Industrial refrigeration: application and technology trends

Industrial Refrigeration & Heat Pump solutions provider

Natural five refrigerants

- NH₃ Ammonia
- CO₂ Carbon Dioxide
- HC Hydro Carbon
- H₂O Water
- Air

Temperature range:
- -100°C to +120°C
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Process industry cooling

Highly Controled environments:
• allow for ATEX applications > HC’s
• Propylene & Propane availability

Ammonia equally strong

R22 phase out : important transition opportunities
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**Industrial refrigeration**

**Ammonia:**
- Historically most common used refrigerant
- Accounts for most HCFC&HFC conversions

**CO2:**
Settling in negative temperature applications

**HC & Air:** very low temperature applications
Technological trends

Screw vs. reciprocating
Pistons: COP ↑ & Capex ↓
Latest generation Pistons: opex ↓

Minimize refrigerant charge
Cascade systems
Innovative heat exchangers
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NH3/CO2 hybride chiller
Technological trends

Increase efficiency
- Frequency control, PM motors
- Advanced valve control systems
- Multi-stage systems (compound compressors)

Heat recuperation
- Hot gas recuperation vs. Low Tc
Technological trends

System safety
Introduction semi-hermetic compressor/motor
- Eliminate potential leaks

Motor alignment advantages
Ammonia semi-hermetic piston chiller
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Ammonia semi-hermetic screw compressor
Industrial heat pump trends

**NH3** : hot water temperatures up to 90°C
- Using condensing waste heat
- Using stable thermal heat source

**HC** : allowing to exceed 120°C temperatures
- Competition fossil fuel steam boilers
Mayekawa Industrial Heatpump
Water chilling 10°C to 1°C / 1MW - 90°C hot water
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Mayekawa Industrial Heatpump
500kW - 70°C hot water
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Butane Industrial heat pump / 120°C steam
Industrial refrigeration
Short term challenges

ban R22: transition turn-around

Investments: faster from project to start-up

Resource shortage: enhance training

Legislation: information & implementation
Industrial refrigeration, natural refrigerants & legislation

Legislation on high & medium GDP refrigerants evolve much faster and tend to be more restrictive worldwide

Industry needs a stable legislative environment
Capex life cycle is 20, 25, 30...years

Natural refrigerants based technology are the ideal solution for sustainable industrial activities.
Thank you very much!