



**LU-VE**  
**GROUP**

*leadership with passion*



***"High efficiency heat exchangers"***

Ngo Xuan Loi – Country Sales Manager

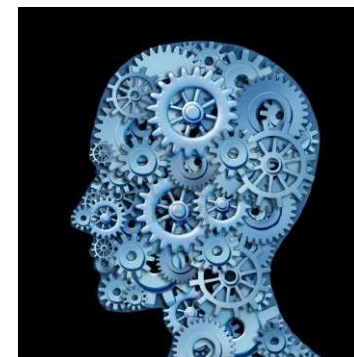
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## **Research & Development activity**

The basis of the industrial philosophy of the LU-VE Group is the principle that:  
“IT’S THE GREY MATTER THAT MATTERS MOST!”



## Research & Development activity



**R&D: LU-VE HAS ONE OF THE LARGEST PRIVATE LABORATORIES IN EUROPE, AND WORKS IN CLOSE COOPERATION WITH MILAN POLYTECHNIC UNIVERSITY AND OVER 20 OTHER UNIVERSITIES ALL OVER THE WORLD**





# 8 - PATENTS & INNOVATIONS

«LESS RAW MATERIAL, MORE BRAIN POWER»



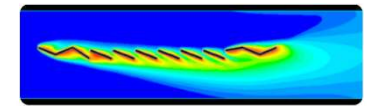


# R&D Activities



## C.F.D. method (Computational Fluid Dynamics)

The use of C.F.D. to increase the understanding of the fluid dynamic phenomena



## Calorimeter room tests

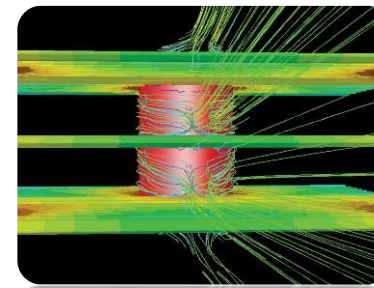
The results of the C.F.D. analyses have consistently been confirmed in experimental tests

## Fin performance tunnel

To study optimized specialized surfaces

## Tube performance device

To study and optimize grooved tube technology



## CO2 TEST

To study in detail the behaviour of CO2 in the heat exchanger





**R&D**  
LABORATORY





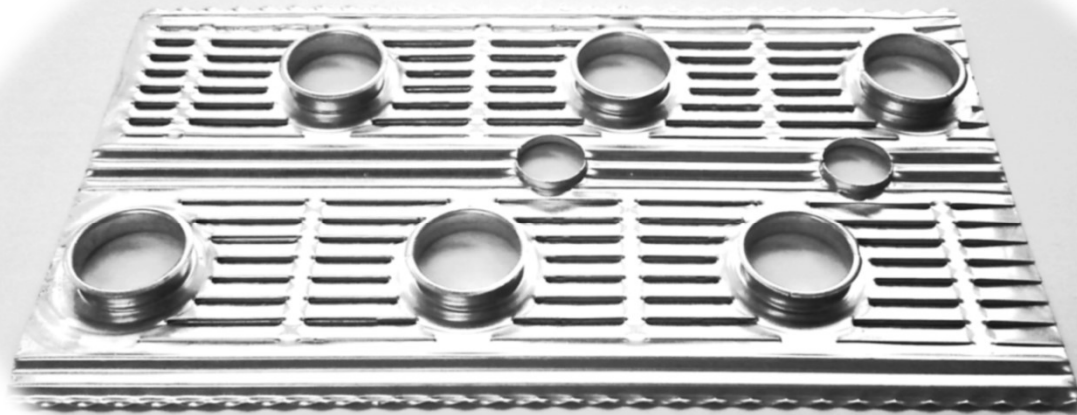
**R&D**  
**LABORATORY**





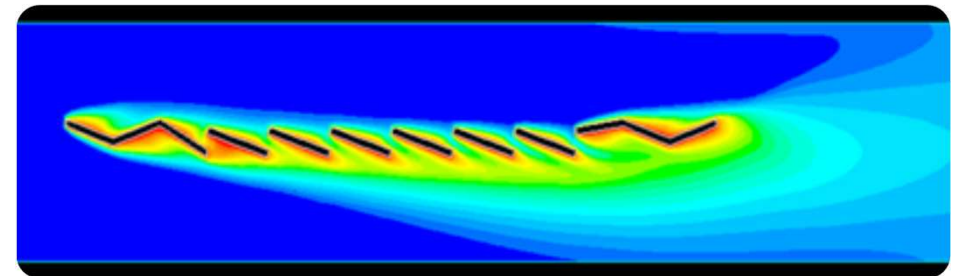
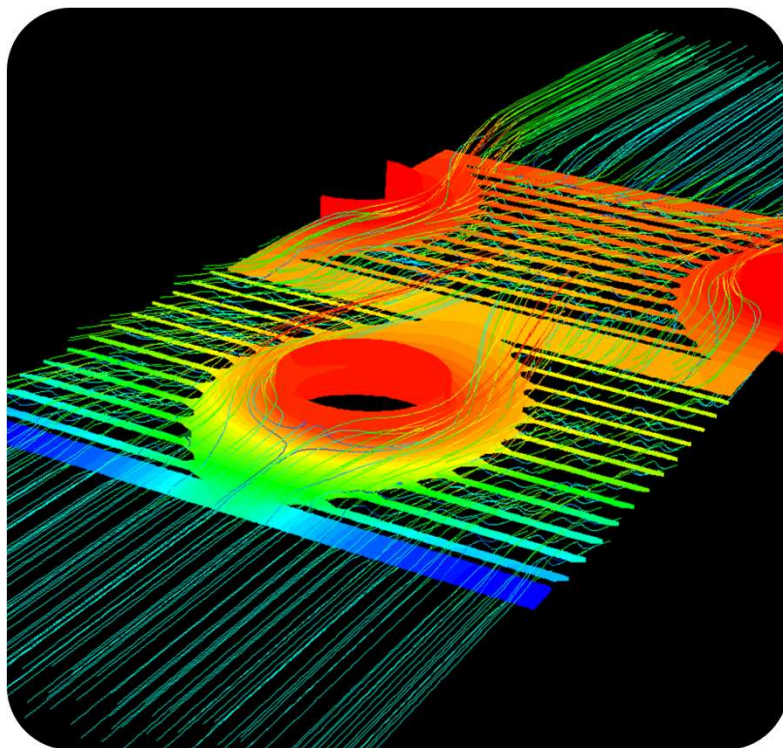
 **HOW TO INCREASE THE**   
**EFFICIENCY OF A HEAT EXCHANGER**

## FIN AND TUBE OPTIMIZATION



# R&D Development activity: C.F.D. analyses

- new coil geometry definition
- turbulence improvement
- best matching of fans to coils

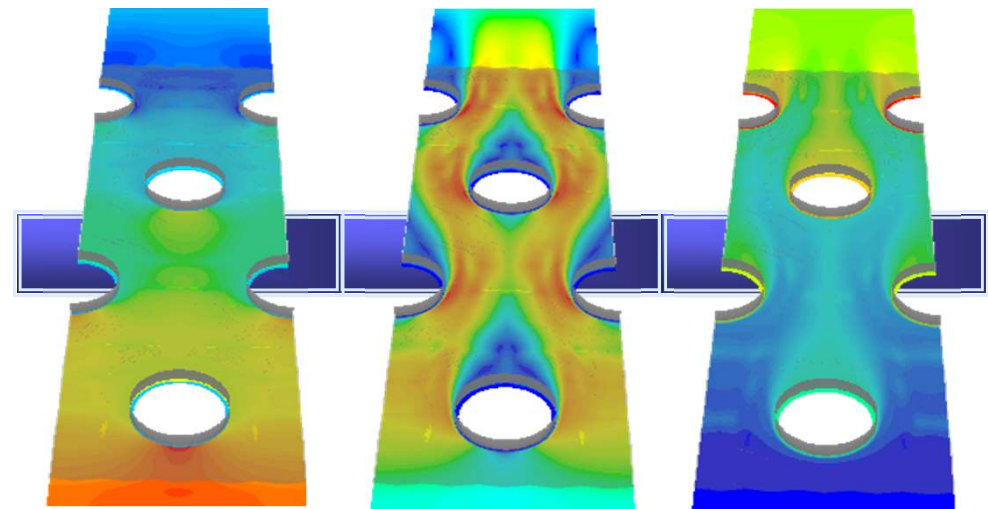


Thermo-Fluidodynamic Distributions:

Pressure

Speed

Temperature

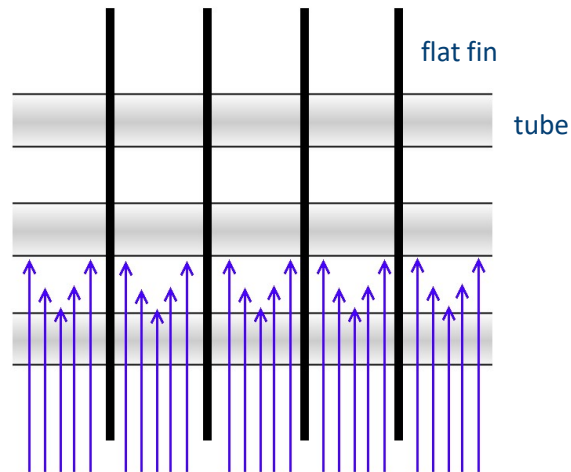




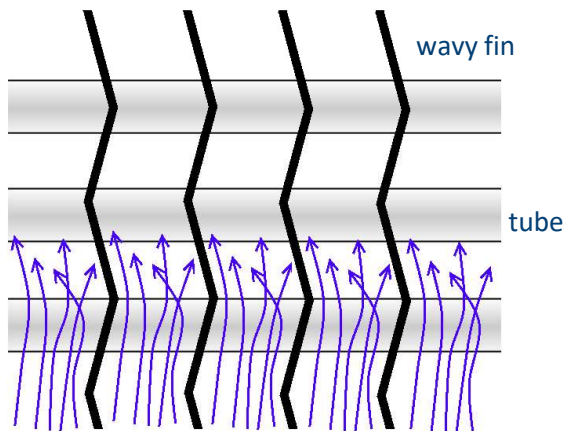
## Fin optimization



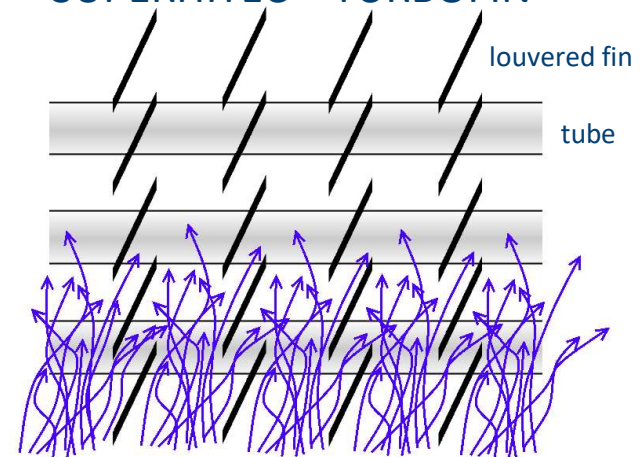
### TRADITIONAL



### HITEC

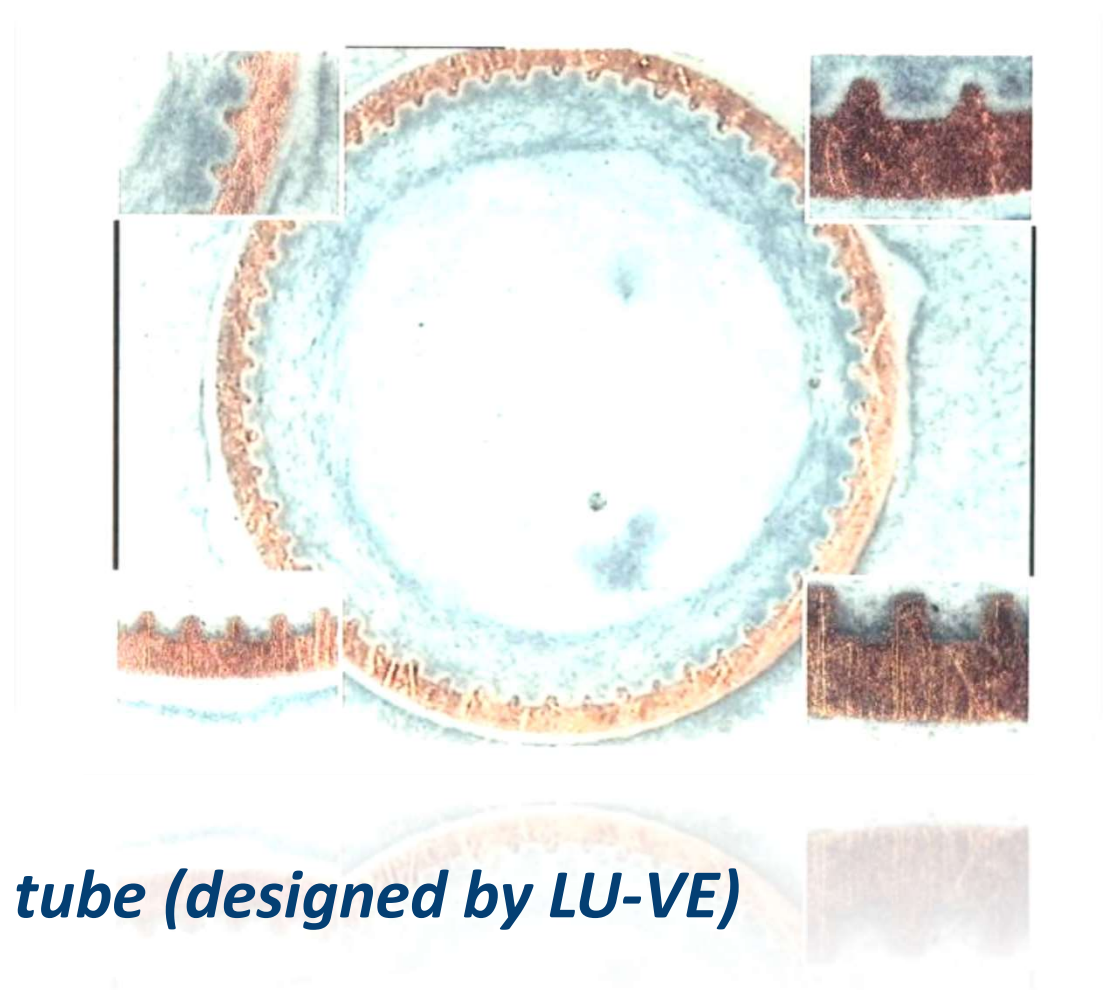


### SUPERHITEC – TURBOFIN<sup>®</sup>

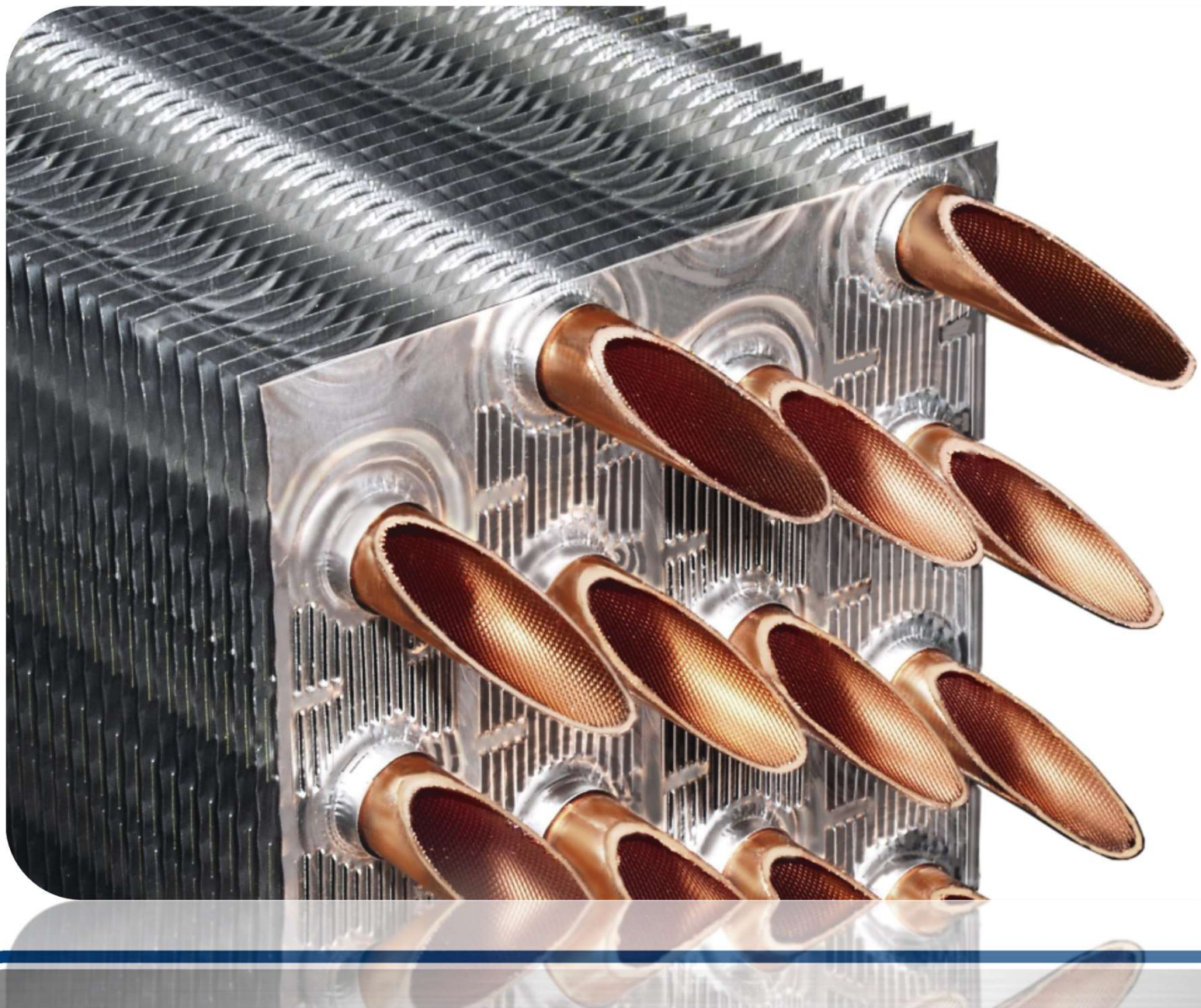




## *Tube optimization*



*Inner grooved tube (designed by LU-VE)*

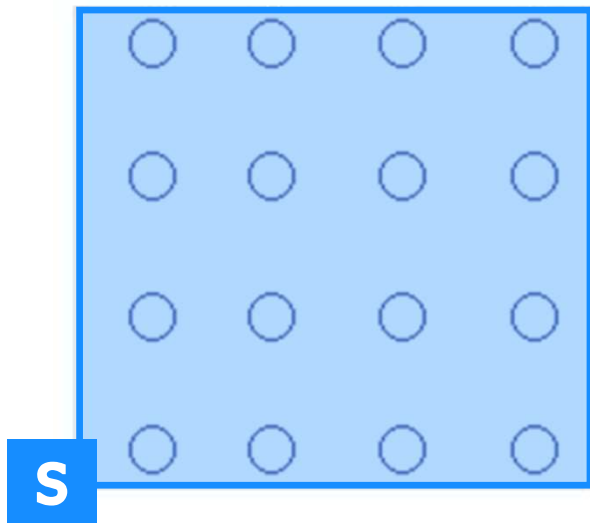




# INCREASING THE TOTAL HEAT EXCHANGING COEFFICIENT

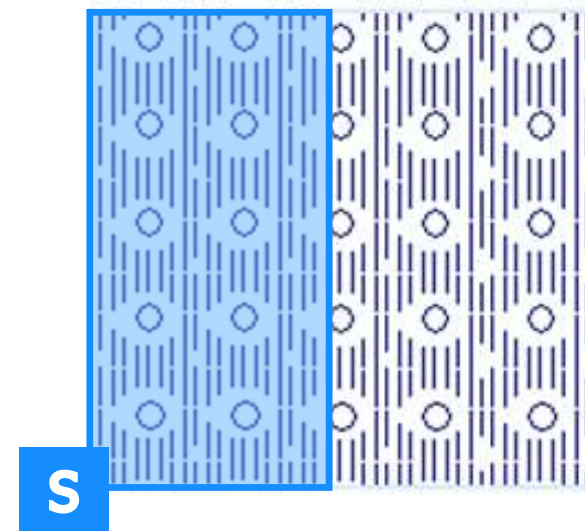


Standard market SURFACE



SMOOTH TUBES AND FLAT FINS

LU-VE HIGH EFFICIENCY SURFACE



HIGH EFFICIENCY TUBES AND FINS

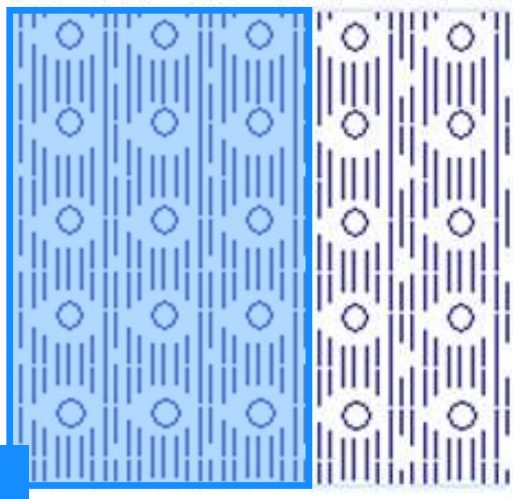
$$Capacity = K \cdot \Delta T \cdot S$$



$$K \div \frac{h_i \cdot h_e}{h_i + h_e} \uparrow$$

# **HIGH EFFICIENCY HEAT EXCHANGER**

LU-VE HIGH EFFICIENCY SURFACE



S

$$Capacity = K \cdot \Delta T \cdot S$$

↑
↓

$$K \div \frac{h_i \cdot h_e}{h_i + h_e} \quad \uparrow$$

**COMPACT SURFACE!**

**REDUCED FOOT PRINT!**

**FEWER TUBES with REDUCED DIAMETER!**

**REDUCED INTERNAL VOLUME AND**

**REDUCED REFRIGERANT CHARGE!**

**REDUCED NEEDED AIR QUANTITY!**

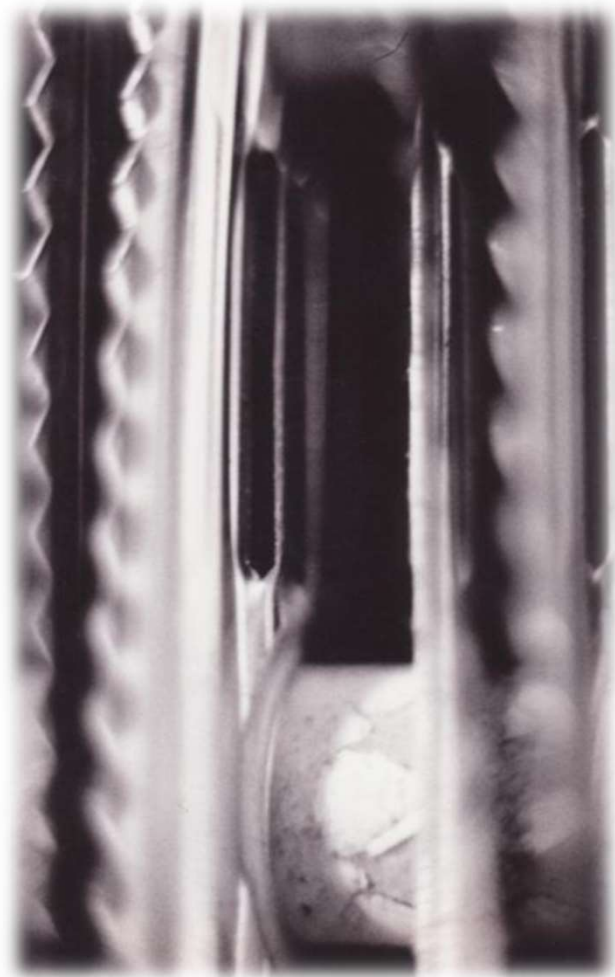
**REDUCTION OF FAN ENERGY CONSUMPTION!**

**AND REDUCTION OF NOISE LEVEL!**

**REDUCTION OF DEFROST NEEDED ENERGY!**



## 0...1...2 [mm] FROST





# EUROVENT CERTIFICATION



# In 2000, LU-VE was the first company in Europe to achieve the important “Certify All” certification of EUROVENT



**CAPACITY**

**SOUND PRESSURE LEVEL**

**ENERGY CONSUMPTION**



# INFLUENCE OF TEMPERATURE ON THE CYCLE EFFICIENCY

## DESIGN DATA

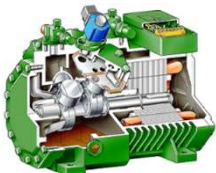


# ?

TC	40 °C
T. Air	35 °C
Tev	-6 °C
T. Room	2 °C
<b>COP = 2.56</b>	

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T. Air	35 °C
Tev	-6 °C
T. Room	2 °C
<b>COP = 2.56</b>	

TC	45 °C
T. Air	35 °C
Tev	-8 °C
T. Room	2 °C
<b>COP = 2.12</b>	



**Δ cycle efficiency = +20.8%**



Data refers to systems with the same semi-hermetic compressors



**On 10 March 2016, EUROVENT awarded LU-VE a certificate of merit for never having any failures in test performance compared with declared data.**

**LU-VE is the only EUROVENT certified company to receive this important recognition.**



result of the Mean Failure Value calculated  
**0 % for the following 3-years periods:**



- ✓ 2011-2013-2014
- ✓ 2012-2013-2014
- ✓ 2013-2014-2015

Your qualified partner  
for refrigeration, air conditioning and industrial applications.



[www.luve.it](http://www.luve.it)

