



2025

Rio Tinto Hope Downs 4
True ceramic coating drives Scope 1
reductions at Hope Downs 4

Project Details

Industry: Mining & Resources

Location: Pilbara, Western Australia

Facility: Mess / dining & commercial kitchen

Use cases: Energy efficiency, asset protection, waterproofing, worker safety

Project dates: Application 11–13 Dec 2024; post-application performance observed from 5–15 Dec 2024 and beyond

Product credential: Thermoshield — Australian-made, true ceramic insulation coating (a genuine insulator, not a reflective paint)

Impact Snapshot

37%

reduction in
cooling demand

730t CO₂-e/yr

avoided when
monitored across asset

44%

drop in roof surface
temperatures

\$200k

annual savings on one
asset

The Challenge

In the Pilbara's extreme climate, the mess and commercial kitchen faced a compound heat problem:

- Brutal ambient + solar load: Metal roof temperatures routinely exceeded 60 °C, driving heat into the roof assembly and dining areas during peak service.
- High internal gains: Ovens, fryers and dishwashers added sustained sensible heat, forcing HVAC to chase comfort through the hottest part of the day.
- Exposed ductwork: Roof-mounted or externally routed ducts absorbed radiant heat, elevating supply-air temperatures and creating condensation/mould risk on cold sections. An insulation-first fix was required to cut heat soak and stabilise the air path.
- Water ingress & corrosion: Wind-driven rain and capillary action at sheet laps, penetrations and degraded sealants were causing leaks during summer storms. Repeated wetting accelerated corrosion at fasteners and joints, threatening structural integrity, electrical safety and food-service hygiene (mould risk). Thermal cycling widened gaps, compounding ingress and rust.
- Energy & emissions: Cooling demand spiked daily and peaked constantly during daylight hours, increasing consumption and Scope 1 emissions.
- Operational reality: The facility required a fast, non-disruptive intervention with no shutdowns, robust warranties, and proven performance under cyclonic rain, dust and UV.

The team specifically needed an insulation-first solution—something that would impede heat flow through the building envelope, not just reflect sunlight—and simultaneously improve waterproofing and worker safety.



The Solution



To tackle the sustained daylight-hour peaking on the cooling plant, Powerhouse Renewables Group applied Thermoshield ceramic thermal insulation coating to the mess roof, paired with minor roof repairs and targeted waterproofing. The solution was engineered to flatten constant peaks by cutting roof and plenum heat soak so the HVAC could cycle rather than run flat-out.

The approach combined:

- Australian-made Thermoshield ceramic thermal insulation coating (true insulator — not a reflective paint) to reduce heat flux into the building envelope, flatten sustained daytime peaks, and restore compressor cycling
- Waterproofing & rust conversion at vulnerable junctions (laps, fasteners, penetrations, gutters), backed by a 10-year warranty
- Surface temperature reduction & thermal-shock control: Post-application roof max fell from 62.8 °C → 44.8 °C (-18 °C), smoothing day-night swings and reducing thermal expansion/contraction that loosens fixings and accelerates corrosion

Installation was completed over three days (11–13 Dec 2024) with no disruption to site operations, and was sequenced to avoid lunch and dinner service peaks.

Ceramic
Thermal
Insulation

Rust
Converter

10 Year
Warranty



Outcome (at-a-glance)

- 37% reduction in energy consumption measured on monitored distribution boards
- 558 kW drop in daily energy use across the monitored circuits
- Max roof surface temperature reduced from 62.8 °C → 44.8 °C (-18 °C)
- 137 t CO₂-e/yr avoided (monitored scope) — equal to ≈2,264 trees
- Immediate storm test passed post-install: no leaks or water ingress
- Safer access for maintenance: hot-surface burn risk substantially reduced



What changed - in detail

Insulation cuts heat flow, lowers HVAC load

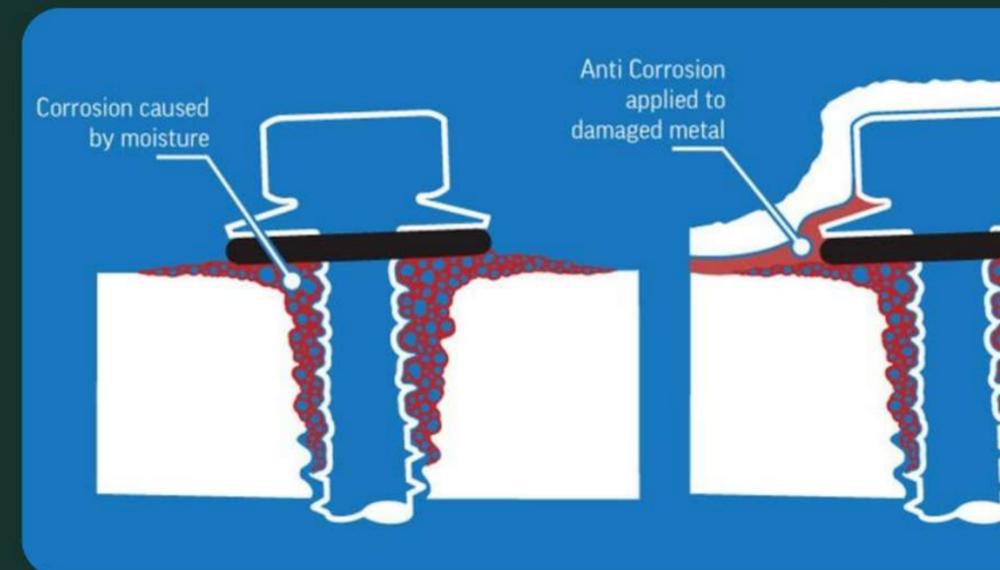
Within days of application, the insulated roof assembly showed a sharp drop in surface temperatures and heat flux. By impeding conductive and radiative heat transfer through the metal sheet, compressor runtime and fan energy use were cut materially. Lower roof and plenum temperatures also reduced heat soak into exposed ductwork, improving supply-air stability and further lowering compressor cycling.

Waterproof, durable, and safer to work on

The waterproofing program targeted the primary leak paths — laps, fasteners, penetrations and gutters — eliminating known ingress points and converting active rust. After significant storms in December, the mess reported no leaks. By isolating metal from oxygen and moisture, corrosion progression was arrested, extending service life and reducing unplanned repairs. Lower peak surface temperatures also minimise thermal expansion and contraction cycles, protecting fixings and sheeting. The cooler surface further removes burn hazards for technicians.

Operational continuity

The coating and repairs were scheduled around site activities, avoiding shutdowns. All work was completed on live assets with standard controls and access.



Ceramic insulation vs reflective paint — what's the difference?

Bottom line: Ceramic coatings act as insulation (low thermal conductivity + thickness) to impede heat flow year-round. Most reflective paints mainly rely on high solar reflectance; they can cut summer sun gain but contribute little thermal resistance and may increase winter heating demand in cold climates.

How ceramic insulation wins

- **Mechanism:** Low-conductivity ceramic matrix + film thickness reduces conduction and radiant transfer through metal skins; reflective paints primarily reduce absorption on sunny days and add negligible R-value.
- **Year-round performance:** Ceramic reduces summer heat gain and winter heat loss; reflective paints can be counter-productive in cold/cloudy seasons where more solar gain is desirable.
- **Peak vs. base load:** Ceramic flattens sustained daytime peaks and reduces evening run-on (less stored heat to purge). Reflective paints mostly trim midday peaks when sun is highest.
- **Ducts & cold surfaces:** Ceramic lowers heat soak into exposed ductwork and reduces condensation risk on cold sections. Reflective paints have minimal impact on these paths.
- **Resilience & maintenance:** Ceramic systems are thicker, can bridge micro-cracks, and are less sensitive to soiling for performance. Reflective paints' effectiveness drops with dirt/aging and requires frequent cleaning to maintain reflectance.
- **Waterproofing synergy:** Our system integrates waterproofing + rust conversion—addressing ingress and corrosion alongside thermal performance.
- **Fuel & emissions:** By lowering both daytime peaks and after-hours run-on, ceramic insulation delivers more consistent diesel/gas fuel (Scope 1) reductions on self-generation sites.

Cold-climate note - For southern or high-altitude clients (colder winters, frequent overcast): ceramic insulation helps retain indoor heat and mitigate condensation; a purely reflective coating can increase heating energy in winter. Ceramic insulation is therefore the safer, all-season choice across mixed climates.



Ready to take action?
Get in touch and let's
get to work.

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