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Wastewater Treatment in the Plating Industries

There are basically four options facing the galvanic industries today when considering wastewater treatment.

1. Chemical-physical treatment (without a vacuum evaporator)

a) *Water containing cyanide without chrome:* before the water can be discharged it has to undergo a treatment involving de-cyaniding, precipitation, decantation, neutralization and final filtration.
b) *Water containing chrome without cyanide:* before the water can be discharged it has to undergo a treatment of de-chromizing, precipitation, decantation, neutralisation and final filtration.

Problems:

i) The water cannot be re-used due to the high salt levels present which risk polluting the treatment baths and rinses.
ii) The raw materials present cannot be recovered.
iii) The large space required in the factory for such a treatment.

2. Chemical-physical treatment with insertion of a vacuum evaporator

The water coming out of the chemical-physical plant is sent to a vacuum evaporator. The pure distillate coming out of the evaporator is recovered and sent back to be used in the various rinses present on the galvanic line, while the concentrate of pollutants is sent away using a specialised disposal company.

Only the water is recovered and recycled. Problems remain regarding the space required and there is no recovery of the raw materials present. The vacuum evaporator inserted has to be very large to treat this volume of water.

3. Insertion of an Ionic exchange plant

This form of water treatment allows the water coming from the various rinses to be treated and recycled back into the production line, guaranteeing a better quality and quantity of water for the galvanic rinses. The eluates resulting from the process of re-generation of the ionic exchange system can be either taken away directly by a specialised company or sent to a much smaller chemical-physical treatment.

Advantages: 1) recovery of the water for recycling

2) constant guaranteed quality and quantity of water available for the rinsing operations.
3) reduction of operation costs regarding smaller chemical-physical wastewater treatment

4. Insertion of an evaporator for the treatment of the ionic exchange eluates.

An evaporator can be inserted after the smaller chemical-physical in order to allow total recovery of the water present and obtain zero discharge. This recovered water can be re-used from where it comes. It can also be discharged into the environment, with the guarantee that it respects all the environmental limits, but then scope of zero discharge is ignored.

Advantages: 1) total recovery and recycling of the water used in the plating process
2) constant guaranteed quality and quantity of water available for the rinsing operations.
3) using a evaporator we have a reduction of the volume of the ionic exchange eluates by about 20 times.

5. Insertion of a vacuum evaporator directly on the galvanic line.

The tendency in Europe nowadays is to design ”zero discharge” factories which allow total recovery both of the raw materials and of the process water. When a vacuum evaporator is placed directly onto a specific galvanic treatment bath it allows total recovery of the raw material used on that particular line, whether chrome, nickel, copper or zinc. With the savings in the purchase costs of the raw materials and the savings in the wastewater treatment itself, this allows a return of investment in a short period of time.

To note:

- The dragout from each treatment bath is essential to know to evaluate the capacity of the evaporator that can be inserted on the line.
- The economic return depends on the level of drag out from the treatment bath to the first rinsing tank: the higher the value, the sooner the purchase costs of the vacuum evaporator will be covered.