SUBIC INTERNATIONAL MANAGEMENT AND CONSULTANCY, Inc.

Cool/ White Roof Initiatives

THERMO SHIELD®

thermal insulation coating

“Cool Roofs are one of the best greenhouse gas reduction strategies.”- Pres. Barack Obama

- Definition –

  A cool roof reflects the sun's heat and emits absorbed radiation back into the atmosphere at a higher rate than standard materials. They reduce the amount of heat held and transferred to the building below, keeping the building cooler and at a more constant temperature.

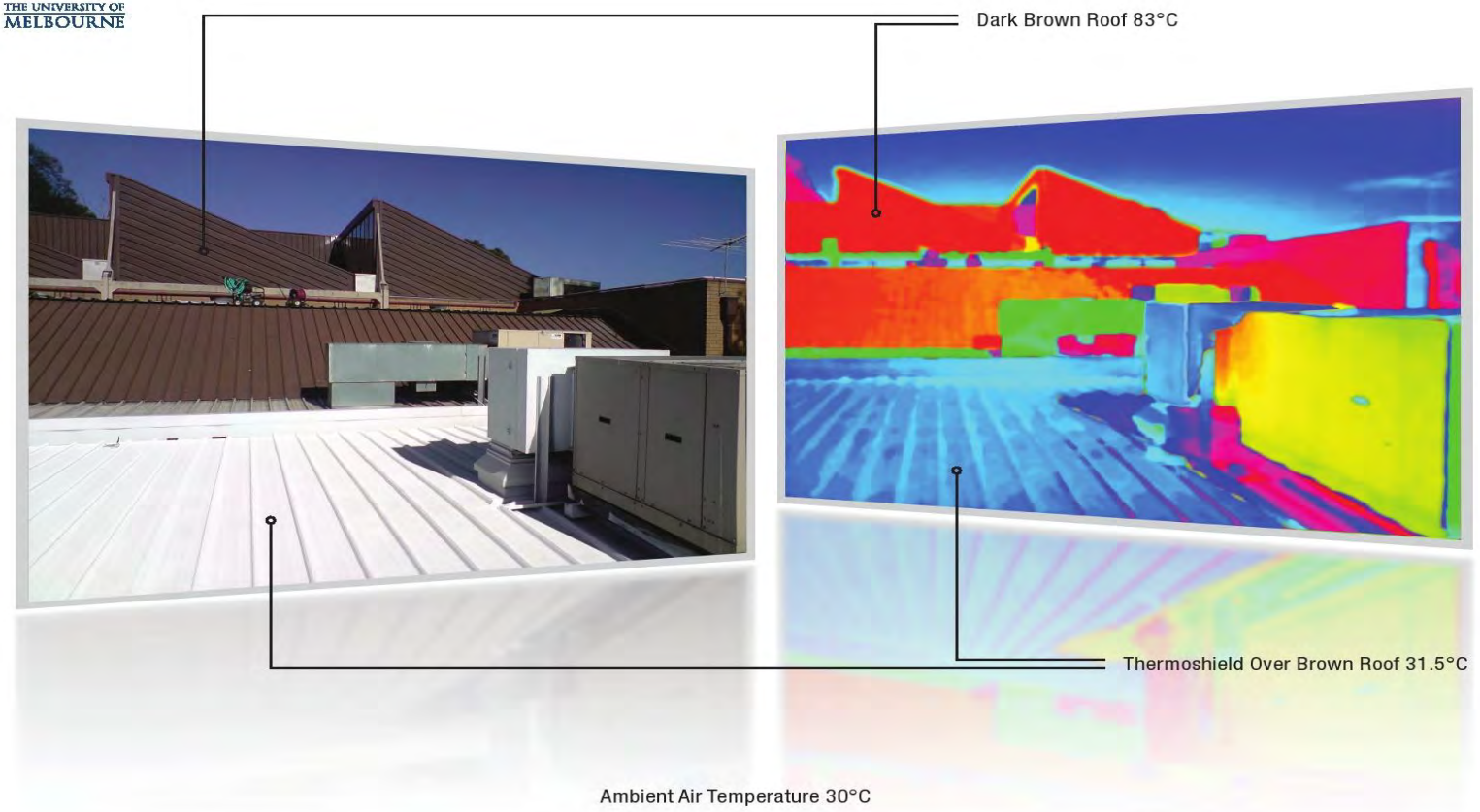
Cool Roof Initiatives AIM to:

- **reduce cooling energy load**
- increase the life of air conditioning systems and roofs service life
- lower roof maintenance costs
- **reduce the temperature in the city due to reduced amount of heat trapped in the city - UHI**
- **reduce air pollution and greenhouse gas emissions**
- improve human health and comfort.

FOR ENTIRE CITIES

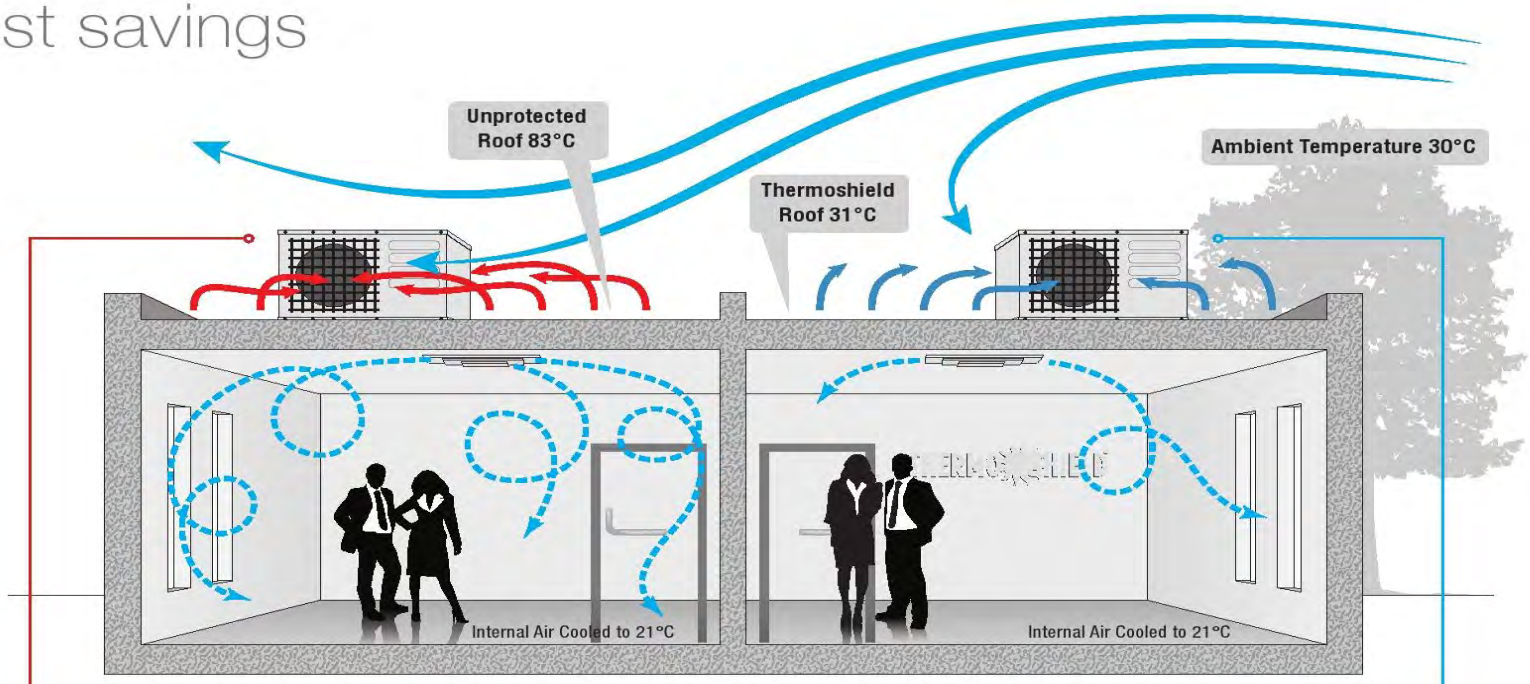

UNCOATED
83°
UNCOATED
63°
THERMOSHIELD
34.5°
THERMOSHIELD
31.5°C

THE UNIVERSITY OF MELBOURNE



Ambient Air Temperature 30°C

cost savings



This AC unit has to remain on for a full hour to maintain 21°C internal temerature

On the unprotected side the air conditioner has to work a lot harder and comsume more power to acheive the same result.

The radiant heat is sucked into the AC unit.

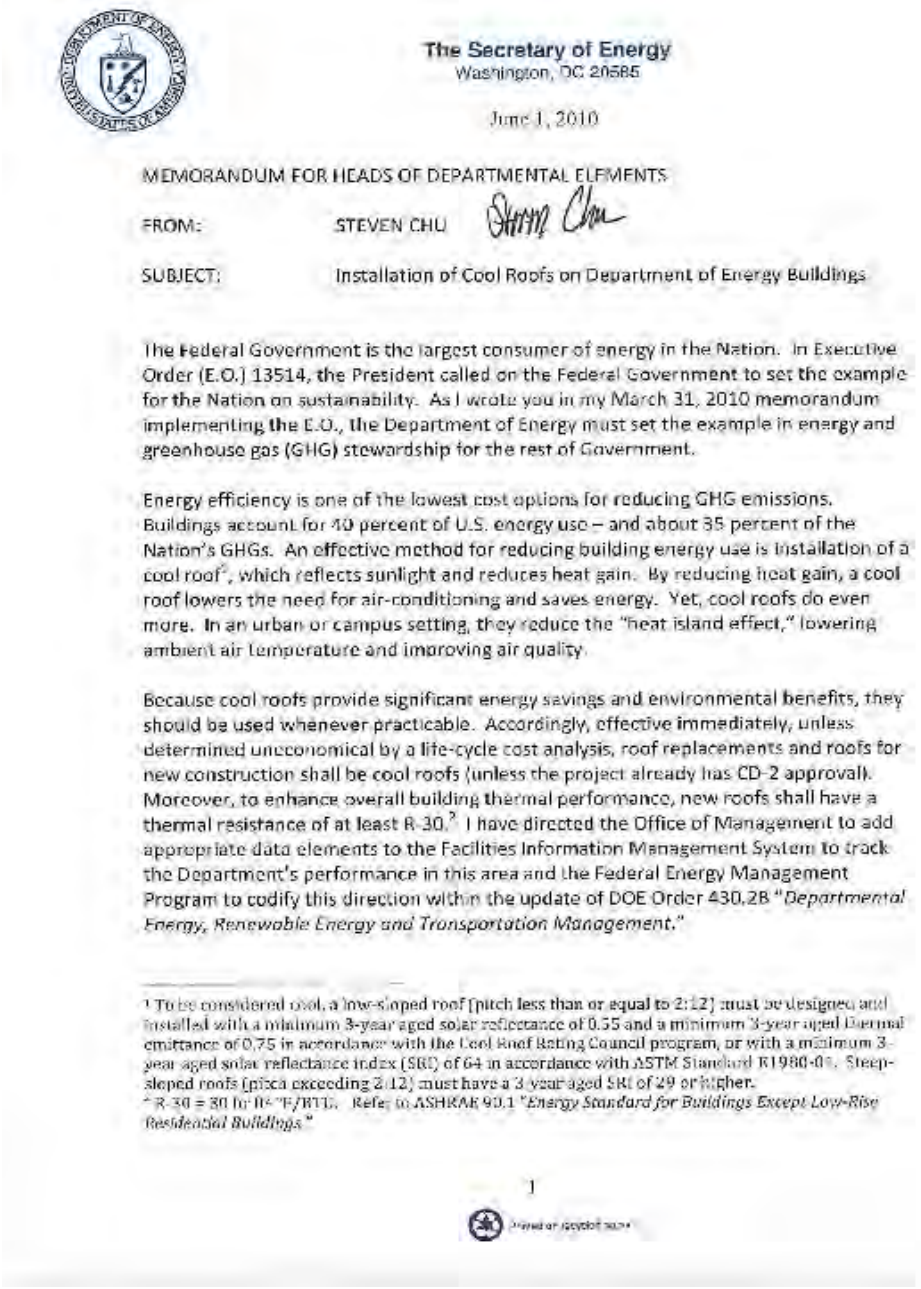
This AC unit is only required for 10 mins. per hour to archieve the same result.

With a coating of Thermoshield, this air conditioner works a lot less because the air around the unit is much cooler and the internal temperature is low to begin with.

No radiant heat is sucked into the AC unit.

Past US Sec. of Energy – Steven Chu

Memo to all Heads of Dept. instructing that all Gov bldg's to adopt a Cool Roof System



The Secretary of Energy
Washington, DC 20585

June 1, 2010

MEMORANDUM FOR HEADS OF DEPARTMENTAL ELEMENTS

FROM: STEVEN CHU

SUBJECT: Installation of Cool Roofs on Department of Energy Buildings

The Federal Government is the largest consumer of energy in the Nation. In Executive Order (E.O.) 13514, the President called on the Federal Government to set the example for the Nation on sustainability. As I wrote you in my March 31, 2010 memorandum implementing the E.O., the Department of Energy must set the example in energy and greenhouse gas (GHG) stewardship for the rest of Government.

Energy efficiency is one of the lowest cost options for reducing GHG emissions. Buildings account for 40 percent of U.S. energy use – and about 35 percent of the Nation's GHGs. An effective method for reducing building energy use is installation of a cool roof[1], which reflects sunlight and reduces heat gain. By reducing heat gain, a cool roof lowers the need for air-conditioning and saves energy. Yet, cool roofs do even more. In an urban or campus setting, they reduce the "heat island effect," lowering ambient air temperature and improving air quality.

Because cool roofs provide significant energy savings and environmental benefits, they should be used whenever practicable. Accordingly, effective immediately, unless determined uneconomical by a life-cycle cost analysis, roof replacements and roofs for new construction shall be cool roofs (unless the project already has CD-2 approval). Moreover, to enhance overall building thermal performance, new roofs shall have a thermal resistance of at least R-30.[2] I have directed the Office of Management to add appropriate data elements to the Facilities Information Management System to track the Department's performance in this area and the Federal Energy Management Program to codify this direction within the update of DOE Order 430.2B "*Departmental Energy, Renewable Energy and Transportation Management.*"

[1] To be considered cool, a low-sloped roof (pitch less than or equal to 2:12) must be designed and installed with a minimum 3-year aged solar reflectance of 0.55 and a minimum 3-year aged thermal emittance of 0.75 in accordance with the Cool Roof Rating Council program, or with a minimum 3-year aged solar reflectance index (SRI) of 64 in accordance with ASTM Standard E1980-01. Steep-sloped roofs (pitch exceeding 2:12) must have a 3-year aged SRI of 29 or higher.
[2] R-30 = 30 hr·ft²·°F/BTU. Refer to ASHRAE 90.1 "*Energy Standard for Buildings Except Low-Rise Residential Buildings.*"

Cool Roofs America

- If flat roofs in warm climates is whitened and 10% increase in reflectivity, it would offset 24 gigatons of Gh gas emissions

- This is equivalent to 300 million cars off the road for 20 years

- > 1000 sq ft (93.8 sq meters) of white roof offset 10 tonnes of c02 emission over 20 years

Scientific American

- Proceedings of the National Academy of Science USA February 11/2014

- White/Green roofs form an effective strategy for both cooling buildings and help combat climate change

- Such roofs can completely offset **warming** due to urban expansion (new development esp. cutting down trees) and even offset future greenhouse warming over large regional areas. (Arizona State University)

Birds Eye View – Cool Roof Development

St Petersburg, Florida

California USA – New Title 24 Cool Roof Requirements

- As of January 1, 2010, the California Energy Commission's updated Title-24 Building Energy Efficiency Standards for residential and non-residential roofing are now in force, otherwise know as "Cool-Roof"
- The new Cool Roof requirements affect new construction, significant repairs of existing roofs, re-roofing, plus additions and alterations of existing buildings and homes.

New York City, USA

- New York City, NY, USA – New York Cool Roofs Program

- Launched in 2009 aim to cover 10000 m2
- Have covered 2,500,000m2 of NY rooftops to date
- Obligatory to install Cool Roofs to 75% of newly built bldg's

- Dallas has passed bill similar to California
- 13 states offer financing programs
- 14 states offer subsidy programs

- Korea and China starting to implement similar initiatives.

Melbourne, Australia

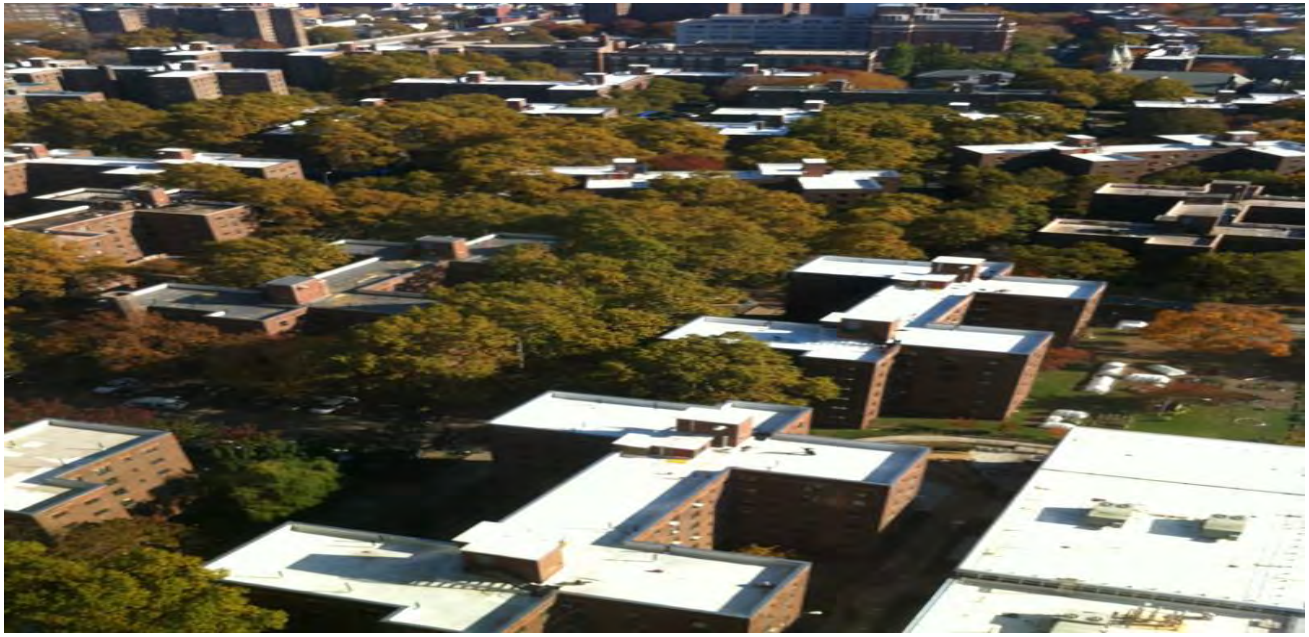
- After a 2 year collaborative study conducted by University of Melbourne and the Melbourne City Council, the Cool/White Roof Policy was created and adopted - The white roof push will form part of the city's beleaguered 1200 Buildings program, which is at the heart of its ambitious bid to become carbon neutral by 2020.

Bldg’s with Cool Roof Systems

Apple Datacentre, North Carolina


Melbourne Airport

Residential - Australia



Brooklyn, New York


Palms Springs Califonia
Write a description for your map.
Legend
Canyon Country Club Collony Condo #13 on 6th tee
Google Earth
©2017 Google
400 m
N

THERMO SHIELD®

thermal insulation coating

- Developed by NASA
- High Solids Ceramic Coating
- Classic Properties:
  - Durability
  - Strength
  - Outstanding Adhesion
  - High Thermal Resistance
  - High Electrical Resistance

THERMO SHIELD®
thermal insulation coating

Ability to withstand the damaging effects of:

- Acids & Alkaline, Salts & Gases
- Oxygen & Water
- Chemical Compounds
- Long term UV exposure

THERMO SHIELD®
thermal insulation coating

Can be applied to:

- Roof tiles
- Metal deck
- RC Slab

Has Residential, Commercial and Industrial uses

THERMO SHIELD®
thermal insulation coating

- Not just a high quality white paint, provides solutions in the areas of:

1. ENERGY EFFICIENCY – Thermal Insulation
2. CORROSION CONTROL – Asset Protection
3. ASSET REJUVENATION

THERMO SHIELD®

thermal insulation coating

THERMO SHIELD®
thermal insulation coating

- Comprised of millions of ceramic beads which creates dead air space – the fundamental key to insulation
- Full solar spectrum: UV, Visible, Infra-Red (Radiant Heat)
- Radiant Heat Barrier – blocks solar heat from entering building structure
- <u>Reflects, absorbs AND dissipates Heat</u>

THERMOSHIELD test results:

1. Solar Reflectance 90%+
2. Ultraviolet Resistance 96.6%
3. Emissivity 90%
4. R-value 6.3
5. K-value 0.00345W/degK

THERMOSHIELD®
thermal insulation coating

" It was demonstrated that a commercial building in Melbourne could benefit by up to 20% in terms of cooling energy reductions"

- Cool Roofs: A City of Melbourne Guideline Research Results, University of Melbourne

THERMO SHIELD®
thermal insulation coating

Residential Roof Before

Residential Roof After

THERMO SHIELD®
thermal insulation coating

Residential Roof Before

Residential Roof After

THERMO SHIELD®
thermal insulation coating

Pizza Hut Setia Alam

KFC Setia Alam

THERMO SHIELD®
thermal insulation coating

Brunsfield Prop before

Brunsfield Prop after

THERMO SHIELD®
thermal insulation coating

Residential Slate Roof Before

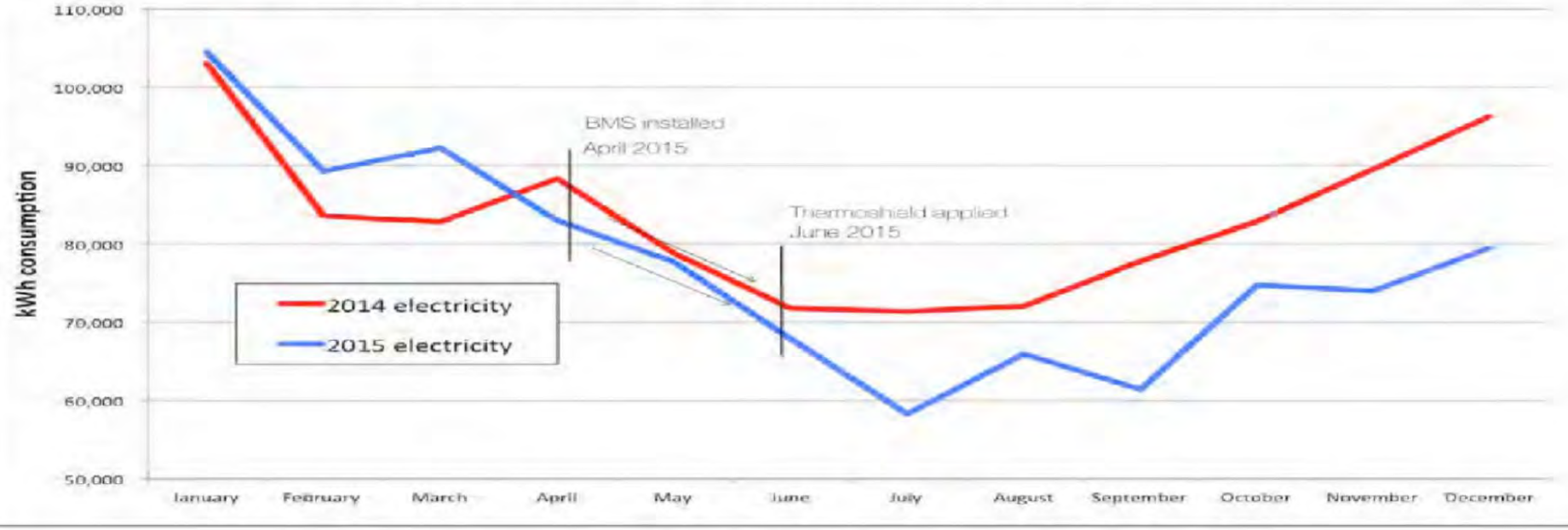
Residential Slate Roof After

Kingpin Bowling – Nth Queensland

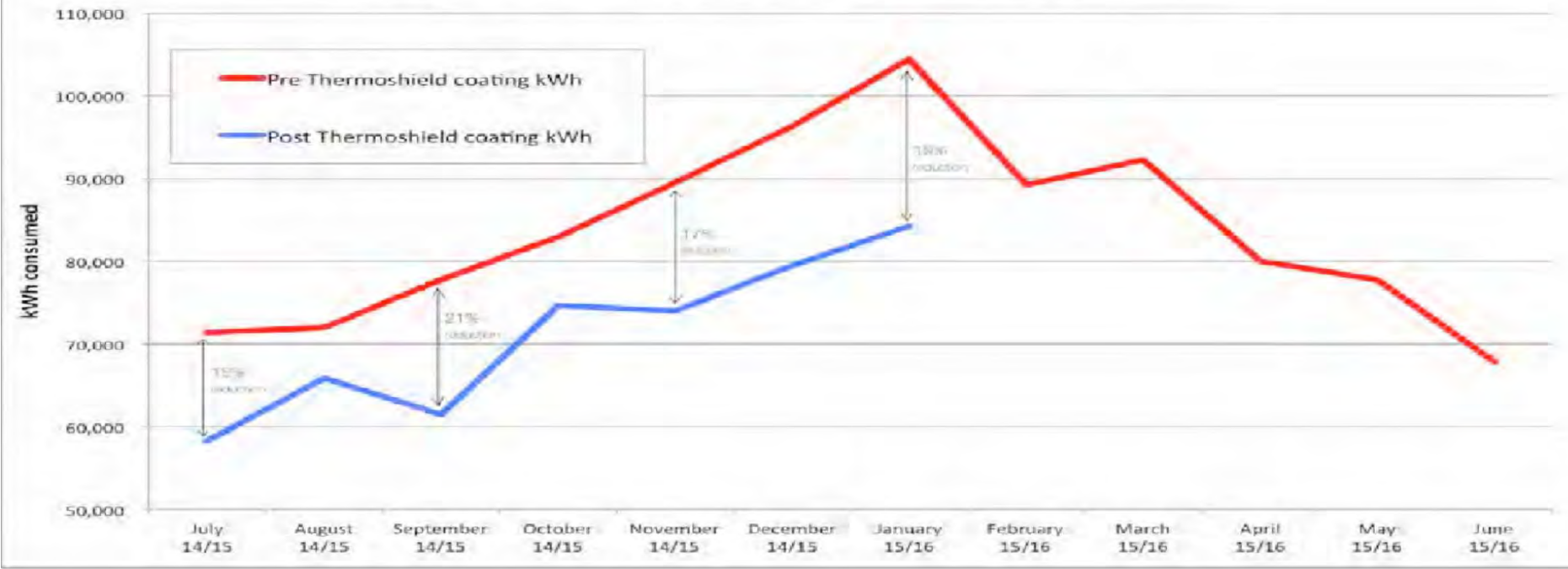
3900m2 Building

Pre coating			Post coating			Year on year monthly reduction	kWh saved	
Jul-14	71,372	kWh	Jul-15	58,246	kWh	18.39%	13,126	kWh
Aug-14	72,000	kWh	Aug-15	65,883	kWh	8.50%	6,117	kWh
Sep-14	77,807	kWh	Sep-15	61,427	kWh	21.05%	16,380	kWh
Oct-14	82,916	kWh	Oct-15	74,702	kWh	9.91%	8,214	kWh
Nov-14	89,545	kWh	Nov-15	74,014	kWh	17.34%	15,531	kWh
Dec-14	96,329	kWh	Dec-15	79,531	kWh	17.44%	16,798	kWh
Jan-15	104,413	kWh	Jan-16	84,282	kWh	19.28%	20,131	kWh
						TOTAL kWh SAVED:	96,296	kWh

2014 & 2015 - Electricity kWh consumption | Monthly comparison



KingPin Townsville - Year on year monthly comparison



THERMO SHIELD®

thermal insulation coating

THERMO SHIELD®
thermal insulation coating

- Creates a UV stable, non-permeable, elastomeric membrane
- Encases substrate from exposure to corrosive elements (chemicals, acids, water, salt, o2)
- Long term protection – coastal, caustic areas
- Extends life of asset
- System able to rejuvenate rusted surfaces to as new

THERMO SHIELD®

thermal insulation coating

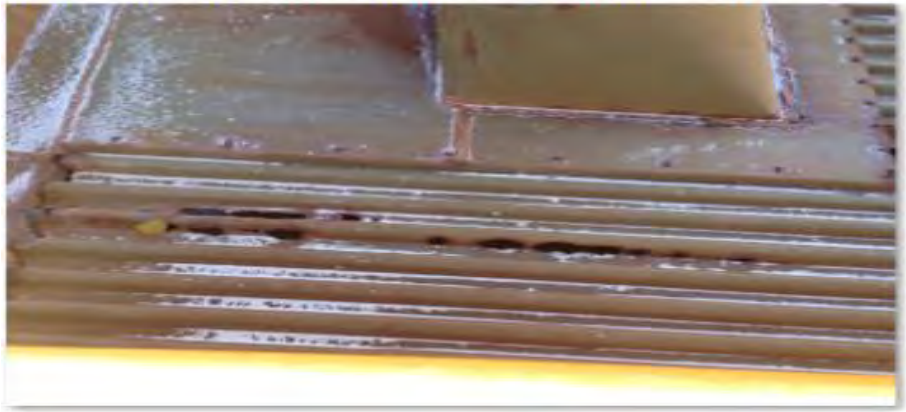
* A shot of the sheds - from a distance:

*An indication of the volumes of explosives stored

*Closer inspection of external cladding

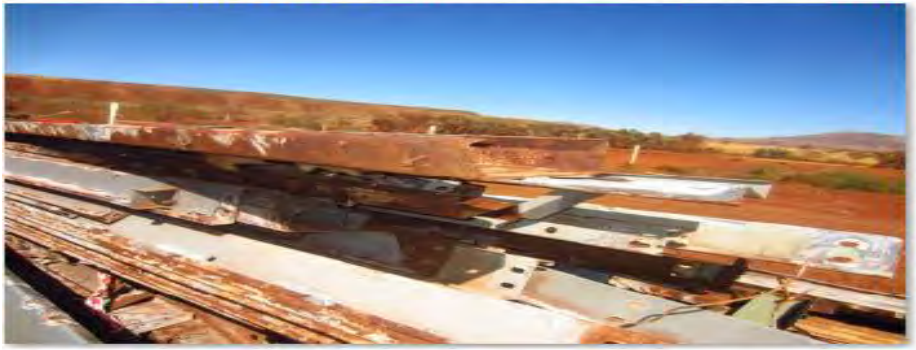
*Sheets corroded through - major falling hazard

*Roof sheeting corroded in corrugation 'troughs'



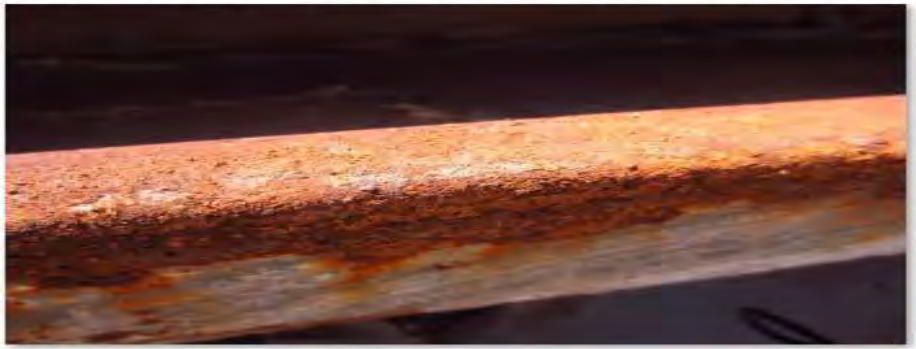
*Internal wall sheeting - imminent risk of falling

*When coating is 'flaked' off - reveals extent of corrosion



*Protective coating inflexible & unable to adhere

*Engineers deemed purlins contained hairline cracks



*Tech screws provided entry points for corrosion

*Harnesses worn - rope length set to correct length

*Highly experienced, high efficiency & precision

*Roofers then installed ridge caps & gutters which coating crew would apply second coat internally

THERMOSHIELD®
thermal insulation coating

19/09/2012

RioTinto

TO WHOM IT MAY CONCERN

During the refurbishment period, the ammonium nitrate storage facility at West Angelas first started storing 'prill' once again during early May 2012. Two new sheds, with two storage bays in each were both coated with the Thermoshield thermal ceramic coating both internally and externally, encasing the substrate.

All of shed 1 (bays 1 and 2) were completed before work commenced on shed 2 so that supply of explosives wasn't impeded. Early May was the first time the highly corrosive ammonium nitrate 'prill' first came into direct contact with the Thermoshield coating.

In our vast experience with storage of ammonium nitrate, we believe that the very first signs of corrosion, which are found at the entry/exit point of tech screw penetrations, will appear after as little as two weeks exposure. We had a pre-determined view that after 3 months of exposure, we would then know beyond doubt if we could deem if the Thermoshield coating has been successful in preventing corrosive elements accessing and damaging the underlying structure.

The first Thermoshield site inspection after three months showed not a single sign of corrosion. The sheds also had areas of incidental contact & the elastomeric properties of the coating meant that a dent in the shed didn't result in the coating 'seal' being broken. Very recently, the second inspection after 6 months of exposure also showed no signs of product delamination, cracking or bubbling which we are delighted with.

It also must be stated that temperatures in the Pilbara have been as high as 35 in recent weeks & consistently above 30. When entering the sheds, the temperature inside is noticeably cooler. The result in having the 'prill' not exposed to extreme heat results in better product performance and less chance of blasts failing (misfires), which results in significant production down time as no one can enter the pit until the explosives are safely dealt with.

We at Rio Tinto are delighted with the performance and deem the coating to be greatly successful in preventing corrosion. Currently tenders are in place for a planned renovation at the Hope Downs Rio Tinto mine site where multiple tenders include the application of Thermoshield given its success thus far.

Regards
Jacob Taylor

Project Coordinator
Rio Tinto West Angelas Operations
West Angelas, PO Box 675, Newman, 6753, Western Australia

T: +61 (8) 9175 6231 F: +61 (8) 9144 8636 M: 0457 549 589
jacob.taylor@riotinto.com http://www.riotinto.com

- Solved a AUD80 mil + per year problem
- Only approved corrosion control to be used in Rio Tinto assets w 'wide

THERMO SHIELD®

thermal insulation coating

Australian Government
IP Australia

LETTERS PATENT

INNOVATION PATENT

I, Robyn Foster, the Commissioner of Patents, hereby grant an innovation Patent
2012101262
to
Gavin Roderick Batty of PO Box 16, Silvan, VIC, 3795, Australia
for the innovation Patent titled
Corrosion Protection
invented by Batty, Gavin Roderick.
This Innovation Patent is granted for a term of eight years commencing from 21 August 2012.
This Innovation Patent can not be enforced unless and until it has been examined by the Commissioner of Patents and a Certificate of Examination has been issued. See sections 120(1A) and 129A of the Patents Act 1990, set out on the reverse of this document.

Dated this 6th day of September 2012

R E Foster

Robyn Foster
Commissioner of Patents

COMMONWEALTH OF AUSTRALIA
AUSTRALIA
PATENT OFFICE

PATENTS ACT 1990

- Patent for Corrosion Control

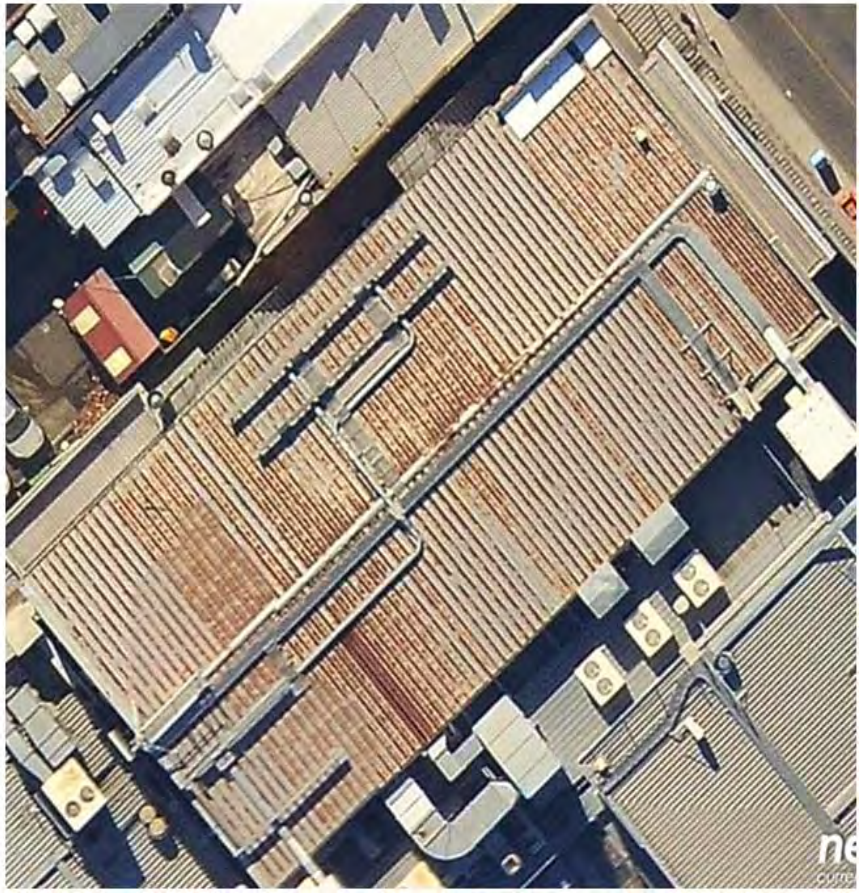
THERMO SHIELD®

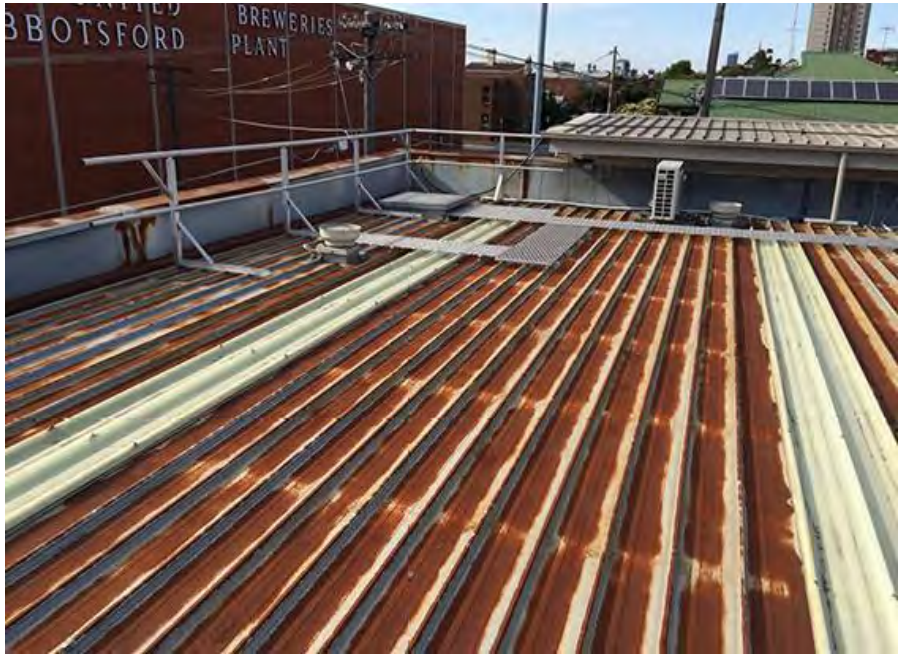
thermal insulation coating

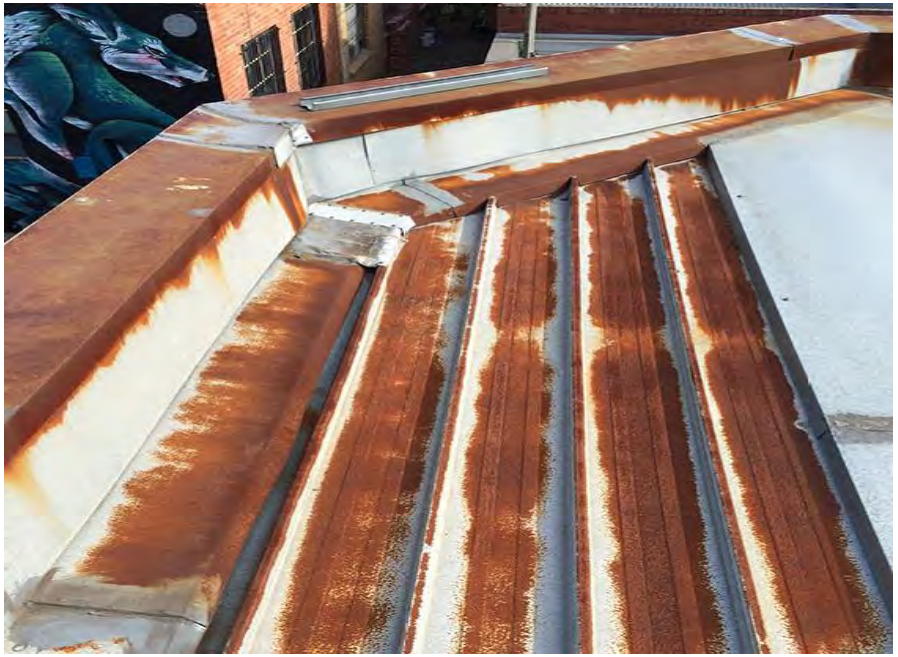
Rust Progression

January 2010

April 2014

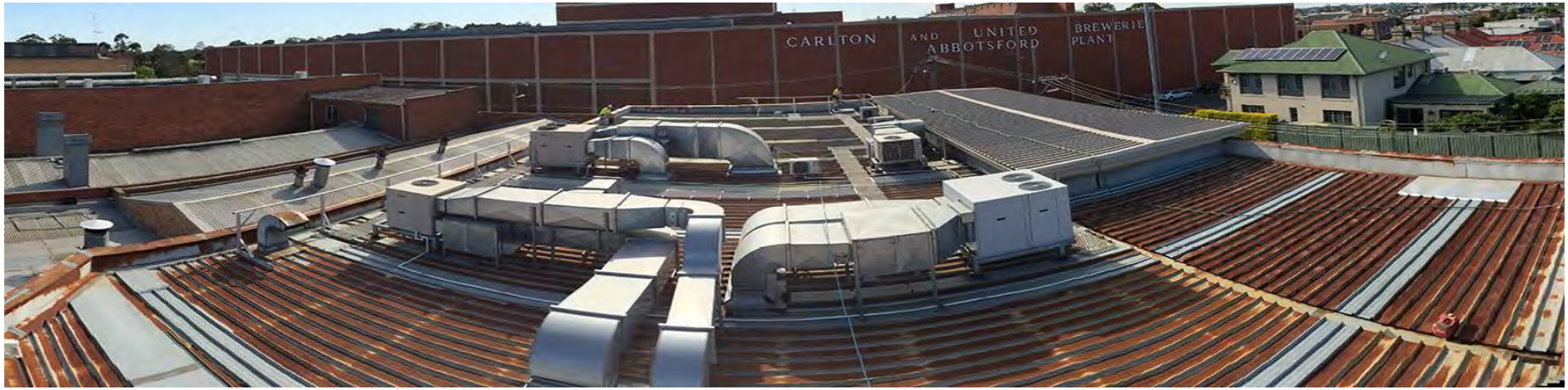


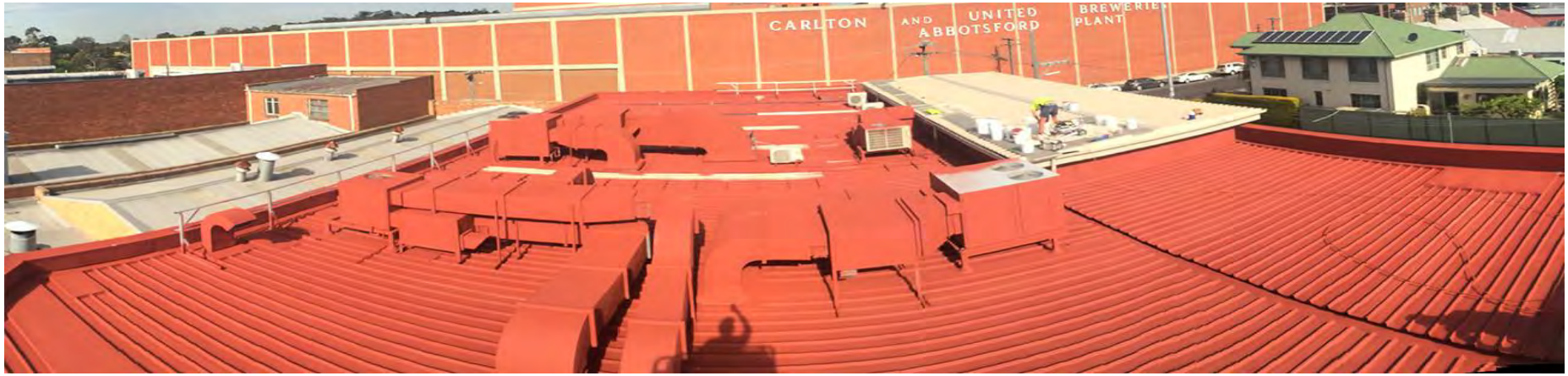

BBOTSFORD
BREWERIES
PLANT




Maps


ABBOTSFORD
PLANT


CARLTON AND UNITED BREWERIES
ABBOTSFORD PLANT


CARLTON AND UNITED BREWERIES
ABBOTSFORD PLANT


CARLTON AND UNITED BREWERIES
ABBOTSFORD PLANT

THERMO SHIELD®
thermal insulation coating

Hitachi Bangi Before

Hitachi Bangi After

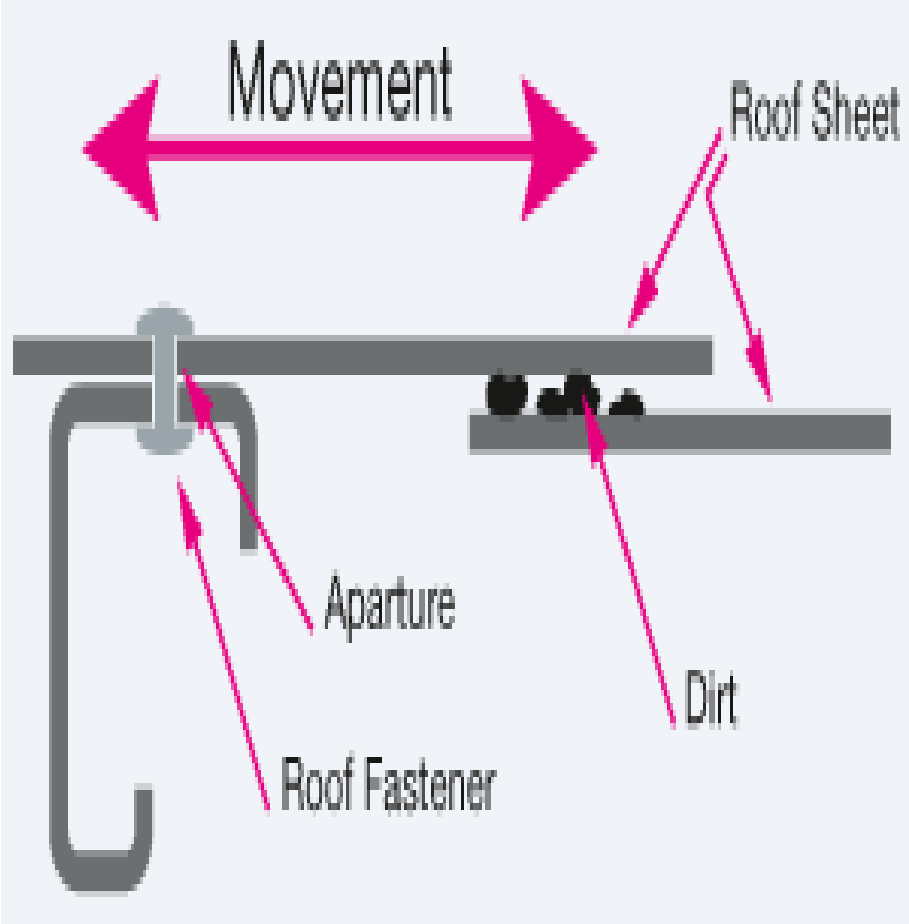
THERMO SHIELD®
thermal insulation coating

- Significantly decreases “thermal shock”:

  expansion & contraction caused by surface

  temp fluctuations
- Helps Prevent:

1. Joint fractures
2. Metal contortion
3. Waterproofing issues



THERMO SHIELD®
thermal insulation coating

Benefits:

- Provides LONG TERM performance & protection of assets – Future Proofing
- Provides superior insulation against heat
  - Energy Efficiency, increased comfort, cost savings, green
- Climate Change
- 10 year Warranty – applied by certified applicator

Colours Available

Evening Haze®

Pale Eucalypt®

Shale Grey™

Surfmist®


THERMO SHIELD
thermal insulation coating


bhpbilliton


coles
save every day


HITACHI


MONASH University


JKR


RioTinto


POSTERA CRESCAM LAUDE
THE UNIVERSITY OF
MELBOURNE


PKNS


TENAGA
NASIONAL


verve
ENERGY


TOP GLOVE
TOP QUALITY, TOP EFFICIENCY
THE WORLD'S LARGEST RUBBER GLOVE MANUFACTURER


WD
Western
Digital®


BRUNS
FIELD
®