Ultrasonic Scale Preventer

USP

PROSPERITE

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Common problems with heat exchanger, boilers and cooling towers

- **Loss of Energy**
- **Shutdown time**
- Scheduling of cleaning
- Unknown of damage condition
- Labor and time intensive
- Cost of cleaning and repair
- Cost of chemical usage
- Environment and safety issues

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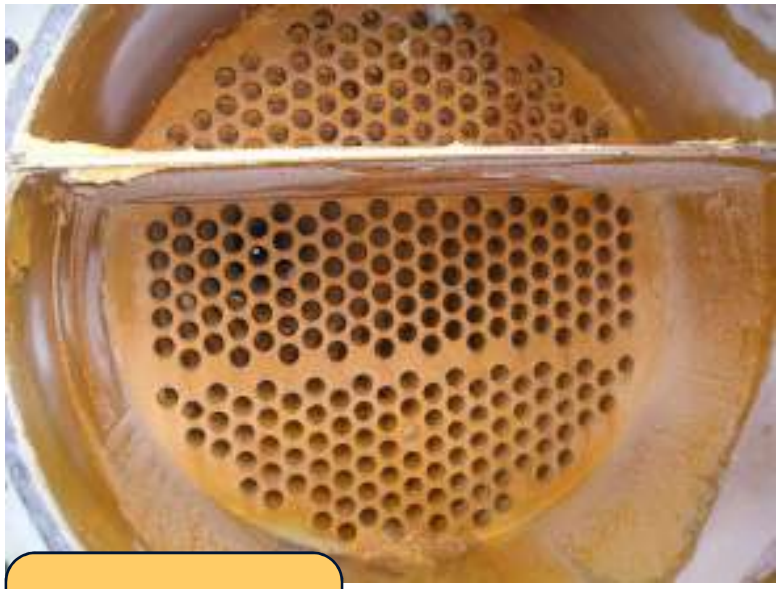
References at Power Plant

Comparison of pre heat exchanger after 1 year in operation

WITHOUT USP



WITH USP

Prevent fouling formation
Slowdown fouling
Remove fine fouling
24/7 prevention

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Shutdown Savings

-Production lost
-Prolong cleaning cycle
-Labor & Maint cost
-Tube Bundle last longer
-Cranes & scald-folding

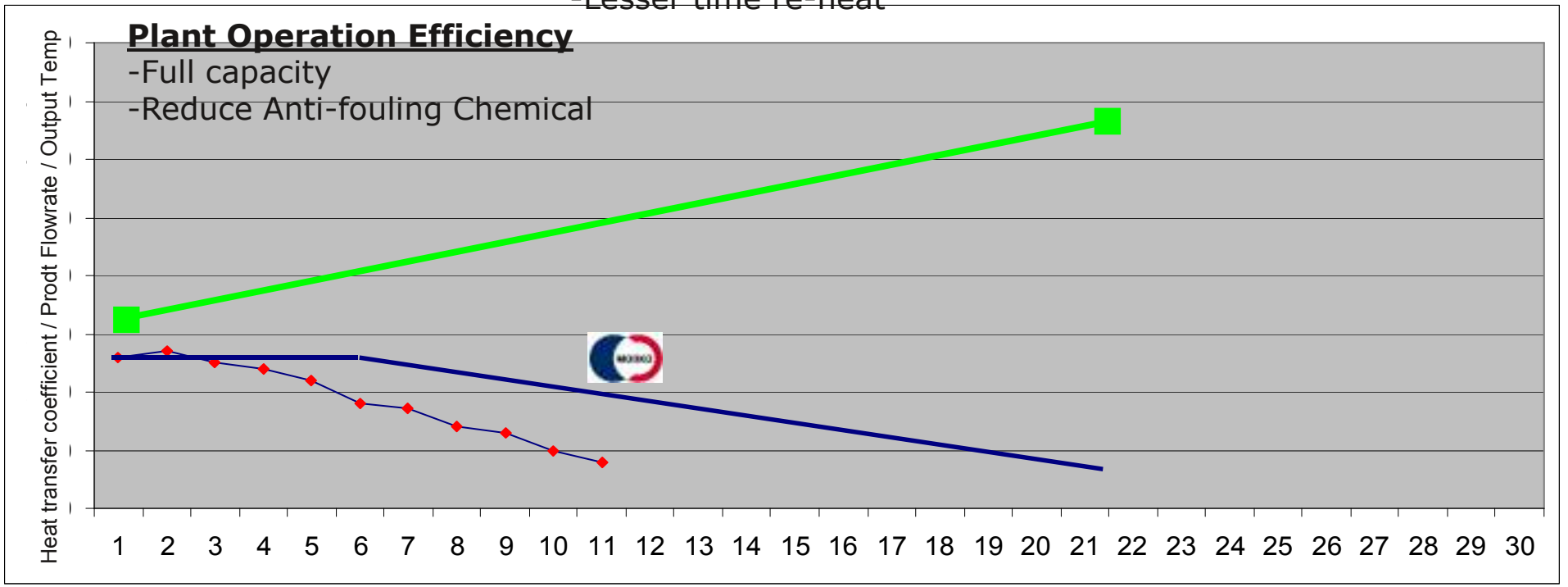
Energy Savings

-Heat Transfer Efficiency
-Less Fuel
-Lesser time re-heat

Millions Saved

Plant Operation Efficiency

-Full capacity
-Reduce Anti-fouling Chemical



Companies Benefited using USP

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GS Caltex

Hyundai Oilbank

S-OIL

KUMHO PETROCHEMICAL

Riaupulp
a member of the APRIL Group
UNEP Champions of the Earth 2006 Corporate Partner

SAMSUNG FINE CHEMICALS

IRPC
Integrated Refinery & Petrochemical Complex Public Co., Ltd.

ptt GLOBAL CHEMICAL

ExxonMobil

SRC

PETRON

Company Profile

Morko Co., Ltd.

Russia & Korea jointed technology and partnership.
Leading company in the field of high power ultrasound & specialize in research, development, manufacture for high power ultrasonic technology.

CERTIFICATES AND AWARDS

New Excellent Product by MOCIE

Certificate of Water Treatment Equipment by KEMCO

ISO14001

Energy Winner by CACPK

CE Certification

Excellent Product by PPS

Patent/Utility Model
Patent/Design/Trademark
17 items

QA Certificate

WIPO award

Ultrasonic Scale Preventer

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With dynamic energy of ultrasound, it is used to PREVENT & REMOVE the fouling/scaling in boiler, chillers, heat exchanger, condenser, Piping etc

Ultrasound is a high tone sound that safe to human. Frequency is 10 kHz to 25kHz.

Ultrasonic Generator

Ultrasonic Transducer

Ultrasonic Scale Preventer-Principle

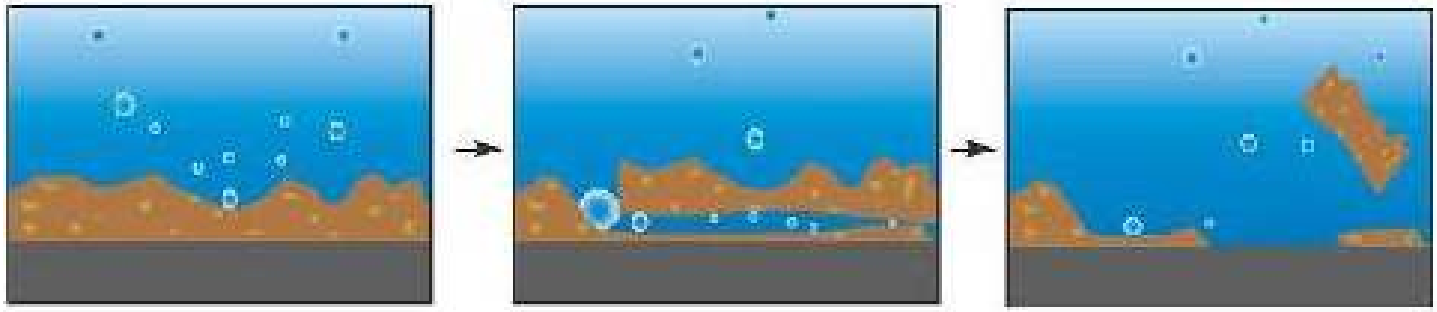
The Ultrasound is generated and applied onto the external shell of boiler or tube sheet of heat exchanger and is transferred throughout the entire tube bundle and fluids. Ultrasonic Waves created 2 effects.

- Cavitations
  The Ultrasonic waves repeatedly induce the formation and collapse of micro-bubbles. The energy generated prevents particles and gases from bonding to the interior metal surface, thereby keeping the heat transfer surface free of any depositions which may impede or reduce the heat transfer efficiency. The energy produced also shatters and breaks down any free floating particles.

- Vibration
  The 2 micros vibration is generated and transferred to the whole facility through metal, preventing newly formed scales stick onto tubes inner or outer diameter and shell side metal parts.

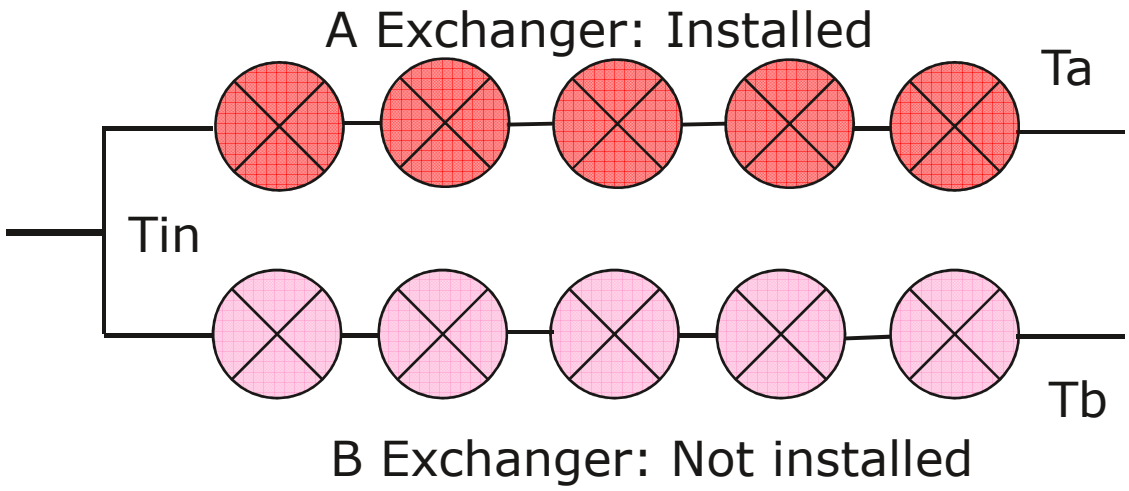
Ultrasonic Scale Preventer-Principle

- The micro-bubbles also infiltrate into the fine cracks on any existing scales deposition, causing them to break up and disintegrate through the cavitations effect of the ultrasonic wave energy. Eventually, the scales are removed from the metal heat transfer surface and disintegrated.



Reference & Results – GS-Caltex

- Site : #1 CDU, Crude Pre-Heat Exchanger



In operation for 12 months:-
- Observation the inlet temp.
- Observation outlet temp, Ta in 1st train , Tb in 2nd train.

Reference & Results – GS-Caltex
Crude Pre-Heat Exchangers

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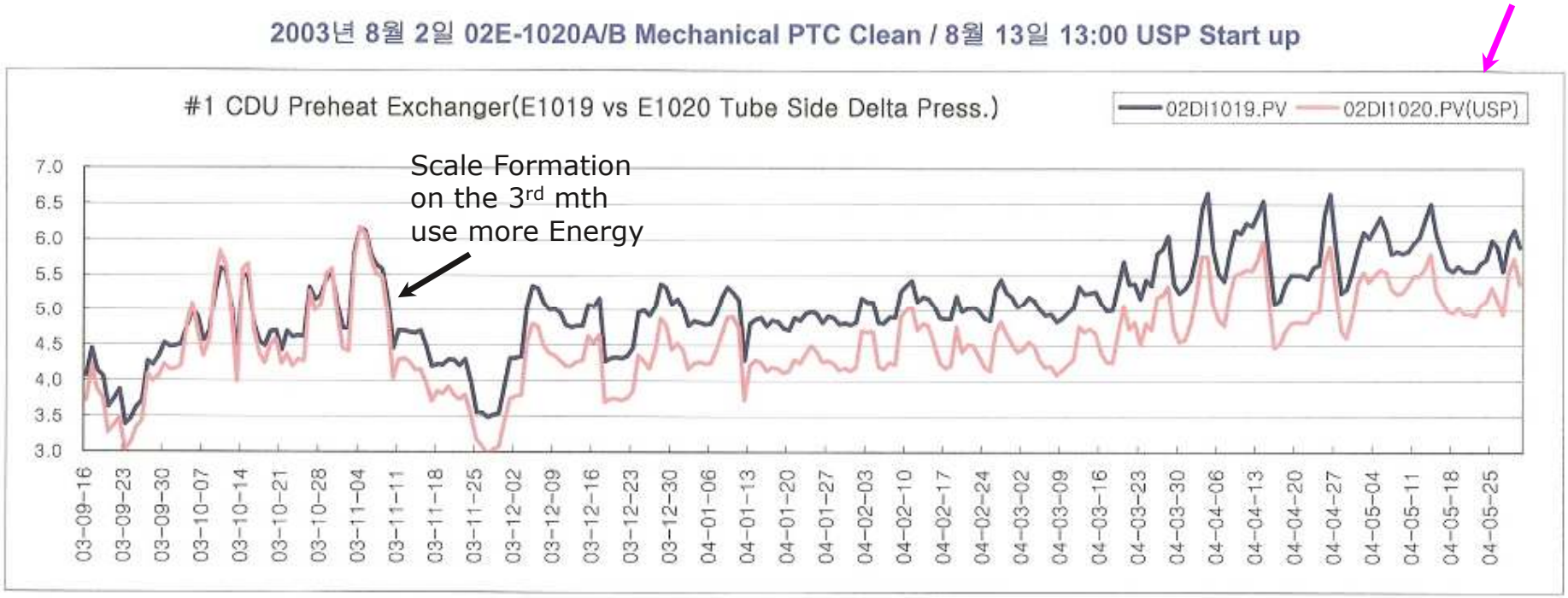
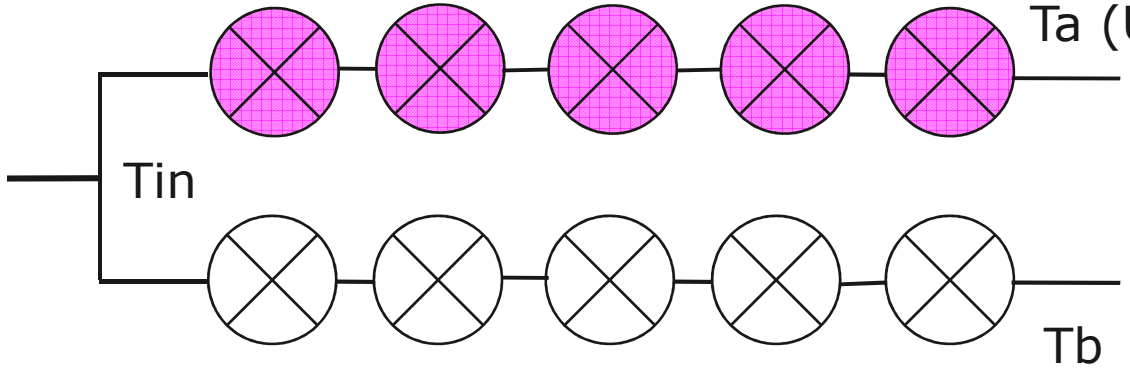
Ultrasonic Scale Preventer = USP





Conclusion

- Additional 8°C heat picking up effect
- Heat Exchanger with USP uses Less Energy = Savings
- Means Caltex saving of 800K USD/yr
- GS-Caltex installed USP to all other CDU heat exchangers

Reference & Results – GS-Caltex

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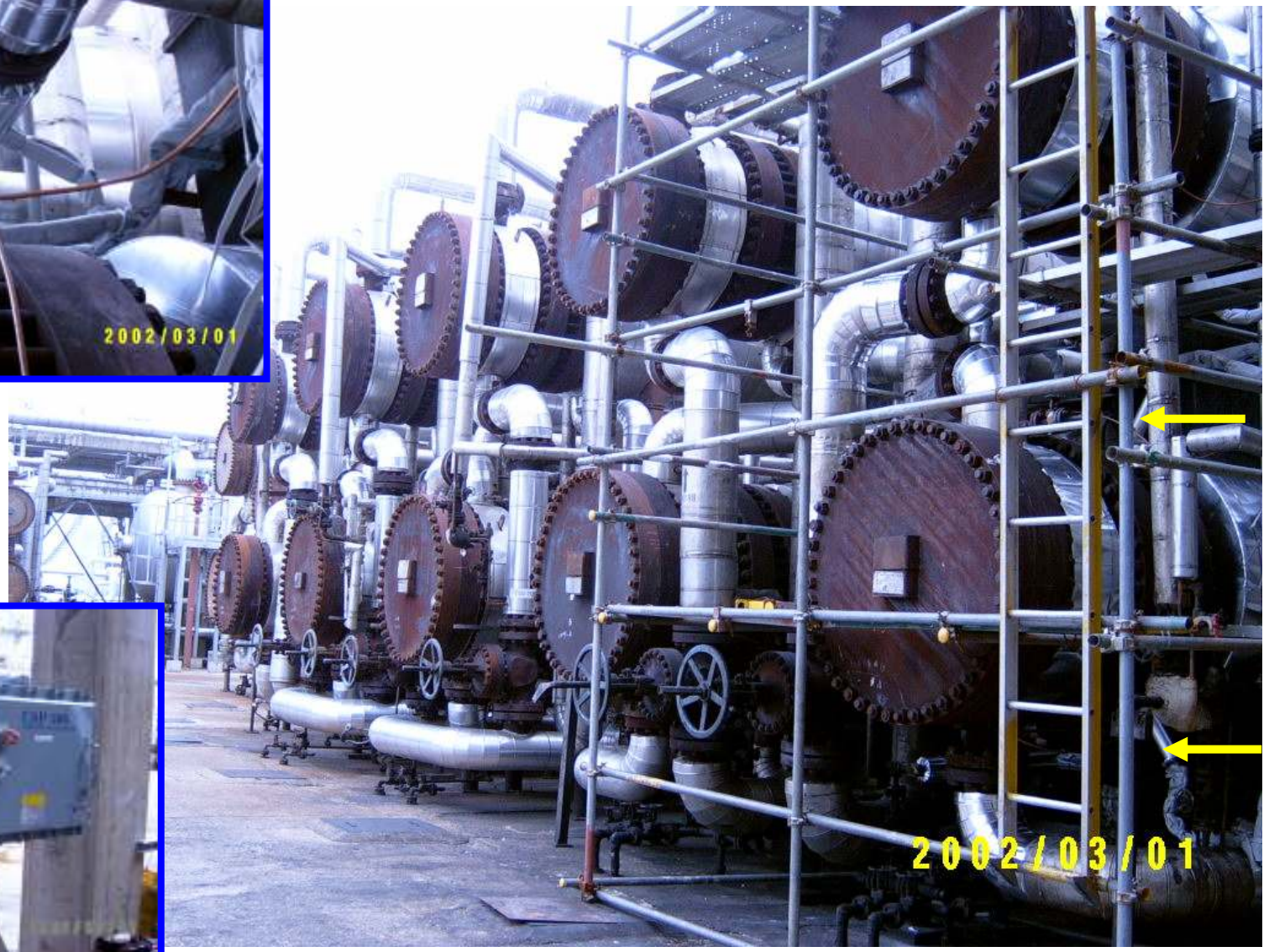

Reference & Results – S-Oil

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Generators

Energy saving: 220KUSD/yr per train
Installed Total 50 sets at Crude AR
Exchangers in #1,#2,#3 CDU in 2007

Reference & Results – S-Oil

Reference & Results – SK Energy

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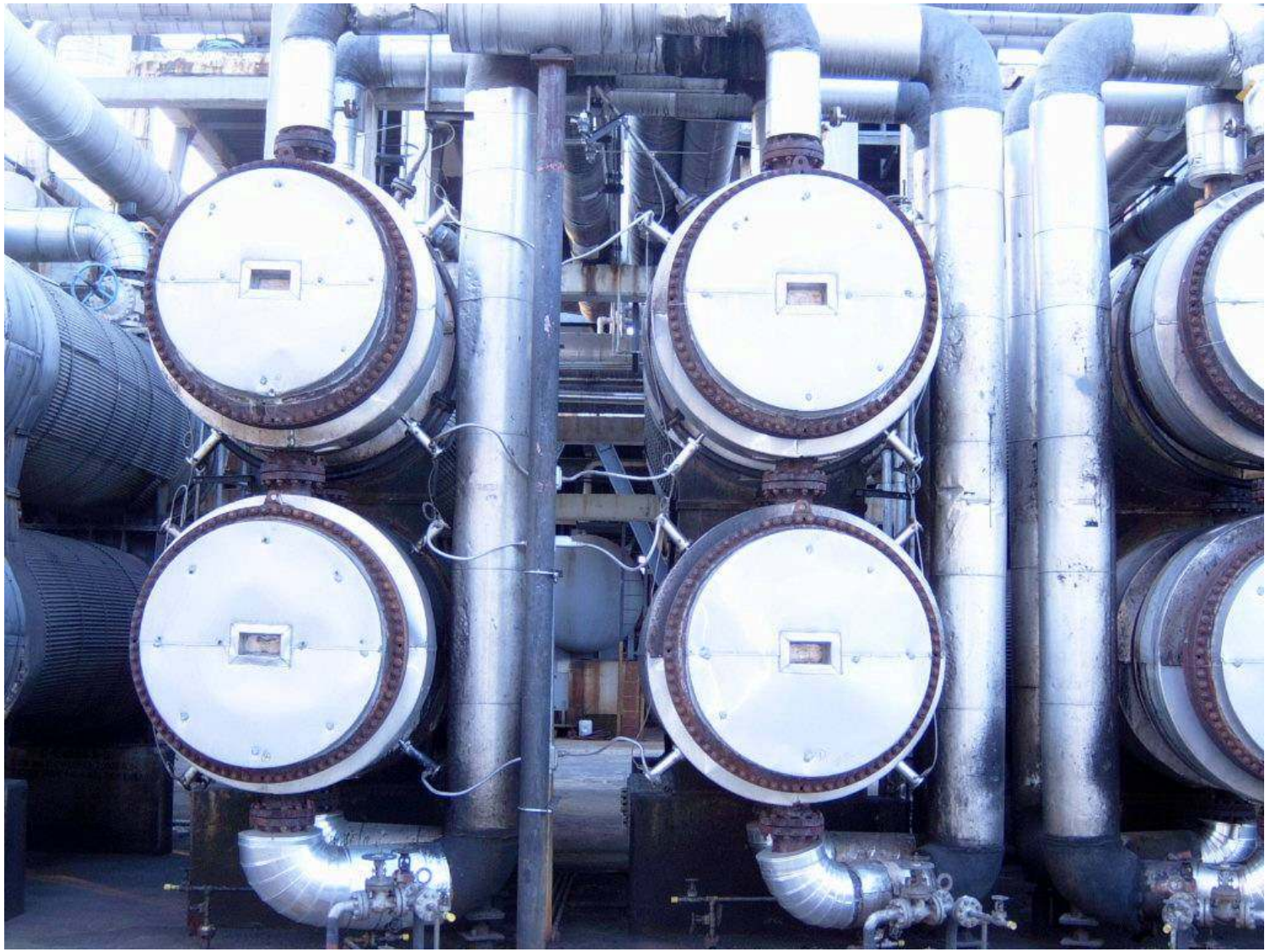

Power Plant Heat Exchangers – 12 months operation and review

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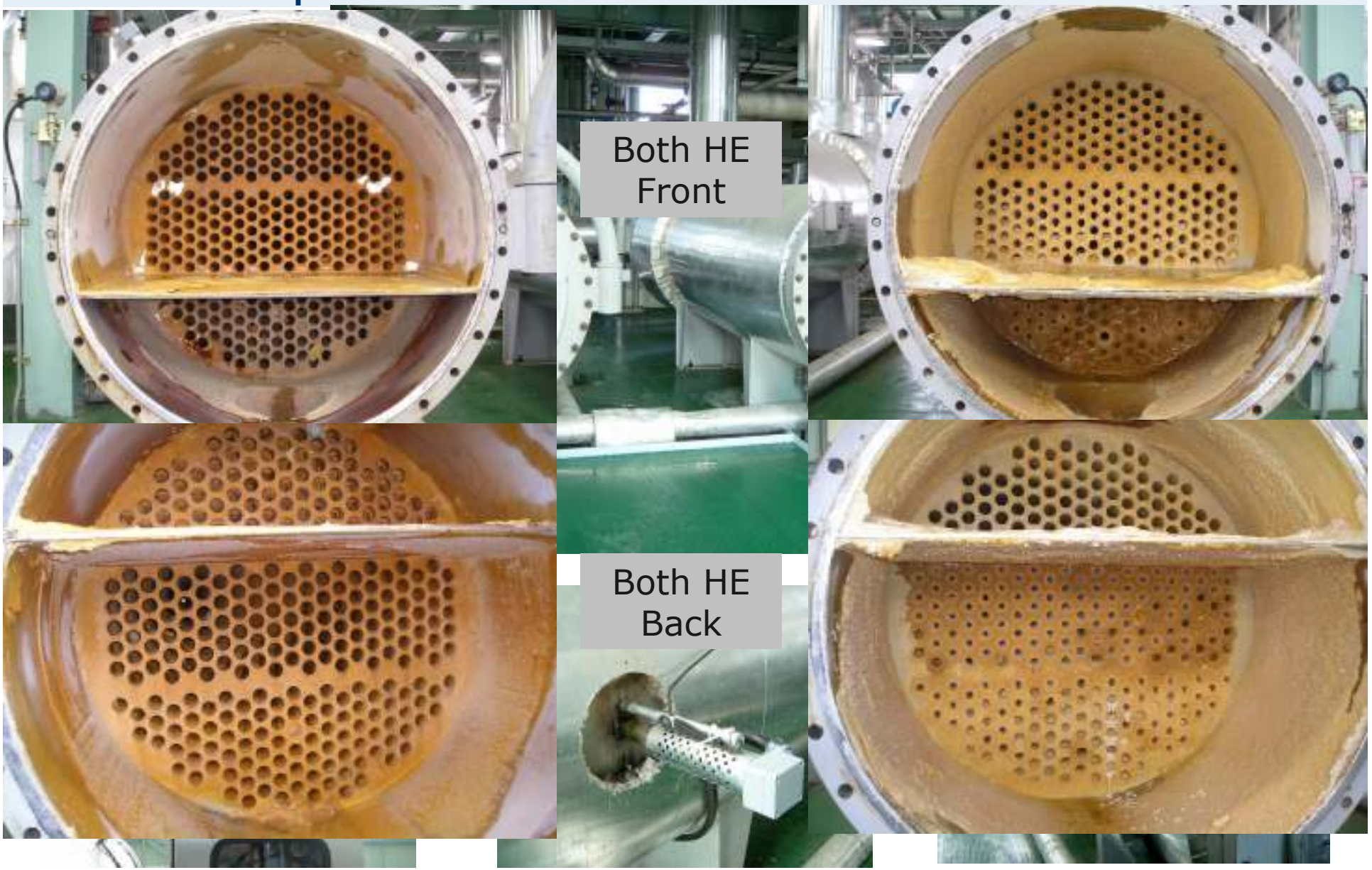
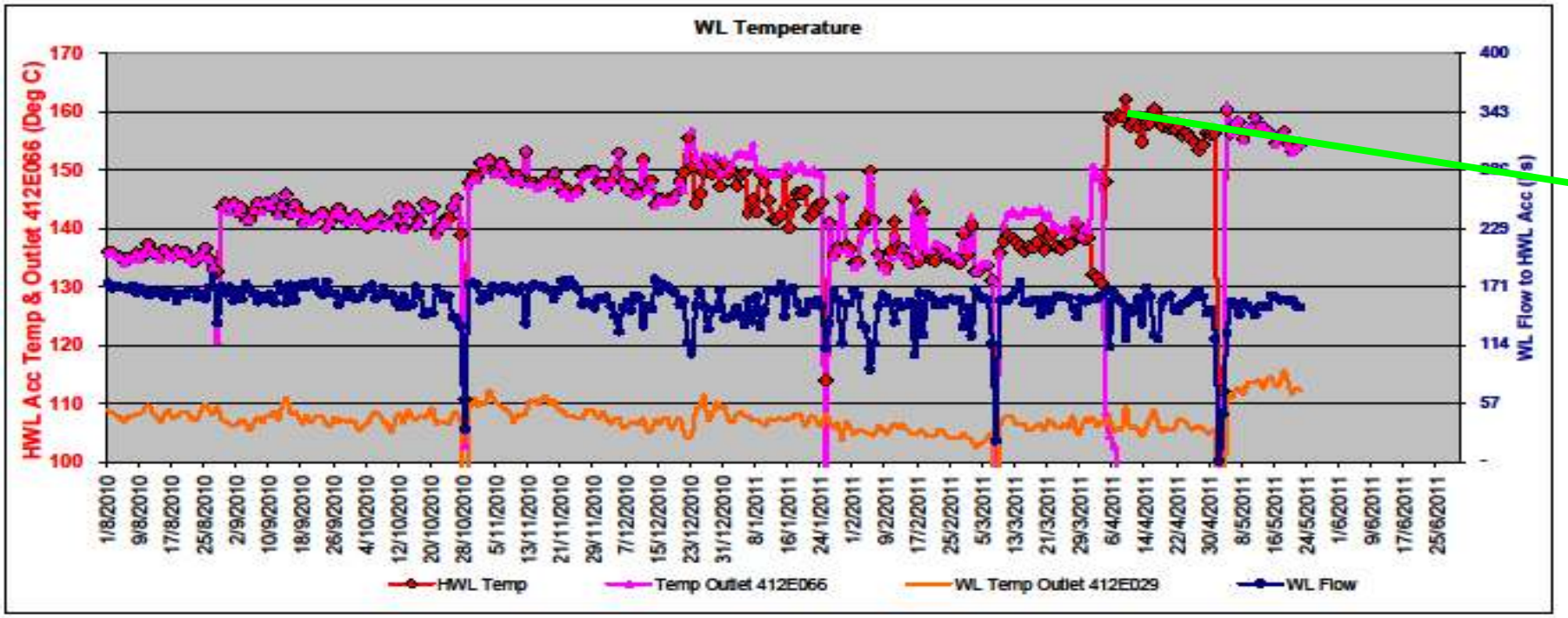


Pulp & Paper Industry

2 Months Result



Benefit achieved in 5 months

1. HWL temp average 156deg C
   Margin 10.58 deg C
2. Steam consumption Average
   Reduce 3.23 ton / cook
   Means fuel consumption to generate steam decrease 3.
3. Heating time reduce 6.5 minutes
4. Energy Saving Cost US$ 150,000 (exclude Stutdown, Chemical Cleaning Cost)

Piping and other Applications

Hopper

Before

After (USP)

Fish Deterrent

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Patent List of MORKO

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Type	Name	Registration No
Registration of Patent	A method for anti-access of fishes and shellfishes to the around of cooling water inflow area in power plant using ultrasonic waves	0378729
	A device for the protection of the crops and facilities from wild animals and birds using supersonic waves	0414556
	Dyeing method for polyethyleneterephthalate fabric sand apparatus there for	0500523
	A apparatus of surface-modifying for waste-rubber using ultrasonic cyclic horn type	10-2003-0020325
	Ultrasonic device for prevention and removal of scale in hazard area	10-2005-0052523
Application of Patent in Japan	A device for the protection of the crops and facilities from wild animals and birds using supersonic waves	2001-314934

Conclusion

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Proven Scale Prevention System Benefits…..

- **Significant Energy Savings**
- **Production efficiency**
- **Excellent Heat Transfer Efficiency**
- **Minimized Down Time**
- **Reduced Labor & Maintenance Costs**
- **Reduced Cost of Consumables eg. Anti-Fouling Chemicals**
- **Increased Life of Equipment (Safety & Reliability)**
- **Regulatory & Environmental Compliance**

Saving Energy, Time, Money and Ultimately The Earth!

Thank You

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