



## 高科技產業污染防治技術

采利環工股份有限公司

Resource and Energy Systems, Inc.  
Research Group Environmental Services, Inc.



# 廢水處理與工業用水回收再利用技術

## INDUSTRIAL WATER TREATMENT AND RECYCLING



台灣地區水資源的分配不均及季節性欠缺愈來愈嚴重，而且工業用水單價日升，加上廢水處理及排放所需費用也日益增加。使得資源回收及水資源回收再利用，於各種工業都愈來愈顯得重要。

為提供工業界可靠且高效率的工業用水回收技術，采利環工股份有限公司特與美國 Manchester 公司簽署技術合作協議，提供先進的工業用水回收再利用科技。

### 值得回收再利用嗎？

考慮工業用水回收再利用的兩項主要考慮因素，包括排放水之水質及回收再利用所需之水質。在許多工業用途上，RESI 的技術都顯現極有效率的回收成果；通常安裝設備後約 10 至 18 個月即可回收成本。

### 回收再利用的作法

要有效率的建立工業用水回收再利用系統，通常應採行三項步驟：首先應進行現場查勘，分析水流及其品質、工廠配置情況，以判斷是否可進行工業用水之回收。其次應進行可能節約的費用及建設費用評估，判定財務可行性。最後應進行模型廠試驗，收集數據，作為規劃設計之依據。

### 為何應選擇 RESI？

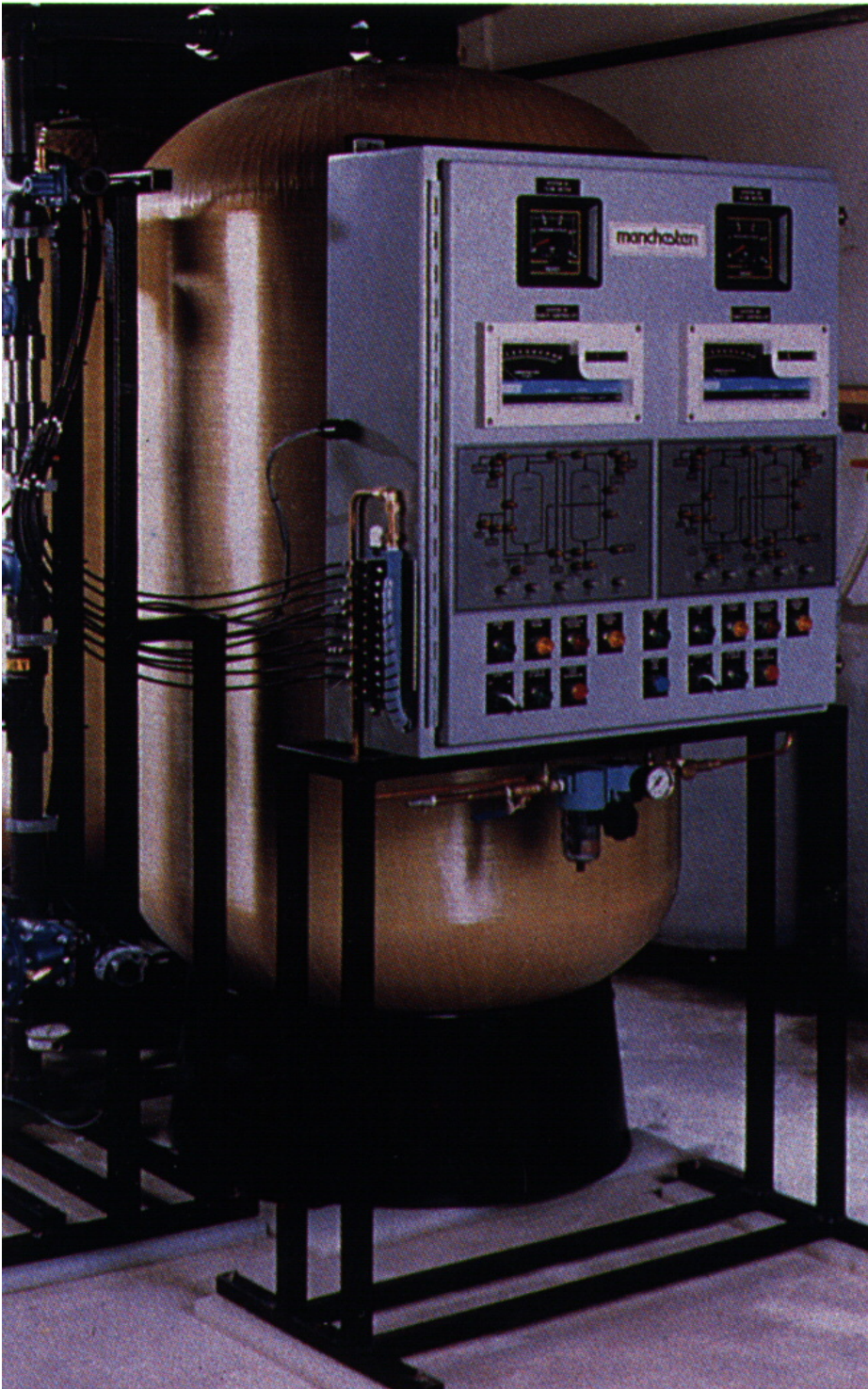
RESI 擁有豐富的資源、經驗與技術，可提供有效率的廢水處理及工業用水回收再利用工程服務。自 1975 年至今，RESI 的合作夥伴 Manchester 公司已在美國建立各種創新的方案，提供各種不同客戶以最適化的工程系統。

Manchester 於美國北卡州三菱公司美國電子廠所建立的工業用水回收再利用系統，於 1993 年榮獲美國環保署之水資源回收首獎，技術深獲肯定。選擇 RESI，必能獲得最可信賴的高品質工程服務。

### 工業用水回收再利用技術

工業用水回收再利用技術是一種整合性的科技。大部分情況下，均需要使用多種傳統或新穎技術的巧妙整合，例如薄膜分離技術、過濾、活性炭吸附、紫外線/臭氧處理或離子交換等科技。RESI 具有整合各種不同技術，為特定需求建立整合性程序之經驗與能力，利用 RESI 的研發能力，我們可以提供現場評估、測試、規劃設計、許可申請、工程製造安裝、試車、人員訓練至維護保養的全套服務。





### 系統特性

- 可行性及處理方案評估
- 模組化設計、操作維護簡易
- 先進的自動化控制系統

### 工業應用

- 化學及石化工業
- 印刷電路板工業
- 汽車工業
- 食品加工及製藥工業
- 紙漿及造紙工業
- 航太工業
- 塗裝及電鍍工業
- 電子及半導體工業
- 其他

Resources conservation, and water recycling in particular, is becoming more and more critical in a wide range of industries. Both the costs of fresh water as well as the cost of disposal and discharge to waste water treatment systems are rising sharply in Taiwan.

RESEARCH GROUP Environmental Services, Inc. (RESI) has established a technology cooperation with Manchester Corporation to provide our client a total engineering solution for industrial water recycling.

### WHO SHOULD RECYCLE?

Due to the shortage of water resources in Taiwan, everyone should consider water recycling. The two main criteria when investigating water recycling are the quality of water being discharged and the quality of water required for reuse. Many applications

result in substantial water cost recovery. The system provided by Manchester/ RESI has a typical payback of ten to eighteen months.

### STEPS TOWARD WATER RECYCLING

Three steps are required when optimizing the installation of a water recycling system. They are the site survey, pilot testing and final design and installation. First, a site evaluation shall be performed. An analysis of the water stream and plant layout shall be reviewed to ascertain whether water recycling is viable. Potential savings and process costs shall be evaluated. A pilot test shall be run at the facility for some cases. The data collected will confirm equipment selected, operating parameters and operating costs.

### WHY RESI?

RESI and Manchester have the resources, experience and expertise to provide cost-effective solutions for waste water treatment and recycling. Since 1975, Manchester has been offering innovative solutions through an engineered approach. Manchester/RESI design solutions to specific needs and provide wastewater treatment and water recycling services to a variety of industries. A system completed by Manchester at Mitsubishi American facility in Durham, NC, which won the 1993 US EPA region IV Water Recycling Award The results for this engineered system are shown on the chart.

### WATER RECYCLING TECHNOLOGY

Water recycling is an integrated engineering solution. In most cases, best results are obtained by a judicious combination of several technologies, which may include conventional as well as advanced systems such as membrane separation, filtration, carbon adsorption, UV/ozone treatment and ion exchange. RESI/Manchester engineer systems to meet specific needs, and take responsibility from the site survey, through testing, design, permitting, manufacturing, installation, start-up and training, and equipment services.

### SYSTEM FEATURES

- Advanced electronic controls allow for remote monitoring and trouble-shooting
- Laboratory supported feasibility and treatability studies
- Modularized design, turnkey installations, easy maintenance and easy operation

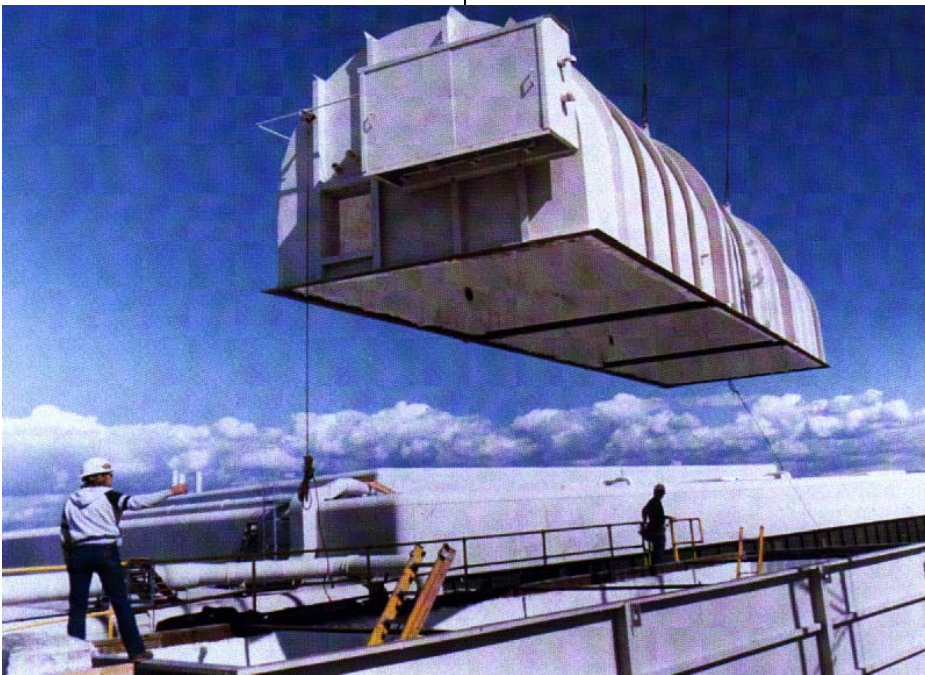
### INDUSTRIAL APPLICATIONS

- Aerospace and Automotive Industries
- Chemical and Petrochemical Industries
- Coating and metal processing Industries
- Computer and Semiconductor Manufacturers
- Electroplating and Printed Circuit Industries
- Food and Drug Industries
- Government
- Pulp and Paper
- And More



# 揮發性有機氣體及臭氣處理技術

## CONTROL OF VOLATILE ORGANICS, HALOGENATED ORGANICS, AND ORDORS



### 觸媒氧化熱處理技術(CTO)

RESI 的觸媒氧化熱處理系統可徹底將廢氣中的溶劑蒸氣於低溫條件下利用觸媒進行催化性焚化，並達到99%以上的破壞去除效率。

廢氣首先被送入預熱系統預熱，然後與 250 至 400 °C 的觸媒接觸，利用觸媒的催化作用將揮發性有機溶劑徹底破壞。

採用先進的電腦化控制系統，RESI 的 CTO 系統隨時都可以維持在最佳的操作條件。

處理後的排氣則經冷卻後，視需要作處理，以達環保單位之要求。

CTO 的再生週期則視熱回收效率及利用間歇性的連續採樣監測設備決定之。

采利環工股份有限公司 (RESI) 與美國 MANCHESTER 公司技術合作，提供各種揮發性有機氣體、鹵化有機氣體、毒性氣體及臭氣之全面性解決方案。所提供之技術包括：熱觸媒氧化技術、再生式氧化熱處理技術、及活性碳吸附技術。

### 系統特性

- 世界性的 TURNKEY 服務
- 模組化設計，處理容量：200 - 100,000 scfm
- 完備的實驗室支援，提供可行性分析、最適化設計及處理性能電腦模擬
- 符合環保法規的模組化空氣淨化系統
- 先進的控制系統

### 控制系統

利用可程式型控制器設定吸附及脫附行程，並利用連續監測記錄系統進行流量、排放濃度、溫度、及其他系統參數。此系統並可利用數據機與中央控制系統連線，進行系統遙控、故障排除及記錄分析。

### 工業應用

- 化學及石化工業
- 塑膠及橡膠工業
- 油漆及溶劑工業
- 汽車工業
- 航太工業
- 塗裝及電鍍工業
- 農產及食品加工業
- 電子及電腦工業
- 製藥及醫學工業
- 其他

### 活性碳再生技術(CA)

RESI 的活性碳吸附系統可徹底將廢氣中的溶劑蒸氣吸附。

廢氣利用排風機送入活性碳吸附塔，將有機溶劑吸附去除。

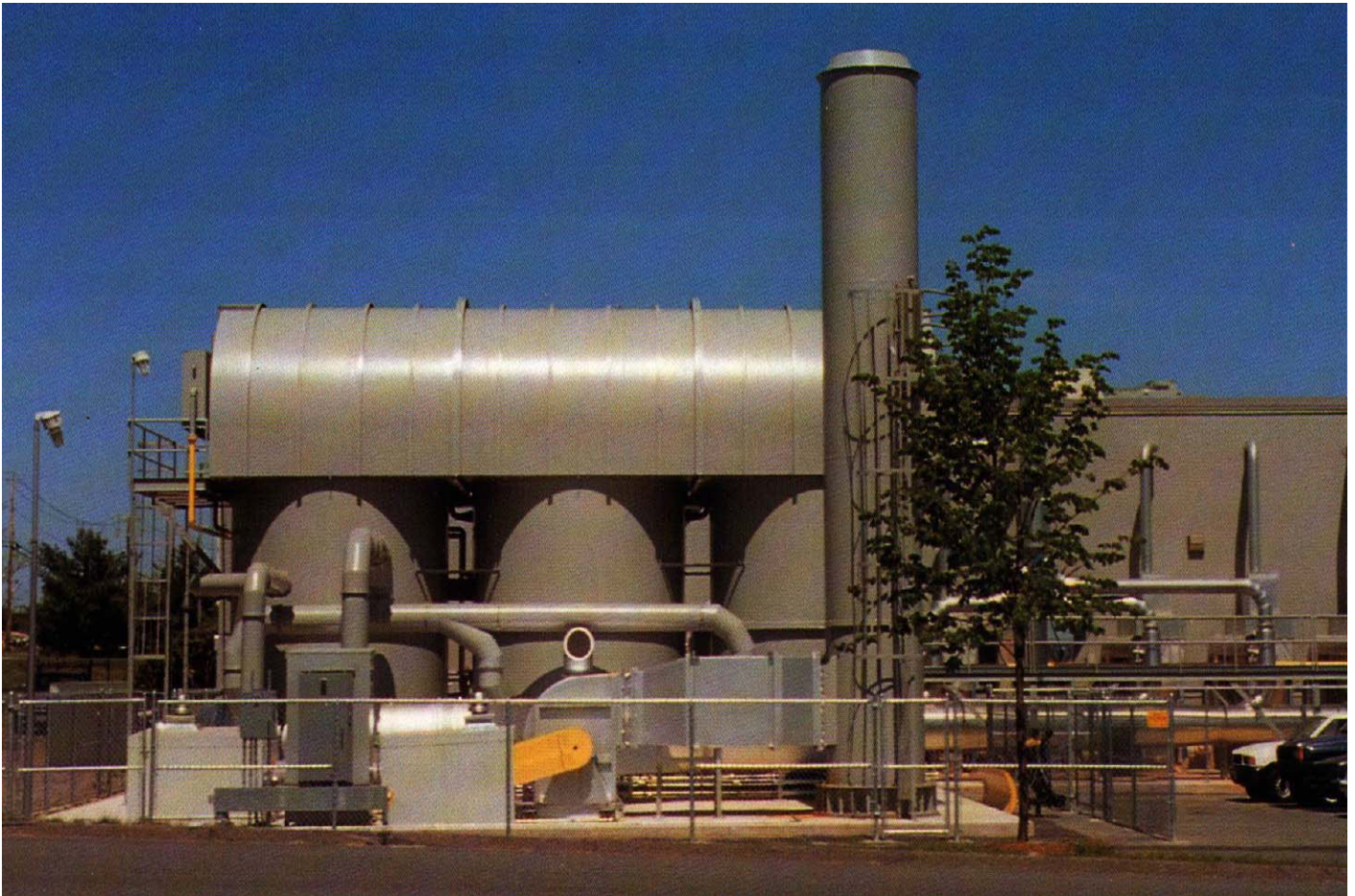
系統利用蒸汽週期性地將活性碳再生，所產生溶劑蒸氣再利用冷凝器冷凝，並進行溶劑及水之分離。

活性碳床再利用空氣冷卻及乾燥，以供繼續吸附使用。

再生週期則利用間歇性的連續採樣監測設備決定之。







## 再生式氧化熱處理技術(RTO)

RESI 的再生式氧化熱處理系統可徹底將廢氣中的溶劑蒸氣焚化，並達到99%以上的破壞去除效率。

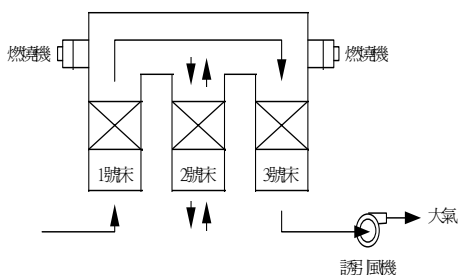
廢氣首先被送入預熱系統預熱，然後與高溫火焰接觸，並維持在750 °C以上高溫，將揮發性有機溶劑徹底破壞。

利用多個陶瓷填充蓄熱床的特殊設計，RESI 的 RTO 系統隨時都可以維持在最佳的操作條件。

處理後的排氣則經冷卻後，視需要作處理，以達環保單位之要求。

RTO 的再生週期則視熱回收效率及利用間歇性的連續採樣監測設備決定之。

三床式再生系統設計省能源、操作維護簡單



**RESEARCH GROUP Environmental Services, Inc. (RESI)** provides a total engineering solution and a full spectrum of technologies for the removal and control of volatile organics, halogenated organics, air toxics and odors. The technologies provided by RESI and his cooperation partner, Manchester Corporation, include Thermal-Catalytic Oxidation, Regenerative Thermal Oxidation, and Active Carbon Adsorption.

## CARBON ADSORPTION SYSTEMS

RESI's Carbon Adsorption Systems collect airborne solvent vapor from an exhaust source. A blower fan drives vapors through a bed of activated carbon where emissions are adsorbed. Periodically, steam is passed over the adsorption unit to vaporize the adsorbed solvent, which is fed into a condenser. The water/solvent mixture is separated, the adsorption bed is then cooled and dried with ambient air to prepare the unit for its next adsorption cycle. Cycle times are determined by intermittent continuous sampling

## SYSTEM FEATURES

- Turnkey installation available worldwide
- Single bed or multiple bed units
- Steam regeneration
- Air stripping modules for compliance with EPA regulations
- Advanced electronic control allow for remote monitoring and trouble shooting

## CONTROL SYSTEM

A programmable controller provides automatic setting of adsorption and desorption cycles, as well as on-line monitoring for record keeping and reporting in compliance with regulations. Flow rates, discharge parameters, temperatures, valve status and other key operating information are continuously recorded and available for reporting purposes. The control unit can be connected to a central location via modem, for remote monitoring and trouble-shooting.

## INDUSTRIAL APPLICATIONS

- Aerospace
- Automotive
- Chemicals
- Coating
- Degreasing
- Electronics
- Pharmaceuticals and Medical
- And More

## CHEMICALS REMOVED

- Acetone
- Alcohols
- Benzene
- Chloro-solvents
- Freon
- Hexane
- Phenol
- Toluene
- Vinyl Chloride
- Xylene
- And many others



## CATALYTIC THERMAL OXIDATION

RESI's Catalytic Thermal Oxidation (CTO) Systems will incinerate airborne waste solvents to over 99% efficiency. The gases are drawn through a preheater, flow through a catalyst bed which is held at an elevated temperature about 250 to 400 °C to complete the destruction. With our catalytic thermal oxidation design, minimum energy will be used. The gas stream is then cooled and post-processed to meet EPA regulation and permit requirements.

### SYSTEM FEATURES

- Turnkey installations: 200 - 100,000 scfm
- Laboratory supported feasibility and treatability studies
- Modularized design, easy maintenance and easy operation
- Chlorinated systems complete with quench tower, scrubbers and water treatment systems
- Advanced electronic controls allow for remote monitoring and trouble-shooting

## REGENERATIVE THERMAL OXIDATION

RESI's Regenerative Thermal Oxidation (RTO) Systems will incinerate airborne waste solvents to over 99% efficiency. The gases are drawn through a preheater, exposed to a flame, then held in a combustion chamber at 750 °C or higher to complete the destruction. With our thermal regeneration design, up to 98% of the energy can be recovered. With a multiple bed configuration, our system provides optimal thermal conditions at all times. The gas stream is then cooled and post-processed to meet EPA regulation and permit requirements.

### SYSTEM FEATURES

- Turnkey installations: 200 - 100,000 scfm
- Laboratory supported feasibility and treatability studies
- Modularized design, easy maintenance and easy operation
- Chlorinated systems complete with quench tower, scrubbers and water treatment systems
- Advanced electronic controls allow for remote monitoring and trouble-shooting

## CONTROL SYSTEM

A programmable controller provides automatic setting of combustion and regeneration cycles, as well as on-line monitoring for record keeping and reporting in compliance with regulations. Flow rates, discharge parameters, temperatures, valve status and other key operating information are continuously recorded and available for reporting purposes. The control unit can be connected to a central location via modem, for remote monitoring and trouble-shooting.

### INDUSTRIAL APPLICATIONS

- Aerospace
- Agriculture and food
- Automotive
- Chemical and Petrochemical
- Coating and metal processing
- Electronics
- Pharmaceutical and Medical
- And More

### CHEMICALS REMOVED

- Acetone
- Alcohols
- Benzene
- Chloro-solvents
- Freon
- Hexane
- Phenol
- Toluene
- Vinyl Chloride
- Xylene
- And many others





# 化學廢棄物收集系統

## RESI ChemWaste System

### 全自動安全可靠的化學廢棄物處理系統

RESI 是台灣最有經驗的廢溶劑資源再生工廠設計建造專家。RESI 為了協助電子工業解決廢棄化學品及廢溶劑處理問題，特別精心設計一套全自動化的模組化廢棄化學品暫存、泵送、貯存及處理系統 **ChemWaste System**。

**ChemWaste** 系統提供電子工業 Process Tools 一個安全、有效且經濟的廢棄物清理方案。此系統是由 MPS(模組化泵送系統)、連接管線、貯存槽及全自動圖控電腦控制系統所組成。

MPS 通常安裝於 Process Tools 下方，作為廢溶劑之暫存設施，以便將廢溶劑泵送至集中貯存區，降低廠區廢溶劑處理之風險。

**ChemWaste** 系統適用於各種製程廢化學品之處理，且可因應各廠特性作元件之選用。所有元組件均設計成符合 NFPA 及 FM 防爆級要求。安全是工業的基本要求，RESI 與客戶一樣關切。

**ChemWaste** 系統已經使用於台灣積體電路製造股份有限公司、昇利化工股份有限公司、嘉義縣大林鎮廢棄物焚化廠等廢溶劑應用場所，並證實性能優異。



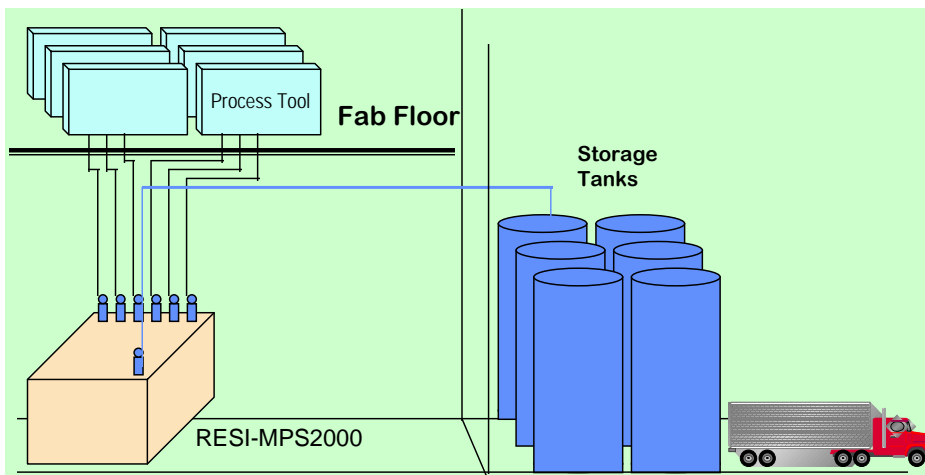
### Safe, Reliable, and Fully Automatic Waste Handling System

**RESI ChemWaste** System is a modularized chemical waste holding, transportation, storage and handling system. **ChemWaste** System provides safe, efficient, effective and economical waste removal from process tools. The system consists of Mini-Pump Stations (MPS), inter-connecting pipes, storage tanks and computer control system. The MPS are typically located beneath process tools and act as intermediate holding and pumping stations to move chemical waste over long distances to a centralized waste solvent storage tank farm.

**ChemWaste** Systems are designed to meet a variety of process chemical waste removal needs and plant constraints. All components have been designed to compliant with NFPA codes and Factory Mutual (FM) explosion-proof approval. Safety and reliability are of our top priority concern.

### System Components

- Mini-Pump Station (MPS2000, MPS2100)
- Inter-connecting Piping & Fittings
- Storage Tanks
- Computer Control System
- Safety Interlock and VOC Monitors



**ChemWaste** System is a proven technology. It has provided continuous services in Taiwan Semiconductor Manufacturing Co. Ltd. (tsmc), Shenly Chemical Industries Co. Ltd. and Da-Lin Incineration plant successfully.

### MPS - Efficient and Effective Mini-Pump station

- Strainer Module - Removing process debris
- Pump Module - Air driven diaphragm pump
- Air Drive Module - Air supply/control system
- VOC Monitor - Spill and leakage detection
- Nitrogen Blanketing System
- Capacity 2, 3, 5, 10, 20, 50 gallons

### System Specifications:

- Constructed of chemically resistant material
- All stainless steel structure and Teflon packing
- Displays chemical storage and removal graphically
- Automatic spill and leakage detection
- Design codes: ASME, ANSI, CNS, FM, NFPA, UFC, JIS, CFR, OSHA
- Overfill alarm and interlock
- Audible and visual alarms
- Central computer control
- On-line event reporting
- Windows compatible man-machine interface

### System Performance Reliability

Minimum time between failure 7,000 hrs



# 采利環工股份有限公司

**The RESI Family:**

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