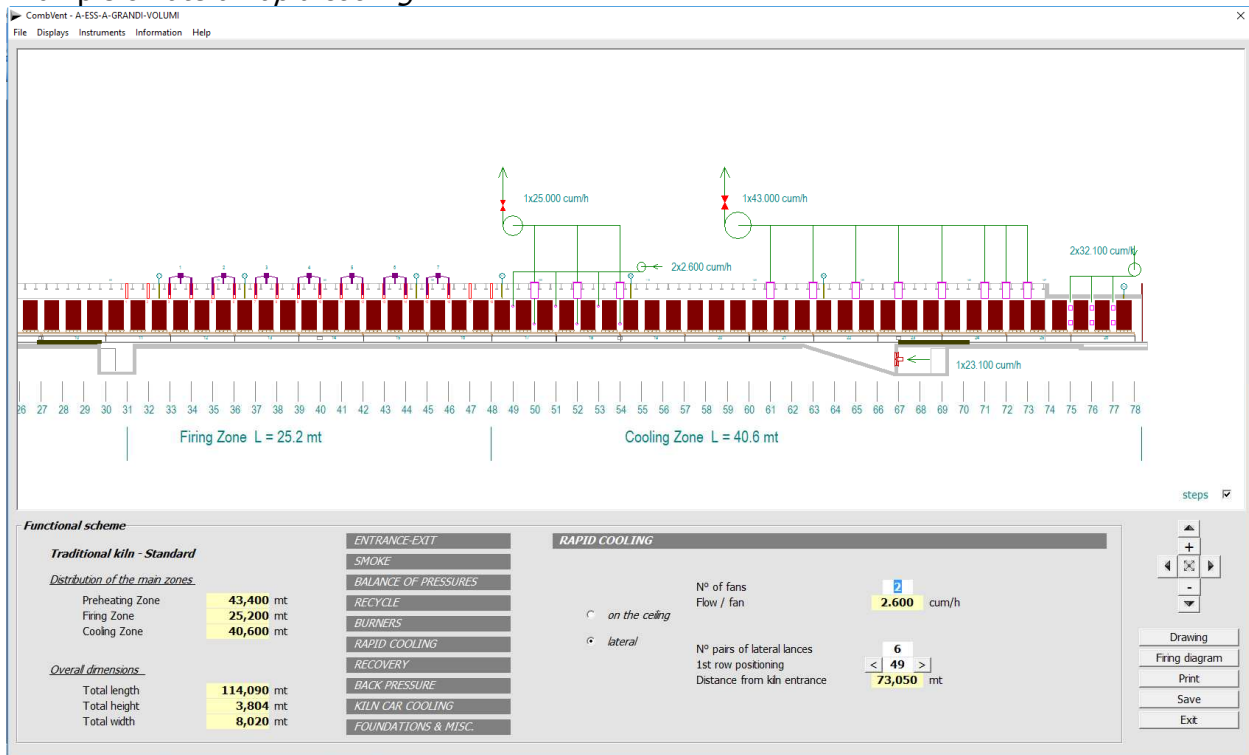
RAPID COOLING

To quickly reduce the temperature at the end of the firing zone and then favor a slow cooling in the quartz processing area, so-called Rapid cooling is used. It consists in blowing in ambient air, in modest quantities but at high speed, inside the tunnel from the ceiling or laterally.

Example of rapid cooling *on the ceiling*.

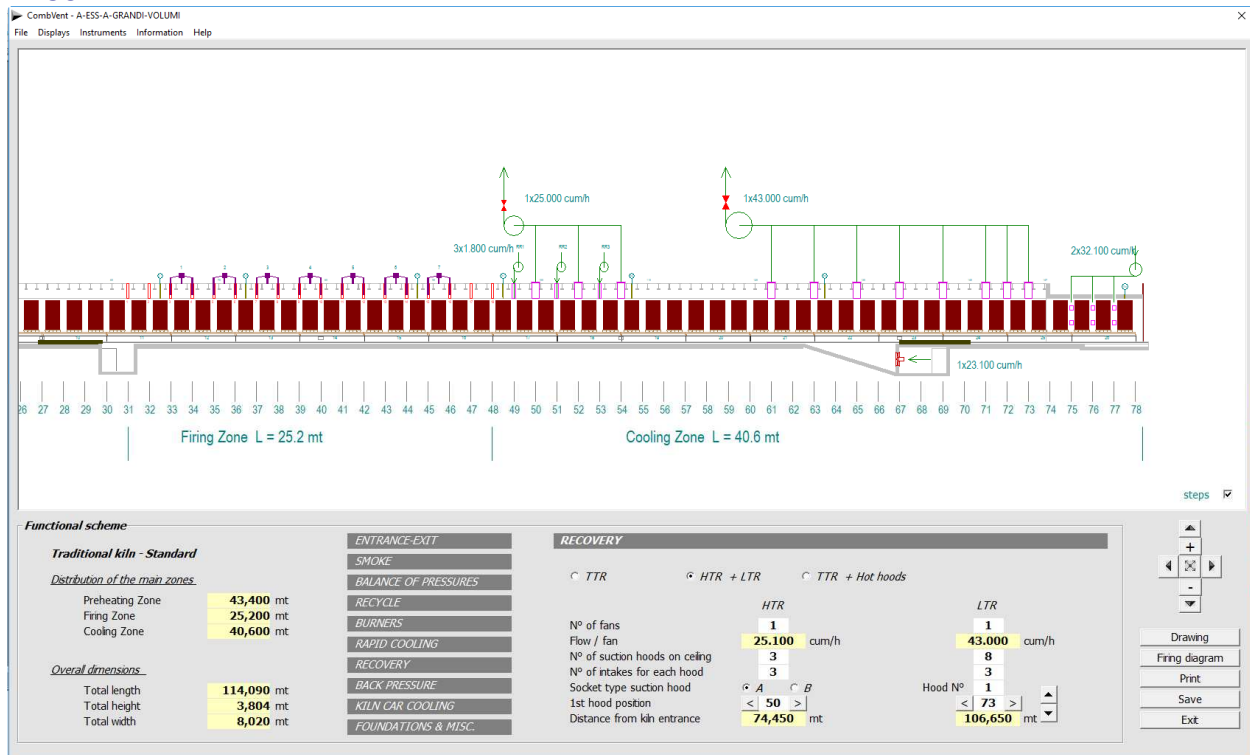


Example of *lateral rapid cooling*.



In both cases there is the possibility to place the groups with the commands < >.

RECOVERY



NOTE: We distinguish two recovery areas: the first immediately after the firing zone called *High Temperature* (HT); the second towards the kiln output called *Low Temperature* (LT).

There are 3 different types of recovery:

- *single TTR in case a single fan only draws from the LT zone;*
- *HTR + LTR in case there is a fan that recovers from the HT area and another fan that recovers from the LT area;*
- *TTR + Hot hoods is a similar case to the previous one with the difference that there is only one fan that aspires from both areas.*

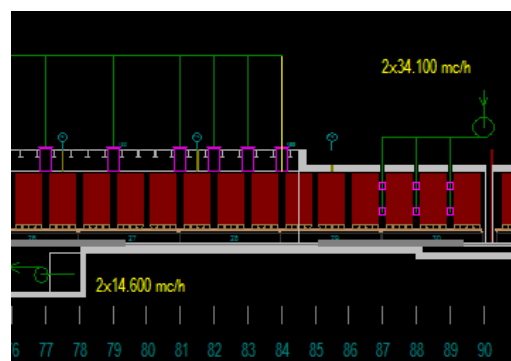
In all cases it is possible to place the recoveries with the commands **<** **>**. Keep in mind, however, that while in the case of *HTR* recovery, the aforementioned commands move the whole group, in the case of recoveries in the *LT* zone it is possible to individually position each socket (hood).

In this case it is sufficient to select the relevant hood (it is highlighted with a different color) and use the commands **<** **>** for moving.

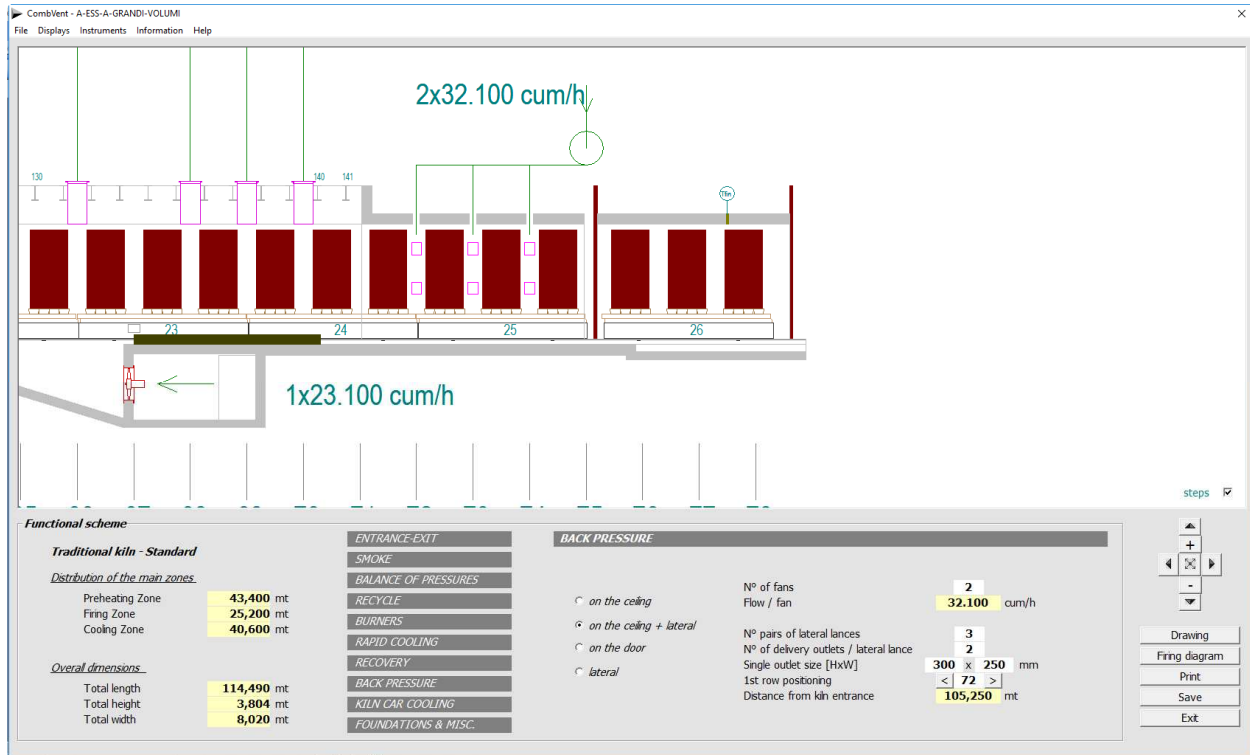
If you want to move, even in this case, the whole *LTR* group is sufficient select the hood number 1 (the first towards the exit of the kiln) and move the group with the commands **<** **>**.

NOTE: for *HT* recovery there are two types of sockets: the first is a rectangular metal hood; the second consists of a refractory opening (same type used in the firing zone).

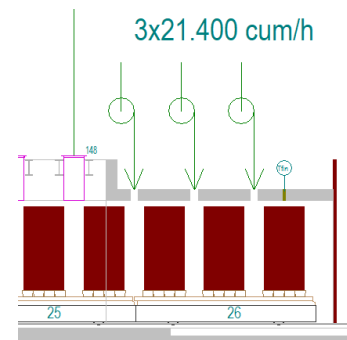
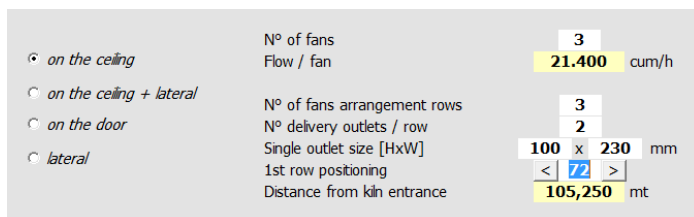
Socket type suction hood ☒ A ☐ B



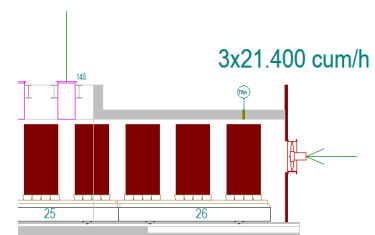
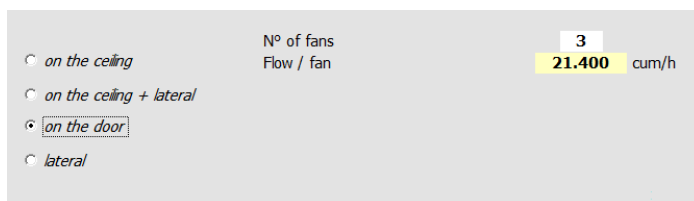
BACK PRESSURE



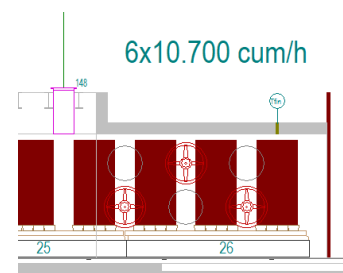
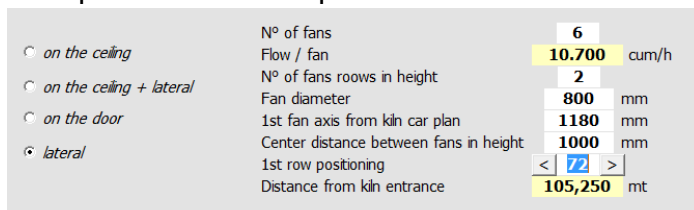
Example of back pressure *on the ceiling*.



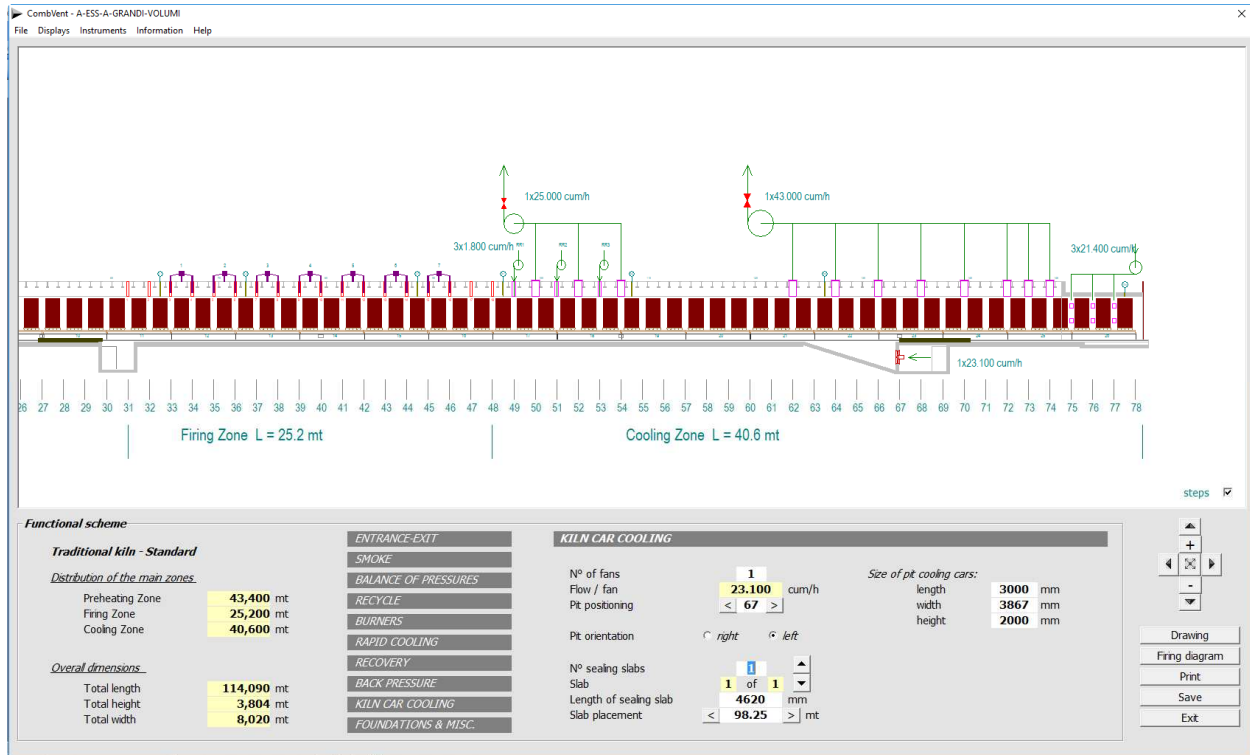
Example of back pressure *on the exit door*.



Example of *lateral* back pressure.



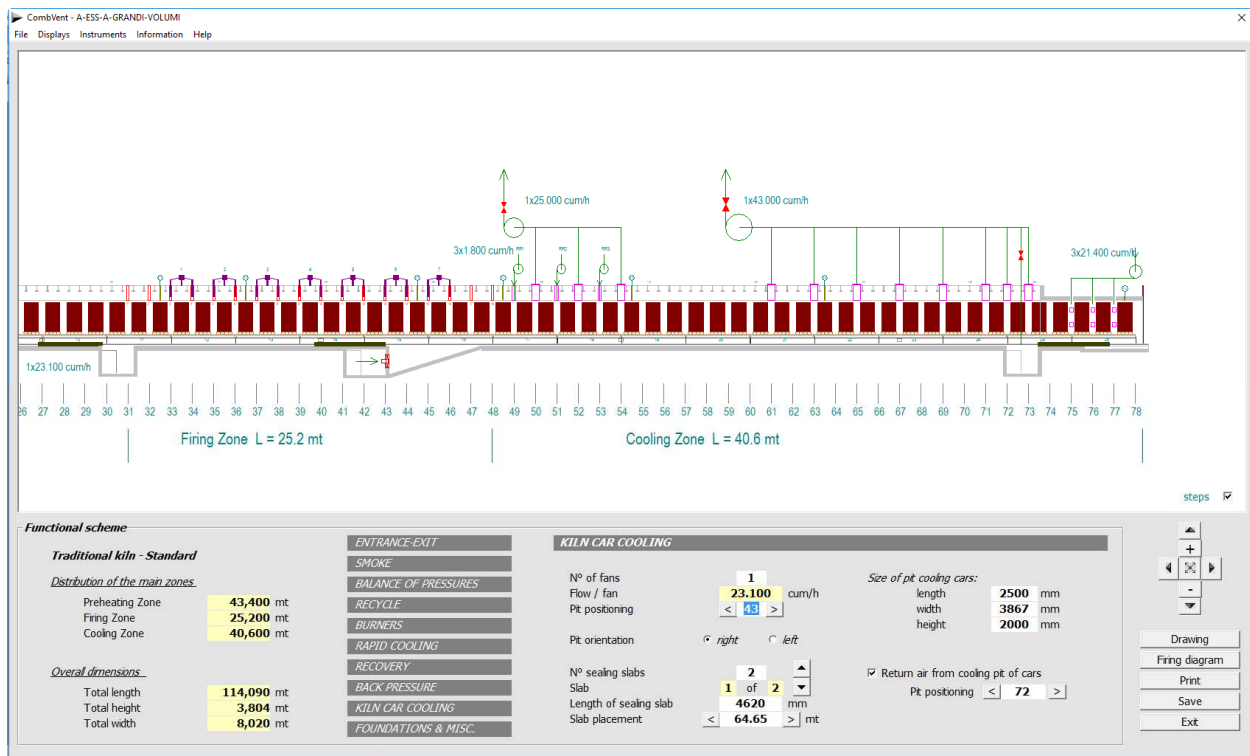
KILN CAR COOLING



The cooling of the carpentry of the kiln cars takes place by means of axial fans, placed in a pit formed under the tunnel of the kiln, which blow ambient air into the area below the kiln cars. The affected area is the one that goes from the end of the firing area and up to about half of the LT recovery area.

The pit above can be oriented in both directions.

Pit orientation ☐ right ☒ left

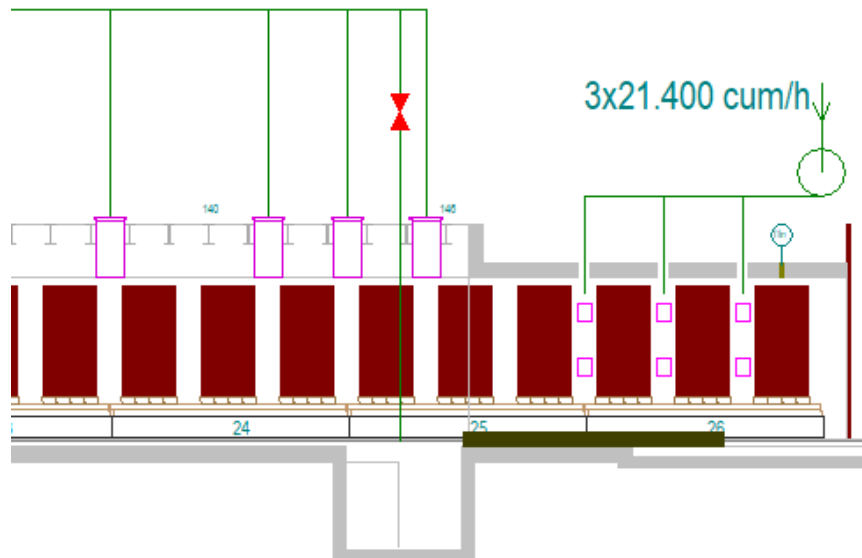


In the case of *right* orientation there is also the possibility of using the cooling air of the kiln cars sending it to the recovery inserting a pit from which it connects to the main recovery channel.

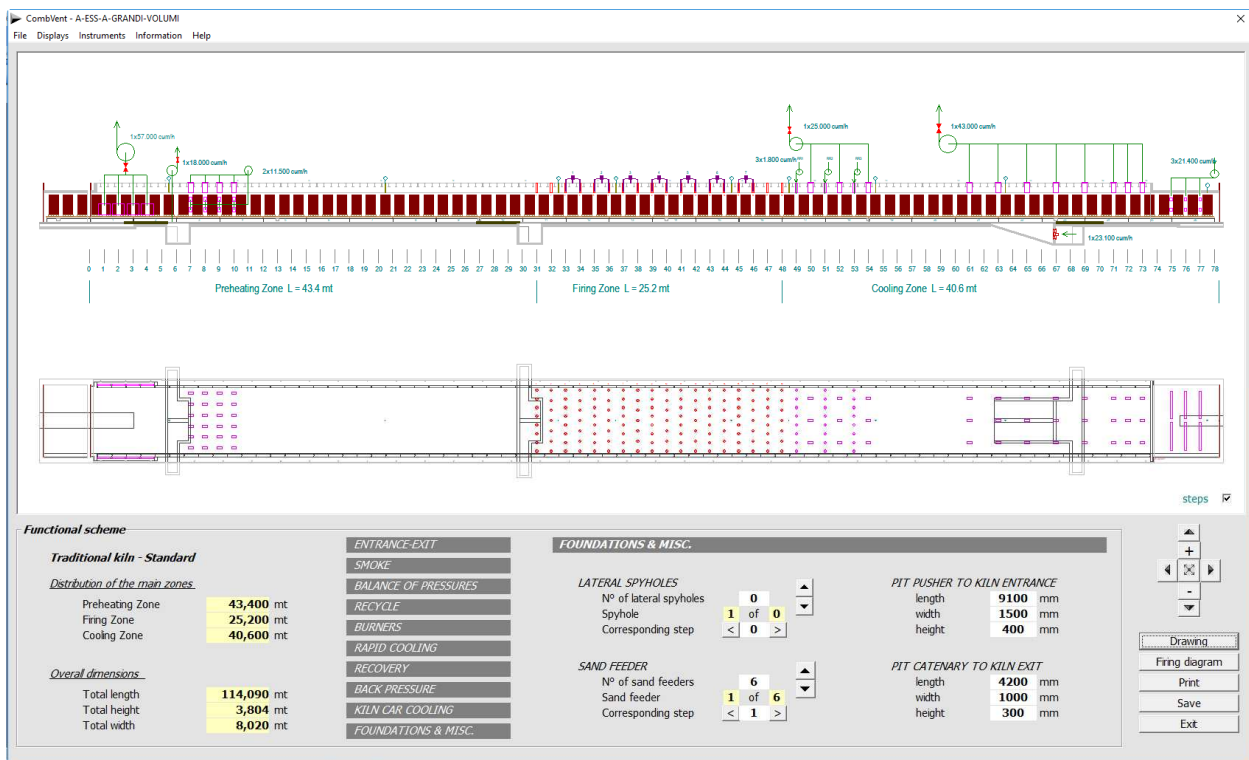
In this case, generally, an adjustment damper is provided to avoid an excessive influence of the recovery depression.

☒ Return air from cooling pit of cars
Pit positioning

Detail of the recovery area of the cooling air of the kiln cars and its entry into the recovery channel.

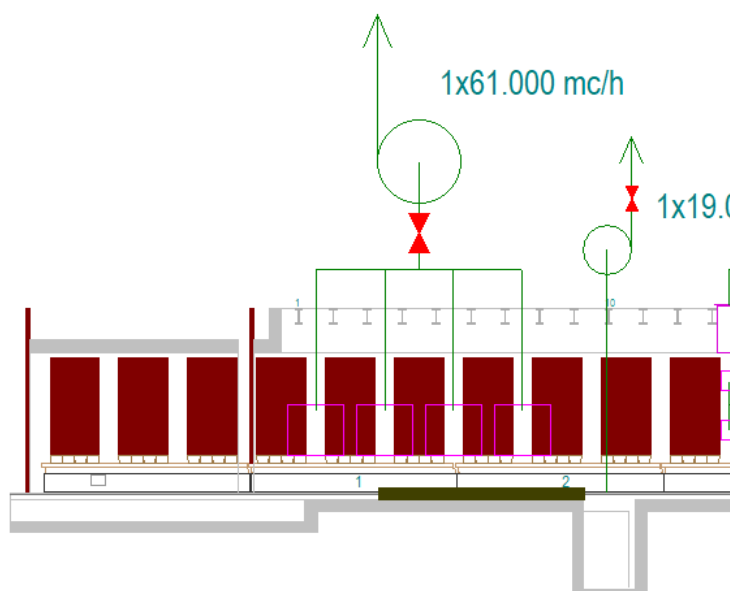


FOUNDATIONS & MISCELLANEOUS



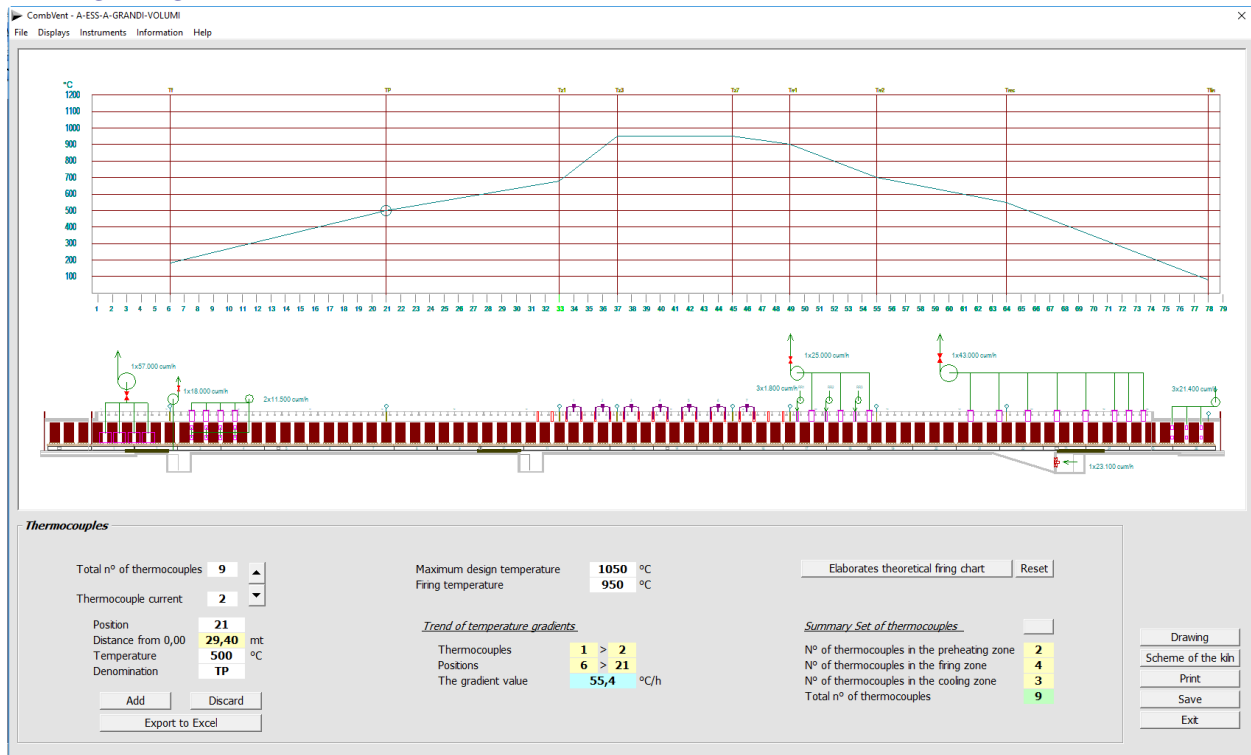
To complete the functional scheme of the kiln with more details, it is possible to insert the side *spyholes* and the *sand seal feeders*. The program proposes by default, according to the tunnel length, a certain number for the sand seal feeders.

It is also envisaged to indicate the dimensions of the pits of the entrance pusher and, if envisaged, of the pusher at the exit.



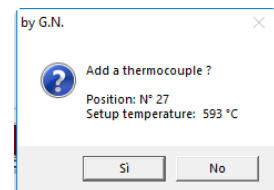
Detail of the entrance area kiln with pusher pit.

FIRING DIAGRAM

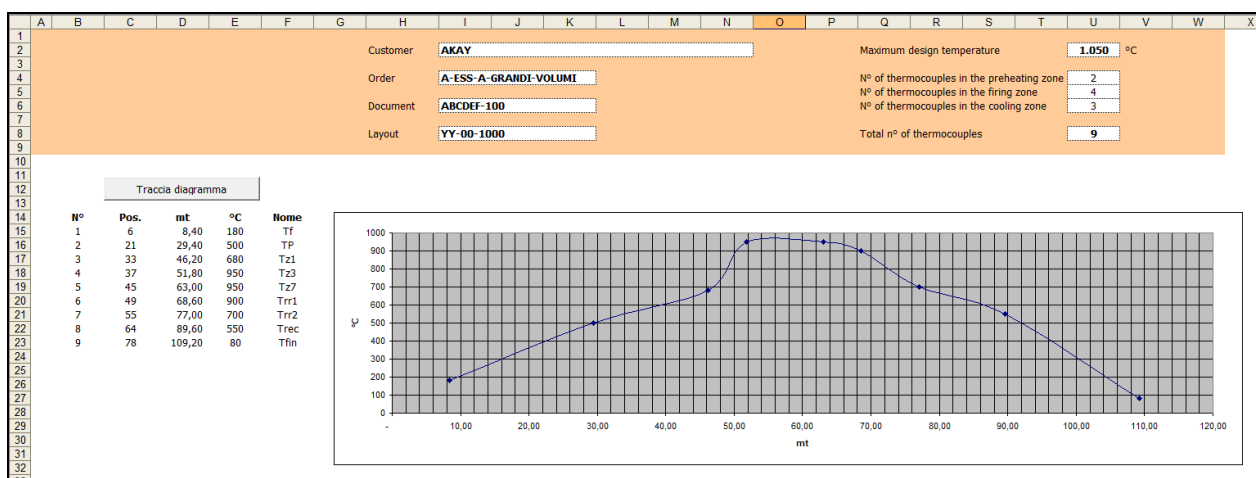


The *Elaborates theoretical firing chart* command allows you to define a firing curve that the program defines based on the final layout of the kiln. Subsequently, this curve can be customized as desired.

NOTE: by double clicking on a point in the area of the diagram, a thermocouple can be inserted automatically. Following the double click, a message appears as shown in the figure.



The *Export to Excel* command allows you to have the firing curve on an Excel sheet, as shown in the example below.



The *Drawing* command allows to obtain a drawing in DWG format and a 1: 1 scale of the functional scheme of the kiln and of the relative firing diagram.

Example of drawing in DWG format of the *functional scheme* of the kiln.



Example of printing of the same functional scheme.

Ing. Gennaro Nasuti
gn@supertecweb.com

Customer : AKAY
Order : A-ESS-A-GRANDI-VOLUMI
KILN FUNCTIONAL SCHEME

The diagram illustrates the functional scheme of a kiln system. It includes a temperature profile graph at the top, showing temperature (°C) on the y-axis (100 to 1200) and distance (m) on the x-axis (0 to 79). The profile shows a heating phase from 0 to 25m, a preheating phase from 25 to 43.4m, a firing phase from 43.4 to 55.2m, and a cooling phase from 55.2 to 79m. Below the graph, a detailed cross-section of the kiln is shown, with various components labeled, including fans, burners, and structural elements. The diagram also includes a table of installed fans and a specific consumption value.

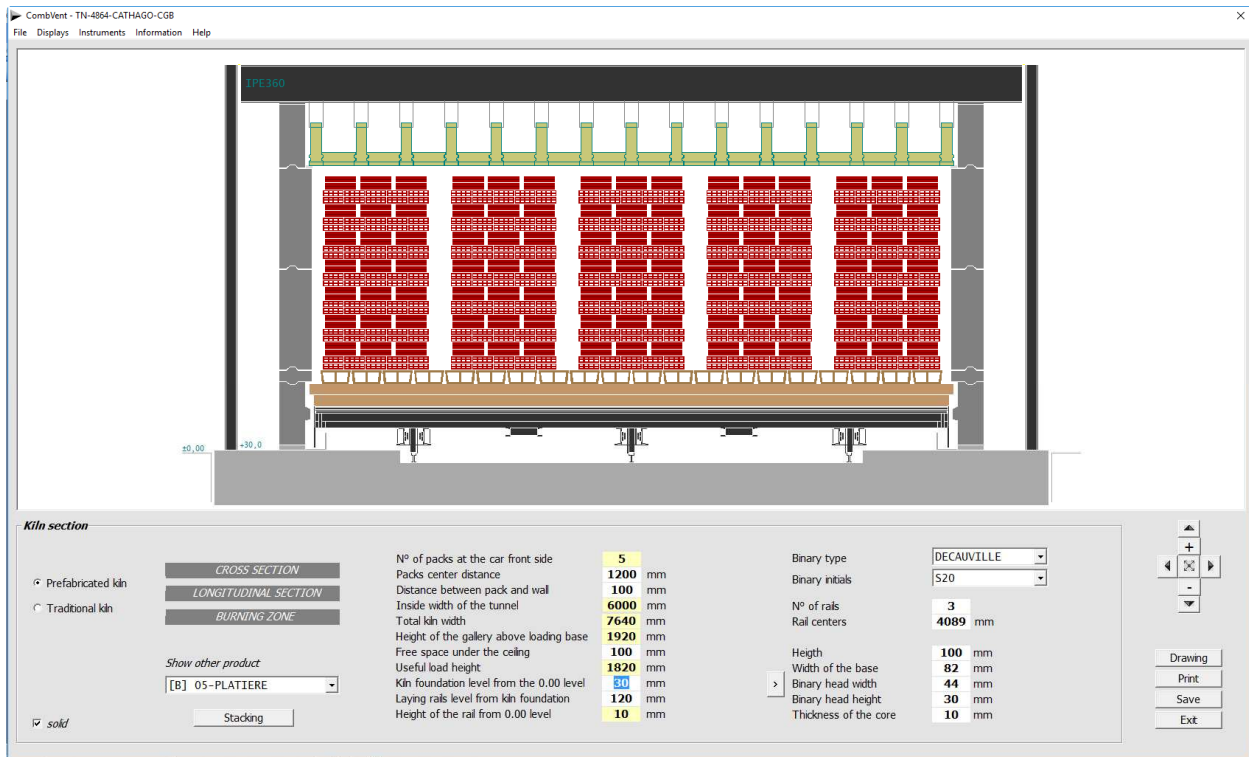
Using	Flow mc/h	Tes °C	Prev. mmH2O	Flow mc/h	Revol. n°	Press. mbar	Press. kPa	Press. kPa	Press. kPa	Type	Motor kW
Smoke extraction	25,000	120	120	25,000	0.100	25.0	2.5	2.5	2.5	Centrifugal	37 kW
Warm recirculation of preheating	25,000	230	120	25,000	0.100	25.0	2.5	2.5	2.5	Centrifugal	37 kW
Rapid cooling	25,000	230	120	25,000	0.100	25.0	2.5	2.5	2.5	Centrifugal	37 kW
Low temperature recovery	25,000	230	120	25,000	0.100	25.0	2.5	2.5	2.5	Centrifugal	37 kW
Top temperature recovery	25,000	230	120	25,000	0.100	25.0	2.5	2.5	2.5	Centrifugal	37 kW
Kiln cars cooling	25,000	230	120	25,000	0.100	25.0	2.5	2.5	2.5	Centrifugal	37 kW

Specific consumption 7.2 kcal/ton

Section 3.4.2 – KILN → Graphics → Section



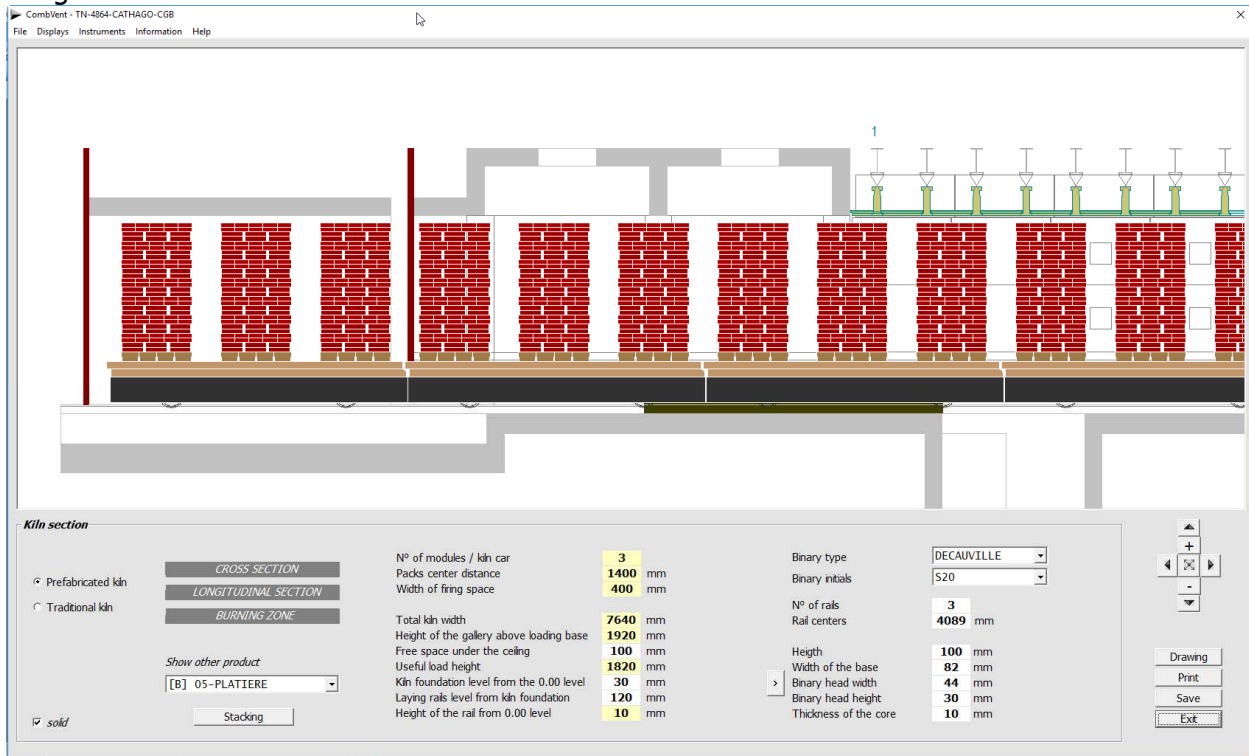
Completion of the detailed definition of the tunnel kiln section



This Section, already starting completely defined by the program, allows you to make the changes you want to all those values present in the boxes with a white background and concerning the section of the gallery.

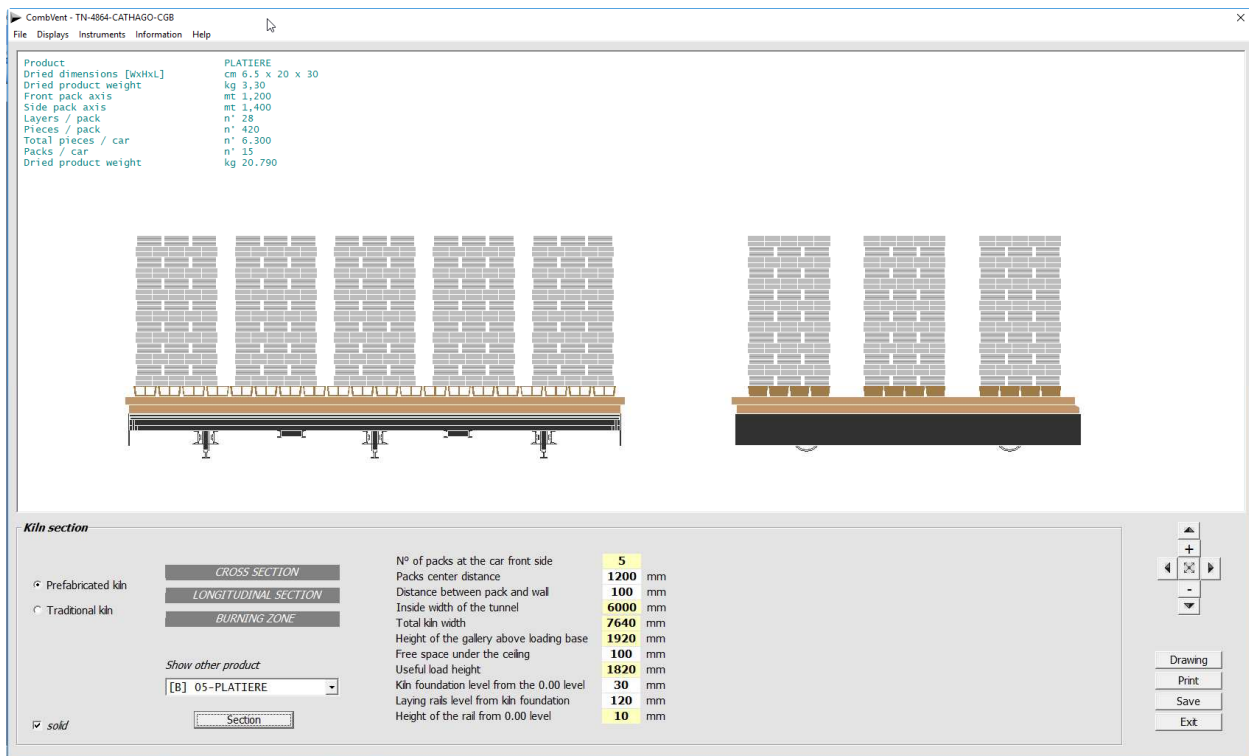
NOTE: Modifications to the tunnel kiln are allowed only if the *Base Product* is displayed.

Longitudinal view

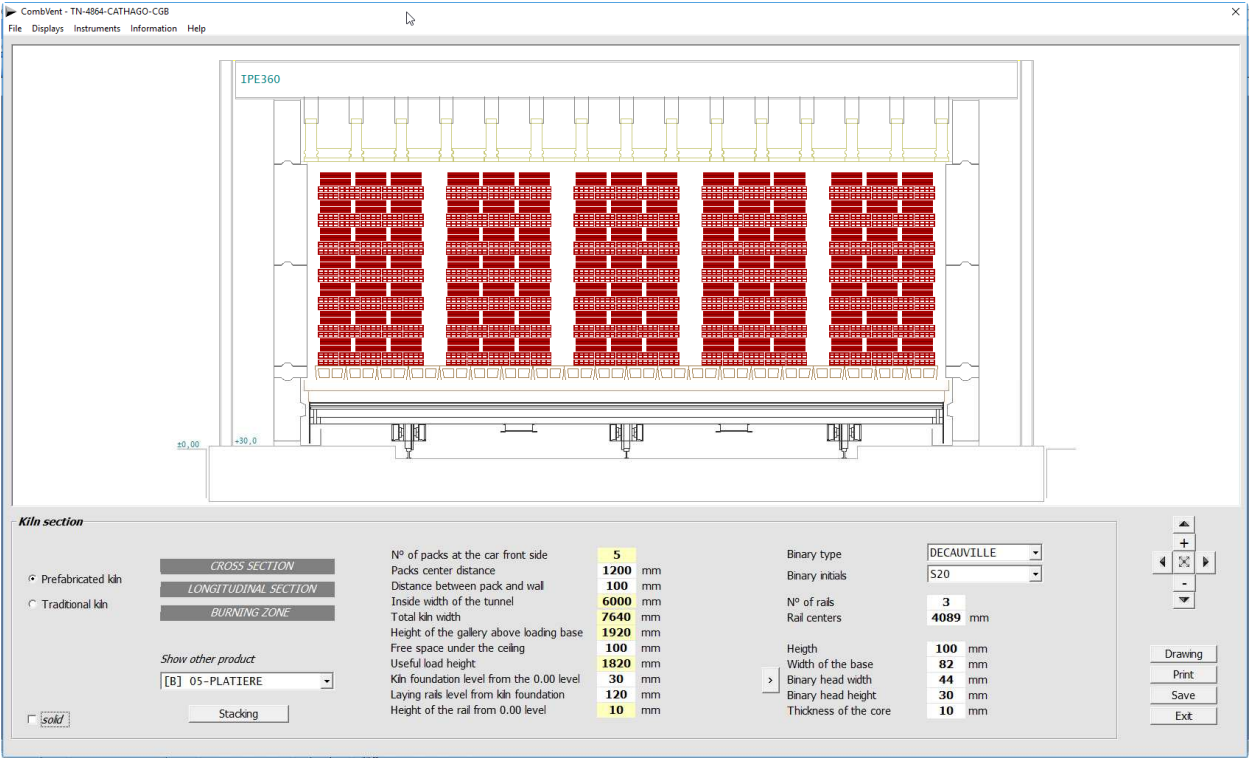


NOTE: In general all input boxes have a *white* background. The boxes with a *yellow* background are read only.

The *Stacking* command displays the following screen showing the two views of the dry material charged on the kiln car and related data.



NOTE: in many graphic windows there is the *solid* option that allows you to view a more engaging graphic. In the current example, disabling this option results in the following figure.

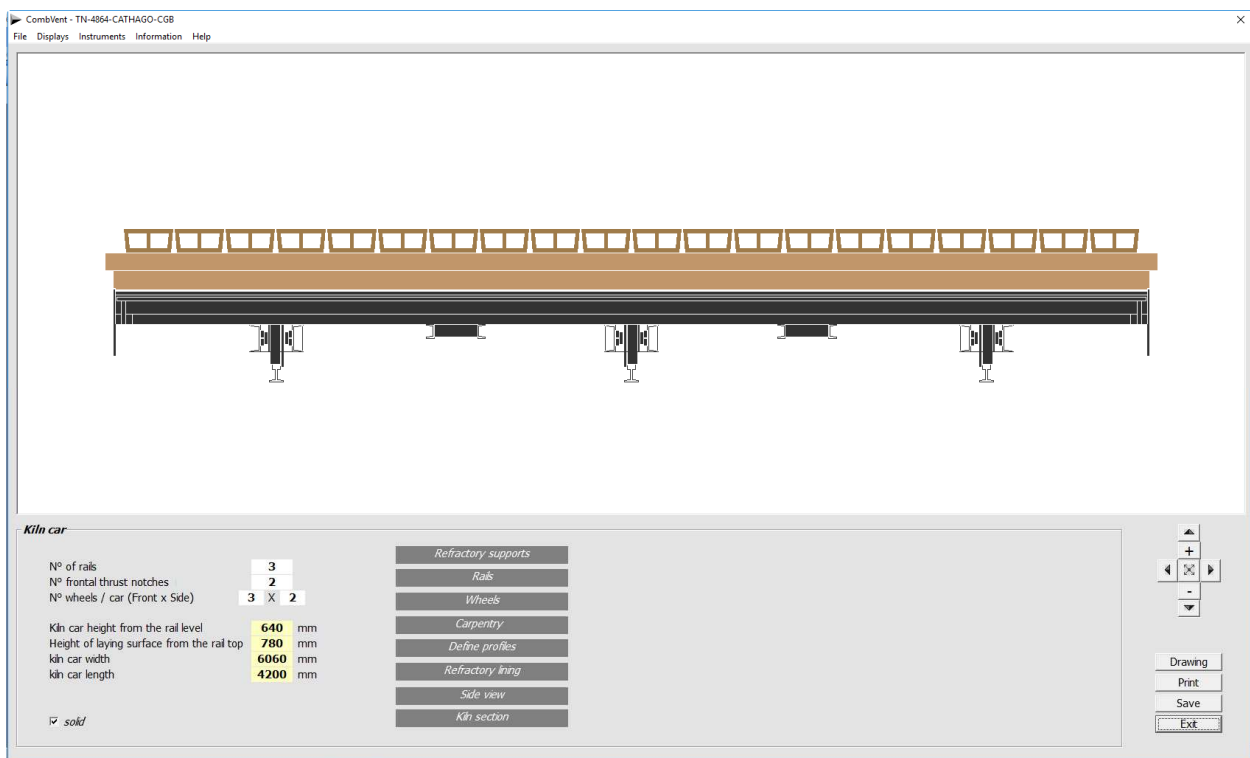


Section 3.4.3 – KILN → Graphics → Kiln Car



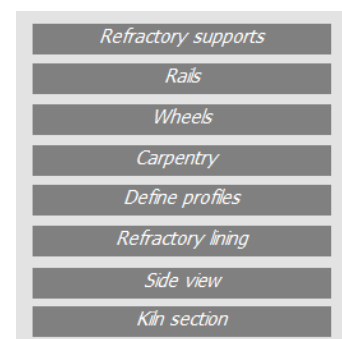
Completion of the definition in detail of the kiln car both as regards the metallic carpentry and the wheels both for the refractory lining and eventual lightening

Home screen



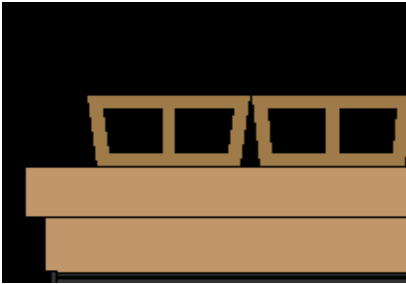
Even this Section is already completely defined by the program.

Through the present menu you can make all the changes you want and customize the kiln car to the maximum, both as *carpentry* and as *refractory lining*.

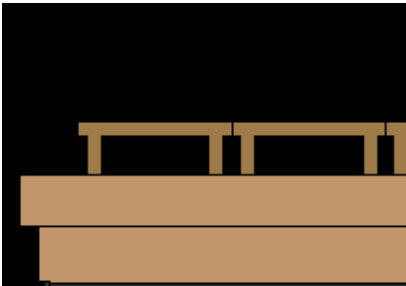


REFRACTORY SUPPORTS

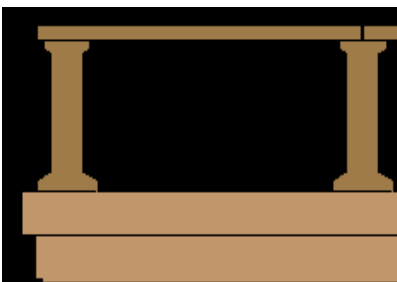
There are 4 different types of refractory supports:



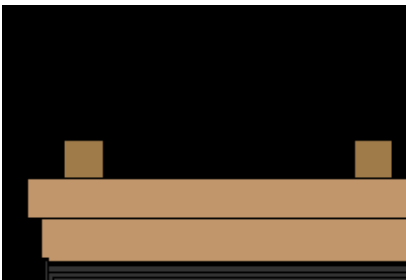
- Closed holed block



- Opened holed block



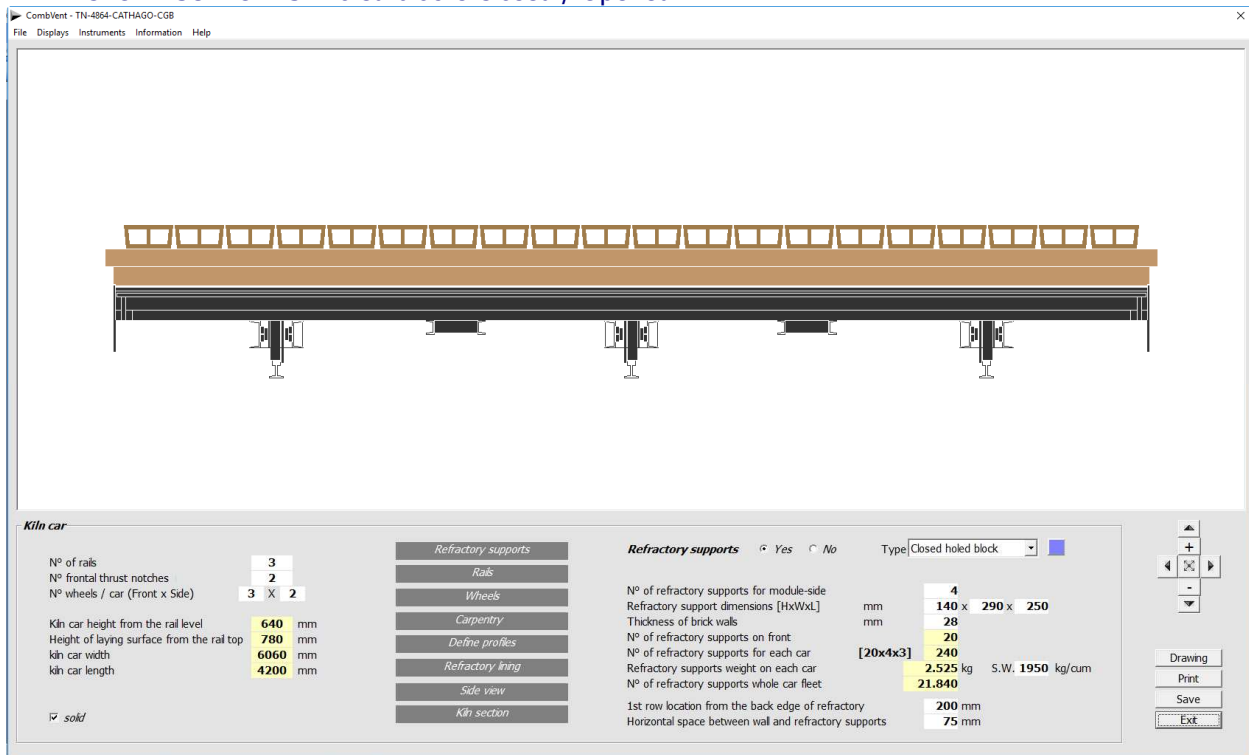
- Small pillars and plates



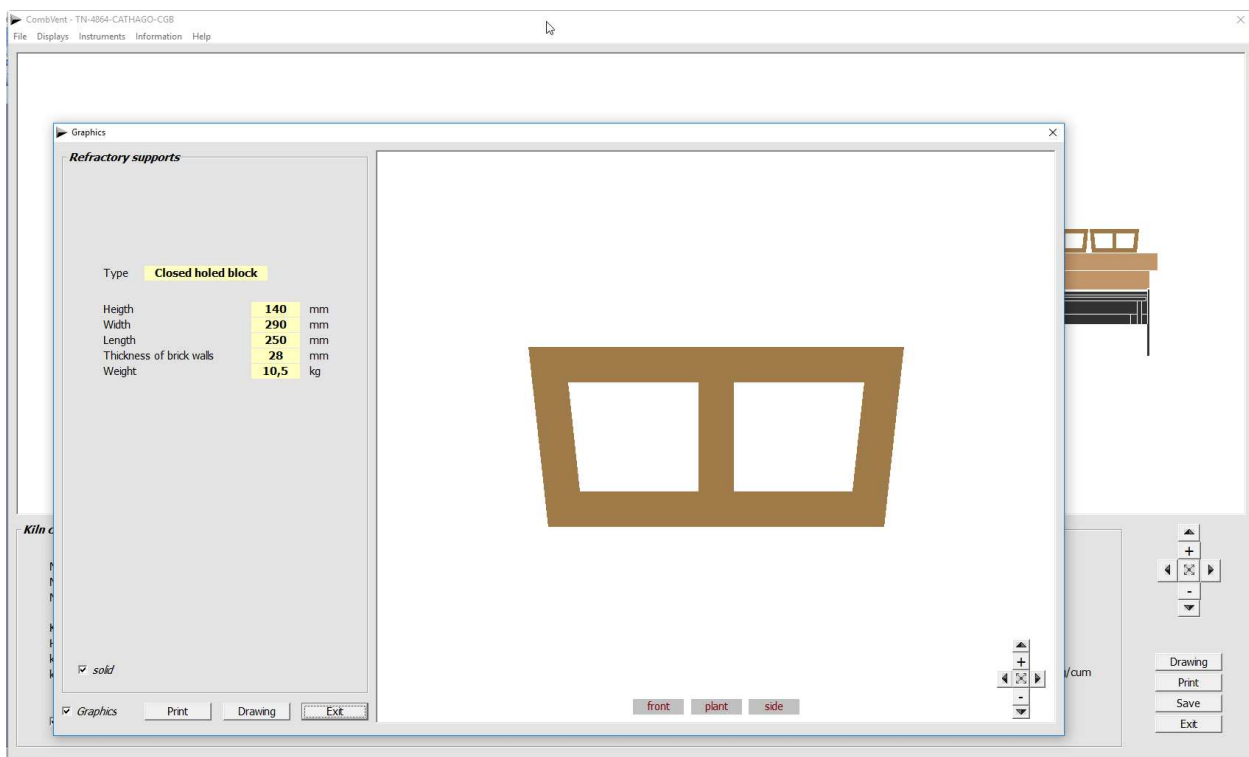
- Joists

The refractory supports most commonly used are the *holed blocks*. The *pillars* and *plates* are used where the charge is low and requires a large passage of gas to the 'foot' of the package. The latter are almost always used in single-layer kilns. The *joists* are generally used to support refractory cassettes (U-cassettes and H-cassettes).

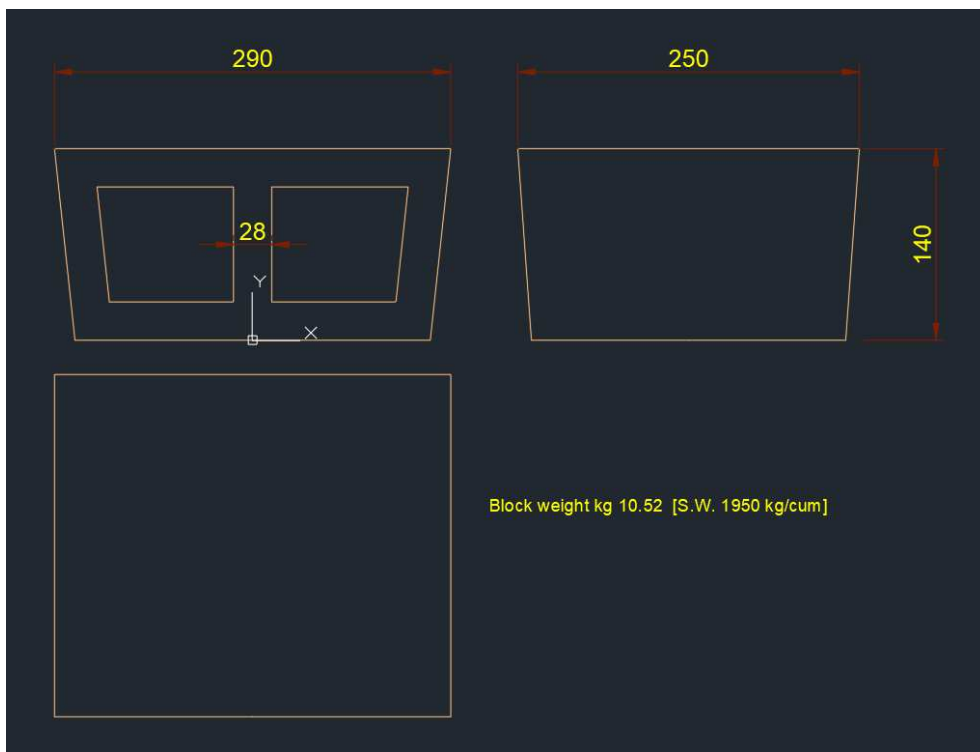
REFRACTORY SUPPORTS: Holed blocks Closed / Opened



The button in the figure on the right shows the window that follows where the dimensions and weight of the refractory support are shown. From here, moreover, it is possible to obtain a *print* or *drawing* in DWG format and 1: 1 scale with its orthogonal views.



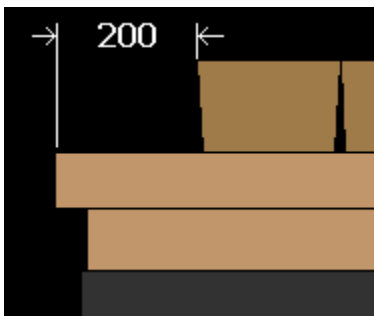
Example of drawing in DWG format and 1: 1 scale of a closed holed block.



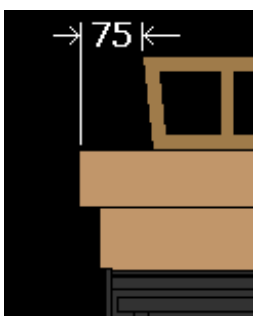
The positions of the holed blocks plane can also be changed with respect to the perimeter refractory bead.

1st row location from the back edge of refractory
Horizontal space between wall and refractory supports

200 mm
75 mm



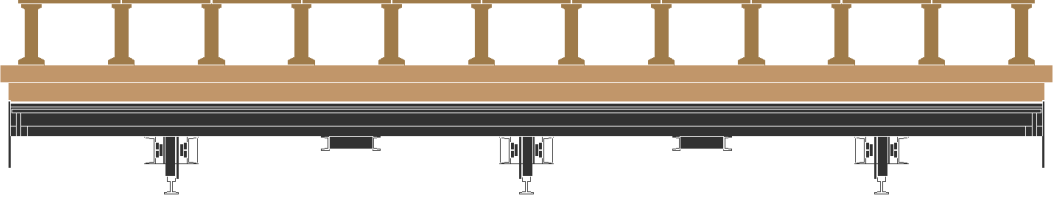
Rear positioning



Front positioning

REFRACTORY SUPPORTS: Small pillars and plates

CombVent - TN-4864-CATHAGO-CGB
File Displays Instruments Information Help



Kiln car

N° of rails: 3
N° frontal thrust notches: 2
N° wheels / car (Front x Side): 3 x 2

Kiln car height from the rail level: 640 mm
Height of laying surface from the rail top: 780 mm
Kiln car width: 6060 mm
Kiln car length: 4200 mm

☒ solid

Refractory supports

- Refractory supports
- Rails
- Wheels
- Carpentry
- Define profiles
- Refractory lining
- Side view
- Kiln section

Refractory supports ☒ Yes ☐ No Type: Small pillars and plates

One floor plates ☐ No ☒ Yes

N° small pillars / module [Front x Side]: 12 x 12
Pillar dimensions [H x W x L]: mm 350 x 150 x 100
N° pillars / car: [12x4x3] 144 in whole car fleet 13.104

Plate dimensions [W x L x T]: mm 513 x 328 x 35
N° plates / car: [11x3x3] 99 in whole car fleet 9.009

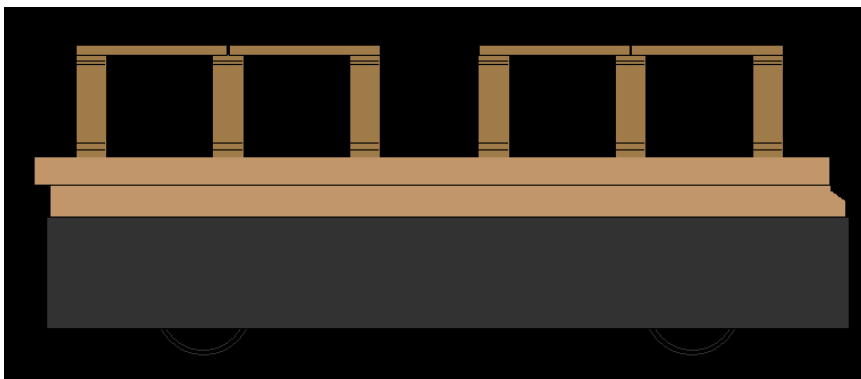
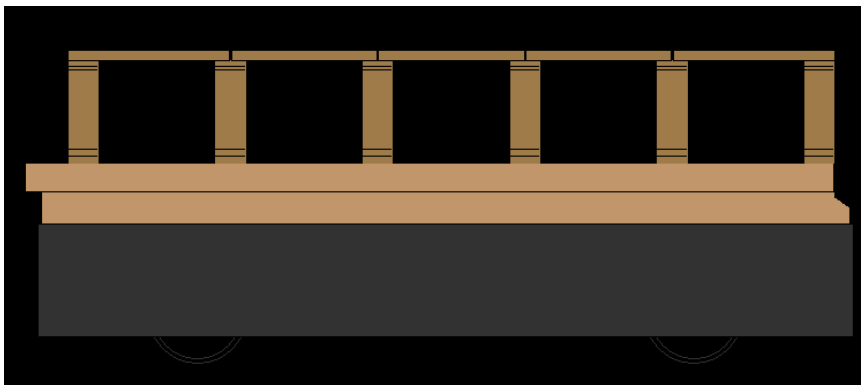
Weight of small pillars and plates on each car: 2.133 kg S.W. 1950 kg/cum

1st row location from the back edge of refractory: 200 mm
Horizontal space between the pillar and wall: 75 mm

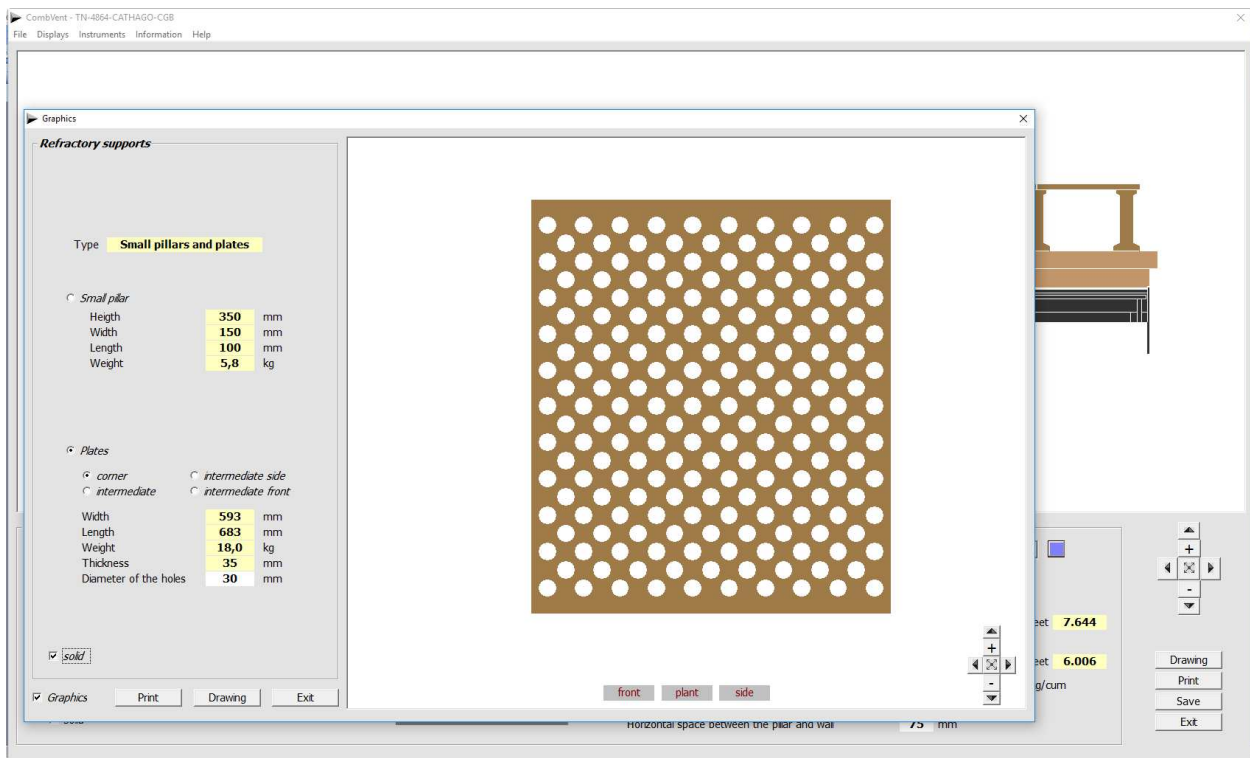
Navigation: ↑, ↓, ←, →, +, -, X, Y, Z, Print, Drawing, Save, Ext.

In this case there is an option that allows you to have a plate plane that covers the entire kiln car (a solution generally adopted in *single-layer kilns*). The difference is evident from the following side views of the car, according to the two solutions.

One floor plates ☐ No ☒ Yes

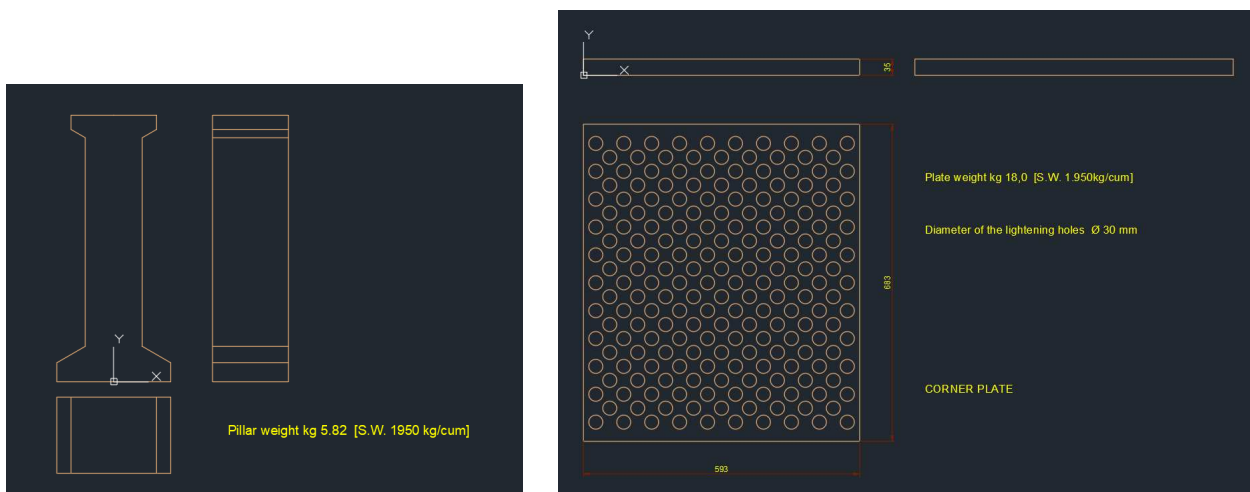


In this case, the graphic display shows both the pillar and the plates with their relative dimensions and weight. It should be noted that the plates are not all the same because their dimensions depend both on the longitudinal and the transversal steps between the pillars on the kiln car.



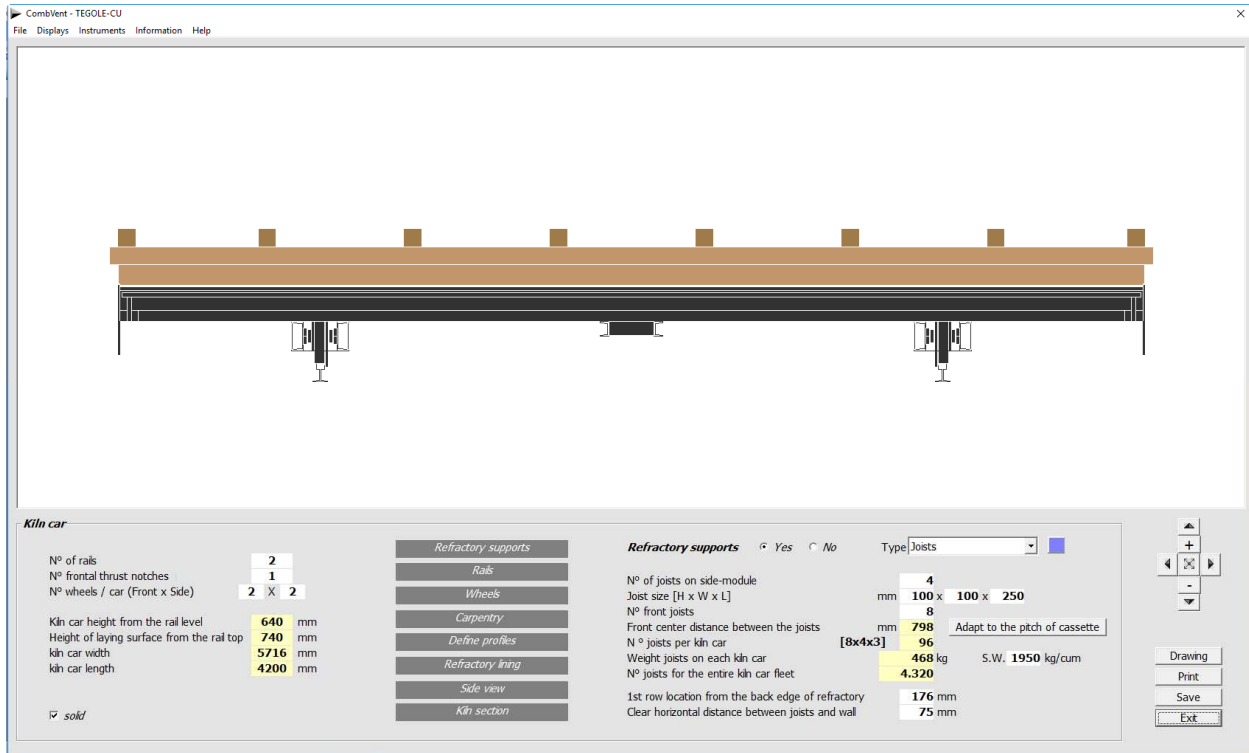
As in the case of the holed blocks, you can get the print or drawings in DWG format and 1: 1 scale of both the plates and the pillars.

Below are two examples of drawings in DWG format that can be obtained.

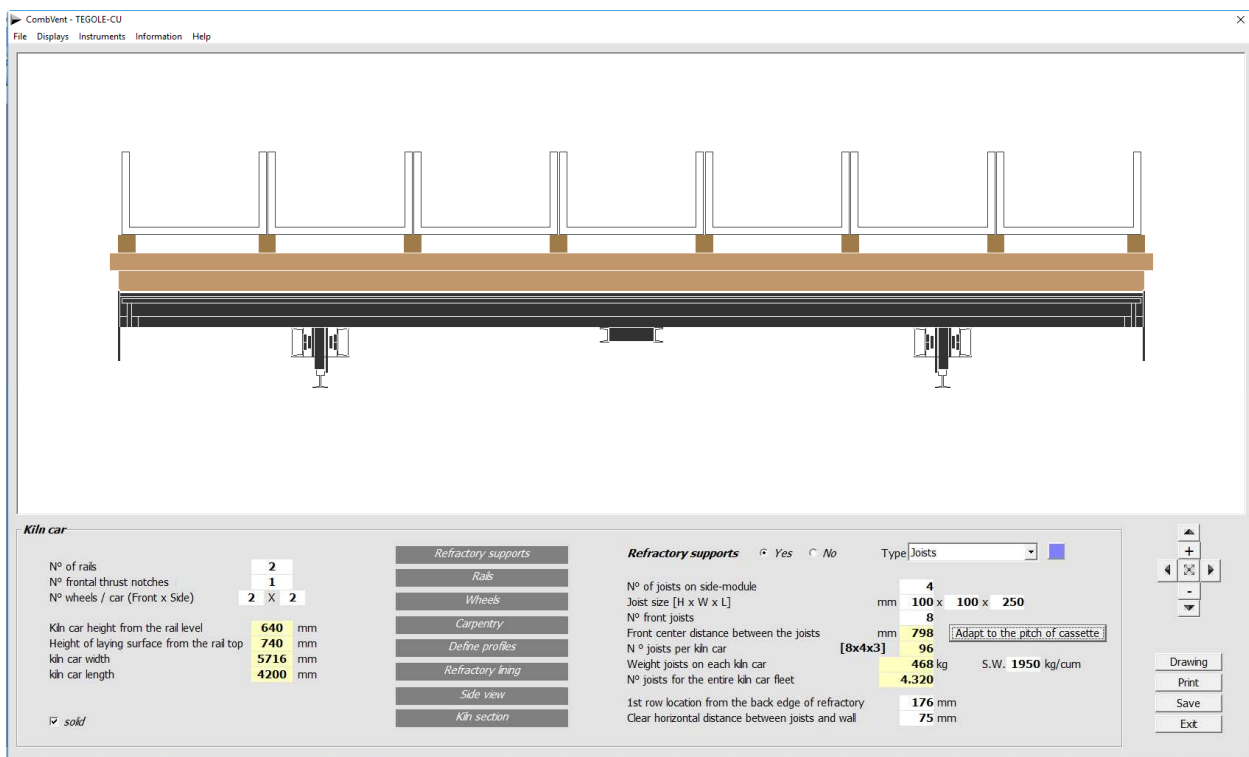


As regards the positioning of the plane of pillars and plates, with respect to the perimeter refractory edge of the carriage, the same applies to the holed blocks.

REFRACTORY SUPPORTS: Joists

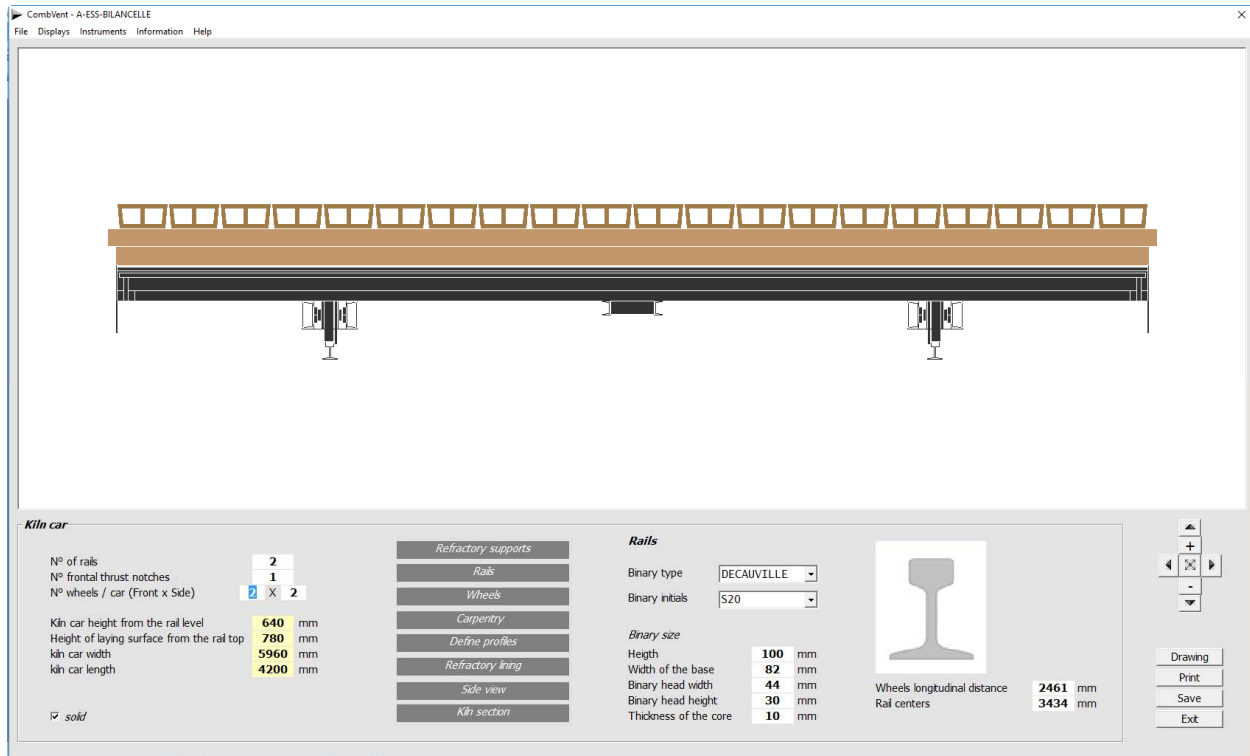


This case, as already mentioned, is adopted when there is a charge of material placed in U or H cassettes. Their number therefore depends on the number of cassettes present. For this purpose, the *Adaptation to the pitch of cassette* command is available that allows the automatic positioning of the required joists.

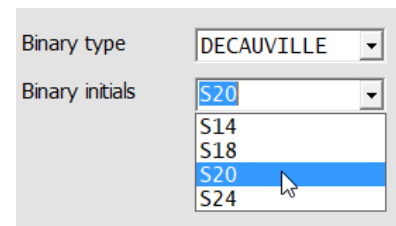


For the rest, the same applies as previously stated.

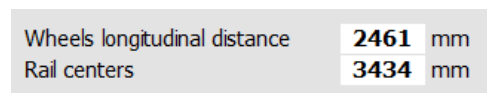
RAILS



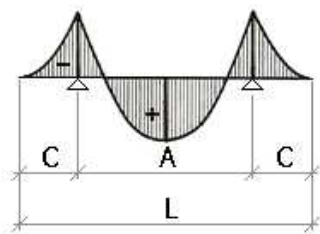
You can choose between the series of the trade tracks type DECAUVILLE or BURBACK or you can introduce a customized track indicating the dimensions.



The rail center distance and the longitudinal distance between the wheels of the kiln car can be modified. The values proposed automatically by the program are calculated according to the following criterion.



The car is assimilated to a beam on two supports (the supports are represented by the wheels of the car) with two equal overhangs and loaded with a uniformly distributed load.



The distance **A** between the two supports, which is equivalent in the first case to the longitudinal axis of the wheels and in the second case to the rail axis, is calculated in such a way that the negative moments on the supports are equal in absolute value at the maximum positive moment in span. In the first case, **L** is equivalent to the length of the car and in the second case to the width. The equality of moments occurs when $A = 0.586 \times L$.

If one of the two values is set to zero, the program performs the calculation again, as indicated, and re-proposes the default value.

WHEELS

CombVent - A-ESS-A-GRANDI-VOLUMI

File Displays Instruments Information Help



Kiln car

N° of rails: 4
 N° frontal thrust notches: 3
 N° wheels / car (Front x Side): 4 x 2

Kiln car height from the rail level: 640 mm
 Height of laying surface from the rail top: 780 mm
 kiln car width: 8540 mm
 kiln car length: 4200 mm

☐ solid

Refractory supports

- Rails
- Wheels
- Carpentry
- Define profiles
- Refractory lining
- Side view
- Kiln section

Wheels

N° of rails: 4
 Binary: 1 of 4

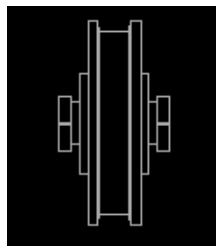
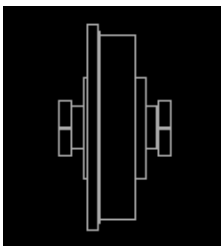
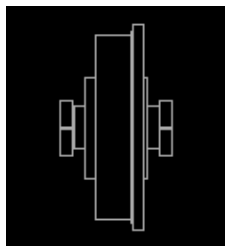
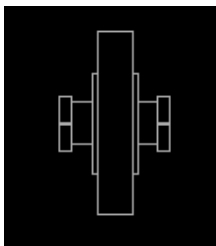
☐ flat wheel
☒ wheel with the right edge
☐ wheel with the left edge
☐ wheel with double edge

Kiln car wheels details

Diameter: 300 mm
 Width of the rolling belt: 58 mm
 Length of inclined tract of flange: 2.5 mm
 Thickness of the wheel flange: 17 mm
 Length of the wheel shaft: 180 mm

Total car weight: 20.391 kg

The following wheels are available which can be placed as desired.



- ☐ flat wheel
- ☒ wheel with the right edge
- ☐ wheel with the left edge
- ☐ wheel with double edge

The *Wheel Bearing Capacity* command displays the following message.

by G.N.

RESULT OF VERIFICATION

Total carpentry kiln car weight 2.656 kg
 Total weight of the refractory lining 17.735 kg

 Total kiln car weight 20.391 kg

Weight of the charge 19.656 kg

 Total weight 40.047 kg

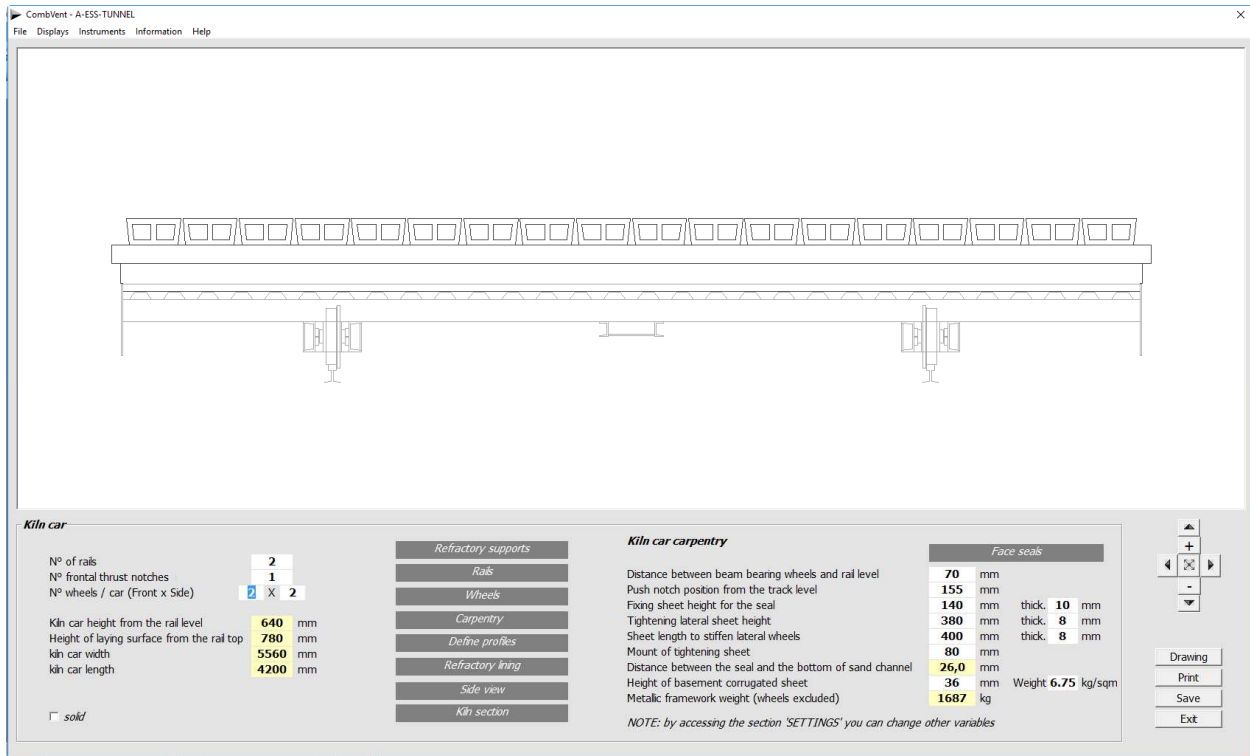
Load applied onto each wheel 5.006 kg
 Permissible load on each wheel 7.045 kg

The bearing capacity is
 >>> VERIFIED <<<

Load index of the wheel = 43,9 (40÷60)
 Bearing capacity / load on each wheel = 1,41

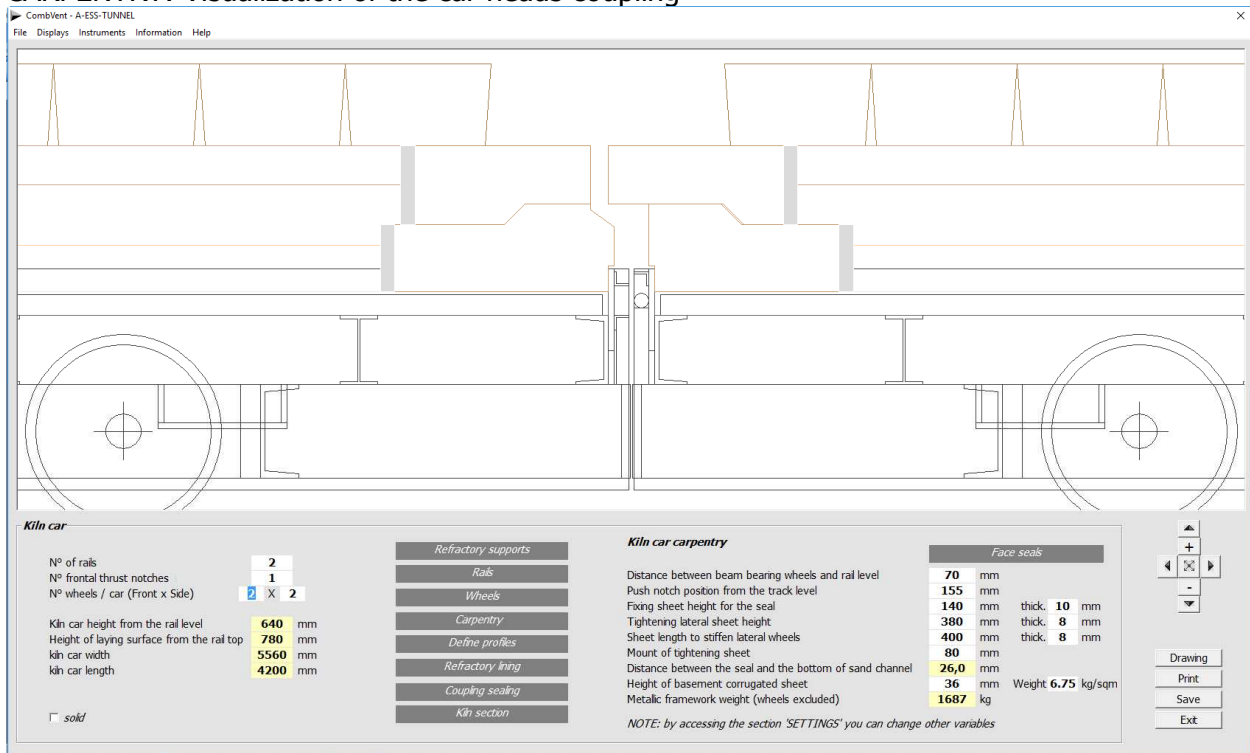
Print the report ?

CARPENTRY



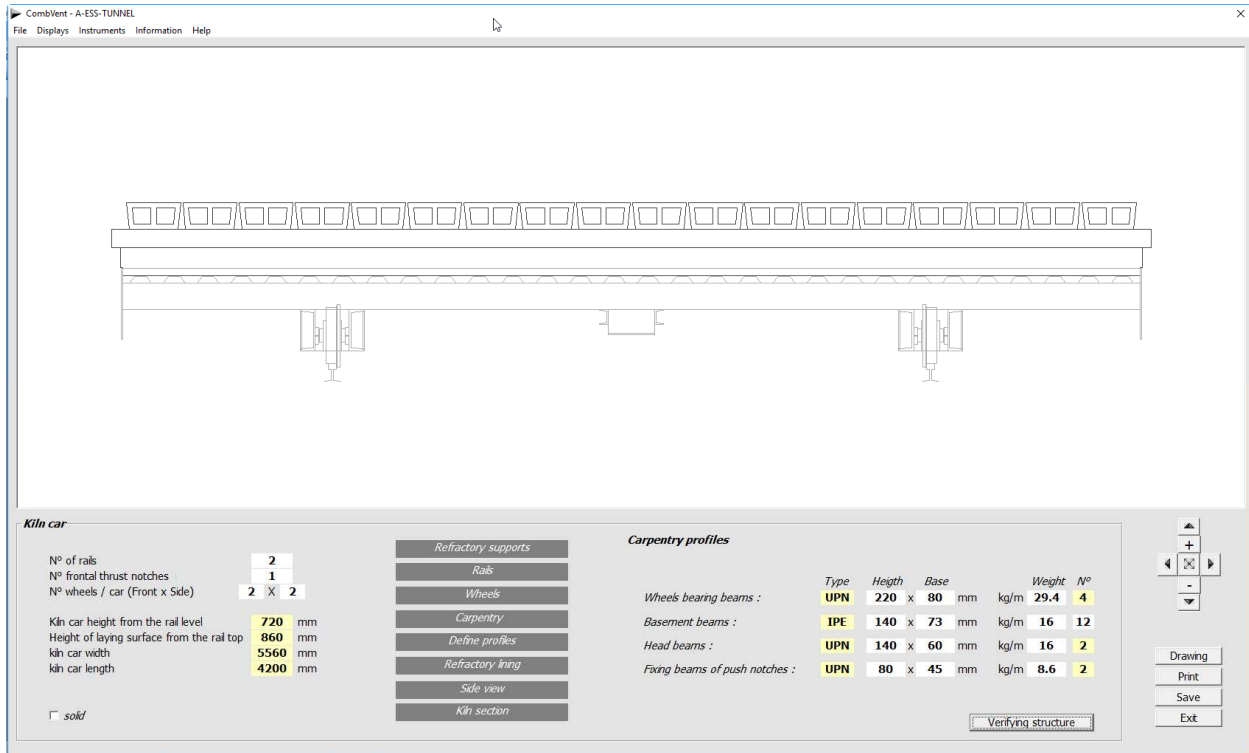
NOTE: The kiln car carpentry reflects the ALPINA INDUSTRIALE SPA standard.

CARPENTRY: Visualization of the car heads coupling



The *Face Seals* command simply allows you to visually verify the coupling between the heads of the kiln cars.

CARPENTRY: Profiles



The choice of the profiles that make up the carpentry of the cart is made by clicking with the mouse on the boxes related to the *Type* of profile.

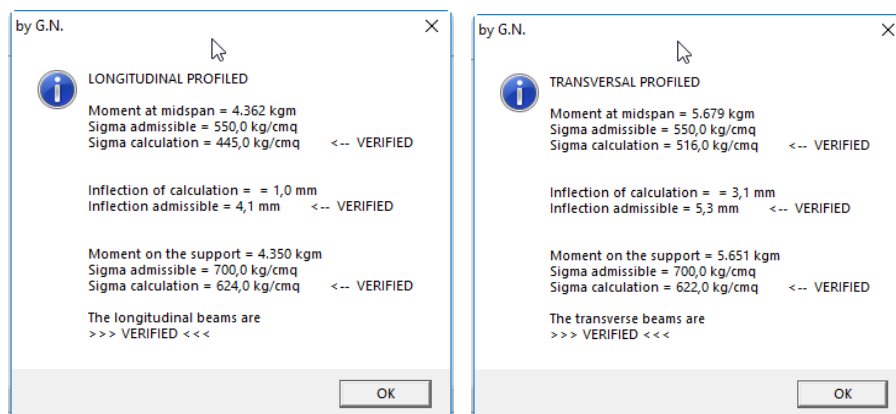
In this way, a small window appears where you can choose the *type* and *size* of the profile.

	Type	Height	Base	mm	kg/m	N°
Wheels bearing beams :	UPN	220	x	80	29.4	4
Basement beams :	IPE	140	x	73	16	12
Head beams :	UPN	140	x	60	16	2
Fixing beams of push notches :	UPN	80	x	45	8.6	2

Verifying structure


In the case in which you have available non-commercial profiles or in any case not dimensionally corresponding to those present, you can manually introduce the relative dimensions and weights.

With the *Verifying Structure* command the program shows the following two messages.



You can also have a *summary print* of the check with more details.

Example of printing a report on the structural verification of the kiln car carpentry.



Ing. Gennaro Nasuti
gn@supertecweb.com

Customer : A
 Order : A-ESS-TUNNEL

STRUCTURAL CHECK OF THE KILN CAR

*** TRANSVERSAL PROFILED**

>> Beam with 2 supports <<
 Length of calculation 5.460 mm
 Supports center distance 3.200 mm
 Lateral overhang 1.130 mm
 Distributed load 8.851 kg/m

Jx equivalent 7.702 cm⁴
 Wx equivalent 1.100 cm³
 Ax equivalent 237,6 cm²

Moment at midspan 5.679 kgm
 Sigma admissible 550,0 kg/cmq
 Sigma calculation 516,0 kg/cmq <-- VERIFIED

Inflection admissible 5,3 mm
 Inflection of calculation 3,1 mm <-- VERIFIED

Moment on the support 5.651 kgm
 Sigma admissible 700,0 kg/cmq
 Sigma calculation 622,0 kg/cmq <-- VERIFIED

The transverse beams are
 >>> VERIFIED <<<

*** LONGITUDINAL PROFILED**

>> Beam with 2 supports <<
 Length of calculation 4.200 mm
 Supports center distance 2.461 mm
 Lateral overhang 869 mm
 Distributed load 11.507 kg/m

Jx equivalent 10.764 cm⁴
 Wx equivalent 980 cm³
 Ax equivalent 149,6 cm²

Moment at midspan 4.362 kgm
 Sigma admissible 550,0 kg/cmq
 Sigma calculation 445,0 kg/cmq <-- VERIFIED

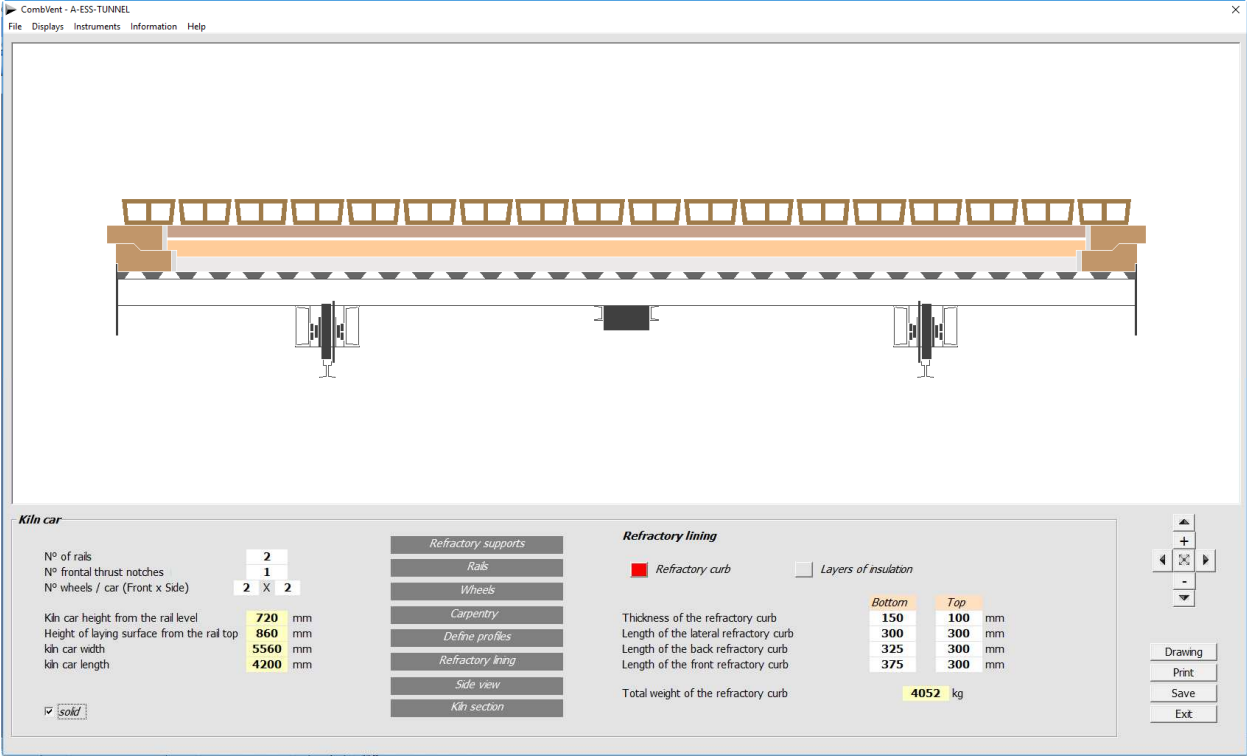
Inflection admissible 4,1 mm
 Inflection of calculation 1,0 mm <-- VERIFIED

Moment on the support 4.350 kgm
 Sigma admissible 700,0 kg/cmq
 Sigma calculation 624,0 kg/cmq <-- VERIFIED

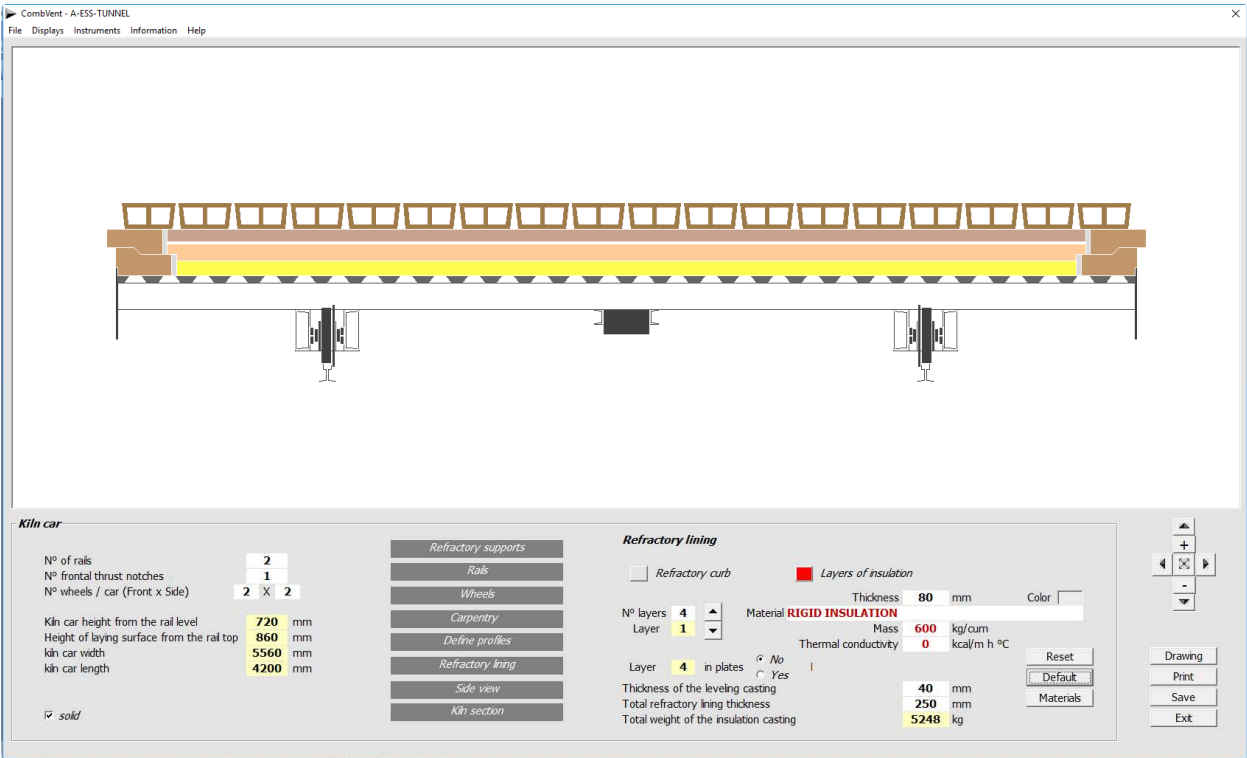
The longitudinal beams are
 >>> VERIFIED <<<

REFRACTORY LINING

Front view

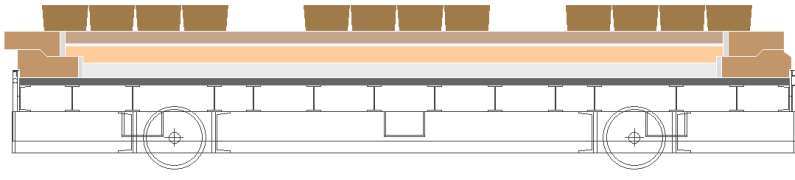


NOTE: The refractory lining of the kiln car reflects the ALPINA INDUSTRIALE SPA standard. It includes a refractory, lower and upper perimeter curb, and a series of overlapping layers of insulating material of different composition.



REFRACTORY LINING: Side view

CombVent - A-ESS-TUNNEL
File Displays Instruments Information Help



Kiln car

N° of rails: 2
N° frontal thrust notches: 1
N° wheels / car (Front x Side): 2 X 2

Kiln car height from the rail level: 720 mm
Height of laying surface from the rail top: 860 mm
kiln car width: 5560 mm
kiln car length: 4200 mm

☒ solid

Refractory supports

- Rails
- Wheels
- Carpentry
- Define profiles
- Refractory lining
- Front view
- Kiln section

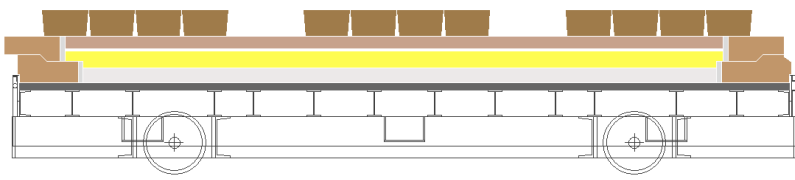
Refractory lining

☒ Refractory curb ☐ Layers of insulation

Thickness of the refractory curb: 150 mm (Bottom) / 100 mm (Top)
Length of the lateral refractory curb: 300 mm
Length of the back refractory curb: 325 mm
Length of the front refractory curb: 375 mm
Total weight of the refractory curb: 4052 kg

Drawing
Print
Save
Exit

CombVent - A-ESS-TUNNEL
File Displays Instruments Information Help



Kiln car

N° of rails: 2
N° frontal thrust notches: 1
N° wheels / car (Front x Side): 2 X 2

Kiln car height from the rail level: 720 mm
Height of laying surface from the rail top: 860 mm
kiln car width: 5560 mm
kiln car length: 4200 mm

☒ solid

Refractory supports

- Rails
- Wheels
- Carpentry
- Define profiles
- Refractory lining
- Front view
- Kiln section

Refractory lining

☐ Refractory curb ☒ Layers of insulation

N° layers: 4
Layer: 2

Material: INSULATION CONCRETE
Thickness: 90 mm
Color:

Mass: 900 kg/cum
Thermal conductivity: 0 kcal/m h °C

Layer: 4 in plates ☒ No ☐ Yes

Thickness of the leveling casting: 40 mm
Total refractory lining thickness: 250 mm
Total weight of the insulation casting: 5248 kg

Reset
Default
Materials

Drawing
Print
Save
Exit

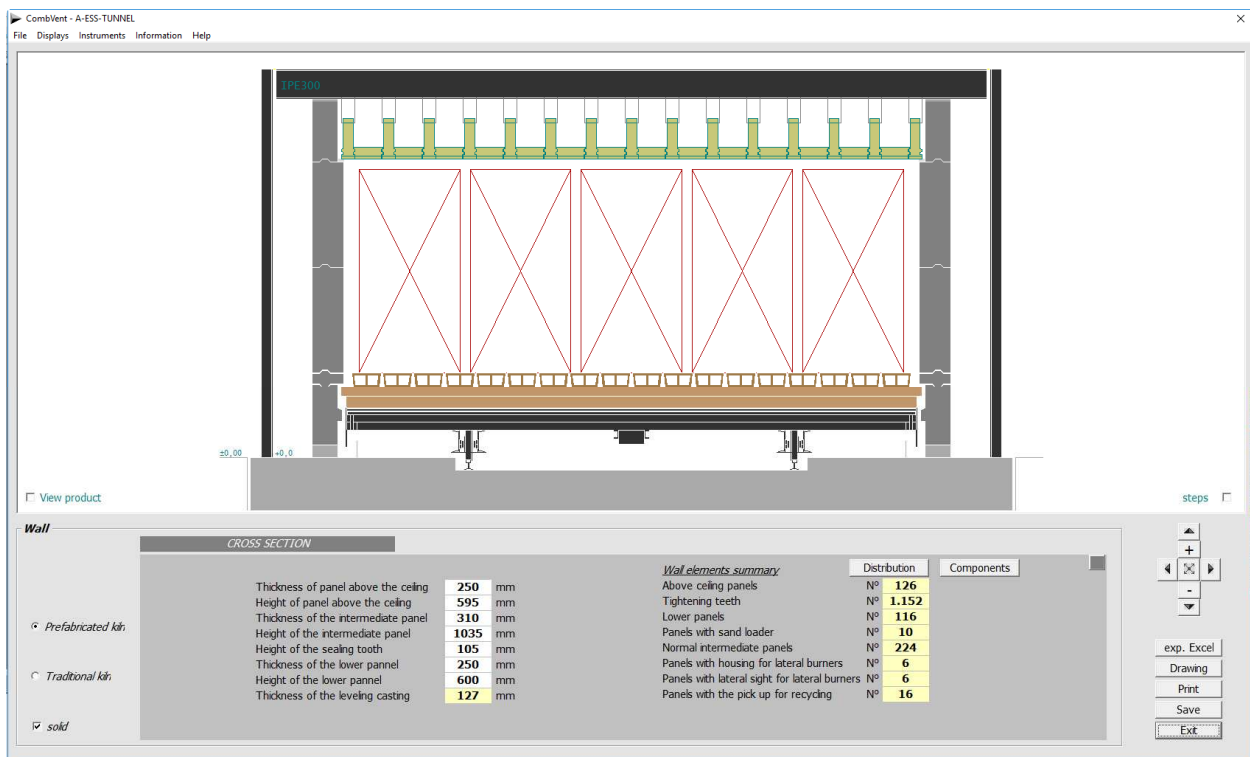
The *Default* command allows you to restore the insulations proposed by the program. The *Materials* command displays the *Materials Archive* from which you can pick up the necessary ones (if any) for the isolation of the kiln car.

Section 3.4.4 – KILN → Graphics → Walls



Completion of the definition of the type of kiln walls, distribution and automatic calculation of the quantities required

Initial screen for a prefabricated kiln



There are two types of walls: *prefabricated*, *traditional*. It is possible to switch from one to another with a simple mouse click. Both graphics and all data are automatically updated.

CombVent - A-ESS-TUNNEL

File Displays Instruments Information Help

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

Preheating Zone L = 36.4 mt Firing Zone L = 28 mt Cooling Zone L = 36.4 mt

☐ Cars in the tunnel

steps

Wall

LONGITUDINAL SECTION

Thickness of panel above the ceiling 250 mm
 Height of panel above the ceiling 595 mm
 Thickness of the intermediate panel 310 mm
 Height of the intermediate panel 1035 mm
 Height of the sealing tooth 105 mm
 Thickness of the lower pannel 250 mm
 Height of the lower pannel 600 mm
 Thickness of the leveling casting 127 mm

☒ Prefabricated kbr
☐ Traditional kbr
☒ solid

Wall elements summary

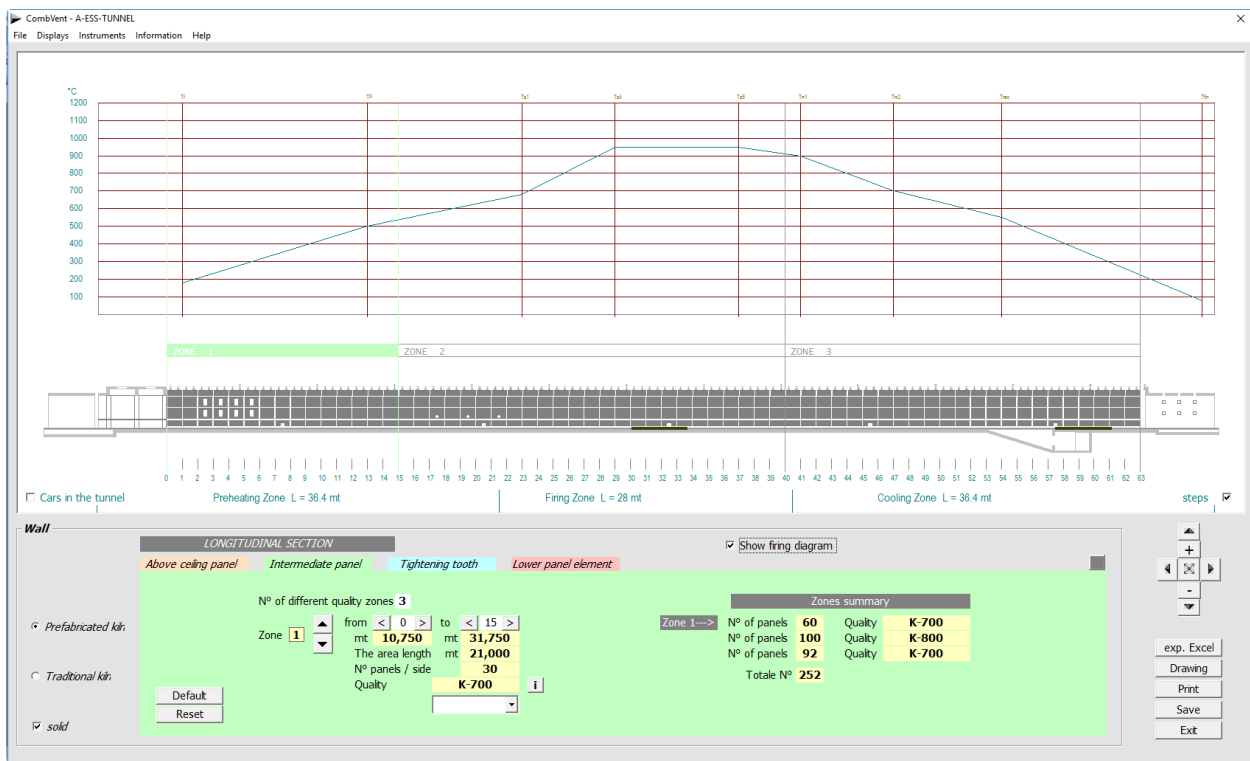
Distribution	Components
Above ceiling panels N° 126	
Tightening teeth N° 1.152	
Lower panels N° 116	
Panels with sand loader N° 10	
Normal intermediate panels N° 224	
Panels with housing for lateral burners N° 6	
Panels with lateral sight for lateral burners N° 6	
Panels with the pick up for recycling N° 16	

exp. Excel
 Drawing
 Print
 Save
 Exit

Distribution of the different types of panels of a prefabricated type kiln

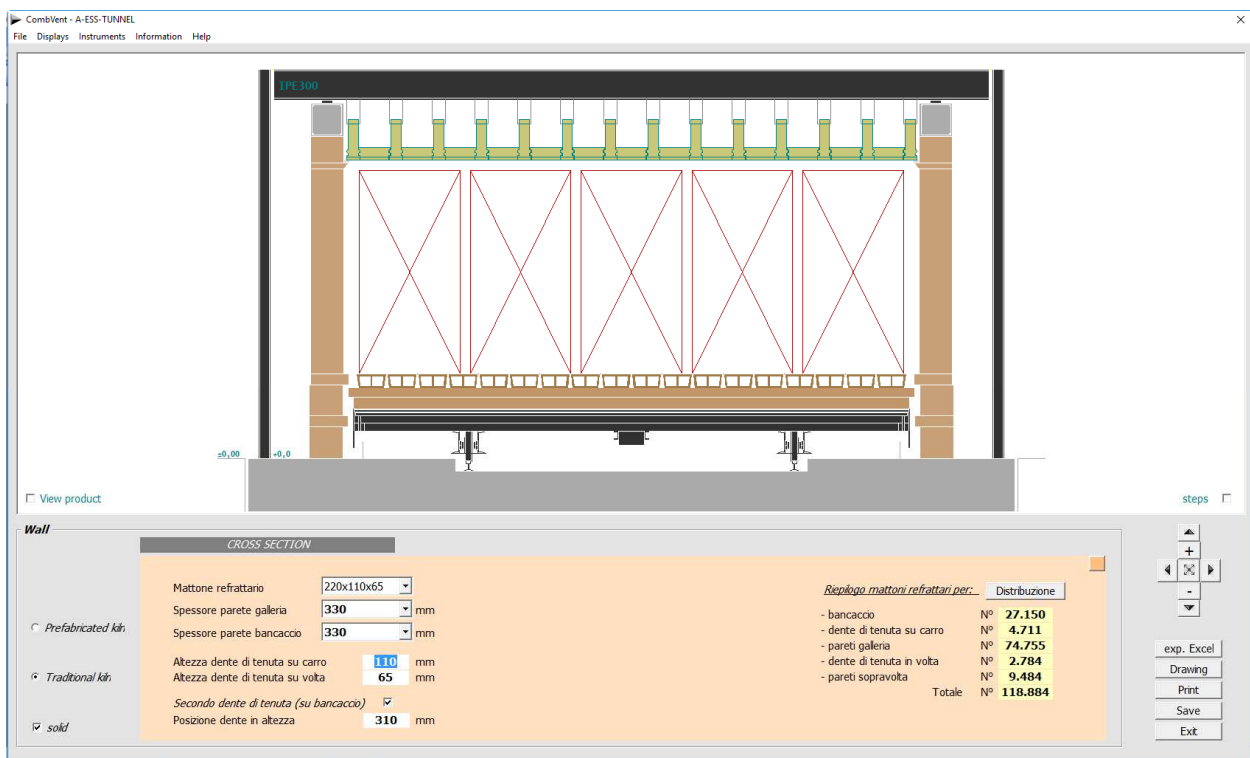


It is also possible to display the *firing diagram*, if this has been previously defined.

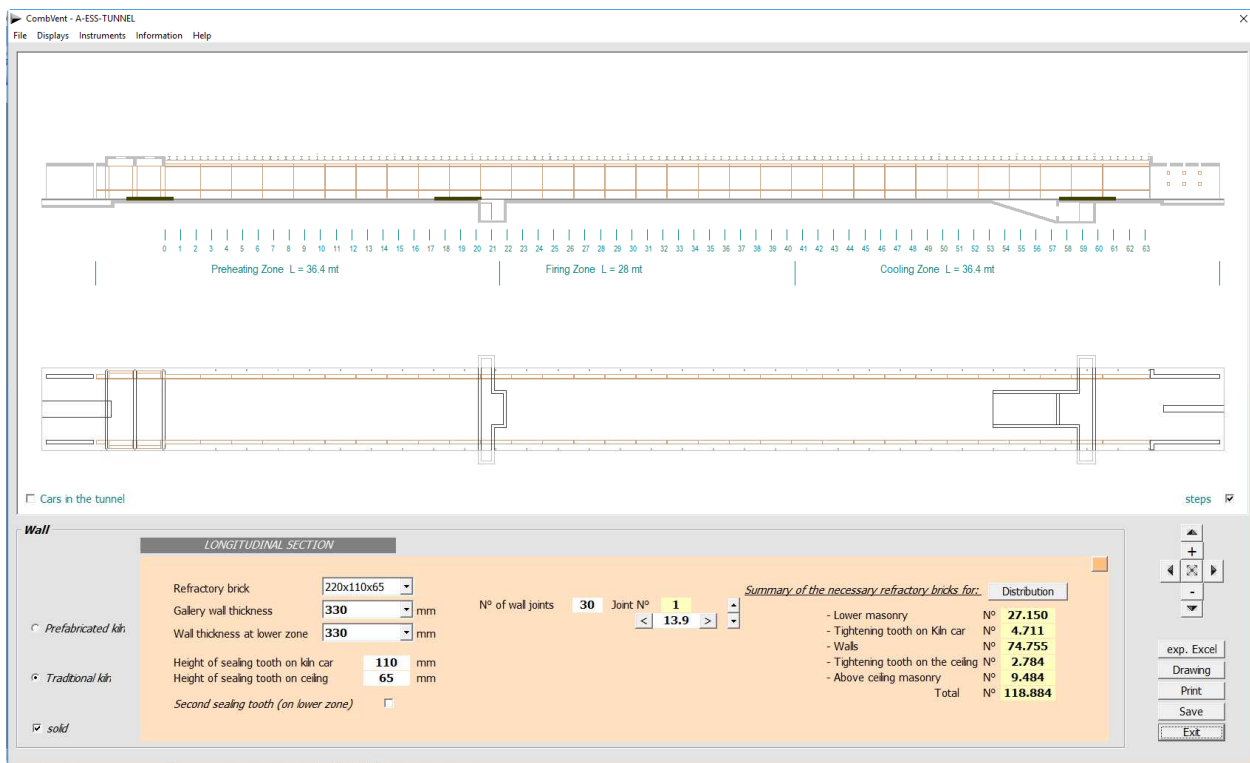


NOTE: for the prefabricated walls there are no more than 4 areas with different qualities. For traditional walls at most 10 zones.

Home screen for a traditional kiln

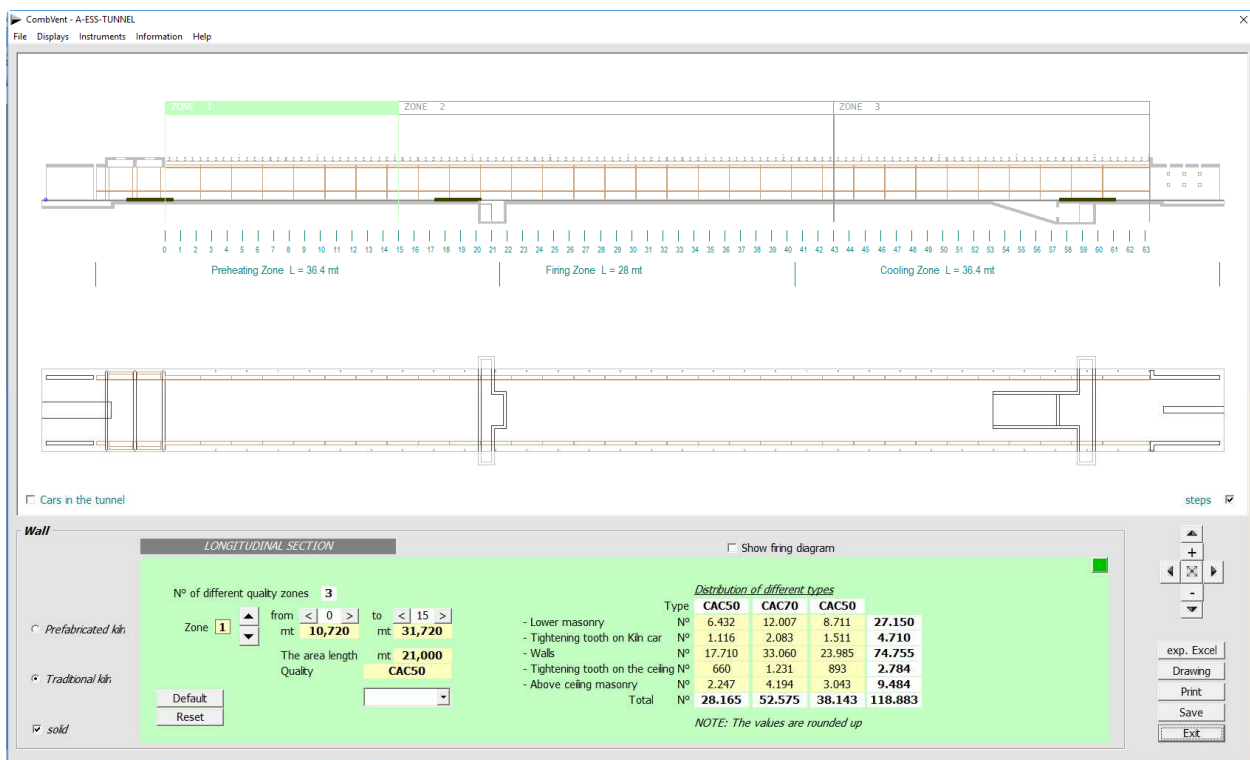


Longitudinal view of a traditional type kiln



NOTE: setting the value relative to the number of wall joints equal to zero, the program calculates and proposes a basic starting number, according to the length of the tunnel kiln.

Distribution of the different types of refractory bricks in a traditional type kiln

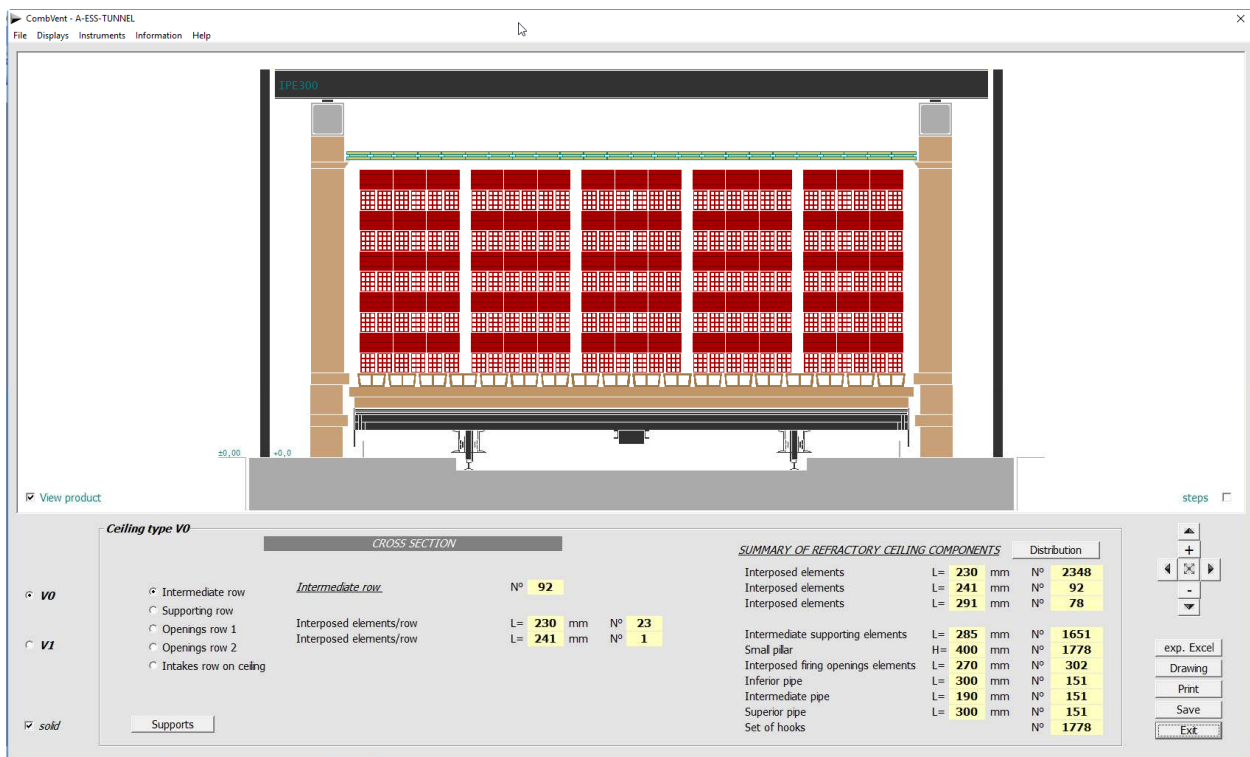


Section 3.4.5– KILN → Graphics → Ceiling



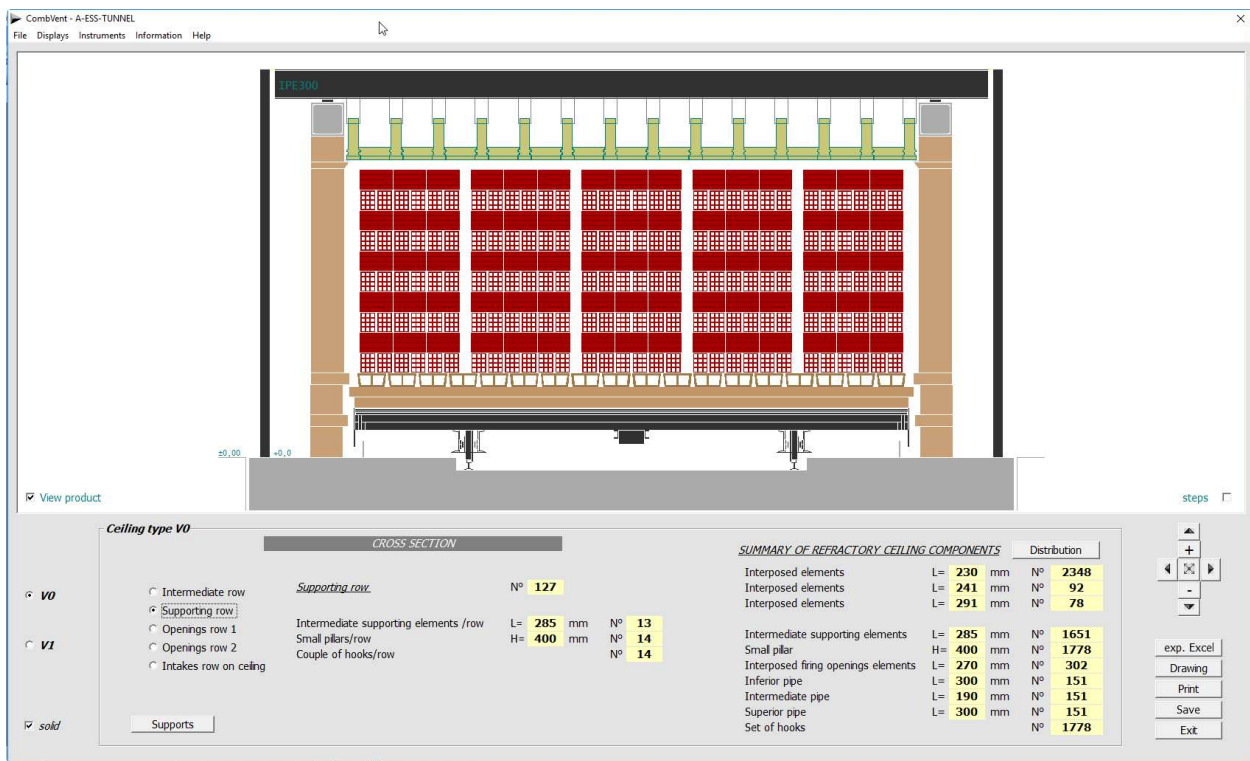
Completion of the definition of the type of ceiling of the kiln, distribution and automatic calculation of the quantities needed

Home screen. Displayed the *Intermediate* row

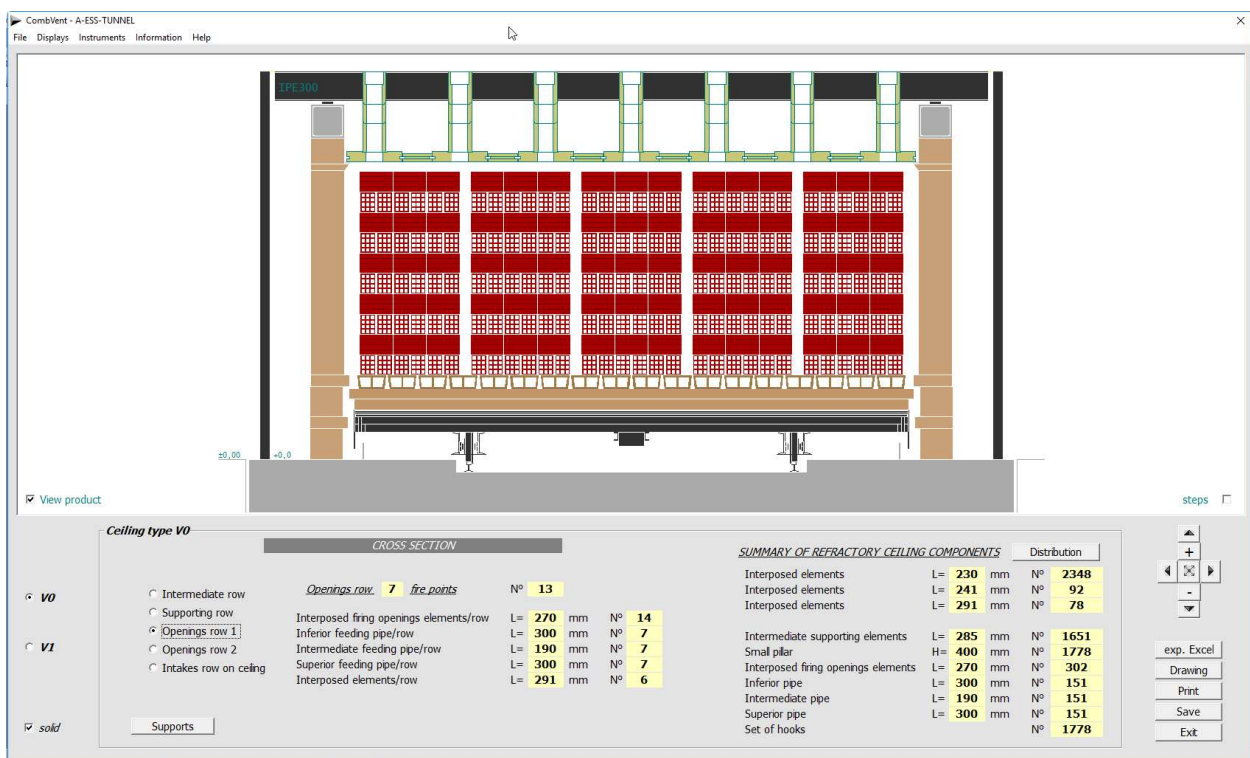


NOTE: there are two types of ceiling: *V0* and *V1*. The standard of the Alpina Industriale Spa generally includes these two types of ceiling.

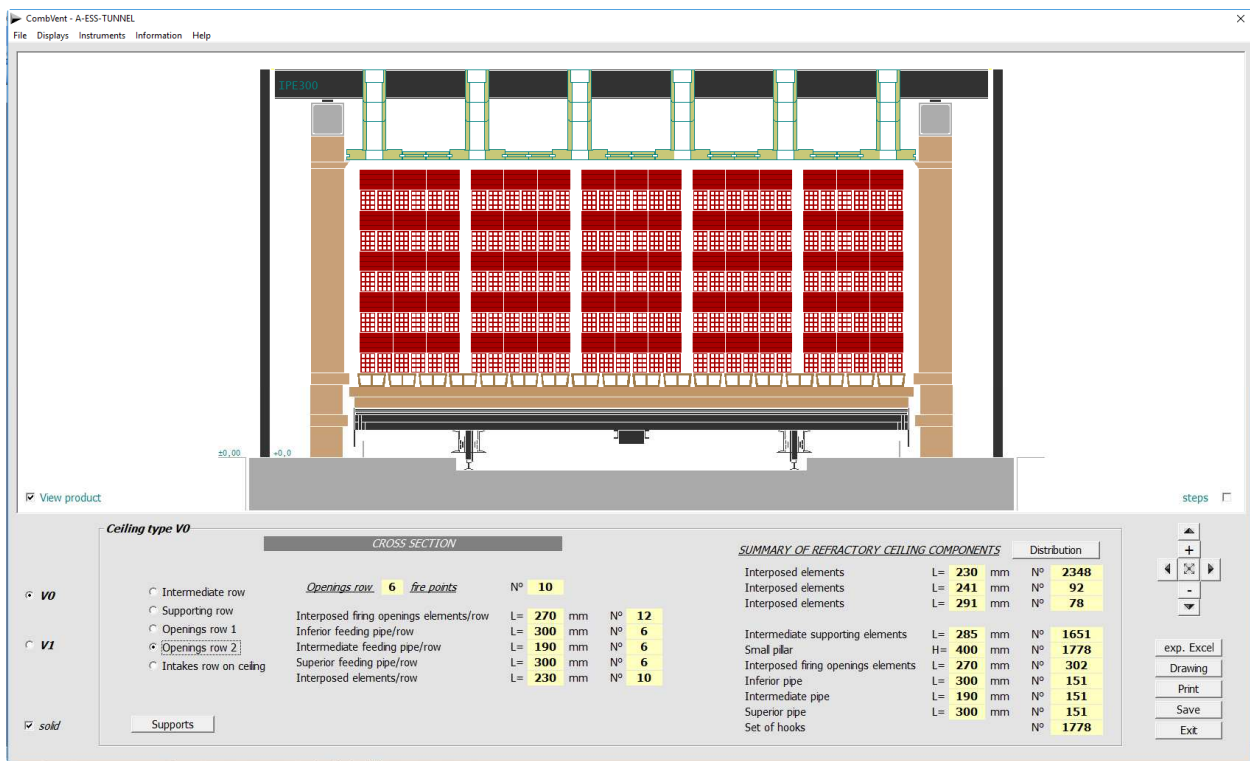
Displayed the *Supporting* row



Displayed the row of *Odd openings*.

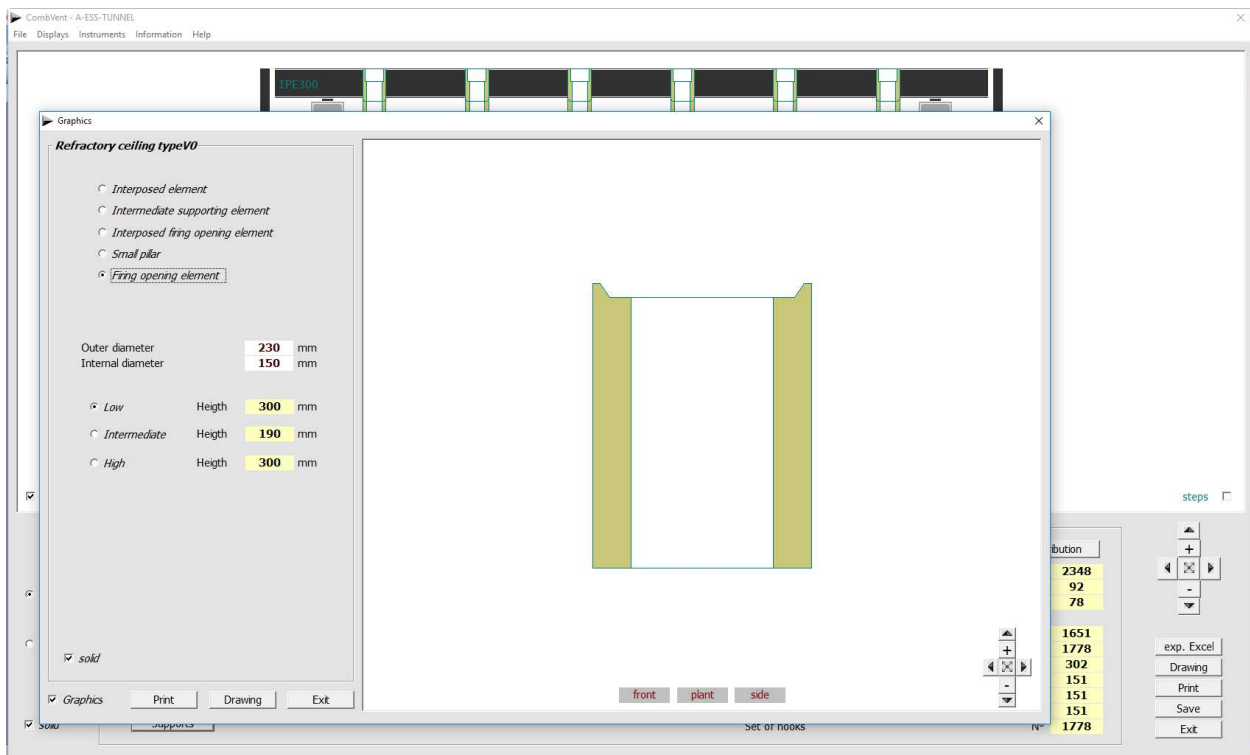


Displayed the row of *Even openings*.

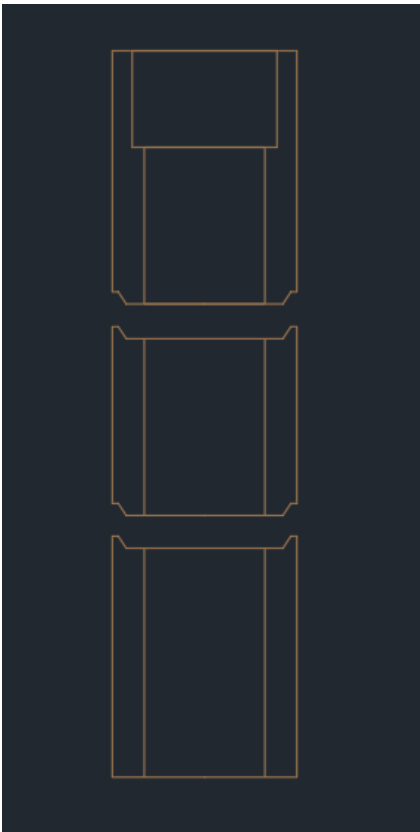


By changing the type of ceiling the program automatically updates all the data and the calculation of all the components the ceiling.

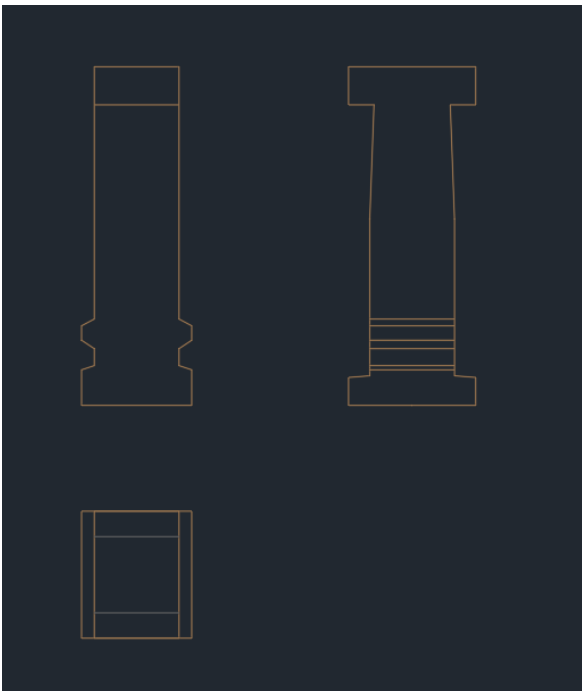
With the *Supports* command you can view all the components of the ceiling with their dimensional characteristics.



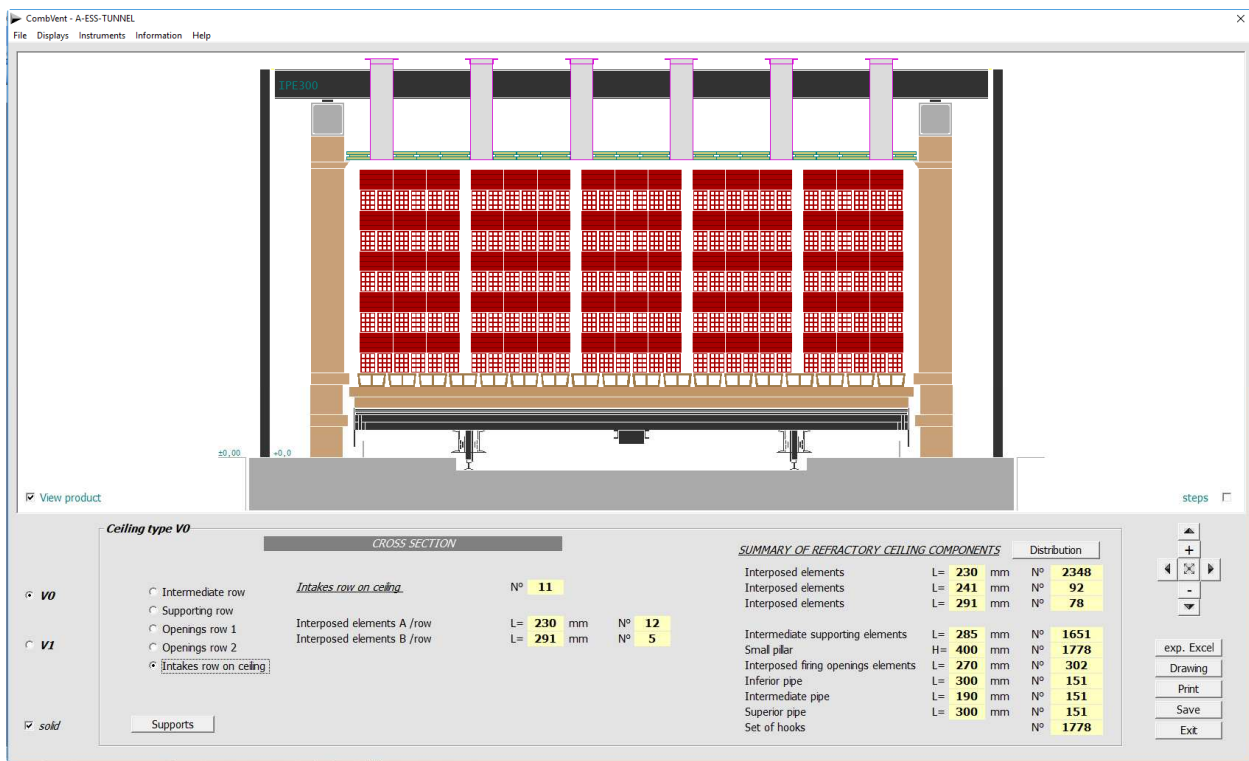
Also here is the *Print* command and the *Drawing* command that allows the drawing of the displayed object drawing. In this case all three pieces that make up the single opening are drawn.



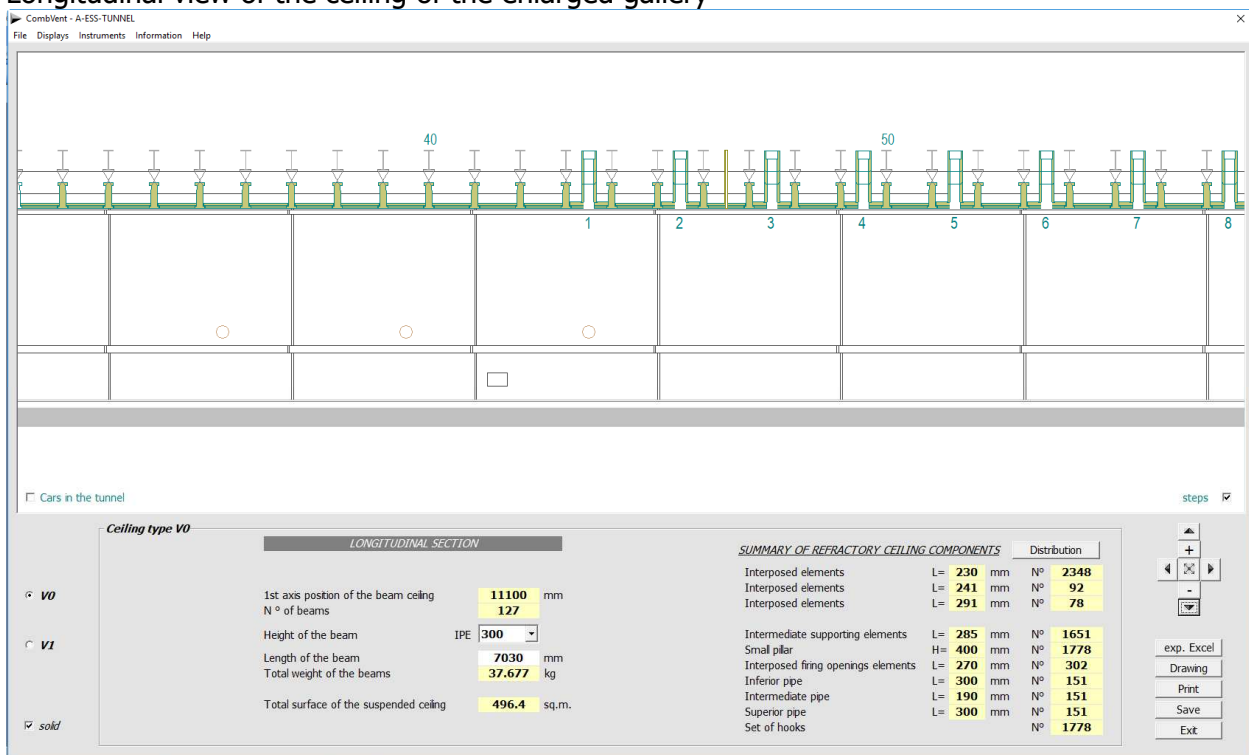
The following example concerns the drawing in DWG format of the pillar of ceiling.



Displayed the *Intakes* row on ceiling for recovery.

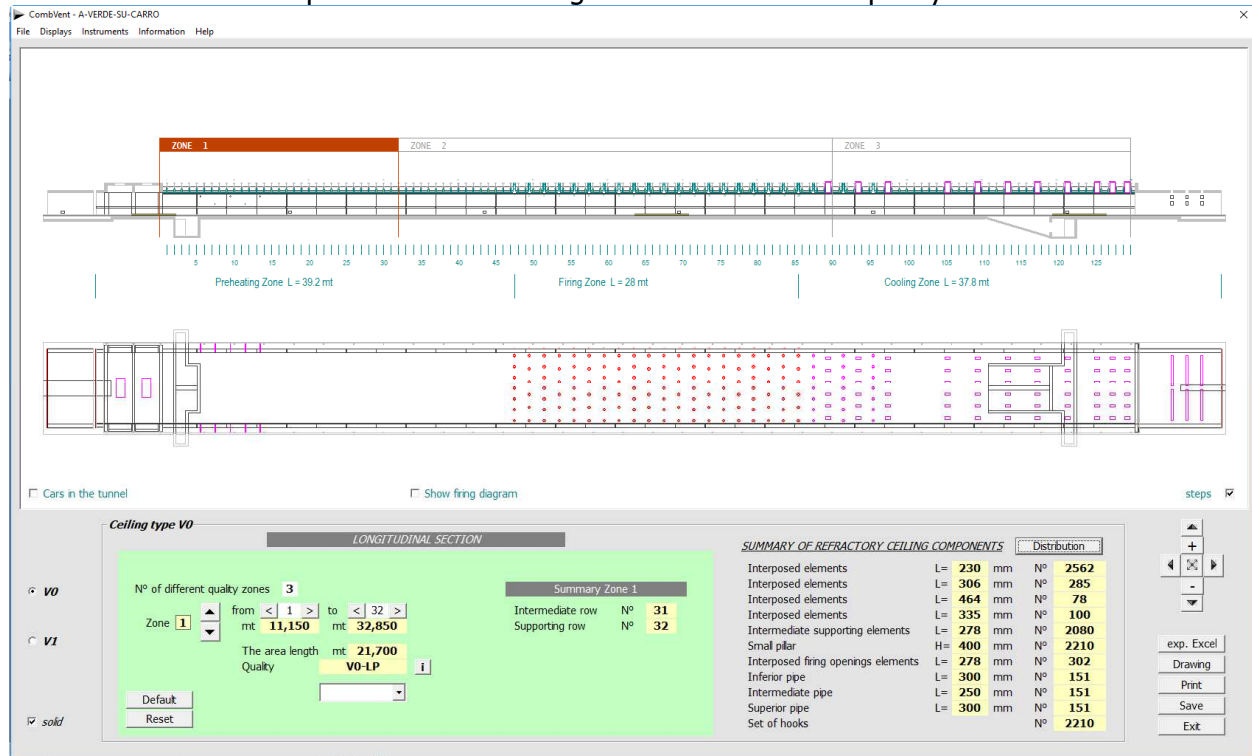


Longitudinal view of the ceiling of the enlarged gallery



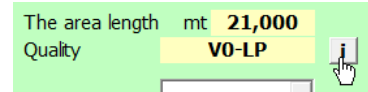
The program calculates the dimensions, quantity and weight of the beams that support the ceiling. It is possible to change the height of the beams proposed by the program. If the new height chosen does not satisfy the condition that the maximum deflection arrow must be less than 1/800 of the light, the program displays a warning message.

Distribution of the components of the ceiling in areas of different quality.

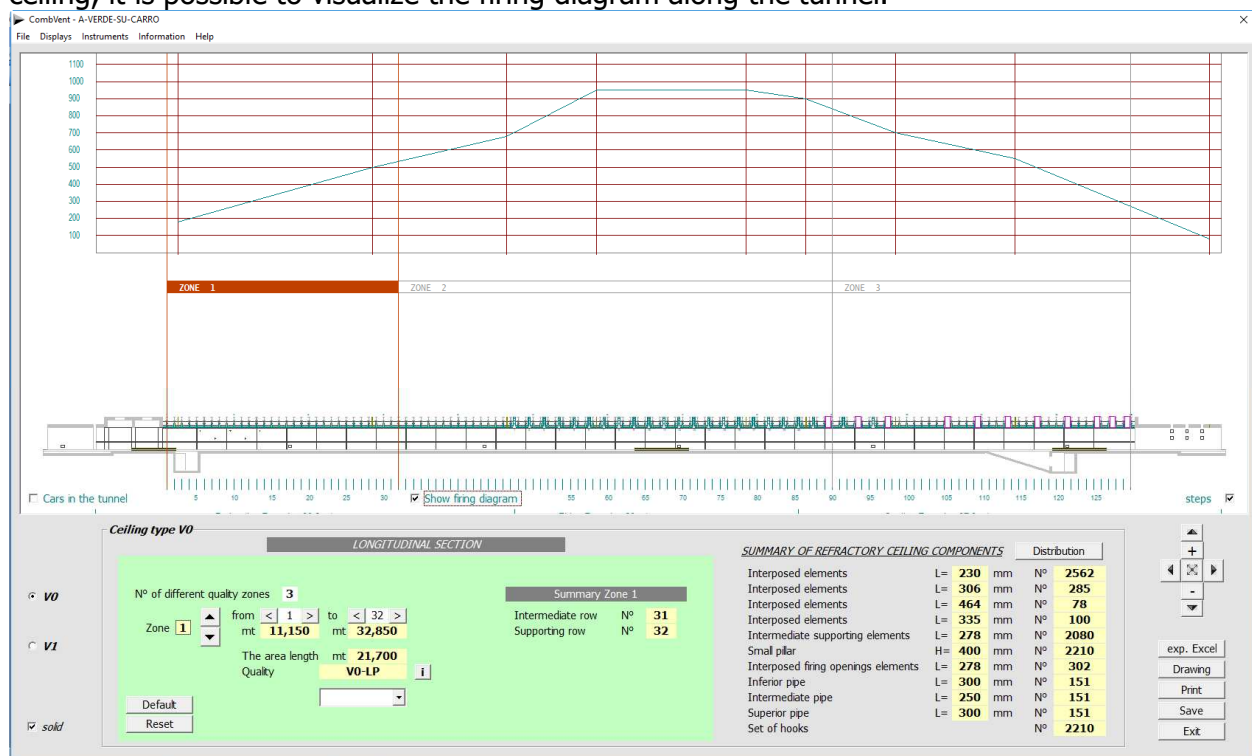


The *Distribution* command allows the components of the ceiling to be distributed in zones according to the quality of the material used for the components themselves.

NOTE: reference is made to the different expected product qualities (type V0 and V1 type ceiling). It is possible to display a window that shows the characteristics of each product with button in the figure.



For an easier evaluation in the qualitative distribution of the ceiling, it is possible to visualize the firing diagram along the tunnel.

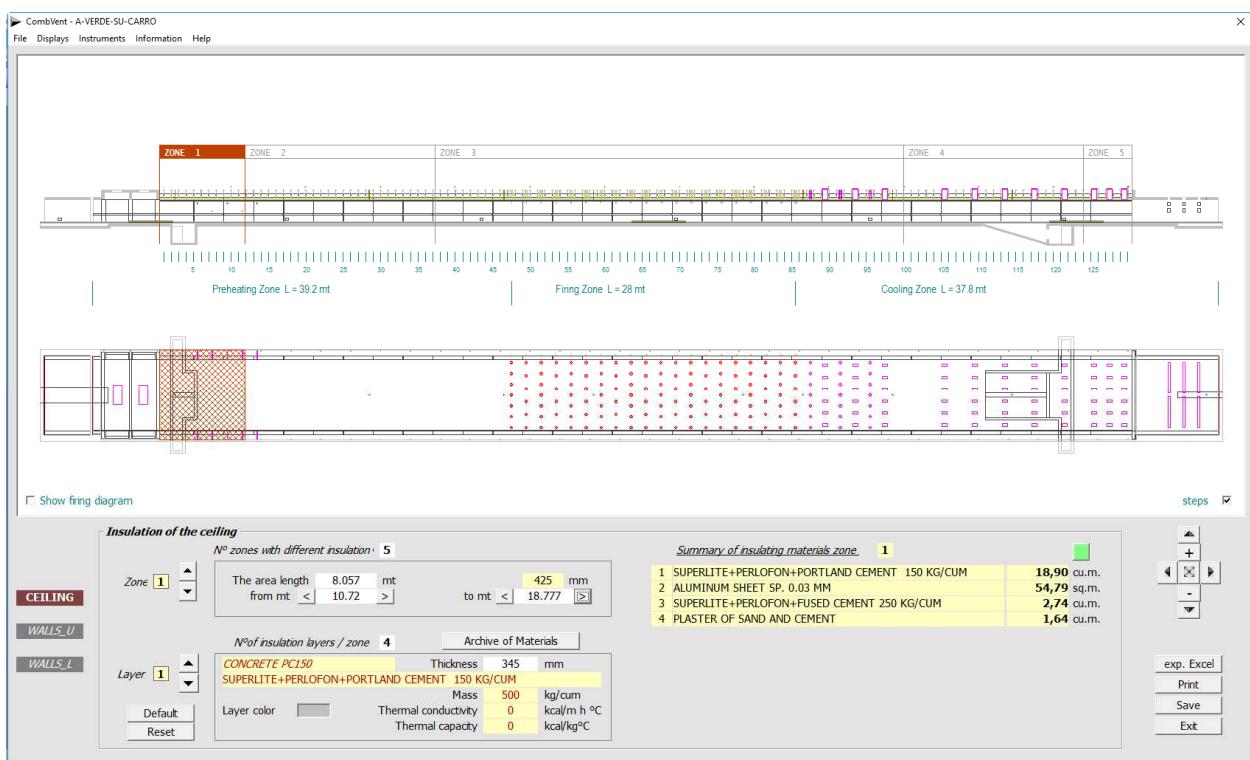


Section 3.4.6– KILN → Graphics → Insulations



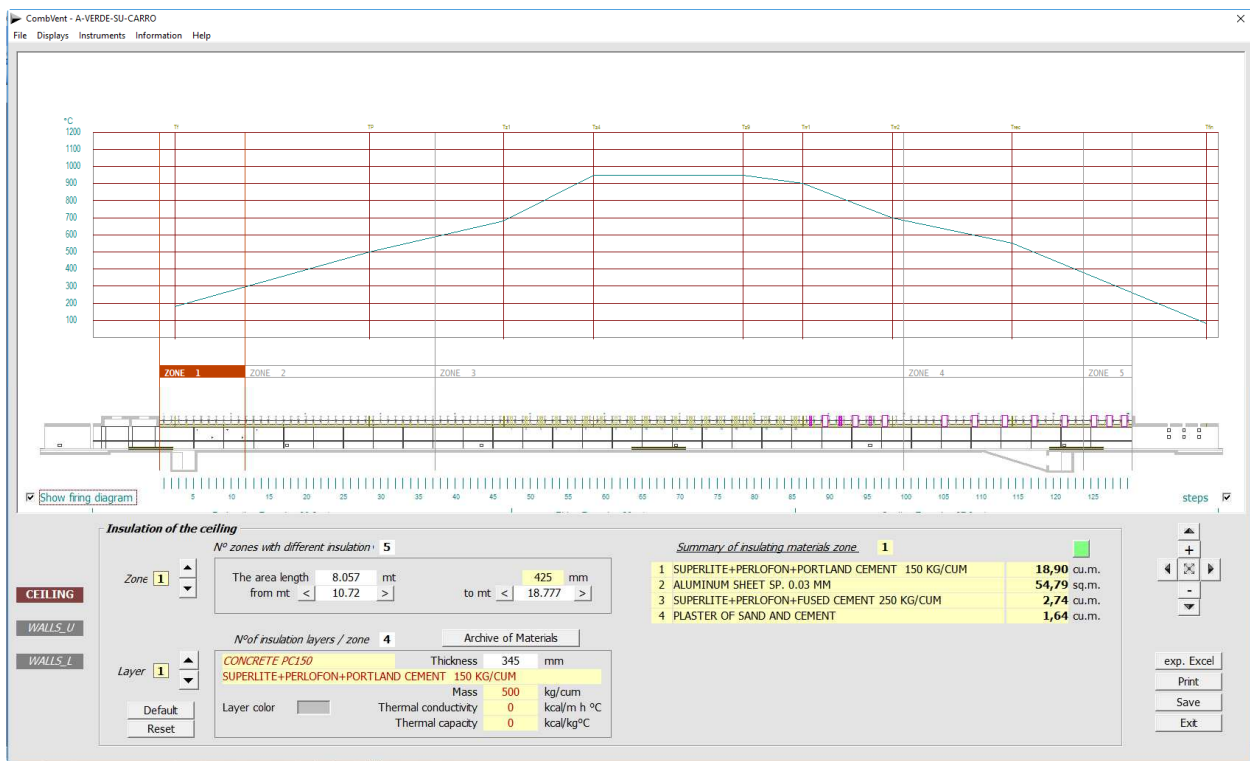
Definition of insulation both of the walls and of the ceiling of the kiln, distribution and automatic calculation of the quantities needed

Initial screen: split the ceiling into zones with different insulation

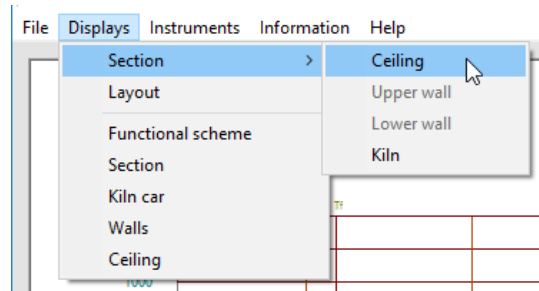


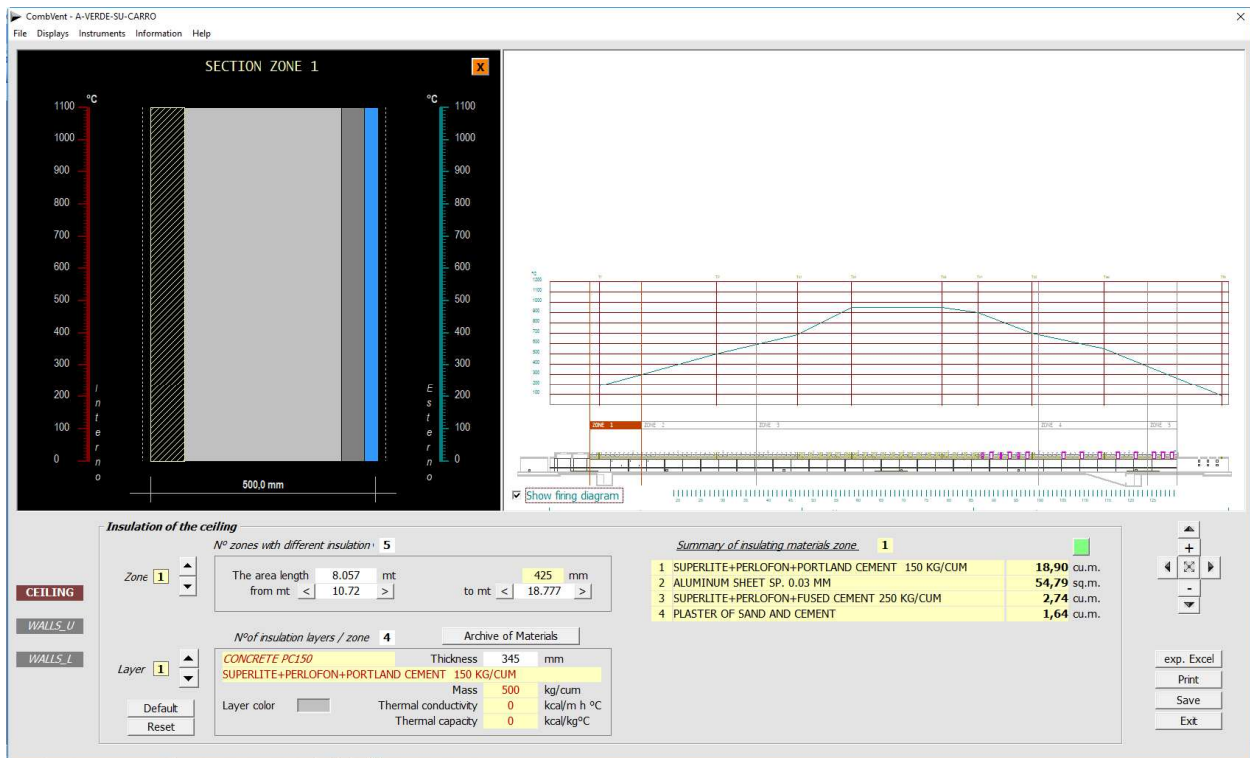
With the *Default* command it is possible to assign, for both the *ceiling* and the *walls*, a starting insulation that can subsequently be modified. The *Reset* command deletes all the existing insulation concerning the area under examination.

Subdivision of the ceiling in zones with different insulation: displayed the *firing diagram*



It is possible to see the arrangement of the insulation layers, in this case the ceiling, with the command: *Displays → Section → Ceiling.*





From the same drop-down menu it is possible to see the arrangement of the insulation layers for the walls.


By clicking on the colored button in the figure you get a summary of the total amount of insulation used, in this case, for the ceiling.

Summary of the total amount of insulating materials for the ceiling

1	SUPERLITE+PERLOFON+PORTLAND CEMENT 150 KG/CUM	233,66	cu.m.
2	ALUMINUM SHEET SP. 0.03 MM	657,79	sq.m.
3	SUPERLITE+PERLOFON+FUSED CEMENT 250 KG/CUM	32,88	cu.m.
4	PLASTER OF SAND AND CEMENT	19,73	cu.m.
5	CAIL WOOL MATERIALS 1" - 128 KG/CUM	235,51	sq.m.
6	POLYETHYLENE SHEET SP. 0.8 MM	572,01	sq.m.
7	CAIL WOOL MATERIALS 2" - 128 KG/CUM	336,50	sq.m.

The same key is present to obtain a summary of the total amount of insulation used for the walls, both *lower* and *upper*.

The *exp.Excel* command allows you to have an Excel folder with summaries of the isolations used for the ceiling for walls and for the kiln cars. The folder also contains a last summary sheet of everything, which allows you to define the total cost and possibly compare it with the planned project budget.

	A	B	C	D	E
1	3				
2	A				
3	A-ESS-TUNNEL				
4					
5					
6	TRADITIONAL KILN				
7					
8					
9		Kiln length	mt	105,690	
10		Total kiln height	mt	3,830	
11		Internal kiln width	mt	5,650	
12		External kiln width	mt	7,330	
13					
14					
15		CEILING	1		
16					
17		WALLS	2		
18					
19		VARIOUS	3		
20					
21		KILN CAR	4		
22					
23		SUMMARY	5		
24					
25		PURCHASES	6		
26					
27			Update	31/12/2018	
28					
29					
30					
31					
32					
33					
	Main 1/2/3/4/5/6/				

By way of example, the contents of the first sheet of the aforementioned folder are shown on the following page.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		0											
2		A											
3													
4													
5													
6													
7													
8													
9													
10													
11		ZONE 1	length	mt	4,433	5,3%	thicknesses	4,433					
12			SUPERLITE+PERLOFON+PORTLAND CEMENT 150 KG/CUM	cu.m.	8,64		345,00						
13			ALUMINUM SHEET SP. 0.03 MM	sq.m.	25,05		0,03						
14			SUPERLITE+PERLOFON+FUSED CEMENT 250 KG/CUM	cu.m.	1,25		50,00						
15			PLASTER OF SAND AND CEMENT	cu.m.	0,75		30,00						
16							Total	425,03					
17													
18													
19													
20													
21		ZONE 2	length	mt	15,251	17,2%	thicknesses	19,684					
22			CIL WOOL MATERIALS 1" - 128 KG/CUM	sq.m.	86,17		25,40						
23			SUPERLITE+PERLOFON+PORTLAND CEMENT 150 KG/CUM	cu.m.	29,73		345,00						
24			ALUMINUM SHEET SP. 0.03 MM	sq.m.	86,17		0,03						
25			SUPERLITE+PERLOFON+FUSED CEMENT 250 KG/CUM	cu.m.	4,31		50,00						
26			POLYETHYLENE SHEET SP. 0.8 MM	sq.m.	86,17		0,80						
27			PLASTER OF SAND AND CEMENT	cu.m.	2,59		30,00						
28							Total	451,23					
29													
30													
31													
32		ZONE 3	length	mt	48,148	54,3%	thicknesses	67,832					
33			CIL WOOL MATERIALS 2" - 128 KG/CUM	sq.m.	272,04		50,80						
34			SUPERLITE+PERLOFON+PORTLAND CEMENT 150 KG/CUM	cu.m.	99,29		365,00						
35			ALUMINUM SHEET SP. 0.03 MM	sq.m.	272,04		0,03						
36			SUPERLITE+PERLOFON+FUSED CEMENT 250 KG/CUM	cu.m.	13,6		50,00						
37			POLYETHYLENE SHEET SP. 0.8 MM	sq.m.	272,04		0,80						
38			PLASTER OF SAND AND CEMENT	cu.m.	8,16		30,00						
39							Total	496,63					
40													
41													
42													
43		ZONE 4	length	mt	16,404	18,5%	thicknesses	84,236					
44			CIL WOOL MATERIALS 1" - 128 KG/CUM	sq.m.	92,68		25,40						
45			SUPERLITE+PERLOFON+PORTLAND CEMENT 150 KG/CUM	cu.m.	31,98		345,00						
46			ALUMINUM SHEET SP. 0.03 MM	sq.m.	92,68		0,03						
47			SUPERLITE+PERLOFON+FUSED CEMENT 250 KG/CUM	cu.m.	4,63		50,00						
48			POLYETHYLENE SHEET SP. 0.8 MM	sq.m.	92,68		0,80						
49			PLASTER OF SAND AND CEMENT	cu.m.	2,78		30,00						
50													

SUMMARY OF CEILING

Material	Composition	U.M.	amount
EXPANDED CLAY+PORTLAND CEMENT 100 KG/CUM	Expanded clay 1,25 cum/cum Portland Cement 100 kg/cum	m³	-
SUPERLITE+PERLOFON+PORTLAND CEMENT 250 KG/CUM	Superlite 0,625 cum/cum Perlofon 0,625 cum/cum Portland Cement 250 kg/cum	m³	-
SUPERLITE+PERLOFON+PORTLAND CEMENT 150 KG/CUM	Superlite 0,625 cum/cum Perlofon 0,625 cum/cum Portland Cement 150 kg/cum	m³	178,28
VERMICULITE+PORTLAND CEMENT 100 KG/CUM	Vermiculite 1,2 cum/cum Portland Cement 100 kg/cum	m³	111,43
PLASTER OF SAND AND CEMENT	Sand 1,2 cum/cum Portland Cement 250 kg/cum	m³	26,742
SUPERLITE+PERLOFON+FUSED CEMENT 250 KG/CUM	Superlite 0,625 cum/cum Perlofon 0,625 cum/cum Fused Cement 250 kg/cum	m³	15,03
SUPERLITE+PERLOFON+FUSED CEMENT 150 KG/CUM	Superlite 0,625 cum/cum Perlofon 0,625 cum/cum Fused Cement 150 kg/cum	m³	18,04
VERMICULITE+FUSED CEMENT 100 KG/CUM	Vermiculite 1,25 cum/cum Fused Cement 100 kg/cum	m³	3,758
CHAMOTTE+FUSED CEMENT 300 KG/CUM	Chamotte 1,2 cum/cum Fused Cement 300 kg/cum	m³	25,04

SUMMARY OF MATERIALS

Material	U.M.	amount
SAND	m³	18,04
CHAMOTTE	m³	-
CEMENT PORTLAND	kg	30.500
EXPANDED CLAY	m³	-
SUPERLITE	m³	127,08
PERLOFON	m³	127,08
VERMICULITE	m³	-
FUSED CEMENT	kg	6.260
CIL WOOL MATTRESS 2" - 128 KG / CUM	cu.m	277 m²

Section 4 – DRYER

Section 4.1 – DRYER → Sizing



Sizing of the dryer whose type has already been chosen in Section 2.3

NOTE: after sizing, the program has already completely defined the dryer, as can be seen in the next sections which will allow you to make the necessary changes to customize the project.

CHAMBER DRYER

A screenshot of the 'CHAMBER DRYER' software interface. The window title is 'CombVent - A-ESS-CAMERE-CARR-VT'. The menu bar includes 'File', 'Displays', 'Instruments', 'Information', and 'Help'. The main area is divided into several sections:

- DRYER** (left sidebar):
 - Nº of Dryer: 1
 - Specific consumption: 1050 kcal/kgH2O
 - Correction factor: 1
 - Correct correction factor: 1.050 kcal/kgH2O
 - Shifts per day: 3 n°
 - Working days per week: 7 n°
 - Gross daily production: 416 ton of fired/day
 - Total shrinkage: 5,5 %
 - Moisture wireworks: 24 %
 - Loss of spontaneous evaporation: 0 %
 - Residual moisture in the material: 2,5 %
 - Water to be expelled (*): 21,5 %
 - Water quantity to be expelled: 3.727 kg/h
 - (*) Value related to the weight of fired product
 - Basic Product: HOUDIS H15
 - Product type: CEILING BLOCK
 - Fired weight: 9,05 kg
- CHAMBER DRYER** (right sidebar):
 - Nº of drying chambers: 10
 - Nº of lanes per chamber: 2
 - Nº of cars-shelfs/chamber: 20
 - Nº of cars-shelf / lane: 10
 - Nº of pieces / cars-shelfs: 420
 - Nº of piece / chamber: 8.400
 - Water to be ejected per chamber: 373 kg/h
 - Nominal drying cycle: 43 h 51'
 - Type of clay: ☒ Easy ☐ Difficult
 - Internal ventilation**:
 - ☐ Transversal ☒ Longitudinal
 - Nº of ventilators per chamber: 3
 - Capabilities of a single fan: 28000 mc/h
 - Total flow of chamber ventilation: 84.000 mc/h
 - Total number of fans: 30
 - Overall dimensions of a chamber**:
 - Interior length: 30,050 mt
 - Inside width: 5,400 mt
 - Internal height: 3,800 mt

Just enter a few data to completely define the dryer (boxes with a white background).

The indication of the type of *easy* / *difficult* clay involves a change in the amount of ventilation air needed (higher for *difficult* clays).

There are two different *directions* of internal ventilation. The *Transversal* one provides for the choice of the type of mixer and the choice of having a ventilation on both sides or not. By transversal direction is meant that according to the width of the chamber for which the support (Trolley or Rack) of the material to be dried is *laterally* ventilated.

A screenshot of the 'Internal ventilation' settings section. It includes:

- Internal ventilation**:
 - ☒ Transversal ☐ Longitudinal
 - Type of mixer: moving cone (dropdown menu)
 - Ventilation on both sides: No ☐ Yes ☒
 - Capabilities of a single fan: 20000 cum/h
 - Nº of mixers / lane: 7
 - Nº of mixer lanes: 1
 - Nº total mixers: 70

The *Longitudinal* direction only provides the indication of the number of fans for each chamber and the capacity of the individual fan. By longitudinal direction we mean that according to the length of the chamber for which the support (Trolley or Rack) of the material is *frontally* ventilated. The difference will then be more clearly seen later.

Internal ventilation

☐ Transversal

☒ Longitudinal

N° of ventilators per chamber	3
Capabilities of a single fan	28000 mc/h
Total flow of chamber ventilation	84.000 mc/h
Total number of fans	30

INTERNAL VENTILATION OF DRYERS

There are four different types of mixers (in the case of *Transversal* ventilation).

Internal ventilation

Type of mixer

- moving cone
- rotating cone
- moving cone
- axial moving
- axial+cone moving

Rotating cone

These are sheet metal cones with side openings over the entire height from where the hot air, coming from the openings on the floor, is sucked by the fan at the top of the cone and blown through the side slits on the material. The cones are fixed in predetermined positions and rotate on themselves, generally of 120° in both directions.

Internal ventilation

Ventilation on both sides ☐ No ☒ Yes

Type of mixer: rotating cone

N° of mixers / lane: odd lane 11 equal lane 12

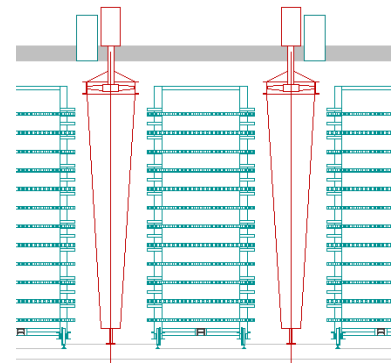
N° of mixer lanes: 7

Diameter of the collar fan: 800 mm

Collar thickness: 200 mm

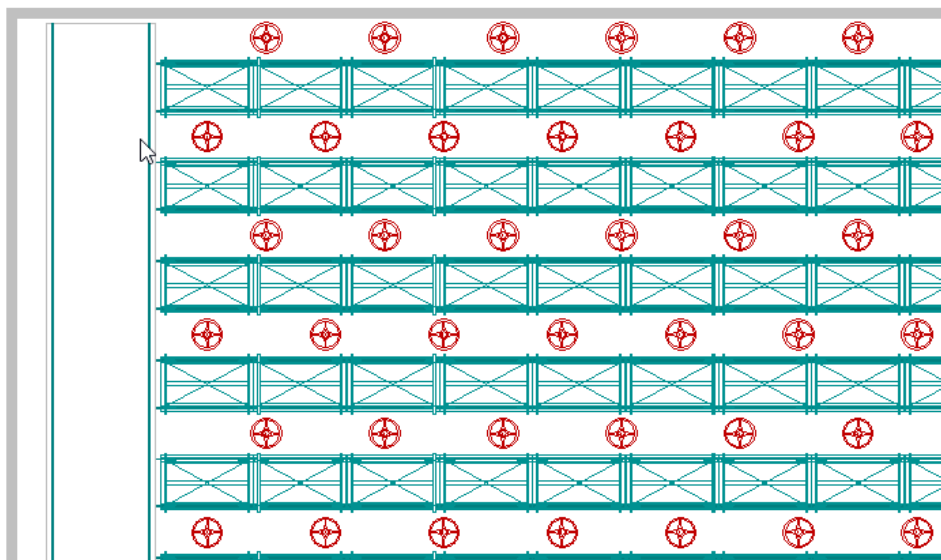
Height of the cone: 3890 mm

Distance between collar and roof slab: 350 mm



NOTE: setting the value relative to the height of the cone to zero, the program automatically calculates the maximum value compatible with the dimensions of the material charge.

Generally, with this type of mixer the ventilation is adopted on *both sides* so the rows of mixers are arranged staggered so as to have a greater uniformity of ventilation of the material.



In this case it is obvious that the files can not contain the same number of mixers (see *odd* lane, *even* lane).

Moving cone

Also in this case it is a sheet metal cone with side openings on the whole height for the passage of hot air to the material. The cones are provided with a fan at the top that draws hot air from openings in the attic. In this case the cones are placed on a base provided with wheels and move between the rows of material to be dried.

Internal ventilation

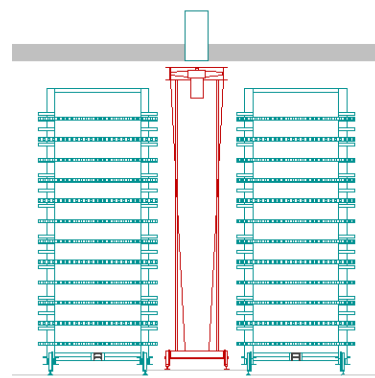
Ventilation on both sides ☒ No ☐ Yes

Type of mixer: **moving cone**

N° of mixers / lane: **9**
N° of mixer lanes: **3**

Mixers wheelbase: **4594** mm
Diameter of the collar fan: **800** mm
Collar thickness: **200** mm
Height of the cone: **4110** mm
Distance between collar and roof slab: **100** mm

Motion: **4598** mm
< **0** >
Edit cart mixer



In this case it is necessary to indicate the distance between the various mixers on the same tracks. The program automatically calculates the travel (translation) that each group of mixers must make.

NOTE: If the wheelbase of the mixers are set to zero, the program calculates and proposes, according to the internal length of the dryer, a value that makes very similar, if not equal, wheelbase and translation.

Axial moving

In this case the cone is replaced by one or more fixed axial fans.

Internal ventilation

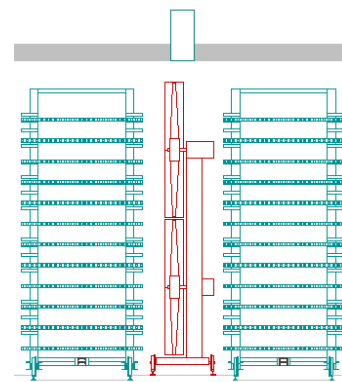
Ventilation on both sides ☒ No ☐ Yes

Type of mixer: **axial moving**

N° of mixers / lane: **9**
N° of mixer lanes: **3**

Mixers wheelbase: **4483** mm
N° of helices / mixer: **2**
Propeller diameter: **2000** mm
Position from the base of the cart: **1050** mm
Vertical helices wheelbase: **2050** mm

Motion: **4486** mm
< **0** >
Edit cart mixer



NOTE: for the wheelbase of the mixers, the same applies to moving cone mixers.

By introducing the number of propellers for each mixer the program automatically calculates the *diameter*, the *wheelbase* in the case of more than one propeller and the *position* of the propeller axis lower than the level of the dryer.

Axial + Cone moving

This is a solution that provides a moving cone and an axial moving joint set on a same base provided with wheels. The same applies to the same single mixers.

Internal ventilation

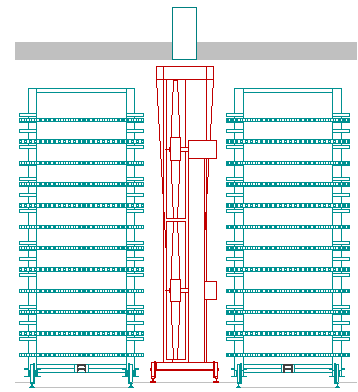
Ventilation on both sides ☒ No ☐ Yes

Type of mixer
axial+cone moving

N° of mixers / lane 9
N° of mixer lanes 3

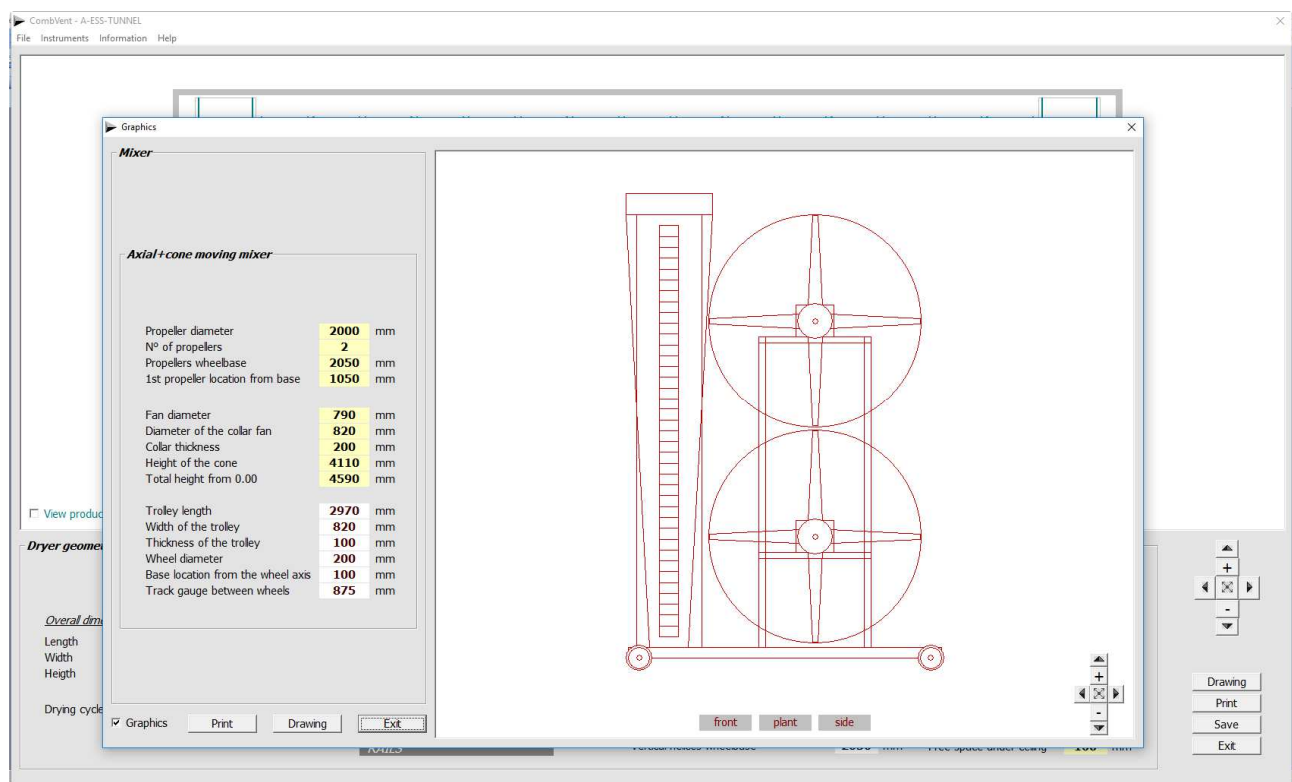
Mixers wheelbase 4387 mm
N° of helices / mixer 2
Propeller diameter 2000 mm
Position from the level of the dryer 1050 mm
Vertical helices wheelbase 2050 mm

Motion 4384 mm
Edit cart mixer < 0 >
Fan diameter 820 mm
Collar thickness 200 mm
Height of the cone 4110 mm
Free space under ceiling 100 mm



In the three cases shown there are the keys < > that allow a simulation of the movement of the mixers inside the dryer.

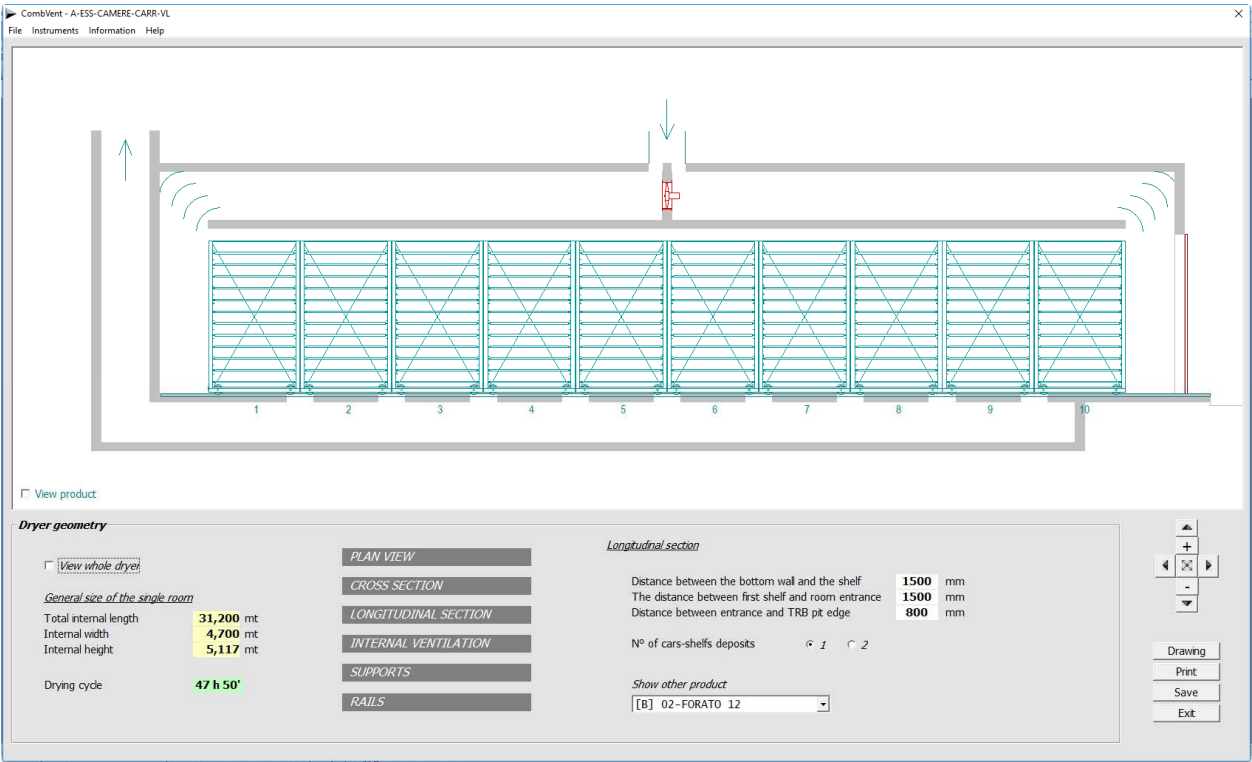
The *Edit Cart Mixer* command is also available, which allows dimensional changes to be made to the structure of the mixer's cart.



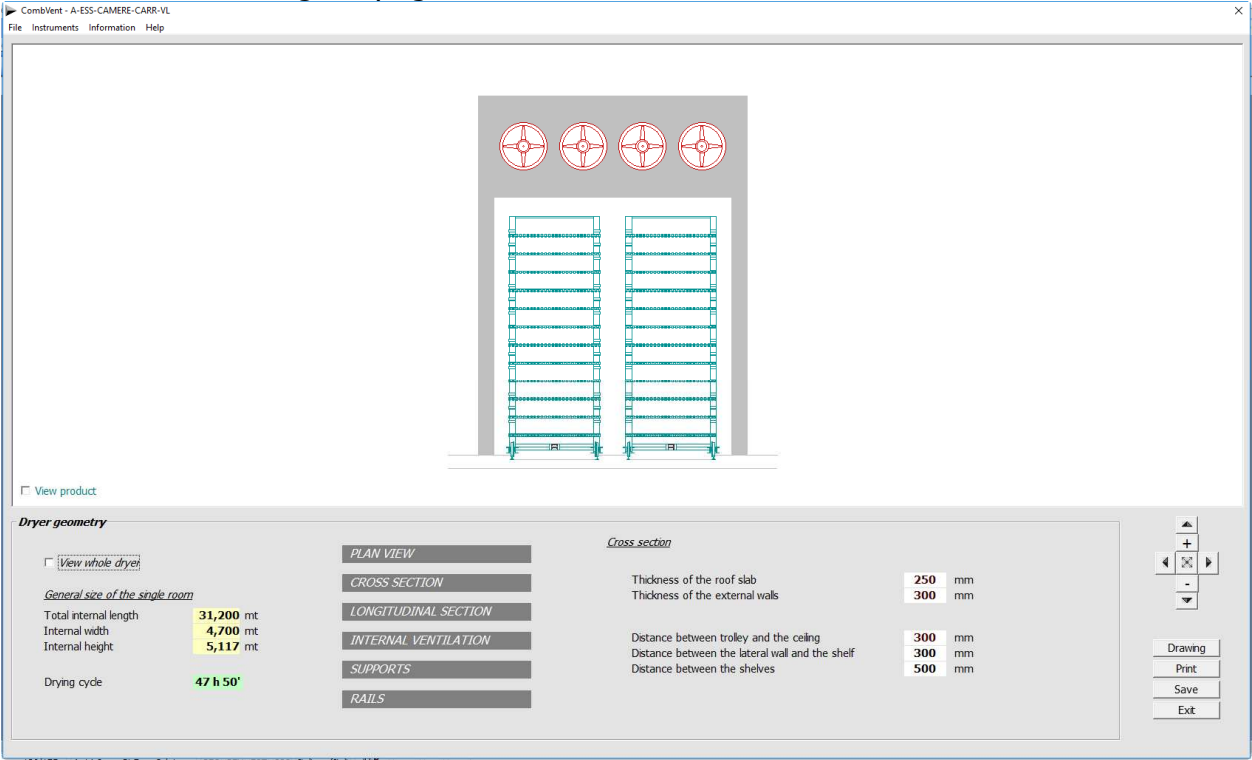
The quantities that can be modified are those indicated in the boxes with a white background.

As in other cases, the *Drawing* command allows to obtain, in this case, the mixer drawing displayed in DWG format and 1: 1 scale.

In the case of *longitudinal ventilation direction*, the fan is of the fixed axial type as shown in the following figure.

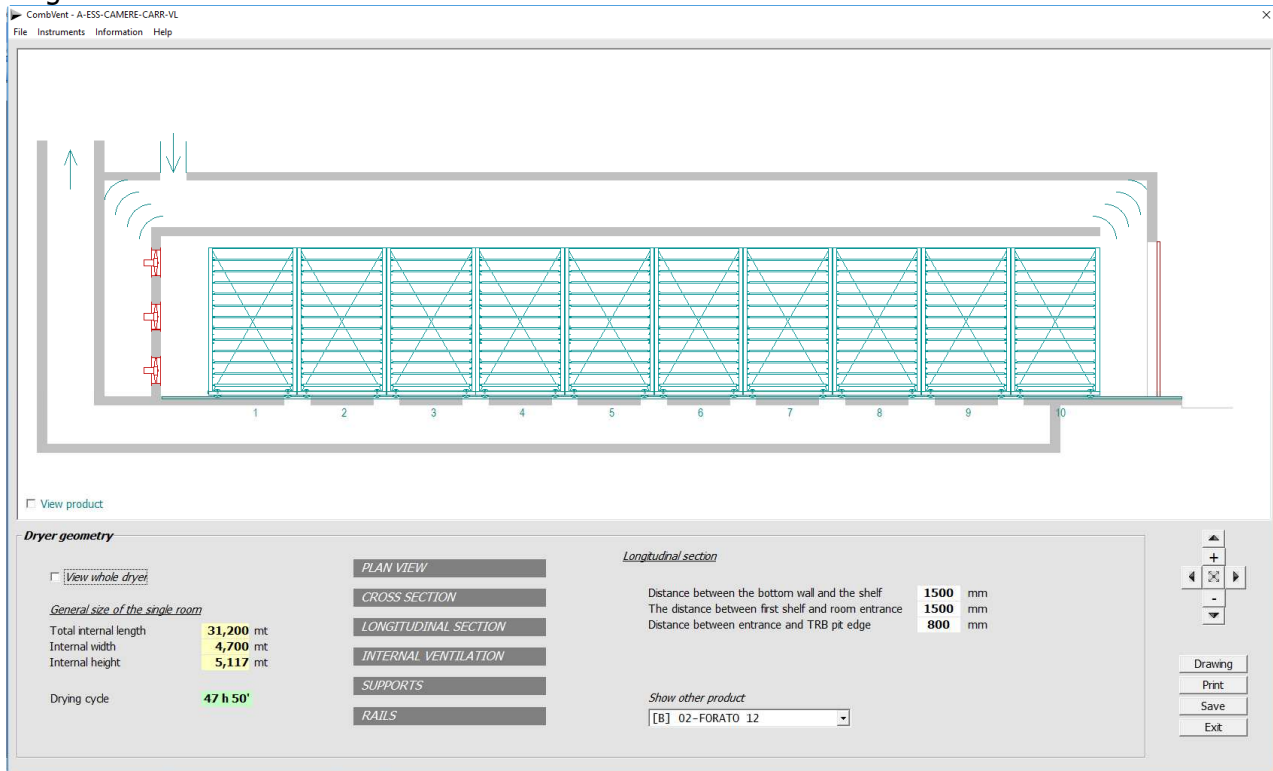


cross-section of the *single* drying chamber

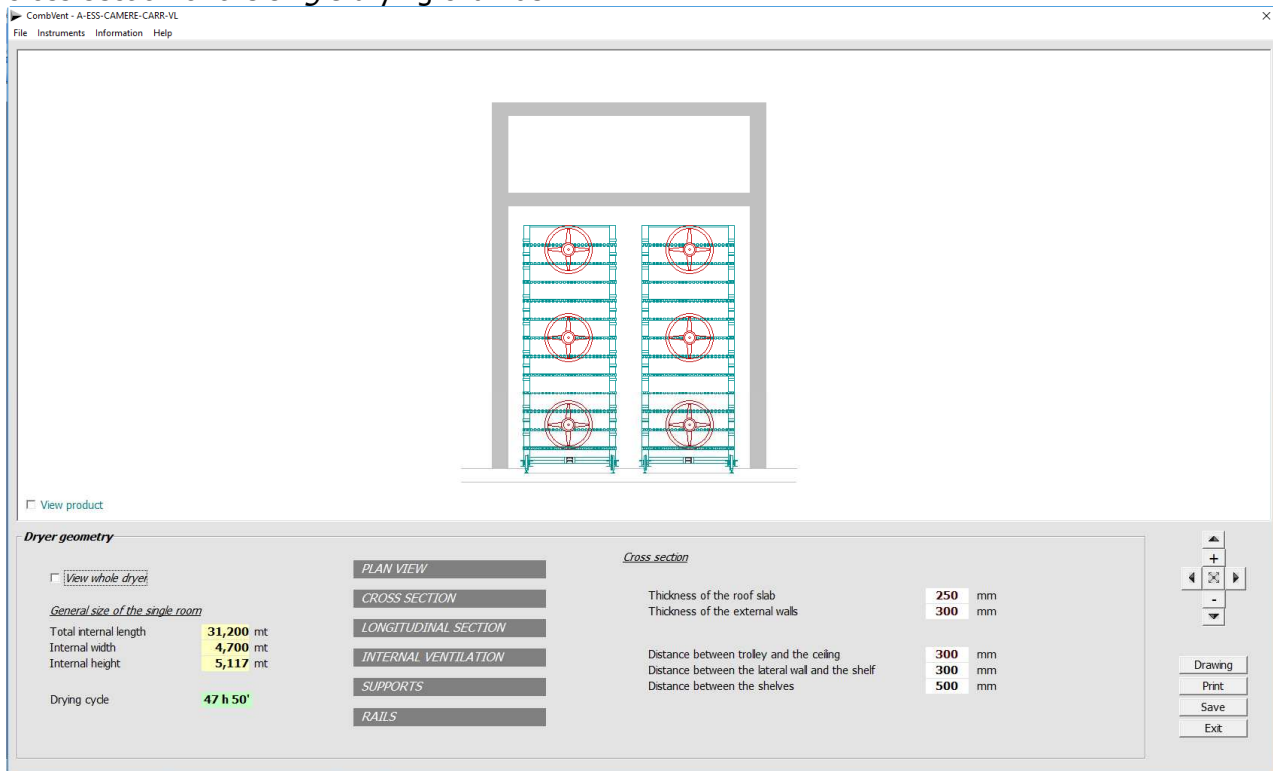


A variant with respect to the *longitudinal direction of ventilation* is possible, as can be seen from the following figures.

longitudinal section



cross-section of the *single* drying chamber



TUNNEL DRYER

Home screen

CombVent - A-ESS-TUNNEL
File Displays Instruments Information Help

DRYER

Nº of Dryer	1	Total calories needed	3,541.000 kcal/h
Specific consumption	950 kcal/kgH2O	Calories from the kln recovery	2,211.000 kcal/h
Correction factor	1	Difference (calories to integrate)	1,330.000 kcal/h
Correct correction factor	950 kcal/kgH2O		

Auxiliary heat source


Fuel type	Methane
Nº of hot air generators	1
Potentiality / hot air generators	1,500.000 kcal/h
HOT AIR GENERATOR - IN AIR VEIN	
Fuel consumption	161,2 Ncum/h

Environment temperature: 15 °C
Hot air supply fans: 2 n°
Recycling fans: 0 n°
Most air evacuation fans: 3 n°

Shifts per day: 3 n°
Working days per week: 7 n°
Gross daily production: 416 ton of fired/day
Total shrinkage: 6,0 %
Moisture wireworks: 24 %
Loss of spontaneous evaporation: 0 %
Residual moisture in the material: 2,5 %
Water to be expelled (*): 21,5 %
Water quantity to be expelled: 3,727 kg/h

(*) Value related to the weight of fired product

Basic Product: BLOCK B15
Product type: FORATO LEGGERO
Fired weight: 8,00 kg



TUNNEL DRYER

☒ Sets the drying cycle
☐ Sets the size

Min drying cycle	24 h
Nº of trolley needed	90
Nº of lanes of drying	6
Nº of trolleys for each lane	15
Nº of spare trolleys	10

Add : ☐ Entrance lane
☐ Exit lane
☒ Input / output corridor

Nº of trolleys in the entrance-exit lane: 1 9
Total number of trolleys: 110

Internal ventilation

Type of mixer: moving cone

Ventilation on both sides: ☒ No ☐ Yes

Capabilities of a single fan	28000 m³/h
Nº of mixers / lane	9
Nº of mixer lanes	3
Total Number of mixers in the inner lanes	27

Ventilation in the exit lane

Add ventilation: ☒ No ☐ Si

Nº of mixers	0
Nº total mixers	27

Overall dimensions of dryer

Interior length	42,600 mt
Inside width	16,000 mt
Internal height	4,690 mt

Ventilation
Graphics

Exit

The dryer can be defined by setting the *drying cycle* you want or by setting the *dimensions*. In both cases, for sizing it is sufficient to enter the values in the boxes with a white background.

Additional lanes or a single entry-exit corridor can be provided. It will be much clearer to evaluate the differences when switching to the dryer's graphic display.

NOTE: with regard to internal ventilation, the same applies to the chamber dryer.

As you will see better later, there is the possibility of adding ventilation both in the entry lane and in the exit lane.

☒ Sets the drying cycle
☐ Sets the size

Min drying cycle	24 h
Nº of trolley needed	90
Nº of lanes of drying	6
Nº of trolleys for each lane	15
Nº of spare trolleys	10

Add : ☐ Entrance lane
☐ Exit lane
☒ Input / output corridor

Internal ventilation

Type of mixer: moving cone

Ventilation on both sides: ☒ No ☐ Yes

Capabilities of a single fan	28000 cum/h
Nº of mixers / lane	9
Nº of mixer lanes	3
Total Number of mixers in the inner lanes	27

Ventilation in the exit lane

Add ventilation: ☒ No ☐ Yes

Nº of mixers	0
Nº total mixers	27

RAPID DRYER

Home screen

CombVent - A-ESS-BILANCELLE
File Displays Instruments Information Help

DRYER

N° of Dryer	1	Total calories needed	4,287,000 kcal/h
Specific consumption	1150 kcal/kgH2O	Calories from the kln recovery	2,211,000 kcal/h
Correction factor	1	Difference (calories to integrate)	2,076,000 kcal/h
Correct correction factor	1.150 kcal/kgH2O		

Auxiliary heat source


Fuel type	Methane
N° of hot air generators	2
Potentiality / hot air generators	1,500,000 kcal/h
HOT AIR GENERATOR - IN AIR VEIN	
Fuel consumption	251,6 Ncurn/h

Environment temperature	15 °C
Hot air supply fans	2 n°
Recycling fans	2 n°
Moist air evacuation fans	3 n°

(*) Value related to the weight of fired product

Shifts per day	3 n°
Working days per week	7 n°
Gross daily production	416 ton of fired/day
Total shrinkage	6,0 %
Moisture wireworks	24 %
Loss of spontaneous evaporation	0 %
Residual moisture in the material	2,5 %
Water to be expelled (*)	21,5 %
Water quantity to be expelled	3,727 kg/h

Basic Product: **VOLTERRANA 16**
Product type: **SOLAIO INTERPOSTO**
Fired weight: **6,60 kg**



Ventilation
Graphics

RAPID DRYER

N° of galleries	2
Step between the cars	2800 mm
Cars for each gallery	30 n°
Total cars	60 n°

[Data referred to the basic product]

Charge for each car	792 kg of fired
Total charge for the dryer	47,5 ton of fired
Drying cycle	2 h 44'
Cars / hour	21,9 n°
Cars / day	525,5 n°

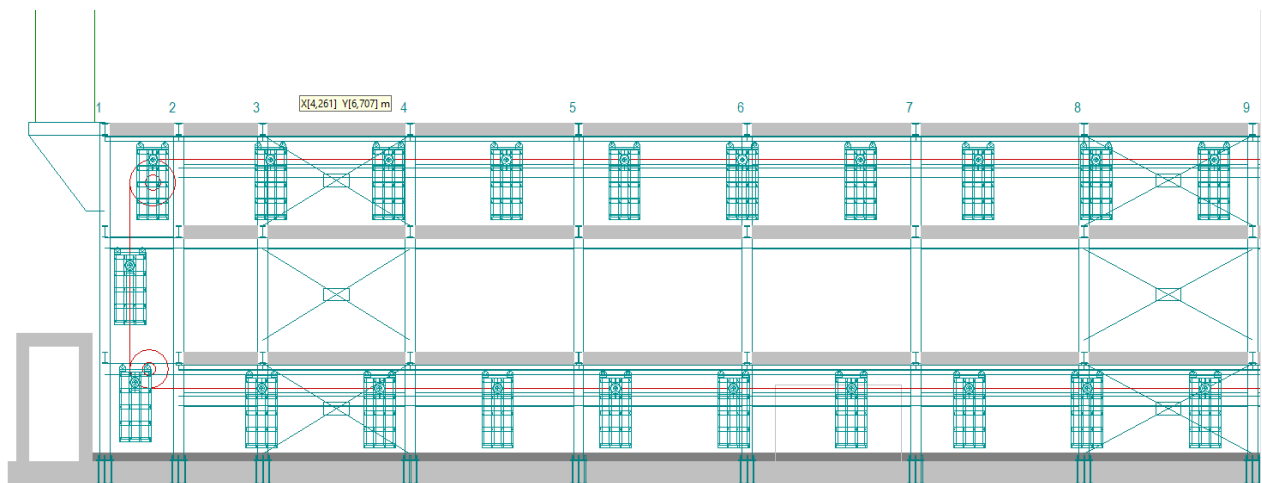
Internal dimensions

Length of the gallery	78,879 mt
Width of the gallery	6,940 mt
Height of single gallery	2,150 mt

Exit

The dimensioning of the dryer consists in indicating the *number of galleries*, the *step* of the cars and the *number* of cars in each gallery.

Detail of the loading head of the dryer, as will be seen in the *Section 4.3 – DRYER → Graphics*.



DRYER WITH LARGE VOLUMES OF AIR

Where it is possible to exploit the atmospheric air for drying the brick, it is possible to think of the use of a dryer designed for this purpose, ie the use of natural resources. Naturally large volumes of air are needed to meet certain production needs. The exploitation of natural energy is therefore at the basis of the concept of this type of dryer.

It is also obvious that, since the weather conditions are variable, it is necessary to resort to artificial heat sources to provide all the calories needed.

Home screen


CombiVent - A-ESS-A-GRANDI-VOLUMI
File Displays Instruments Information Help

DRYER

N° of Dryer	1	Total calories needed	3.019.000 kcal/h	DRYER WITH LARGE VOLUMES OF AIR	
Specific consumption	1080 kcal/kgH2O	Calories from the kiln recovery	1.658.000 kcal/h	<input checked="" type="radio"/> Sets the drying cycle	
Correction factor	1	Difference (calories to integrate)	1.361.000 kcal/h	<input type="radio"/> Sets the size	
Correct correction factor	1.080 kcal/kgH2O				

Shifts per day	3 n°	<u>Auxiliary heat source</u>	Fuel type	Methane	Min drying cycle	24 h
Working days per week	7 n°	N° of hot air generators	1		N° of trolley needed	124
Gross daily production	312 ton of fired/day	Potentiality / hot air generators	1.500.000 kcal/h		N° of lanes of drying	6
Total shrinkage	6,0 %	HOT AIR GENERATOR - IN AIR VEIN			N° of trolleys for each lane	20
Moisture viewworks	24 %	Fuel consumption	165,0 Ncum/h		N° of trolley in the entrance lane	1
Loss of spontaneous evaporation	0 %	Environment temperature	15 °C		N° of trolley in the exit lane	22
Residual moisture in the material	2,5 %	Hot air supply fans	1 n°		N° of spare trolleys	10
Water to be expelled (*)	21,5 %	Recycling fans	0 n°		Total number of trolleys	157
Water quantity to be expelled	2.795 kg/h	Moist air evacuation fans	16 n°			

(*) Value related to the weight of fired product

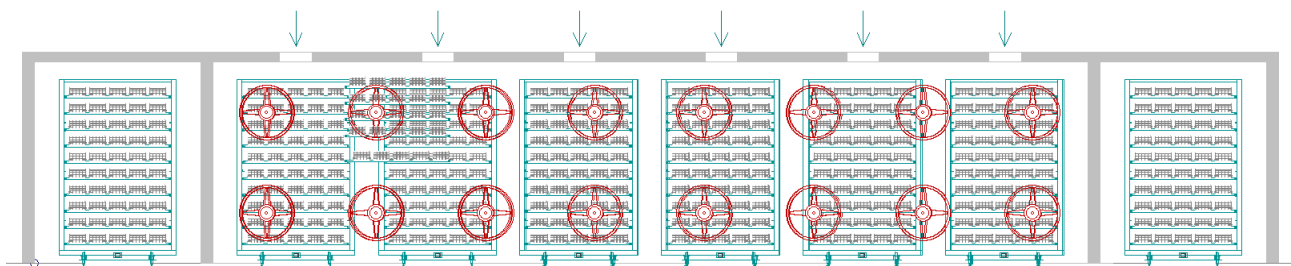
Basic Product	SOLAIO H15	
Product type	INTERPOSED CEILING	
Fired weight	7,00 kg	

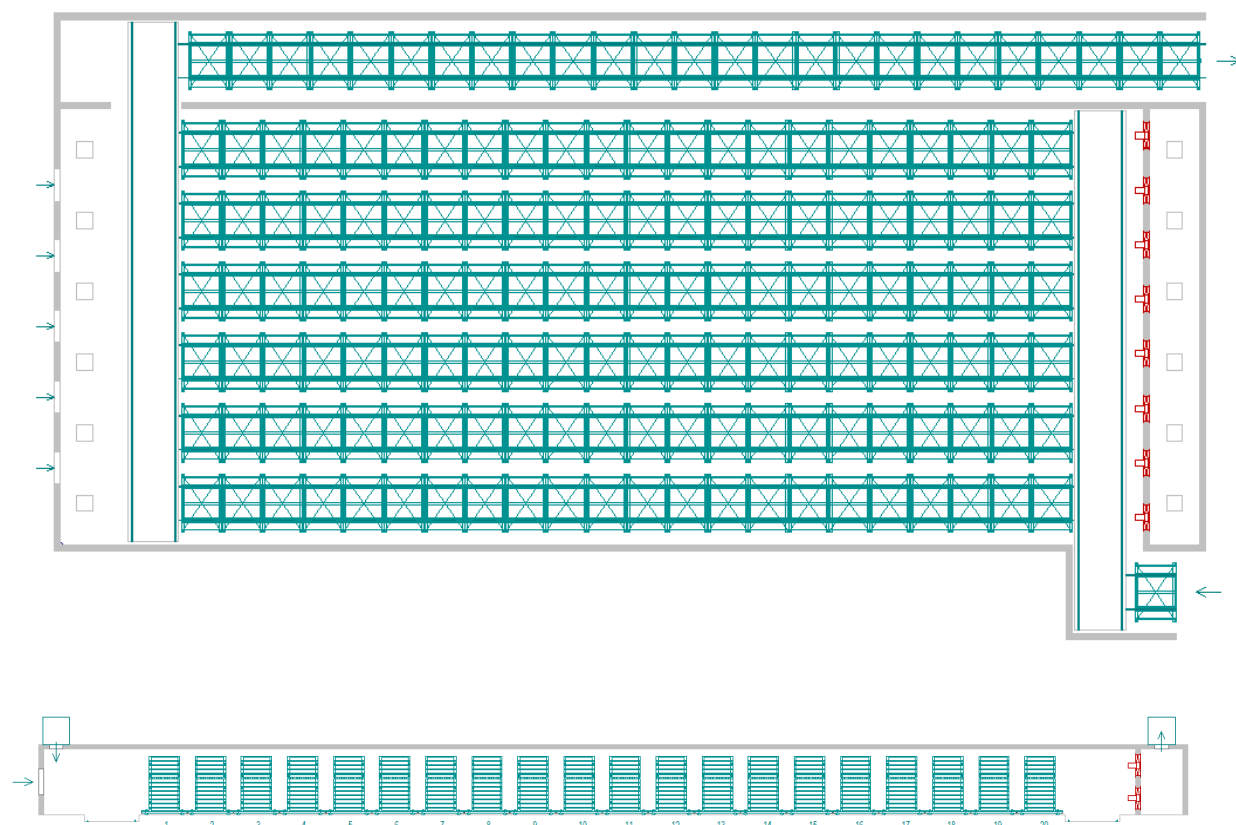
<u>Overall dimensions of dryer</u>	
Interior length	54,700 mt
Inside width	23,600 mt
Internal height	3,850 mt

Ventilation
Graphics

Exit

This type of dryer has internal ventilation which occurs longitudinally, that is to say, according to the direction of movement of the trolleys. The whole section of the gallery is interested in this flow that invests the material placed then with the drilling parallel to the flow itself.





As a result of the evacuation fans, the material is hit by a flow of air that consists of external air coming from the openings in the head of the dryer and hot air introduced through an auxiliary generator and coming from the openings arranged on the ceiling.

DRYER WITH WET LOADING ON KILN CAR

Home screen

CombVent - A-VERDE-SU-CARRO

File Displays Instruments Information Help

DRYER

Nº of Dryer	1	Total calories needed	5.031.000 kcal/h
Specific consumption	1200 kcal/kgH2O	Calories from the kiln recovery	2.487.000 kcal/h
Correction factor	1	Difference (calories to integrate)	2.544.000 kcal/h
Correct correction factor	1.200 kcal/kgH2O		

Auxiliary heat source

Fuel type: Methane

Nº of hot air generators: 1

Potentiality / hot air generators: 3.000.000 kcal/h

HOT AIR GENERATOR - IN AIR VEIN

Fuel consumption: 308,4 Ncum/h

Environment temperature: 15 °C

Hot air supply fans: 2 nº

Recycling fans: 40 nº

Moist air evacuation fans: 6 nº

DRYER WITH WET LOADING ON THE KILN CARS

☒ Sets the drying cycle

☐ Sets the size

Min drying cycle: 36 h

Nº of cars needed: 27

Nº of cars in the pre-chamber: 1

Nº of spare cars: 4

Total number of cars: 32

[Data referred to the basic product]

Load per car: 25.553 kg of fired

Total charge for the dryer: 689,93 ton of fired

Cars / hour: 0,8 nº

Cars / day: 18,0 nº

Nº of recycling hot air groups: 20

Nº of fans for each recycling group: 2

Length of the individual recycling steps: 2 nº

Overall dimensions of dryer

Interior length: 118,970 mt

Inside width: 7,165 mt

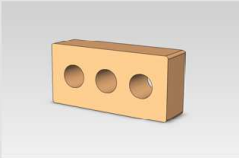
Internal height from the base of car: 2,236 mt

Total height of dryer: 2,486 mt

Basic Product: COMMON BRICK1

Product type: COMMON BRICK

Fired weight: 2,73 kg



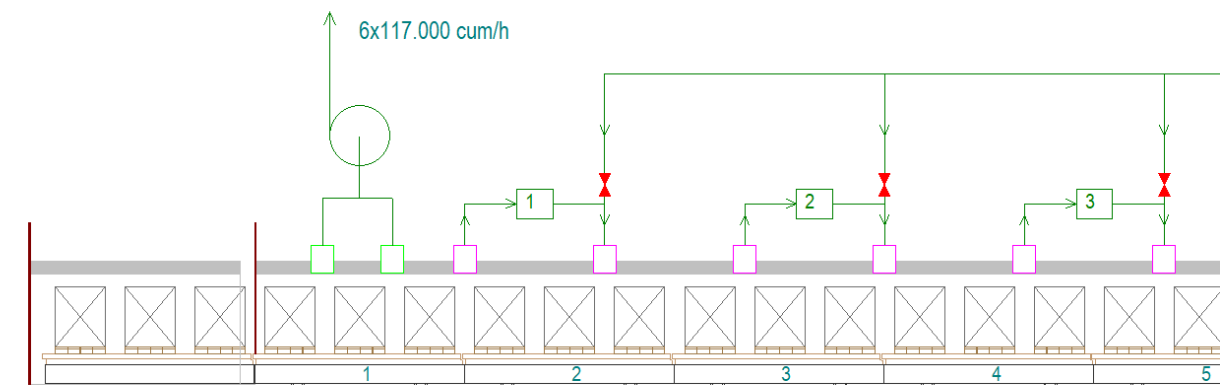
Ventilation

Graphics

Exit

As for the tunnel dryer, sizing can be performed by introducing the *drying cycle* or by indicating the *dimensions* of the dryer.

This type of dryer requires a large amount of air and forced recirculation of hot air along the entire length of the tunnel. Therefore, the *number of recycles* should be indicated, the *number of fans* for each recycling and the *length in recycle steps*.



In the example of the previous figure, the length of the recycles is 2 steps.

RAPID DRYER WITH SHORT CHARGE

Home screen

CombVent - A-ESS-CARICA-CORTA
File Displays Instruments Information Help

DRYER

Nº of Dryer	1	Total calories needed	5.955.000 kcal/h
Specific consumption	1150 kcal/kgH2O	Calories from the kin recovery	3.039.000 kcal/h
Correction factor	1	Difference (calories to integrate)	2.916.000 kcal/h
Correct correction factor	1.150 kcal/kgH2O		

Auxiliary heat source

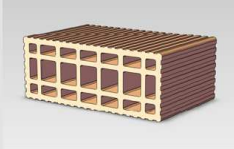
Fuel type	Methane
Nº of hot air generators	2
Potentiality / hot air generators	1.500.000 kcal/h
HOT AIR GENERATOR - IN AIR VEIN	
Fuel consumption	353,5 Ncum/h

Environment temperature

Hot air supply fans	15 °C
Recycling fans	1 nº
Moist air evacuation fans	0 nº
	3 nº

() Value related to the weight of fired product*

Basic Product	POROTHERM HP 150
Product type	FORATO PESANTE
Fired weight	8,50 kg



Ventilation
Graphics

RAPID DRYER SHORT CHARGE

⌂ Sets the drying cycle
⌂ Sets the size

Min drying cycle	4 h
Minimum number of required trolleys	94
Nº of trolley in the entrance lane	50
Nº of trolley in the exit lane	44
Minimum number of trolleys outside dryer	8
Nº of spare trolleys	10
Total number of trolleys	112

Internal ventilation

Nº of fan lanes in the entrance gallery	24
Nº of fan lanes in the exit gallery	21
Nº of fans in height	2
Total number of fans	90
Capabilities of a single fan	20000 cum/h

Overall dimensions of dryer

Interior length	133,660 mt
Inside width	8,200 mt
Internal height	3,720 mt

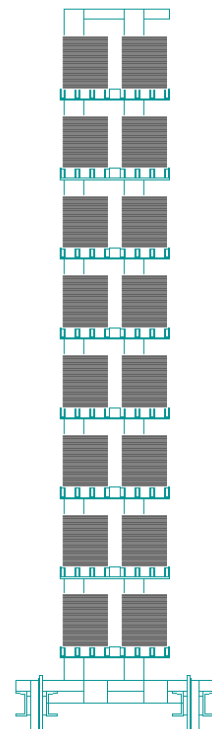
Exit

Also in this case the sizing can be carried out by setting the *drying cycle* or by indicating the *dimensions* of the dryer.

The dryer consists of an *entrance lane* and an *exit lane*. The two lanes are connected by two transfer car in such a way that the carriages make a ring path. Along this path there is the loading station and the unloading station of the material, as we will see later.

In the case of setting the duration of the cycle, it is sufficient to indicate the number of carriages in the entry lane, in addition to the spare trolleys. In the case of geometric sizing, it is necessary to indicate the number of trolleys in each lane. In this case the program will automatically determine the duration of the drying cycle.

In both cases, with regard to internal ventilation, the number of fans present in each lane and the number of the fans in height is shown, in addition to the capacity of the individual fan.



Section 4.2 – DRYER → Ventilation



Automatic sizing of dryer ventilation

CombVent - A-ESS-CAMERE-CARR-VT
File Instruments Information Help

DRYER - VENTILATION

CHAMBER DRYER

Using	Total flow rates cum/h	Temp. °C	Preval. mmH2O	Single flow rates cum/h	Fan N°	effic. η	KW				Type fan	Model fan	Motorizz. KW	Or.	
							Pabs at 20°C	Pabs at Text	Pinst total	Pabs total					
Hot air supply fans	185.000	110	120	185.000	1	.7	86.4	66.1	110	110	66.1	Centrifugal	CHB 80 II	110 KW	1
Recycling fans															
Moist air evacuation fans	206.000	60	40	20.500	10	.7	3.2	2.8	4	40	28	Axial	GAX 100	4 KW	AU
Internal ventilation	840.000	90	20	28.000	30	.7	2.2	1.8	2.2	66	54	Axial	GAX 100	2.2 KW	
										414	265.1				

Efficiency index: 21.9 (25 ÷ 30 grams of H2O / kg of hot air)
Internal agitation Index: 4.5 (5÷8)

Specific consumption: 15.29 kw/ton

Table of the orientations of the axial fans

A

AD

AU

B

BD

BU

AU

Exit

NOTE: the same information as in Section 3.3 applies (kiln ventilation).

Section 4.3 – DRYER → Graphics



Completion of the graphic definition of the dryer

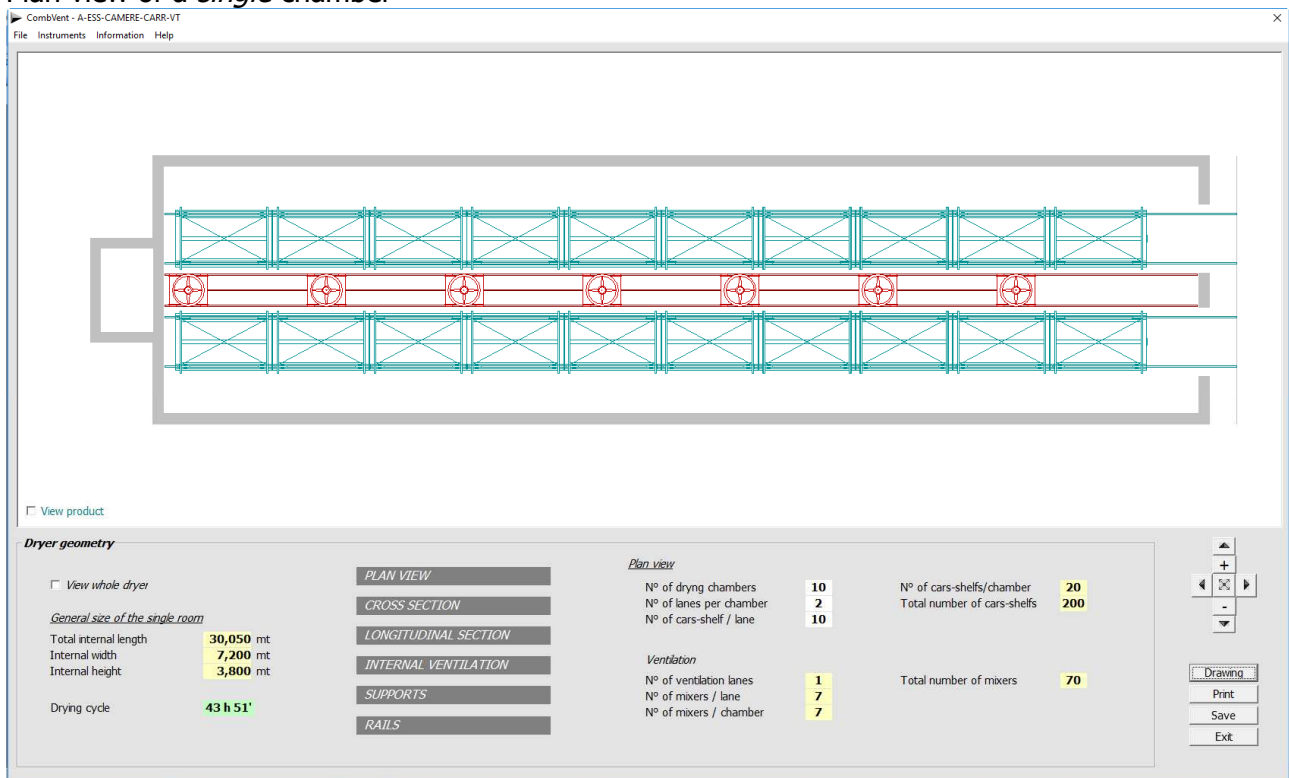
As already mentioned on page 31, there are 6 different types of dryer:

- *Chamber dryer*
- *Tunnel dryer*
- *Rapid dryer*
- *With large volumes of air*
- *With wet loading on kiln cars*
- *With short charge*

The various types as proposed by the program will be illustrated graphically below.

CHAMBER DRYER

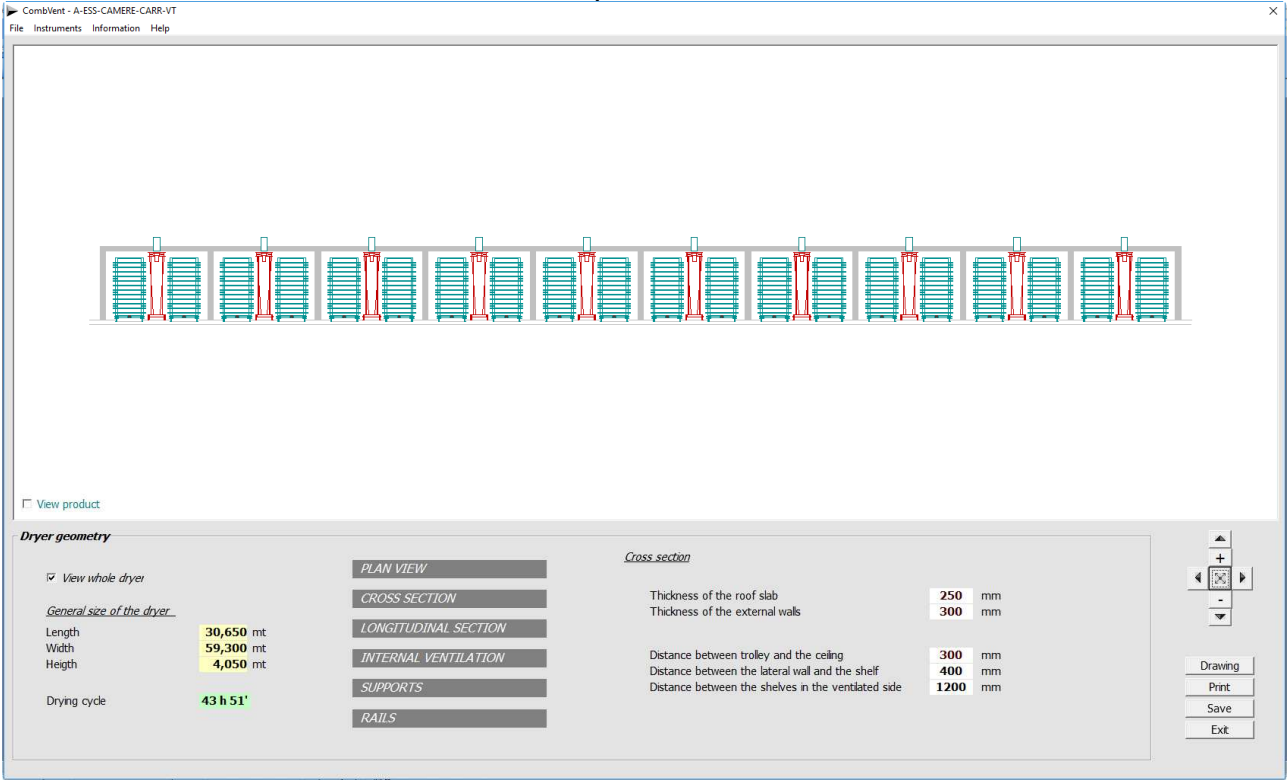
Plan view of a *single* chamber



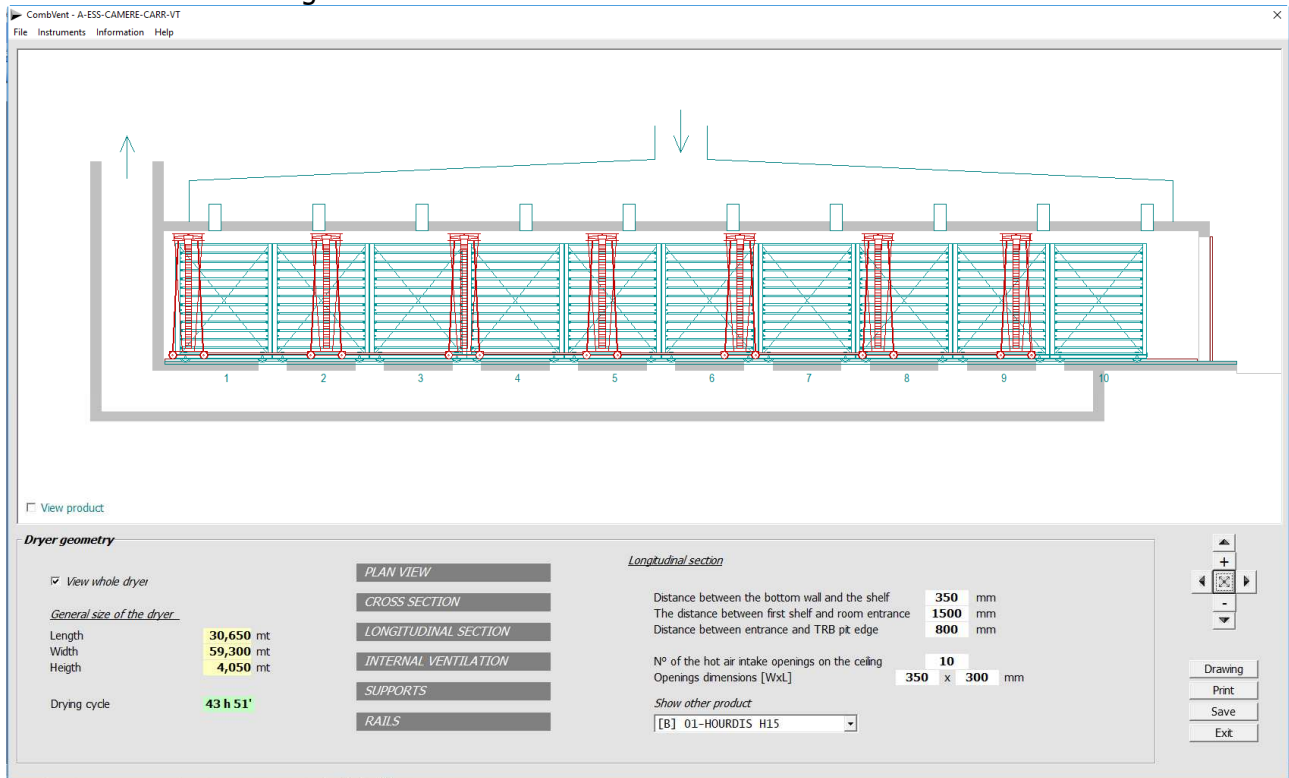
CHAMBER DRYER: Plan view of the entire dryer



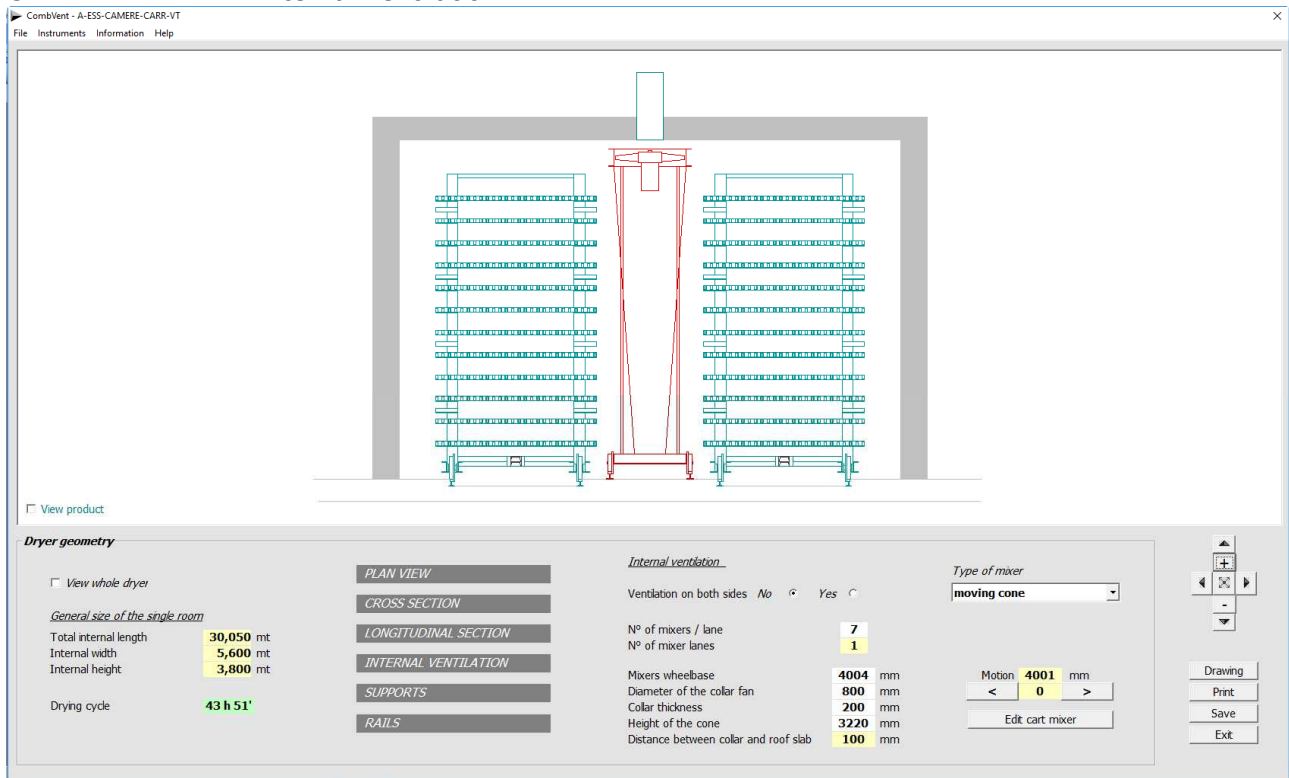
CHAMBER DRYER: Cross view of the entire dryer



CHAMBER DRYER: Longitudinal view



CHAMBER DRYER: Internal ventilation



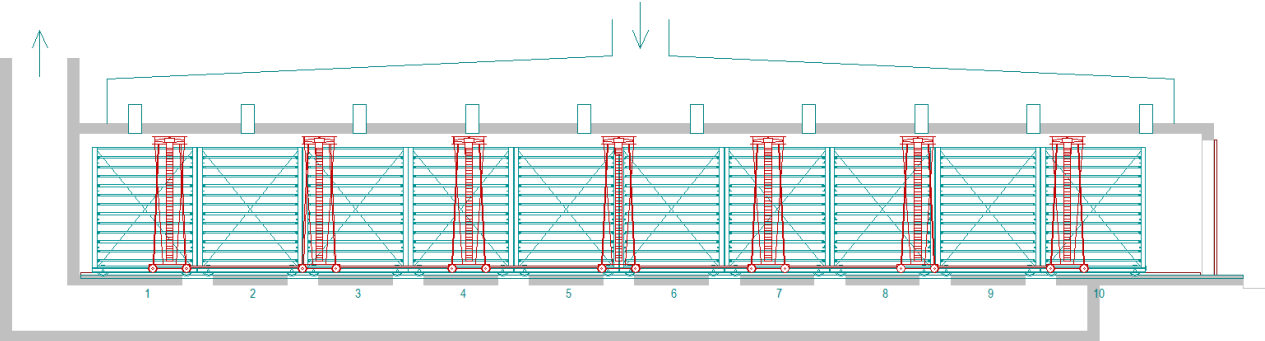
NOTE: In each window displayed it is possible to change the values proposed by default from the program by introducing the new values in the boxes with a white background.

With the commands < > is possible to simulate the movement of the mixers inside the dryer in the longitudinal view.

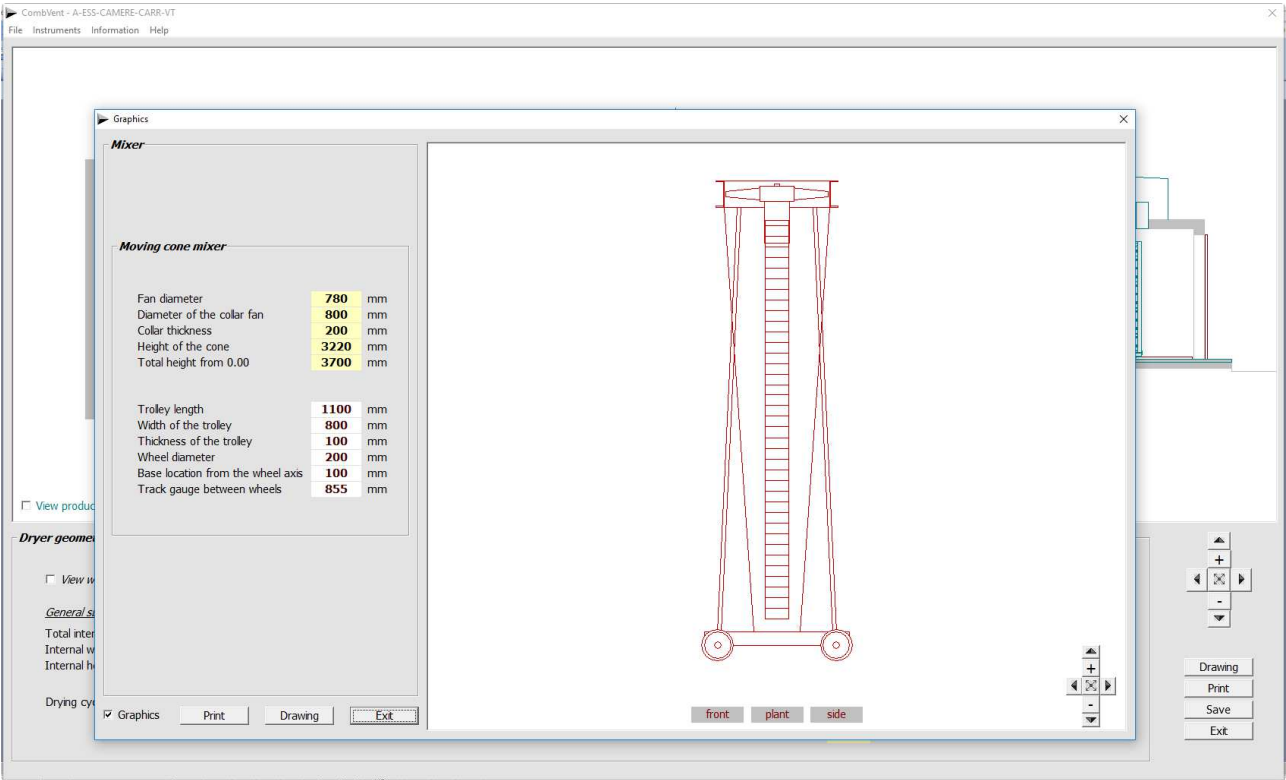
Motion **4001** mm

< **1700** >

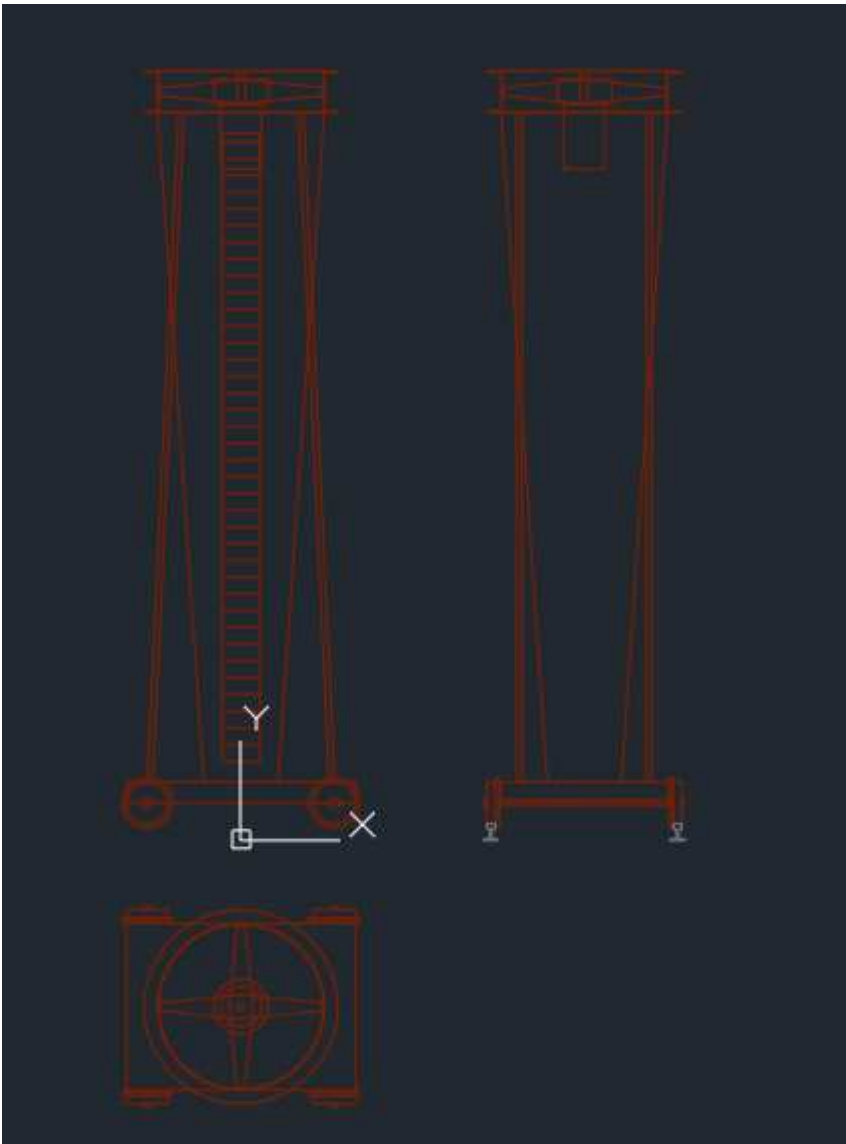
Edit cart mixer



It is also possible to make some changes to the mixer cart with the *Edit Cart mixer* command which displays the following window.

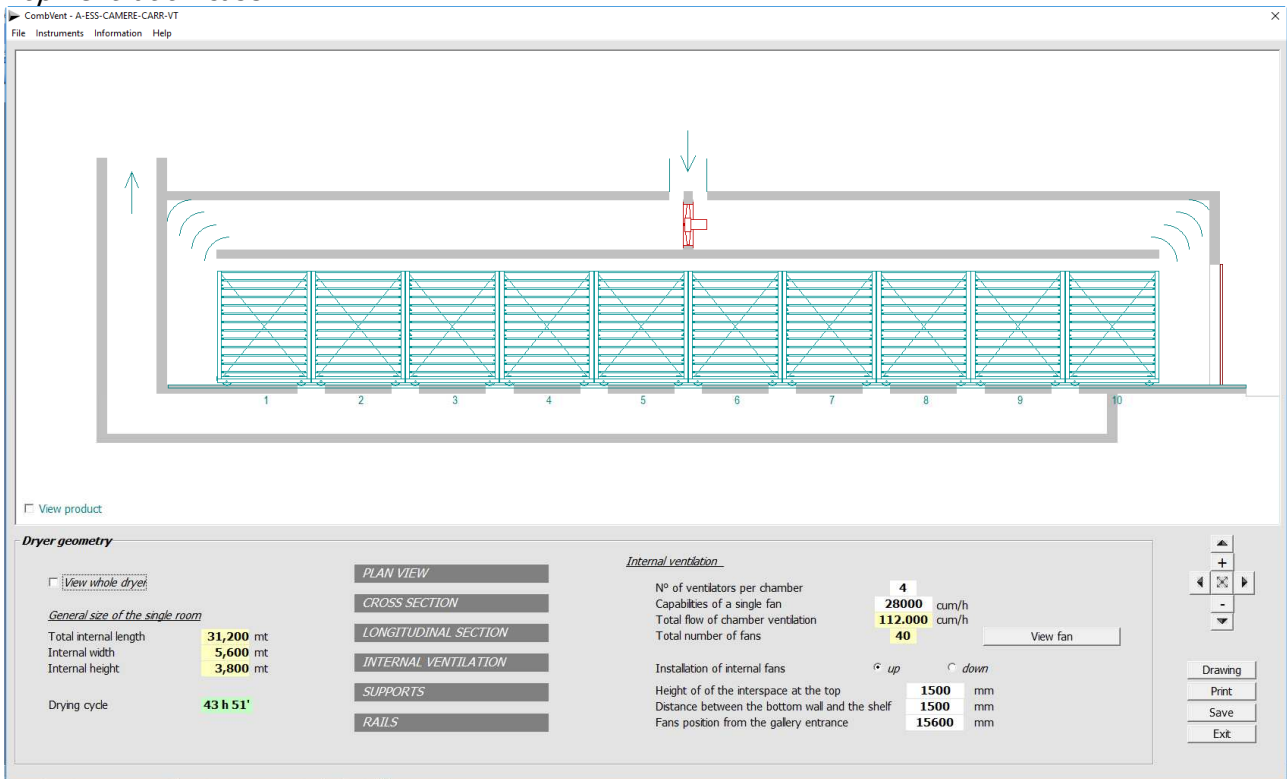


With the *Drawing* command you can have 3 orthogonal views of the mixer in DWG format and 1: 1 scale.

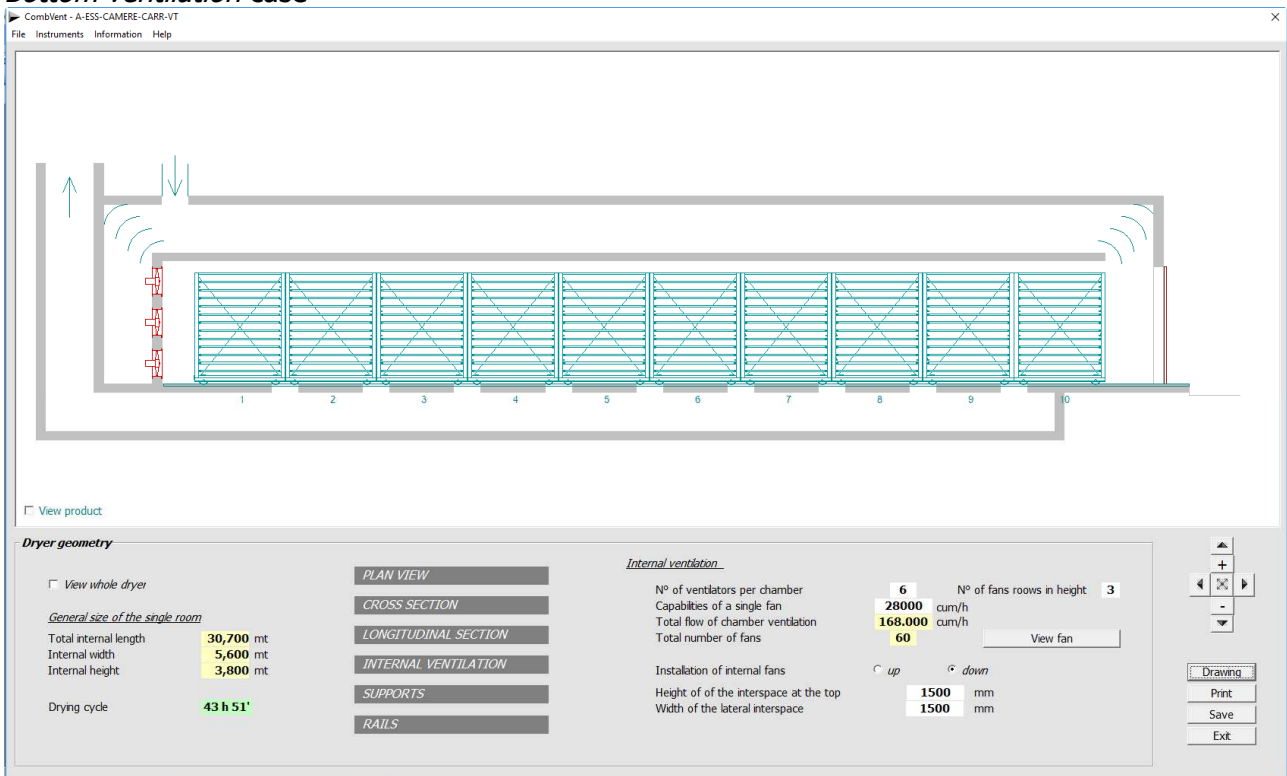


In addition to the *transverse internal ventilation*, *longitudinal ventilation* is also provided, as shown on page 117. In this case we distinguish two cases: case with *ventilation at the top* and case with *ventilation at the bottom*.

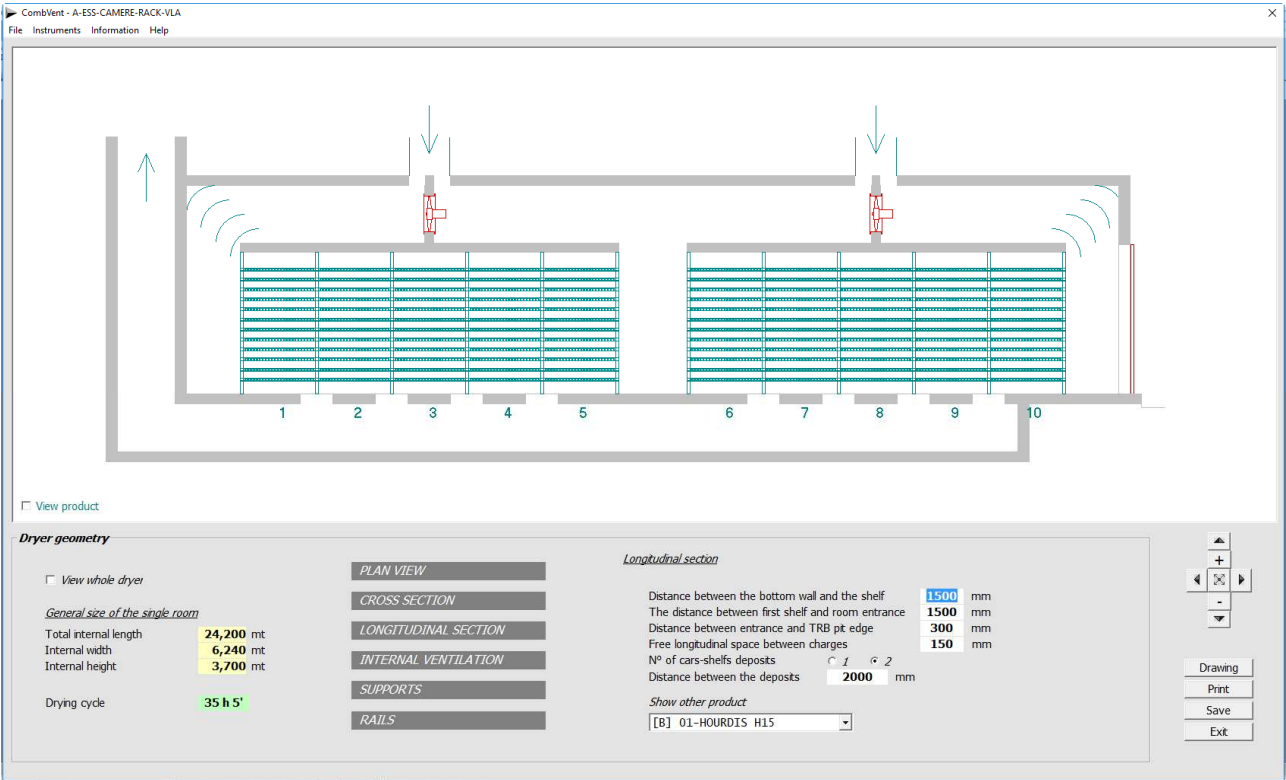
Top ventilation case



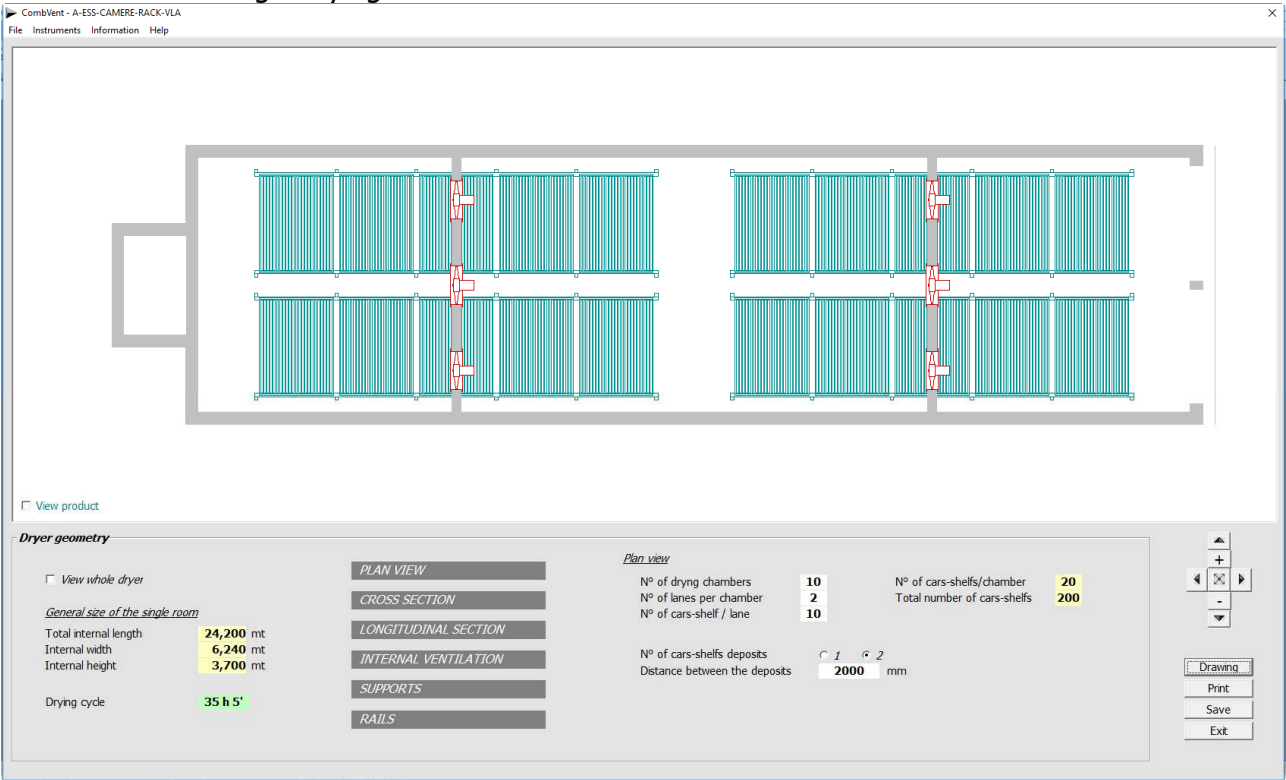
Bottom ventilation case



In the case of use of the *Rack* and in the case of internal *ventilation at the top*, the charge of the drying chambers can take on different configurations. An empty intermediate space can be created in the row of racks.

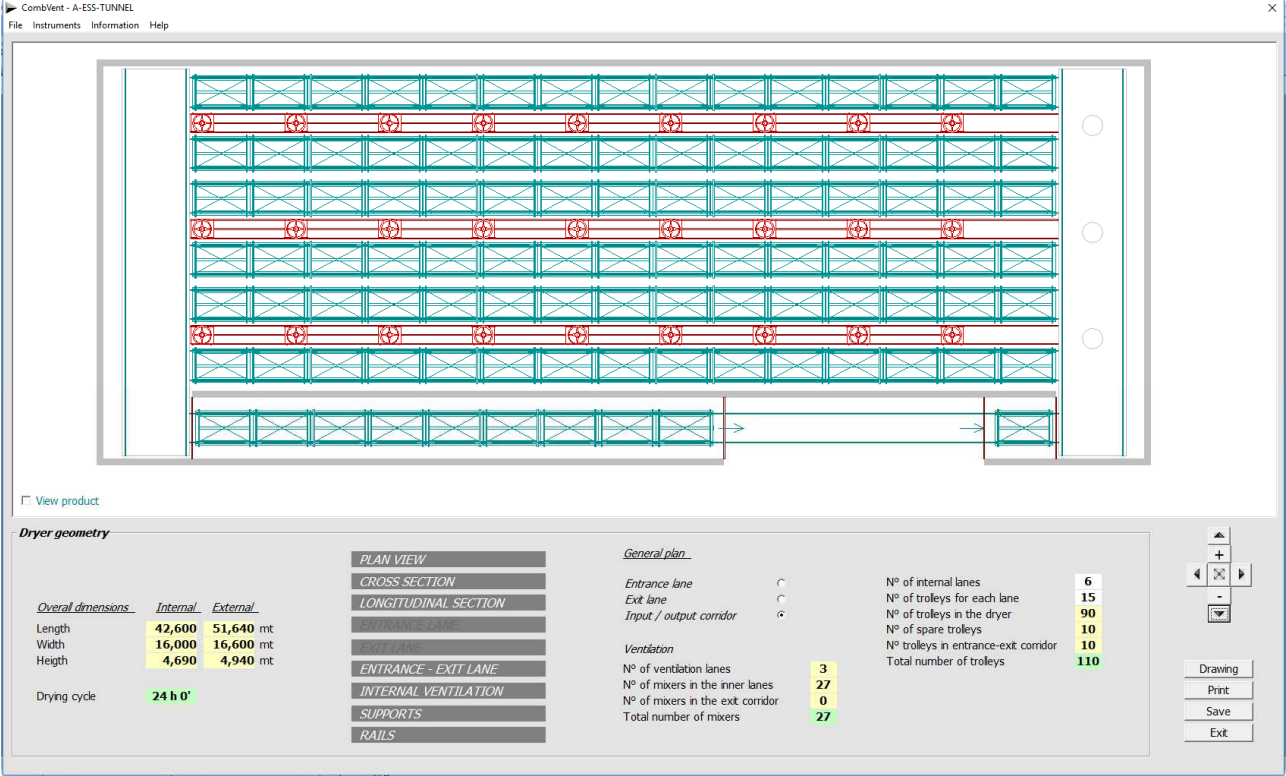


Plan view of the single drying chamber

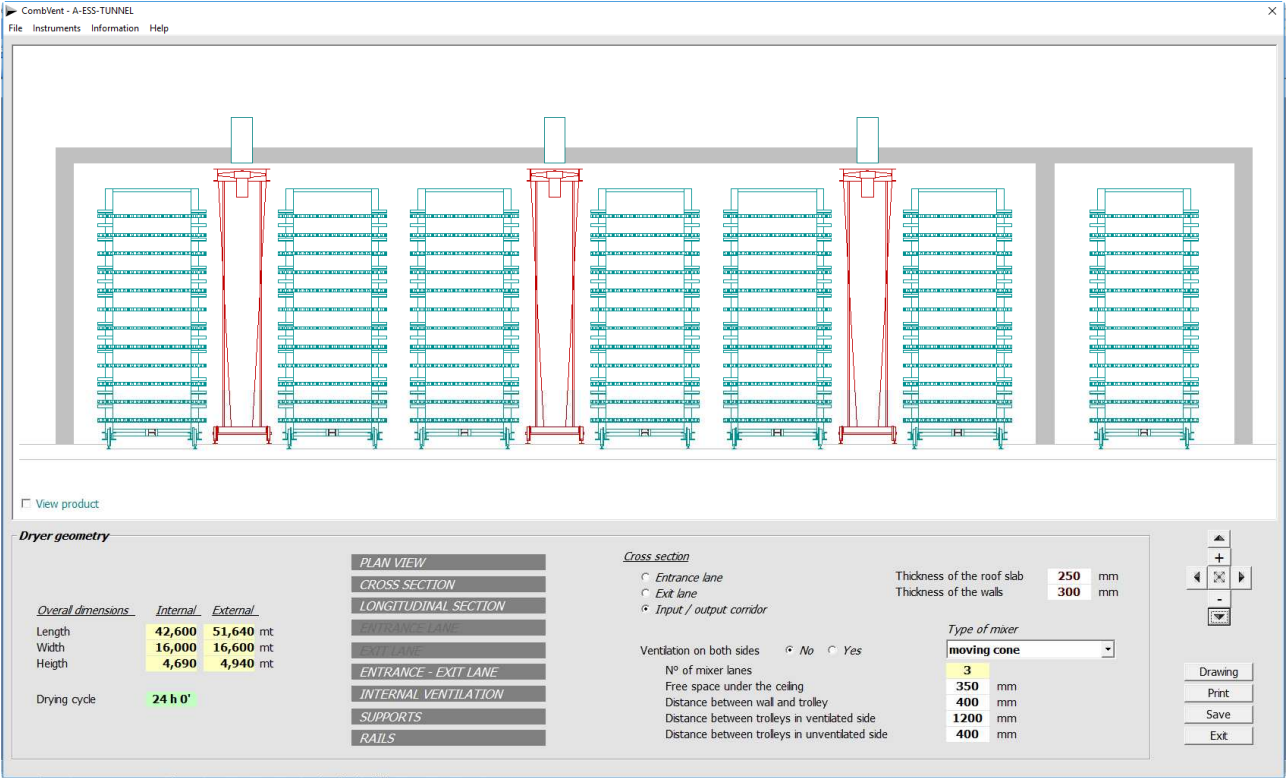


TUNNEL DRYER

Plan view (Solution with *input-output corridor*)

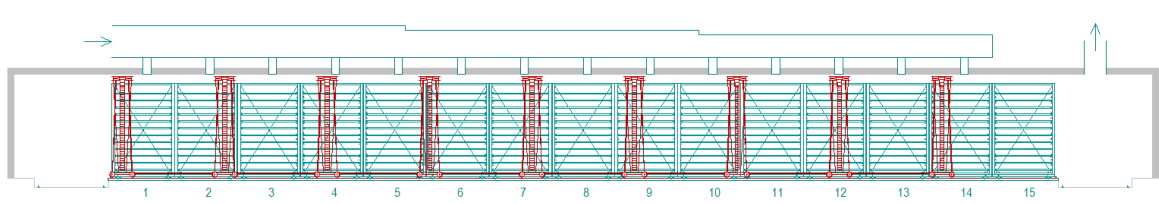


TUNNEL DRYER: Cross view



TUNNEL DRYER: Longitudinal view

CombVent - A-ESS-TUNNEL
File Instruments Information Help



☐ View product

Dryer geometry

Overall dimensions	Internal	External
Length	42,600	51,640 mt
Width	16,000	16,600 mt
Height	4,690	4,940 mt

Drying cycle: 24 h 0'

PLAN VIEW
CROSS SECTION
LONGITUDINAL SECTION
ENTRANCE LANE
EXIT LANE
ENTRANCE - EXIT LANE
INTERNAL VENTILATION
SUPPORTS
RAILS

Longitudinal section
Nº of trolleys for each lane: 15
Nº of lanes: 6
Nº of trolleys in the dryer: 90

Wet side
Dry side

Products List
Basic Product: [B] 01-BLOCK B15

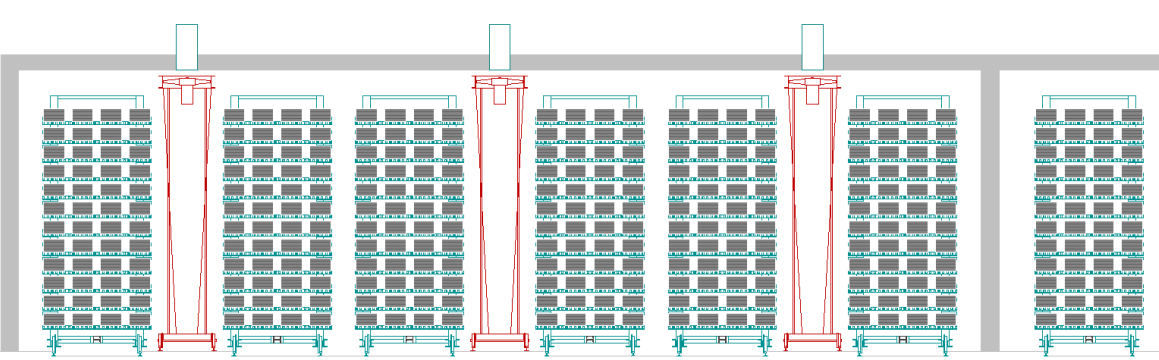
Nº of spare trolleys: 10
Nº trolleys in entrance-exit corridor: 10
Total number of trolleys: 110

Navigation: ↑, ↓, ←, →, +, -, X, O, View product icon

Buttons: Drawing, Print, Save, Exit

TUNNEL DRYER: Internal ventilation

CombVent - A-ESS-TUNNEL
File Instruments Information Help



☒ View product

Dryer geometry

Overall dimensions	Internal	External
Length	42,600	51,640 mt
Width	16,000	16,600 mt
Height	4,690	4,940 mt

Drying cycle: 24 h 0'

PLAN VIEW
CROSS SECTION
LONGITUDINAL SECTION
ENTRANCE LANE
EXIT LANE
ENTRANCE - EXIT LANE
INTERNAL VENTILATION
SUPPORTS
RAILS

Internal ventilation
Ventilation on both sides: ☒ No ☐ Yes

Nº of mixers / lane: 9
Nº of mixer lanes: 3

Mixers wheelbase: 4594 mm
Diameter of the collar fan: 800 mm
Collar thickness: 200 mm
Height of the cone: 4110 mm
Distance between collar and roof slab: 100 mm

Type of mixer: moving cone

Motion: 4598 mm
< 0 >

Edit cart mixer

Navigation: ↑, ↓, ←, →, +, -, X, O, View product icon

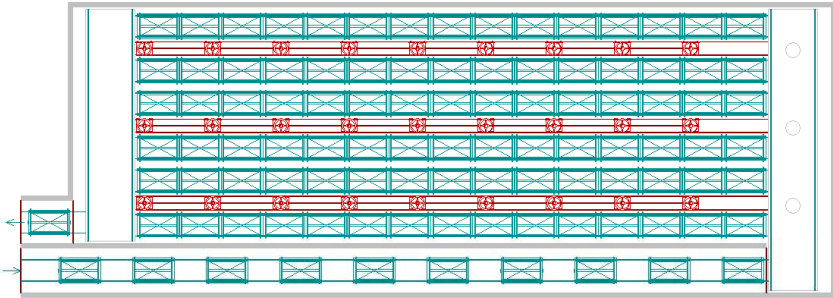
Buttons: Drawing, Print, Save, Exit

NOTE: In each window displayed it is possible to change the values proposed by default from the program by introducing the new values in the boxes with a *white background*.

Same example but with *Entrance lane*.

CombVent - A-ESS-TUNNEL

File Instruments Information Help



☐ View product

Dryer geometry

Overall dimensions	Internal	External
Length	42,600	51,640 mt
Width	16,000	22,900 mt
Height	4,690	4,940 mt

Drying cycle: 24 h 0'

PLAN VIEW

CROSS SECTION

LONGITUDINAL SECTION

ENTRANCE LANE

EXIT LANE

INTERNAL VENTILATION

SUPPORTS

RAILS

Entrance lane

Provision of trolleys 'to pack' ☒ No ☐ Yes

Nº of trolleys in the lane: 10

Distance between the left wall and trolley: 600 mm

Distance between trolley and the right wall: 600 mm

Width of the entrance lane: 3000 mm

Entrance lane extension: 50290 mm

Trolley position from the edge of TRB pit: 300 mm

Center distance: 3300 mm

Align input-output

Add ventilation lane ☒ No ☐ Yes

Drawing

Print

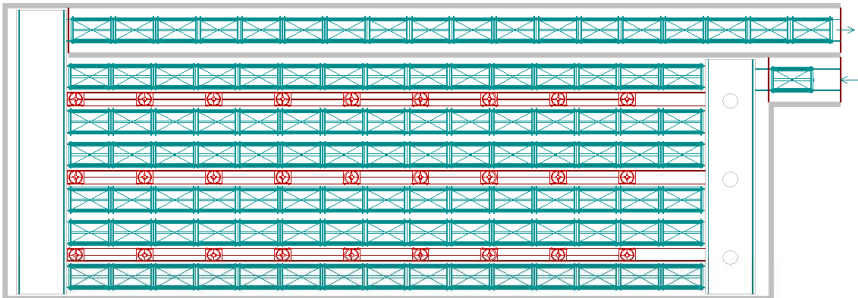
Save

Exit

Solution with *Exit lane*.

CombVent - A-ESS-TUNNEL

File Instruments Information Help



☐ View product

Dryer geometry

Overall dimensions	Internal	External
Length	42,600	51,640 mt
Width	16,000	22,600 mt
Height	4,690	4,940 mt

Drying cycle: 24 h 0'

PLAN VIEW

CROSS SECTION

LONGITUDINAL SECTION

ENTRANCE LANE

EXIT LANE

INTERNAL VENTILATION

SUPPORTS

RAILS

Exit lane

Provision of trolleys 'to pack' ☐ No ☒ Yes

Nº of trolleys in the lane: 18

Distance between the left wall and trolley: 600 mm

Distance between trolley and the right wall: 600 mm

Exit lane width: 3000 mm

Exit lane extension: 51560 mm

Trolley position from the edge of TRB pit: 300 mm

Center distance: 3300 mm

Align input-output

Add ventilation lane ☐ No ☒ Yes

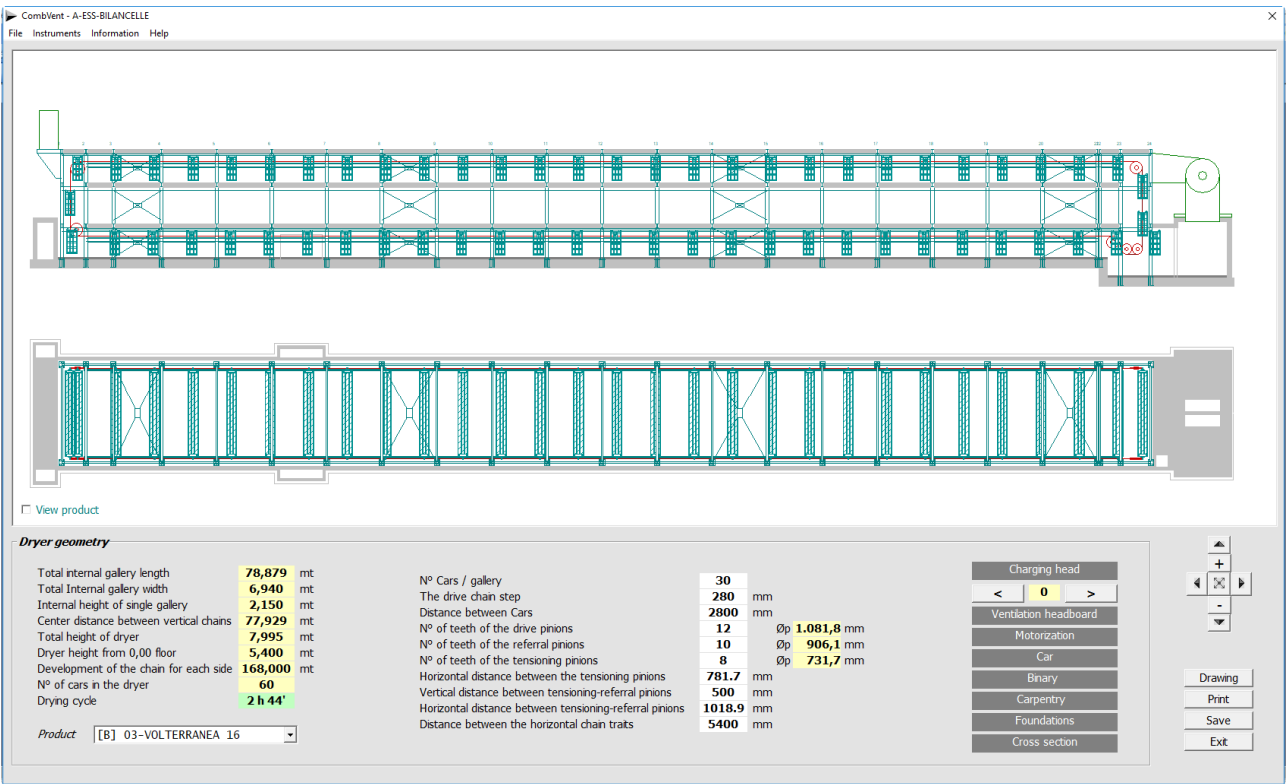
Drawing

Print

Save

Exit

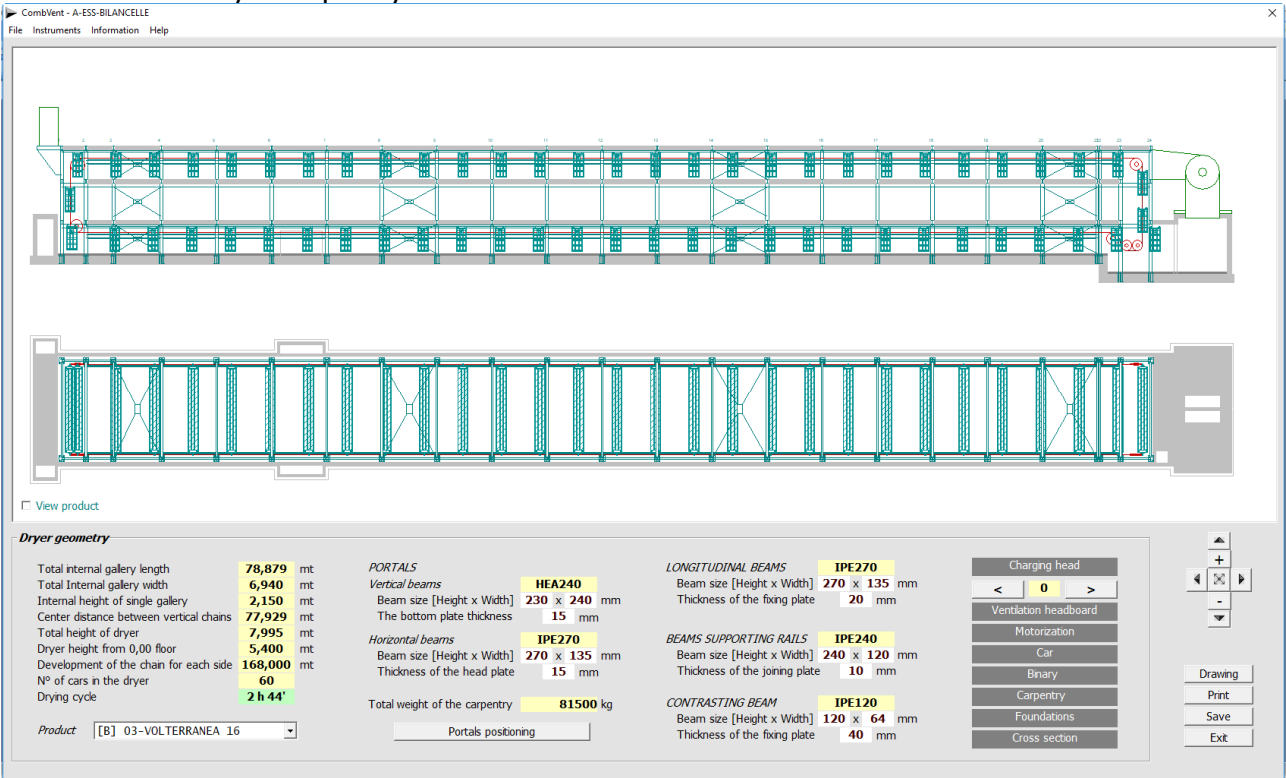
RAPID DRYER



NOTA : The buttons in the figure on the right allow you to see the movement of the cars inside the dryer.

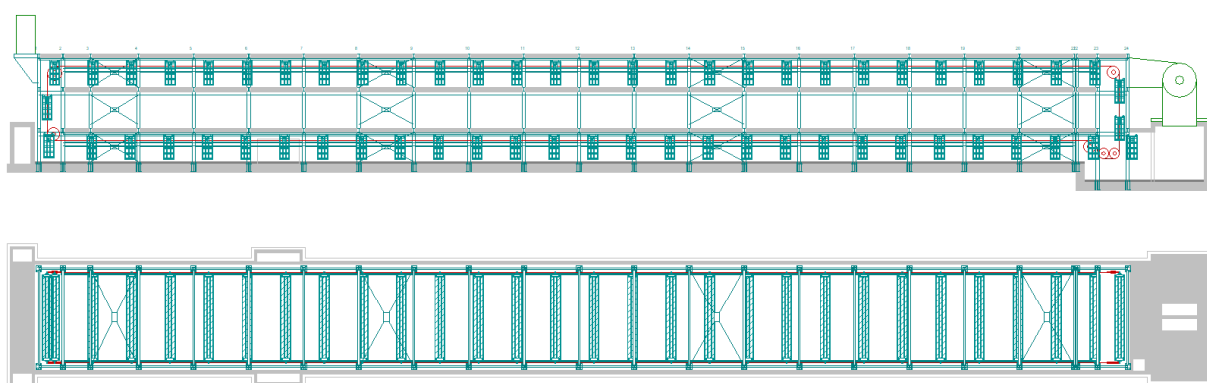


RAPID DRYER: Dryer carpentry



RAPID DRYER: Portals positioning

CombVent - A-ESS-BILANCELE
File Instruments Information Help



☐ View product

Dryer geometry

Total internal gallery length	78,879	mt
Total Internal gallery width	6,940	mt
Internal height of single gallery	2,150	mt
Center distance between vertical chains	77,929	mt
Total height of dryer	7,995	mt
Dryer height from 0,00 floor	5,400	mt
Development of the chain for each side	168,000	mt
N° of cars in the dryer	60	
Drying cycle	2 h 44'	

Product: [B] 03-VOLTERRANA 16

POSITIONING OF PORTALS

Number of portals: 24
Positions: 1 to 2
Span [1]: 1750 mm
Average span: 4000 mm

BRACINGS

N° of bracings: 4
Bracing Position: 1 to 4
Discard

Repositioning of the portals

Charging head

< 0 >
Ventilation headboard
Motorization
Car
Binary
Carpentry
Foundations
Cross section

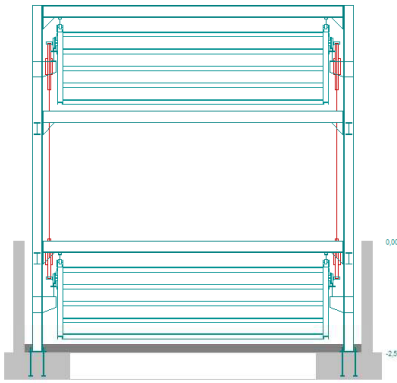
Drawing
Print
Save
Exit

RAPID DRYER: Car

CombVent - A-ESS-BILANCELE
File Instruments Information Help

CHARGING HEAD

- Length of vertical beams: mm 7.970
- Length of vertical beams lowered area: mm 9.289
- Length of horizontal beams: mm 6.940



☐ View product

Dryer geometry

Total internal gallery length	78,879	mt
Total Internal gallery width	6,940	mt
Internal height of single gallery	2,150	mt
Center distance between vertical chains	77,929	mt
Total height of dryer	7,995	mt
Dryer height from 0,00 floor	5,400	mt
Development of the chain for each side	168,000	mt
N° of cars in the dryer	60	
Drying cycle	2 h 44'	

Product: [B] 03-VOLTERRANA 16

Free space between car and side inner wall: 350 mm
Thickness of the covering slabs: 300 mm
Level of supporting surface of the portals in the foundation: 2.595 mm
Level of supporting surface of the portals in lowered area: 3.914 mm

Deviation between the car and front walls

Side of the charging head: 100 mm
Side of the ventilation head: 100 mm

Deviation between car and upper and lower floor

Free space between ceiling and first floor of the car: 340 mm
Free space between floor and the bottom of the car: 150 mm
Free space between car and foundation: 325 mm

Charging head

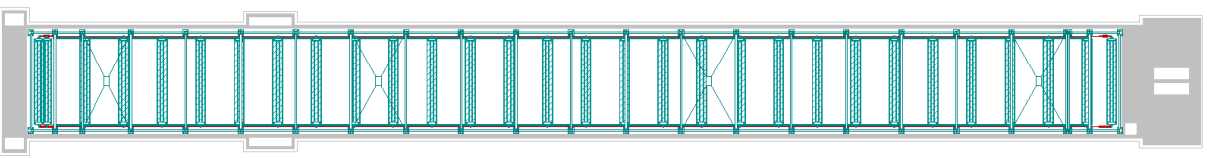
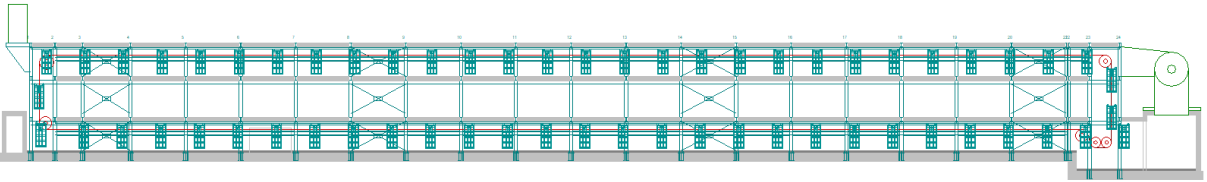
< 0 >
Ventilation headboard
Motorization
Car
Binary
Carpentry
Foundations
Longitudinal section

Drawing
Print
Save
Exit

RAPID DRYER: Foundations

CombVent - A-ESS-BILANCELLE

File Instruments Information Help



☐ View product

Dryer geometry

Total internal gallery length

78,879

mt

Total Internal gallery width

6,940

mt

Internal height of single gallery

2,150

mt

Center distance between vertical chains

77,929

mt

Total height of dryer

7,995

mt

Dryer height from 0,00 floor

5,400

mt

Development of the chain for each side

168,000

mt

N° of cars in the dryer

60

Drying cycle

2 h 44'

Product

[B] 03-VOLTERRANA 16

Lowering increase in the low floor area

0

mm

Length of the lowered area

3306

mm

Length of the outer floor in recycling area

1500

mm

Length of the recycle fan supporting plane

4200

mm

Increase of the recycle fan supporting plane

450

mm

Thickness of covering floor in the recycling area

300

mm

Height of the foundation beam

600

mm

Width of the foundation beam

1500

mm

Ledge of the foundation from the wall

200

mm

The foundation wall thickness

250

mm

Increase of the gallery width in the recycling area

500

mm

Hot air supply

Positioning

16274

mm

Length of the opening

3000

mm

Width of the opening

800

mm

Air recycling intake

Length of the opening

2500

mm

Width of the opening

800

mm

Charging head

< 0 >

Ventilation headboard

Motorization

Car

Binary

Carpentry

Foundations

Cross section

Drawing

Print

Save

Exit

NOTE : In each window displayed it is possible to change the values proposed by default from the program by introducing the new values in the boxes with a *white background*.

Sectional view of the ventilation head (lowered area)

VENTILATION HEADBOARD

• Length of vertical beams

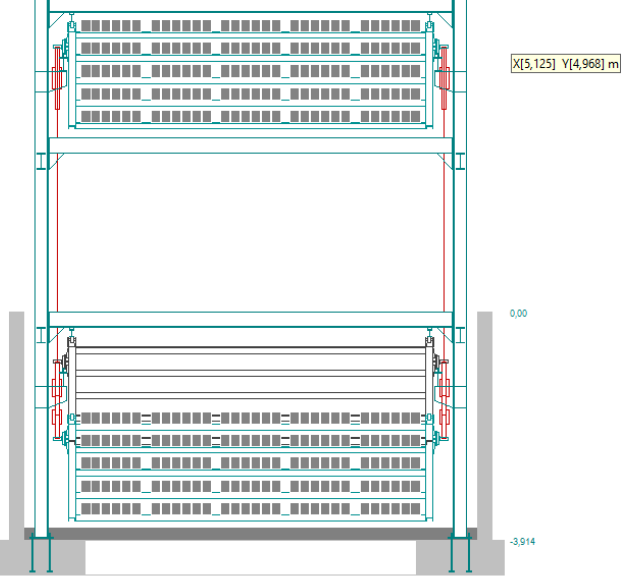
mm 7.970

• Length of vertical beams lowered area

mm 9.289

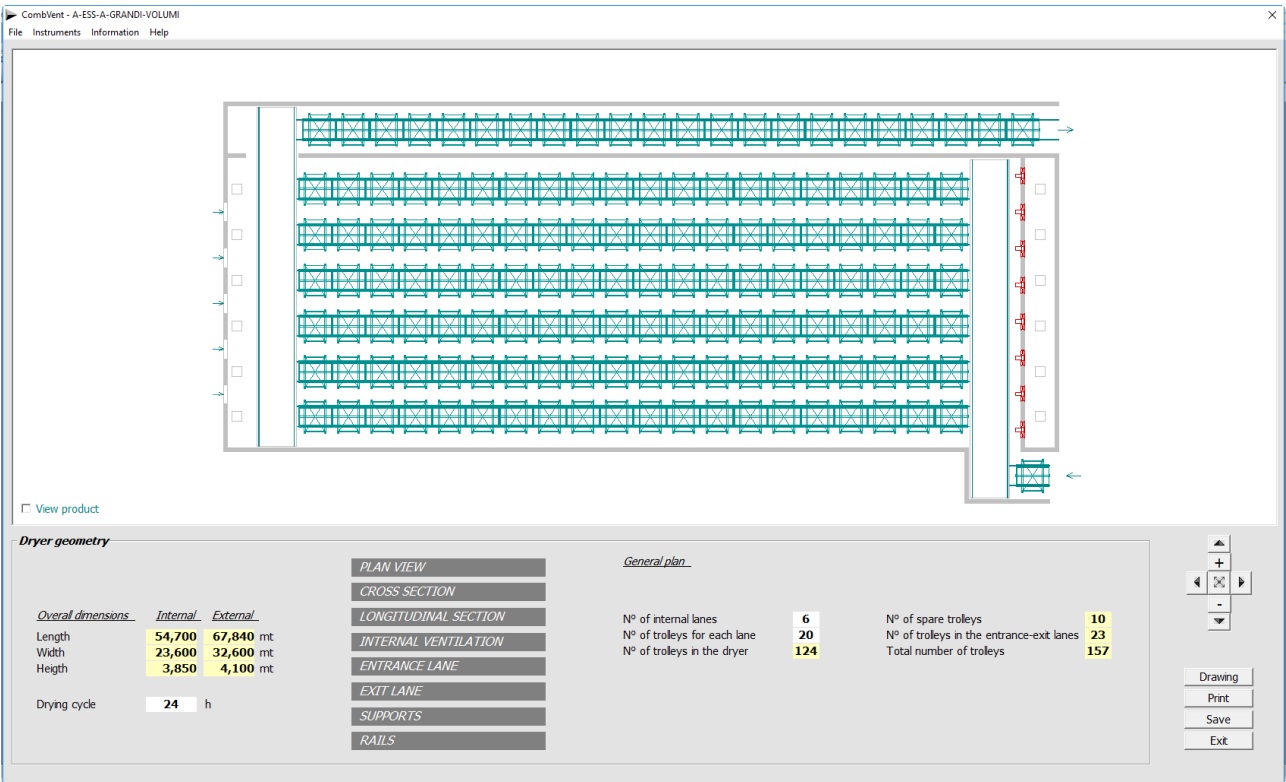
• Length of horizontal beams

mm 6.940

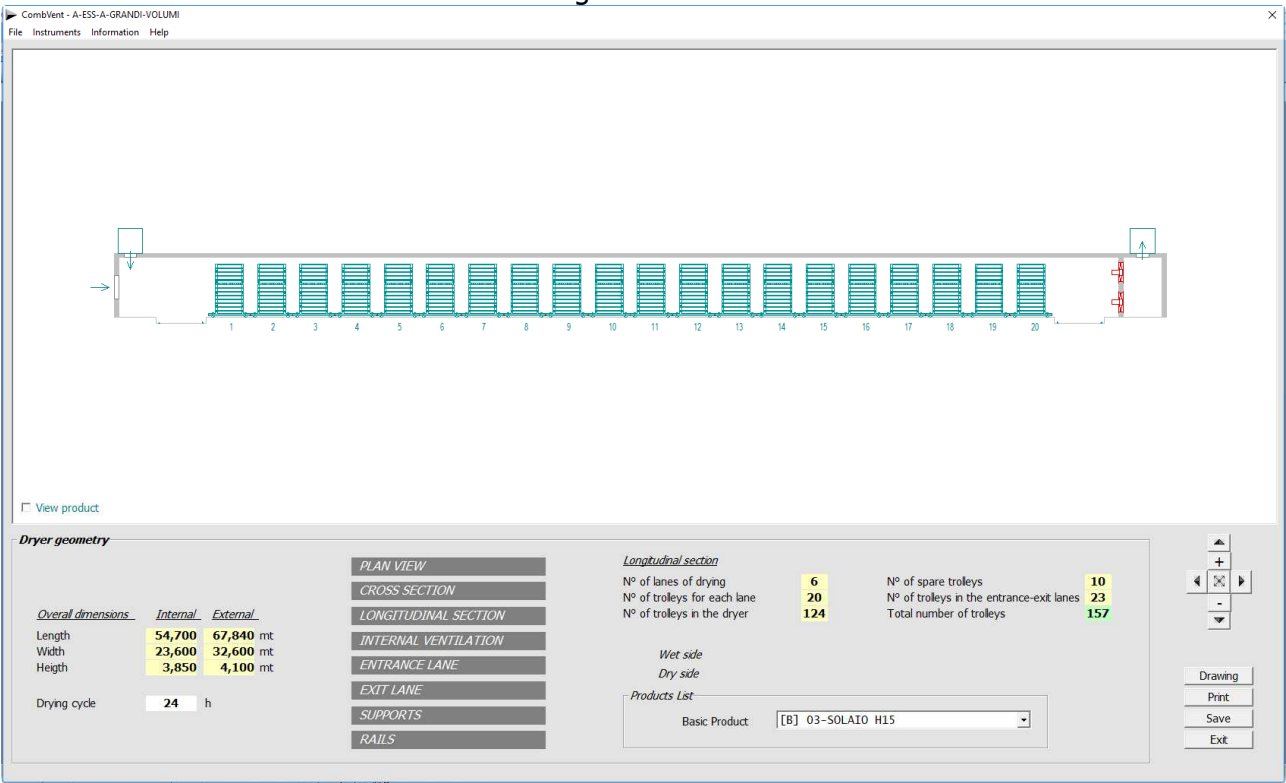


☒ View product

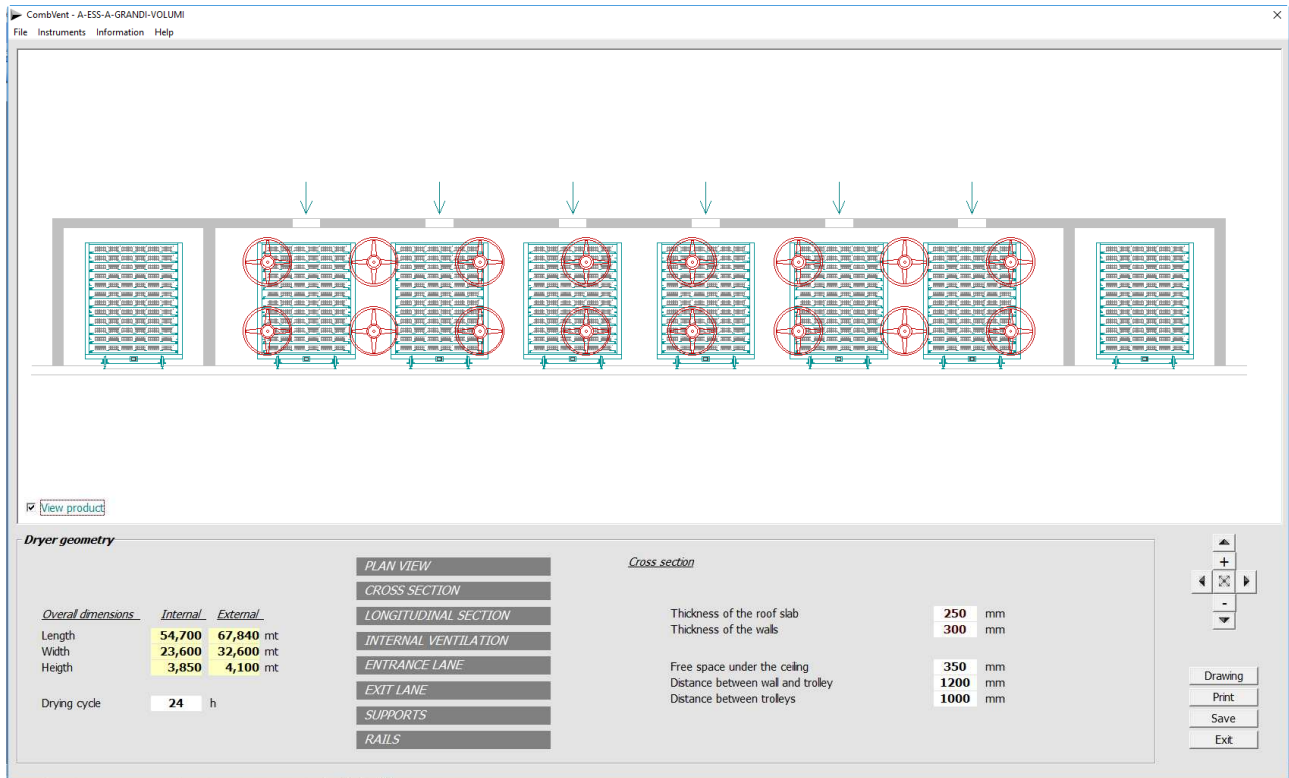
DRYER WITH LARGE VOLUMES OF AIR



DRYER WITH LARGE VOLUMES OF AIR: Longitudinal view



DRYER WITH LARGE VOLUMES OF AIR: Cross view

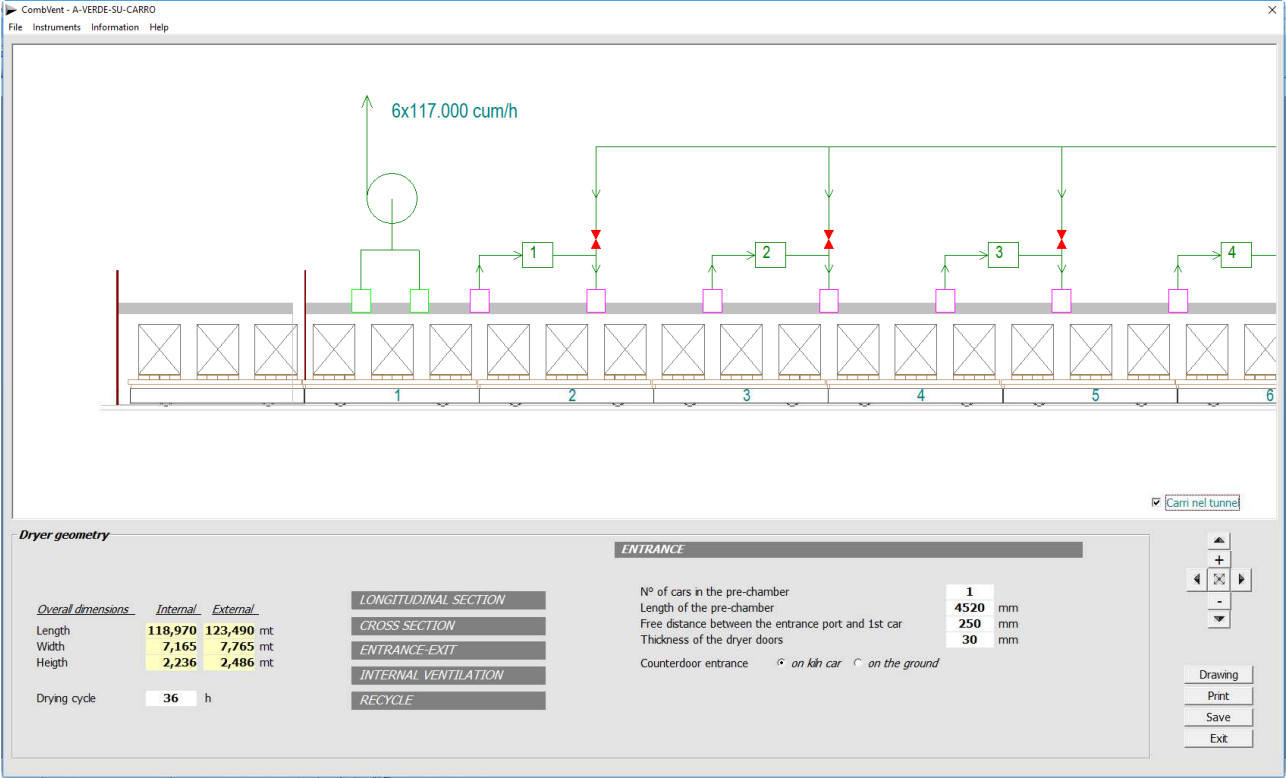


NOTE : In each window displayed it is possible to change the values proposed by default from the program by introducing the new values in the boxes with a *white background*.

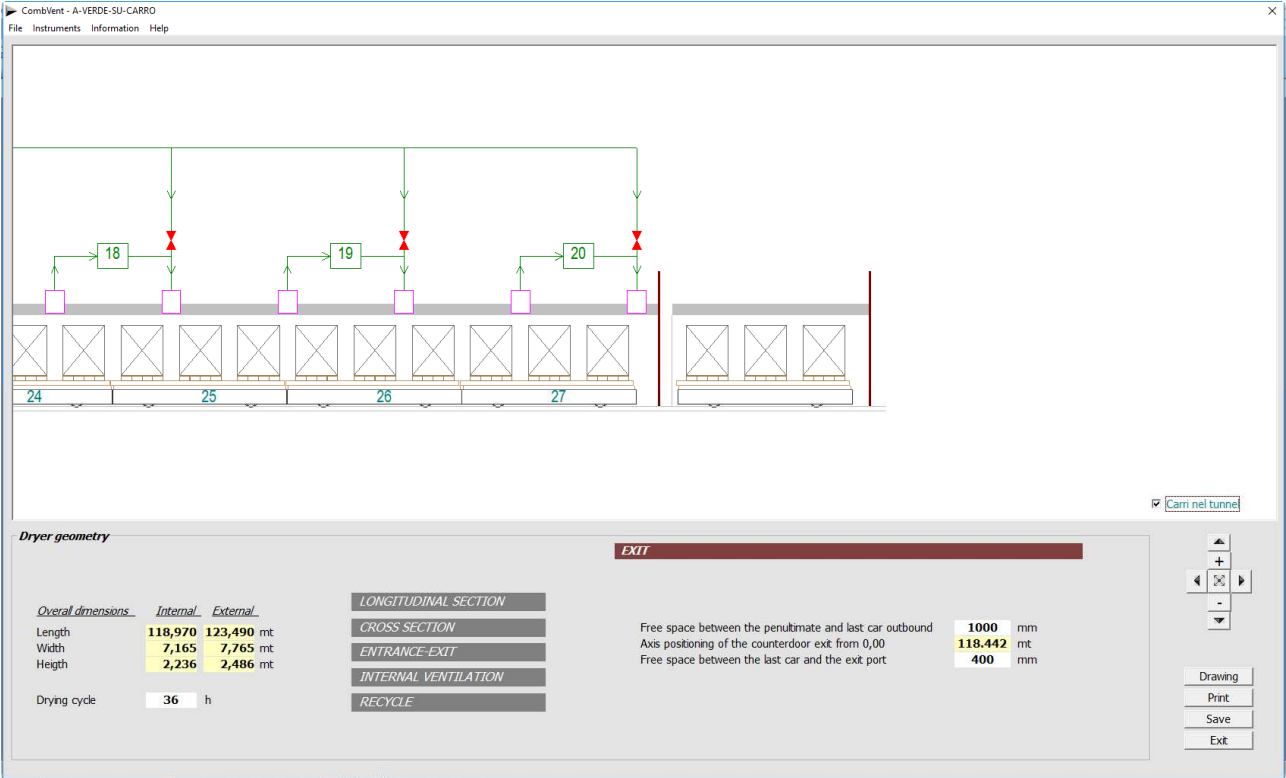
Home screen



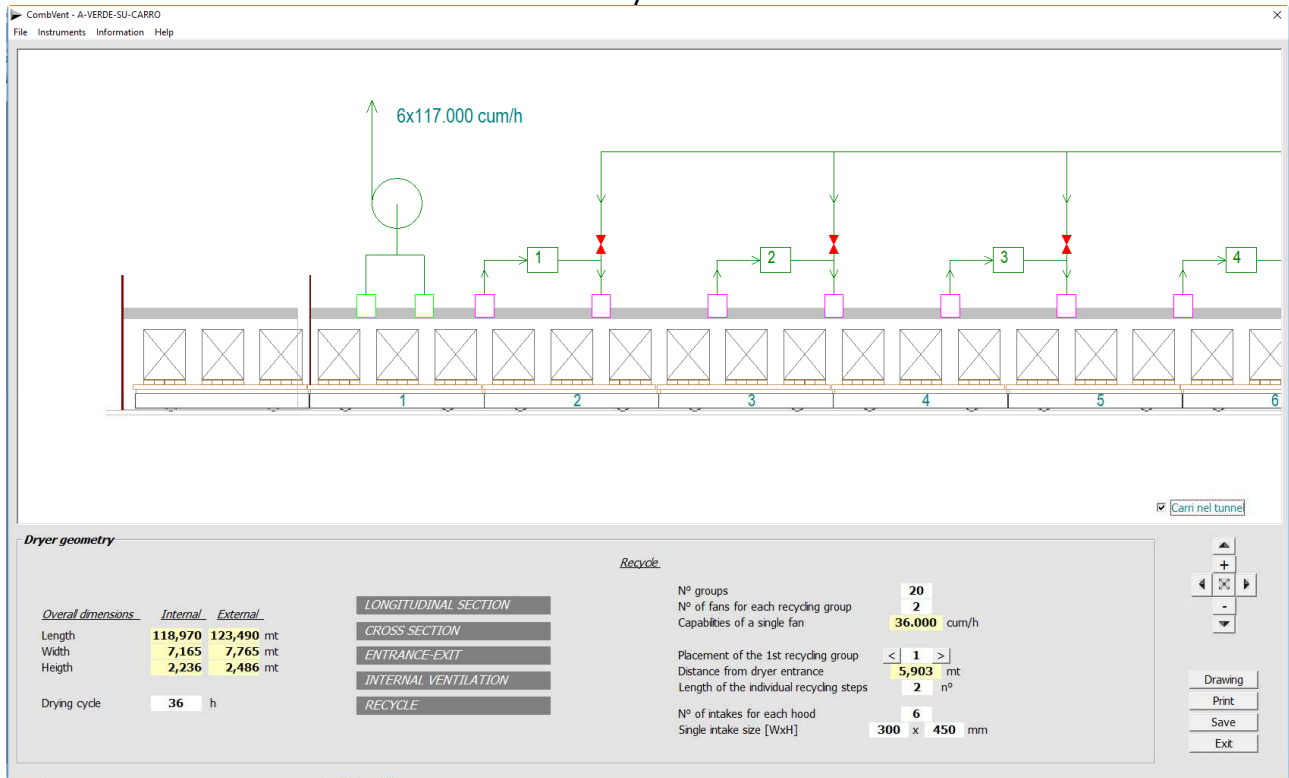
DRYER WITH WET LOADING ON KILN CAR: Entrance



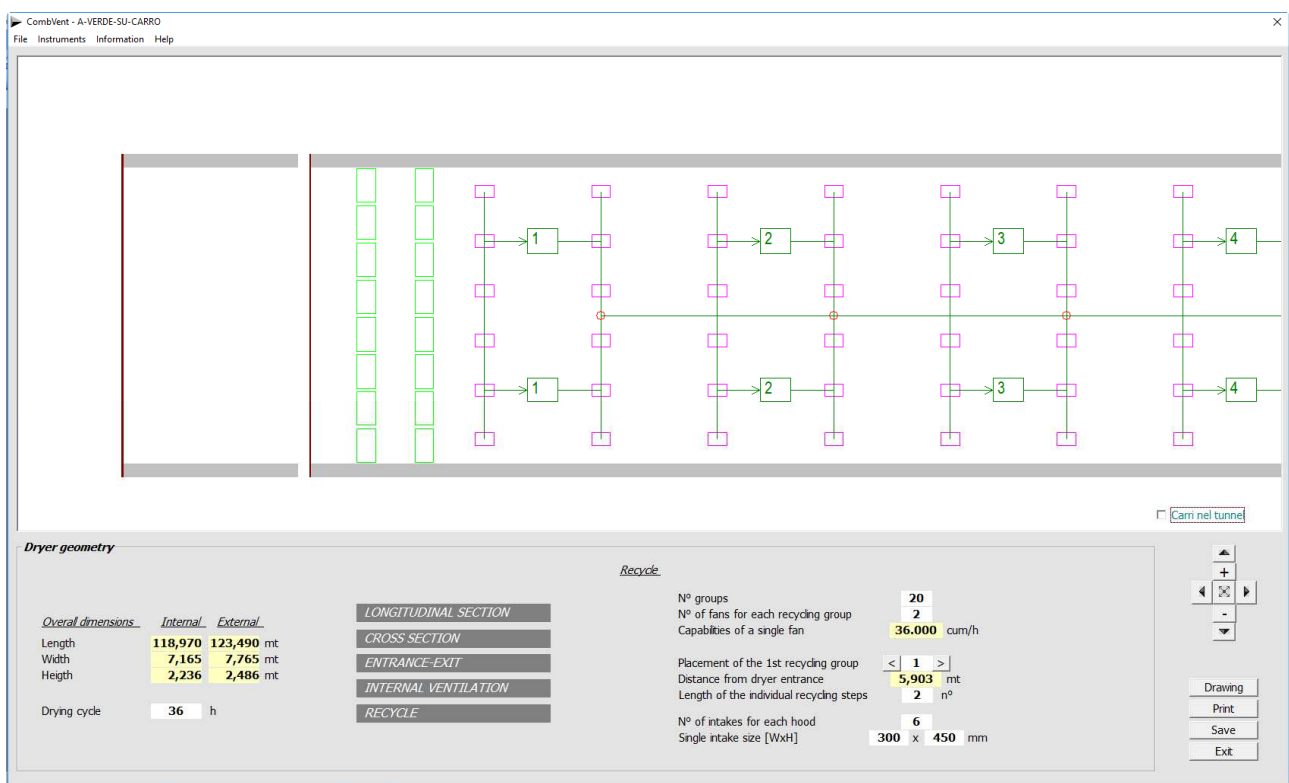
DRYER WITH WET LOADING ON KILN CAR: Exit



DRYER WITH WET LOADING ON KILN CAR: Recycles

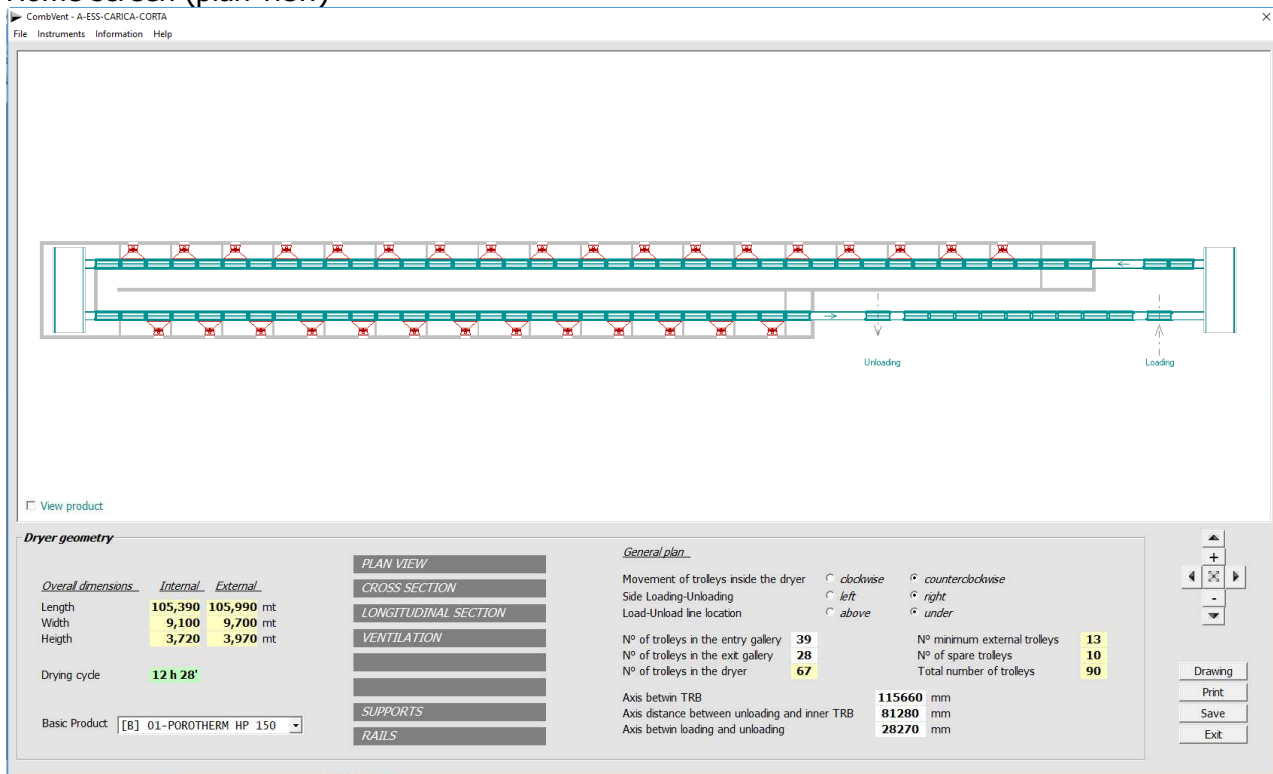


NOTE : In each window displayed it is possible to change the values proposed by default from the program by introducing the new values in the boxes with a *white background*.

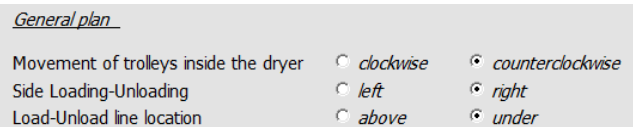


RAPID DRYER WITH SHORT CHARGE

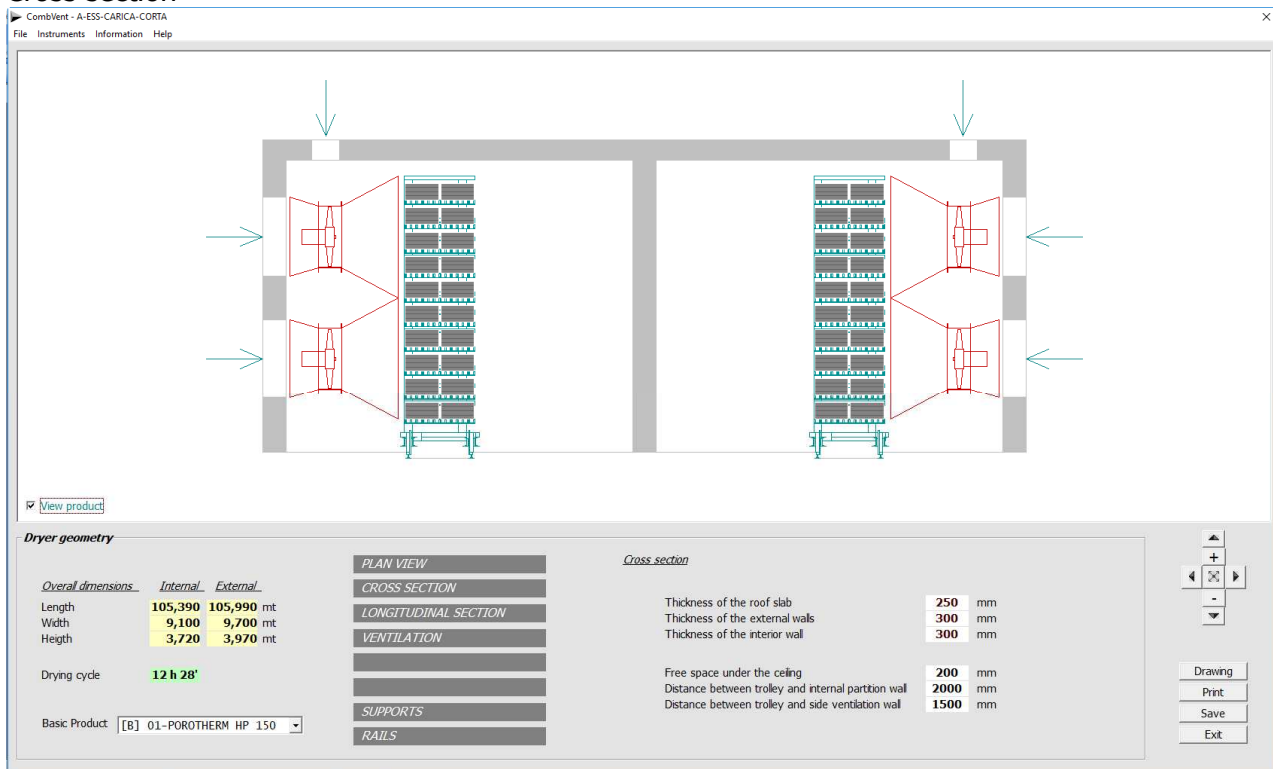
Home screen (plan view)



It is possible to define various shapes and configurations of the dryer with the different options on the initial screen.

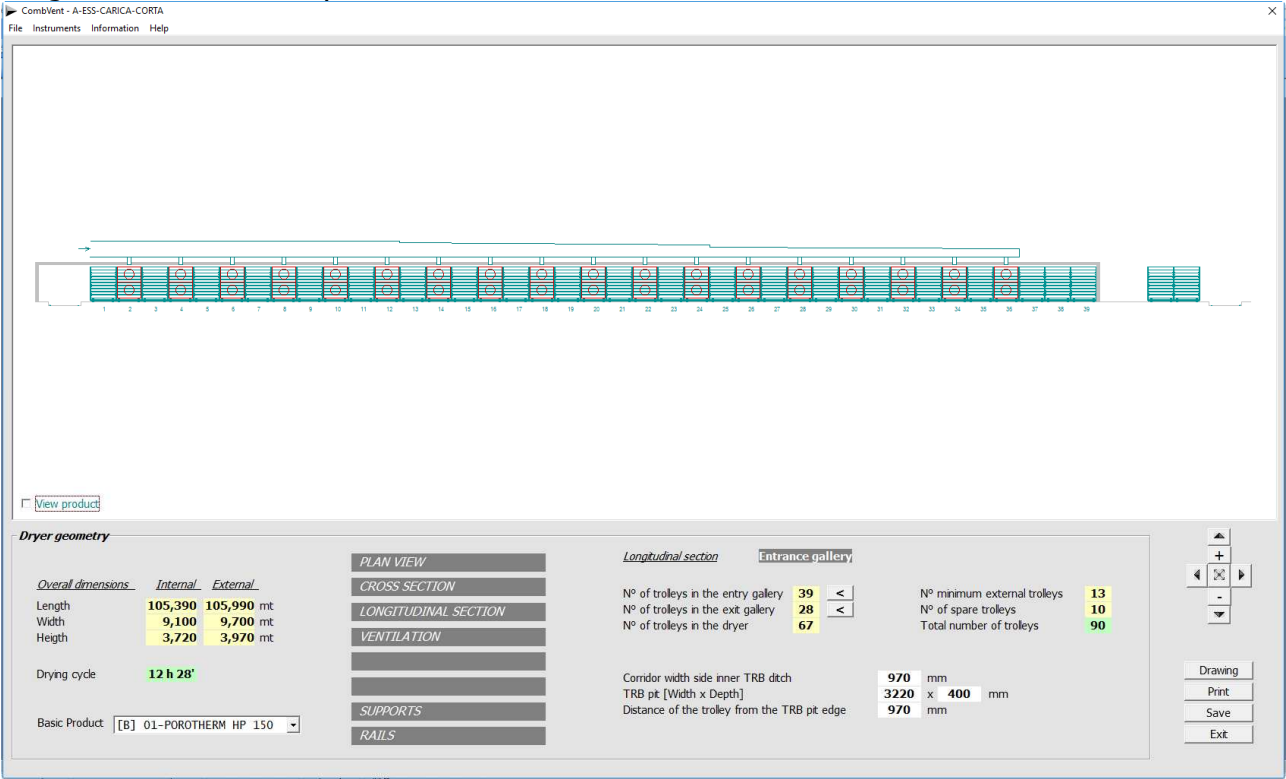


Cross section



The particularity of this type of dryer, in addition to the reduced depth of charge, concerns the ventilation that is carried out laterally and completely invests the whole material in a uniform and energetic manner.

Longitudinal view of entry lane



Longitudinal view of exit lane



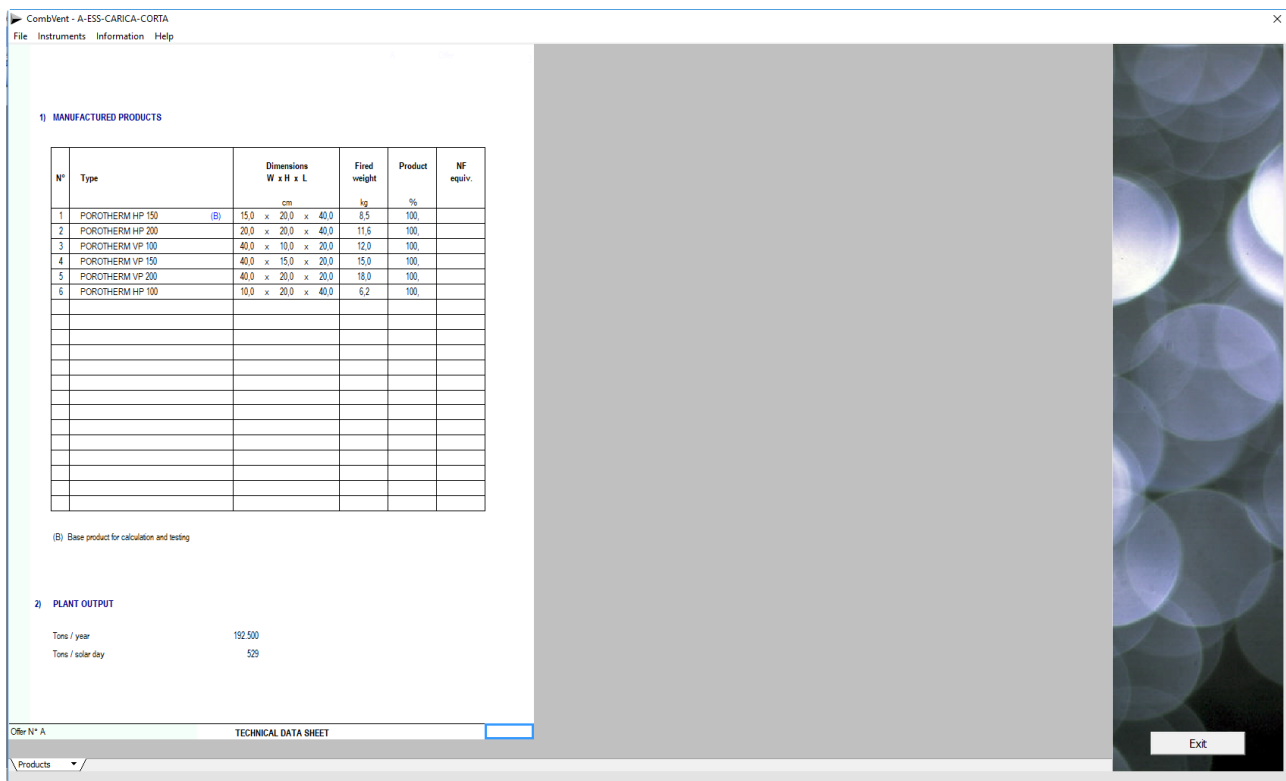
Section 5 - REPORT

Section 5.1 - REPORT → Preview Excel Folder

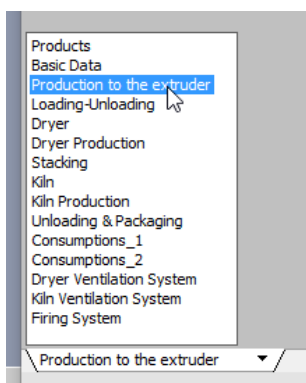


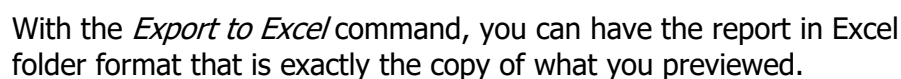
Once the previous steps have been completed, the project is defined. It is therefore possible to display a preview of the final report of the project, according to the chosen language (Main Menu), which can be converted into an Excel format folder

Home screen



15 sheets are visible selectable from the drop-down window at the bottom left of the screen.



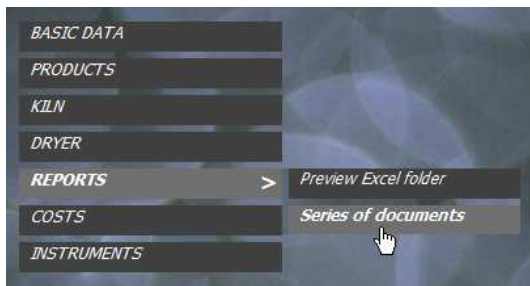


REPORT: ***Extruder Production***

REPORT: ***Kiln Production***

152

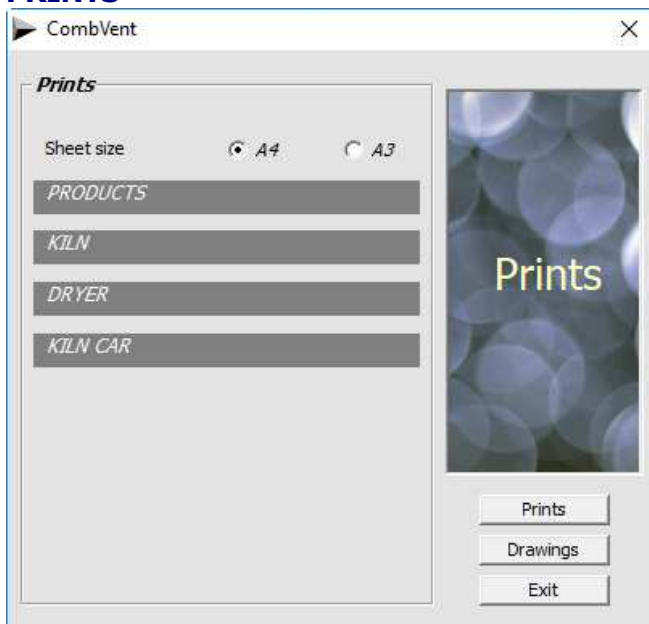
Section 5.2 - REPORT→ Series of Documents



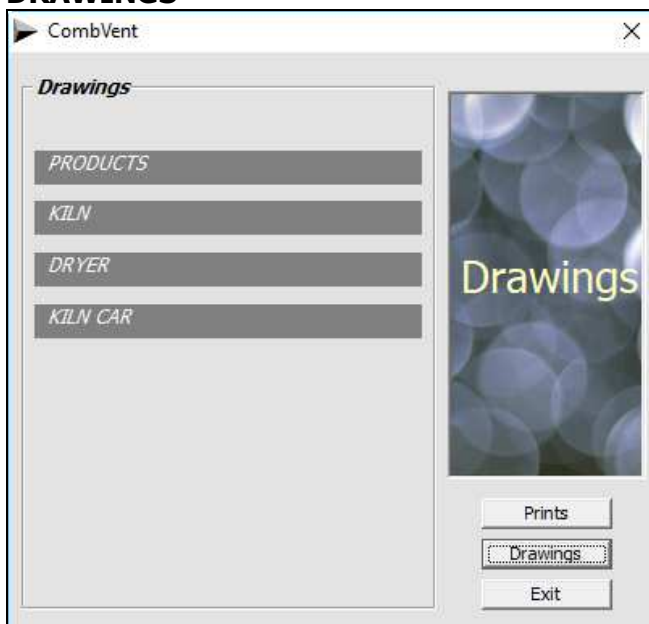
At this point, it is possible to obtain both the Prints and the Drawings concerning the developed project.

It is possible to have a series of documents both as Prints and as Drawings in DWG format.

PRINTS



DRAWINGS



In both cases, the extractable documents refer to the **Products**, the **Kiln**, the **Dryer** and the **Kiln Car**. For each item there are various selectable documents.

PRODUCTS

- ☐ Products List
- ☐ Load wet material
- ☐ Stacking on kiln car
- ☐ Packaging

OK

KILN

- ☐ Functional scheme
- ☐ Section of the tunnel
- ☐ General scheme of the walls
- ☐ General scheme of ceiling
- ☐ Typical sections of ceiling

OK

DRYER

- ☐ Longitudinal section
- ☐ Cross section
- ☐ Plan
- ☐ 3 views

OK

KILN CAR

- ☐ Overall
- ☐ Carpentry
- ☐ Refractory lining
- ☐ Coupling sealing

OK

NOTE: in the case of the PRINTS there is the possibility to choose the format of the sheet.

Sheet size ☒ A4 ☐ A3

Example of printing a page of the wet material load.

Ing. Gennaro Nasuti
gn@supertecweb.com

Customer : A
Order : A-ESS-RAPIDO

DRYER CAR LOADING

Product n° 1

Wet dimensions [WxHxL] cm 15.9x21.2x31.8

File / storey [front] n° 30

Loading / storey [frontxdepth] n° 30x2 = 60

Pieces / car n° 300

Weight of wet product n° 2376

BRIQUE CREUSE B12

Product n° 2

Wet dimensions [WxHxL] cm 43.46x15.9x21.2

File / storey [front] n° 12


Loading / storey [frontxdepth] n° 12x3 = 36

Pieces / car n° 180

Weight of wet product n° 2151

HOUDIS H15

Example of printing a page related to the packaging of the fired material.



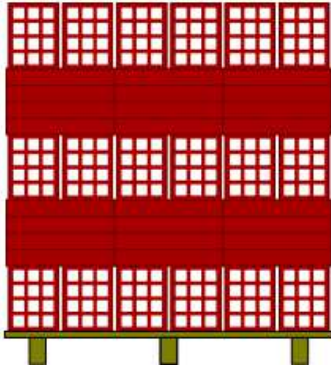
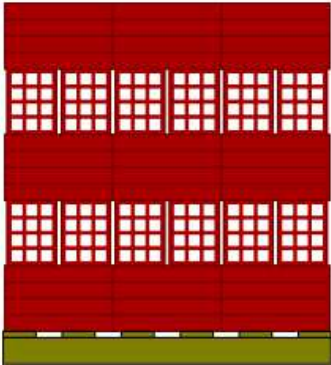
Ing. Gennaro Nasuti
gn@supertecweb.com

Customer : A
Order : A-ESS-TUNNEL

PARCELS PACKED

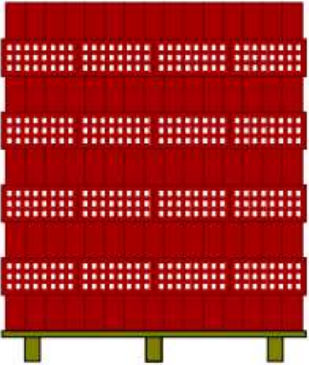
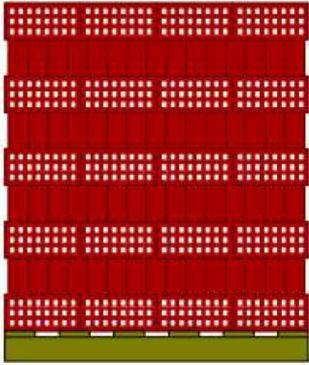
Product n° 1
Fired dimensions [WxHxL]
Weight of Fired product
Pieces / layer
Layers / pack
Pieces / pack
Pack weight
Length x Width of pack
Pack height
Packed packs / hour

BLOCK B15
cm 15x20x33
kg 8,00
n° 6 x 3 = 18
n° 5
n° 90
kg 720
mt 0,990x0,990
mt 1,000
n° 16,9

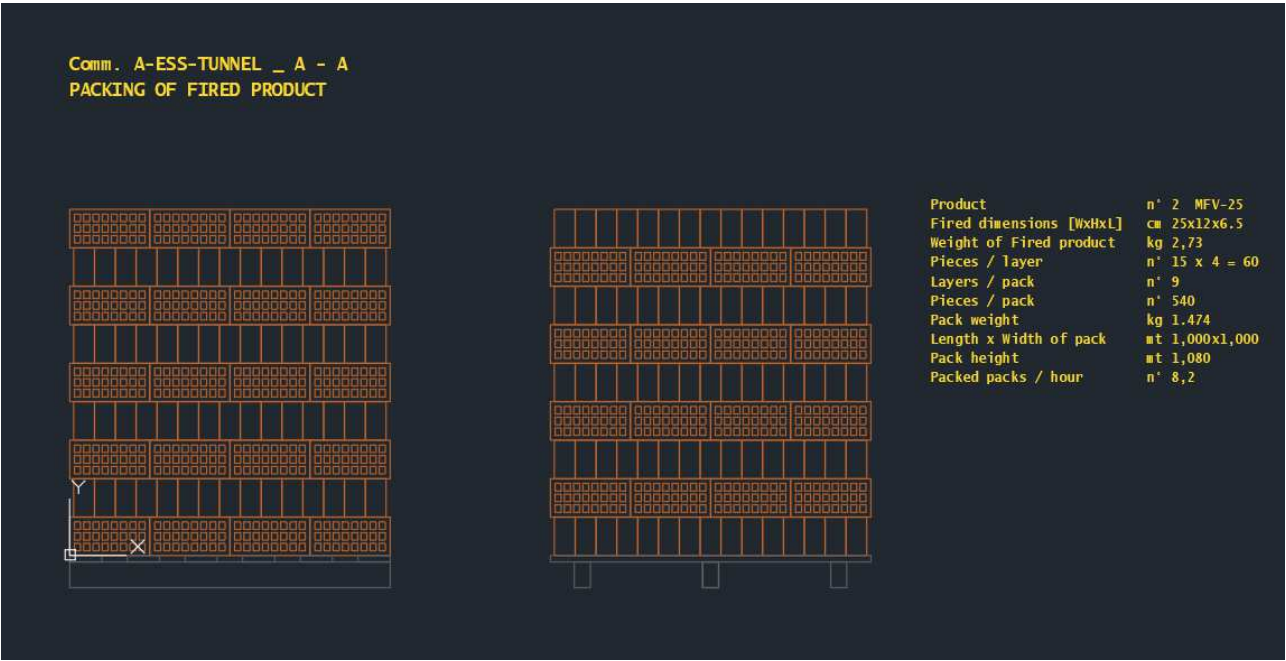


Product n° 2
Fired dimensions [WxHxL]
Weight of Fired product
Pieces / layer
Layers / pack
Pieces / pack
Pack weight
Length x Width of pack
Pack height
Packed packs / hour

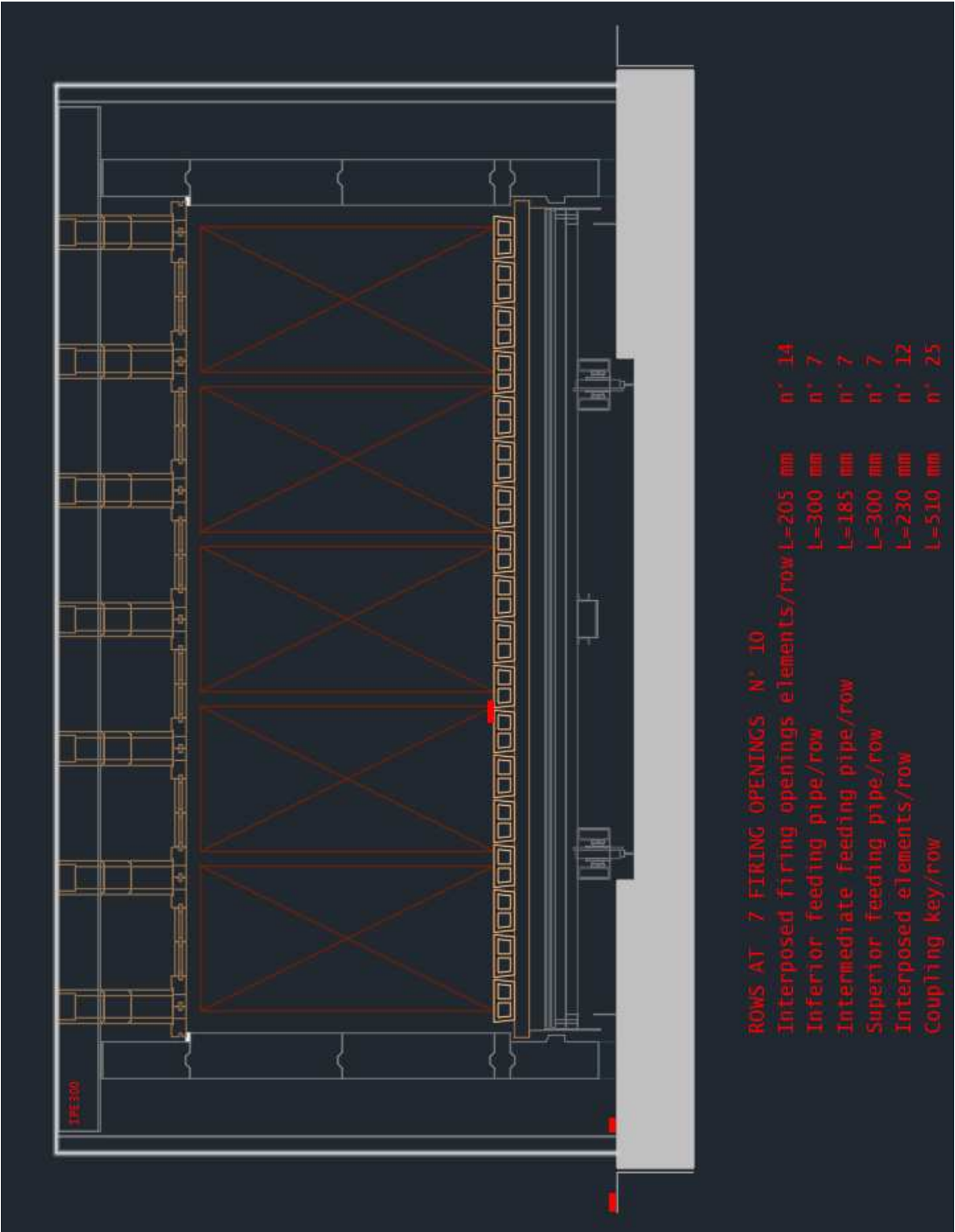
MFV-25
cm 25x12x6.5
kg 2,73
n° 15 x 4 = 60
n° 9
n° 540
kg 1.474
mt 1,000x1,000
mt 1,080
n° 8,2



NOTE: everything that can be printed can also be in DWG format and in 1: 1 scale



Example of drawing in DWG format of a detail of the assembly related to the ***Typical sections of ceiling.***



Section 6 – COSTS

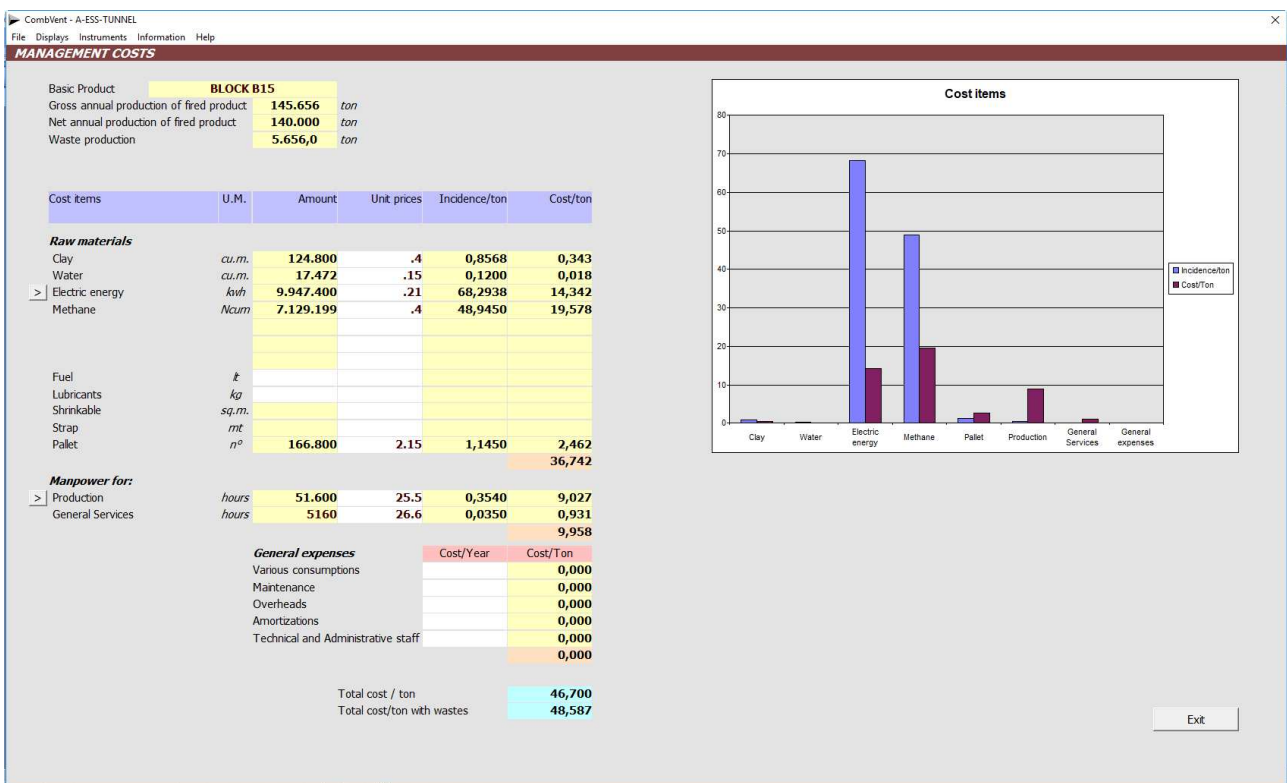


The last section of the program is reserved for the costs of management of the plant designed with the inclusion of unit prices of various materials and labor.

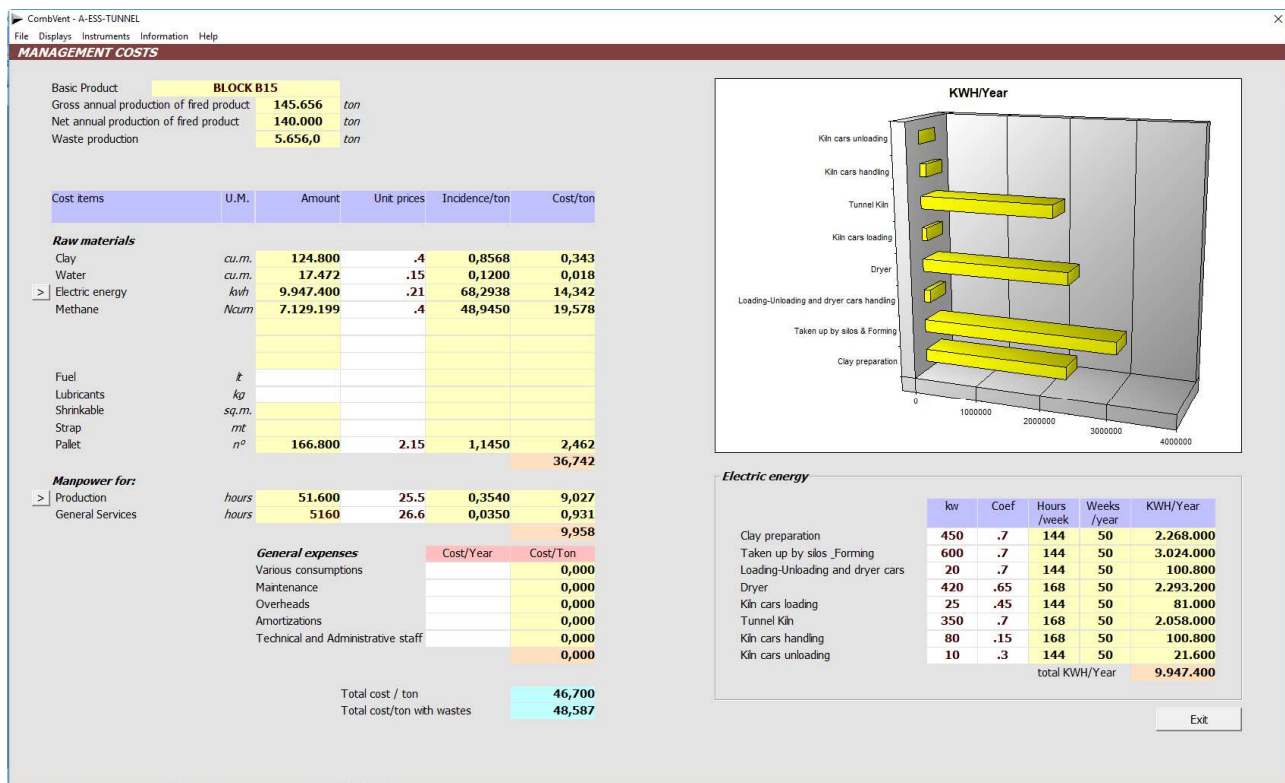
The program extrapolates the quantities of raw materials used and labor. It is sufficient to enter the relative *unit prices* in order to have the individual and total cost of production.

Under the heading Unit prices the currency used to give the user the possibility to insert his own is not intentionally specified.

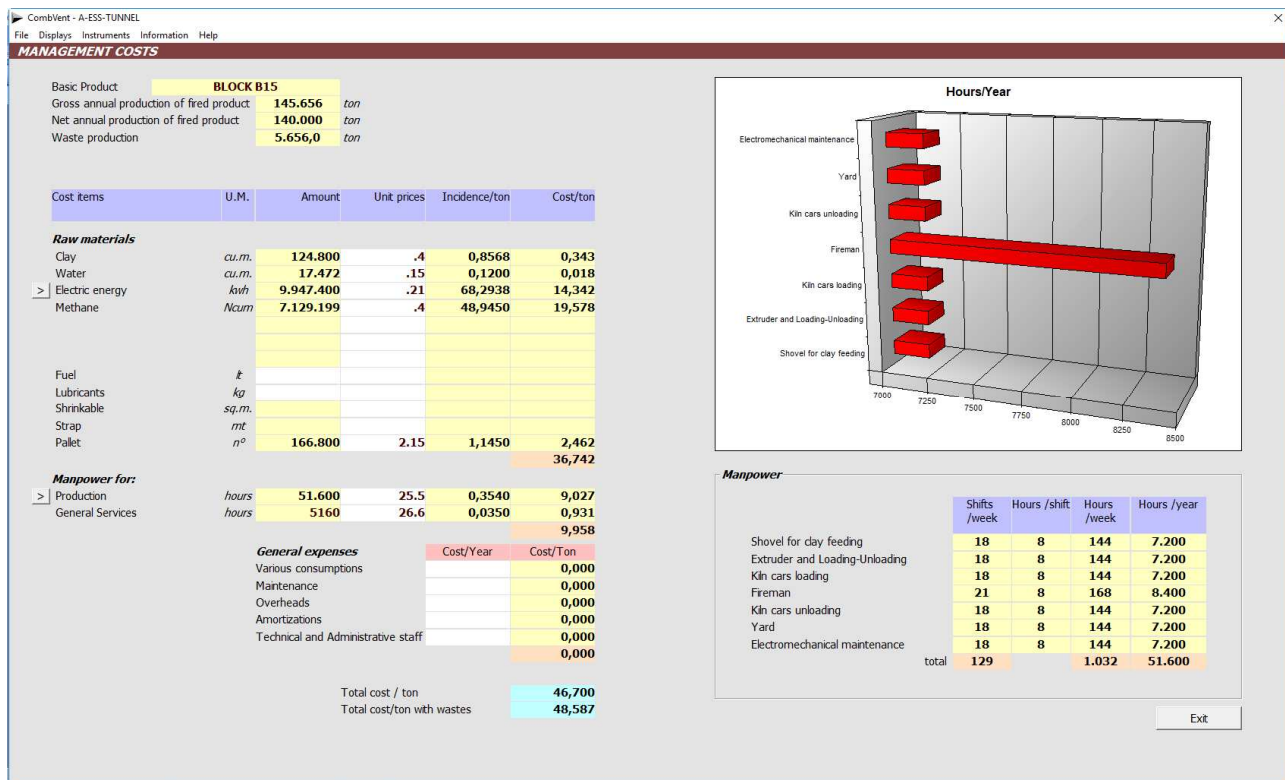
Home screen



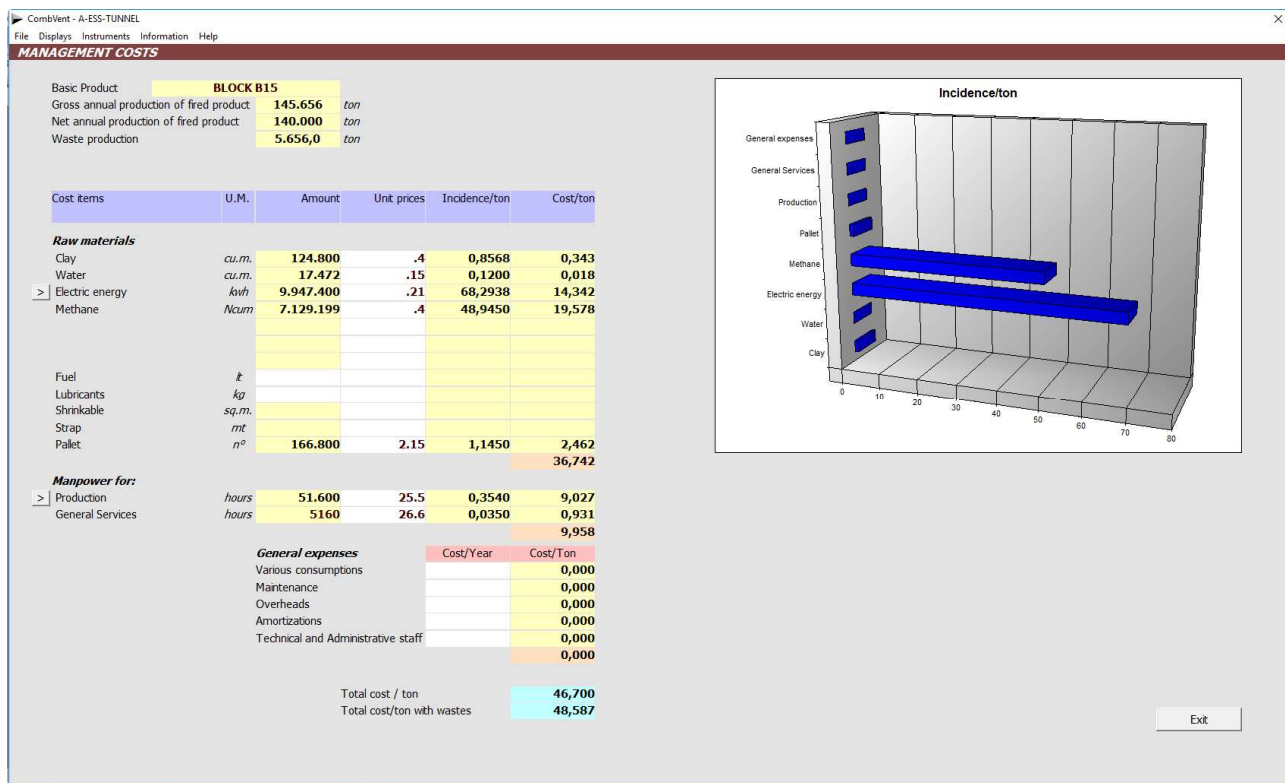
Electric energy



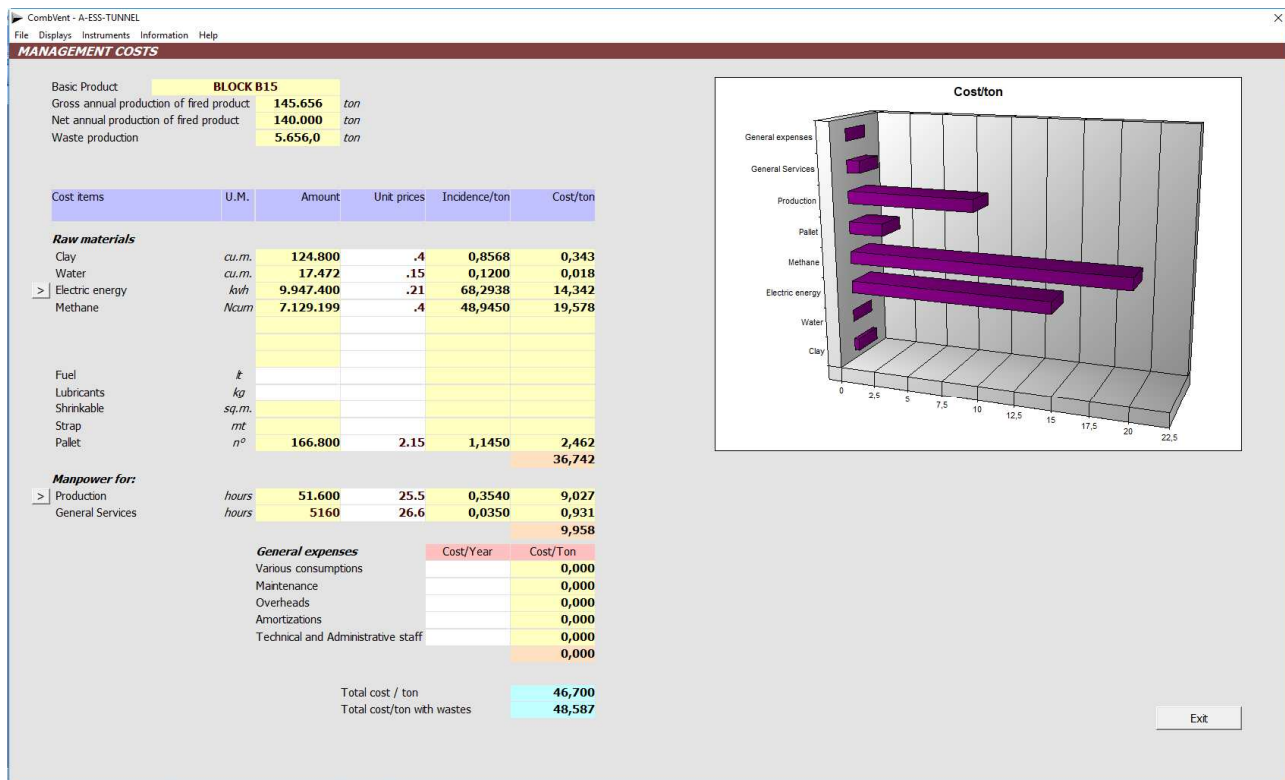
Manpower



Incidence / tonn



Cost / tonn



NOTE: Only the values in the boxes with a *white background* can be changed.

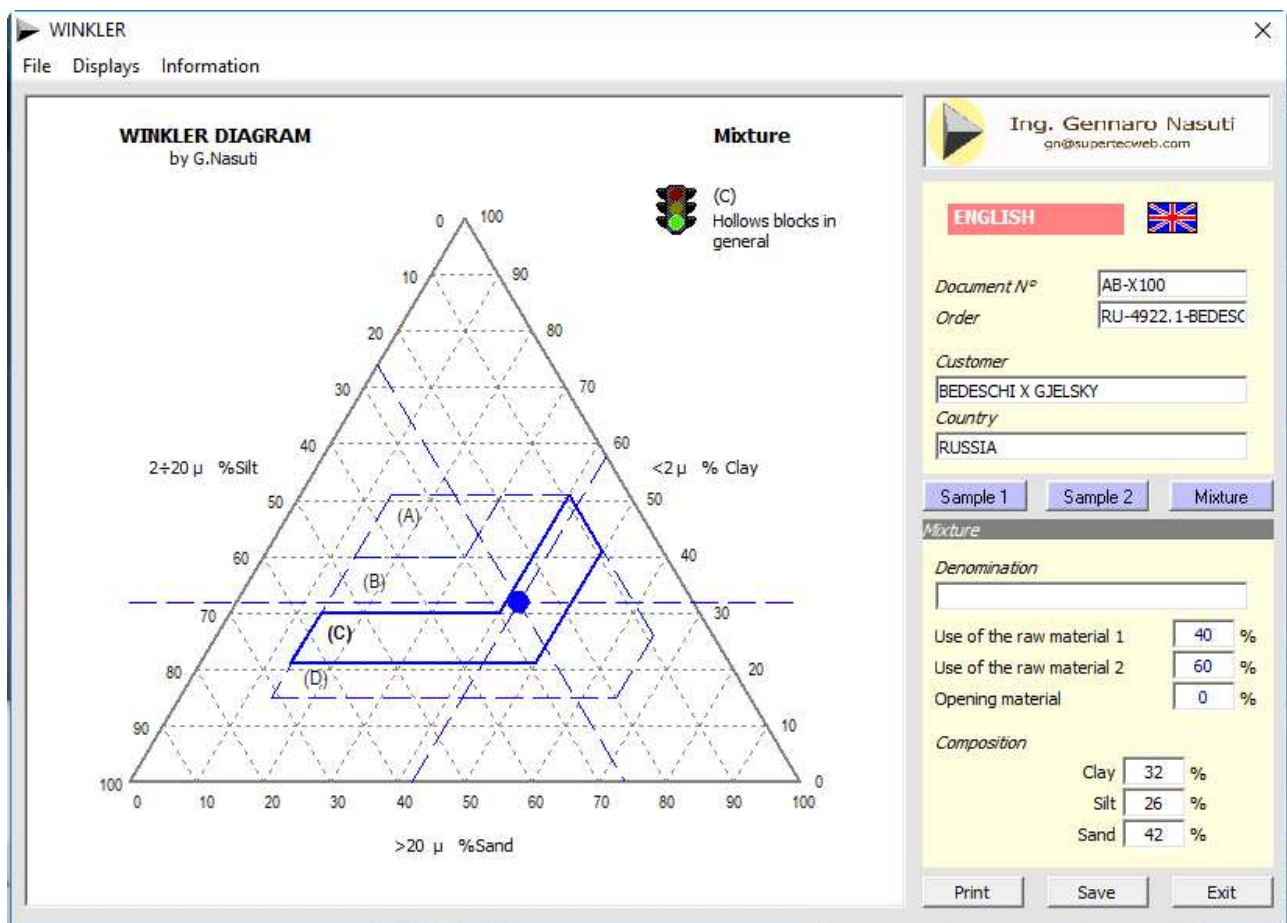
Section 7 – INSTRUMENTS

Section 7.1 – INSTRUMENTS → Winkler



The program is completed with the **WINKLER** application for the determination of the granulometric diagram of the raw material

It allows to evaluate the use of raw materials according to their *granulometric composition*. It is also possible to compose *mixtures* between two different raw materials to obtain the best granulometric composition according to your needs.



When defining a report related to the particle size composition, the program displays the following note in Section 2 - PRODUCT LIST:

By clicking on it, Section 7.1 is launched and the report is displayed.

Total shrinkage	0	% (*)
Weight loss during firing	0	% (*)
NOTE		
In archive there is a report for raw materials.		

Print options allow you to print individual reports for each raw material or cumulative reports. If you choose to print an empty Diagram, all other options are canceled and vice versa.

Printing options

Select the prints to be made

☒ Raw Material 1

☒ Raw Material 2

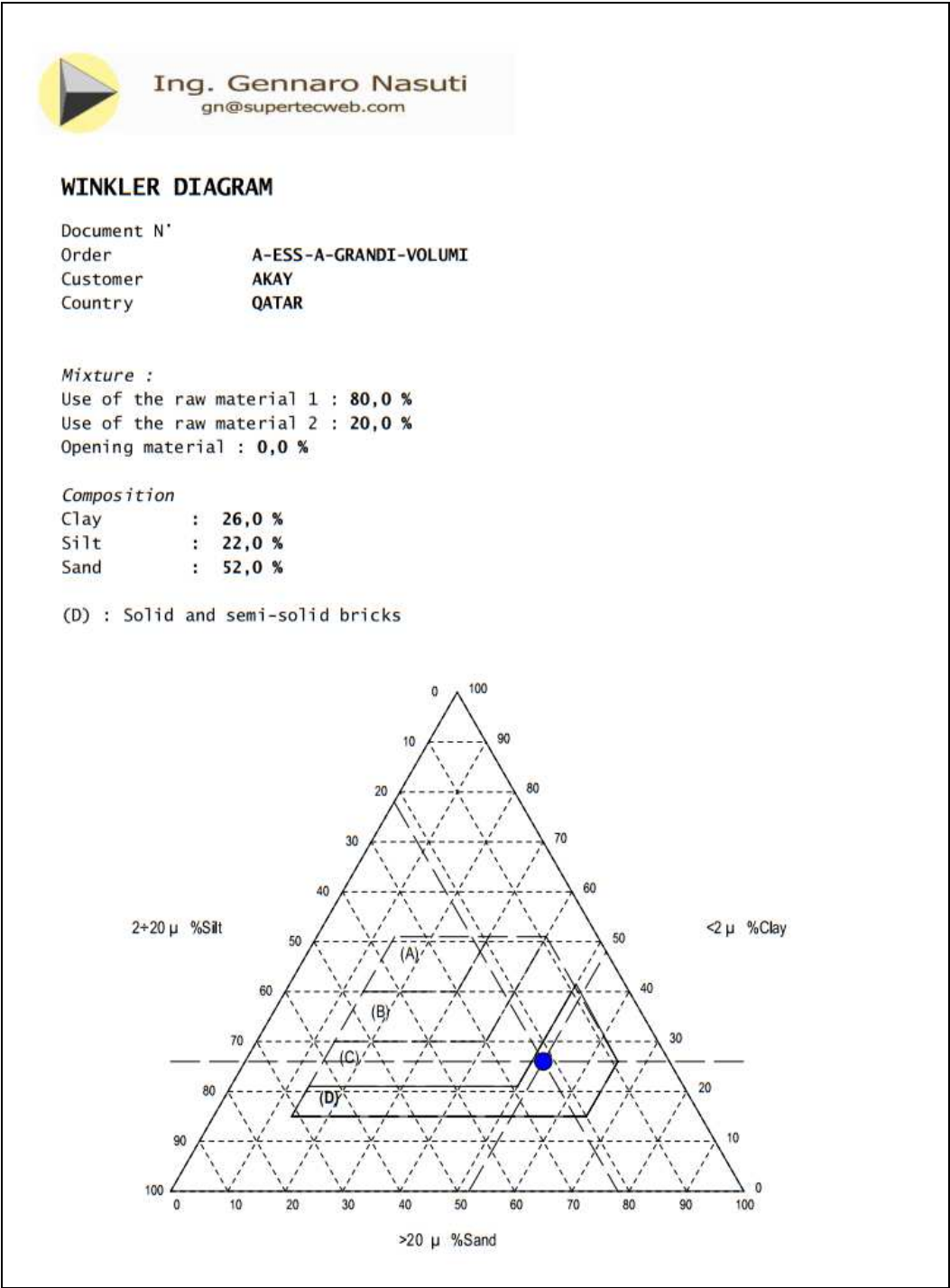
☒ Mixture

☐ Empty diagram

OK

Cancels

Example of printing the report related to a mixture.



Section 7.2 – INSTRUMENTS → Archive of Materials



An archive of Materials is available for use in the program in Section 3.4.6– KILN → Graphics → Insulations

Archive of Materials

Archive **LIST_MAT3.DAT** Types **AIR**
 Nº Records in archive **21**
 Types: **BRICKS**
COATINGS

Record **1** Type **AIR**
 Material **VERTICAL CAVITY**

Mass **1.3** kg/cum
 Thermal conductivity **.26** kcal/m h °C
 Thermal capacity **1** kcal/kg°C

Select

List
 Discard
 Change
 Save
 New
 Exit

ID	Type	Material	Mass	Thermal co...	Thermal ca...
1	AIR	VERTICAL CAVITY	1.3	.26	1
2	BRICKS	SOLID BRICK	1800	.72	.84
3	COATINGS	PANEL OR PLATE PLASTERBOARD	900	.21	1.09
4	COATINGS	PLASTER OF SAND AND CHALK	1400	.7	1.01
5	COATINGS	PLASTER OF SAND AND CEMENT	1800	.9	.84
6	CONCRETE FC	SUPERLITE + PERLOFON + FUSED CEMENT 150 KG/CUM	1300	0	0
7	CONCRETE FC	SUPERLITE + PERLOFON + FUSED CEMENT 250 KG/CUM	1300	0	0
8	CONCRETE PC	VERMICULITE + PORTLAND CEMENT 100 KG/CUM	450	0.001	0.00
9	CONCRETE PC	SUPERLITE + PERLOFON + PORTLAND CEMENT 250 KG/CUM	1500	0	0
10	CONCRETE PC	SUPERLITE + PERLOFON + PORTLAND CEMENT 150 KG/CUM	500	0	0
11	FILLING	PERLITE EXPANDED IN GRAINS	100	0.066	.84
12	FILLING	VERMICULITE EXPANDED IN GRAINS	80	0.077	.84
13	FILLING PC	EXPANDED CLAY + PORTLAND CEMENT 100 KG/CUM	1000	0	0
14	INSULATION FC	VERMICULITE + FUSED CEMENT 100 KG/CUM	700	0	0
15	INSULATION FC	CHAMOTTE + FUSED CEMENT 300 KG/CUM	1500	0	0

The *List* command displays the following print preview.

Print Preview

N°	DESCRIPTION	Mass kg/mc	Thermal conductivity kcal/m h °C	Thermal capacity kcal/kg °C
*** Type : AIR				
1	VERTICAL CAVITY	1,3	0,260	1,00
*** Type : BRICKS				
2	SOLID BRICK	1.800	0,720	0,84
*** Type : COATINGS				
3	PLASTER OF SAND AND CEMENT	1.800	0,900	0,84
4	PLASTER OF SAND AND CHALK	1.400	0,700	1,01
5	PANEL OR PLATE PLASTERBOARD	900,0	0,210	1,09
*** Type : CONCRETE FC				
6	SUPERLITE+PERLOFON+FUSED CEMENT 250 KG/CUM	1.300	0,000	0,00
7	SUPERLITE+PERLOFON+FUSED CEMENT 150 KG/CUM	1.300	0,000	0,00
*** Type : CONCRETE PC				
8	SUPERLITE+PERLOFON+PORTLAND CEMENT 150 KG/CUM	500,0	0,000	0,00
9	SUPERLITE+PERLOFON+PORTLAND CEMENT 250 KG/CUM	1.500	0,000	0,00
10	VERMICULITE+PORTLAND CEMENT 100 KG/CUM	450,0	0,001	0,00
*** Type : FILLING				
11	VERMICULITE EXPANDED IN GRAINS	80,0	0,077	0,84
12	PERLITE EXPANDED IN GRAINS	100,0	0,066	0,84
*** Type : FILLING PC				
13	EXPANDED CLAY+PORTLAND CEMENT 100 KG/CUM	1.000	0,000	0,00

Print Exit

Section 7.3 – INSTRUMENTS → Archive of Products



An archive of Products to be used in the program in Section 2.1 – PRODUCTS → Products List is also available

Archive of Products

Archive **LIST_PROD.DAT**

N° Records in archive **22**

Record N° **1**

Product type **WALL BLOCK NOTCHED LT** Initials **BL**

Product Name **HHZX 25-DL**

Width **39.5** cm N° of teeth per side **4**

Height **25** cm Height of toothing **15** mm

Length **21.9** cm Type toothing

Fired weight **14.8** kg ☒ misaligned ☐ aligned

Select

Graphics

List

Discard

Change

Save

New

Exit

N°	Initials	Name	Width	Height	Length	Fired weight
1	BL	HHZX 25-DL	39.5	25	21.9	14.8
2	BM	HHZX 25	38	25	23.8	16.8
3	BS	HHZX 25-DS	51	26.5	21.9	20.2
4	CE	COP-E40	21	10	40	4
5	CP	COP-P35	20	8	35	3
6	FL	FORATO B15	15	25	25	5.3
7	FL	FORATO B10	10	25	25	3.7
8	FL	FORATO B20	20	25	25	6.7
9	FL	FORATO B12	12	25	25	4.8
10	FL	PLATIERE	6.5	20	30	3
11	FP	FORATO H12	38	12	23.8	9.2
12	MC	STANDARD BRICK	25	12	6.5	2.3
13	MF	MFV-25	25	12	6.5	2.73
14	S1	SOLAIO H15	41	15	20	8.5
15	S1	SOLAIO H20	40	20	25	9
16	S1	SOLAIO H16	40	16	25	8.3

The *List* command displays the following print preview.

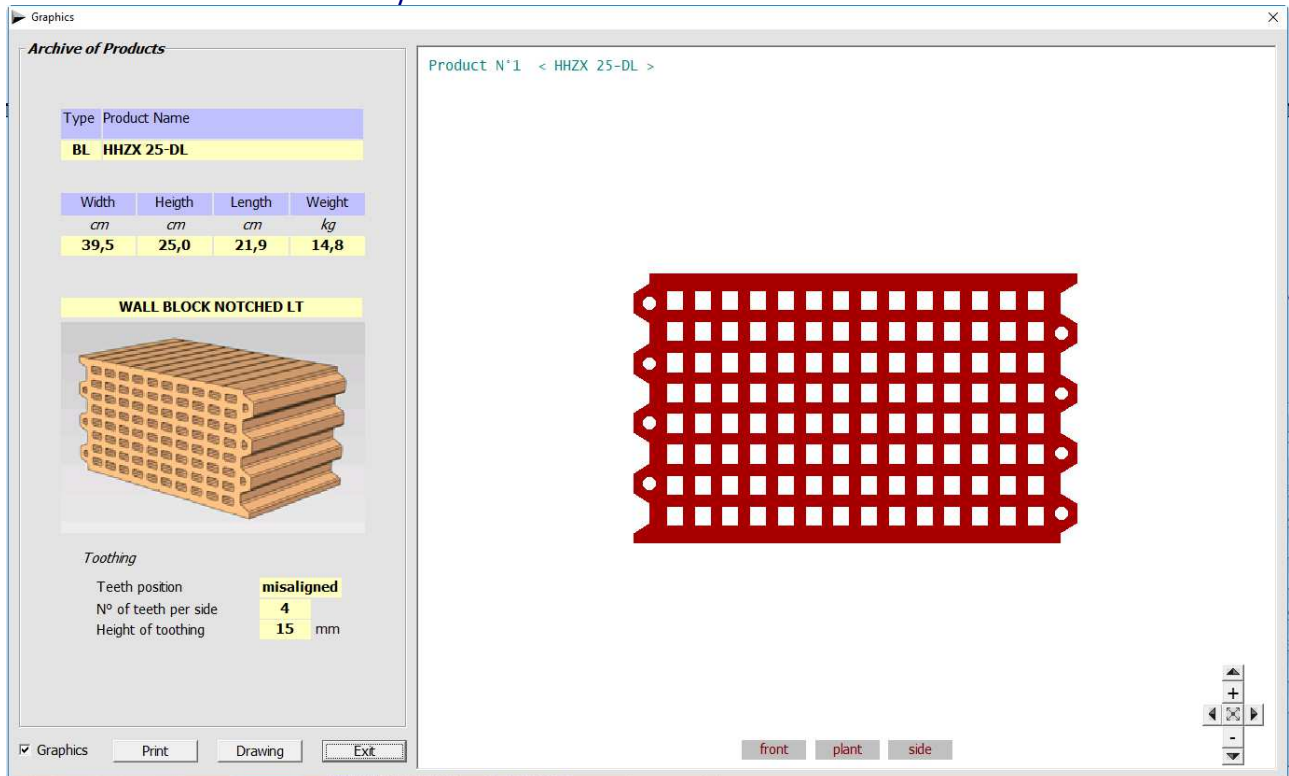
Anteprima di Stampa

N°	DESCRIZIONE	Larghezza cm	Altezza cm	Taglio cm	Peso cotto kg
***	TIPO: BLOCCO DA MURO DENTATO DL				
1	Sigla: BL HHZX 25-DL	39,5	25,0	21,9	14,8
***	TIPO: BLOCCO DA MURO				
2	Sigla: BM HHZX 25	38,0	25,0	23,8	16,8
***	TIPO: BLOCCO DA MURO DENTATO DS				
3	Sigla: BS HHZX 25-DS	51,0	26,5	21,9	20,2
***	TIPO: COPPO ESTRUSO				
4	Sigla: CE COP-E40	21,0	10,0	40,0	4,0
***	TIPO: COPPO PRESSATO				
5	Sigla: CP COP-P35	20,0	8,0	35,0	3,0
***	TIPO: FORATO LEGGERO				
6	Sigla: FL FORATO B15	15,0	25,0	25,0	5,3
7	FORATO B10	10,0	25,0	25,0	3,7
8	FORATO B20	20,0	25,0	25,0	6,7
9	FORATO B12	12,0	25,0	25,0	4,8

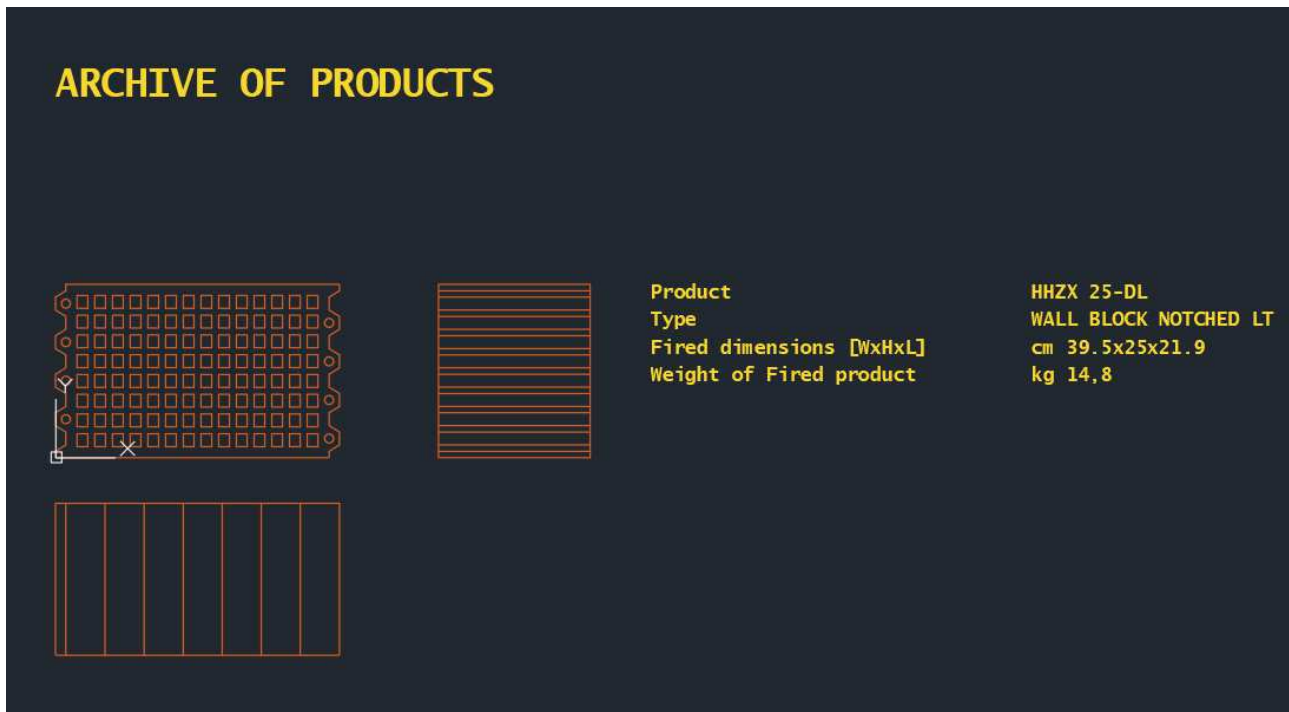
Stampa

Esd

ARCHIVE OF PRODUCTS - *Graphics*



Below is an example of a DWG drawing of the product mentioned above.



Section 7.4 – INSTRUMENTS → Utility



There is also a support application called **UTILITY**

Home screen



Thermal Balance

Utility

Bilancio Termico

Analisi energetica di 2° livello

Cremagliera

Levismo

Trasmisione a catena

Calcolo canali aria

Tubolari

Profilati

Esci

Bilancio Termico - Dati di Input

Peso cotto prodotto base	4	kg	Temperatura al Camino	120	°C
N° Pezzi per carro forno	1920		Temperatura di Cottura	900	°C
N° Carri / ora	2.846		Temperatura Ambiente	20	°C
Produzione oraria	21857.1	kg cotto/h	Temperatura recupero BT	120	°C
PCI Combustibile	8250	kcal/kg(mc)	H2O sul cotto	2.5	%
Calore spec. dissociazione	900	Kcal/KgCO2	CaCO3 sul cotto	0	%

	Preriscaldamento	Cottura	Raffr. rapido	Raffr. lento	Totale
Dimensioni forno	47.25	36.45	13.12	35.48	132.3

Perdite

	Preriscaldamento	Cottura	Raffredd.	
Perdite in parete	15250	111700	20850	Kcal/h
Perdite in volta	2480	19400	3644	Kcal/h
Aria parassita	4000	4000	4000	Kg/h

Rivestimento carro

Tirafumi	1289	Kg/carro	3.668 Kg/h
Coronamento	3706	Kg/carro	10.547 Kg/h
Isolamento interno	3138	Kg/carro	8.931 Kg/h

Temperature

	Aria-Fumi	Materiale	Piastre	Coronamento	Isolamento
T_ingresso ZP	120	20	20	50	120
T_ingresso ZC	700	600	600	305.2	273.7
T_ingresso ZRR	850	890	900	545.2	419.95
T_ingresso ZRL	600	640	650	435.2	353.7
T_uscita Forno	20	60	70	180	200

Dati Input Calcoli Riepilogo Grafico

Utility

Bilancio Termico

Analisi energetica di 2° livello

Cremagliera

Levismo

Trasmisione a catena

Calcolo canali aria

Tubolari

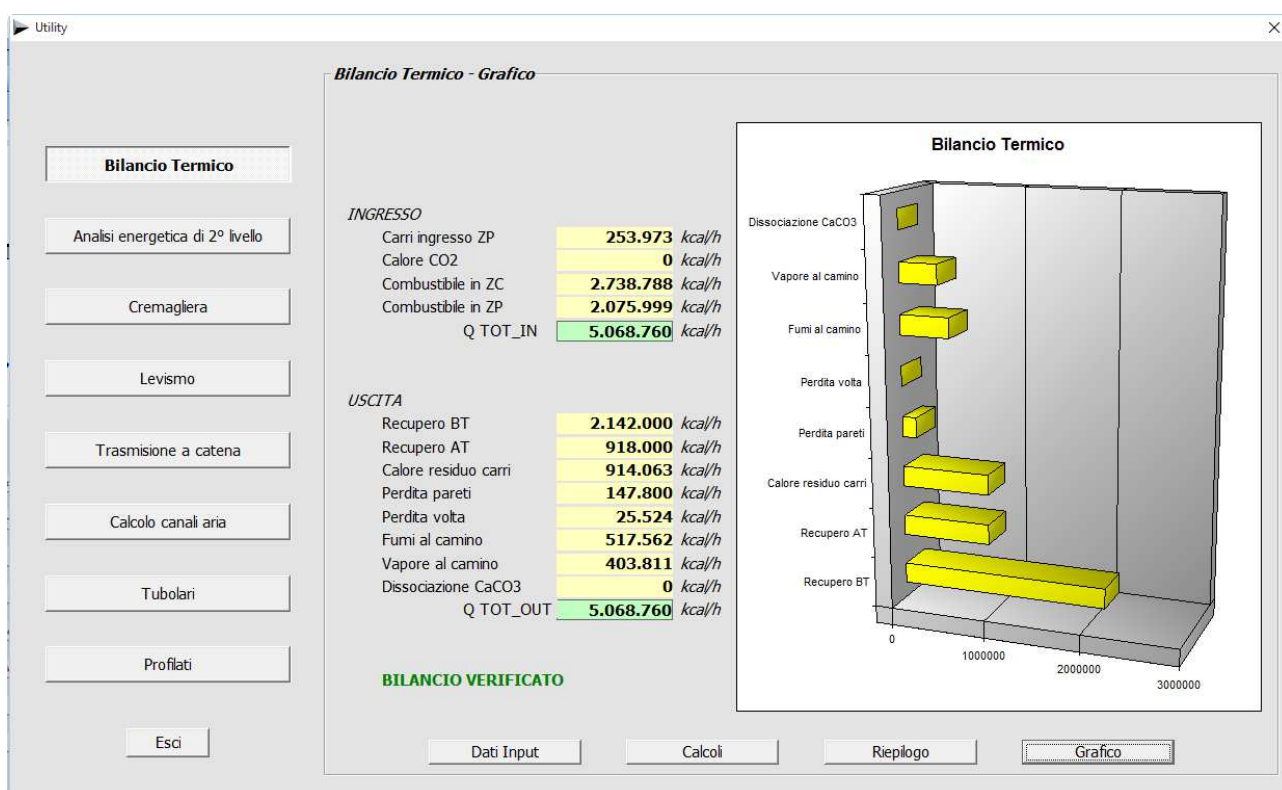
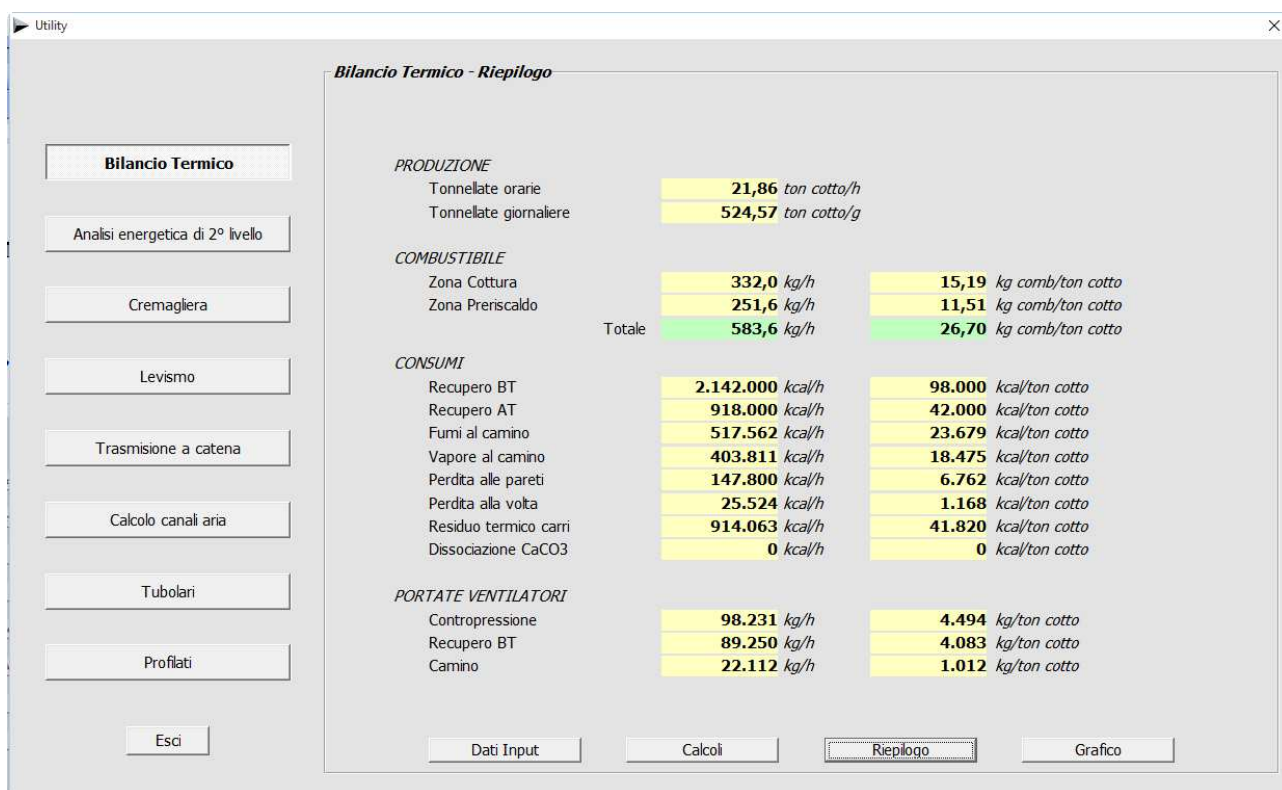
Profilati

Esci

Bilancio Termico - Calcoli

Zona Preriscaldamento	Zona Cottura	Zona Raffreddamento
Riscaldamento materiale	2.662.200	Kcal/h
Riscaldamento piastre	446.742	Kcal/h
Riscaldamento coronamento	565.290	Kcal/h
Riscaldamento isolamento interno	288.219	Kcal/h
Calore totale necessario al carro in ZP	3.962.451	Kcal/h
Riscaldamento acqua-vapore	403.811	Kcal/h
Calore residuo carri in ingresso	253.973	Kcal/h
Calore proveniente da ZC	2.825.555	Kcal/h
Massa occorrente di combustibile in ZP	252	Kgcomb/h
Massa di aria comburente in ZP	5.159	kg/h
Massa di aria di integrazione in ZP	0	kg/h
Aria non utilizzata per la combustione	10.843	kg/h
Massa fumi al camino	21.565	kg/h
Massa vapore al camino	546	kg/h
Calore fumi al camino	517.562	Kcal/h
Calore vapore al camino	403.811	Kcal/h
Calore perso al camino	921.373	Kcal/h

Dati Input Calcoli Riepilogo Grafico



2nd level energy analysis

Utility

Energy analysis of the 2nd level

Ing. Gennaro Nasuti
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Thermal balance sheet

Energy analysis of the 2nd level

Rack

Lever system

Chain drive

Calculation of air channels

Tubulars

Profiles

Exit

Product	BLOCK B15	
Period considered	24	hours
Weight of the material at the dryer entrance	9.92	kg/pz
Weight of the material at the dryer exit	9.72	kg/pz
Weight of the material at the kiln entrance	9.8	kg/pz
Weight of the material at the kiln exit	8	kg/pz
Number of pieces produced	51000	pz
Specific thermoshinking consumption	8	kg of fired/hour
Carbonates (expressed as CaCO ₃)	0	% dry
Organic substances (n.c.v. = 5000 kcal / kg)	0	% dry
The plant fuel consumption	16174	kg (cum)
Boiler fuel consumption	78	kg of fired/hour
Boiler efficiency	80	%
N.C.V. of fuel	8250	kcal/kg (kcal/cum)
Production	408.000	kg of fired
Water evaporated in the drier	10.200	kg H ₂ O
Tempering Water	4.080	kg H ₂ O
Carbonates		kcal/kg CaCO ₃
Organic substances		kg
Evaporated water in the kiln	91.800	kg H ₂ O
Useful heat	223,4	kg of fired/hour
Total combustion energy	327,0	kg of fired/hour
Global thermal efficiency	68,3	%

Rack

Utility

Rack

Ing. Gennaro Nasuti
gn@supertacweb.com

Thermal balance sheet

Energy analysis of the 2nd level

Rack

Lever system

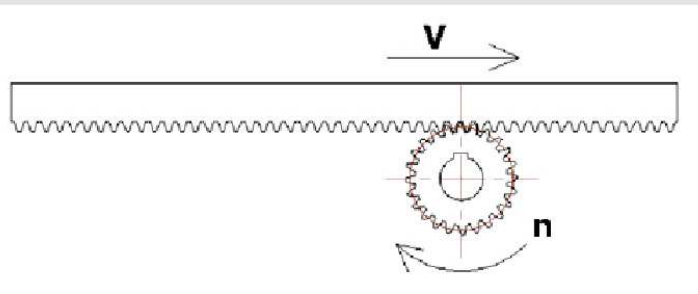
Chain drive

Calculation of air channels

Tubulars

Profiles

Exit



Number of engine rpm **3000** turns/min

Reduction gear ratio 1: **15**

n **200,0** turns/min

Sprocket pitch diameter **80** mm

V **83,78** cm/sec

Sprocket pitch diameter **80** mm

V **83,78** cm/sec

Reduction gear ratio 1: **18,0**

n **167,1** turns/min

Lever system

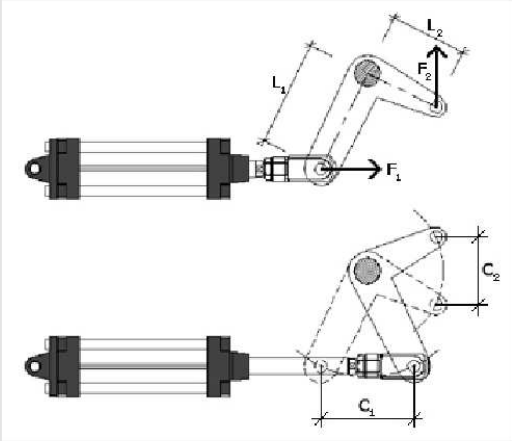
Utility

Lever system

Ing. Gennaro Nasuti
gn@supertecweb.com

NOTE: The levers are at 90 °

Cylinder Ø	100	mm
Stroke Cylinder	220	mm
Lever arm L1	110	mm
Lever arm L2	160	mm
Stroke C2	320,0	mm
Work pressure	6	bar
Strength F2	480,5	kg
Strength F1	330,4	kg



Thermal balance sheet

Energy analysis of the 2nd level

Rack

Lever system

Chain drive

Calculation of air channels

Tubulars

Profiles

Exit

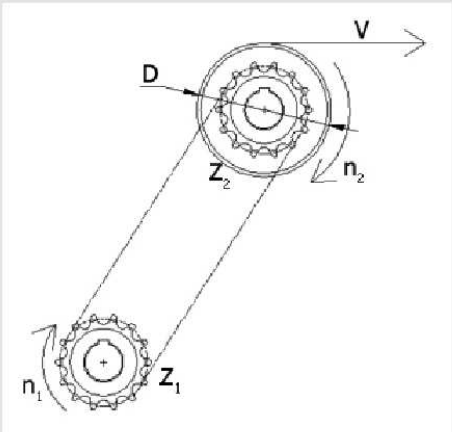
Chain drive

Utility

Chain drive

Ing. Gennaro Nasuti
gn@supertecweb.com

Roll peripheral speed	V	10	cm/sec
Roller diameter	D	50	mm
Nº turns of roller	n2	38,0	turns/min
Nº turns of the electric motor		1450	turns/min
Reduction gear ratio	1 :	42	
Nº turns of the reduction gear	n1	35,0	turns/min
Ratio n2/n1	1 :	,92	
Nº of teeth of the pinion gear	Z1	24	
Nº of teeth of the roller pinion	Z2	22	



Thermal balance sheet

Energy analysis of the 2nd level

Rack

Lever system

Chain drive

Calculation of air channels

Tubulars

Profiles

Exit

Calculation of air channels

Utility

Calculation of air channels

Air flow available
Average air speed

12000
10

cum/h
m/sec

Theoretical diameter of the air pipe
Equivalent square channel

Ø
Side L

651
577

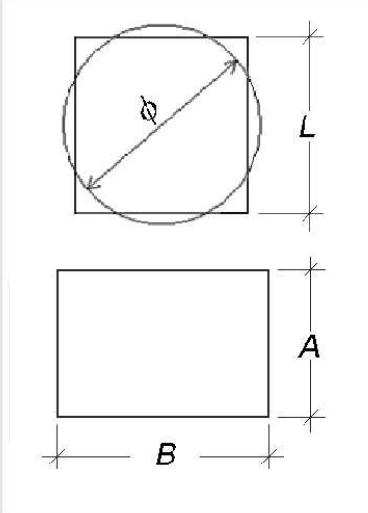
mm
mm

Equivalent rectangular duct

Side A
Side B

500
667

mm
mm



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Thermal balance sheet

Energy analysis of the 2nd level

Rack

Lever system

Chain drive

Calculation of air channels

Tubulars

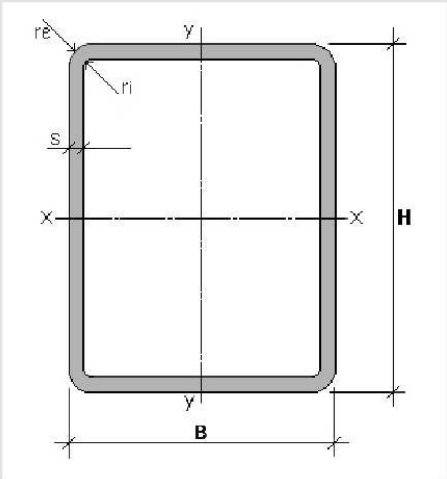
Profiles

Exit

Tubulars

Utility

Tubulars



Heigh H
Width B
Thickness s
Internal fittings ri
External fittings re

150
100
6
4
10,0

mm
mm
mm
mm
mm

Area
Barycentric inertia Jx
Resistant modulus Wx

27,84
885,25
118,03

cm2
cm4
cm3

Barycentric inertia Jy
Resistant modulus Wy

466,31
93,26

cm4
cm3

Specific weight of the material
Weight per linear meter

1750
4,87

kg/cum
kg/m

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Thermal balance sheet

Energy analysis of the 2nd level

Rack

Lever system

Chain drive

Calculation of air channels

Tubulars

Profiles

Exit

171

Profiles

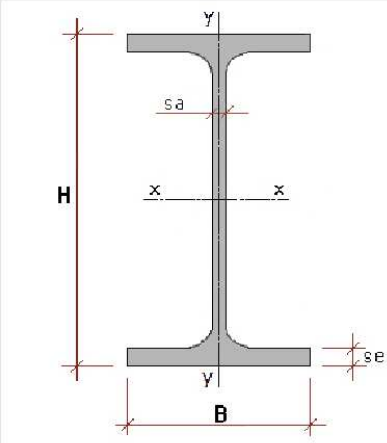
Utility

Profiles

Type IPE

Height 140

Profile IPE140



H	140	mm
B	73	mm
sa	4.7	mm
se	6.9	mm
Jx	541	cm4
Wx	77.3	cm3
Jy	44.9	cm4
Wy	12.3	cm3
Section	16.4	cm2
Weight	12.9	kg/m

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Thermal balance sheet

Energy analysis of the 2nd level

Rack

Lever system

Chain drive

Calculation of air channels

Tubulars

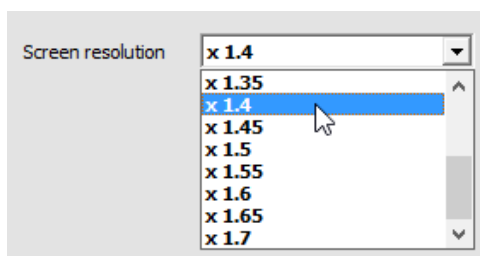
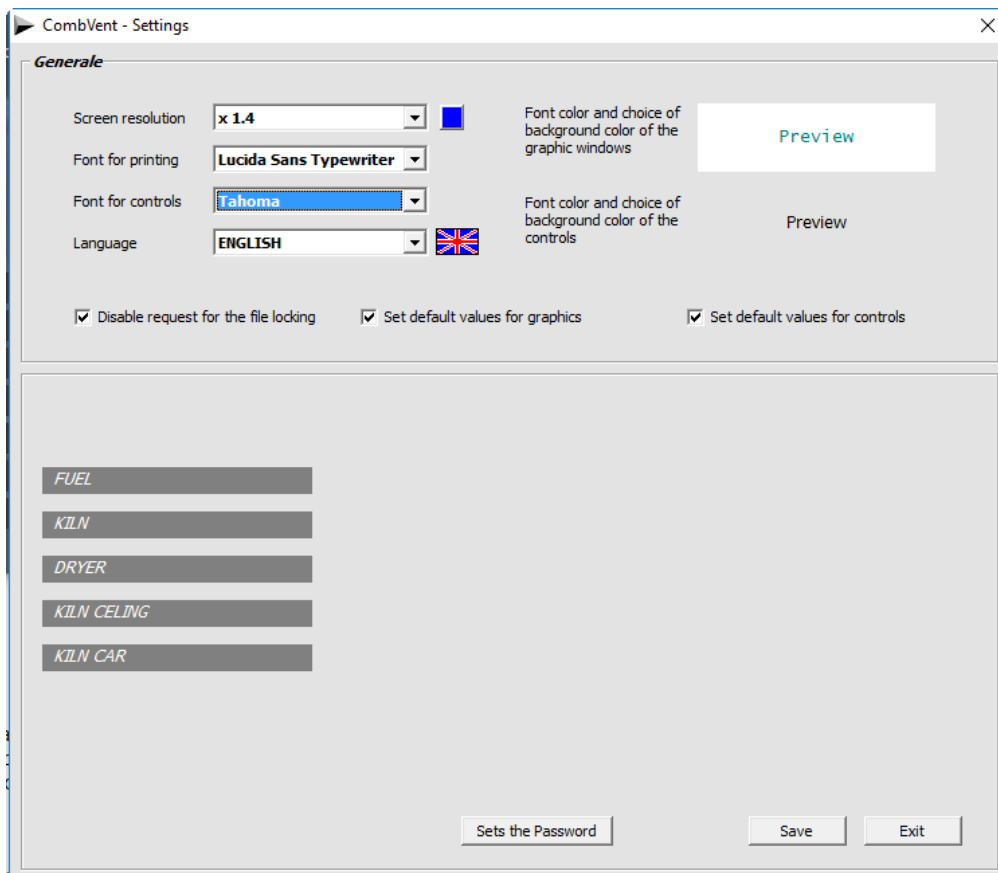
Profiles

Exit

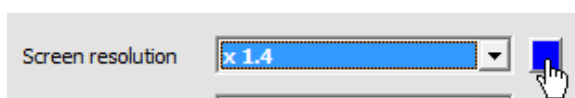
Section 7.5 – INSTRUMENTS → Settings



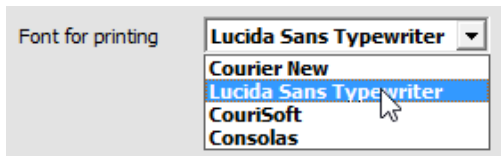
It is possible to customize the program by modifying various aspects through the following window.



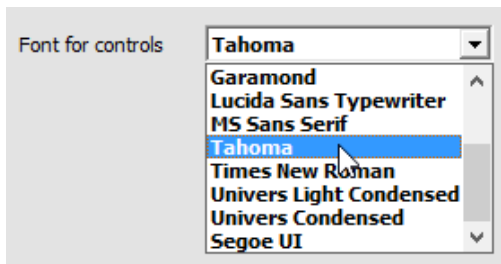
It is possible to adapt the display of the program to the size of your video by choosing the most appropriate multiplier value among those present in the drop-down box.



Pressing the *blue side button* sets the optimal resolution based on the size of your video.

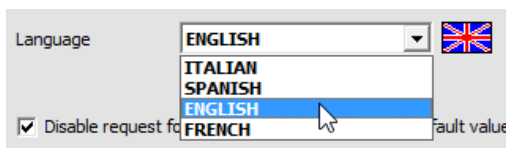


You can choose the type of font to use for printing (the default font is 'Lucida Sans Typewriter').

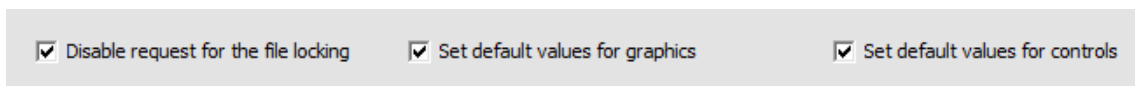


Choice of the type of font to be used for the text of the controls present in the various windows of the program (the default font is 'Tahoma').

You can choose the language for the program amongst the languages listed in the following drop-down menu (the *default* language is *Italian*).



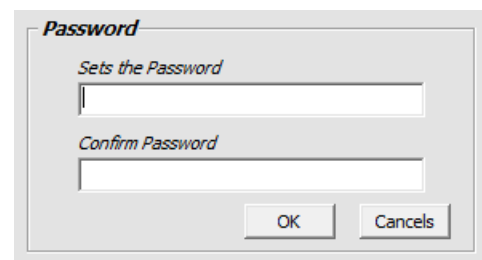
The check on *Set default values* for the controls allows to reset the settings related to fonts and colors to the starting situation.



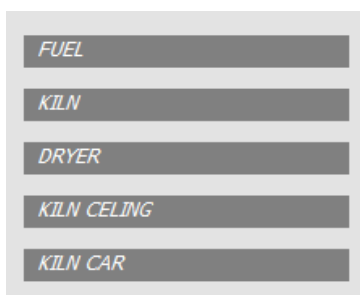
The program provides for the possibility of preventing any other users of the program from modifying a developed project. It is therefore possible to lock the project file so that it can not be modified. A password is required to unlock an existing file. It is therefore necessary that the user set his own password.

It is sufficient to type in the password and reconfirm it in the *Set Password* window on the side.

You can change a password only if you know the old one.



The following command allows access to the windows which show the default values taken into consideration by the program and which can be modified.



If a password is set, access is only allowed to the owner of the password.

Password required

Password required

OK Change Cancells

Change Entry Save Exit

Once the password is entered, clicking on the *Entry* command will display the windows and make any changes to the default values.

FUEL

Net Calorific Values

Methane	8250	Kcal/Ncu.m
GPL	23500	Kcal/Ncu.m
Coal gas	3500	Kcal/Ncu.m
Fuel oil	9800	Kcal/kg
Petroleum coke	7400	Kcal/kg

NOTE
For each variable in this section you can get the corresponding default value by entering 0 followed by the Enter key in the appropriate box.

Sets the Password Save Exit

KILN

☐ Traditional kiln ☒ Prefabricated kiln

Horizontal deviation between ceiling and wall	25	mm
Vertical deviation between ceiling and wall	25	mm
Vertical free space between sealing tooth and refractory floor of kiln car	30	mm
Refractory mortar thickness	3	mm
Length of side refractory seal tooth	150	mm
Deviation between wall flue area and the first row of panels	30	mm
Deviation between the intermediate panel and panel above the ceiling	50	mm
Beams of ceiling	15	mm

	MIN	MAX
Lateral space admissible between the package and wall of kiln	50	400
Vertical space admissible between the package and ceiling	50	400
Width of wall opening for inserting intermediate ports	320	mm
Carpentry height pier fumes area	160	mm
Height pier carpentry	120	mm

NOTE
For each variable in this section you can get the corresponding default value by entering 0 followed by the Enter key in the appropriate box.

Sets the Password Save Exit

FUEL

KILN

DRYER

KILN CEILING

KILN CAR

NOTE
For each variable in this section you can get the corresponding default value by entering 0 followed by the Enter key in the appropriate box.

DRYER

☒ *in chambers / tunnel*
☐ *with cars*

Distance between the pallet and vertical carpentry of dryer car

30 mm

Distance between the bar and vertical carpentry of dryer car

30 mm

Minimum free space between material and soffit top shelf

40 mm

Maximum free space between material and soffit top shelf

100 mm

Deep pit transporter of dryer cars

350 mm

Tolerance between the rail and the trolley wheel

2 mm

Sets the Password

Save

Exit

FUEL

KILN

DRYER

KILN CEILING

KILN CAR

NOTE
For each variable in this section you can get the corresponding default value by entering 0 followed by the Enter key in the appropriate box.

KILN CEILING

☒ *Coveri*
☐ *Maref*

ongitudinal

Minimum

Pillar supporting height

330

400

mm

Width of the interposed component

230

340

mm

Width of the bearing intermediate component

260

320

mm

Width of the openings interposed component

240

280

mm

Height of the feed tube module

260

300

mm

Transverse tolerance between the pieces of the ceiling

3

mm

Longitudinal tolerance between the pieces of the ceiling

5

mm

Sets the Password

Save

Exit

FUEL

KILN

DRYER

KILN CEILING

KILN CAR

NOTE
For each variable in this section you can get the corresponding default value by entering 0 followed by the Enter key in the appropriate box.

KILN CAR

☒ *Carpentry*
☐ *Coating*

Diameter of the front sealing rod

25

mm

Vertical position of the front sealing rod

55

mm

Thickness of the plate of the front wheel connecting door beams

15

mm

Shortening wheels door beams with respect to the car

1.5

mm

Shortening side plates to the wheels door beams

2.5

mm

Length of the thrust notch

220

mm

Width of the thrust notch

250

mm

Thick plate of the thrust notch

10

mm

Tolerance between the rail and the trolley wheel

2

mm

Allowable stress for verification at the centerline of the beam

550

kg/cm²

Allowable stress for verification to the beam supports

700

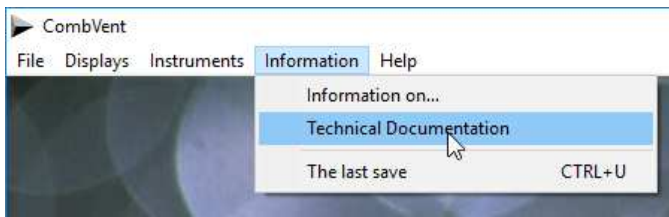
kg/cm²

Sets the Password

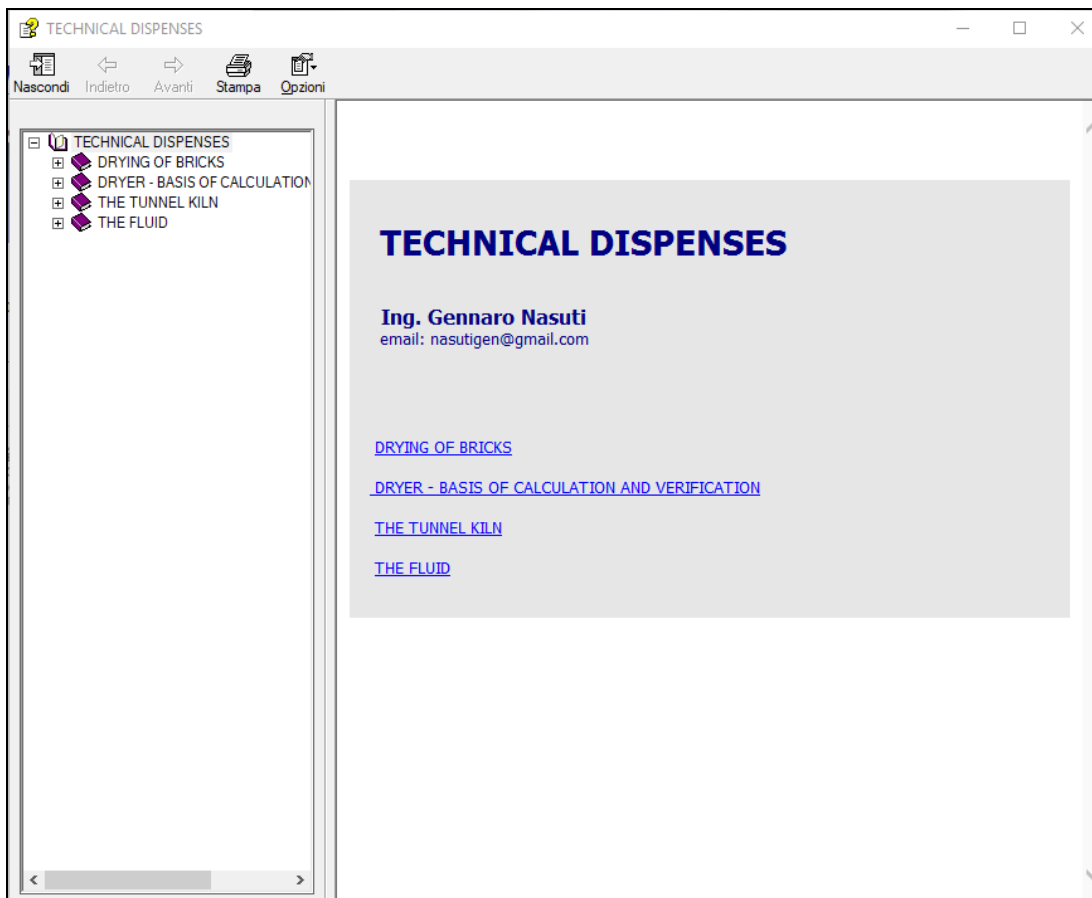
Save

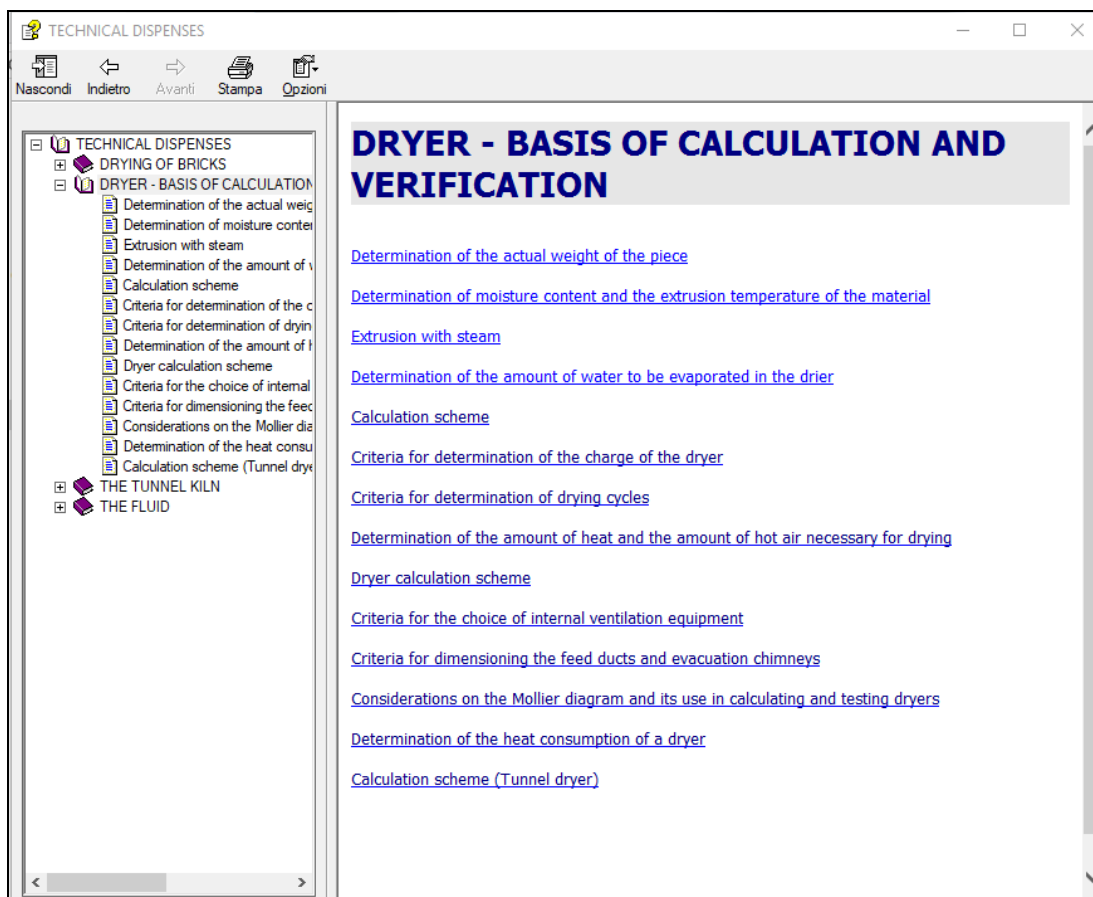
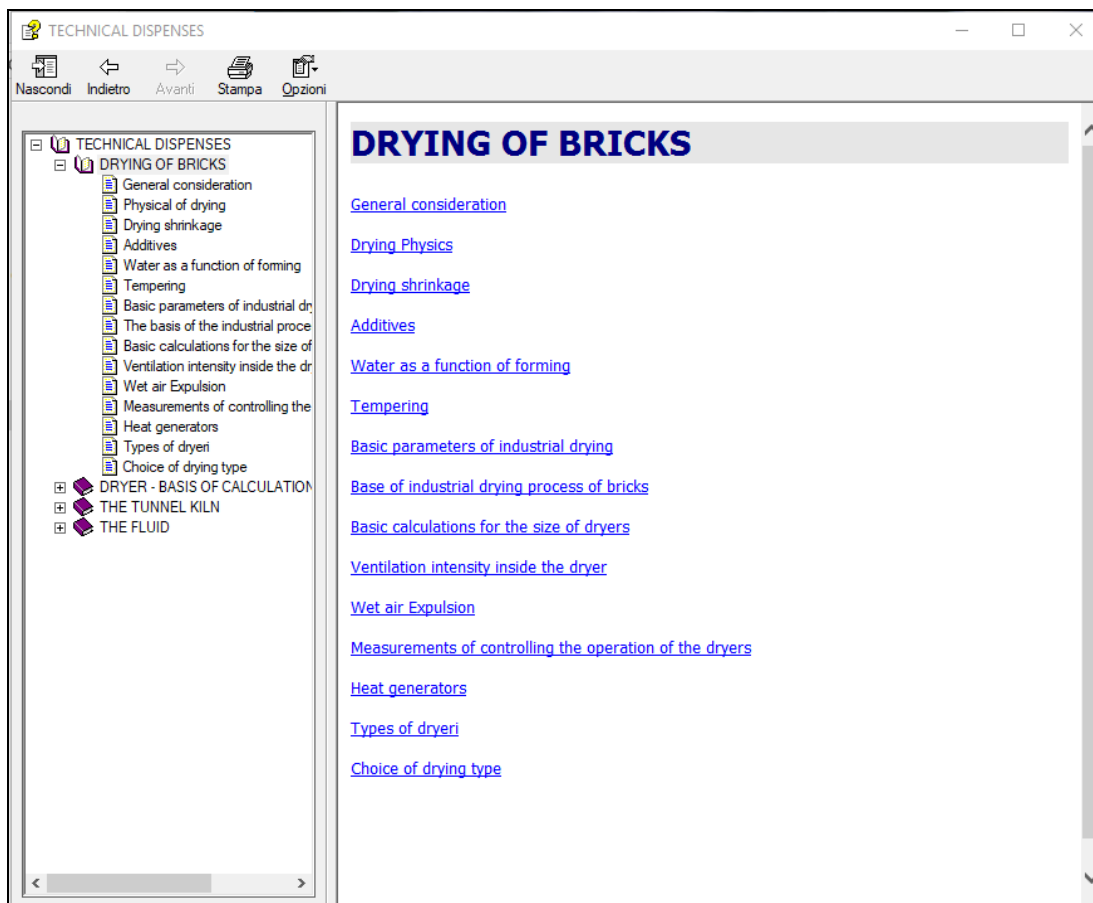
Exit

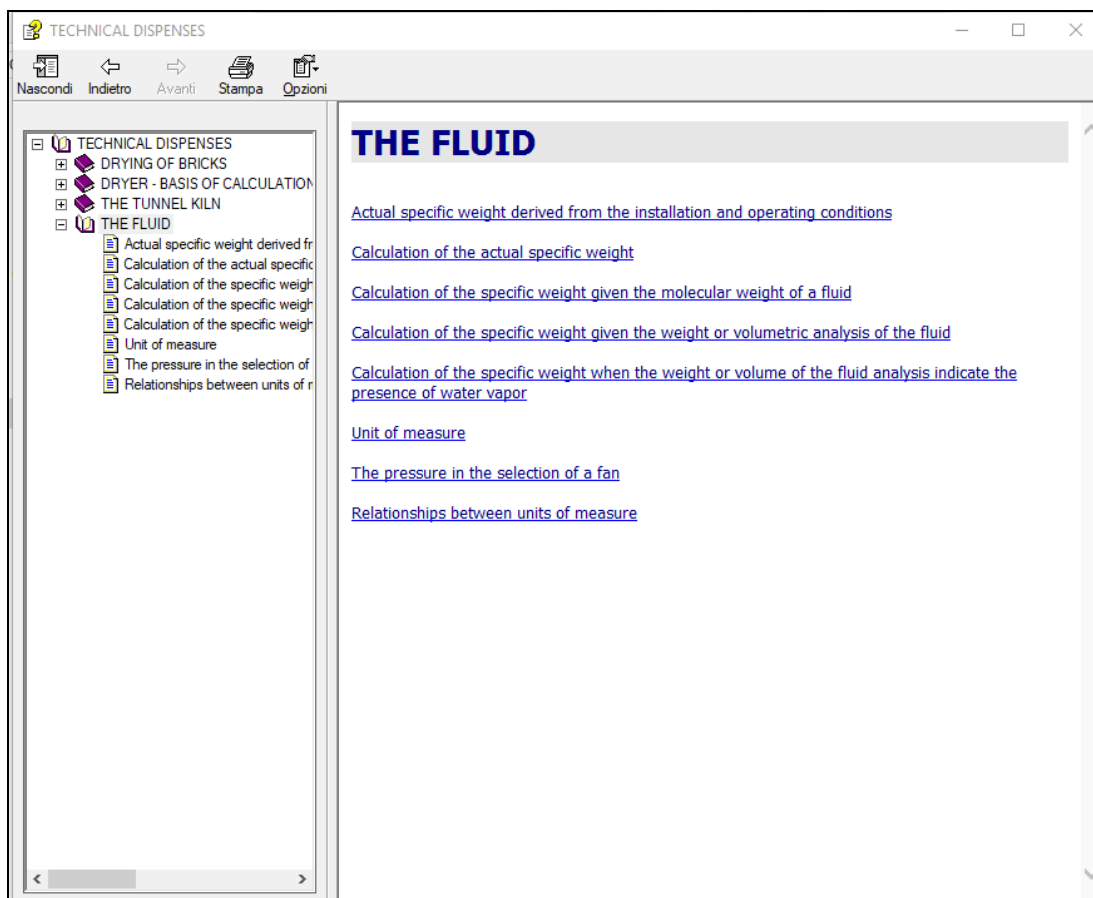
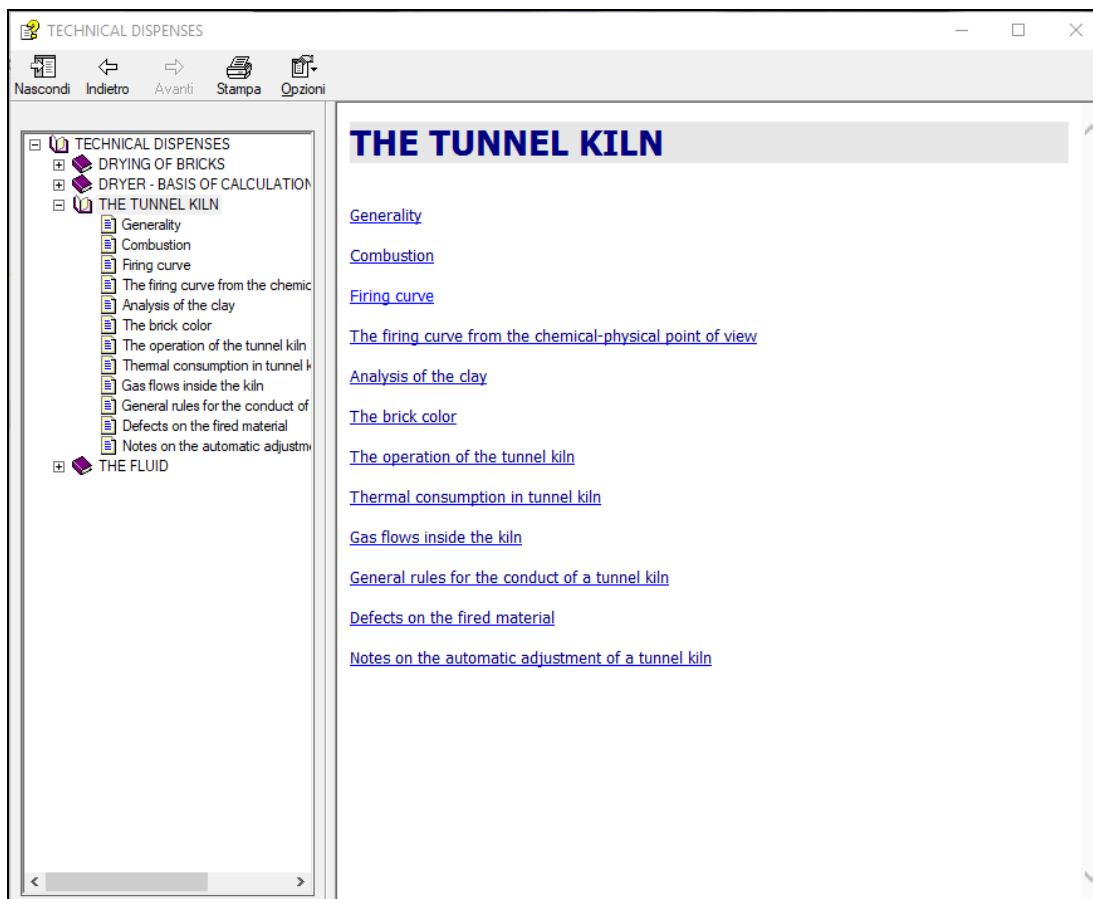
Section 8 – TECHNICAL DOCUMENTATION



For information, a series of *technical documents* regarding the brick industry is reported, with particular reference to the *drying* and *firing processes*.







COMBVENT HELP



The *Help* command in all the program windows displays the guide to be consulted for using the program.

