

# Total Waste Water Management Approach

Luther Wong

**Secretary General**  
Hong Kong Printed Circuit Association

**Managing Director**  
C&G Environmental Technology Ltd.

Apr.23, 2007



## Content

- Failures in Waste Water Treatment System
- Total Waste Water Management Approach



## Failures in Waste Water Treatment System

- Lack of Chemical Knowledge as Waste Water Treatment are Mostly Chemical Reactions
- Poor and Wrong Waste Segregation
- Undersize and Oversize Design
- Inadequate Buffer Capacity for Peak Discharge Period
- Insufficient Design on handling Non-compliance Waste Water
- Inadequate Management Attention

**Waste Water Treatment System is a Highly Complicated System,comprise of Chemistry, Chemical Engineering, Mechanical Engineering, Electrical Engineering, Industrial Automation, Civil Construction,Material Science and Management.**



## Total Waste Water Management Approach

- Waste Water Quantitative & Qualitative Analysis
- Employ Green Processes
- Maximize Consumable Recovery and Recycling
- Minimize Water Consumption
- Optimize Water Recycling
- Waste Treatment Systems and Treatment Flow
- Waste Water Segregation
- Regulate Waste Water Inflow to Treatment System
- Safety Factors Consideration
- Guarantee Discharge Compliance Devices
- Reasonable Capital and Operating Cost



## Waste Water Quantitative & Qualitative Analysis

- This is the Most Vital Step to Ensure an Effective System Design
- Both Quantity and Types of Pollutants Need to be Studied, include Wastes and Rinsing Water from Production, Floor Cleaning, Cooling tower, DI/RO System, Air Scrubber & .....



## Employ Green Processes

- To work with Specialty Chemical supplier to eliminate High Pollution Processes

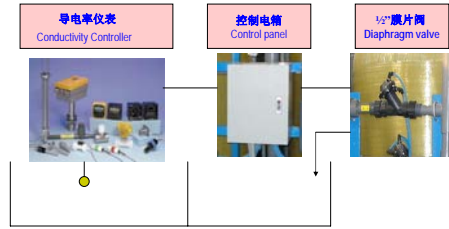


## Maximize Consumable Recovery and Recycling

- Available Technologies Include
  - EDTA Recovery and Recycling
  - Alkaline Etchant Recovery and Recycling
  - Tin Stripper Recovery and Recycling (Limited to 2-4 PCB Application)
  - Micro Etch and Acidic Etchant Recovery
  - Precious Metals: Gold, Palladium and Silver Recovery
  - Acid Copper/Nickel Electrolytes Purification

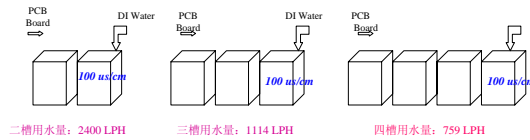
## Minimize Water Consumption

- Install in Process Water Saving Devices



## Minimize Water Consumption

- Scientific Calculation and Determination for Minimum Rinsing Water Quantity and Rinsing Time



Assume: Dragout volume-100cc/m<sup>2</sup>,  
Conductivity of Plating Bath:10000 us/cm,  
Conductivity of Final Rinse Tank:100 us/cm

## Optimize Water Recycling

- 30% Water can be Recycled at Reasonable Capital and Operating Cost for Normal PCB WWTP
- Available Technologies Include:
  - Micron Filtration, Ultra Filtration, Nano Filtration, RO, Ion Exchange, Organic Removal
- Aware of Cross-Contamination Issue Due to Wrong System Design

## Waste treatment system and treatment flow

- Only Those Wastes/Rinsing Waters cannot be Recovered and Recycled should Enter into the Defined Treatment Systems or Out-Source to Sub-Contractors for Treatment
- Typical 5000m<sup>3</sup>/day PCB Waste Water Treatment Systems are

	Waste Treatment System	Quantity M3/day	PH	Cu Metal Concentration	COD (mg/l)
1	General Metal Rinse	3000	3-5	20-50mg/l	70-80
2	General Organic Rinse	1000	8-10	10-25mg/l	250-350
3	Complex Metal Rinse	300	8-9	20-40mg/l	300-350
4	High Organic Rinse	500	10-12	<15mg/l	15,000-26,000
5	NH <sub>3</sub> / Cyanide Rinse	100	8-9	<20mg/l	200-500
6	Nickel Rinse Water	100	5-6	<50mg/l	150-250

## Typical Treatment Flow Format

- General Metal Rinse :3000m<sup>3</sup>/day or 150m<sup>3</sup>/hr
- Treatment: Continue Treatment
- Segregation defined : The wastewater shall have COD less than 80ppm COD and Non-complex Metal .

处理容量	反应时间	流程	添加化学药品	添加量	DMS-pH 设定	COD ppm	Cu ppm	备注
600立方米	360分钟	T-1, In						
		储存池						
		泵						
		T-1, 反应池				3-13		
		泵						
	30分钟	T-1, 2	金属反应池	硫酸氢化钠	pH: 5-6			
		溢流		硫酸亚铁	0.1-0.2g/L			
				凝聚剂CCP	0.003-0.006g/L			

### Typical Treatment Flow Format

- General Organic Rinse : 1000m3/day or 50m3/hr
- Treatment: Continuous
- Segregation defined : The wastewater shall have general organic composition, the COD within 350mg/l, Non-complex Metal and lower copper content.

槽池容量	反应时间	流程	添加化学药品	添加量	DMS- pH设定	COD ppm	Cu ppm	备注
	360分钟	T-4.3 储存池 泵 T-2.1a 反应池						



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### Typical Treatment Flow Format

- Complex Metal Rinse : 300m3/day or 15m3/hr
- Treatment: Continuous
- Segregation defined : The wastewater with Complex Metal and Floor Cleaning

槽池容量	反应时间	流程	添加化学药品	添加量	DMS- pH设定	COD ppm	Cu ppm	备注
	360分钟	T-3.1 储存池 泵 T-3.2 反应池	硫酸 络络剂 MP-30 硫酸 硫酸亚铁 双氧水 氢氧化钠 亚硫酸钠 DE 絮凝剂 FF-8 PAM(0.5%) 活性炭	pH : 8-9 0.03-0.05g/L pH : 3-3.5 0.05-0.1g/L 0.1-0.3mL/L pH : 8-9 0.05-0.07g/L 0.0025-0.0075g/L 0.0075-0.0225mL/L				



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### Typical Treatment Flow Format

- High Organic Rinse : 500m3/day or 25m3/hr
- Treatment: Continuous
- Segregation defined : Dry-Film, Developer and Soldermask etc.

槽池容量	反应时间	流程	添加化学药品	添加量	DMS- pH设定	COD ppm	Cu ppm	备注
	360分钟	T-4.1 储存池 泵 T-4.2 酸化池 涂液 污泥泵T-3.3	硝酸 CCP 聚铁 硫酸	pH : 8-9 0.05mL/L pH : 2				

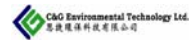


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### Typical Treatment Flow Format

- NH<sub>4</sub>/Cyanide Rinse : 100m3/day or 5m3/hr
- Treatment: Batch
- Segregation defined : The wastewater contained NH<sub>4</sub> and Cyanide.

槽池容量	反应时间	流程	添加化学药品	添加量	pH	CN- ppm	Cu ppm	NH <sub>3</sub> ppm
		T-5.1 储存池 泵 T-5.2 综合反应池 T-3.1 T1.10	氢氧化钠/硫酸 次氯酸钠	pH : 10-11				



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### Typical Treatment Flow Format

- Nickel Rinse : 100m3/day 或 5m3/hr
- Treatment: Batch
- Segregation defined : The wastewater contained Nickel from ENIG.

槽池容量	反应时间	流程	添加化学药品	添加量	pH	CN- ppm	Cu ppm	NH <sub>3</sub> ppm
		T-6.1 储存池 泵 T-6.2 综合反应池						



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### Waste Water Segregation

- Base on the Waste Water Quantitative Analysis and Their Subsequent Defined Waste Treatment Systems, Wastes and Their Rinsing Water are being Collected Under a Well Defined Segregation Mechanism
- Must Consider In-pipe Chemical Reaction, Heat Generation, Precipitation when such Wastes/Rinsing Water being mixed
- Normally, not Less then 9 Segregation streams,
  - General Metal Rinse
  - General Organic Rinse
  - Complex Metal Rinse
  - High Organic Rinse
  - NH<sub>4</sub> / Cyanide Rinse
  - Nickel Rinse Water
  - Acidic Waste
  - Alkaline Waste
  - Individual concentrated wastes



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## Waste Water Segregation Format (Sample)

- Vertical & Horizontal Desmear & PTH 垂直及水平之除膠渣及PTH

Unit	pH	Temp	Composition & Parameters				TDS	DO	Metal	COD	BOD	Diss. Chlor	Air	Sewer				Re-use	In		
			SS	Oil	Grease	Others								PH	Temp	DO	Flow				
Inlet	8.12	21.48	18.2(1)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	X
Canola Biom 1	8.12	21.48	18.2(1)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	X
Canola Biom 2	8.12	21.48	18.2(1)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	X
Wastewater	8.12	21.48	18.2(1)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	X
Oil Biom	8.12	21.48	18.2(1)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	X
Canola Biom 1	8.12	21.48	18.2(1)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	X
Canola Biom 2	8.12	21.48	18.2(1)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	X
Wastewater	8.12	21.48	18.2(1)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	X

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## Regulate Waste Water Inflow to Treatment systems

- Most Difficult to Control and Thus Create Most Problems Even With Well Designed WWTP
- Good Production Discharge Discipline
- Well Organize Process Maintenance Schedule
- Strong Management Involvement on Discharge Practice
- Buffer Storage Tanks with Dosing Devices for Concentrated Wastes
- Bigger Reception Tank

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## Safety Factors Consideration

- Projected Peak Waste Water Discharge Period
- Retention Time to Allow Unexpected System Failure
- Extra Treatment Capacity to Handle Non-Compliance Waste Water

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## Guarantee Discharge Compliance Devices

- Install On-line pH, Metal and COD Analyzers before Final Discharge Tank
- On-site Checking/Analysis on Critical Treatment Steps
- Non-compliance Waste Water route back to WWTP for Treatment
- PLC/DMS for Full Time and on-time Monitoring
- Alert System to Management Staff on System Failure Reporting
- Ensure Capable Human Resource being assigned to handle WWTP

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## Reasonable Capital and Operating Cost

- Professional Design System to Ensure Treatment Capability and Capacity but Without Unnecessary Wastages
- Mutual wastes treatment approach
- Employ Good Equipment and Instrument in Critical Steps and Acceptable Equipment in Non-critical Steps
- Appropriate Sizing to Avoid Over-sizing Design to Minimize Energy Consumptions
- Good Segregation can Minimize Operating Cost
- Consider Total Cost But not Unit Price
- Work with WWTP Operating Partner for Out-sourcing Services

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## Sample of WWTP



Wastewater collection tanks with leaking detection & containment



General Metal and COD treatment system



COD treatment - Fenton System



Spent waste Pre-treatment system



RO type water recycling system  
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COD treatment - Biological system

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**Q & A**

**Thank  
you!**

