

ART STORAGE– TRANSPORTATION

1. INTRODUCTION

Art pieces are commonly stored in buildings where temperature, humidity and lighting levels are controlled within strict tolerances to limit the potential for degradation by the local environment. Some items are stored within transparent enclosures where a micro climate is set up with inert gases and microbial protection.

These strict requirements are not relaxed even when collections are shared between national and international galleries.

The art pieces must be maintained at conditions from the moment of dispatch to the moment of return.

This may be a short run from the local airport to the gallery or may be a national road trip where pieces are transported from Gallery to Gallery by road over a number of weeks.

Depending upon the value of the art work that is carried a vehicle may carry a larger number of lesser valued items or simply be used to carry a single, high value artifact or painting.



2. PROCESS DESCRIPTION

A system was required that was mobile, quiet and offer extremely high levels of mechanical and environmental reliability.

The system must be inherently simple and easy to maintain.

The design criteria was 20°C, ±0.5°C and 50%rh, ±5.0%.

The adjustable temperature range was between +15°C and +30°C.

External conditions could be between 0°C and +38°C.

3. PROCESS DETAILS

A diesel powered, 415vac generator is located underneath the insulated storage area within an acoustic enclosure. The enclosure includes lined inlet and outlet vanes and a high pressure radiator circulation fan driven directly off the engine. Easy access is provided for routine inspection and maintenance through a hinged acoustic panel.

An air cooled, fully modulating refrigeration system is housed in a stainless steel housing above the vehicle cabin. The unit includes condenser air flow control for operation in cold and hot climate ranges.

The environmental control unit is a split system which allows for the transport/storage area to be effectively quarantined from the external environment. Conditions within the inside of the storage area are held constant by the refrigeration system, which employs a 0% to 100% modulating control, heating system and reticulated humidification system.



Vehicle showing under-slung diesel generator, main control panel on the front wall and the external stainless steel condensing unit on the high front wall.



Precise and close control is monitored by a DDC controller with LCD display and key pad interface. The DDC also includes data logging of both the internal conditions and the status of key processes with the environment conditioning equipment.

This is typically used for maintenance records and fault finding as required by download to a separate PC.

Internal, replaceable air filters are utilised in the 100% recirculated air stream.

Retransmission of the internal temperatures and humidity is directed into the drivers compartment for continuously monitoring of the internal conditions by the driver during transport.

The system also included a power inlet system so that external mains power could be taken advantage of during over night stops in regional areas where the humm of a generator at night may not be appreciated.



Close-up of the acoustically enclosed diesel generator and main control cubicle including weatherproof DDC access point.

REFRIGERATED TRANSPORT AND EQUIPMENT NEWS

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Cool art

When masterpieces by artists like Sidney Nolan, Arthur Boyd or Russell Drysdale move around Victoria and interstate, they need a controlled, protected environment to move in. The National Gallery of Victoria will open its new gallery of Australian Art - the Ian Potter Centre: NGV Australia at Federation Square at the end of November 2002'

To ensure the longevity of paintings, sculptures and other artefacts, they are stored and displayed in an environment where humidity and temperature are controlled; the requirements are the same in transport. The project specification requirements were researched and developed by Wayne Childs of the NGV. Enter Heuch, specialist refrigeration and process cooling engineers.

Victoria's National Gallery commissioned Heuch to develop a vehicle for transporting paintings and artefacts between galleries and storage sites.

"They are displayed or stored in controlled conditions, so to maintain their longevity, they need the same with the vehicle.

"So in the vehicle, we needed to reproduce the same climate they are stored in and maintain that on an overnight stop or while they are travelling.

"That's expected to be within Victoria or to New South Wales or South Australia, but it could actually be anywhere in Australia," Heuch director and applications engineer Steve Oakley said.

The quest was for accurate and stable control of climate, irrespective of the prevailing weather.



The result is a refrigerated body on a Mitsubishi FK 617 LS1V, a 250HP turbo charge intercooled 7.5l diesel with six-speed transmission.

To smooth out the ride, the suspension was converted from springs at rear to airbag and airbag assist on the front.

The body is fitted with a Tieman power tailgate and insulated barn doors. The body itself is fibreglass with 75mm insulation all around.

The sophisticated refrigeration unit is one of the most interesting aspects of the vehicle.

“It has some basic components from our range of transport equipment,” Oakley said, “with some additions and modifications.

“The unit has an on board controller and digital display. It also retransmits to the driver’s cabin, which tells him the temperature and humidity in the vehicle.

“The digital controls are on a steel control box mounted on the front wall of the truck. That has all the starters and switch gear and solid state relays to drive the unit.

“It also has a logging function, so it logs current temperature and humidity and also performs fault logging.

“If we need to check on it later on, we can come and plug a laptop into it and work out what was going on at the time it faulted.

“We can also do remote site diagnosis by modem. That means, no matter where it is in Australia, we can dial in and see what is going on,” Oakley said.

The refrigeration system is fully sealed, or hermetic, running on 415 volt AC. It includes an electronically controlled condenser air-flow regulator to prevent over cooling while operating on the road.

In this system, the condenser fans run continuously, while the amount of air available is metered as required.

This allows for the refrigeration system to operate within a stable environment.

“It also has a special humidification system we developed. That’s because it’s an enclosed space, so if you go on traditional methods, it’s very difficult to control, you’re either putting in too little or too much,” Oakley said.

“We needed something we could control precisely, so we developed a system that allows us to do that.

“It uses a few in house secrets we’ll keep under our belts for as long as we can!

“That exceeded expectations actually, we’re very happy with that – we were controlling temperature to within half a degree and humidity within 3% or 4%.”

The unit has two operating modes – ‘electric standby’ when it is plugged in to a power source and ‘on-road’ which is provided by an under-slung diesel generator which is a variant of the type Heuch use for defence work.

The air cooled Kubota three cylinder diesel drives a two pole alternator and is built within an acoustic chamber to keep the sound level down under 60DB.

The diesel generator has its own independent controller that monitors all functions including water temperature, oil pressure, over and under speed and glow plugs.

“The unit is on the road and operating now. It was used to move the last bits and pieces between the gallery site and the new gallery at Federation Square,” Steve Oakley said.

“They did some trial runs to Leongatha (Gippsland) when they just got it and as a result of that we made a few minor modifications.

“The feedback has been very good, they’re very happy.”

The Mitsubishi was supplied by Hallam Trucks and the body built by All Truck.

Heuch, established in 1970, currently has around 20 employees in its special purpose refrigeration business.

Major clients include defence, transport industry, petrochemicals, pharmaceuticals and food businesses.

“We do the stuff that’s just a little bit different,” Steve Oakley said, “but we also have regular business like transport equipment and water chillers.”

Heuch is located in Melbourne with support networks Australia-wide and a 24 hour seven-day a week national service capability.

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