

## AIRAH "Food for Thought"

# **Refrigerated Road – Rail Distribution Link Project**

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#### **Refrigerated Logistics**









#### <u>JIT Refrigerated Rail</u> "<u>The Future is here Today</u>"

•Today I will present an overview of Australia's first refrigerated road - rail van concept which is now a fast growing enterprise, both facilities were completed in 2000

•To compliment the new refrigerated rail vans, the company has invested significant capital in developing Australia's first Refrigerated Rail Cross Dock Facilities with major terminals in Altona in Victoria and Forrestfield in Western Australia. The new Refrigerated Rail Vans and Cross Dock Facilities, coupled with efficient Refrigerated Road Transportation on the East Coast of Australia, enables manufacturers of refrigerated foodstuffs to offer their client base a total logistical solution to meet their national distribution requirements.

•The company operates three weekly services to Perth:

Departure ex Melbourne	Arrival in Perth
Tuesday P.M.	Friday 2.00am
Friday P.M.	Monday 2.00am
Saturday P.M.	Tuesday 2.00am

• The flexible door to door road and rail services, ensures that the client's freight can be <u>picked up on a</u> <u>Friday afternoon and delivered to their customers in</u> <u>Perth on the following Monday</u>.





#### "On Line – Real Time" Freight Tracking

•The Freight Tracking System installed pinpoints the whereabouts of any freight by client, reference number or consignment note number whether it is in transit, on a delivery vehicle or in a warehouse. This information can be sourced by customers, 24 hours a day via the internet and facilitates direct electronic communication between customers and the freight service operator.



Satellite Tracking of Refrigerated Wagon Temperatures

#### Design Brief

- 1. Construct Two Facilities One Vic & One WA
- 2. Each Facility to have Variable Room Temperatures
- 3. Room Temperature Range +18C to -30C
- 4. Must Maintain Cold Chain Integrity
- 5. Temperature Control and Monitoring, Both Sites from a Central Location
- 6. Facility Usage Cross Dock Product Transfer and Short Term Storage
- 7. Common Controls and System Components
- 8. Energy Efficiency During all Seasons and Operating Duty Levels
- 9. Water Problems WA Site
- 10. Simple to Operate
- ISECO Role Refrigeration Cool room Panels, Electrical including Lighting, Automatic Doors, Road and Rail Dock Seals and Dock Leveling Devices.
- 12. Projected Pallet Capacity and Loading Rates were Provided to Aid the Layout and System Design Process.

#### Room Temperature Specification

- 1. Ambient Store (Occupied) +10°C to +18°C
- 2. Holding Chiller  $0^{\circ}$ C to  $+4^{\circ}$ C
- 3. Transit Chiller (Occupied)  $0^{\circ}$ C to  $+4^{\circ}$ C
- 4. Holding Freezer  $+4^{\circ}$  to  $-30^{\circ}$ C
- 5. Transit Freezer (Occupied) +4° to -30°C
- 6. The design objective is to provide a system that will accommodate a wide variety of product temperatures, for both short term storage and transit through the cross dock facility.
- 7. Each room is to be capable of operating at the set temperature, being adjusted to the set point prior arrival of the stored product, this is either cooled down or warmed up from the previous setting.

## Altona Terminal



# Altona Refrigerated Cross Dock Facility Plan



# Forrestfield Terminal



# Forrestfield Refrigerated Cross Dock Facility Plan



## **Refrigeration Design Objectives**

- 1. Low Noise and Air Movement in the Refrigerated Areas
- 2. Defrost Control On Demand to Suit the Room Set Temperature
- 3. Separate Systems to Limit Refrigeration Leak Potential
- 4. Same Refrigerant for All Systems
- 5. Multiple Compressors to Ensure Efficient Operation at All Operating Conditions
- 6. Multiple Compressors to Provide System Back Up
- 7. Low Condensing Temperature to Minimise Power Consumption
- 8. Same System Design for Both Facilities
- 9. System Design that will Cater For Large Room Temperature and Operating Condition Fluctuations

#### **Refrigeration Design Initiatives**

- 1. Install Two Speed Evaporator Fans and Air Diffuser Socks in the Occupied Areas
- 2. Install Ice Sensor Demand Defrost Controls on All Rooms that operate at or Below Freezing
- 3. Evaporator Defrost to be Electric with Cloth Drop Bags to Contain Air During Defrost Cycle.
- 4. Electric Defrost Heaters to Cycle On to Increase Room Temperatures As/When Required Duty is Changed
- 5. Design to Include Four Separate Refrigeration Systems.
- 6. Select Refrigerant R507 for all Systems
- 7. Select Multiple Reciprocating Compressors One Rack for each System
- 8. Select One Air Cooled Condenser Having Multiple Refrigerant Circuits
- 9. All Evaporators to have Electronic Expansion Valves to Cater for the Varying System Operating Conditions
- 10. The Low Temperature System to have Air Cooled Liquid Sub Cooling Using Cool Air From the Under Floor Ventilation System
- 11. Adjustable Suction Temperature, Controlled at 7K Below Room Set Point Temperature
- 12. System Control Via PLC, Pressure-Temperature Sensors and SCADA System
- 13. Off Site Control and Monitoring Via PC-Modem

## **Refrigeration Piping Drawing**



#### A Look at the Plant Room Condenser Area



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## A Look Inside the Refrigeration Plant Room





#### A Look at the Freezer Rooms



#### A Look at the Cross Dock Area





#### A Look at the Ambient Store



#### Road Transport Link

#### "An Overview"



Trailer Reversing Into Loading Dock



Loading Dock with Air Seals, Dock Leveler and Control Lights



Refrigerated Trailer In Loading Dock



Internal View Refrigerated Trailer

# Rail Link and the Environment

•Rail transport provides an economic and environmental alternative which is advantageous to the community and organisations

•The impact to the environment is minimised with the current weekly rail freight volume from Melbourne to Perth representing the displacement of 300 semi trailers per week or 15,000 semi trailers per annum from the National Highway system with a weekly saving of 2 million litres of diesel fuel.

•At present, freight transport in Australia contributes to <u>16%</u> of Australia's total greenhouse gas emissions.

•Operators Statistics show, that of the amount of road transport emissions run at a ratio of 82 to 24 per tonne for rail. In summary, utilization of rail transportation over road, will reduce emissions by up to 71%.

•Manufacturers who choose to utilise rail transport over road transport significantly contribute to the reduction of burning fossilised fuels, thereby making a significant contribution to reducing total greenhouse gas emissions.

#### Rail & Road Greenhouse Gas Emissions





#### Refrigerated Rail Car

- The automated "<u>Air Bag Sealed</u>" docks for both <u>Road</u> and <u>Rail</u> ensure that temperature integrity is maintained at all times.
- Refrigerated Rail Vans have far better thermal insulation qualities than both road units and containers with wall insulation at 106mm compared with conventional road units at 48mm

*Typical Road/Rail Container Insulation* 







#### Rail Car Loading

#### "A Look Inside"



Refrigeration<br/>UnitDoor Seals<br/>InflatedEach Rail Car Holds 88 Pallets



Air distribution duct, return air coil face and pallet support structure

#### Securing Product

- Plastic dunnage systems are used that completely secure a customer's product (When it is in the rail van), from any movement therefore, minimising the opportunity of in transit damage.
- Cardboard reusable pallet caps and pallet sleeves, are ideally suited for product that is highly sensitive to damage and small leaks in the packaging could result in the destruction of the contents.
- Racking in refrigerated rail vans ensure that highly sensitive temperature controlled product is transported in such a way to remove the risk of damage and allows sufficient air flow around the product.
- Dome roofs on the rail vans enables the economical transport of paper reels to Perth. The domes allow rotation of the reels so that they can be placed in the wagon on their base.





Plastic Dunnage

Racked Refrigerated Wagon



Pallet Caps



Product Packed and Secured

## Non Refrigerated Facility











Inside Dry Store

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