

LIFE Program HeroTile project



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DA

Dipartimento
Architettura
Ferrara

L'efficacia della ventilazione dei tetti a falda con
la nuova tegola 



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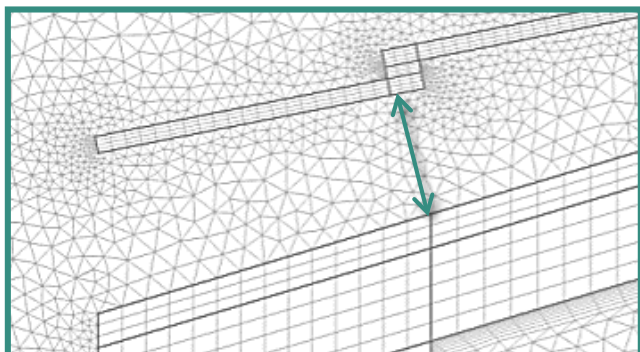
Nei tetti ventilati l'aria entra dalla linea di gronda ed esce dalla linea di colmo.

Questa circolazione d'aria smaltisce una parte del calore solare che riscalda il sottotetto e riduce i consumi per il raffrescamento.

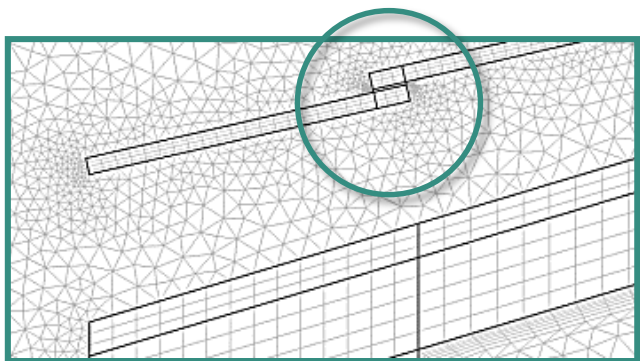
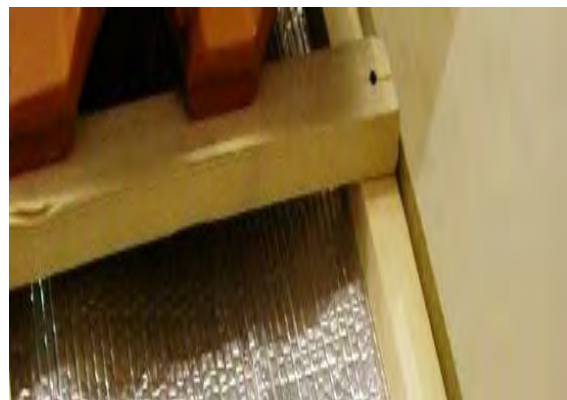
Aumentare la permeabilità all'aria fra le tegole migliora questa prestazione



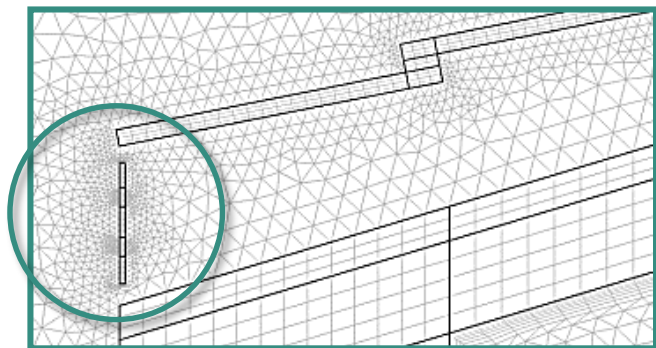
Simulazioni al computer



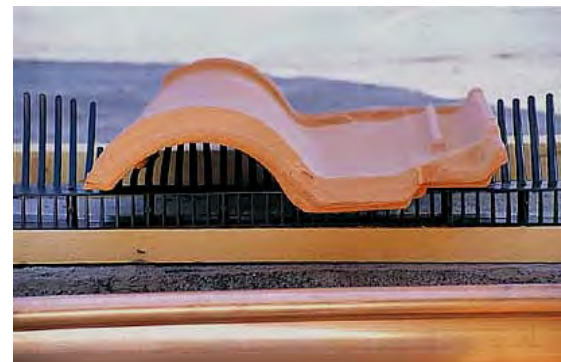
**Strato di ventilazione
4/8 cm**



**Permeabilità
all'aria
0.0/2.5/9.0 mm**



**Apertura in
gronda
0-50-100%**

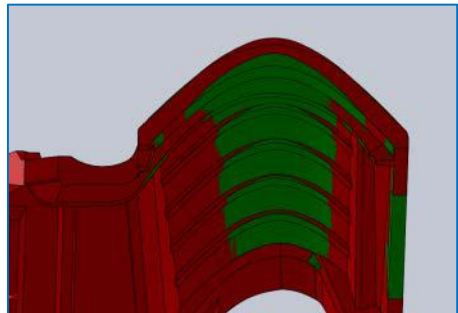
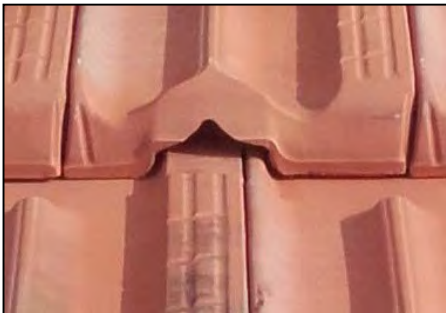
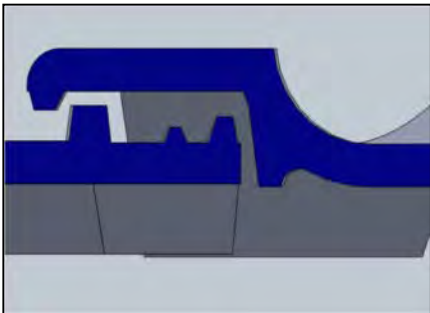
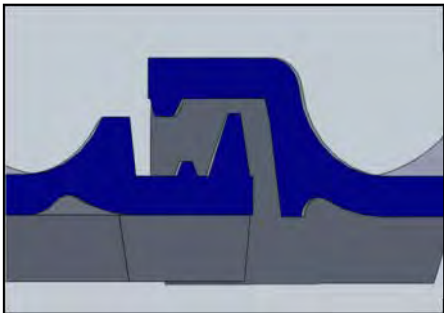
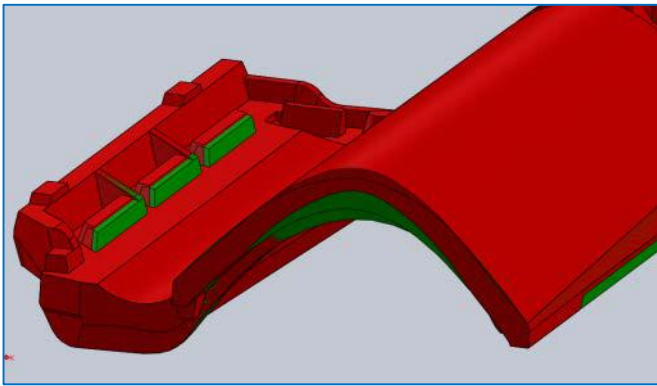
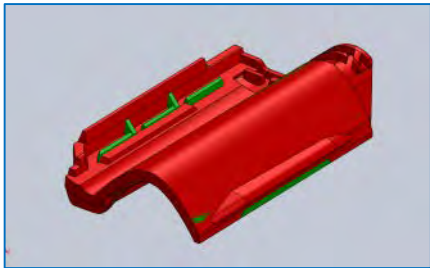
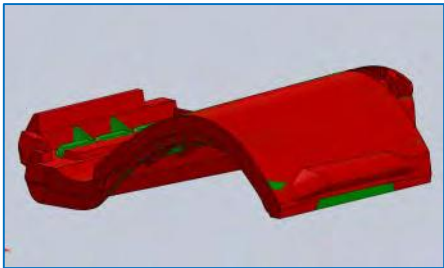




Obiettivo del progetto HEROTile è stato:

- **Riprogettare il design delle tegole**
- **Confrontarne le prestazioni con le tegole standard**
- **Selezionare la migliore soluzione e produrla**
- **Verificare le prestazioni con test al vero**

24 soluzioni individuate e testate di tegola portoghese e marsigliese



Matrice di valutazione

Parameter	Case_01n	Case_02n	Case_03n	Case_04n	Case_05n	Case_06m	Case_07m	Case_08mb	Case_09m	Case_10m
Air permeability	1.77	2.17	1.51	1.92	1.73	1.36	1.33	1.58	1.81	1.31
Waterproof	-1.00	-0.36	-0.07	0.14	-0.54	-0.54	-0.79	-1.00	-1.00	-0.79
Conformity of standard regulation	0.00	0.00	-0.21	-0.48	-0.48	0.00	-0.48	0.00	0.00	0.00
Aesthetic index	0.00	-0.48	-0.33	-0.15	-1.00	-0.33	-0.33	0.00	-0.37	0.33
Line production cost	-0.46	-0.64	-0.64	-1.00	-1.00	0.00	-0.46	0.00	0.00	0.00
Unitary cost	-0.13	-0.13	-0.35	-0.35	-1.00	0.00	-0.13	0.00	0.00	0.00
Mechanical performance	-0.44	-0.44	-0.44	-0.44	-1.00	0.00	-0.20	0.00	0.00	0.00
Installation cost	-0.23	-0.23	-0.46	-0.46	-0.77	0.00	-0.54	0.00	-0.23	0.00
Commercial index	0.00	0.29	0.21	0.46	-0.82	-0.07	0.11	0.21	-0.25	0.46
	0.28	0.57	0.17	0.30	-2.24	0.56	-0.32	0.49	0.37	0.48



Galleria del vento



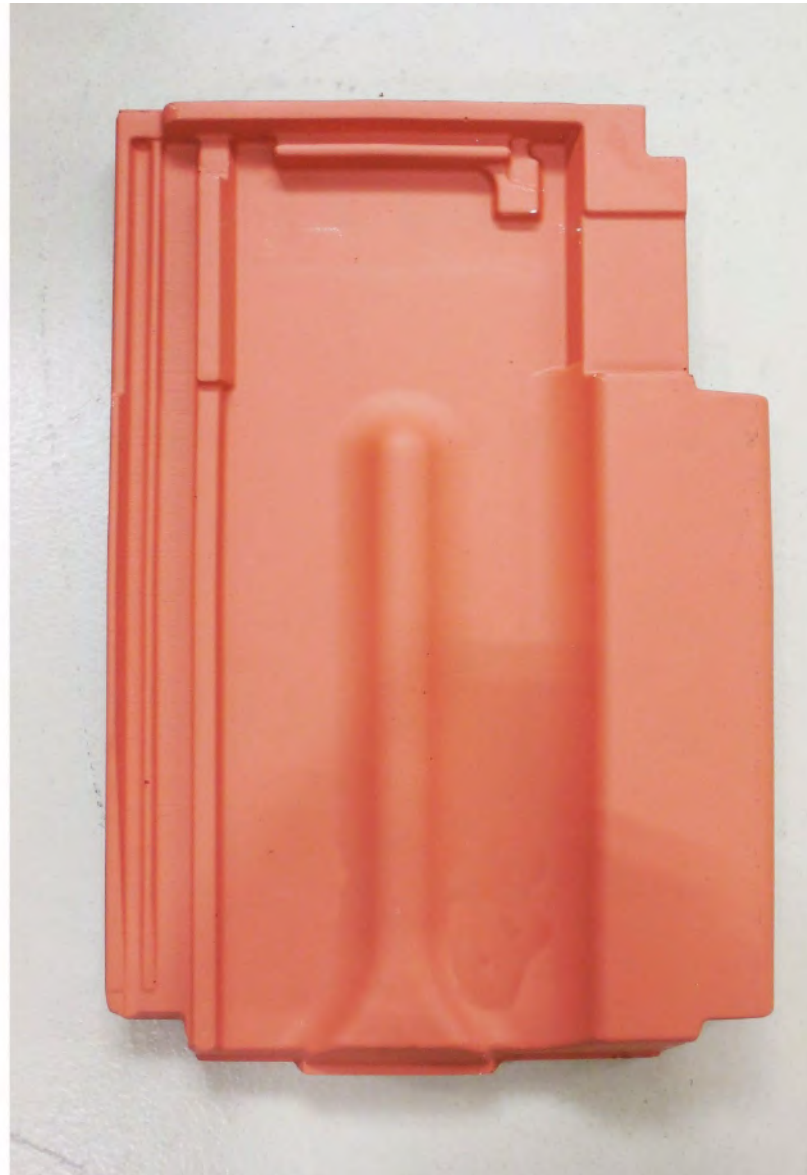
prototipazione



portoghese Herotile



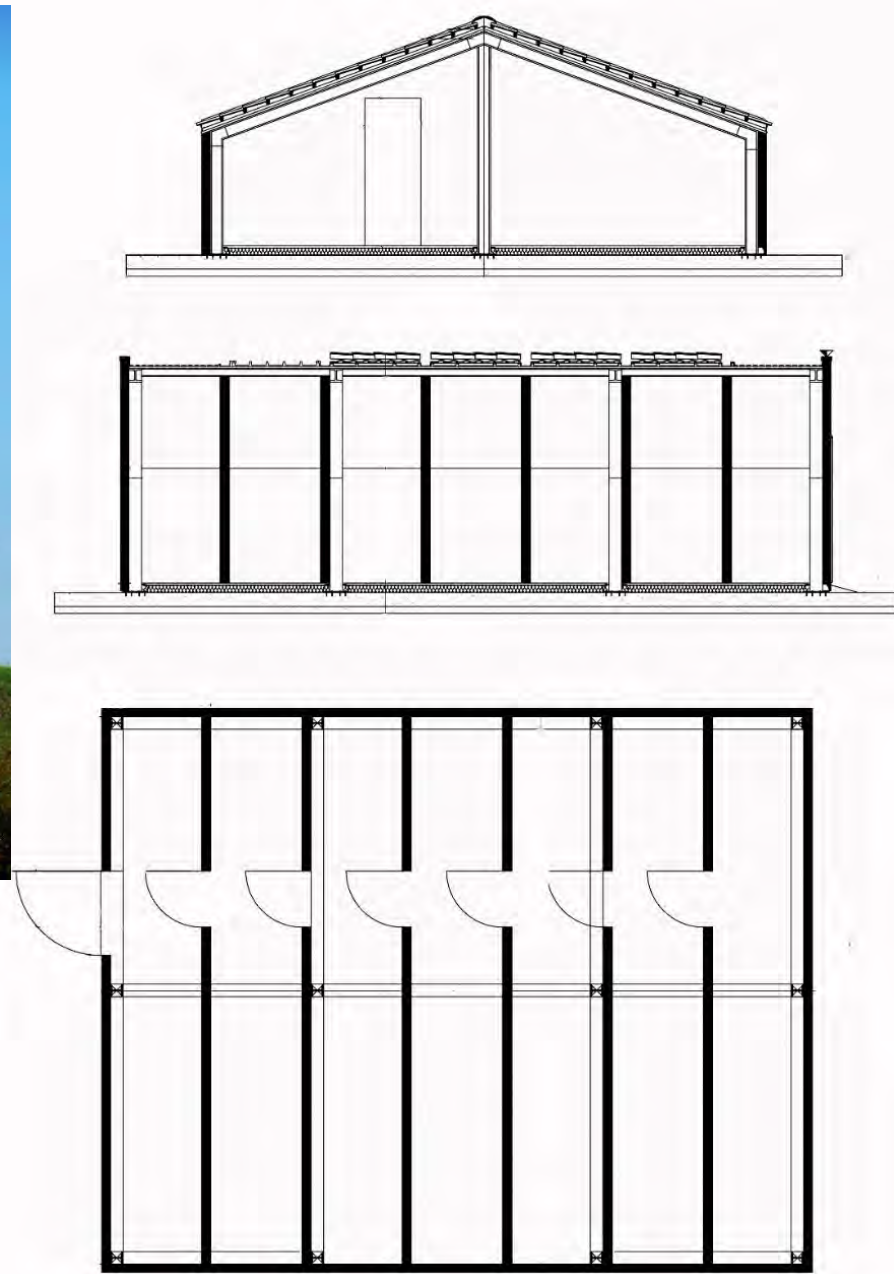
marsigliese Herotile





Università di Ferrara Tecnopolo Mock up con tetto a sette falde

- Marsigliese standard
- Marsigliese Herotile
- Portoghese standard
- Portoghese herotile
- Metallo
- 2 camere di guardia





Università di Ferrara Tecnopolo CAI factory Israele

Mock up con tetto piano

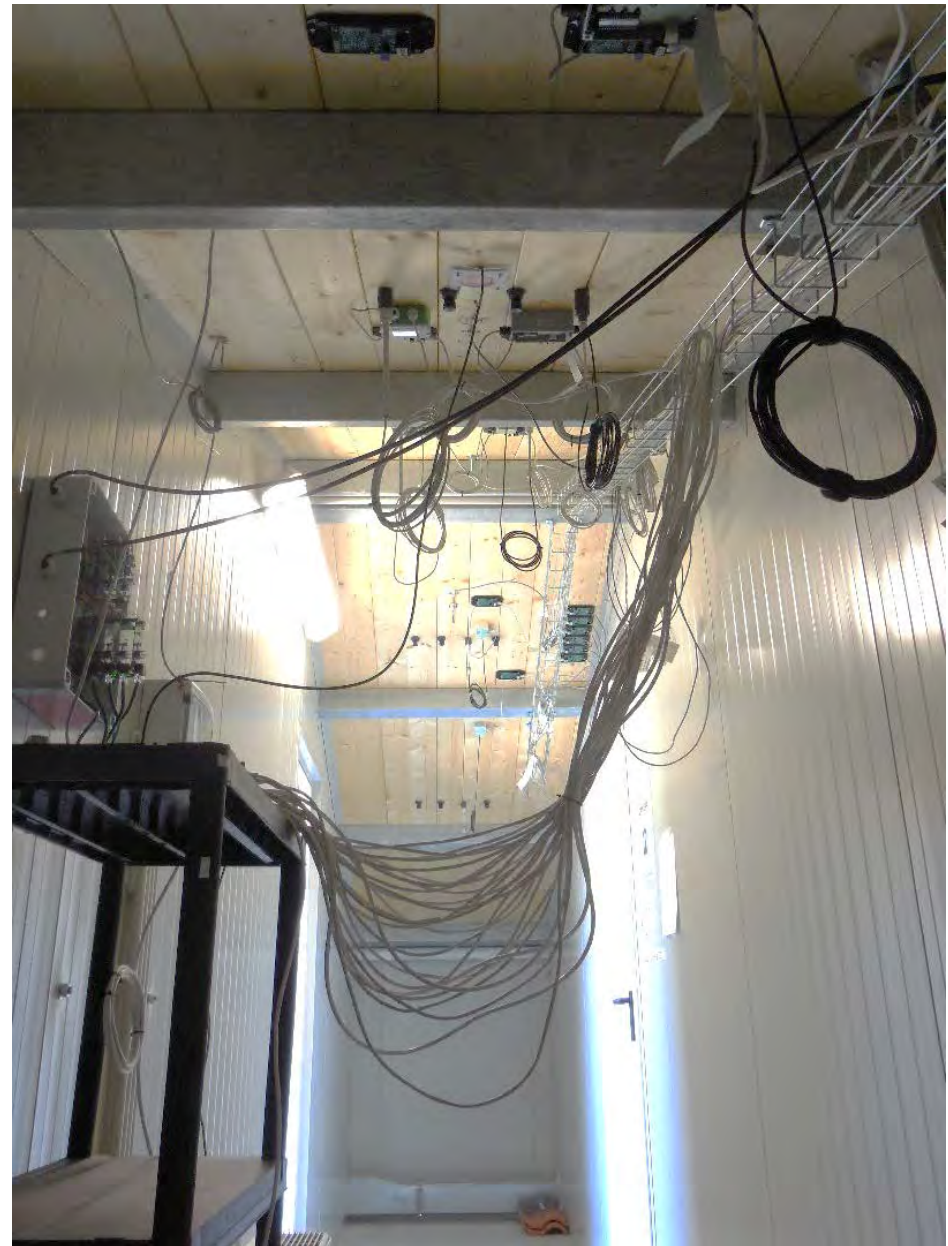
Mock up con tetto a sette falde

- Marsigliese standard
- Marsigliese Herotile
- Portoghese standard
- Portoghese herotile
- Metallo
- 2 camere di guardia





Strumentazione di monitoraggio





Sperimentazione al vero

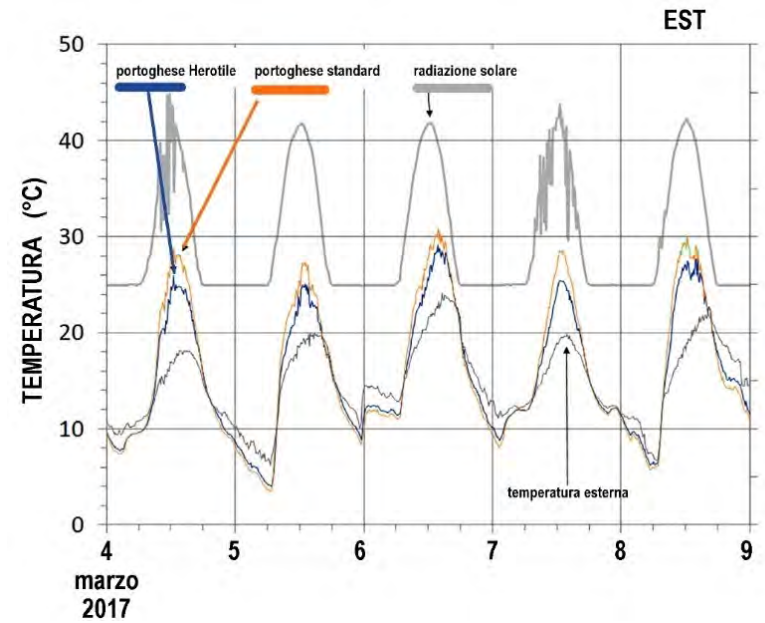
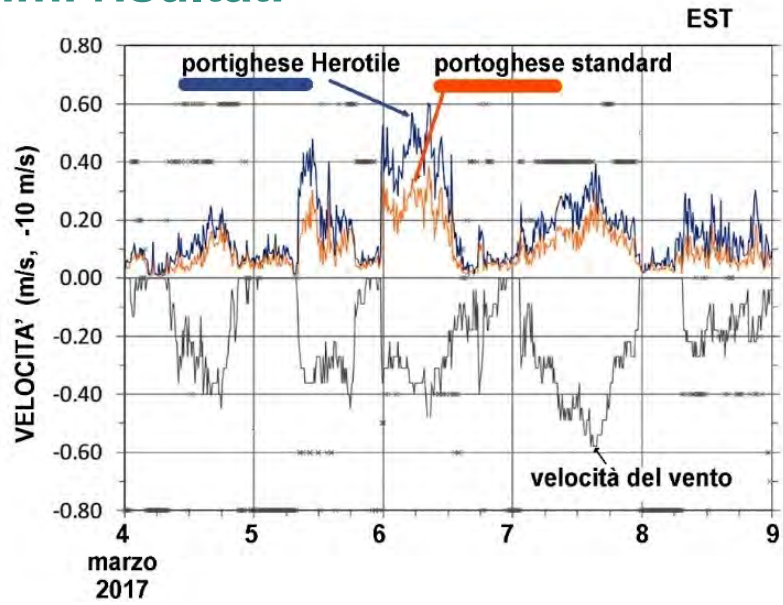
- 2 edifici
- 4 appartamenti

Saragozza, Spagna

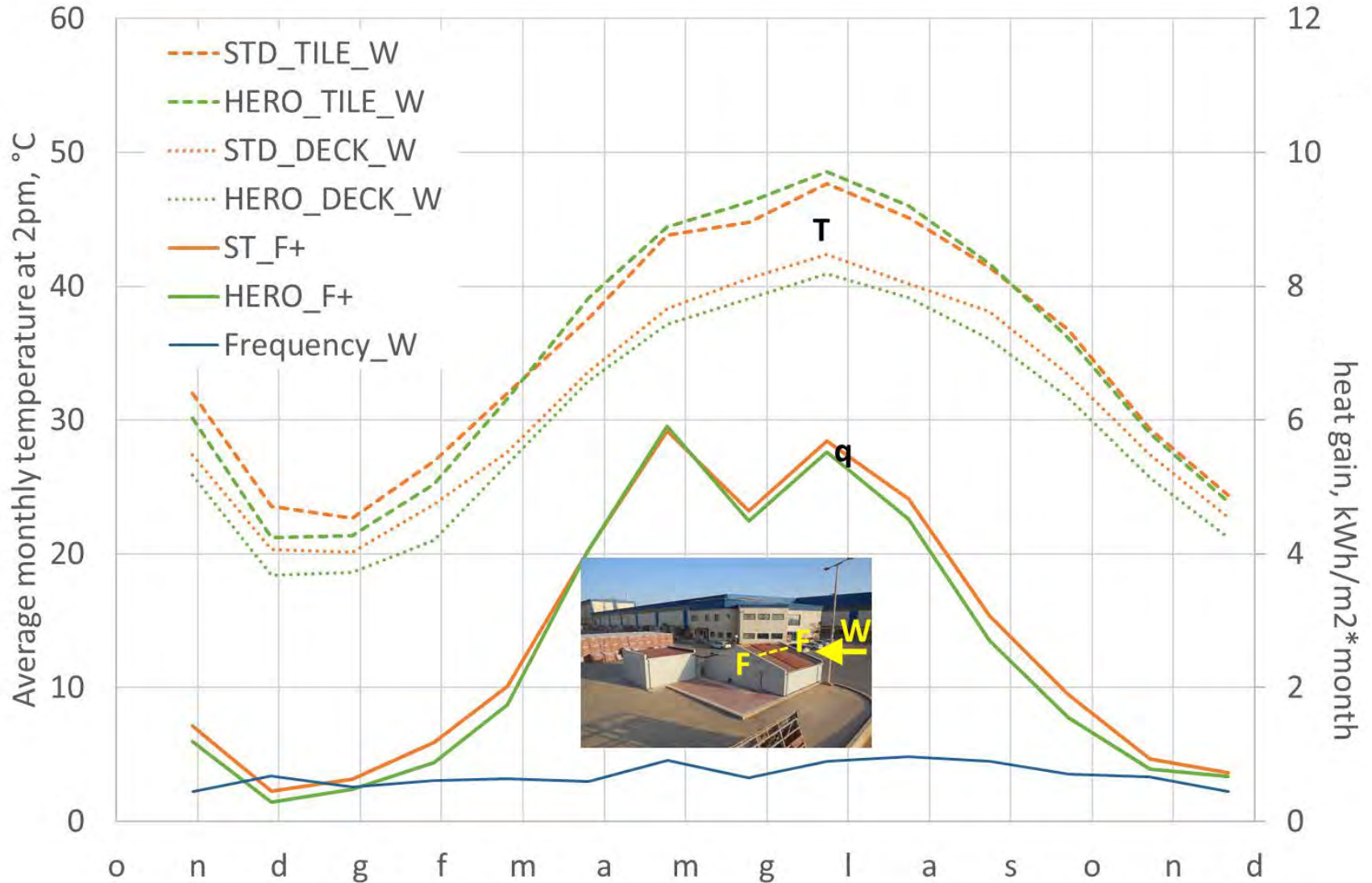
Reggio Emilia, Italia



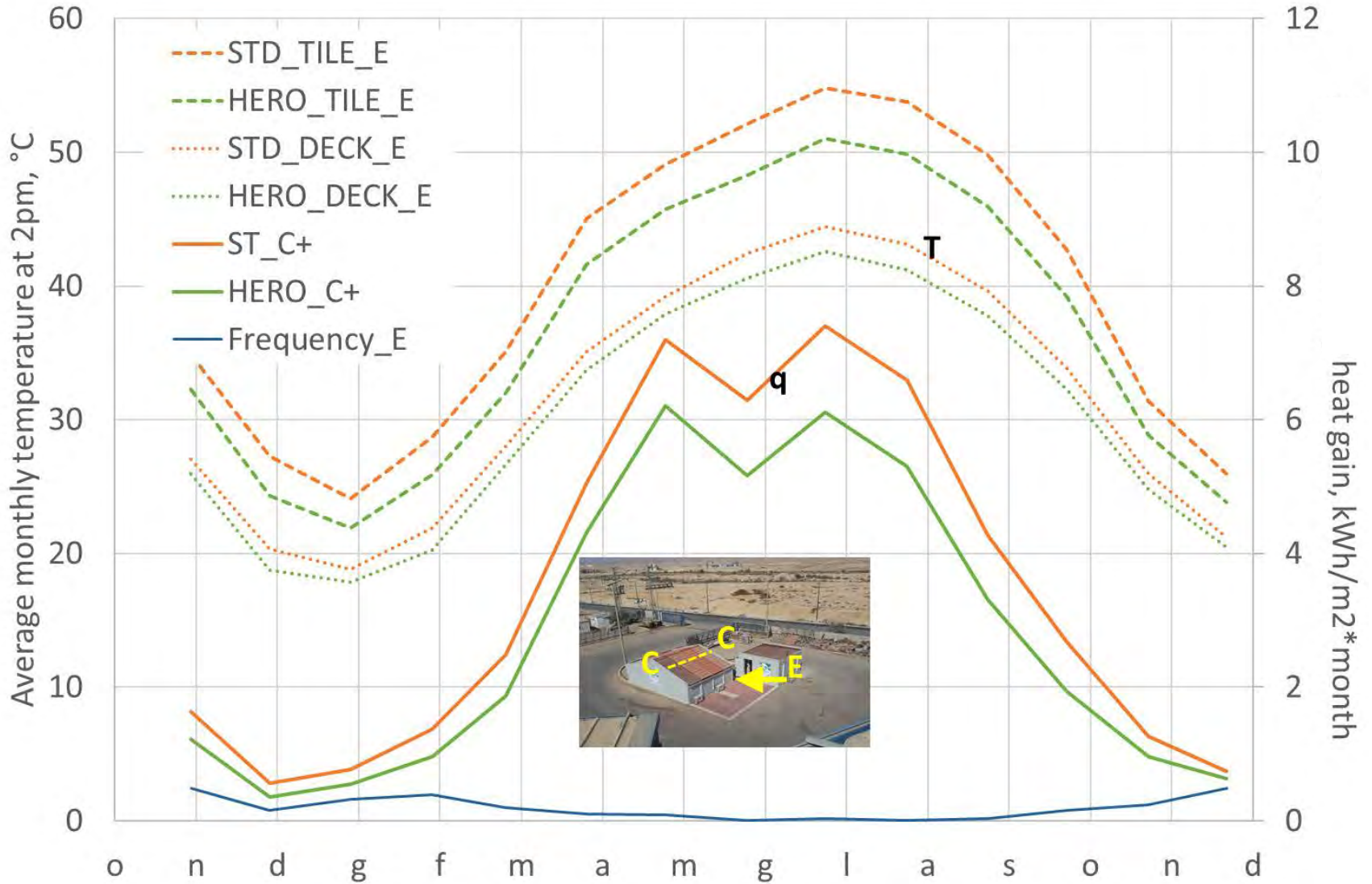
Primi risultati



medie mensili falda sopravento

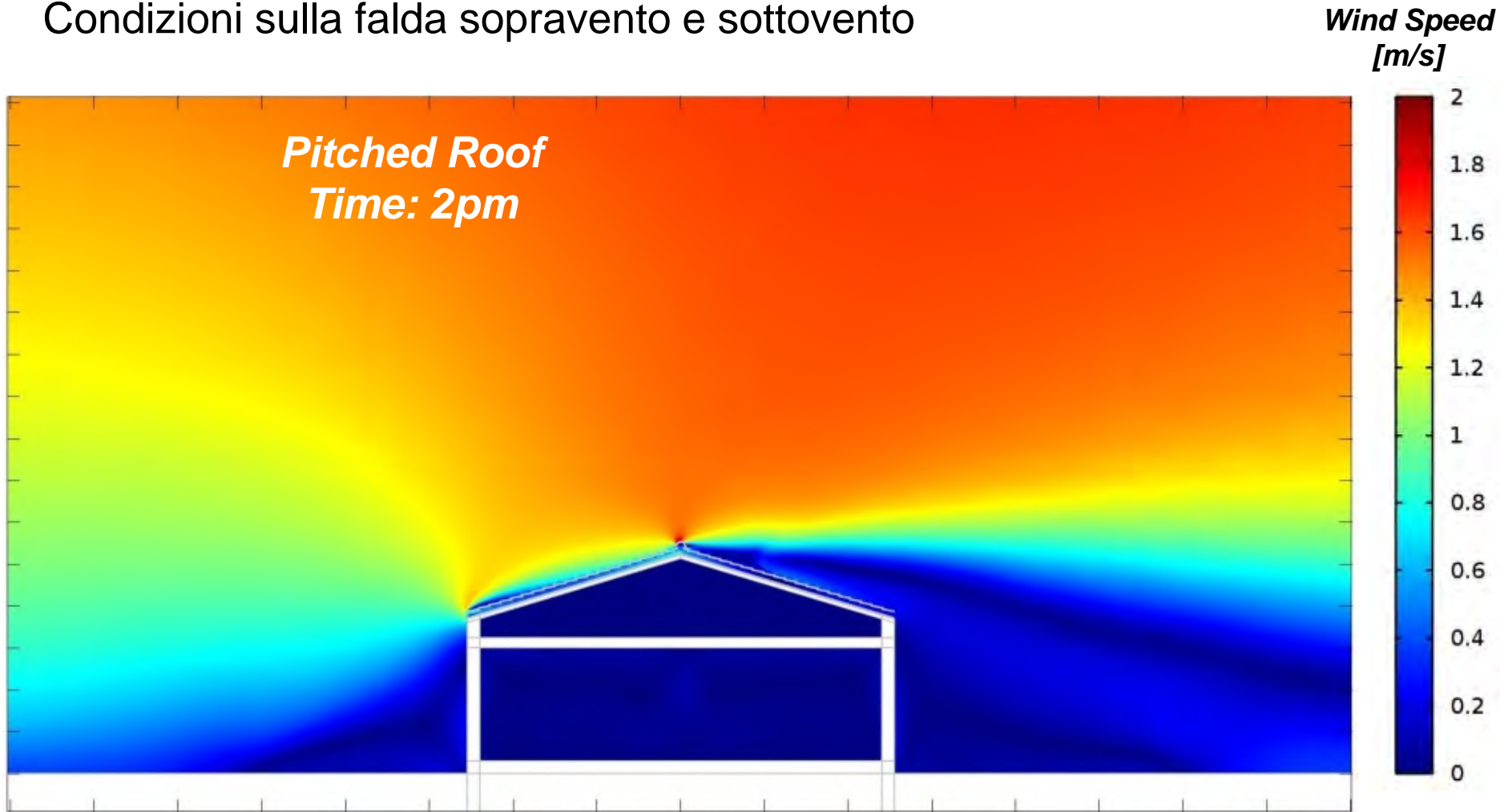


medie mensili falda sottovento

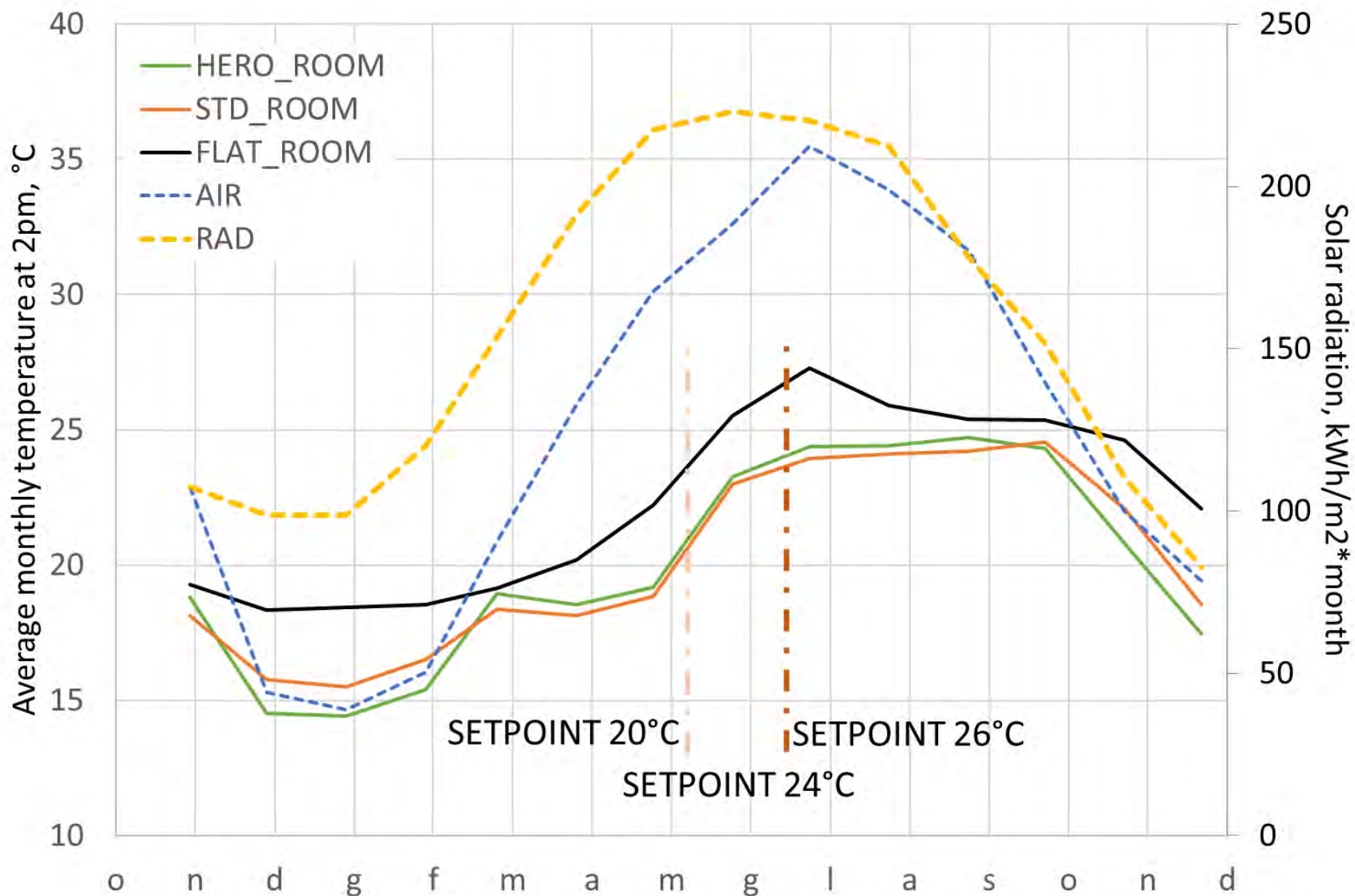


Simulazioni al computer

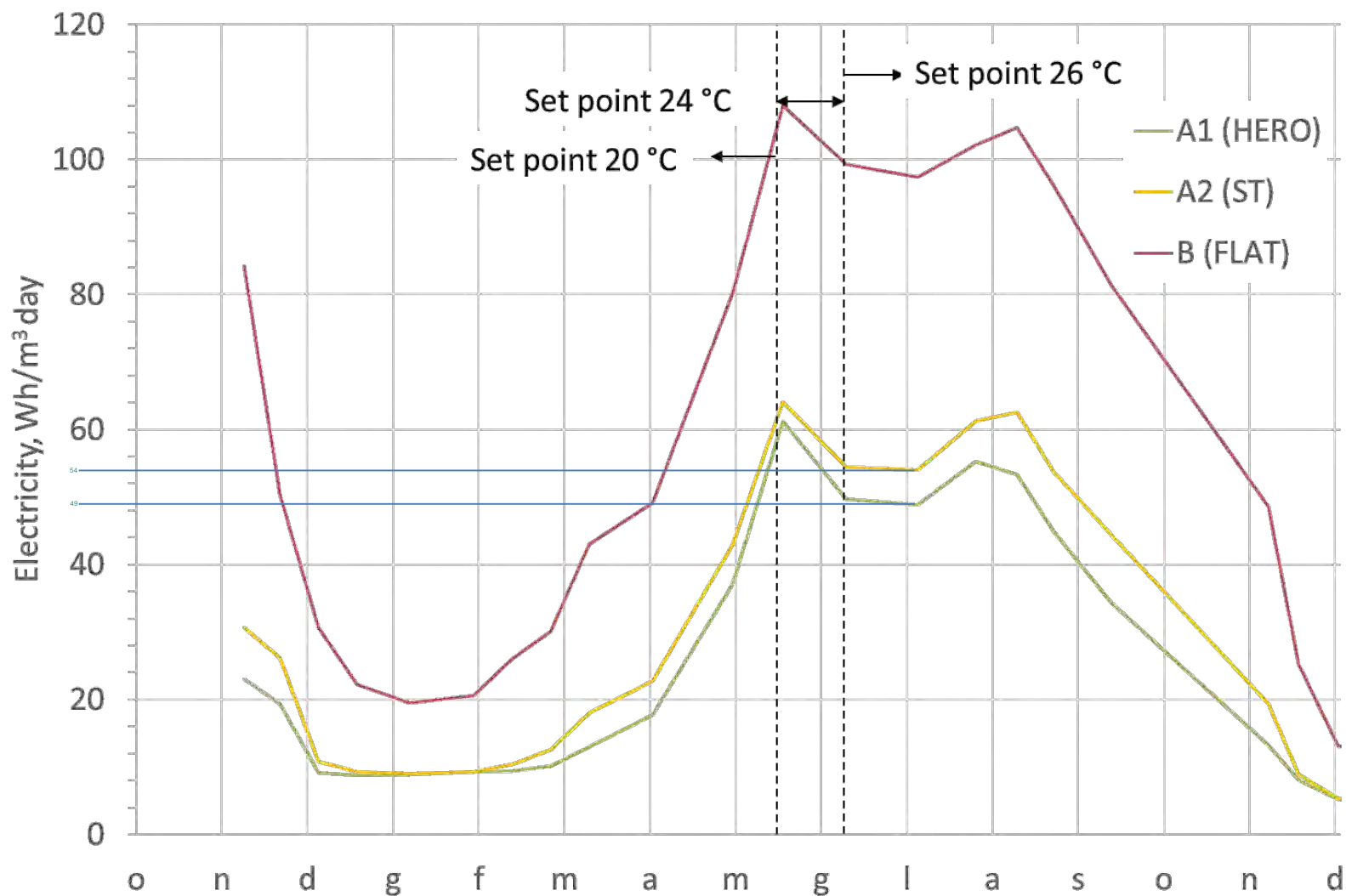
Simulazioni fluidodinamiche al contorno del tetto.
Condizioni sulla falda sopravvento e sottovento



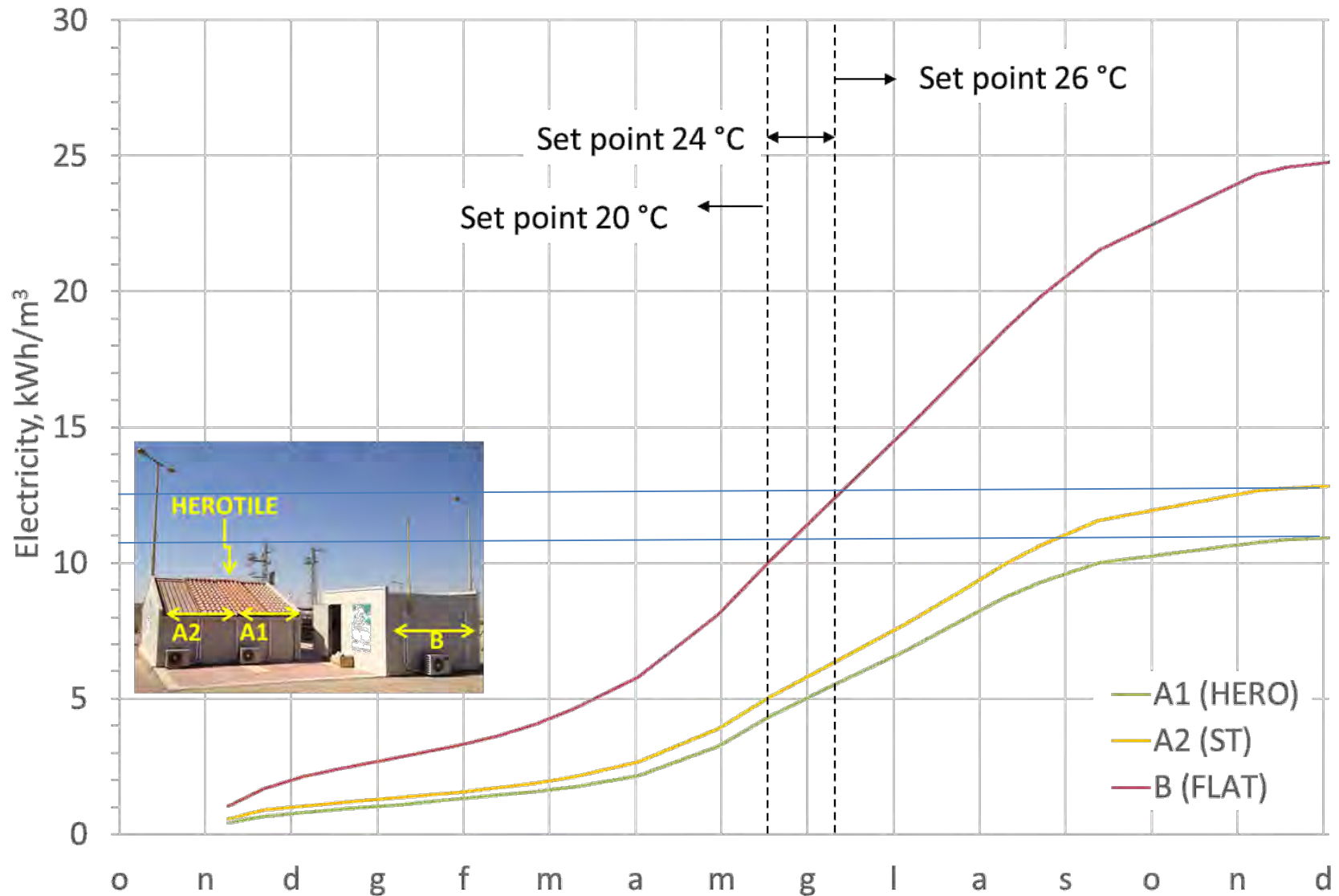
temperatura media mensile (2 pm)



elettricità giornaliera per raffrescamento





energy supply



SENSAPIRO

Software energy saving pitched roof

Different years in epw file **Software ENergy SAVings Pitched ROofs**  

LOCATION PARAMETERS

Year 1995

F:\sensapiro_10_10_2018 NEW
\\CHN_Hong.Kong.SAR.450070_CityUHK.epw

Latitude (deg) 22.32
(-90..90) overwrite

Longitude (deg) 114.17
(-180..180) overwrite

Timezone 8
(-11..14) overwrite

Urban Context **urban: high dens.**
urban_medium dens.

TIME RANGE

From 1 To 15

January	January
February	February
March	March
April	April
May	May
June	June
July	July
August	August
September	September
October	October
November	November
December	December

ROOF PARAMETERS

Roof average height (m) 5

Roof tilt (deg) 20

Roof Azimut (deg) 45

Roof type **Portoghese Hero**

Eave **open**

Setpoint temp (°C) 25



Min diurnal radiance (W/m2) 25

ASV factor 1

LAYERS

Number of layers **5**

lock chart scale

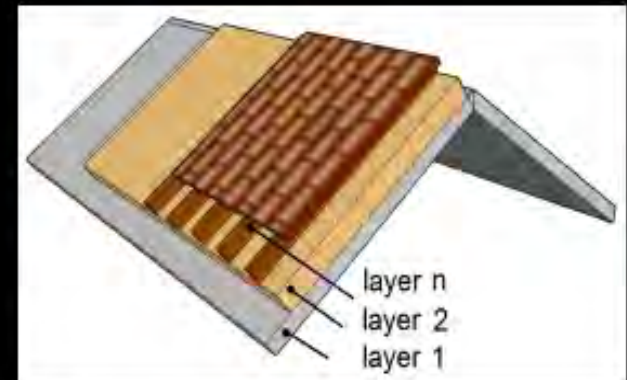
 

SENSAPIRO

Software energy saving pitched roof

LAYERS

Layer 1 to Layer n	Thickness (mm)	Thermal conductivity (W/mK)	Density (kg/m ³)	Specific heat (J/kgK)
L1 Intonaco calce e gesso	20	0,54	1500	1000
L2 Blocco forato	180	0,35	750	840
L3 Cfs armato	60	1,8	2500	1000
L4 XPS	60	0,036	30	1200
L5 Plastica	5	0,25	1700	1400



Calculate
Decrement
Factor

0,10721

BACK

Dec. factor = 0,10721

Thermal transmittance timeshift = 10,254 (h)

Periodic thermal transmittance = 0,044 (W / m² K)

Internal thermal admittance = 3,392 (W / m² K)

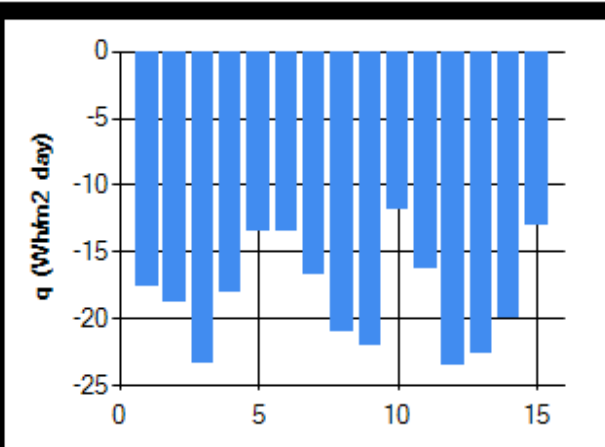
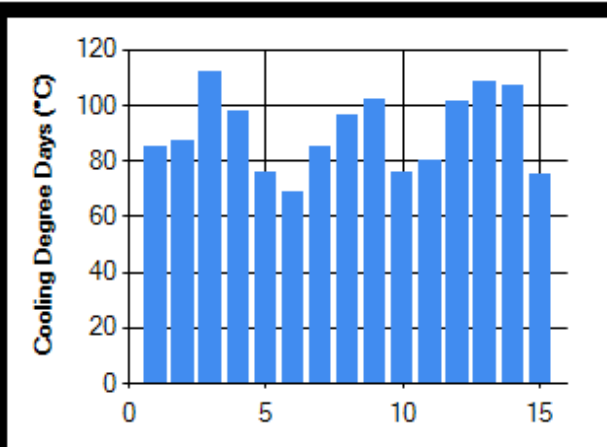
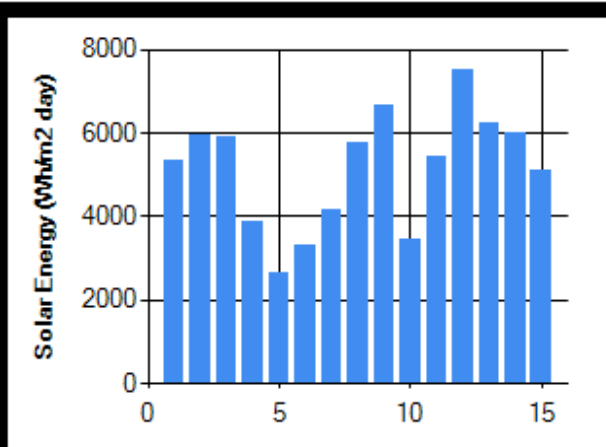
External thermal admittance = 1,078 (W / m² K)

Component thermal resistance = 2,271 (m² K / W)

System thermal resistance = 2,441 (m² K / W)

SENSAPIRO

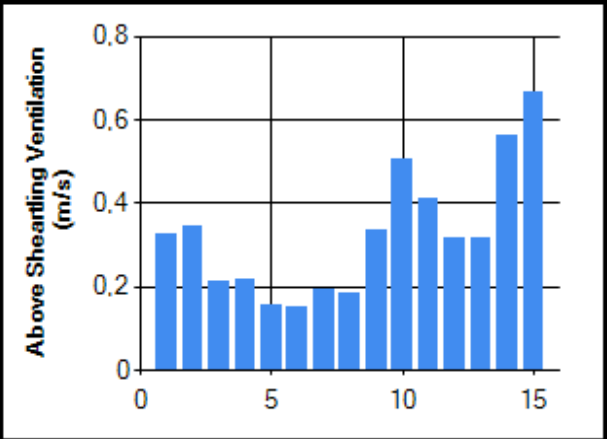
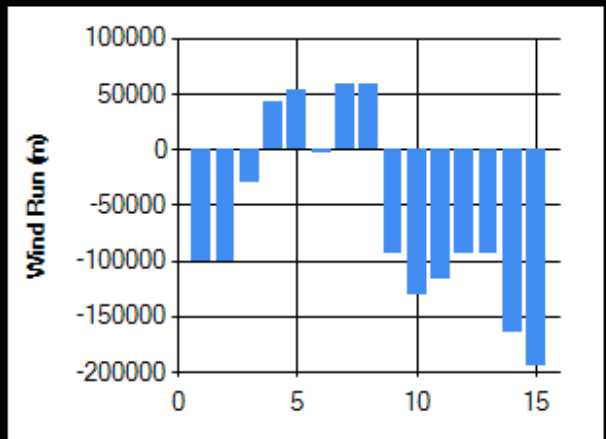
Software energy saving pitched roof



Average = 5154,6

Average = 90,533

Average = -18,116



Average = -60431,8

Average = 0,327

Period: 1/7-15/7 15 days

Sensible Cooling Load = -272 (Wh/m2)

Outdoor average temperature = 28,95 °C

Setpoint T: 25

Dec. factor: 0,10721

Roof tilt: 20

Roof average height: 5

Roof Type: Portoghese Hero

Eave: open

Urban context: urban: high dens.

Location: HONG KONG

Number of layers: 5

fASV: 1

Roof azimuth: 45

Generate report
CLOSE

Grazie

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lifeHEROTILE

LIFE14 CCA/IT/000939 - LIFE HEROTILE
LIFE Climate Change Adaptation
project application

www.lifeherotile.eu

TILE

lifeHERO

High Energy savings in building cooling
by ROof TILES shape optimization
toward a better above sheathing ventilation