from A to Z
26 CHALLENGES FACING REFRIGERATED TRUCKS FOR SUSTAINABLE DEVELOPMENT

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Before A: introduction

- **Antiquity**
- **XIXth cent.**
- **1876**
- **1900**
- **1920**
- **1937**
- **1950**
- **2010**
- **2050?**

Timeline:

- Antiquity
- XIXth cent.
- 1876
- 1900
- 1920
- 1937
- 1950
- 2010
- 2050?
IA : like Aerodynamics

To many trucks without spoilers

Improve aerodynamicism : reduce consumption
Better protection for better ageing and energy saving
You can’t like Color Black

White trucks are the champions!

Humor?

Tomorrow: reflective skins, Less absorbant materials

2010

2020
ID: like Development of new refrigeration systems

- CO2, NH3?
- Absorption?
- Undirect refrigeration?
- Energy reuse?
- Mixt units ventilated refrigerant?
IE: like Electronic temperature recorders and indicators

1950

Use of temperature recorders mandatory in EU R37/2005

1970

Developpement of simple and cap indicators

2010

2030
IF : like F-gases

Refrigerant and

Today :
Mechanically refrigerated units with HFC >95% of trucks market

Tomorrow :
• Natural fluids(CO2, NH3...)?
• Cryogeny?
• Absorption?
In 30 years:
• Average speed: +50%
• Engine power: +200%
• Gas consumption: -40%.

Direct effect reduction: F-Gaz changes
Undirect effect reduction: energy consumption reduction
IH : like Hygiene

For foodstuff and pharmaceuticals

Integration of hygiene standards: food, pharmaceuticals....
Certification process for products: IFS, BRC, ISO 22000, HACCP, CertyPHARM...
II: like Insulation

Natural insulation

1950

PU foams with hydrocarbons

2010

1980

PU foams with CFCs or HCFCs

2030

New insulation materials: Aerogels, multilayers, organic insulation...
I: like Joints
And etancheity

Towards a better etancheity, reduction of thermal bridges, improvement of bulkheads...
**1990**

European industry  
Multisites production  
Rationalisation and specialisation  
World Economy

**2010**

**2020**

Quality control  
Système management  
Equipments certification  
Harmonisation of certification process  
Improvement of ATP certification process
Secured ATP certificates

- ATP a quality label?
- A world system?
IM : like Multi-temperature

1990

- First multi-temperatures refrigeration units and test procedure

2010

- 30% of new equipments
- 20% of in service equipments
- 42% of trucks and trailers
- More than 80% of some fleets

2030

- An ATP certificate?
- Reduction of conduction losses
- New multi-temperatures technologies
IN : like Noise

Noise first environmental constraint for people

12 times less noise in 30 years

La comparaison

Tomorrow silent night delivery to reduce pollution
• Doors and Curtains,

2010 • Automatic doors

2020 • Air curtains

• Reduction of air losses
IP : like Performance

- Driver behavior: -13%
- Equipment definition: -40%
- Road resistance: -5%
- Aerodynamics: -15%
- Transport efficiency: -18%
- Maintenance: -12%
- Control: -5%
IQ : like Quality
Recognition and continuity of quality

- 200 tests centers = periodic control
- End of sanitary control = temptation

2000

- ATP = type conformity and quality control
- No continuous check = variability of production

2010

2030

- ATP quality label
- ATP performance identification
- ATP improvement and innovation driver
- Harmonisation of tests, procedures and systems
IR : like Regulations

Standards and references

- Code Rural
  - articles L. 231-1 et L. 231-4-1
- Décret n° 2007-1791 du 19 décembre 2007
  - Transport conditions
- Arrêté du 1er juillet 2008
  - Technical control
  - certification process
- Arrêté du 2 juin 2008
  - New independant ATP competent authority

Transport equipment CEN standard
Implementation of modernised ATP worldwide
Integrated approach including +/- methodology
Safety coefficient $k = 1.75$
For ageing and unit installation

Safety coefficient linked with operation: Distribution, long distance transport, ....
Deep frozen food definition in French regulation

1964

- 0°C/+4°C
- +2°C/+6°C
- +2°C/+8°C
- +15°C/+25°C

2010

- 0°C/+2°C
- 0°C/+4°C
- 0°C/+4°C

2020

- -25°C
- -18°C
- -80°C

The right temperature for lower energy consumption
1970
Supermarkets development

2010
Foodstuff, health products, works of art, chemistry...

2020
Night delivery, Home delivery, High added values Flows optimisation, Combined transports
IV: like Ventilation
And air circulation

- Increase:
  - air flow,
  - homogeneity,
  - circulation
2010 Second life...<br/><br/>IW : like Waste and recycling<br/><br/>Recycling organisation<br/>Ecoconception<br/>Reusable materials
IX : like the unknown factor of the market

- 103,841 valid certificates
  - 1,549 tanks
  - 102,346 bodies
- Répartition par PTAC :
  - 51,121 vans
  - 24,281 Trucks
  - 27,655 trailers and semi trailers
  - 694 other equipments
- 1,5M equipments in the world
  - 30,000 in China
  - 5,000 in Tunisia

- Which manufacturers tomorrow?
- Which equipments in the world tomorrow?
Y : like yards, meters and tons

For a better efficiency

- 17.86 m for 36 euro-palettes
- 44 tons harmonisation
- EMS at 25.5 m
IZ : like Zoning

Of the load in the bodies

- Improve air circulation
- Improve homogeneity
Conclusion
Thank you for your attention!

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