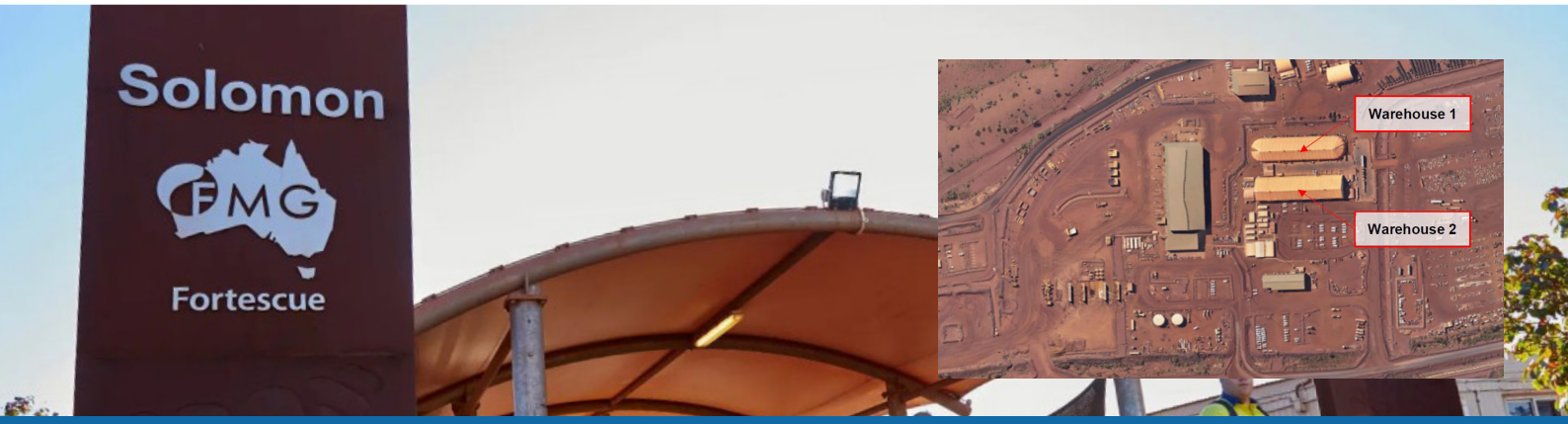
Case Study

Solomon Mine - Central Warehouse, Pilbara Region, WA



Transforming warehouse conditions in extreme mining environments: Fortescue's Solomon site achieves reliable climate control through intelligent HVAC innovation.

Solomon Mine Pilbara Region, WA

Project Address
Pilbara Region, WA

Consultant
PDF Engineering

Installer
Western Energy Group

Equipment
4 x Climate Wizard Indirect Direct Evaporative High Capacity Air Conditioning Unit

Model: Climate Wizard **CW-80S Hi-Cap**

CUSTOMER PROFILE

The Solomon site is central to Fortescue iron-ore operations, with a workforce of over 2,200 people. The operation comprises of 2 ore processing facilities, Kings and Firetail.
Iron ore from Solomon is transported 300kms by rail to Herb Elliott port in Port Hedland, where it is shipped to customers around the world.

INDUSTRY

- Warehouse
- Industrial

APPLICATION

- Stand-alone cooling
- Dedicated ventilation

Fortescue Metals Group (Fortescue) operates the Solomon Mine site in the Pilbara region of Western Australia, a region known for extreme heat and harsh environmental conditions. Within this operation, the Solomon Central Warehouse 1 & 2 serve as critical logistics hubs supporting mining activities.

However, both warehouses have been experiencing excessively high internal temperatures due to their structural design and limited air movement, creating challenging working conditions for personnel.

Project Requirements

- **Temperature Control**
  Maintain internal temperatures within a comfortable 24 – 27°C range using autonomous CW-80S unit operation.
- **Humidity Management**
  Disable units when ambient relative humidity exceeds 60% (adjustable).
- **Air Quality & Purge Cycles**
  Implement a night purge mode to remove moisture buildup.
- **Water Efficiency**
  Stagger salinity dump cycles to reduce peak potable water demand.
- **Sensor Integration**
  Install room, ambient, and duct sensors in optimal locations for accurate readings.
- **Control System Design**
  Provide control panels, switchgear, master time clock, and manual override capability.
- **User Interface**
  Locate Seeley Multi Magic controllers within the warehouse office for ease of access.

Proposed Solution

To address the thermal challenges, a comprehensive HVAC control strategy was developed around the deployment of CW-80S cooling units, each equipped with:

- **Room, ambient, and duct sensors** for precise environmental monitoring.
- **Autonomous temperature based operation** ensuring cooling only occurs when supply air is cooler than room air.
- **Humidity based lockout logic** to prevent ineffective operation during high humidity conditions.
- **Night purge functionality** running units at low speed overnight to remove moisture and stabilise internal conditions.
- **Staggered salinity dump cycles** to reduce simultaneous water demand across units.
- **Optimised sensor placement** including shaded ambient sensors and duct mounted supply air sensors.
- **Centralised Multi Magic controllers** installed in the warehouse office for intuitive system management.
- **Custom designed control panels and switchgear** enabling seamless integration between switchboards, HVAC units, and sensors, including master time clock and manual override capability.

The Outcome

The implemented solution delivered a measurable improvement in warehouse working conditions:

- **Reduced internal temperatures**, maintaining the target 24 - 27°C range during operational hours however current supply temperatures are below the required range.
- **Improved air movement and comfort,** significantly enhancing the working environment for warehouse personnel and pressurising to eliminate infiltration.
- **Optimised energy** with an estimated **saving of 81%** when compared to equivalent DX system and **water usage** through intelligent control logic and staggered dump cycles.
- **Increased system reliability** due to accurate sensor placement and robust control panel design.
- **Enhanced operational oversight** via centralised Multi Magic controllers and manual override capability.

Overall, the project successfully addressed the thermal challenges at Solomon Central Warehouse 1 & 2, supporting Fortescue's commitment to safe and productive working environments.

ASHRAE 0.4% Monthly Conditions (Pilbara Region,WA, Design Conditions) - Ambient - 42.8 °C DB / 18.9 °C WB / **Indoor -** 27.0 °C DB / 50% RH												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry Bulb	44.3°C	43.6°C	40.8°C	37.2°C	34.0°C	29.0°C	28.7°C	31.6°C	35.5°C	40.0°C	41.2°C	44.0°C
Wet Bulb	18.8°C	18.5°C	19.0°C	18.0°C	16.3°C	15.4°C	14.4°C	14.1°C	15.4°C	16.7°C	17.5°C	18.8°C
Dew Point	-2.4°C	-2.8°C	3.4°C	4.1°C	1.9°C	4.9°C	2.1°C	-3.6°C	-4.4°C	-6.3°C	-3.9°C	-1.9°C
4 x CW-80S Hi-Cap (32,800 L/s @ 240Pa ESP) - Performance for Stand-alone												
CW-80 Hi-Cap Supply Air Temp	12.2°C	12.0°C	13.5°C	13.1°C	11.7°C	12.0°C	10.7°C	9.3°C	10.0°C	10.4°C	11.2°C	12.3°C
Stand Alone Cap	711.2 kW	721.2 kW	658.8 kW	674 kW	732 kW	721.2 kW	773.2 kW	830.4 kW	804.4 kW	784.8 kW	752.8 kW	708 kW
Stand Alone COP	12.52	12.70	11.60	11.87	12.89	12.70	13.61	14.62	14.16	13.82	13.25	12.46

SEELEY INTERNATIONAL
COMMERCIAL HVAC SOLUTIONS

For more information, please call 1300 475 091
or email commercial@seeleyinternational.com

bsi ISO 9001 Quality Management Systems CERTIFIED FS 744827

We provide full technical support to ensure optimal design for each application.

Seeley International Pty Ltd
112 O'Sullivan Beach Road
Lonsdale, South Australia 5160
seeleyinternational.com

ABN 23 054 687 035

Breezair, Braemar, coolair, Supercool, Climate Wizard, Coolerado, AIRA, Integrated Comfort Inc. — By SEELEY INTERNATIONAL