Carbon neutrality, Environment protection

100% Eco-friendly solution

Electrolytic Scale Removal & Automatic Discharge System for circulating cooling water

循環冷卻水電解除水垢及自動收集系統

SRD

eco-friendly Scale Power Cleaner

節約能源&實現碳中和 +

Saving Energy & Actualizing Carbon Neutrality

Planting effect + Securing CER 設置效果+確保碳排放額

境保護零 +

Environment protection

Zero chemical wastewater + Saving water

零化學廢水 + 省水

GALAXY®

GALAXY TECHNOLOGY DEVELOPMENT COMPANY

空調系統冷卻水塔及
冰水機水垢清除設備SRD 介紹

SRD安裝實績

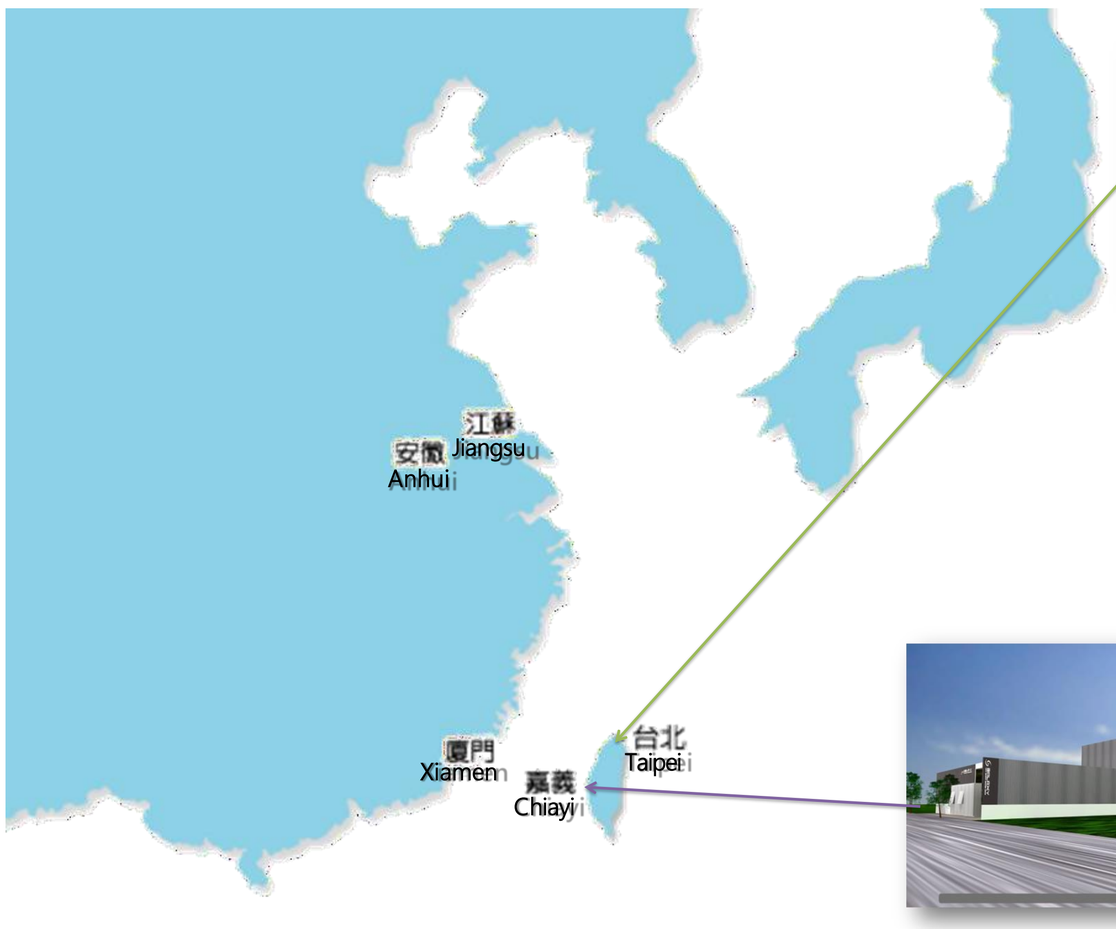
公司介紹 Company Profile

凱勒斯科技有限公司（ Galaxy Technology Development Company）成立於2011年，是由一群努力實 踐自我的快樂工作者所組成，專注於綠能科技產業鏈的發展與整合，現以供應切割、研磨及拋光等相 關製程的材料與加工設備，廣泛地應用於半導體、發光二極體（LED）、太陽能（Solar）及各類精密 陶瓷、寶石等產業的加工。同時積極尋求國內外各先進夥伴合作開發新產品、新技術及新應用，透過 系統化的技術整合，共同開創新綠能科技及製程技術，成為具有競爭性及未來性的業界領航者。
客戶服務範圍及技術合作廠商遍佈台灣、大陸、美國、德國、瑞士、俄羅斯、日本、韓國等地區。
不斷的創新、研究與發展、新技術、新應用、新產品是我們面對市場競爭及作好客戶服務的經營策略。

Galaxy Technology Development Company (凱勒斯科技有限公司) was established in 2011 by a group of dedicated and passionate workers. We specialize in the development and integration of the green energy technology industry. Currently, we supply materials and processing equipment for various processes such as cutting, grinding, and polishing, which are widely used in industries including semiconductors, Light Emitting Diodes (LEDs), solar energy, and precision ceramics and gemstones. We actively seek partnerships with advanced domestic and international collaborators to develop new products, technologies, and applications. Through systematic technological integration, we strive to create innovative green energy technology and manufacturing processes, positioning ourselves as a competitive and forward-thinking leader in the industry.
Our customer service scope and technical cooperation partners span across Taiwan, China, the United States, Germany, Switzerland, Russia, Japan, South Korea, and other regions.
Continuous innovation, research and development, new technologies, applications, and products are our operational strategies to address market competition and provide excellent customer service.

凱勒斯分布 Galaxy Branches

凱勒斯分布 Galaxy Branches

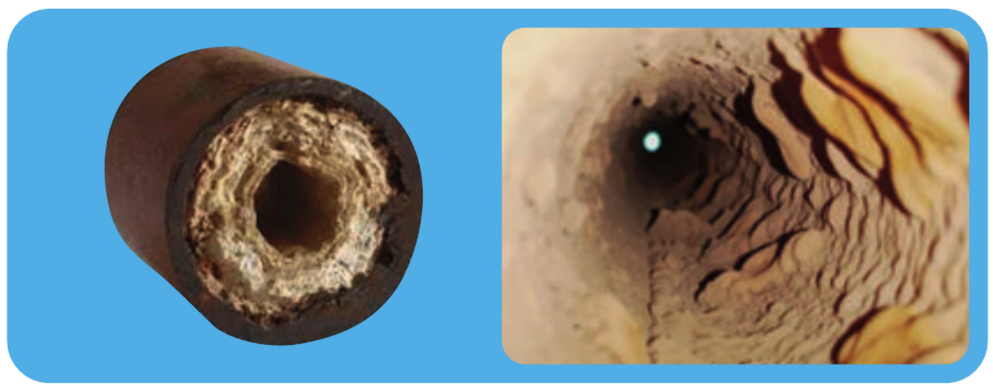


台北總部 Taipei Headquarters

嘉義正一廠 Chiayi Factory

水垢形狀 Shape of scale

冷卻管內的水垢 Scale in cooling pipe



SRD 捕獲的水垢 Scale captured in eSPC

為什麼需要去除水垢? Why is it necessary to remove scale?

水垢的問題 Problem by scale	SRD的解決方法 SRD Solution
通過減少管道內部空間來降低液體輸送性 lowering liquids transportability by reducing inner space of pipe	通過移除冷卻系統的水垢來增加運送效率 increasing transportability by moving scale in cooling system
熱交換器中的水垢降低了傳熱效率 reducing heat transfer efficiency by the scale in the heat exchanger	提高熱交換效率 increasing heat exchange efficiency
水質惡化導致閥門和設備故障 causing breakdown on valves & equipment by deteriorating water quality	排除故障因素 removing breakdown factors
水垢導致增加公耗 increasing power consumption by scale	減少功耗 reducing power consumption
增加維護成本 increasing maintenance costs	將維護成本最小化 minimizing maintenance costs
因清潔化學品的濃度而頻繁排放冷卻水 frequent blow-down of the cooling water by the concentration of cleaning chemicals	無須排空補水且無化學廢水 no need of blow-down and no chemical wastewater
各種粘液和細菌降低設備效率 lowering equipment efficiency by various slimes & bacteria	提高運營效率 increasing operating efficiency

電解分析除垢原理 The principle of scale removal by electrolytic analysis

陰極 － 還原反應 Cathode - Reduction reaction

› 鈣離子和碳酸氫根離子從哪裡來?
Where did calcium and bicarbonate ion come from?

· $CaCO_3 + CO_2 + H_2O \rightarrow Ca^{2+} + 2HCO_3^{2-}$

› 為什麼會出現水垢？
Why does scale occur?

· $2HCO_3^{2-} + \text{Heat} \rightarrow CO_2 + CO_3^{2-} + H_2O$

· $Ca^{2+} + CO_3^{2-} \rightarrow CaCO_3$

› 陰極表面（還原反應）-水垢提取
Cathode surface (Reduction reaction) - scale extraction

· $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$

在強鹼環境中碳酸氫根離子轉變為碳酸根離子
In a strong alkali environment ,Bircarbonate ion changes to Carbonate ion

· $HCO_{3-} + OH^- \rightarrow CO_3^{2-} + H_2O$

通過鈣離子和碳酸根離子的反應沉澱碳酸鈣
precepting calcium carbonate by the reaction of the calcium ion and carbonate ion

· $Ca^{2+} + CO_3^{2-} \rightarrow CaCO_3 \downarrow$

高pH條件促進氫氧化鎂沉澱
High pH condition promotes precipitation of the magnesium hydroxide

· $Mg^{2+} + 2OH^- \rightarrow Mg(OH)_2 \downarrow$

陽極-氧化反應 Anode - Oxidation reaction

陽極表面（氧化反應）預期有額外的殺菌效果
› Anode surface (Oxidation reaction) Expecting additional sterilizing effect

· $2Cl^- \rightarrow Cl_2 + 2e^-$

· $Cl_2 + H_2O \rightarrow HOCl\ (\text{hypochlorous acid}) + H^+ + Cl^-$

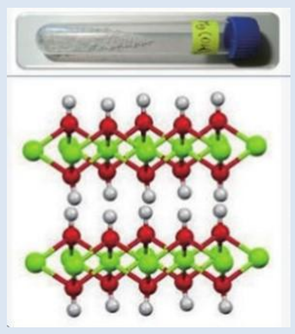
因此，陽極上產生具有殺菌能力的 HOCI 和 OH 自由基，可期待額外的微生物抑制效果
Consequently, expectable a microbial suppression effect additionally by the generation of HOCI and OH radical having sterilization ability on the anode

注）量表主要內容 note) major contents of the scale

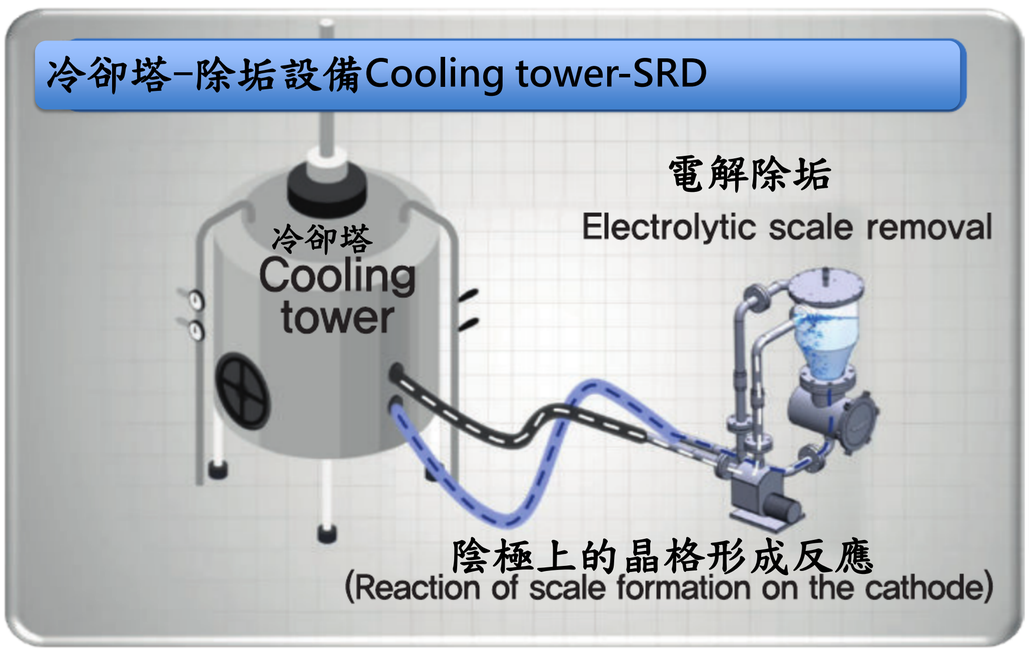
碳酸鈣 Calcium carbonate $CaCO_3$

它是碳酸根離子和鈣離子化合生成的白色物質，難溶於水，在水溶液中產生沉澱
It is a white substance produced by combining carbonate ions and calcium ions It is insoluble well in water and precipitates in an aqueous solution

氫氧化鎂
Magnesium hydroxide $Mg(OH)_2$



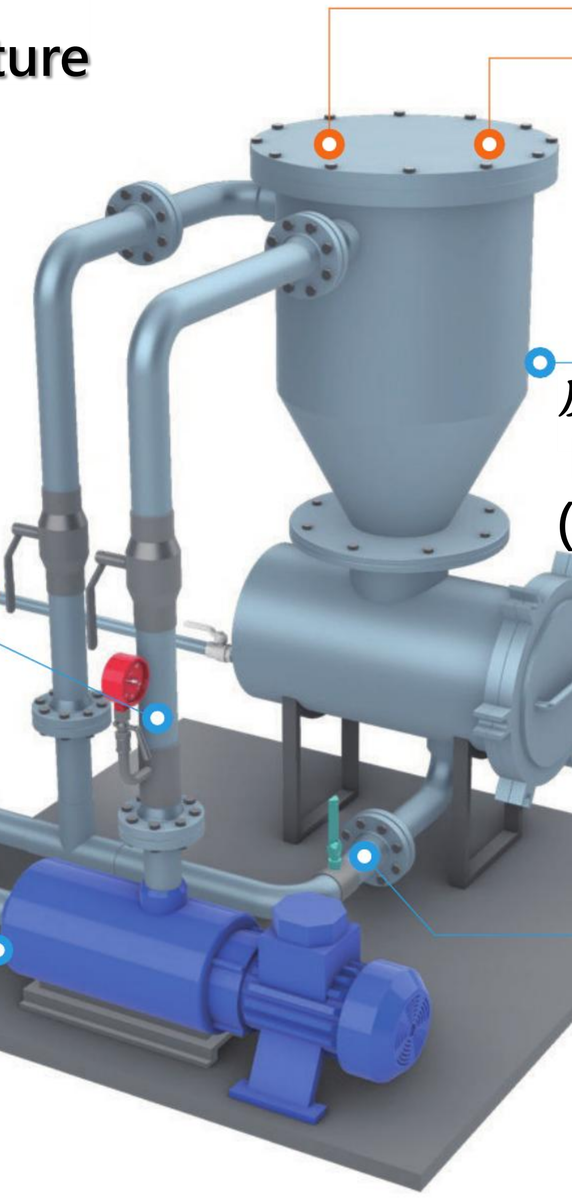
它是一種弱鹼性離子結合物質，通過鹼金屬氫氧化物與鎂鹽的作用而產生
It is a weak base ion-binding substance, by the action of an alkali hydroxide on magnesium salts



通過從冷卻水中排出Ca2+（鈣）、Mg2+（鎂）、Si02（二氧化矽）來去除和防止冷卻系統和管道中的水垢形成

Removing and preventing of scale formation in the cooling system and pipes by discharging Ca2+ (Calcium) Mg2+ (Magnesium), SiO2 (Silicon dioxide) out of the cooling water

設備結構 Equipment structure



水垢擷取
Discharging scale

壓力傳感器
Pressure censor

冷卻水出口
Cooling water Outlet

冷卻水入口
Cooling water Inlet

幫浦
Pump

反應器（電極）
Reactor
(Electrode)

過濾器
Strainer

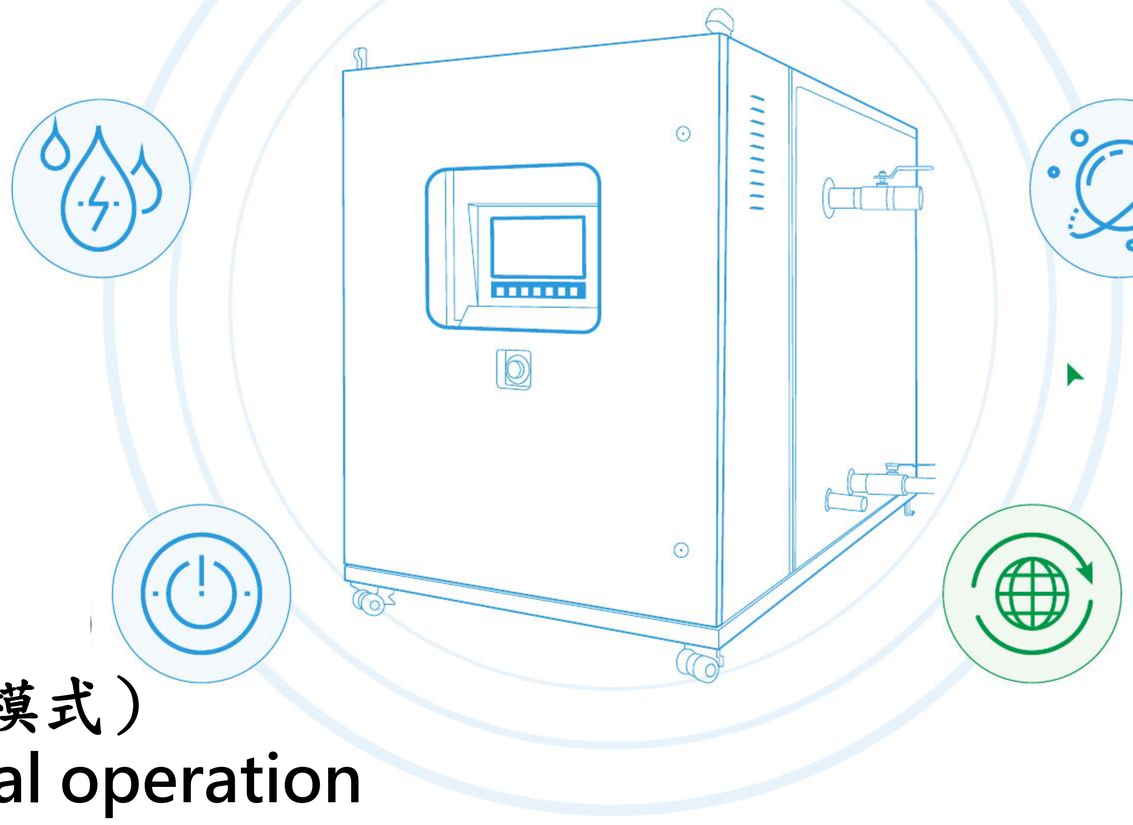
溫度傳感器
Temperature censor

控制面板 Control Panel

主要功能 Major function

10.2吋 觸控液晶螢幕
Touch LCD (10.2inch LCD)

自動電流控制
Automatic electric current control



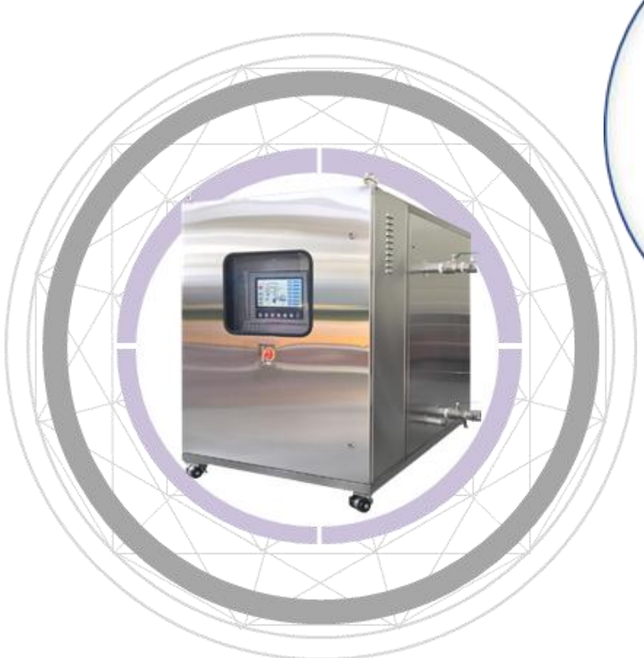
自動除垢
Automatic scale discharging

自動電極清洗
Automatic electrode cleaning

自動和手動操作（雙模式）
Automatic & manual operation (dual mode)

遠程通訊與控制（PC&手機）
Remote communication and control (PC & Mobile Phone)

應用領域 Application fields



壓製機
Extruder

熱交換器
Heat Exchanger

水冷壓縮機
Water-cooled Compressor

冷凍機
Refrigeration Machine

冷卻塔
Cooling Tower

擠壓產線
Extrusion Line

冷水機
Chiller

引進SRD效果 Introduction effect of the SRD

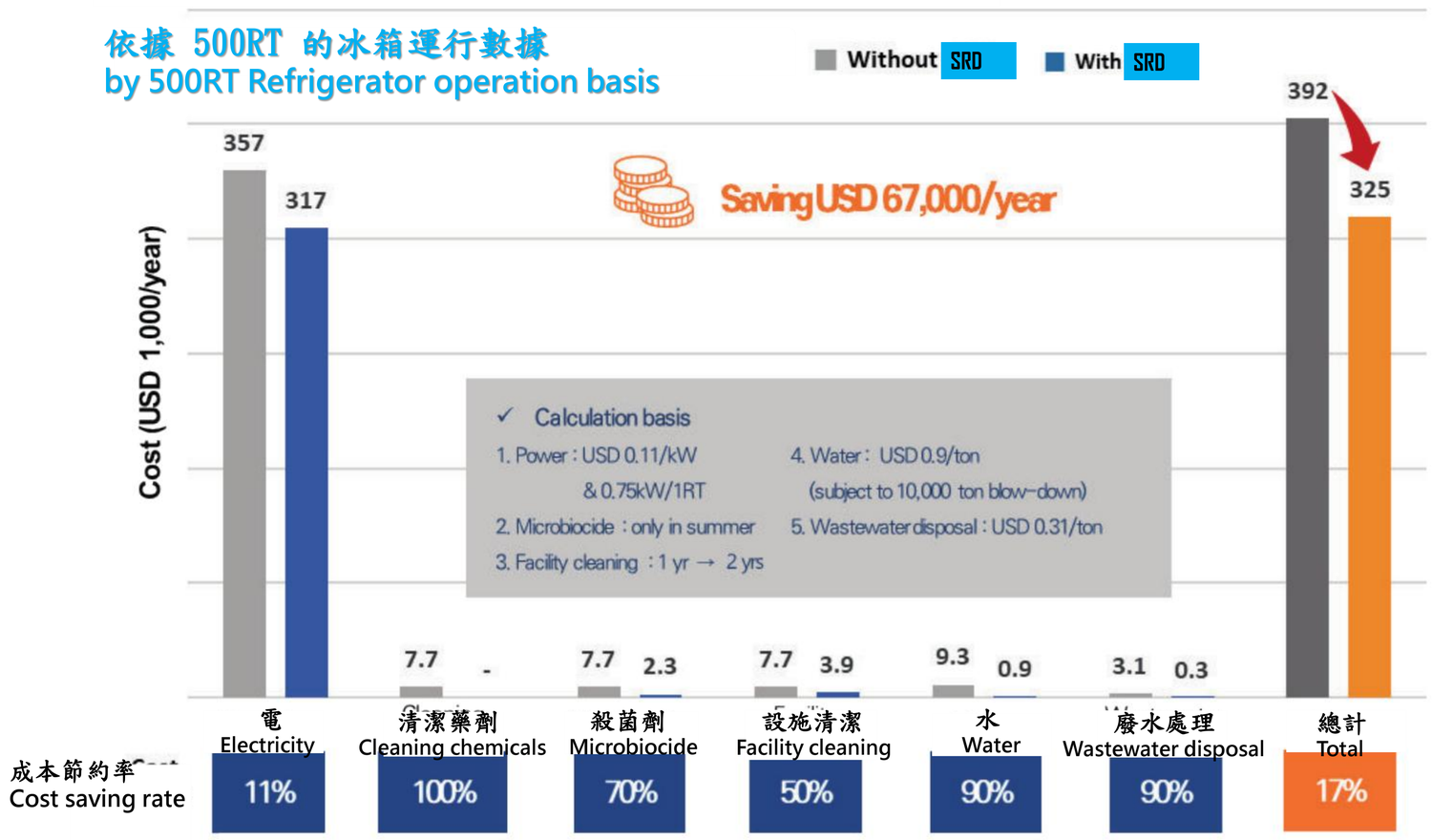
欄位 Fields	使用前Before	使用後After	備註 Remark
能量損失 Energy loss	○	△	通過降低電力成本和間接碳排放，為ESG管理做出貢獻 Contributing to ESG management by reducing power cost and indirect carbon emission
冷卻設施清潔 Cooling facility cleaning	○	△	節省冷卻設施清潔成本並延長清潔間隔時間 Saving cooling facility cleaning costs and extending cleaning interval
冷卻水排空補水 Cooling water blowdown	○	X	節省水費並保護水資源 Saving water costs and preserving water recourses
冷卻水的處置 Disposal of cooling water	○	X	節省廢水處理成本，保護環境 Saving waste water disposal costs and preserving environment
殺菌劑 Microbiocide	○	X	與之前的消耗量相比，減少70~80%的數量 Reducing 70~80% quantity by comparing the previous consumption
冷卻設施化學清潔劑 Chemicals for cleaning cooling facility	○	△	無需使用化學品，無需處理即可排出 Unnecessary to use chemicals, possible to drain without treatment
縮短設備壽命 Shortening lifespan of equipment	○	X	使用化學品和系統中循環的漂浮顆粒縮短設備的使用壽命 Shortening the lifespan of equipment by using chemicals and the floating particles circulating in the system
生產損失 Production loss	○	X	無需停止生產線來清潔冷卻設施 No need to stop the production line in order to clean the cooling facility

凱勒斯科技有限公司 GALAXY®

降低成本和溫室氣體的效果 Effect of reducing costs and green house gas

模擬降低維護成本 Simulation of reducing maintenance costs

依據 500RT 的冰箱運行數據
by 500RT Refrigerator operation basis



24小時365天運行，假設厚度為03㎜（需要多11%的能量 Carrier 手冊）
24h 365d operation,assuming a scale of 03mm thickness (11% more energy required, Carrier handbook)

確保減碳額度(CER)
Securing Carbon Emission Right (CER)
171 Co_2 eq. Ton/year

Domestic price	EU price
USD4,600/yr	USD15,500/yr

提高效能 Increasing power efficiency

通過去除和防止水垢提高能源效率，可以節省電力成本
Power cost(electricity cost) can be saved by increasing energy efficiency through removing and preventing scale

熱交換部分沉積0.5毫米厚的水垢時的能量損失率
Energy loss rate when deposited 0.5mm thickness of scale in the heat exchanging part

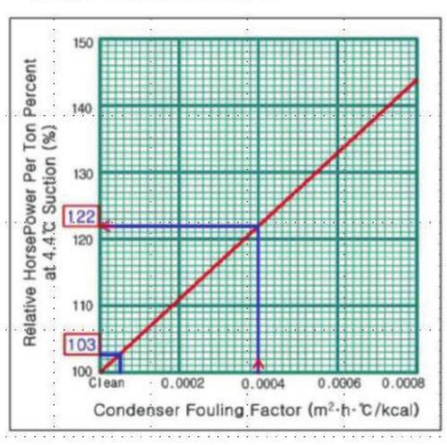
Carrier, USA

壓縮機功率：增加18%以上
Power for Compressor :more than 18% up

✓ Increase rate of power consumption in the compressor by pollution degree (scale thickness)

power (%)	Fouling factor (m^2*h*℃/kcal)	Scale Thickness (mm)	Power (%)	Fouling factor (m^2*h*℃/kcal)	Scale Thickness (mm)
0.0	0.00000	0.000	22.0	0.00040	0.610
3.0	0.00005	0.076	24.2	0.00045	0.671
5.5	**0.00010**	**0.152**	27.5	0.00050	0.782
8.8	0.00015	0.244	29.7	0.00055	0.823
11.0	0.00020	0.305	33.0	0.00060	0.914
13.2	0.00025	0.366	35.2	0.00065	0.975
16.5	0.00030	0.457	39.6	0.00070	1.097
18.7	0.00035	0.518	42.9	0.00075	1.189

✓ Variation of power consumption in compressor by the pollution in the condenser tube

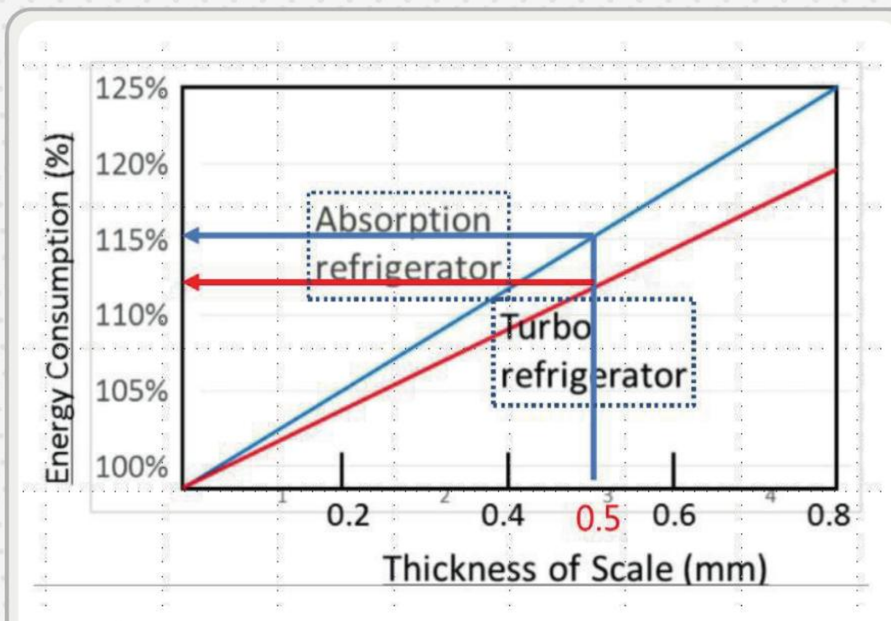


Source) Carrier : refrigerator handbook

Beatrix, Japan

吸收式冰箱額外耗電量增加16%以上
Additional power consumption for absorption refrigerator more than 16% up

渦輪式冷凝器額耗電量增加13%以上
Additional power consumption for turbo refrigerator more than 13% up



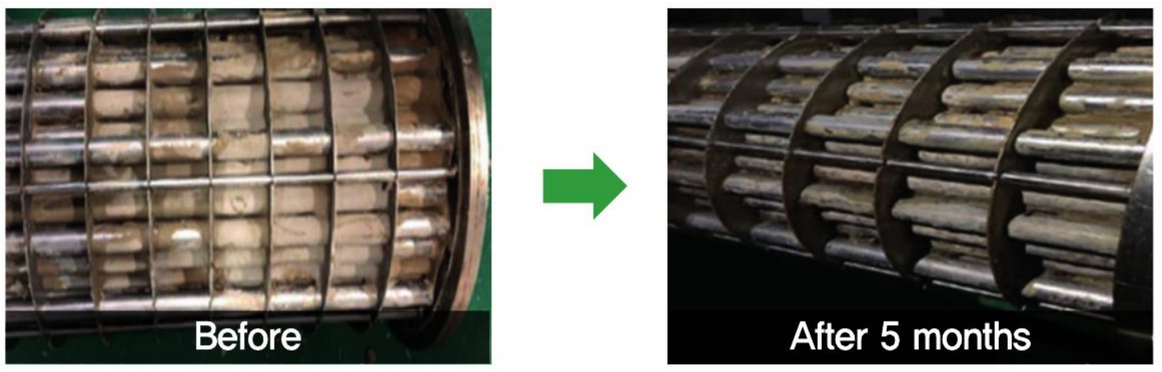
Source) Beatrix : scale removal & prevention equipment company

規格 Specification

型號 Model	SRD-300A	SRD-500A	SRD-1000A
目標設施 Target Facility	Cooling tower 100~300RT	Cooling tower 400~600RT	Cooling tower 700~1200RT
處理能力 Treating capacity	7m^3/hr	10m^3/hr	20m^3/hr
吸力/壓力高度 Suction/Pressure height	8M/13M (MAX)	8M/13M (MAX)	8M/19M (MAX)
輸入功率 Input power	Single phase AC220V / 60Hz	Single phase AC220V / 60Hz	Single phase AC220V / 60Hz
消耗功率 Power consumption	1.8~2.7kW (MAX)	1.8~2.7kW (MAX)	2.8~3.6kW (MAX)
電極壽命 Lifespan of electrode	3years(5A, 24hr/365d)	3years(5A, 24hr/365d)	3years(5A, 24hr/365d)
管徑 Pipe Diameter	Water inlet – 40A, Water outlet – 40A Drainage – 40A	Water inlet – 40A, Water outlet – 40A Drainage – 40A	Water inlet – 50A, Water outlet – 50A Drainage – 40A
尺寸 Dimension	W:960 / L:1150 / H:1250	W:940 / L:1500 / H:1250	W:940 / L:1640 / H:1440
重量 Weight	310kg	380kg	440kg

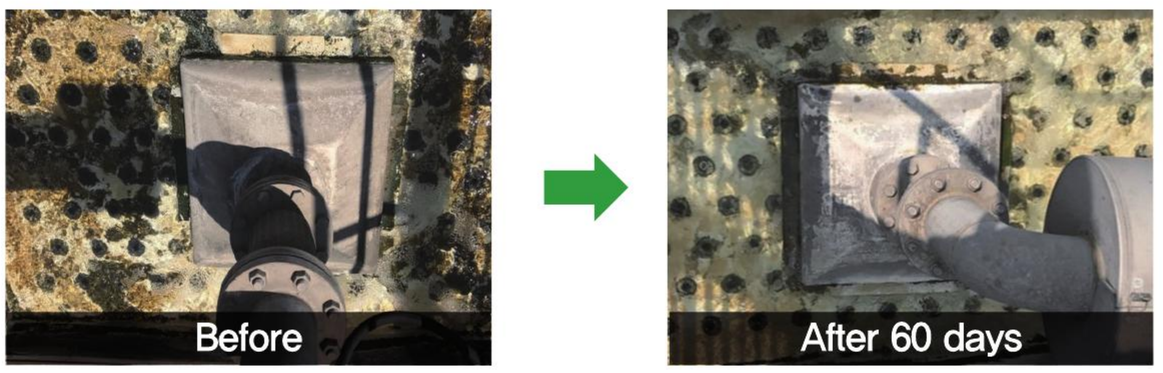
SRD運行後熱交換器(內冷卻器)的水垢狀態
Scale status of the heat exchanger (inter cooler) after SRD operation

顯示在未進行設備清潔的情況下清除表面水垢和附著物的狀態
shown the status of being removed scale and slime on the surface without equipment cleaning



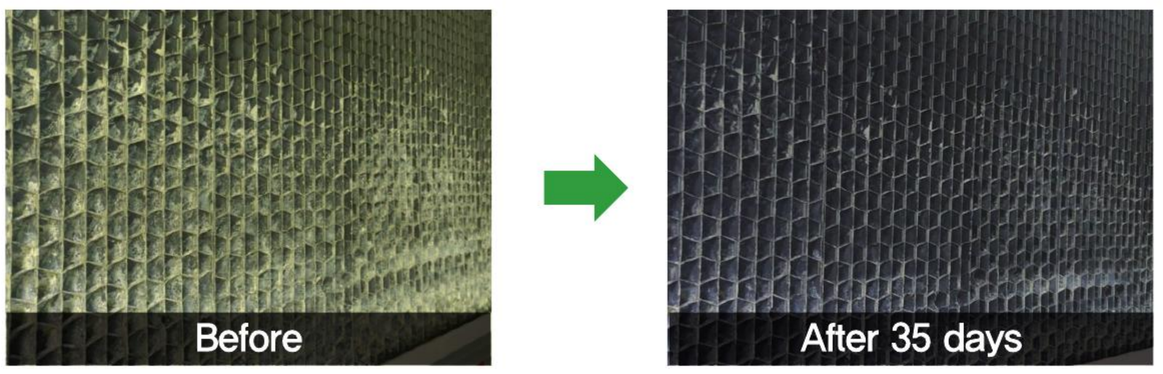
SRD運行後冷卻塔上層水垢狀態
Scale status of the upper tank in the cooling tower after SRD operation

顯示去除表面水垢和附著物的狀態
shown the status of being removed scale and slime on the surface



SRD運行後冷卻塔鰭片的水垢狀態
Scale status of the filler in the cooling tower after eSPC operation

顯示去除表面水垢和粘附著物狀態
shown the status of being removed scale and slime on the surface



銷售實績 Installed Site

凱勒斯科技有限公司

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