

MAXIMIZING ENERGY EFFICIENCY IS OUR DUTY



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ABOUT US



With more than **15 years of solid technical experience**, JMM Consulting Services aims to be the one-stop solution provider to industrial companies using **Heating**, **Ventilation & Air-Conditioning & Refrigeration (HVAC & R) systems**. Based and registered in Singapore, we work with local and regional end-users who require **technical advisory and optimal solutions** and for their heating, ventilation, cooling & freezing needs.

We tap on latest technologies used in the industry and share these know-how with our customers. Our solutions are practical, with good ROI and oriented towards energy efficiency. Over the years, we have track records of business owners lowering utility cost through better process performance.

We have obtained SCEM certification (Singapore Certified Energy Manager) where we are qualified to provide energy optimization of HVAC&R systems and identify areas of improvement.

THE CONSULTANT

- Specialized in HVAC&R system design using Natural Refrigerants such as NH₃ and CO₂
- Worked at YORK Refrigeration (2000-2004) Johnson Controls (2007-2009)
- Technical Director Asia Pacific for Carrier Commercial Refrigeration in 2006
- Graduated from French Institute of Industrial Refrigeration (IFFI France).
- NEA-certified Singapore Certified Energy Manager (SCEM-128)





WHY ENGAGING OUR SERVICES?

- Bring a proven step-by-step process for success to your HVAC & Refrigeration project built through past experiences.
- Work with your operational & technical team to define the objectives and requirements for the project. Defining client's requirements is a critical task. It will make your company an informed consumer.
- Utilize design requirement to develop a Request For Proposal (RFP). This process will allow for apple-to-apple comparison of solutions and make sure you are getting a competitive market price that meets your requirement.
- Use technical skills to provide Senior Management with the factbased analysis to make an informed decision.
- It only takes a small percentage savings on a project to completely offset the consultant cost.
- Consultant are not affiliated with any vendor and have nothing to sell other than their expertise. They have nothing to gain through their design analysis and alternative recommendations.

COMMON ISSUES

- Cold Room Temperature Control
- Humidity Control
- Rising Utility Costs
- Too much time taken to freeze produce
- Condensation and Icing on insulated Panels
- Over-charging of Refrigerant
- Disputes with Contractors/ Manufacturers on refrigeration system defects





Low Charge NH₃ Refrigeration Systems

Special Features:

- No NH₃ pumps
- Superheat and Quality controlled NH₃ injection into evaporators
- Dry suction lines resulting in minimum pressure drop
- VFD on everything for optimized energy conservation
- Superior part load performance using reciprocating compressors
- Use of SS304L pipe to lower friction
- NH₃ inventory 3-5 times lower than liquid overfeed systems





- Especially engineered for refrigerated logistic warehouse
- 20% return for retrofits of HFC plants with new low charge NH₃ (based on unit electrical energy cost \$200-\$300/MWh)
- NH₃ "inconveniences" gradually minimized/eliminated (oil drainage, moisture, operators, specialist maintenance)





CO₂ / NH₃ Cascade Refrigeration Systems

Main Drivers around CO₂ refrigerant:

- A major leak will not damage stored goods as CO₂ is not toxic
- NH₃ charge restrictions
- ▶ NH₃ hazardous and toxicity
- Electricity costs
- Lower first cost due to smaller pipes, smaller pumps & less insulation
- Less space required





- Designed for logistic warehouse and food processing facility
- Constant positive pressure
- Environmentally friendly

INDUSTRY EXPERTISE



CO₂ Heat Pump Technology



By inserting 1kW of electrical power to the heat pump, it is able to generate about 4kW of heating capacity and 3kW of cooling capacity, providing a combined coefficient of performance (COP) of 7

INDUSTRIES EXPERTISE



INDUSTRIAL

- Refrigerated Logistics Warehouse (AS/RS)
- Food Processing Facilities
- Brewery & Beverages
- Dairy
- Block Ice
- Chemicals/ Oli & Gas
- Pharmaceutical
- Marine

SYSTEMS & TECHNOLOGIES

- Ammonia, CO2
- Air Blast Freezer
- Tunnel & Spiral Freezer (IQF)
- Contact Plate Freezer
- Flake Ice Machine
- Thermal Storage
- Heat Reclaim











°CCF























CLIENT:MANDAI LINK LOGISTICSLOCATION:SINGAPOREINDUSTRY:REFRIGERATED LOGISTICS WAREHOUSE



WORKS

• Consulting Services to convert an existing refrigerated bay from freezing application (-22°C) into chilling operation (+5°C)

PROJECT SIZE

• 80,000m³ refrigerated bay





CLIENT:PREFERRED FREEZER SERVICES/ ANTARALOCATION:HO CHI MINH, VIETNAMINDUSTRY:REFRIGERATED LOGISTICS WAREHOUSE



WORKS

• Contracting works inspection and Quality Control of newly installed Refrigerated plant for warehouse (ASRS)

PROJECT SIZE

- Cold Storage size: 120m Long x 80m Wide x 22m High
- 22,000 pallets





PAST PROJECTS

CLIENT:SHARIKAT PTE LTDLOCATION:SINGAPOREINDUSTRY:REFRIGERATED LOGISTICS WAREHOUSE



WORKS

- Refrigeration system of a new 12,000 pallet position refrigerated warehouse with chiller & freezer rooms
- Centralized R507 refrigeration system due to restriction from NEA to use ammonia as primary refrigerant







BACKGROUND

Authorization to use Ammonia (NH3) refrigerant was not granted by National Environment Agency (NEA) to the end-user. Taking this into consideration, the consultant had to design a refrigeration system using R-507A adding best energy savings features in order to ensure the lowest operating cost per pallet position.

The cold storage serves a total floor area of about 78,000sqft (54.6m x 66.0m) distributed over two floor levels and located on top of a newly built industrial building in Chin Bee area, Singapore. Total storage capacity is 11,000 pallet position.

The internal cold room height is 7.75m for Level 7 and 10.0m for Level 9. The design temperature is -20° C for freezer room, $+2^{\circ}$ C for chiller room (7% of storage floor area), and $+10^{\circ}$ C for loading/ unloading bay (non storage area).



SIGNIFICANT ENERGY SAVINGS ACHIEVED

through proper design works based on know-how and proper equipment selection

Company Representative		Signature / Date
End-User	Mr. Joseph Phang	66° Aug 20,7
Consultant	Mr. Jean-Marie Martineau	gh- Ary 2017

Monthly Electrical Power Consumption: Monthly Electrical Cost:

Number of Pallets Stored: Monthly Electrical Cost per Pallet Position: 233,933 kWh S\$ 35,089 (normal grid, \$0.15/ kWh) 11,000 S\$ 3.18