Introduction

This presentation will provide an overview of the current state of food cold chain in Australia, and an introduction to some of the guiding principles and requirements necessary for its improvement.

The content and conclusions are presented from the results of the work we are doing at my own SuperCool, and from the policies and objectives currently Under focus by the Australian Food Cold Chain Council (AFCCC).
Introduction

Compliance to **worlds best practices** is now on the Australian agenda due to the global food loss and wastage (FLW) crisis and its triple bottom line.

Commercial, consumer, logistics and contractual arrangements should no longer ignore food safety and the opportunity for FLW reduction.

New technology and systems are always at the forefront of the refrigeration industry and the cold chain, however proper implementation of existing first level technology is required.
The process - simplified

When food is stored and transported at its correct temperature, losses are reduced and shelf life is honored.
Multiple ownership of temperature makes temperature abuse more common, and avoidance of responsibility easier.
Cold chain type – closed loop

Single ownership of temperature, clear responsibility
Cold chain transport and storage is a chain of events separated into Control Points (CP) and Critical Control Points (CCP)
A compliant cold chain proves its product temperature between all stakeholders
Compliant temperatures require collaboration between key stakeholders.

**Refrigeration System**

**Container & Vehicle Body Builder**

**Process**
Long haul example
Road and rail cold chain
Monitoring and data points

Storage at DC → Load IMC → Road Journey → IMC transfer to rail → Rail journey → IMC transfer to road → Road journey → Unload IMC → Storage at DC

CCP = Critical control point

PE - Performance and efficiency
PT - Product temperature
AT - Air temperature
The critical control points are CRITICAL

Storage

Load IMC

Temperature, packaging and packing

Time temperature to loading dock

Time temperature on loading dock

Time temperature to IMC at dock

Time temperature, stacking in IMC at dock

Time temperature at journey start
The critical control points are CRITICAL.
When things go wrong
Responsibility is unclear

Boxes touch the wall

Different problems, same result

 Entire pallet touches the wall
When things go wrong
Responsibility is unclear

Boxes touch the wall

Entire pallet touches the wall

Pallets are too close
Equipment is important

- Refrigerated to ISO standards
- Correct temperature
- Locked and secure
- Monitored door openings
- Monitored temperatures
- Alerts issued when exception occurs
- Record of journey and events
- HACCP compliant process in place
When things go wrong
Finger pointing starts

- When a temperature rule is broken during a journey or upon arrival at a destination, the common practice in a non-compliant cold chain is to finger point to someone else to take responsibility, or to not disclose the rule has been broken.

- Any activity with shared responsibility between stakeholders, by nature attracts the typical ‘it’s not me’ mentality.

- Therefore stakeholders must commit to implementing cold chain decision making based on facts and data.

- A prime example of this is when airflow causing lack of refrigerating effect on a product is deemed to be the cause of an event.
Product arrives out of temperature

Ok. DC not responsible

Product temperature during journey not available

Air temp in fridge Ok.

Transporter not responsible

Product Temp at departure not available

Transporter blames loading point temp

QC at destination determines issue at rear of IMC

QC blame refrigeration system, insufficient capacity

Transporter shows fridge system service certificate, all Ok

QC engage refrigeration system manufacturer, all airflow

Photos show stock moved and high in places

Loading point blames transporter

Loading point blames transporter for stock moving

Packaging company not responsible, blames refrigeration

Product owner considers blame on all parties

Finger pointing continues...

Transporter blames transporter for stock moving

Loading point blames transporter

Product blame refrigeration system

QC at loading point determines temp at departure of IMC

Arrival point blames loading point after review of fridge temp

Transporter says not responsible for stock moving

Loading point blames transporter for stock moving

Packaging company not responsible, blames refrigeration

Product owner considers blame on all parties

Finger pointing continues...
Example finger point | Airflow

The facts

- Good flow produces heat convection
- It is crucial for maintaining product temperature in transport
- Moving air is forced convection
- Still air is free convection
Example finger point | Airflow

The facts

• Sufficient forced air convection occurs in IMC and trailer applications velocities > 0.5 m/s

• Inadequate forced air and free air convection can occur at the rear of an IMC/Trailer, or at velocities of 0.0 to 0.1 m/s
Example finger point | Airflow
The facts

- Packaging, packing, stacking and wrapping play a role in product temperature compliance
- They are four different things
- Either can block airflow sufficiently to negate convection and introduce conduction
- Can eliminate the efficiency of good refrigeration
Example finger point | Airflow

The facts

The reality of responsibility in this typical example is the opposite to current behaviour and thinking.

**Loading point** - is a primary responsible party due to:
- Inability to prove product temperature from the loading dock to the IMC
- Pallets stacked too high blocking airflow to rear of IMC
- Lack of co-operation with transporter to validate fit for purpose packing and wrapping for the journey
- Insufficient load restraints installed for journey (plywood not good enough)

**Transporter** - is a primary responsible party due to:
- Inability to prove product temperature from the loading dock to the IMC
- Pallets stacked too high blocking airflow to rear of IMC
- Lack of co-operation with loading point to validate fit for purpose packing and wrapping for the journey
- Inability to prove product temperature during journey, and absence of adequate air temperature monitoring
- No thermal certification of equipment
- Insufficient load restraints installed prior to journey (plywood not good enough)

**Refrigeration system installer** - is a secondary responsible party due to:
- Lack of advice regarding use of air ducts and secondary evaporators at the point of installation to make the IMC more fit for purpose.

**IMC manufacturer** - is a secondary responsible party due to:
- Making incorrect fit for purpose claims
- Providing no ISO/ATP/AHRI/ASNZ thermal certifications for the IMC
Equipment CPE factor

**Capacity** - is the unit or system large enough or sufficient in achieving heat removal to meet the heat load requirement.

**Performance** – is the unit working properly according to the manufacturers specifications without faults or modifications.

**Efficiency** – is the unit in combination with other equipment in the application sufficient to achieve the correct temperature result.
Product temperature monitoring must be continuous..... end point only not good enough. Automatic systems are best
Journey temperature mapping is second best to probing. Must be continuous and automatic.
Smart product probe technology is here
Cold Chain View – main page
# Cold Chain View – main page

## Assets

### Root Depot

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<th>Status</th>
<th>Temperature (°C)</th>
<th>Humidity (%)</th>
<th>Engine Hours</th>
<th>Battery Voltage</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>SH1</th>
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## Main Page

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Cold Chain View – data report
The pudding is in the proof
ColdFoodCode will provide guidance to different sectors of cold chain industry and stakeholders.
Thanks for listening